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Floods and Farmers: Evidence from the Field in Thailand

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Floods and Farmers: Evidence from the Field in Thailand[*]

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Abstract: This paper studies the impacts of the 2011 flood on preferences, subjective expectations, and behavioral choices among Thai rice-farming households. Our results show that experiencing the 2011 flood made farming households more risk averse, more impatient, and more altruistic, and that asset-poor farming households were more likely to be affected by the flood than better-off households. The flood also made households adjust upward their subjective expectations of future severe floods. After being hit by the 2011 flood, households lost their confidence in social safety nets, signifying the limitations of risk-sharing in the presence of covariate shocks. Middle-income households who were not prone to floods had higher expectations of public insurance following the flood. Mediating through the changes of preferences and subjective expectations, the flooded households were less likely to save money and engage in self-insurance mechanisms, as well as to invest in productive investments, but more likely to take out commercial crop insurance, especially those in the bottom and middle wealth groups. These findings shed light on the design of incentive-compatible safety nets and development interventions.

Key Words: Flood, farming households, preferences, subjective expectation, insurance, adaptation

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1. Introduction

Livelihood of agricultural households in developing economies depends tremendously on the nature. Weather affects their farm productivity, income, consumption, and vulnerability. Natural disasters, especially the rare and largely unexpected ones, cause damages on assets and income. In addition, these disasters could lead to changes in household's preferences and behaviors. Understanding these consequences is therefore important for the design of safety nets and development programs that could facilitate effective risk management, especially among vulnerable rural agricultural households.[1]

This paper studies the effects of the 2011 flood on rice farming households in Thailand, one of the world's largest rice exporting countries. Among various types of natural disasters, flood is one of the most commonly observed events that affect farming households in tropical countries. The flood that hit Thailand in 2011 was considered the worst one that the country had experienced in half a century. Given its rarity and severity, this flood serves as an ideal natural experiment to identify the casual impact of a largely unexpected natural disaster on affected agricultural households. It directly affected farmland which were operated by relatively poor households whose access to risk-management and risk-coping mechanisms was limited.[2]

We identify the effects of the 2011 flood on the risk, time, and social preferences; the subjective expectations of future floods and of the dependability of various safety net institutions; and the behavior of rice-farming households in Thailand. We do so by utilizing the discontinuity generated by the 2011 flood, on the basis of a remote sensing flood map, to construct a variation in severe flood experience across sampled villages and households.

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[1] There is growing literature that examines the impacts of weather and natural disasters on agricultural production and insurance. See World Bank (2005), Aimin (2010), Mahul and Stutley (2010), Dercon (2005), Chantarat et al. (2007), Chantarat et al. (2013), McIntosh et al. (2013), and Karlan et al. (2014). For Thailand, see Felkner et al. (2009) and Pannangpetch et al. (2009).

[2] In a recent study, Poaponsakorn and Meethom (2014) compare information from Thailand's socio-economic surveys in 2009 and 2011 and map them with the flooded areas by using satellite images. They show that the 2011 flood in Thailand had a large negative impact on farm profits of some middle income households in the flooded provinces.

This discontinuity allows us to compare villages and households that were directly hit by the 2011 flood with those that were not. In particular, using a cross-sectional survey of Thai rice-farming households collected in 2014, we first explore how experiencing the 2011 flood affected the risk, time, and social preferences of flooded and non-flooded households within the flood-prone and non-flood-prone areas. We then explore how the 2011 flood affected these households' subjective expectations of future flood events and of the dependability of various safety net institutions. Finally, we examine whether the 2011 flood affected household behavior and how the changes in preferences and subjective expectations induced by the 2011 flood affected such behavior.

Recent studies have shown evidence that natural disasters can change risk, time, and social preferences of affected households. For risk preferences, Eckel et al. (2009) find that experiencing Hurricane Katrina in 2005 affected the risk preferences of Hurricane evacuees in the United States. Cameron and Shah (2012) find that individuals who had recently suffered a flood or earthquake in Indonesia exhibited higher risk aversion than those living in similar but unaffected villages. Cassar et al. (2011) and Ingwersen (2014) show that the 2004 Indian Ocean tsunami in Thailand and Indonesia resulted in higher and lower risk aversion, respectively. Page et al. (2012) find that after large negative wealth shocks from the 2011 flood in Brisbane, Australia, individuals became more willing to adopt riskier options in their decision-making process. For time preferences, Callen (2015) shows that exposure to the 2004 Indian Ocean earthquake and tsunami increased the patience of Sri Lankan wage workers. For social preferences, Castillo and Carter (2011) find that a large negative shock caused by Hurricane Mitch in 1998 increased altruism, trust, and reciprocity in small Honduran communities. Cassar et al. (2011) show that the 2004 Indian Ocean earthquake and tsunami in Thailand also resulted in higher altruism.[3] Conducted in parallel to this study, Chantarat et al. (2016) study the impacts of the 2011 flood on preferences, subjective expectations, and behaviors of Cambodian farmers.

[3] There is also literature on the effects of traumatic and catastrophic civil conflicts on preferences – for example, Voors et al. (2012), Cassar et al. (2013), and Callen et al. (2014).

