Shocks, individual risk attitude, and vulnerability to poverty among rural households in Thailand and Vietnam

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Abstract

We examine whether the experience of shocks influences individual risk attitude. We measure risk attitude via a simple survey item, compiled among more than 4,000 households in Thailand and Vietnam. The experience of adverse shocks, which is typical for poor and vulnerable households, is related to a higher degree of risk aversion, even when controlled for a large set of socio-demographic variables. Therefore, shocks perpetuate vulnerability to poverty via their effect on risk attitude. We extend this general finding to various categories of shocks and find differences between Thailand and Vietnam. This suggests that risk-coping strategies profit from case-specific design.

JEL-Classification: O12, D 81, R2

Keywords: Risk attitude, shocks, vulnerability, risk perception, behavior towards risk, Southeast Asia

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1 INTRODUCTION

Households who are vulnerable to poverty or chronically poor are subject to vicious cycles as has been often noted (e.g., Lipton, 1968; Dercon, 2009). One of the elements keeping these cycles ongoing may be relatively high risk aversion of poor households. High risk aversion can lead to an economic behavior generating relatively less income and thus increases the probability of poverty. Under such living conditions, however, people can hardly afford to accept higher risks as adverse outcomes would endanger proper survival (see Mosley & Verschoor, 2005). This is also the case in emerging market economies where chronic poverty has declined but transient poverty remains high especially for the rural population. What makes such vicious cycles ongoing?

We examine the possible impact that shocks may have on these cycles via changing risk attitude. The hypothesis is that shocks, which we define here always as unfavorable shocks, tend to increase risk aversion. We have three motivations to examine this relation: first, shocks occur frequently in rural areas and a major source of vulnerability to poverty (e.g., Hulme & Shepherd, 2003). Second, shocks and risk can have long-lasting negative effects on development (Dercon, 2004; Elbers et al., 2007). Third, living with shocks may be regarded as making decisions with "background risk" which is known to increase risk aversion (Eeckhoudt et al., 1996; Harrison et al., 2007; Herberich & List, 2012). Thus shocks do not just have negative direct effects but possibly also indirect amplifying effects via changing risk attitude. This amplifier would contribute to the persistence of vulnerability to poverty and missed opportunities.

Risk attitudes are crucial in understanding economic behavior. Accordingly, risk attitudes have been investigated in some detail, typically as an invariant personal characteristic. However, this invariance is not fully true as it has been noted for example in studies on vicious cycles. Even though the individual risk attitude has a clear person-specific root, it is also time-varying due to (changing) socio-demographic circumstances (Guiso & Paiella, 2008). Such living conditions are particularly volatile in developing countries and thus deserve careful attention. Several studies consider such conditions and their influence on risk attitude (e.g., Tanaka et al., 2010) but it seems fair to say that empirical coverage of possible important determinants could be more complete. Accordingly, our research contributes to filling this gap by examining the influence of a wide range of shocks on risk attitude among a relatively poor rural population. This analysis is missing so far to the best of our knowledge.

As the basis of our investigation we rely on a standard household survey being conducted in rural provinces of Northeast Thailand and Vietnam in 2010. This survey covers more than 2,000 households in each country and is representative for the rural population in these areas. The survey contains a standard

item revealing the risk attitude of respondents which has been used in many studies before (see Dohmen et al. (2011), Hardeweg et al. (2013), and references there). Due to the survey structure, the response towards this item can be easily related to other characteristics of participating individuals. We find the expected relationships between risk attitude and a few standard determinants, such that older people respond in a more risk averse way. Interestingly, this relation also holds for lower income respondents, supporting the notion of vicious cycles (such as Mosley & Verschoor, 2005) but providing evidence different from Binswanger (1980). These relations are similar in Thailand and Vietnam. Whereas this indicates an influence from household conditions (e.g., income) on risk attitude already, our main focus is on the living circumstances of vulnerable households, which we capture by examining the role of shocks on risk attitude.

The underlying data set is rich in its coverage of shocks because it is designed to analyze the vulnerability of relatively poor rural households in Northeast Thailand and Vietnam. We rely on detailed information which households give about shocks that have happened to them over the two years proceeding the survey. Due to the detailed reporting of shocks we can categorize shocks in various dimensions in order to examine which kind of shocks may be more relevant. In addition to just taking the number of shocks that a household was exposed to, we categorize shocks in four ways: (i) the kind of shocks happening, such as e.g. demographic or agricultural shocks, (ii) the impact of shocks, i.e. shocks with high impact vs. shocks with low or medium impact on the household (according to self-classification by households), (iii) idiosyncratic vs. covariate shocks, and (iv) the degree of expected vs. unexpected shocks.

It is our main result that we find a robust relation between adverse shocks and higher risk aversion. This mechanism contributes to the persistence of vulnerability. The relation is maintained with or without control variables and holds for both countries. In detail, regarding shock categories we receive four findings: first, shocks of all kinds occur but some areas are more important and this may differ between countries. Second, it is not just the number of shocks that matters but the number of high impact shocks. Third, with respect to idiosyncratic vs. covariate shocks, both kinds of shocks may be important, the former more in Vietnam, the latter more in Thailand. Fourth, and in line with theoretical reasoning, shocks which are more unexpected matter more.

In order to demonstrate the relevance of these determinants of risk attitude we show that our measure of risk attitude is meaningful in the sense that it can predict risk-related behavior to some degree. This relation provides the link between shocks and the often mentioned vicious cycles in development, because adverse shocks reduce risk-taking and the latter reduces expected outcomes etc. (e.g., Lipton, 1968; Dercon, 2008; Yesuf & Bluffstone, 2009). Moreover, the measures of risk attitude and shocks seem quite reliable: the survey measure of individual risk attitude is validated by an experiment revealing risk aversion. The

shocks can be substituted to some degree by subjectively perceived income volatility of the household. This measure should be and is indeed highly correlated with the occurrence of shocks. As a final note we would like to mention that we are restricted to a cross-sectional analysis here because the expectation of shocks and the risk experiment for Vietnam are only available for the wave conducted in 2010.

Our study fits into a line of studies examining risk attitudes in developing countries. Starting with the pioneering experimental work of Binswanger (1980, 1981), several authors have reproduced and extended the elicitation of risk aversion (e.g., Cardenas & Carpenter, 2008; Harrison et al., 2010). Our approach differs from anonymous experiments because it considers various socio-demographic control variables (Tanaka et al., 2010). There are a few studies where the relation between changing circumstances and risk attitude is analyzed, in particular Humphrey & Verschoor (2004) and Yesuf & Bluffstone (2009) who find that reduced wealth is related to more risk aversion. This is in line with evidence from advanced economies, such as Guiso & Paiella (2008) who find a role for declining wealth and uninsurable risk to generate higher risk aversion or Malmendier & Nagel (2011) who find that exposure to macroeconomic risk leads to less financial risk taking. Although these related studies clearly motivate our research, we are not aware of any study (in developing countries) where a broad set of shocks would be examined comprehensively in its relation to risk attitude.

The paper proceeds in the following steps: Section 2 introduces the data and describes risk attitudes. Section 3 informs about the households' perspective on shocks and provides several measures of shock classification. Determinants of risk attitudes and in particular the role of shocks in explaining risk attitudes are the focus in Section 4. Section 5 indicates the usefulness of risk attitude in predicting household decision making and provides some robustness tests, including an experimental validation of the survey item. Section 6 concludes.

2 DATA COLLECTION AND DESCRIPTIVE STATISTICS

This section summarizes the data collection process (Section 2 (a)), describes typical characteristics of rural households in Thailand and Vietnam (Section 2 (b)) and then describes the response to our survey item measure of risk attitude in both countries (Section 2 (c)).

(a) Data collection

The data set originates from the project "Impact of shocks on the vulnerability to poverty: Consequences for development of emerging Southeast Asian economies", funded by the German Research Foundation (FOR

756). Primary data was collected during a survey which was carried out in three provinces in the Northeast region of Thailand and three provinces across Vietnam between April and June 2010. The countries are deliberately chosen: they are similar to each other regarding their size and regarding their development level, in particular in rural areas (whereas the central region in Thailand stands out due to high income per capita). By contrast, the two countries have different cultural and institutional backgrounds. Thailand is a Buddhist country (more than 90% of the population) following largely traditional open market policies with limited state interference. Vietnam, however, is characterized by the absence of important religious groups (about 80% of the population say to be atheists) and by several decades of a conventional socialist planning economy. Although the economy has been somewhat liberalized during the last 20 years, state enterprizes and state interferences are still important and more important than in Thailand. Also political systems differ, e.g. democratic elections are de facto only conducted in Thailand. In each country three provinces are selected, namely Buri Ram, Ubon Ratchathani, Nakhon Phanom in Thailand and Ha Tinh, Thua Thien Hue, Dak Lak in Vietnam.

The household selection process follows a three-stage stratified sampling procedure where provinces are constituting strata and the primary sampling units (PSU) are sub-districts. Within each of the three provinces, we exclude the urban area around the provincial capital city and confine the sample to the remaining rural areas. Within these areas, sub-districts, in Vietnam communes, are randomly selected using population density weights. Within each sub-district, two villages are chosen at random, in which 10 households are randomly selected each. There are in total 4381 households from 440 villages in 220 sub-districts of the six provinces. Overall, the sampled households are representative for the rural areas in the six provinces.

The survey itself is a typical household survey, covering many areas of interest. These include rich information on household demographics, various aspects of social and economic behavior and in particular items addressing risk attitudes and risk behavior. We describe the information we need for our analysis in the following Section 2 (b) regarding the households and in Section 2 (c) regarding the risk attitude measure.

(b) Descriptive statistics of the household sample

Due to the relative poverty of Northeastern Thailand and the discrepancy compared to the booming region of Central Thailand, parts of the local workforce migrate into urban areas and in particular towards the economic center. This is reflected in the household characteristics (see Table 1). A description of all variables can be found in Table A.1. Respondents are on average 52 years old[1], are mostly women (share

of 60%), are below 1.60 meter tall and annual household income is on average about 9,000 PPP-US-Dollar. This translates into about 130 PPP-US-Dollar per person per month for the median income. Respondents experienced slightly more than five years of education in school because during their youth compulsory schooling was four years. The family situation is still traditional as people aged beyond 50 years will usually be grandparents, so that often three generations live in one household, in various combinations, however. 83% of respondents are married, which we expect as we aim for household heads a respondents of our household survey.

(Insert Table 1 here)

This table with descriptive statistics contains further variables which may need some more explanation. The variable "general risk attitude" is our survey item measuring risk attitude and is scaled from 0 to 10, representing decreasing risk aversion. Accordingly, the mean of 4.66 lies slightly towards the lower end of the scale, which indicates some degree of risk aversion on average. Regarding the behavior towards risk, 9% of respondents are self-employed which typically involves taking more risks than being employed. Due to the rural area under review their occupation is in most cases related to the agricultural sector. We observe another kind of risky behavior, i.e. buying lottery tickets. About half of the households participate in lottery gaming, spending on average about 45 PPP-US-Dollar per year.

The next variable "minimum acceptable offer" informs about the decisions participants make at a standard risk experiment which will be described in more detail in the robustness part of this paper. This experiment was conducted in one province only, which explains the lower number of observations. Finally, the variable "perceived income volatility" gives the subjective expectations of respondents on a scale from one to three, indicating low to high fluctuations. People seem to feel being heavily exposed to fluctuations, as they classify themselves at 1.77 on average. The high level of income insecurity is tentatively justified, as dramatic shocks occurred during the years 2008 to 2010 and incomes fluctuated indeed highly when compared to the experience of households in advanced economies.

In summary, sample characteristics in Thailand show traditional rural households in an emerging economy where some brain drain takes place and where vulnerability of living conditions is high. We now compare this to our sample from Vietnam.

The situation of Vietnamese rural households is somewhat different from the Thai households. The last column in Table 1 indicates mostly statistically significant differences between both samples. However, this result is more a statistical than an economically meaningful difference, driven by the large samples.

Nevertheless, there are some patterns which may be interesting for the understanding of differences in risk attitudes.

Regarding personal characteristics of respondents, Vietnamese are four years younger than Thai, are less often female (48%) and are slightly taller by about one centimeter. Measured in PPP-terms their household income is lower than in Thailand. Most important may be the better education level of Vietnamese as, on average, they have two years more schooling than their Thai counterparts. By contrast, the share of married respondents is similar to Thailand.

The degree of risk aversion in Vietnam is slightly higher than in Thailand as can be consistently seen from the means of "general risk attitude" and "minimum acceptable offer". The share of self-employed is similar to the one in Thailand, whereas lottery tickets play a very much smaller role. The latter holds for the purchase of lottery tickets as well as for the expenses made. Finally, Vietnamese respondents regard their expected income fluctuations lower than Thai respondents.