As summarized in Delavande et al. (2011), people form and adjust their subjective expectations to reflect some risk factors, which could be socio-economic characteristics, preferences, perceptions, or past experiences. In addition, expectations have been found to be associated with agricultural decisions. Giné et al. (2009) find that the timing of the planting decisions of Indian rainfed farmers was strongly influenced by their belief in the monsoon onset. Vargas Hill (2009) shows that coffee producers in Uganda allocated less labor when the expectations of coffee yield and price corresponded with negative returns. Several studies also show that individual expectations are key determinants of insurance demand. Shaik et al. (2008) find that farm producers in the United States who perceived higher crop yield or price were less likely to purchase both yield and revenue insurance, while those who expected higher yield variance were more at risk and hence demanded more revenue insurance. In the Netherlands, Van Asseldonk et al. (2002) find that a producer's belief in the availability of public disaster relief in the future was negatively correlated with the willingness to pay for crop insurance. By studying public insurance schemes in Austria and Germany, Raschky et al. (2013) conclude that the lower the level of disaster relief and the more uncertain it was, the lesser was the degree of crowding out of private flood insurance.

Changes in preferences and subjective expectations could affect household behavior in various ways, which could in turn affect households' economic development and their resilience to future disaster risks. On one hand, increasing risk aversion may lead households to reduce risk-taking behavior, which might include a reduction in productive investment – necessary for economic growth. An increase in risk aversion could also lead households to invest in more insurance measures, including self-insurance, social insurance, and market-based insurance. A change in time preference could affect households' intertemporal decisions, with increasing patience resulting in an increase in savings. Increasing altruism may enhance public goods contribution and investment in social capital. Increasing subjective expectations of future risk exposure could also dampen investment incentives but, on the other hand, increase various uses of insurance mechanisms. Increasing subjective expectations or the dependability of disaster safety nets could, however, create a problem.

For example, increasing expectations of public disaster relief could lead to excessive risk-taking behavior and could potentially crowd out households' incentive to insure themselves and to invest in social and market-based insurance.

The results show that experiencing the 2011 flood made farming households more risk averse, more impatient, and more altruistic, and that asset-poor farming households were more likely to be affected by the flood than better-off households. The flood also made households adjust upward their subjective expectations of future severe floods. After being hit by the 2011 flood, households lost their confidence in social safety nets, signifying the limitations of risk-sharing in the presence of covariate shocks. Middle-income households who were not prone to floods had higher expectations of public insurance following the flood. Mediating through the changes of preferences and subjective expectations, the flooded households were less likely to save money and engage in self-insurance mechanisms, as well as to invest in productive investments, but more likely to take out commercial crop insurance, especially those in the bottom and middle wealth groups.

The rest of this paper is organized as follows. Section 2 provides key information on the incidence of the 2011 flood in Thailand. Section 3 describes our survey and sampling strategy, outcome variables, and summary statistics of the sampled households. Section 4 discusses the empirical strategy we use to identify the causal effects of the 2011 flood. Section 5 shows the estimation results. Finally, section 6 concludes and provides policy implications.

2. The 2011 Flood in Thailand

As in other East Asian countries, natural disasters are common in Thailand. Due to the country's tropical monsoon climate, the most common natural disasters in Thailand are floods. According to the Emergency Events Database (EM-DAT), Thailand experienced 68 floods during 1980-2014, averaging about two events per year.[4] Although floods occurred frequently during this period, they did not generally result in high numbers of people killed, with the cumulative death toll from all flood events less than one death per flood event on average. In most cases, the damage was geographically limited, with the exception of severe floods. The most recent was the 2011 flood in 2011, one of the country's deadliest and most destructive natural disasters.

The severe flood in 2011 was recorded as the largest flood to have hit Thailand in over the past 50 years. It claimed over 800 lives, making it the second deadliest natural disaster in Thailand's modern history (behind only the 2004 Indian Ocean earthquake and tsunami). The flood was initially caused by a series of early heavy rains in the north and the north-east, together with a number of tropical storms occurring consecutively from late June to October 2011.[5] As a result, there was excessive rainwater in the north and the upper north-east that eventually exceeded the capacity of the country's key dams and drainage systems, thus causing rapid downstream flood flows towards the south through a few rivers in the major river basins – the Chao Phraya and Tha Chin River basins in the central plain and the Chi and Mun River basins in the north-east. The 2011 flood covered approximately one-third of the country, affecting 66 of 77 provinces in all regions, with 4.14 million hectares of land being inundated. Among the flooded areas, the variations in the extent of the inundation period largely depended on the variations in the availability of good drainage systems and blockages, especially with respect to ineffective urban planning. In total, the 2011 flood affected 12.8 million people and damaged 1.67 million hectares of agricultural land as well as 9,859 factories. It affected the agricultural sector in at least 26 provinces in the northern, central, and north-eastern regions (World Bank, 2012). In particular, the 2011 flood inundated key rice-growing areas in the Chao Phraya and Tha Chin River basins. The Thai

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[4] For a more detailed discussion on the impact of the 2011 flood on the Thai economy, see Samphantharak (2014).

[5] The average cumulative rainfall of 1,781 millimetres between January and October 2011 was the highest on record and was about 35 percent higher than its 50-year average (Poaponsakorn and Meethom, 2014). The statistics provided by the World Bank show that the total rainfall during July-September was the highest recorded since record-keeping began in 1901. The probability of such rain event has been estimated at once in 250 years.

government spent more than US$3 billion on disaster relief, of which approximately 8 percent went to rice farmers. The total loss and damage was approximated at US$46.5 billion, or 14 percent of the country's gross domestic product (GDP).

3. Data

The data used in this study are from a recent survey of Thai rice-farming households. The fieldwork was conducted between January and April 2014 in the country's key rice-growing areas affected by the 2011 flood.

3.1 Sampling strategy

The survey was conducted in four rice-growing provinces that were affected by the 2011 flood: Suphan Buri, Phitsanulok, Khon Kaen, and Nakhon Ratchasima. These provinces were purposefully selected to provide representative variations in rice cultivation systems, the nature of the 2011 flood exposure, and the capacity and strategies of households and communities to cope with floods in general.[6] Suphan Buri and Phitsanulok are the country's main rice-growing provinces, covering about 15 percent of rice-farming areas in the central and the lower northern plains, where rice farming is mostly irrigated. Khon Kaen and Nakhon Ratchasima cover almost 20 percent of rice-farming areas in the north-eastern region, where rice farming is mainly rainfed. Shown in Figure 1, Suphan Buri and Phitsanulok are located in the Chao Phraya and Tha Chin River Basin Group, while Khon Kaen and Nakhon Ratchasima are located in the Mekong Tributary Basin Group.[7] Within the Chao Phraya and Tha Chin River basins, Phitsanulok is upstream of the Nan River, while Suphan Buri is downstream of the Tha Chin River. In the north-east, Khon Kaen is upstream

[6] A selection effect must be acknowledged since we were not able to capture households that were severely affected by the 2011 flood and had already moved out of our selected areas.

[7] According to the classification of the National Committee on Hydrology of Thailand, there are 25 distinct hydrological units, or basins. The basins are regrouped into nine basin groups. The Chao Phraya and Tha Chin River Basin Group consists of the basins of the Ping, Wang, Yom, Nan, Chao Phraya, Sakae Krung, Pasak, and Tha Chin Rivers. The Mekong Tributary Basin Group consists of the basins of the Mekong, Kok, Chi, and Mun Rivers, as well as the Tonle Sap.

of the Chi River, while Nakhon Ratchasima is upstream of the Mun River, where both rivers flow into the Mekong River.

The first step in our sampling strategy, we used GIS remote sensing maps provided by the Geo-Informatics and Space Technology Development Agency (GISTDA) at the Ministry of Science and Technology of Thailand to identify rice-farming villages in each of the four provinces based on GIS-based rice-growing maps. We defined rice-growing villages as those with more than 50 percent of the areas used in rice cultivation. We then overlaid rice cultivation maps with flood maps to identify subdistricts (*tambon*) that experienced flood in 2011. We selected heavily flooded and not-so-heavily flooded villages. We used the 2011 flood inundation maps to distinguish heavily-flooded villages (defined as villages with more than 50 percent of areas observed inundated for longer than 15 days) from the nearby not-so-heavily flooded villages, so that we could then randomly choose five to six villages from each group in each province.[8]

There were still large variations in flood-proneness and exposure to the 2011 flood within each selected village. In the next step, we selected heavily flooded and not-so-heavily flooded households for comparison within each flood-prone or non-flood-prone areas in each chosen village. Combining the 2011 flood inundation maps with land use maps provided by local authorities, we divided rice-growing households in each village (sampling frame) into four groups: [1] prone to floods and heavily flooded in 2011; [2] prone to floods but not heavily flooded in 2011; [3] not prone to floods but heavily flooded in 2011; and [4] not prone to floods and not flooded in 2011. A household was considered heavily flooded in 2011 if its rice fields were located in areas with observed inundation of longer than 15 days. A household was considered being prone to floods if its rice fields were located in flood-prone areas. Finally, we randomly selected households from each of the four groups in each chosen village. We captured 8-18 households altogether in each village, depending on village size. Within the flood-prone or non-flood-prone group, the selected households should thus largely share similar characteristics in terms of geography, rice cultivation

[8] For simplicity, in this paper we use the term “non-flooded village” to represent not-so-heavily flooded village.

systems, socio-economic conditions, and exposure to other shocks and policies, and differ only in the exposure to the 2011 flood.

[Table 1]

Table 1 shows descriptive statistics of the 2011 flood by studied province. The sample size is given in the top panel; there were 44 sampled villages, 22 of which were heavily flooded villages. There were 426 sampled households in total, 248 of which were in the non-flood-prone group. A total of 175 households were flooded households, 85 of which were in the non-flood-prone group. Although we intended to collect a balanced sample of flooded and non-flooded households, our sample size was largely unbalanced–roughly 30-40 percent of households in Suphan Buri, Khon Kaen, and Nakhon Ratchasima were flooded. The share of flooded households in Phitsanulok (55 percent) slightly exceeded that of non-flooded households. These proportions reflect variations of flood incidence across sampled villages and, therefore, provinces.

3.3.2 Survey and outcome variables

Our questionnaire included standard household surveys, with a special module on households' experiences with the 2011 flood and other adverse natural events in the past. This module contained detailed information on the occurrence and consequences of shocks, together with how the affected households prepared themselves prior to shocks and how they coped with shocks afterwards.