Overall, there are some differences between Thailand and Vietnam which justify to view the two samples as being independent from each other (i.e. both samples not being drawn from the same population). Thus, it is even more interesting to see whether and how characteristics found in both countries are related to risk attitudes.

(c) Risk attitudes in Thailand and Vietnam

The risk attitudes of respondents are surveyed by the simple question whether they are fully prepared to take risk or whether they avoid taking risk. The exact formulation is given in Figure 1 and follows the German Socio-Economic Panel Study (SOEP) which has been using this question (Dohmen et al., 2011). Respondents classify themselves on a scale between 0 and 10 so that category five represents the middle category. Due to the kind of question asked and due to the qualitative nature of the scale, the category with label five (middle category) does not represent risk-neutrality. However, it is obvious that the larger the number of an answer, i.e. the weaker the tendency towards avoiding risk, the lower this respondent's degree of risk aversion.

The description of all responses is shown in Figure 1, giving the distribution of responses to the 11 categories. The mass of responses is on the left hand side of the figure, indicating that people tend towards risk avoidance. This holds for Thailand and for Vietnam. The spikes in the histograms at the extreme values and at the middle category are expected for rating scales in general and show up here for both countries. However, the share of responses at category five for Thailand seems to be unusually high and deserves further attention in the later course of this research.

(Insert Figure 1 here)

When comparing the two distributions of the risk attitude for Thailand and Vietnam the two-sample Wilcoxon rank-sum test finds a significantly higher rank for Thailand than for Vietnam (z-value 6.401, p-value 0.000): on average Thais are less risk averse than Vietnamese.

3 SHOCKS IN THAILAND AND VIETNAM

We survey the past shock experience of each household. We implement a dual strategy to cover all shocks of the household. First, we ask the household about the three largest shocks in the last two years. This pull procedure enables us to detect the self-reported most important shocks without any restriction of the kind of shocks. Second, in a push strategy we ask the household for shocks in specific areas. This approach ensures that we collect shocks also in categories which are not in the focus of the household.[2] Overall, we are trustful to collect the full set of shocks which occurred to the household.

Due to this comprehensive information, we are able to provide various categorizations of shocks. Here, we focus on the total number of shocks, the areas in which shocks occur, the impact severity of shocks, idiosyncratic vs. covariate shocks and (un)expected shocks. Table 2 provides descriptive statistics about these shocks, separated for the main categories and by country.

(Insert Table 2 here)

(a) Kinds of shocks

The aggregate number of shocks within the past two years before our survey amounts in Thailand to 1.2 shocks on average. In Vietnam the total number of shocks is fairly higher with 1.9 shocks, which is significantly different from the figure in Thailand. The total number of shocks can be divided into demographic, social, agricultural, and economic shocks. For the sake of conciseness we analyze shocks on these four coarse categories which are build from even more detailed categories.[3] We summarize shocks of household members leaving or joining the household as demographic shocks. Social shocks is the aggregate of social life which occur to the household, e.g. ceremonies, law suits, remittances. As the majority of households is at least partly engaged in agricultural activities agricultural shocks account for most of the shocks which are reported by the households. Particularly in Vietnam more than half of the shocks are agricultural shocks. Only the economic shock category contains more shocks in Thailand than in Vietnam; whereas in Thailand 0.2 shocks occurred in the reference period Vietnamese households suffered only by half as many shocks (0.1).

(b) Shock impact

From our survey we also receive the information how respondents estimate the severity of the shock impact on their household. Answers are coded as: no, low, medium, or high impact. For both countries we observe that households perceive reported shocks mostly as high impact shocks. The finding may indicate that respondents recall shocks more often when the shocks are severe or the respondent perceives them as affecting the household particularly hard. For all categories but the category of no impact the average shock number is larger in Vietnam than in Thailand.

(c) Idiosyncratic vs. covariate shocks

To differentiate between idiosyncratic and covariate shocks we ask the respondent to estimate the impact of the particular household shock on others. Response categories are no other household, some other households, or most other households in village, district, province, or country. We code shocks of the first two categories as idiosyncratic shocks and the last four as covariate. In both countries answers resemble two thirds of shocks as being idiosyncratic and one third of all shocks as covariate shocks.

(d) Shock expectation and unexpected shocks

For the calculation of unexpected shocks we need two components. The number of actual shocks and an estimate of the expected number of shocks. The first is based on the information described above. For the latter we use some information from the previous wave of our household survey, in which we ask the household about the risks it is facing; these risks are restricted to adverse risks (as actual shocks are restricted to adverse events, too). For convenience we call these risks here "expected shocks" which are tabulated in the same categories as actual shocks.[4] A table of summary statistics of the shock expectations is given in the Appendix (Table A.3). Specifically, respondents are asked in 2008 to give their expectation of the number of shock occurrences in the next five years, i.e. until 2013. The number of expected shocks is surveyed as a ordinal variable with the categories, one, two, three, four, five and six or more shocks.

Most of the expected shock events are related to agricultural shocks, although there are also obvious differences between countries (see also Doss et al., 2008). Especially Vietnamese households seem to expect many shocks in this area. Storm and and flooding are expectedly Vietnamese specific risks, since the country is exposed to the sea and affected by e.g. typhoons while Thailand is more inland. Crop pests and droughts appear to be in both countries relatively pronounced. For Thai households also economic risks play a large role. This might stem from the fact that markets play a larger role and, possibly, that

in our sample Thais are more often engaged in non-agricultural business activities than Vietnamese. With respect to social and demographic risks money spent for ceremonies and illness of household members belong to the most frequently expected shocks.

To measure shock surprises we use two methodologies, computation via common differences of actual minus expected shocks and a regression approach.[5] The latter is used for robustness and is explained in the respective Section 5 (e).

For the difference approach we utilize simple differences between the number of actual shocks $NSHOCK$ of each household i in each category j and the number of expected shocks $NSHOCK^e$. We calculate the difference separately for each category as the number of shocks between different categories appears to be systematically different in size and nature. For example, the expected effects of a household member becoming ill once might be different than the occurrence of one drought in size and kind of impact.

$$\delta_{i,j} = NSHOCK_{i,j} - 2\frac{NSHOCK^e_{i,j}}{5} \tag{1}$$

The difference is the number of expected shocks (from the previous two years) minus the expectation, which was formed two years prior the survey date, of how many shocks would occur in the next five years. Thus, the two reference periods are not congruent but overlap by two years. That is why we derive from the expected number of shocks in the next five years the number of shocks which are expected in the next two years. We assume that the households form uniform expectations of shock occurrence over time and divide the expected number of shocks linearly by years, i.e. divide by five and multiply by two.

For the difference approach we observe means substantially different from zero as the approach does not adjust the differences to be unbiased on average. We would like to remark that the data format in which we survey expected shocks is not the number of expected shocks as such. As the number of expected shocks is given in categories of one, two, three, four, five, six or more shocks we need to assume a numeric value for the last and highest category. We take a value of six. Since the shock surprises, i.e. the differences, are in general rather negative taking an even higher value for the last expected shock category would imply to calculate even more negatively biased differences.

We calculate mean differences $USI(\delta)$ for each household i over shock category j for all categories M for which we have non-missing shock expectations of the household to form our unexpected shock index $USI(\delta)$[6]:

$$\forall i:\ USI(\delta) = \frac{\sum_{j=1}^{M} \widehat{\delta_{i,j}}}{M} \tag{2}$$

Thai respondents exhibit a negative total (-0.193) but are outreached by the Vietnamese mean of -0.217, which is statistically different from the other. The negative sign indicates that the number of actual shocks lies below the expected number of shocks. As discussed above the major reason might originate from the approach as the residuals are not adjusted to balance on average. In the robustness section we implement a second regression-based approach which is centered around zero (see Section 5 (e)).

4 DETERMINANTS OF RISK ATTITUDES IN THAILAND AND VIETNAM

In the following we analyze the determinants of general risk attitudes measured by the survey item described above. In three sections we introduce first our empirical approach (Section 4 (a)) which is succeeded by the analysis of the determinants of risk attitudes (Section 4 (b)). In a consecutive step we challenge the hypothesis of stable general risk attitudes in the presence of shocks and estimate the impact of our particular shock measures on risk attitude (Section 4 (c)).

(a) Empirical approach

In explaining the individual risk attitude we rely on a set of standard variables. These include demographic, socio-economic and subjective variables which are potential determinants of risk attitudes. Our baseline sample for general risk attitude consists of 2,068 observations in Thailand and 2,048 in Vietnam. In general, we estimate the two countries separately as we regard Vietnam as an out-of-sample case where we can test whether findings for Thailand are robust across countries.

For estimations we use interval regressions and bootstrapped standard errors to take care of the nature of data, characterized by interval scaling and by the non-normal distribution. We note that our results throughout do not depend on the particular econometric approach chosen but that we get qualitatively the same insights if we use ordinary least squares. Nevertheless, in order to address potential concerns regarding the kind of data, tables in this section rely on the methods described above if not stated otherwise.

(b) Determinants of risk attitudes

(i) Results for Thailand

We proceed with the regression approach in several steps. As a starting point, specification (1) in Table 3 uses just three potentially meaningful variables which can all be seen to a overwhelming degree as exogenous, i.e. the gender of respondents, their age and height (see Dohmen et al., 2011). We find that

older respondents are more risk averse than others, whereas gender and height do not play a significant role.

(Insert Table 3 here)

In a next step we examine relations between three further socio-economic variables and risk attitude. It is to be expected that higher income is related to more willingness to risk-taking, either because higher income provides some cushion against adverse outcomes or because a reverse channel plays a role, i.e. that people with higher willingness to take risk will end up with higher income. The second variable is education, where better education enables respondents to get higher income (see the earlier variable) and to be better able to get along with risk (e.g. by better understanding impact of risk, risk distribution or correlation etc.). Third, being married leads sometimes to more risk-averse behavior because these people feel also responsible for others, in particular children. However, another link of being married to risk attitude could be that the fact of a marriage provides an element of income and risk diversification which may allow accepting more risk. The empirical outcome is shown in specification (2), indicating that higher income and better education correlate with less risk aversion, whereas the positive coefficient sign for being married is statistically insignificant.

Due to the somewhat disputed relevance of income for risk attitude, we also plot this relation in Figure 2, i.e. without any control variables. The left-hand part of the figure shows the result for Thailand. It is obvious that individuals with higher values in risk attitude, i.e. larger willingness to take risk, have higher income (household income per capita).

(Insert Figure 2 here)

Finally, putting all variables in one regression leads to the result shown as specification (3): The determinants of age and income remain significant, whereas the variable education has a much smaller coefficient which turns statistically marginally significant. Overall, the explanatory power of the demographic and socio-economic variables considered here is quite limited for the case of Thailand. This result is to some degree in line with other studies which explicitly emphasize this outcome, such as Guiso & Paiella (2008). Nevertheless, we test below whether this may be related to some noise from respondents who are undecided or who possibly do not fully understand the design (see Section 5 (b) (i)).

The use of survey items in practical field work would profit from their "universal" appropriateness. As a simple test of the general usefulness of this item, we repeat the exercise from Thailand in another country, i.e. Vietnam. We confirm that the survey based measure of risk attitude is plausibly linked

to many correlates. In some contrast to Thailand, there exist more statistically significant relationships which may be partially due to the higher degree of individualism and thus less homogeneous responses in Thailand compared to Vietnam (see Carpenter et al., 2004).

(ii) Results for Vietnam

Starting with specification (4) in Table 3 parallel to specification (1) for Thailand, we get a result that is different from Thailand as age is insignificant whereas the effect from height is strong. The explanatory power of this first specification is as low as in Thailand.

When we analyze the three socio-economic variables in specification (5) we get qualitatively similar results to Thailand but coefficients are larger and the "married" variable becomes significant. Accordingly, explanatory power of this regression is comparatively good. Putting all variables into one regression, specification (6) shows that formerly significant variables keep their sign and significance with one remarkable exception, i.e. age. The age coefficient becomes significant but with an unexpected positive sign. Why should older people in Vietnam accept more risk, different from standard results and different from the parallel examination Thailand? There may be two explanations: first, the estimate might be weakly identified for age groups at the borders, i.e. very young and old respondents. Second, there may be an effect from the Vietnam war. We address this issue in the robustness section (see Section 5 (b) (ii)).

(c) Shocks and risk attitudes

This section reports our main results as we show how various categories of shocks influence risk attitude. In order to do so we analyze whether and in which way the consideration of shock experiences, as described in Section 3, contributes to explaining individual risk attitude. Basically, the respective shock item is added to the set of determinants of "general risk attitude" used before (see results in Table 3). We present results on the four categories of shocks introduced in Section 3, i.e. kinds of shocks, impact of shocks, idiosyncratic vs. covariate shocks and unexpected shocks.

(i) Kinds of shocks

Our first examination raises the question whether different kinds of shocks may have different influence on risk attitude. Thus, we rely on the classification described in Table 2, i.e. we distinguish between four kinds of shock where the most often occurring shock is mention in parenthesis: demographic (e.g. illness), social (e.g. ceremony), agricultural (e.g. drought) and economic shocks (e.g. price increase for inputs).

We find that adverse shocks, which covers all of the shocks in this paper, tend to increase risk aversion but only some kinds of shocks do this to a statistically significant degree. This applies in Thailand to agricultural shocks but in Vietnam to demographic shocks. It is a bit unclear why the coefficient sign on the relatively few economic shocks in Vietnam is positive.

(Insert Table 4 here)

(ii) Shock impact

Our second examination analysis whether the severity of shocks may have an impact on risk attitude. Therefore, we rely on respondents who classify the severity of shocks that happened to them as having no, low, medium, and high impact. Taking the descriptive statistics from Table 1 into consideration, the number of "no" and "low"-impact shocks is about 13% in total only, whereas about half of all shocks are considered as "high"-impact shocks. We find that coefficients on most shock categories do not have a significant coefficient if added to the standard determinants of individual risk attitude, which is shown in Table 5, Panel A for Thailand and Vietnam. The positive coefficient on low impact shocks in Vietnam is surprising but not really important due to the small number of observations in this category. In general, households tend to report only major shocks, i.e. with high shock impact, because smaller shocks are not perceived as such. If we focus on the high impact shocks, which represent the slight majority of all shocks mentioned in both countries, we find that the occurrence of these shocks has indeed a consistent negative coefficient which is borderline significant in Thailand and highly significant in Vietnam: the experience of adverse shocks tends to increase individual risk aversion. This finding is robust throughout various specifications including control variables which we show in Panel B.

(Insert Table 5 here)

In order to see whether each single high impact shock does indeed have the same marginal impact we provide a simple non-linear analysis in Panel C. Here we complement the linear term, i.e. the number of shocks, with a quadratic term, i.e. the squared number of shocks. As might be expected the quadratic term has a positive coefficient, indicating that there is a declining marginal impact of the number of shocks.

(iii) Idiosyncratic vs. covariate shocks

The following analysis explores whether it matters for the influence of shocks on risk attitude that they occur in an idiosyncratic or covariate way. We know from the descriptive statistics (Table 1) that idiosyncratic

shocks hit households about twice as often as covariate shocks and that this ratio applies to both countries, even though the self-stated number of shocks is higher in Vietnam than in Thailand. When we put both kinds of shocks into our standard regression framework we see in Table 6, Panel A, that results differ between Thailand and Vietnam. Whatever particular specification we choose, in Thailand the importance of covariate shocks dominates, whereas in Vietnam idiosyncratic shocks seem to matter much more. This difference cannot be due to differences in number of shocks. However, institutional circumstances differ between both countries: Thailand has a more market-oriented economy so that market shocks occur more often relative to other shock types (and in absolute numbers even more often than in Vietnam); moreover, they are less counterbalanced by state intervention. On the other hand, idiosyncratic shocks are very often health shocks which are largely covered by a very inexpensive public health system. In Vietnam, on the contrary, the state still regulates and dampens market fluctuations more than in Thailand, whereas effective health provisions are less reliable and accessible than in Thailand (see also Lechtenfeld, 2012).

(Insert Table 6 here)

(iv) Unexpected shocks

Theoretically we may expect that fulfilled expectations will lead less to changing behavior whereas surprises, i.e. unexpected events, may change behavior to a large degree. This is the logic behind our examination into the relevance of shocks which are less expected (than other shocks). Thereby, we rely on our measure of unexpected shocks which was introduced in Section 3 (d).

Panel B of Table 6 displays the results for the unexpected shock index. This method takes the simple difference between number of actual shocks and the expected number of shocks, which yields the number of unexpected shocks.[7] Obviously, this measure of unexplained shocks has the expected effect on risk attitude in Thailand and is robust to various controls. The coefficient is significant and ranges from -0.104 to -0.130. The Vietnamese results is even more pronounced, with significant coefficients of -0.294 and -0.271 for specification without and with controls.

(v) Overall

The comprehensive documentation of shocks occurring during a two-year period shows a clear relation between the experience of shocks and the individual risk attitude, controlled for a set of socio-demographic variables. As reverse causality does not seem to be very plausible in this setting, we conclude that shocks influence behavior towards risk. The detailed examination on the influence of four categories of shocks shows

four interesting and largely intuitively appealing results: (1) agricultural shocks influence risk attitude in Thailand most among four shock categories, whereas in Vietnam demographic shocks are most relevant. (2) High impact shocks influence risk attitude more clearly than lower impact shocks and there is a declining marginal effect from the number of shocks on risk attitude. (3) In Thailand covariate shocks matter more, whereas in Vietnam idiosyncratic shocks seem to be more important - this fits nicely to our result (1) and also to the institutional differences between both countries. It also supports the idea that the analysis of risk attitude profits from the availability of multiple samples. (4) The impact of unexpected shocks influences risk attitude stronger than the impact of expected shocks.

5 ROBUSTNESS

This section informs about several robustness examinations; they qualitatively support our findings. Particularly important in this respect is demonstrating that our survey item of risk attitude is relevant as it is able to explain real world behavior. We show this in Section 5 (a). Section 5 (b) informs about examinations into some potentially problematic characteristics of responses to the survey item. Section 5 (c) provides an experimental validation of the survey item, Section 5 (d) validates the shock measures, Section 5 (e) provides an alternative measure for unexpected shocks and Section 5 (f) informs about the consideration of assets as a control variable in understanding risk attitude.

(a) Risk behavior

After having described the similarities and differences between risk attitudes in Thailand and Vietnam we turn the focus to the predictive ability of the risk attitude measure for the respondents' risk behavior. Risk attitudes are shown to be a major determinant for decisions under risk (e.g. Dohmen et al., 2011). To test the predictive ability of the risk attitude measure in Thailand and Vietnam we correlate this measure with risk behavior of the respondents in three directions, i.e. the decision in an investment setting, about being self-employment, and about buying lottery tickets (see Hardeweg et al., 2013). For both countries risk attitude turns out to be a meaningful predictor of risk behavior, with results being more pronounced in Thailand than in Vietnam.

(i) Self-employment

Entrepreneurship is another prominent example of risk behavior (Drucker, 1970). Running a business incorporates the responsibility for decisions in a risky environment. Cash flows in business are not certain

and will typically fluctuate more than in a position as employee. We are aware that the decision for being self-employed and (lower) risk aversion are interrelated: willingness to take risk is an obvious precondition for becoming self-employed but possibly enforced self-employment may lead to lower risk aversion too - self-employment is a matter of supply and demand (Caliendo et al., 2009). Since we cannot clearly identify causality we interpret results conservatively as correlates.

We implement a probit model to estimate the correlation between risk attitude and the probability of being self-employed. Bootstrapped standard errors are used to account for non-normality. Table 7 Panel A displays the marginal effects at the mean observation. Risk attitudes are significantly related to self-employment. In terms of explained variance the evidence for Thailand is much stronger than for Vietnam. In the following we discuss the detailed results by country.

(Insert Table 7 here)

In Thailand risk attitudes alone explain about 3% of variance in self-employment. Raising risk lovingness by 1.1% increases the probability to be an entrepreneur by 1%. The effect is highly significant and robust for all specifications. Even when we use the full set of controls the marginal effect stays with 0.94% close to 1%. In the full specification (3) we explain about 11% of the variance. Overall this is an increase of about 50% compared to specification (1). We conclude that risk attitude is a major determinant of being self-employed.

For Vietnam we find similar results. Risk attitude is significantly correlated with self-employment, although less than in Thailand. Increasing risk attitude by 1% goes along with an increase in the probability of being self-employed by 0.85%. The effect remains the same when we include a few more controls. But with adding the full set of controls the effect drops to 0.66% and loses significance. Spoken in explained variance the importance of risk attitude is limited in Vietnam. Risk attitude alone explains 1.8% whereas the full set of explanatory variables accounts for 11%.

In summary, the survey item on the general risk attitude predicts the decision of being self-employed - if we accept this possible influence here (being aware of reverse causality) - to quite some extent. For Thailand, the relation between survey item and self-employment is consistently close through all specifications, for Vietnam this relation appears to be weaker.

(ii) Lottery purchase

Participation in lotteries is an obviously risky decision. Players spend money hoping for an uncertain lottery win despite a reasonable amount of money which is to put at stake upfront. Hence the purchase of

lottery tickets is seen as a social behavior which is a good indicator for a small degree of risk aversion. The relationship is studied in numerous works (see for an overview on state lotteries Clotfelter & Cook, 1990).

Our survey measures the purchase of lottery tickets for the total household, i.e. costs for lotteries are included in the total household budget. Thus, the link between the respondent and the purchase of tickets is not perfect as other members of the household may be responsible for this expenditure. Nevertheless, most respondents are the household head, who is defined as being responsible for the household expenditures. Even when the household head is not playing herself she will typically agree that part of the household income is spent for buying lottery tickets so that we expect a relation between respondents characteristics and lottery ticket purchase. Another concern often discussed in the context of rural household data is the lack of precision in data (Fisher et al., 2010). To give a conservative estimate of the effect of risk attitude on playing lotteries, we focus on the decision to buy lottery tickets. Additional examinations explaining expenditures for lottery tickets are given in the Panel C of Table 7) and are in support of the evidence presented here.

We estimate a probit regression of the effect of risk attitude on buying lottery tickets. Standard errors are bootstrapped and results are presented in Table 7 Panel B. Risk attitude is significantly correlated to lottery ticket purchase and is a major predictor in Thailand. This also holds when we use various sets of control variables as indicated by specifications (2) and (3) in Panel B of Table 7. Throughout these modifications the marginal effect remains remarkably stable; a marginal increase in risk attitude of one unit results in about 2.3% higher probability of buying a lottery ticket. With this features risk attitude turns out to be the dominant predictor for lottery expenditures in Thailand.

Whereas 55% of households in Thailand buy lottery tickets, this share is very low in Vietnam with 4% as other forms of risk gambles and bets prevail. Accordingly, the result for Vietnam is not strong: economically the coefficient on the general risk attitude variable is just one tenth of the Thai case which results in statistical insignificance. Also in terms of explained variance risk attitude can explain only a small fraction compared to the other controls. This observation is due to the small share of households purchasing lottery tickets in Vietnam.

In summary, the survey item on the general risk attitude predicts the decision of lottery ticket purchase surprisingly well, when we consider that we have to link individual risk attitudes with the behavior of various persons in a household. As in the earlier cases, it performs better for Thailand than for Vietnam.

(b) Examining artifacts with respect to the answers of the item on general risk attitude

In the following section we address two issues arising from the analysis of the survey item on general risk attitude. These are, first, the high share of middle category responses in Thailand (see Section 5 (b) (i)), and second, the unexpected effect of age on general risk attitude, see Section 5 (b) (ii).

(i) Median answers

In order to address the surprisingly high share of responses to the median category five at the survey risk item, i.e. more than 40% of responses (see Figure 1), we propose three different approaches. First, we hypothesize that responses to category five may represent undecided respondents which nevertheless give an answer. An answer at the median response category may serve as a face-saving strategy and may avoid an embarrassing situation where either respondents had to confess their undecidedness or where interviewers might not be able to address respondents' concerns adequately. If this hypothesis is true, we expect no distortion due to undecided respondents but rather an increase of noise. Thus, the regressions are repeated but respondents answering with category five are excluded from the sample. This reduces the new sample to 816 persons. Estimates are provided in Table A.6. The results largely confirm the former findings (Table 3) as all significant variables keep their sign, stay significant and no other variables become significant. It is revealing, however, that the R-squared of all regressions is about 50% higher, supporting the notion that undecided respondents increase noise. We conclude that the "category five respondents" indeed do not distort the structure of findings but contribute to more noise which supports the hypothesis of undecided respondents.

Second, we hypothesize that some respondents may have had problems fully understanding the meaning of this survey item and that they therefore answered with category five. This might distort our analysis if category five-respondents differ from others, e.g., in that these respondents actually have lower cognitive ability and a higher degree of risk aversion (Dohmen et al., 2010; Hsu et al., 2005) which is masked by their category five-responses. In order to test whether understanding may play a role in the choice of category five, we group our sample into three sub-samples according to respondents' degree of education. The results, which are displayed in Table A.7, show indeed that explained variance increases for the best educated group, indicating that answers of the less educated increase noise in the data. Reassuringly, however, the structure of the three regressions is qualitatively the same, i.e. the estimated coefficient signs remain stable.

Third, in order to understand possible motivations of category five-responses as comprehensive as

possible, we compare personal characteristics of respondents answering category five with other respondents (see Table A.8). Especially young and badly educated are likely to chose the middle category of the rating scale. This underlines the two earlier explanations that less decided younger and less educated respondents may choose category five and thus contribute to a noisy data.