Panel B of Table 1 shows the variation in characteristics of the 2011 flood. The flood hit Phitsanulok during July-August 2011 and lasted for 81 days, while Suphan Buri experienced the flood more than a month later, in September, with longer duration of 98 days. Anticipating the floodwaters, farmers in Suphan Buri in principle had more time to prepare for and cope with the flood than those in Phitsanulok. The nature of the 2011 flood in the north-east was different from that in the central plain. Khon Kaen and Nakhon Ratchasima were hit by the 2011 flood later in October, but had only 45-47 flood days. The flood damaged 86 percent of household's rice fields and resulted in 75 percent of total rice income loss on average.[9] On average, rice-farming households in downstream Supan Buri suffered the loss of 148 thousand baht, compared to those in Phitsanulok of 159 thousand baht. Rice income loss was much lower among households in the north-east, with an average of 69 thousand baht in Khon Kaen and 44 thousand baht in Nakhon Ratchasima.[10] Only a small fraction of flooded households reported house damage and asset loss. Approximately 19 percent of flooded households reported that they had to cut back their consumption following the 2011 flood.

Panel C of Table 1 shows the adoption of coping strategies among flooded households in response to the 2011 flood. Borrowing from financial institutions and receiving cash assistance from the government were the most salient responses. Social mechanisms were rather limited in the severe flood event−only 14 percent of flooded households reported getting support from friends or relatives. There was a low take-up rate of crop insurance among sampled households; insurance did not exist in Suphan Buri and Phitsanulok, and only 13 percent of flooded households in Khon Kaen and Nakhon Ratchasima received insurance indemnity following the 2011 flood. Reliance on self-insurance mechanisms was not common practice; only 5 percent of flooded households relied on their own savings and assets, while 9 percent of flooded households, especially those in Khon Kaen (19 percent), relied on additional labor work. Though not common in general, about 23 percent of flooded households in Suphan Buri benefited from natural resources as safety nets during the 2011 flood.

[Table 2]

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[9] We calculated the percentage of total rice income lost from what the sampled households obtained following the 2011 flood, in comparison with what they could have obtained in the best scenario or in normal years when there is no flood.

[10] The exchange rate during the time of the survey was approximately 32 baht per US dollar.

Table 2 reports summary statistics of household characteristics by the 2011 flood exposure at village and household levels for flood-prone and non-flood-prone groups. Panels A and B show that most characteristics were similar between flooded and non-flooded villages, and especially between flooded and non-flooded or households. As for flooded households, the average household size was four people and 21 percent of which had members migrating elsewhere. The majority of the respondent of 77 percent were the household head and about a half of those were female. The average age of respondents was 53 years old, with 71 percent and 23 percent of respondents having completed at least primary and secondary education, respectively. The average land owned per capita by flooded households was 5 rai, while the average income per capita was about 81,500 baht per year.[11] Flooded households earned 52 percent of their income from rice farming each year. Asset holdings were significantly larger among households living in flooded villages and flooded households compared to the non-flooded counterparts within the non-flood-prone group.[12]

The exposure to the 2011 flood of flood-prone and non-flood-prone households could be different by the number of characteristics, especially in flood anticipation, farm elevation, and production practices. If these characteristics correlate with the outcome variables, there will be biases in our estimation results. To deal with this issue, we thus stratified households by the degree to which they were prone to floods, mainly by their plot characteristics. Panels C and D of Table 2 show that production and plot characteristics and shock experiences were not significantly different between flooded and non-flooded villages or households within each stratified flood-prone group. In other words, given flood-proneness, exposure to the 2011 flood no longer depends on these factors. Therefore, in each flood-prone and non-flood prone group, flooded and non-flooded villages or households are relatively similar, but only

[11] Thailand uses 'rai' as unit of measurement for land (1 rai = 0.16 hectare).

[12] Statistics show that some household characteristics like occupational choice, wealth, and past shock experiences were significantly different across studied provinces. Farming households in Suphan Buri and Phitsanulok relied heavily on rice farming, earning more than 80 percent of total income from rice cultivation, while rice income of households in Khon Kaen and Nakhon Ratchasima contributed to less than 40 percent of total income. On average, sampled households in the north-east were poorer than those in Suphan Buri and Phitsanulok. Sampled households in Phitsanulok were slightly more exposed to natural shocks, with an average of three events in the past 10 years, compared with two events for the three other provinces.

differ in exposure to the 2011 flood. Since we include flood-proneness and its interaction with the 2011 flood exposure in all of our regression analyses, the estimation results thus capture the within-group impacts of the 2011 flood on the outcome variables.

We asked the sampled households about what they would do in preparation for future flood events. In addition, the survey included a series of hypothetical questions used to elicit risk, time, and social preferences; subjective expectations of future risk exposure; and safety net perceptions.[13]

For risk preferences, we used a variant of Binswanger's (1980) game by allowing the respondent to choose among a variety of rice seed types, where each type gave different yield that was varied according to uncertain situations. Some types gave a low yield but were more resistant to natural hazards, while some gave a much higher yield in normal circumstances but would give a very low yield under natural hazards. The respondent's seed choice thus reflects his or her degree of risk aversion. We then constructed a risk aversion parameter based on the payoff of the chosen rice variety as an ordinal index ranging from 1 (least averse) to 5 (most averse).