Overall findings on the median responses indicate a limitation to the feasibility of the survey item but do not overrule the general conclusion that the survey item is reliable to illicit risk preferences. To be on the safe side, we have rerun all examinations on the predictive ability of risk attitudes for behavior towards risk (Section 5 (a)) by excluding the median category and get qualitatively unchanged results (Table A.9).

(ii) Age effect

To address the unexpected sign of the age effect we plot the relationship in Figure A.1. Age has a clear hump-shaped pattern with a peak for the 50 year old cohort. We link this pattern to the Vietnam War. People facing war times are subject to fundamental risks which seems to shift their calibration of riskiness so that they appear as more risk loving when compared to people without war experiences (Fearon, 1995).

Furthermore, it is meaningful that the age cohorts which are very young are not very well covered by the sample. This might introduce more noise to the data set. The graphical analysis of age and risk attitudes shows that for the cohorts aged 45 or older the traditional negative effect prevails.

(c) Experimental validation of risk attitudes

We validate the survey-based results on risk attitudes by an incentivized Holt & Laury-type experiment (Holt & Laury, 2002). The design of this experiment closely follows Dohmen et al. (2011) and several further studies which repeat this experiment with different groups and for various purposes. For example, Harrison et al. (2010) also use an experimental setup to elicit risk attitudes in developing countries, though with the different focus, i.e. testing expected utility theory. Basically, respondents make 20 decisions between a safe payoff and a lottery, where the lottery is unchanged but the safe payoff increases steadily from decision to decision.

In Thailand, for example, the safe payoff starts at zero Baht and increases by 20 Baht per decision, i.e. it goes up to 380 Baht, whereas the lottery is a 50% chance of winning 600 Baht, i.e. the expected value is 300 Baht. Due to this design and the ordering of choices, respondents will sooner or later start preferring a safe amount: most respondents start preferring the lottery with an expected value of 300 Baht against a safe payoff of 0, 20 or 40 Baht but will prefer a safe payoff of say 300 Baht or more compared to an

expected lottery value of 300 Baht. Accordingly, individual risk attitude is characterized by the specific decision where respondents start preferring the safe amount. In order to support consistent and reliable decision making, respondents are informed ex ante that one of the 20 decisions will be randomly selected and played afterwards with real money (more details in Hardeweg et al., 2013). The money at stake is quite high as an expected lottery value of 300 Baht is about a two day full salary for a "regular" worker in rural Northeast Thailand. Monetary incentives in Vietnam are also in local currency and are equal to Thailand regarding their incentive. Though Holt (1986) proofs that RLIM has feasible attributes.

(Insert Figure 3 here)

The histogram of minimum preferred safe payoffs, characterizing risk attitude, is shown for both countries in Figure 3. It becomes obvious that most responses tend towards the left and almost all are at or below row 16, i.e. in Thailand the safe amount of 300 Baht. That implies that most respondents are risk averse as expected, a few are risk neutral (at row 16) and only a share of about 14% in Thailand and 10% in Vietnam is risk loving. This outcome makes sense and fits to the outcomes of earlier studies. Perhaps striking is the large fraction of respondents who chose nil as a certain pay-off. We interpret this behavior as rational high risk-aversion which is due to the random lottery incentive mechanism.[8] However, we are interested in the relation of the survey item on risk attitude to this experiment. Therefore, it is reassuring that both measures are positively correlated. The Spearman rank correlation coefficient between both measures is 0.30 in Thailand and 0.14 in Vietnam. Both coefficients are significant at the 1% confidence level.

(Insert Table 8 here)

In order to examine the relation between the survey measure and the experimental measure on risk attitude in more detail, we use the survey item as right hand side variable in explaining the experiment outcome. In a first step, we just relate the two measures in the above used standard procedure of interval regressions and in further steps we add more control variables. As Panel A in Table 8 shows, the survey item of general risk attitude has a quite consistent explanatory power in determining the experimental outcome.

In Thailand, the respective coefficient is highly significant in specification (1), its size decreases a bit when adding more variables. Nevertheless, the result is consistent and largely significant. Outcomes in Vietnam are even clearer, as the coefficient is larger and is highly statistically significant through all specifications, too.

In summary, we conclude that the experiment tentatively validates the findings of the survey based measure.

(d) Validation of shock effect

To scrutinize the effect of shocks on general risk attitude we approach the research question from another direction. Vulnerability as a dynamic poverty concept is often defined as the likelihood to fall below a poverty line, which is commonly measured as a certain level of consumption (Klasen et al., 2012). Adverse shocks to household income and consumption play a crucial role in this probability. We approximate these adverse shocks in the following by employing the self-perceived income volatility of the household. Specifically, we ask how much does the household income fluctuate. Answers are coded on an ordinal scale of income fluctuations: not at all, a bit, or a lot.

The question validates our previous findings in two dimensions. First, it is highly correlated with all shock indicators. The correlation coefficients are all statistically highly significant and vary between 0.0642 for the number of covariate shocks and 0.1382 for the number of high impact shocks. Second, it is negatively correlated to risk attitude. Panel B in Table 8 shows the regression results analogous to the benchmark regressions without and with all controls. Both countries display the expected negative sign, which is only significant in Vietnam.

(e) Alternative unexpected shock index

Furthermore we stress the effect of unexpected shocks in a second approach to compute unexpected shocks. Instead of the difference approach we report here the results for the unexpected shocks measured via the regression approach. Eventually, the results remain qualitatively stable for the aggregate shock surprise index.

For the regression approach we regress the number of shocks $NSHOCK$ of each household i in each category j on a number of dummy variables of shock expectations $NSHOCK^e$, i.e. a dummy for one expected shock, two expected shocks, ..., six or more expected shocks) and a constant α. We run regressions separately for each category as the number of shocks between different categories appears to be systematically different in size and nature. The expected effects of a household member becoming ill once might be different than the occurrence of one drought in size and kind of impact.

$$NSHOCK_{i,j} = \alpha_j + \sum_{k=0}^{6} \beta_{j,k} NSHOCK^e_{i,j,k} + \varepsilon_{i,j} \tag{1}$$

The regression results are presented in Table A.5. From those regressions we obtain the predicted residuals $\hat{\varepsilon_{i,j}}$ as they represent the conditionally unexpected shocks in our survey for each category. In the further analysis we compute the mean of those predicted residuals over all categories for each household. We consider all categories M which for which we have non-missing shock expectations of the household. Eventually, this figure forms our unexpected shock index $USI(\varepsilon)$:

$$\forall i: \; USI(\varepsilon) = \frac{\sum_{j=1}^{M} \widehat{\varepsilon_{i,j}}}{M} \tag{2}$$

We note that by definition the mean over all households in each category is zero, because it is the mean of predicted residuals. Thus, the mean over all categories for each household might be close to zero but does not need to be identical because of differences in averaging. In Thailand the unexpected shock index is marginally less than zero (-0.009), whereas in Vietnam it is fairly larger than zero (0.012) (see Table 2. The difference of both means between the two countries is significantly different. It is notable that the Vietnamese index shows a higher standard deviation (0.067) than the Thai index (0.050). When we compare both approaches of measuring unexpected shocks, i.e. the difference and the regression approach, we find that they are significantly positively correlated. The correlation coefficients are about 0.37 for Thailand and 0.36 for Vietnam, which are highly significant.

The results for the regression results are displayed in Panel C of Table 6. The coefficients still appear to be negative as it is expected, i.e. the more unexpected shocks are which occur to a household, the smaller is the respondent's willingness to take risks. When compared to the results of Panel B for the difference approach the coefficient for Thailand even gains in size, which spurs higher significance. In Vietnam the coefficients decrease in absolute size and lose their significance.

(f) Income vs. asset effect

The literature often accounts for asset endowment of the household instead of household income, partly because asset may be easier available, partly because assets may be more stable over time and thus more appropriate in examining individual risk attitude. In our benchmark results in Table 3 we do not account for wealth but for income only as wealth and income are highly correlated.[9] In Panel C of Table 8 we substitute income by asset endowment. The results remain qualitatively the same with a positive sign for assets in all specifications. Significance is obtained in every case except for Thailand when controlling for other influences.

6 CONCLUSION

This research addresses a question of great importance for practical purposes in development research and policy: which are the possible drivers of poverty and vulnerability to poverty? We address this question by re-examining an "old" hypothesis of vicious cycles in development which focuses on limited risk taking of the poor. According to this argument, poorer households are forced to behave particularly risk averse which hinders them from taking opportunities with high expected returns and risks. An example is the adoption of new technology by peasants but this can be extended to all kinds of investments which is risky by nature, and can be generalized to all kinds of risky activities.

We have a new look at this long-standing hypothesis by, first, re-examining the relation by risk attitude and (vulnerability to) poverty. We find, different from some earlier literature (notably Binswanger, 1980) that the risk-related hypothesis of vicious cycles seems to be empirically valid. Second, and this is our main effort, we examine the possible influence of shocks on risk attitude. The consideration of shocks seems to be particularly important for vulnerable households who are subject to shocks. We find in this respect that adverse shocks clearly influence risk attitude in that they shift attitude towards more risk aversion. Therefore we conclude that shocks have a double influence: they have an undoubted direct negative effect on income and well-being (which we do not examine here) and this negative effect is amplified by their negative indirect influence on increased risk aversion. In sum, shocks tend to contribute to the persistence of poverty and vulnerability to poverty by their influence on risk attitude.

Our detailed documentation of shocks allows analyzing these shocks in various categories. This potentially helps to identify more precisely which shocks may be of particular importance and should thus be addressed by appropriate policy measures. We provide some general and case-specific insights: generally, the number of shocks matters, in particular high-impact shocks, although the marginal effect of additional shocks declines; moreover, a correct anticipation of shocks (what we call expected shocks) reduces the shock impact on risk attitude (in the cross-section). Case-specific lessons emerge from the comparison of Thailand and Vietnam: the most important shocks, measured by their influence on risk attitude, differ between both countries. In Thailand agricultural shocks matter more which are of covariate nature, whereas in Vietnam demographic shocks are more important which are of idiosyncratic character. This difference seems to reflect institutional differences as Thailand provides relatively better coping of (severe) health shocks but less so coping of market price fluctuations. Obviously, extensions to further periods or to further countries seem to be much needed.

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NOTES

1. We exclude respondents aged below 18 and above 80 to make sure they are capable to understand the questions. Due to this assumption of data cleaning the sample size decreases by 80 observations (about 2% of the sample).

2. In both approaches the household is able to name shocks which are not covered in the default category list of shocks.

3. More detailed shock categories are summarized in the Table A.2.

4. Expected shocks are not available for four categories: death of household member, supporting others, education, unable to pay back loan. Asking for the likelihood of the death of a beloved household member does not yield meaningful results as superstitious believes are widespread in Thailand and Vietnam. The other three categories had not been included in the standard list of shocks of the previous wave and were introduced as new items as they appeared to be meaningful and feasible in size.

5. Subjective shock expectations as ours can be used to make shock predictions (e.g., Lingon & Povel, 2012).

6. We standardize the index for comparison of the impact on risk attitude across shock surprise indicators.

7. Panel C reports on the alternative measure of the regression approach, which is discussed in the robustness section (see Section 5 (e)).

8. Cox et al. (2011) and others raise doubts on the validity of the random lottery incentive mechanism (RLIM) mechanism. This might be also one reason for the high share of nil as certain pay-off. Respondents believe already the RLIM as a game where they draw one number out of the bag which will eventually give them a reasonably high pay-off. So they opt for playing the game, but do not want to take more risks than those which are already involved in the RLIM (drawing the card to determine the pay-off game).

9. The correlation coefficient on our sample is 0.40 and 0.41 for Thailand and Vietnam respectively, which are both highly significant.