For time preferences, each respondent was asked to choose whether to receive a certain amount of money the next day or to receive a larger amount of money in the next 15 days in eight circumstances. The amount of money given in the second choice increased as the experiment progressed from situations 1 to 8. We then observed the patterns of answers that the respondent gave to these situations, particularly when he or she first switched to accepting a payment in the next 15 days instead of receiving a certain amount of money the next day. This reflects the extent to which the respondent discounts the future over the present, and hence indicates his or her degree of impatience. We then constructed our time

[13] Appendices A and B provide a summary of hypothetical questions used for eliciting preference parameters and subjective expectations, respectively.

reference parameter or impatience as an ordinal scale ranging from 0 (not impatient or most patient) to 8 (most impatient).[14]

For social preferences, we used the dictator game to elicit how altruistic the respondent would be in two scenarios. This game measures how people care about others, although there is no gain in return. We started the game by hypothetically giving the respondent a certain amount of money and asked him or her to give a part or all of that money to a randomly matched farmer from the same village. The respondent was told that the chosen beneficiary was anonymous and that his or her decision would be confidential. Next, we repeated this game but assumed that there was a severe flood in the preceding year in which every household in the village including the respondent's was affected. This time, we hypothetically gave the respondent a certain amount of money as compensation and asked him or her to give that money to a random flood victim in the village. We then constructed altruism parameters from the proportion of money the respondent gave in each situation. These continuous variables thus range from 0 (least altruistic) to 1 (most altruistic).

To elicit subjective expectations, the respondent was asked to assign a probability to the occurrence of three flood events in the next 10 years (no flood, mild floods, and severe floods). In the field, 10 one-baht coins were given to the respondent as visual aids for us to express the probabilistic concept since we were afraid that it might be too abstract to ask for probabilities directly. The chart in Appendix B was presented to the respondent while we explained the questions and situations of three different flood events that could happen in the future. The respondent was asked to allocate 10 coins into the given intervals labelled by flood events. The number of coins allocated in each bin thus reflected the likelihood that each mutually-exclusive flood event would occur in the next 10 years. We constructed subjective expectation variables of future mild floods and severe floods from the number of coins assigned to each event, ranging from 0 (no chance), 0.1 (1 in 10 years), 0.2 (2 in 10 years), …, to 1 (10 in 10 years).

[14] Note that our simple measure of time preference is subject to risk aversion, as preferring to accept lower instantaneous payment rather than waiting for higher future payment may reflect risk aversion to future payments as well as impatience.

For safety net perceptions, we asked what the respondent thought about the capability of his or her own household, social networks within the community, and the government to deal with future floods or to mitigate the potential impacts of floods. For the perceptions of safety nets provided by households and social networks, we used an ordinal scale of 0 (not able), 0.5 (partially able), and 1 (totally able) for these measures. For safety nets provided by the government, we applied subjective probabilities of public assistance in terms of natural disaster relief, given the occurrence of future flood events, to reflect the dependability of the government. The response thus ranged from 0, 0.1, 0.2, ..., to 1, signifying the respondent's strength of belief about the likelihood of getting government support during floods.

[Table 3]

Table 3 reports summary statistics of preference measures, subjective expectations, and behavior by village-level and household-level flood exposures. For risk preferences, the sampled households had risk aversion of 3.9-4.1 out of the maximum 5 on average in all groups. For time preferences, the mean was 4.7-5.2 on the scale from 0 to 8. There was no significant difference in impatience between flooded and non-flooded villages or households, both within the flood-prone and non-flood prone groups. For social preferences, the average share of grant money given to a randomly matched villager in a normal situation was 0.24-0.31, but reduced to 0.20-0.29 when households were asked to share the assistance money with another flood victim from the same village.

For subjective expectations, households expected mild floods to occur four to five times and severe floods to occur two to three times over the next 10 years. Being hit by the 2011 flood resulted in higher subjective probabilities of future severe floods among flooded households as well higher probabilities of mild flood among flooded households living in flood-prone areas. For safety net perceptions, households affected by the 2011 flood at the village or household level had lower expectations of their capability and that of the social networks to deal with future floods. On the other hand, flooded households are more likely to expect government to provide disaster relief following the 2011 flood.

Finally, this paper examines the potential impacts of the 2011 flood on household behaviors in relation to the preparedness for flood events in the future and the strength of farm production that could help mitigate the severity and damage of future floods following the severe flood in 2011. Each household was asked the following questions: [1] whether the household had savings; [2] whether the household invested in flood prevention or adjusted farming practices by changing modes or methods of rice cultivation; [3] whether the household grew other crops; [4] whether the household had off-farm employment; [5] whether the household participated in or contributed to building flood prevention systems with the community; [6] whether the household gave support to others, including by lending money; [7] whether the household demanded market crop insurance against future flood risks; and [8] whether the household invested in better seeds and organic fertilizer. Panel C of Table 3 shows that most behaviors were similar among households in flooded and non-flooded villages, except for investing in irrigation, adjusting farming practices, and demanding commercial crop insurance, which were significantly more prevalent among households in flooded villages and among flooded households. Compared with non-flooded households, flooded households were more likely to diversify to off-farm employment and provide assistance to others but were less likely to have savings.

4. Empirical Strategy

From our sampling strategy, we construct three flood exposure variables to represent variations in severe flood experience across sampled villages and households. First, village-level flood exposure is a binary variable, indicating whether the household was located in a heavily flooded village. By comparing households living in severely flooded villages with those in not so severely flooded villages, we could identify the potential impacts of the 2011 flood on households living in more heavily flooded villages relative to those in other villages with largely similar characteristics, regardless of whether the household's own rice fields were flooded. Second, household-level flood exposure is another binary variable, indicating whether the household's rice fields were heavily flooded. By comparing heavily flooded households with not-so-heavily flooded households within the flood-prone (non-flood-prone) group, we could identify the potential impacts of the 2011 flood on households that were directly hit by the flood relative to others with similar characteristics. Finally, we used the percentage of rice fields reported being completely submerged for longer than 15 days during the 2011 flood (which implied a complete production loss) to capture the intensity of the flood among flooded households. This household-level flood intensity variable allows us to identify the heterogeneous effects of the extent to which the 2011 flood affected households.

We estimate the impacts of the 2011 flood by regressing preference, subjective expectation, and behavioral variables on each of the three flood exposure measures, controlling for household characteristics, geographical characteristics, and location fixed effects. Moreover, we hypothesize that the effects of the 2011 flood would be different among households who were well acquainted with floods and those who were not, because of some specific characteristics (i.e. farming practices, flood anticipation, and uneven experiences with floods). Flood-prone households also had a greater chance of being hit by the 2011 flood than non-flood-prone households. We therefore include a flood-prone variable and its interaction with flood exposure to capture the impacts of the 2011 flood on the outcome variables within the flood-prone and non-flood-prone groups:

$$Y_{iv} = \beta_0 + \beta_1 Flood_{iv} + \beta_2 Flood_{iv} * FP_{iv} + \beta_3 FP_{iv} + \mathbf{X}_{iv}\boldsymbol{\beta}_4 + \alpha_v + \varepsilon_{iv} \qquad [1]$$

where Y_{iv} represents preference, subjective expectation, or behavioral variables. $Flood_{iv}$ is a variable that captures household exposure to the 2011 flood, for which we use three measures: [1] village-level flood exposure; [2] household-level flood exposure; and [3] the percentage of rice fields with total crop loss owing to their rice fields being completely submerged by floodwaters during the 2011 flood. FP_{iv} is a binary variable indicating whether a household belongs to a flood-prone group. By regressing on FP_{iv} and its interaction with each flood exposure variable, we can estimate flood-prone (non-flood-prone) specific impacts of the 2011 flood. The vector of control variables, $\mathbf{X}_{iv}$, contains household demographics, wealth, and experiences with natural hazards in the past. The model includes α_v to control for unobserved heterogeneity at the village level, where ε_{iv} is a random error.[15] We clustered all specifications at subdistrict level.

There remains the question whether the variation of household-level flood exposure can be treated as exogenous. Our sampling strategy, which employs the discontinuity between heavily-flooded and non-flooded samples from largely homogenous and neighbouring households within the flood-prone (or non-flood-prone) group, along with statistical tests in Table 2, helps ensure that exposure to the 2011 flood was largely exogenous to the outcome variables. We also argue that the main factors creating the variations in household flood experience were the correlations between the rice production cycle, the timing of the flood, and flood severity. Since the 2011 flood was unexpected by the time it arrived, the rice production cycle was unlikely to be endogenous to the flood. Even experienced farmers found it difficult, if not impossible, to adjust their growing periods in order to reduce this 2011 flood risk. In fact, the variation in the rice production cycle could have come from rainfall patterns, which appeared to be exogenous. By asking the sampled households whether they had done anything to prepare for the 2011 flood, we found that the occurrence of the flood, especially the severity, was beyond the expectations of most respondents. We also found that a significantly large number of sampled households that were flooded in 2011 reported that the 2011 flood was the most severe flood they have ever experienced, making its effects highly unanticipated.

5. Estimation Results

5.1 How did the 2011 flood affect preferences?

[15] For village-level flood exposure, we control for subdistrict instead.

Table 4 shows the estimation results of the 2011 flood on households' attitudes towards risk for the full sample and for subgroups by level of wealth. Columns (1) to (3) report OLS estimates of the risk aversion parameter for the three measures of flood exposure. Column (1) shows no significant correlation between the 2011 flood and the risk aversion of households in severely flooded villages in all groups. Columns (2) and (3) show that being hit by the 2011 flood and increasing flood intensity were associated with higher risk aversion among flooded households. These findings are robust when we performed ordered probit estimations in columns (4) to (6). The estimates in columns (5) and (6) provide us with more heterogeneous effects across different subgroups, in which increasing risk aversion can be observed among households in the bottom and middle wealth groups but not in the top wealth group. Our results reveal that the degree to which households are prone to flooding did not significantly affect their risk preferences in general.

[Table 4]

An increase in risk aversion could also have implications for an individual's investment decisions making them more conservative as well as on the demand for safety nets through either self-insurance mechanisms or market-based insurance. In other words, risk aversion affects how people prepare themselves for future risk exposure. Our finding for the non-flood-prone group is consistent with other studies that examine the impacts of natural disasters on risk preferences. For example, Cassar et al. (2011) show that the 2004 Indian Ocean earthquake and tsunami in Thailand made the affected individuals more risk averse. Cameron and Shah (2012) show that individuals who had recently suffered a flood or earthquake in Indonesia exhibited higher risk aversion than those living in similar but unaffected villages. Considering the 2011 flood in Cambodia, Chantarat et al. (2015) find that the 2011 flood led to higher risk aversion among rice-farming households. On the contrary, Eckel et al. (2009) find that after being hit by Hurricane Katrina, some of the Hurricane evacuees became more risk-loving. Page et al. (2012) show that individuals directly affected by the 2011 flood in Brisbane, Australia, became more willing to adopt riskier options in their decision-making process. Ingwersen (2014) shows that individuals' physical exposure to the 2004 Indian Ocean tsunami in Indonesia was associated with a temporary decrease in risk aversion, particularly for older adults and the poor, and that the impacts were independent of asset loss and increasing intensity.