FIGURES

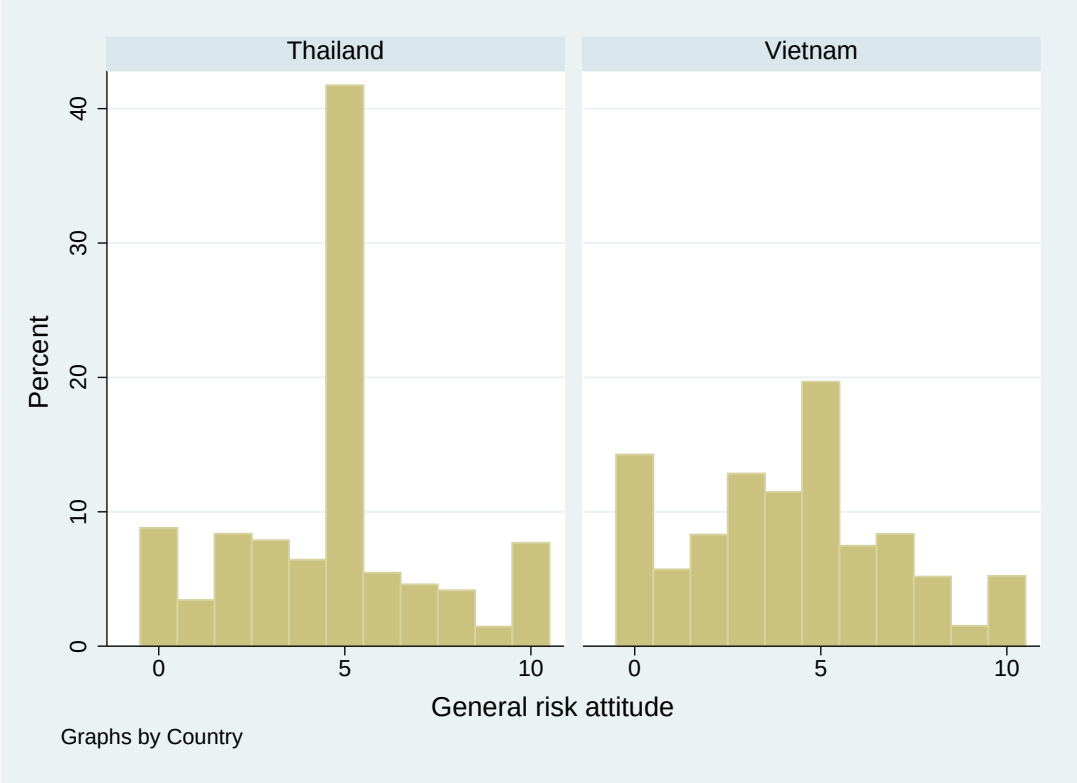

Figure 1: Histogram of general risk attitude by country

Note: General risk attitude is a survey item which asks the following question: "Are you generally a person who is fully prepared to take risks or do you try to avoid taking risk? (Please choose a number on a scale from 0 to 10)". The answer is given on a labeled scale, which ranges from 0 (unwilling to take risk) to 10 (fully prepared to take risks).

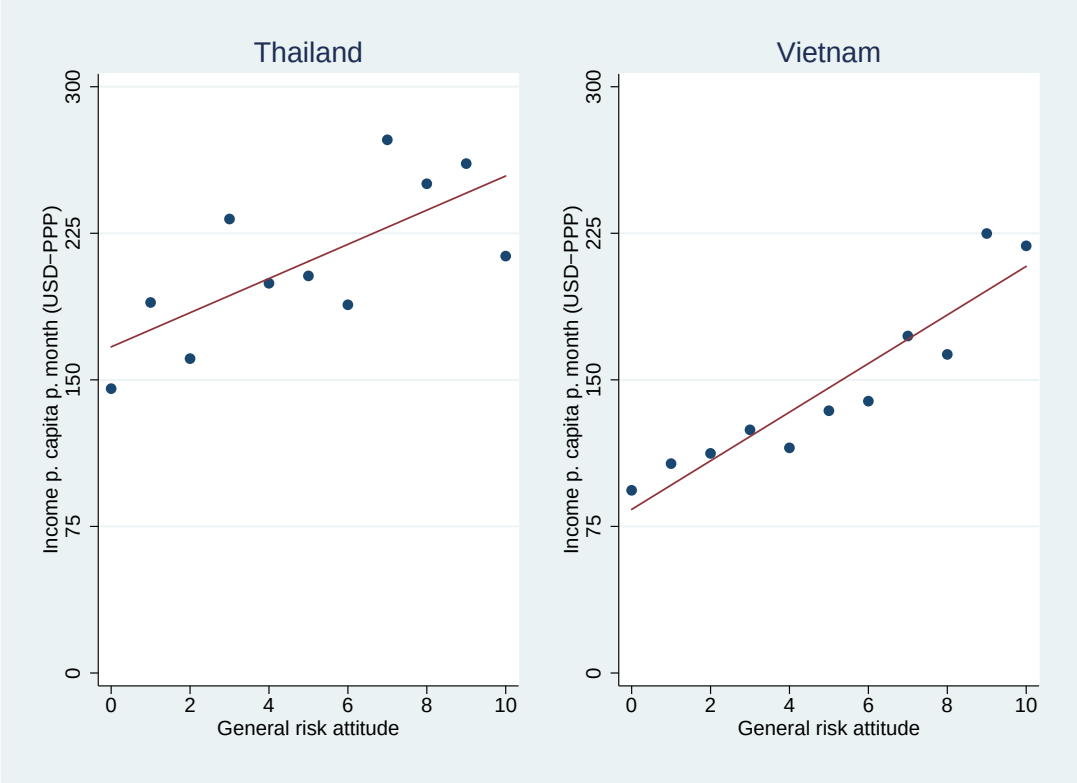

Figure 2: Relationship between income and risk attitude

Note: The figure displays the relationship of general risk attitude and income. General risk attitude is a survey item which asks the following question: "Are you generally a person who is fully prepared to take risks or do you try to avoid taking risk? (Please choose a number on a scale from 0 to 10)". The answer is given on a labeled scale, which ranges from 0 (unwilling to take risk) to 10 (fully prepared to take risks).

Figure 3: Histogram of minimum acceptable offer by country

Note: We elicit risk preferences in a field experiment. Details for the experimental design are discussed in Section 5 (c).

TABLES

Table 1: Descriptive statistics of variables by country

	Thailand					Vietnam					
Variable	Obs	Mean	Std. Dev.	Min	Max	Obs	Mean	Std. Dev.	Min	Max	Difference
Female†	2068	0.595	0.491	0	1	2048	0.490	0.500	0	1	0.000***
Age (years)	2068	52.122	12.504	18	80	2048	47.737	13.177	18	80	0.0000***
Height (meters)	2068	1.584	0.080	1.06	1.85	2048	1.579	0.073	1.05	1.85	0.0710*
Income (1000 USD-PPP)	2068	9.080	16.506	-147	512	2048	5.941	7.597	-85	145	0.0000***
Assets (1000 USD-PPP)	2066	5.710	9.582	0	91	2046	1.932	3.552	0	95	0.0000***
Education (years)	1994	5.377	2.705	1	17	1843	7.398	2.955	1	17	0.0000***
Married†	2068	0.829	0.376	0	1	2048	0.852	0.356	0	1	0.055*
General risk attitude	2068	4.663	2.557	0	10	2048	4.157	2.751	0	10	0.0000***
Minimum acceptable offer	896	9.259	6.158	1	21	687	8.373	5.386	1	21	0.0320**
Self-employment†	2064	0.091	0.287	0	1	2042	0.100	0.300	0	1	0.313
Lottery buyer†	1875	0.548	0.498	0	1	2044	0.040	0.196	0	1	0.000***
Lottery expenditures (USD-PPP)	1875	45.311	70.039	0	276	2044	1.526	13.526	0	283.8	0.0000***
Perceived income volatility	2068	1.776	0.657	1	3	2044	1.519	0.582	1	3	0.0000***

Note: The table presents summary and inference statistics by country. Dummy variables are denoted by †. We test for differences in the mean of both countries with Fisher's exact test, Wilcoxon rank-sum test, or a t-test. Respective p-values are presented in the last column. Level of significance is denoted by * (≤10%), **(≤5%), ***(≤1%). The definition of variables is discussed in Table A.1.

Table 2: Descriptive statistics of shock categories by country

	Thailand					Vietnam					
Variable	Obs	Mean	Std. Dev.	Min	Max	Obs	Mean	Std. Dev.	Min	Max	Difference
Number of shocks	2068	1.235	1.369	0	9	2048	1.876	1.594	0	10	0.0000***
Number of shocks (demographic)	2068	0.261	0.494	0	4	2048	0.409	0.626	0	5	0.0000***
Number of shocks (social)	2068	0.235	0.510	0	3	2048	0.337	0.603	0	4	0.0000***
Number of shocks (agricultural)	2068	0.535	0.808	0	5	2048	1.010	1.068	0	6	0.0000***
Number of shocks (economic)	2068	0.205	0.498	0	4	2048	0.121	0.400	0	3	0.0000***
Number of no impact shocks	2068	0.033	0.188	0	2	2048	0.008	0.091	0	1	0.0000***
Number of low impact shocks	2068	0.094	0.342	0	3	2048	0.135	0.420	0	4	0.0006***
Number of medium impact shocks	2068	0.439	0.818	0	6	2048	0.770	0.992	0	6	0.0000***
Number of high impact shocks	2068	0.669	1.012	0	6	2048	0.957	1.156	0	8	0.0000***
Number of idiosyncratic shocks	2068	0.802	1.079	0	8	2048	1.237	1.201	0	6	0.0000***
Number of covariate shocks	2068	0.428	0.844	0	7	2048	0.633	0.960	0	7	0.0000***
Unexpected shock index (mean of residuals)	2068	-0.009	0.050	-0.079	0.282	2048	0.012	0.067	-0.104	0.772	0.0000***
Unexpected shock index (mean of differences)	2068	-0.193	0.174	-1.244	0.296	2048	-0.217	0.168	-1.044	0.222	0.0000***

Note: The table summarizes the number of shocks that have been occurred between 2008 and 2010. Shocks are categorized according to kind of shocks, impact size, idiosyncratic vs. covariate, and expected vs. unexpected shocks. Differences across both countries are tested by t-tests, the last column reports the respective p-values. Level of significance is denoted by * ($\leq$10%), **($\leq$5%), ***($\leq$1%).

Table 3: Determinants of general risk attitude

	Thailand			Vietnam		
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)
Female†	-0.216		-0.199	-0.0942		0.0439
	(0.139)		(0.139)	(0.146)		(0.160)
Age (years)	-0.0233***		-0.0197***	0.000449		0.0110**
	(0.00462)		(0.00567)	(0.00464)		(0.00500)
Height (meters)	1.088		0.876	4.733***		2.233**
	(0.930)		(0.892)	(1.047)		(1.124)
Income (1000 USD-PPP)		0.00950***	0.00957***		0.0462***	0.0444***
		(0.00341)	(0.00343)		(0.0122)	(0.0120)
Education (years)		0.0821***	0.0422*		0.138***	0.137***
		(0.0215)	(0.0244)		(0.0217)	(0.0220)
Married†		0.176	0.00751		0.910***	0.879***
		(0.158)	(0.163)		(0.187)	(0.193)
Constant	4.785***	4.508***	4.616***	-2.794	2.714***	-1.322
	(1.570)	(0.189)	(1.526)	(1.745)	(0.235)	(1.841)
lnsigma	0.924***	0.924***	0.920***	0.997***	0.972***	0.969***
	(0.0160)	(0.0160)	(0.0160)	(0.0141)	(0.0146)	(0.0146)
Observations	2,068	1,994	1,994	2,048	1,843	1,843
McKelvey & Zavoina's R^2	0.0159	0.0142	0.0228	0.0189	0.0612	0.0666

Note: Interval regression of general risk attitude. Smaller values of general risk attitude correspond with a larger degree of risk aversion. Dummy variables are denoted by †. Standard errors are bootstrapped and reported in parenthesis. Level of significance is denoted by * (≤10%), **(≤5%), ***(≤1%).

Table 4: Determinants of general risk attitude and number of shocks in coarse classification

	Thailand		Vietnam	
	(1)	(2)	(3)	(4)
Panel A: Demographic shocks				
Number of shocks (demographic)	0.0523	0.0620	-0.561***	-0.544***
	(0.113)	(0.110)	(0.0916)	(0.0919)
Controls	No	Yes	No	Yes
Constant	Yes	Yes	Yes	Yes
Observations	2,068	1,994	2,048	1,843
McKelvey & Zavoina's R^2	0.000104	0.0229	0.0165	0.0822
Panel B: Social shocks				
Number of shocks (social)	0.0289	-0.0193	0.119	0.0210
	(0.110)	(0.113)	(0.0980)	(0.0987)
Controls	No	Yes	No	Yes
Constant	Yes	Yes	Yes	Yes
Observations	2,068	1,994	2,048	1,843
McKelvey & Zavoina's R^2	3.38e-05	0.0228	0.000691	0.0666
Panel C: Agricultural shocks				
Number of shocks (agricultural)	-0.253***	-0.257***	-0.0695	-0.0293
	(0.0692)	(0.0726)	(0.0558)	(0.0576)
Controls	No	Yes	No	Yes
Constant	Yes	Yes	Yes	Yes
Observations	2,068	1,994	2,048	1,843
McKelvey & Zavoina's R^2	0.00649	0.0295	0.000737	0.0667
Panel D: Economic shocks				
Number of shocks (economic)	-0.0883	-0.165	0.496***	0.274**
	(0.132)	(0.136)	(0.131)	(0.135)
Controls	No	Yes	No	Yes
Constant	Yes	Yes	Yes	Yes
Observations	2,068	1,994	2,048	1,843
McKelvey & Zavoina's R^2	0.000300	0.0238	0.00525	0.0683

Note: Interval regression of general risk attitude. Smaller values of general risk attitude correspond with a larger degree of risk aversion. Controls include variables for female, age, height, income, education, and married. Standard errors are bootstrapped and reported in parenthesis. Level of significance is denoted by * ($\leq$10%), **($\leq$5%), ***($\leq$1%).

Table 5: Determinants of general risk attitude and number of high impact shocks

	Thailand				Vietnam			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel A: Shocks of different impact size								
Number of no impact shocks	-0.190			-0.151	-0.514			-0.656
	(0.294)			(0.290)	(0.627)			(0.632)
Number of low impact shocks		-0.185		-0.170		0.545***		0.512***
		(0.176)		(0.176)		(0.131)		(0.132)
Number of medium impact shocks			-0.0654	-0.0638			0.0829	0.0555
			(0.0722)	(0.0717)			(0.0566)	(0.0559)
Number of high impact shocks				-0.0925				-0.253***
				(0.0580)				(0.0548)
Controls	No	No	No	No	No	No	No	No
Constant	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2,068	2,068	2,068	2,068	2,048	2,048	2,048	2,048
McKelvey & Zavoina's R^2	0.000196	0.000620	0.000443	0.00252	0.000291	0.00700	0.000903	0.0194
Panel B: High impact shocks								
Number of high impact shocks	-0.0928	-0.0998*	-0.0901	-0.0995*	-0.262***	-0.244***	-0.231***	-0.224***
	(0.0580)	(0.0575)	(0.0587)	(0.0581)	(0.0551)	(0.0548)	(0.0546)	(0.0544)
Controls I: Demographic	No	Yes	No	Yes	No	Yes	No	Yes
Controls II: Social	No	No	Yes	Yes	No	No	Yes	Yes
Constant	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2,068	2,068	1,994	1,994	2,048	2,048	1,843	1,843
McKelvey & Zavoina's R^2	0.00137	0.0175	0.0155	0.0243	0.0122	0.0294	0.0707	0.0755
Panel C: Non-linear effect of high impact shocks								
Number of high impact shocks	-0.342**	-0.327**	-0.347**	-0.343**	-0.655***	-0.652***	-0.578***	-0.573***
	(0.139)	(0.139)	(0.142)	(0.141)	(0.112)	(0.112)	(0.110)	(0.110)
Number of high impact shocks (squared)	0.0805*	0.0735*	0.0823**	0.0780*	0.110***	0.114***	0.0958***	0.0965***
	(0.0412)	(0.0406)	(0.0414)	(0.0408)	(0.0263)	(0.0264)	(0.0264)	(0.0264)
Controls I: Demographic	No	Yes	No	Yes	No	Yes	No	Yes
Controls II: Social	No	No	Yes	Yes	No	No	Yes	Yes
Constant	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2,068	2,068	1,994	1,994	2,048	2,048	1,843	1,843
McKelvey & Zavoina's R^2	0.00350	0.0193	0.0178	0.0264	0.0193	0.0371	0.0763	0.0812

Note: Interval regression of general risk attitude. Smaller values of general risk attitude correspond with a larger degree of risk aversion. Controls include variables for demographic characteristics (female, age, height) and social attributes (income, education, and married). Standard errors are bootstrapped and reported in parenthesis. Level of significance is denoted by * ($\leq$10%), **($\leq$5%), ***($\leq$1%).

Table 6: Determinants of general risk attitude and various kinds of shocks

	Thailand		Vietnam	
	(1)	(2)	(3)	(4)
Panel A: Idiosynratic vs. covariate shocks				
Number of idiosyncratic shocks (std.)	-0.0484	-0.0654	-0.177***	-0.198***
	(0.0674)	(0.0739)	(0.0585)	(0.0498)
Number of covariate shocks (std.)	-0.155***	-0.173***	0.0541	0.0619
	(0.0597)	(0.0651)	(0.0504)	(0.0529)
Controls	No	Yes	No	Yes
Constant	Yes	Yes	Yes	Yes
Observations	2,068	1,994	2,048	1,843
McKelvey & Zavoina's R^2	0.00355	0.0274	0.00476	0.0725
Panel B: Unexpected shock index (difference approach)				
Unexpected shock index differences (std.)	-0.130**	-0.104*	-0.294***	-0.271***
	(0.0572)	(0.0543)	(0.0620)	(0.0644)
Controls	No	Yes	No	Yes
Constant	Yes	Yes	Yes	Yes
Observations	2,068	1,994	2,048	1,843
McKelvey & Zavoina's R^2	0.00268	0.0245	0.0111	0.0762
Panel C: Unexpected shock index (regression approach)				
Unexpected shock index residuals (std.)	-0.161**	-0.186**	-0.0744	-0.0754
	(0.0700)	(0.0729)	(0.0502)	(0.0502)
Controls	No	Yes	No	Yes
Constant	Yes	Yes	Yes	Yes
Observations	2,068	1,994	2,048	1,843
McKelvey & Zavoina's R^2	0.00286	0.0266	0.000925	0.0676

Note: Interval regression of general risk attitude. Smaller values of general risk attitude correspond with a larger degree of risk aversion. Various kind of shocks include idiosyncratic/covariate shocks as well as unexpected shocks which are measured by the regression and the difference approach. Controls include variables for female, age, height, income, education, and married. Standard errors are bootstrapped and reported in parenthesis. Level of significance is denoted by * ($\leq$10%), **($\leq$5%), ***($\leq$1%).

Table 7: General risk attitude and risk behavior

	Thailand		Vietnam	
	(1)	(2)	(3)	(4)
	Panel A: Self-employment			
General risk attitude	0.0112***	0.00942***	0.00848***	0.00660**
	(0.00228)	(0.00230)	(0.00247)	(0.00273)
Controls	No	Yes	No	Yes
Constant	Yes	Yes	Yes	Yes
Observations	2,064	1,990	2,042	1,837
McKelvey & Zavoina's R^2	0.0317	0.113	0.0179	0.108
	Panel B: Lottery buyer			
General risk attitude	0.0237***	0.0192***	0.00379***	0.00262*
	(0.00461)	(0.00475)	(0.00139)	(0.00153)
Controls	No	Yes	No	Yes
Constant	Yes	Yes	Yes	Yes
Observations	1,875	1,804	2,044	1,840
McKelvey & Zavoina's R^2	0.0228	0.0414	0.0150	0.0402
	Panel C: Lottery expenditures			
General risk attitude	3.767***	3.301***	0.363***	0.272**
	(0.613)	(0.635)	(0.124)	(0.120)
Controls	No	Yes	No	Yes
Constant	Yes	Yes	Yes	Yes
Observations	1,875	1,804	2,044	1,840
Adjusted R-squared	0.018	0.024	0.005	0.005

Note: The table displays regression models of risk behavior, i.e. our left handside variable in Panel A is self-employment, in Panel B lottery buyer, and in Panel C lottery expenditure. The former two are dummy variables and are estimated by probit and marginal effects are displayed. The latter is estimated by least squares. We analyze the predictive power of the survey item of general risk attitude in explaining these examples of risky decisions. Smaller values of general risk attitude correspond with a larger degree of risk aversion. Controls include variables for female, age, height, income, education, and married. Standard errors are bootstrapped and reported in parenthesis. Level of significance is denoted by * ($\leq$10%), **($\leq$5%), ***($\leq$1%).

Table 8: Determinants of minimum acceptable offer, effect of perceived income volatility as well as asset endowment

	Thailand		Vietnam	
	(1)	(2)	(3)	(4)
Panel A: Minimum acceptable offer				
General risk attitude	0.269***	0.213***	0.518***	0.355***
	(0.0795)	(0.0811)	(0.0830)	(0.0925)
Controls	No	Yes	No	Yes
Constant	Yes	Yes	Yes	Yes
Observations	896	878	687	607
McKelvey & Zavoina's R^2	0.0124	0.0288	0.0684	0.0858
Panel B: Perceived income volatility				
Perceived income volatility	-0.0405	-0.0649	-1.377***	-1.137***
	(0.0892)	(0.0856)	(0.0978)	(0.113)
Controls	No	Yes	No	Yes
Constant	Yes	Yes	Yes	Yes
Observations	2,068	1,994	2,044	1,841
McKelvey & Zavoina's R^2	0.000110	0.0230	0.0860	0.119
Panel C: Asset endowment				
Assets USD-PPP (ln)	0.108**	0.0436	0.787***	0.625***
	(0.0431)	(0.0431)	(0.0439)	(0.0529)
Other controls	No	Yes	No	Yes
Constant	Yes	Yes	Yes	Yes
Observations	2,065	1,991	2,046	1,842
McKelvey & Zavoina's R^2	0.00327	0.0188	0.119	0.112

Note: In Panel A we run an interval regression of minimum acceptable offer (mao). Larger values of mao correspond to higher levels of risk lovingness. Panel B displays the effect of an alternative shock measure, namely perceived income volatility. In Panel C we analyze the effect of asset endowment on general risk attitude and replace income by asset endowment in the set of control variables. Controls include variables for female, age, height, income, education, and married. For Panel C income is replaced by asset endowment. Standard errors are bootstrapped and reported in parenthesis. Level of significance is denoted by * ($\leq$10%), **($\leq$5%), ***($\leq$1%).

Appendix

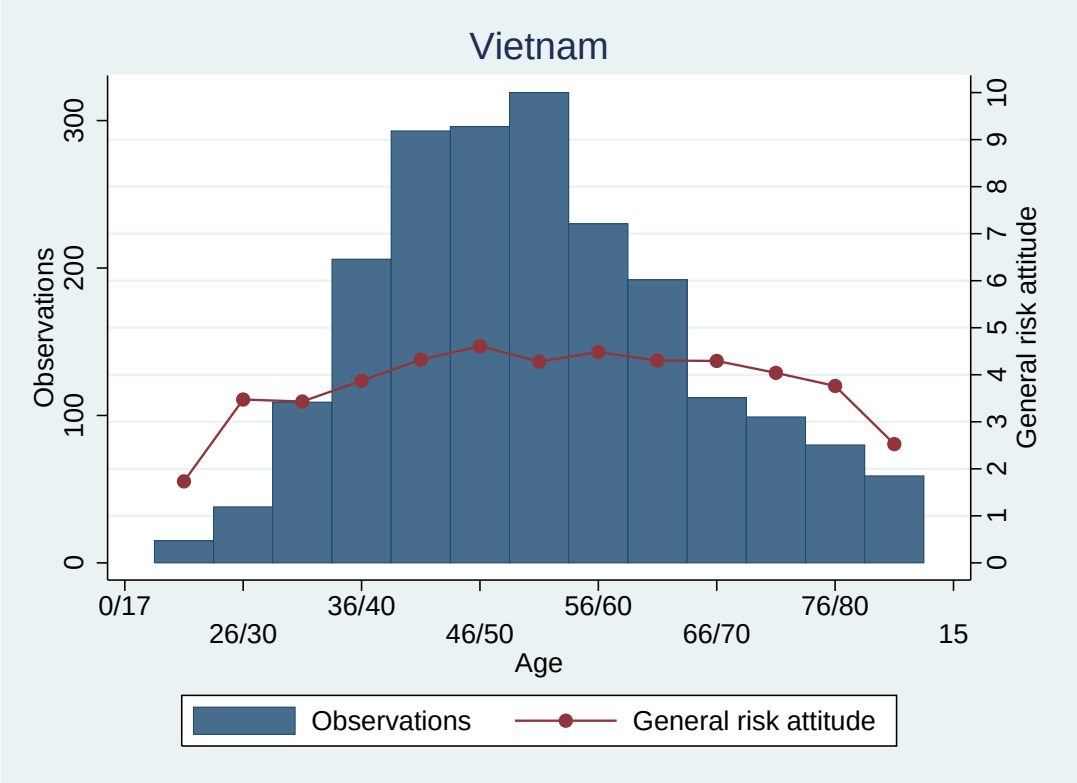

Figure A.1: Histogram of general risk attitude and age in VN

Note: General risk attitude is a survey item which asks the following question: "Are you generally a person who is fully prepared to take risks or do you try to avoid taking risk? (Please choose a number on a scale from 0 to 10)". The answer is given on a labeled scale, which ranges from 0 (unwilling to take risk) to 10 (fully prepared to take risks).