[Table 5]

Table 5 summarizes the estimation results for time preferences. Columns (1) to (3) show OLS estimates of the impatience index. We find that the 2011 flood did not significantly affect time preferences in general and that there was also no statistically significant correlation between impatience and flood-proneness. The estimations for population subgroups show that the flood significantly reduced the impatience of flooded households in the bottom wealth group. This finding is also applicable to households in severely flooded villages as well as to increasing flood intensity. But for households in the top wealth group, being flooded was associated with higher impatience. Ordered probit estimations in columns (5) and (6) show a significant positive effect of the flood on the impatience of flooded households in non-flood-prone areas. The estimates for wealth subgroups were consistent with the OLS estimates. In addition, there was significant evidence that being hit by the 2011 flood resulted in higher impatience among non-flood-prone households in the middle wealth group.

In sum, we find no systematic pattern of the 2011 flood on the time preferences of flooded households across wealth subgroups. The flood made asset-poor households more patient. But for asset-rich households, the 2011 flood seemed to increase the impatience of non-flood-prone households. Time preferences reflect how people discount the future over the present, which affect their incentive to save. Our finding adds to the mixed results about natural disasters and time preferences. Cassar et al. (2011) find that following the 2004 Indian Ocean earthquake and tsunami in Thailand, individuals who had a family member injured or killed were likely to be more impatient. Callen (2015) shows that the Indian Ocean earthquake and tsunami increased the patience of wage workers in Sri Lanka. For

Cambodia, Chantarat et al. (2015) find that the 2011 flood significantly reduced the impatience of flood-prone households that were hit by the flood.

[Table 6]

Table 6 summarizes the estimation results for altruism. We pooled the two altruism measures together (the proportion of grant money given to a random villager in a normal situation and the proportion of money given to a random flood victim during a severe flood) and used a variable '*Share when loss*' to indicate the results for the latter measure. For altruism towards a random villager under normal circumstances, the OLS estimates in columns (1) to (3) show that there was no significant correlation between any of the three measures of flood exposure and altruistic behavior. However, the significantly negative coefficient on the '*Share when loss*' variable implied that, when compared to altruism in a normal situation, households became less altruistic when they were asked to share money with another villager during a severe flood event in which everyone in the village, including the households themselves, was affected. Nevertheless, it turns out that experiencing the 2011 flood made flooded households more altruistic towards flood victims as shown in column (2). Being prone to floods also corresponded with being more altruistic. The estimations for wealth subgroups show that asset-poor households that were not prone to flooding became more altruistic and that flood-prone households in the bottom and middle wealth groups exhibited less altruistic behavior after being hit by the 2011 flood. We find significant evidence, but only in the top wealth group, that flooded households that were already prone to floods became less altruistic towards flood victims. It is likely that experiencing the 2011 flood made them realize the limitations of risk-sharing in the presence of aggregate shock.

These results are robust when performing ordered probit estimations in columns (4) to (6). Overall, we find no significant evidence that the 2011 flood affected the altruistic behavior of households in general. It is only the case for asset-poor households that experiencing the 2011 flood made flood-prone households less altruistic. A decrease in altruistic behavior among flood victims could reduce social capital formation in the aftermath of a severe flood. Our finding corresponds with other studies on natural disasters and social preferences. For example, Castillo and Carter (2011) find that negative weather shocks from Hurricane Mitch in 1998 increased the social interaction of small Honduran communities, but that this relationship was not linear to the size of shock. Cassar et al. (2011) show that the 2014 Indian Ocean earthquake and tsunami in Thailand resulted in higher altruism. Chantarat et al. (2015) also find that the 2011 flood in Cambodia made flooded households in non-flood-prone areas more altruistic.

5.2 How did the 2011 flood affect subjective expectations of future floods and the dependability of safety net institutions?

Table 7 summarizes the regression results for subjective expectations of mild and severe floods in the future. We pooled the two flood events together and used a variable '*For mild flood*' to indicate the results for mild flood events. For the full sample, the OLS estimates in columns (1) to (3) show that the 2011 flood did not make households adjust their subjective expectations of future floods. However, by performing ordered probit estimations in columns (4) to (6), we find that the flood significantly increased the subjective probabilities of future severe floods among flooded households, while being in severely flooded villages did not affect their expectations of future floods. Compared with severe floods, the subjective expectations of mild floods appeared significantly larger, signifying that farming households were likely to anticipate the occurrence of frequent, but less severe floods in the next 10 years. Surprisingly, the degree to which households are prone to floods in normal years did not significantly affect their perceptions of future floods in any mean.