Table A.1: Variable description

Variable	Description
Female	Dummy variable for females. Takes the value 1 for females and 0 elsewise.
Age	Age in years.
Height	Height in meters.
Income	Total net household income in the perdiod from May, 2009 to April, 2010, including net earnings from farming, business, farm and off-farm employment, lending, saving, remittances and public transfers.
Assets	Total sum of all durable household goods, such as tractors, pushcarts, etc. Assets are net value, i.e. current market price for the particular piece.
Education	Education in years.
Married	Dummy variable for being married. Takes the value 1 for married and 0 elsewise.
General risk attitude	General risk attitude is a survey item which asks the respondent "Are you generally a person who is fully prepared to take risks or do you avoid taking risks? Please choose a number on a scale from 0 (unwilling to take risk) to 10 (fully prepared to take risks)"
Minimum acceptable offer	Minimum acceptable offer refers to the chosen offer in a Holt & Laury-type experiment (Holt & Laury, 2002). Respondents choose between a risky and a certain pay-off in 20 setups. The smallest certain payoff which is preferred to playing the lottery is called minimum acceptable offer. I.e. larger values correspond to more risk lovingness. Here the outcome x_i corresponds to the n-th certain offer.
Self-employment	Dummy variable for being self-employed. Takes the value 1 for self-employed and 0 elsewise.
Lottery buyer	Dummy variable for living in a household which buys lottery tickets. Takes the value 1 for buying and 0 elsewise.
Lottery expenditures	Total amount of household expenses for lotteries in USD between May 2009 and April 2010
Shocks	The variable covers all shock events in the last two years. We use a dual strategy to cover all shocks of the household: (i) We ask the household about the three largest shocks in the last two years; (ii) in a push strategy we ask the household for shocks in specific areas.
Expected shocks	Information from the previous wave of our household survey about the household's shock expectation in each of given shock categories. Specifically, respondents are asked to give their expectation of the number of shock occurrences in the following 5 years. The number of expected shocks is surveyed as a ordinal variable with the categories, 0, 1, 2, 3, 4, 5, and 6 or more shocks.
Unexpected shock index (difference approach)	Simple differences between the number of actual shocks and the number of expected shocks. $\delta_{i,j} = NSHOCK_{i,j} - 2\frac{NSHOCK^e_{i,j}}{5}$. Mean differences for each household i over shock category j form the unexpected shock index $USI(\delta)$: $\forall i:\ USI(\delta) = \frac{\sum_{j=1}^{M} \widehat{\delta_{i,j}}}{M}$.
Unexpected shock index (regression approach)	Unexpected shocks are predicted residuals $\hat{\varepsilon_{i,j}}$ from a regression of shock expectation: $NSHOCK_{i,j} = \alpha_j + \sum_{k=0}^{6} \beta_{j,k} NSHOCK^e_{i,j,k} + \varepsilon_{i,j}$. These residuals represent the conditionally unexpected shocks in our survey for each category. The unexpected shock index is defined as average over all categories $USI(\varepsilon)$: $\forall i:\ USI(\varepsilon) = \frac{\sum_{j=1}^{M} \widehat{\varepsilon_{i,j}}}{M}$.
Perceived income volatility	Perceived degree to which income fluctuates. Answers are coded on an ordinal scale whether income fluctuates "not at all", "a bit", or "a lot".

Table A.2: Detailed shock categories by country

	Thailand					Vietnam					
	Obs	Mean	Std. Dev.	Min	Max	Obs	Mean	Std. Dev.	Min	Max	Difference
Number of shocks (demographic)	2068	0.261	0.494	0	4	2048	0.409	0.626	0	5	0.0000***
Number of shocks (death of household member)	2068	0.044	0.207	0	2	2048	0.041	0.207	0	2	0.5905
Number of shocks (household member left the household)	2068	0.020	0.141	0	1	2048	0.024	0.156	0	2	0.4354
Number of shocks (illness of household member)	2068	0.183	0.405	0	3	2048	0.332	0.534	0	3	0.0000***
Number of shocks (person joined the household)	2068	0.014	0.116	0	1	2048	0.012	0.110	0	1	0.7047
Number of shocks (social)	2068	0.235	0.510	0	3	2048	0.337	0.603	0	4	0.0000***
Number of shocks (accident)	2068	0.083	0.295	0	3	2048	0.082	0.289	0	3	0.8580
Number of shocks (conflict with neighbours in the village)	2068	0.009	0.100	0	2	2048	0.006	0.076	0	1	0.2316
Number of shocks (education)	2068	0.001	0.038	0	1	2048	0.002	0.049	0	1	0.4707
Number of shocks (HH was cheated)	2068	0.015	0.120	0	1	2048	0.021	0.158	0	3	0.1099
Number of shocks (household Damage)	2068	0.014	0.122	0	2	2048	0.053	0.229	0	2	0.0000***
Number of shocks (law suit)	2068	0.016	0.131	0	2	2048	0.004	0.062	0	1	0.0001***
Number of shocks (money spent for ceremony in the household)	2068	0.072	0.262	0	2	2048	0.102	0.324	0	3	0.0011***
Number of shocks (relatives/friends stopped sending money)	2068	0.005	0.073	0	1	2048	0.002	0.044	0	1	0.0732*
Number of shocks (supporting others)	2068	0.003	0.054	0	1	2048	0.000	0.022	0	1	0.0603*
Number of shocks (theft)	2068	0.016	0.127	0	1	2048	0.064	0.252	0	2	0.0000***
Number of shocks (agricultural)	2068	0.535	0.808	0	5	2048	1.010	1.068	0	6	0.0000***
Number of shocks (crop pests)	2068	0.110	0.318	0	2	2048	0.145	0.367	0	3	0.0014***
Number of shocks (drought)	2068	0.252	0.447	0	2	2048	0.161	0.378	0	2	0.0000***
Number of shocks (flooding of agricultural land)	2068	0.103	0.311	0	2	2048	0.186	0.416	0	3	0.0000***
Number of shocks (landslide, erosion)	2068	0.001	0.031	0	1	2048	0.015	0.120	0	1	0.0000***
Number of shocks (livestock disease)	2068	0.019	0.136	0	1	2048	0.234	0.463	0	3	0.0000***
Number of shocks (snow/ice rain)	2068	0.007	0.082	0	1	2048	0.005	0.073	0	1	0.5637
Number of shocks (storage pests, incl. rats)	2068	0.018	0.134	0	1	2048	0.009	0.098	0	2	0.0091***
Number of shocks (storm)	2068	0.012	0.107	0	1	2048	0.209	0.415	0	2	0.0000***
Number of shocks (unusually heavy rainfall)	2068	0.012	0.109	0	1	2048	0.047	0.215	0	2	0.0000***
Number of shocks (economic)	2068	0.205	0.498	0	4	2048	0.121	0.400	0	3	0.0000***
Number of shocks (change in market regulations)	2068	0.005	0.069	0	1	2048	0.001	0.038	0	1	0.0540*
Number of shocks (collapse of business)	2068	0.004	0.066	0	1	2048	0.015	0.126	0	2	0.0006***
Number of shocks (job loss, agricultural)	2068	0.005	0.069	0	1	2048	0.003	0.054	0	1	0.3260
Number of shocks (job loss, non-agricultural)	2068	0.017	0.131	0	1	2048	0.015	0.126	0	2	0.5707
Number of shocks (strong decrease of prices for output)	2068	0.054	0.228	0	2	2048	0.048	0.216	0	2	0.3997
Number of shocks (strong increase of interest rate on loans)	2068	0.016	0.129	0	2	2048	0.010	0.098	0	1	0.0839*
Number of shocks (strong increase of prices for input)	2068	0.103	0.309	0	2	2048	0.028	0.167	0	2	0.0000***
Number of shocks (unable to pay back loan)	2068	0.000	0.022	0	1	2048	0.000	0.022	0	1	0.9945
Number of shocks	2068	1.235	1.369	0	9	2048	1.876	1.594	0	10	0.0000***

Note: This table shows descriptive statistics of shocks as we survey and cluster them in detailed categories. We sum up the total number of all shocks in each category to broad shock categories, which are demographic, social, agricultural, and economic shocks as well as to the total number of shocks. Differences across both countries are tested by t-tests, the last column reports the respective p-values. Level of significance is denoted by * ($\leq$10%), **($\leq$5%), ***($\leq$1%).

Table A.3: Detailed categories of expected shocks by country

	Thailand					Vietnam					
	Obs	Mean	Std. Dev.	Min	Max	Obs	Mean	Std. Dev.	Min	Max	Difference
Expected shocks: Household member left the household	2054	0.236	0.532	0	5	2021	0.344	0.685	0	5	0.0000***
Expected shocks: Illness of household member	2055	2.473	2.093	0	6	1993	2.403	2.131	0	6	0.1844
Expected shocks: Person joined the household	2066	0.219	0.540	0	5	2023	0.270	0.600	0	5	0.0018***
Expected shocks: Accident	2062	0.631	1.271	0	6	1886	0.065	0.327	0	6	0.0000***
Expected shocks: Conflict with neighbours in the village	2066	0.068	0.497	0	6	1992	0.012	0.169	0	5	0.0000***
Expected shocks: HH was cheated	2066	0.110	0.611	0	6	1925	0.022	0.291	0	6	0.0000***
Expected shocks: Household damage	2068	0.193	0.739	0	6	1978	0.327	0.825	0	6	0.0000***
Expected shocks: Law suit	2065	0.053	0.360	0	6	1963	0.003	0.055	0	1	0.0000***
Expected shocks: Money spent for ceremony in the household	2063	0.556	1.105	0	6	2000	1.118	2.057	0	6	0.2897
Expected shocks: Relatives/friends stopped sending money	2068	0.180	0.875	0	6	2001	0.066	0.564	0	6	0.0000***
Expected shocks: Theft	2067	0.150	0.706	0	6	1954	0.179	0.817	0	6	0.7809
Expected shocks: Crop pests	2068	1.412	2.098	0	6	2011	2.717	2.342	0	6	0.0000***
Expected shocks: Drought	2063	1.829	1.966	0	6	2016	1.715	1.996	0	6	0.0508*
Expected shocks: Flooding of agricultural land	2067	0.727	1.562	0	6	2017	2.089	2.270	0	6	0.0000***
Expected shocks: Landslide, erosion	2065	0.045	0.412	0	6	2013	0.153	0.772	0	6	0.0000***
Expected shocks: Livestock disease	2065	0.451	1.314	0	6	1990	1.530	1.909	0	6	0.0000***
Expected shocks: Snow/ice rain	2060	0.317	1.052	0	6	1975	0.268	1.014	0	6	0.0005***
Expected shocks: Storage pests, incl. rats	2067	0.683	1.695	0	6	1938	0.182	0.814	0	6	0.0000***
Expected shocks: Storm	2068	0.771	1.582	0	6	2006	2.345	2.431	0	6	0.0000***
Expected shocks: Unusually heavy rainfall	2065	0.519	1.287	0	6	2010	1.185	1.920	0	6	0.0000***
Expected shocks: Change in market regulations	2064	0.334	1.251	0	6	1887	0.323	1.119	0	6	0.0943*
Expected shocks: Collapse of business	2067	0.051	0.380	0	6	1944	0.041	0.346	0	6	0.0388**
Expected shocks: Job loss, agricultural	2067	0.077	0.521	0	6	2006	0.032	0.316	0	5	0.0000***
Expected shocks: Job loss, non-agricultural	2068	0.183	0.755	0	6	1993	0.031	0.297	0	5	0.0000***
Expected shocks: Strong decrease of prices for output	2063	0.756	1.638	0	6	1929	0.221	0.818	0	6	0.0000***
Expected shocks: Strong increase of interest rate on loans	2066	0.333	1.077	0	6	1958	0.351	0.888	0	6	0.0004***
Expected shocks: Strong increase of prices for input	2060	2.629	2.455	0	6	1918	1.231	1.920	0	6	0.0000***

Note: This table displays all categories of expected shock events as we survey and categorize them. Expected shocks are the expectation of the household in 2008 how many shocks will occur in the next five years. We do not know the expectations of the distribution within the next five years. Differences across both countries are tested by Wilcoxon ranksum-test, the last column reports the respective p-values. Level of significance is denoted by * ($\leq$10%), **($\leq$5%), ***($\leq$1%).

Table A.4: Determinants of general risk attitude and shocks by detailed shock categories

Variables	Thailand		Vietnam	
Number of shocks (illness of household member)	0.107	0.0960	-0.588***	-0.462***
Number of shocks (death of household member)	0.0520	0.166	-0.879***	-0.867***
Number of shocks (household member left the household)	0.0276	-0.0451	-0.937***	-0.987***
Number of shocks (person joined the household)	-0.564	-0.568	0.692	0.626
Number of shocks (money spent for ceremony in the household)	0.147	0.0864	0.267	0.0761
Number of shocks (household Damage)	0.221	0.145	-0.0568	0.328
Number of shocks (theft)	-0.376	-0.345	0.350	0.332
Number of shocks (conflict with neighbours in the village)	0.115	0.218	-0.0739	0.299
Number of shocks (relatives/friends stopped sending money)	-1.855*	-1.581	1.095	2.149**
Number of shocks (flooding of agricultural land)	0.185	0.190	-0.0270	0.00116
Number of shocks (drought)	-0.517***	-0.519***	-0.491***	-0.364**
Number of shocks (unusually heavy rainfall)	0.503	0.665	-0.150	-0.256
Number of shocks (crop pests)	-0.427**	-0.450**	0.0385	0.0875
Number of shocks (storage pests, incl. rats)	-1.024**	-0.972**	0.664	0.854
Number of shocks (livestock disease)	-0.572	-0.610	0.0864	0.105
Number of shocks (landslide, erosion)	-2.166	-2.492	0.0439	0.856**
Number of shocks (collapse of business)	-0.666	-0.750	0.927**	0.958*
Number of shocks (unable to pay back loan)	0.337***	0.510***	0.844***	2.880***
Number of shocks (strong increase of interest rate on loans)	0.728	0.859*	-0.0573	0.0370
Number of shocks (strong decrease of prices for output)	0.265	0.149	0.899***	0.342
Number of shocks (strong increase of prices for input)	-0.429**	-0.558***	0.959***	0.674**
Number of shocks (change in market regulations)	-0.968	-1.188	0.844	0.0226
Number of shocks (accident)	0.00493	-0.118	-0.229	-0.156
Number of shocks (education)	0.00322	-0.321	-2.162***	-2.195***
Number of shocks (supporting others)	0.338	0.314	-1.157***	-1.533***
Number of shocks (law suit)	-0.0439	0.0414	-0.157	-0.0401
Number of shocks (HH was cheated)	0.578	0.603	0.805**	0.352
Number of shocks (storm)	-0.376	-0.469	-0.176	-0.0386
Number of shocks (snow/ice rain)	-1.099*	-1.049	0.391	0.473
Number of shocks (job loss, agricultural)	0.439	0.664	-1.996***	-1.976**
Number of shocks (job loss, non-agricultural)	-0.0815	-0.215	0.0350	0.0105
Controls	No	Yes	No	Yes

Note: The table displays the estimated coefficients of the number of shocks in a particular category on general risk attitude. We implement an interval regression model by country with and without other control variables. Controls include gender, age, height, education, income, marital status, and optimism. Smaller values of general risk attitude correspond with larger levels of risk aversion. Standard errors are bootstrapped. Level of significance is denoted by * ($\leq$10%), **($\leq$5%), ***($\leq$1%).

Table A.5: Estimation of shock surprises (regression approach)

Number of shocks...	Exp. shocks = 1	Exp. shocks = 2	Exp. shocks = 3	Exp. shocks = 4	Exp. shocks = 5	Exp. shocks ≥ 6	Const.	N	R^2
Illness of household member	0.0768***	0.0986***	0.145***	0.0795	0.151***	0.172***	0.168***	4,137	0.016
HH member left the household	0.0164***	0.00432	0.0313	-0.0187	-0.0187		0.0187***	4,162	0.002
Person joined the household	0.00766	0.00489	-0.0115	-0.0115	-0.0115		0.0115***	4,178	0.001
Money spent for ceremony in the HH	0.0273**	0.0178	0.0260	0.0260	0.0365	0.0584***	0.0740***	4,151	0.003
Household Damage	0.0284***	0.109***	0.110***	0.173**	-0.00997	0.116*	0.0266***	4,135	0.013
Theft	0.0765***	0.0465*	0.00619	-0.0355	-0.00606	0.224***	0.0355***	4,109	0.013
Conflict with neighbours in the village	0.0210	-0.00761	-0.00761	-0.00761	-0.00761	-0.00761	0.00761***	4,146	0.001
Relatives/friends stopped sending money	0.0164*	-0.00325	-0.00325	-0.00325	-0.00325	0.0190**	0.00325***	4,157	0.002
Flooding of agricultural land	0.104***	0.150***	0.187***	0.113***	0.211***	0.155***	0.0779***	4,172	0.056
Drought	0.101***	0.146***	0.115***	0.0756	0.164***	0.0459	0.130***	4,166	0.029
Unusually heavy rainfall	-0.00298	-0.00924	0.0131	0.0335	-0.0109	0.00765	0.0290***	4,161	0.001
Crop pests	0.0524**	0.0637***	0.0581**	0.0206	0.0249*	0.0593***	0.104***	4,164	0.005
Storage pests, incl. rats	-0.00489	0.0155	-0.0130	-0.0130	-0.00493	0.00781	0.0130***	4,091	0.000
Livestock disease	0.0730***	0.153***	0.173***	0.130*	0.123***	0.103***	0.0841***	4,141	0.031
Landslide, erosion	0.0520***	0.0419**	0.112***	-0.00572	0.0675***	-0.00572	0.00572***	4,163	0.018
Collapse of business	0.00540	-0.00952	-0.00952	-0.00952	-0.00952	-0.00952	0.00952***	4,094	0.000
Strong increase of interest rate on loans	0.0121	0.0220***	0.0561***	-0.00966	0.0121	0.101***	0.00966***	4,106	0.008
Strong decrease of prices for output	0.0318*	0.0697***	0.0117	0.0665	0.0182	-0.00114	0.0446***	4,074	0.005
Strong increase of prices for input	-0.0107	-0.0384**	0.00284	-0.0422	0.0352***	0.00274	0.0607***	4,061	0.007
Change in market regulations	-0.00352	-0.00352	-0.00352	-0.00352	-0.00352	-0.00352	0.00352***	4,033	0.000
Accident	0.0373***	0.0492**	0.0494	-0.0726	0.0403	0.00852	0.0726***	4,035	0.003
Law suit	0.0400***	0.157***			-0.00917	-0.00917	0.00917***	4,115	0.009
HH was cheated	0.0179	0.0199	-0.0172		-0.0172	0.0939**	0.0172***	4,078	0.001
Storm	0.0141	0.0439*	0.167***	0.195***	0.144***	0.0512***	0.0695***	4,162	0.037
Snow/ice rain	-0.00644	0.00327	-0.00644	-0.00644	-0.00644	-0.00644	0.00644***	4,118	0.001
Job loss, agricultural	0.0180**	-0.00369	-0.00369	-0.00369	-0.00369	-0.00369	0.00369***	4,159	0.001
Job loss, non-agricultural	0.00677	0.0133	0.0514	-0.0153	-0.0153	-0.0153	0.0153***	4,146	0.001

Note: Least squares regression of number of shocks in wave three on expected shocks in wave two by shock category. Expected shocks are measured by six dummy variables indicating an expectation of 1, 2, 3, 4, 5, or 6 and more shocks. The baseline category is zero expected shocks. We use the predicted residuals for the computation of the shock surprise index.

Table A.6: Determinants of general risk attitude in TH excluding GRA middle response

VARIABLES	(1)	(2)	(3)
Female†	-0.317		-0.279
	(0.239)		(0.242)
Age (years)	-0.0356***		-0.0291***
	(0.00761)		(0.00885)
Height (meters)	1.631		1.435
	(1.475)		(1.466)
Income (1000 USD-PPP)		0.0125	0.0128*
		(0.00760)	(0.00766)
Education (years)		0.139***	0.0816**
		(0.0355)	(0.0385)
Married†		0.288	0.0259
		(0.269)	(0.271)
Constant	4.400*	3.837***	3.785
	(2.523)	(0.306)	(2.532)
$ln(\sigma)$	1.187***	1.191***	1.185***
	(0.0139)	(0.0139)	(0.0144)
Observations	1,205	1,153	1,153
McKelvey & Zavoina's R^2	0.0235	0.0230	0.0350

Note: Interval regression of general risk attitude excluding responses for the middle category of general risk attitude. Smaller values of general risk attitude correspond with a larger degree of risk aversion. Dummy variables are denoted by †. Standard errors are bootstrapped and reported in parenthesis. Level of significance is denoted by * ($\leq$10%), **($\leq$5%), ***($\leq$1%).

Table A.7: Determinants of general risk attitude in TH by education level

	Education level (0-4 yr)			Education level (5-6 yr)			Education level (>7 yr)		
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Female†	-0.105		-0.0900	-0.528*		-0.588*	-0.212		-0.140
	(0.161)		(0.172)	(0.283)		(0.333)	(0.348)		(0.400)
Age (years)	-0.0255***		-0.0282***	-0.0162		-0.0125	-0.0156		-0.00948
	(0.00738)		(0.00767)	(0.0111)		(0.0183)	(0.0102)		(0.0145)
Height (meters)	0.584		0.449	0.0791		-0.0108	3.326*		3.525*
	(1.095)		(1.123)	(1.791)		(2.014)	(1.884)		(2.129)
Income (1000 USD-PPP)		0.0112	0.0110		7.83e-05	-0.000120		0.0127*	0.0111
		(0.00777)	(0.00727)		(0.00583)	(0.00563)		(0.00711)	(0.00731)
Education (years)		0.164	0.149		-0.196	-0.190		0.0331	0.0447
		(0.164)	(0.165)		(1.123)	(1.118)		(0.0716)	(0.0706)
Married†		0.223	0.0519		-0.0884	-0.0562		-0.0577	-0.0867
		(0.189)	(0.197)		(0.537)	(0.525)		(0.370)	(0.351)
Constant	5.614***	4.124***	5.288***	6.121**	6.548	7.402	1.021	5.207***	-0.0440
	(1.842)	(0.656)	(1.971)	(3.041)	(6.688)	(7.636)	(3.217)	(0.841)	(3.777)
$ln(\sigma)$	0.930***	0.931***	0.925***	0.915***	0.916***	0.910***	0.913***	0.901***	0.892***
	(1.842)	(0.656)	(1.971)	(3.041)	(6.688)	(7.636)	(3.217)	(0.841)	(3.777)
Observations	1,367	1,293	1,293	485	411	411	364	290	290
McKelvey & Zavoina's R^2	0.0108	0.00804	0.0191	0.0137	0.000213	0.0121	0.0271	0.0110	0.0298

Note: Interval regression of general risk attitude excluding responses for the middle category of general risk attitude. Smaller values of general risk attitude correspond with a larger degree of risk aversion. Dummy variables are denoted by †. Standard errors are bootstrapped and reported in parenthesis. Level of significance is denoted by * ($\leq$10%), **($\leq$5%), ***($\leq$1%).

Table A.8: Sample comparison in TH for GRA middle responses vs. others

	N[GRA=5]					N[GRA≠5]				
Variable	Obs	Mean	Std. Dev.	Min	Max	Obs	Mean	Std. Dev.	Min	Max	Difference
Female†	1205	0.605	0.489	0	1	863	0.582	0.494	0	1	0.296
Age (years)	1205	52.473	12.839	18	80	863	51.633	12.013	21	80	0.1318
Height (meters)	1205	1.583	0.083	1.06	1.8	863	1.585	0.077	1.2	1.85	0.6921
Income (1000 USD-PPP)	1205	9.026	18.697	-147	512	863	9.157	12.847	-17	183	0.8581
Assets (1000 USD-PPP)	1204	5.530	9.215	0	87	862	5.962	10.073	0	91	0.3121
Education (years)	1153	5.484	2.829	1	17	841	5.231	2.519	1	17	0.0389**
Married†	1205	0.823	0.382	0	1	863	0.838	0.369	0	1	0.407

Note: Comparison of personal characteristics of the group of middle responses versus other responses. Dummy variables are denoted by †. Standard errors are bootstrapped and reported in parenthesis. Level of significance is denoted by * (≤10%), **(≤5%), ***(≤1%).

Table A.9: Risk behavior and general risk attitude in TH excluding GRA middle responses

	Self-employment				Lottery buyer			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
General risk attitude	0.0107***	0.00976***	0.00904***	0.00856***	0.0222***	0.0202***	0.0189***	0.0176***
	(0.00238)	(0.00235)	(0.00224)	(0.00226)	(0.00473)	(0.00481)	(0.00494)	(0.00502)
Female†		0.0390**		0.0311*		0.0228		0.0208
		(0.0169)		(0.0171)		(0.0380)		(0.0396)
Age (years)		-0.00136**		-0.00107		-0.00436***		-0.00557***
		(0.000628)		(0.000764)		(0.00125)		(0.00142)
Height (meters)		0.158		0.0826		0.0652		0.0284
		(0.105)		(0.107)		(0.235)		(0.225)
Income (1000 USD-PPP)			0.00355***	0.00348***			0.000710	0.000916
			(0.000717)	(0.000726)			(0.00160)	(0.00166)
Education (years)			0.00288	0.00114			0.000603	-0.0107*
			(0.00247)	(0.00279)			(0.00571)	(0.00638)
Married†			0.0133	0.0127			0.0653	0.0467
			(0.0201)	(0.0206)			(0.0416)	(0.0431)
Observations	1,203	1,203	1,151	1,151	1,095	1,095	1,043	1,043
McKelvey & Zavoina's R^2	0.0533	0.0831	0.152	0.170	0.0328	0.0533	0.0302	0.0560

Note: Regression of risk behavior on general risk attitude excluding responses for the middle category of general risk attitude. Smaller values of general risk attitude correspond with a larger degree of risk aversion. Dummy variables are denoted by †. Standard errors are bootstrapped and reported in parenthesis. Level of significance is denoted by * (≤10%), **(≤5%), ***(≤1%).