[Table 7]

The estimation results for population subgroups by ordered probit regressions show that the 2011 flood significantly increased subjective expectations of future severe floods among households in the bottom wealth group. The incidence of the 2011 flood at the village level induced households in this group to adjust upward their expectations of future severe floods. Moreover, we find that the 2011 flood also increased subjective expectations of future severe floods of households in the middle wealth group, while there was no such evidence for households in the top wealth group. Our key finding is consistent with Chantarat et al. (2015) finding that the 2011 flood in Cambodia significantly increased subjective expectations of future floods, especially for severe floods.

[Table 8]

Table 8 summarizes the estimation results on households' perceptions of their own capability and that of social networks and the government as safety net institutions following the severe flood event. Using village- and household-level flood exposures, columns (1) to (6) report OLS estimates; columns (7) to (12) report ordered probit estimates. The results show that there was no significant difference in safety net perceptions between households living in flood-prone areas and households outside those areas. Experiencing the 2011 flood significantly reduced the perceived dependability of self-insurance and social insurance of both flooded households and households in severely flooded villages that were not prone to floods. It turns out that the reduction in self-reliance after the 2011 flood was significantly larger among flood-prone households in flooded villages. As for the provision of public insurance, we find that being hit by the 2011 flood significantly increased subjective expectations of government assistance among flooded households that were not prone to floods.

The estimation results for wealth subgroups reveal that the decreasing dependability of self-insurance and social networks was relatively similar across different subgroups, except that the 2011 flood did not affect the perception of self-reliance of households in the top wealth group. Strikingly, we find that households' perceptions of public insurance varied according to wealth status. The 2011 flood only made flooded households in the middle wealth group who were located in non-flood prone areas adjust upward their subjective expectations of government assistance. However, for flood-prone households in this wealth group, being hit by the 2011 flood did not change their subjective expectations of public safety nets. This could be due to being in the flood-prone areas already made them frequent receivers of government assistance prior to the 2011 flood. We did not see such evidence among households in other wealth groups as poorer households might have already benefited from government assistance during past flood events and, therefore, expected to receive the same treatment in the future, while wealthy households might be capable of dealing with floods and thus do not expect to receive assistance from the government insurance.

5.3 How did the 2011 flood affect household behavior?

In the previous sections, we tried to understand how the 2011 flood affected households' preferences and subjective expectations. These changes in preferences and expectations could also affect household behaviors, and some of these changes could in turn affect households' long-term prosperity and resilience to future disaster risks. In this section, we further explore whether and how the 2011 flood affected household behaviors and how these behavioral changes were related to changes in household preferences and subjective expectations following the severe flood event.

[Table 9]

Table 9 summarizes the estimation results of probit regressions on eight behavioral variables using household-level flood exposure. We consider key behavior that prevents the incidence of floods in the future or mitigates the severity and damage of future flood events. Each household was asked whether they engaged in or made decisions about the following options: [1] whether the household had savings; [2] whether the household invested in their own flood prevention or adjusted farming practices; [3] whether the household grew other crops; [4] whether the household had off-farm employment; [5] whether the household participated in or contributed to building flood prevention systems with the community; [6] whether the household gave support to others, including by lending money; [7] whether the household demanded market crop insurance against future flood risks; and [8] whether the household invested in better seeds and organic fertilizer. Behaviors [1] to [4] are types of self-insurance by building up buffer stocks and diversification. Behaviors [5] and [6] reflect social insurance. Behavior [7] is market-based insurance, while behavior [8] is important for future income generation.

Column (1) shows that the incentive to save of non-flood-prone households was lowered after they were hit by the 2011 flood, especially those in the bottom and middle wealth groups. This result is in line with our earlier findings that the 2011 flood significantly increased the impatience of households that were not prone to flooding. Overall, we find that the more capable the households think they are, the lesser their intention to engage in self-insurance strategies. The incentive to invest in flood protection and to adjust farming practices increased significantly with subjective expectations of future floods reported in column (5). With no significant effect of the 2011 flood, households may find it not worthwhile to invest in flood protection and to adjust farming practices while still living in the location that has been flooded regularly. Column (11) shows that the 2011 flood significantly reduced crop diversification of non-flood-prone households in the middle wealth group, perhaps because of their higher subjective expectations of public insurance following the 2011 flood. Asset-rich households that were prone to floods were most likely to diversify their crop production shown in column (12). Column (15) shows that being hit by the 2011 flood induced off-farm diversification among flood-prone households in the middle wealth group. However, asset-poor households were less likely to engage in off-farm activities when hit by the flood, probably because of their limited earning options shown in column (14).

As for social insurance, experiencing the 2011 flood did not induce flooded households to contribute to public goods or to help others, no matter whether they were living in flood-prone or non-flood-prone areas. This finding is consistent with what we found earlier that the 2011 flood reduced the perceived dependability of social networks among flooded households. Generally, households in risky environments were more likely to take out commercial insurance against future flood risks. Column (25) shows that the 2011 flood boosted demand for crop insurance among flooded households that were not prone to floods before 2011, especially those in the bottom and middle wealth groups. A significant increase in insurance demand is in line with our previous finding that the 2011 flood increased the risk aversion and subjective expectations of future floods of non-flood-prone households. Furthermore, we also find no crowding out effect of public insurance through the provision of natural disaster relief that might crowd out demand for market-based insurance. Column (29) shows that households with higher flood risks generally had less incentive to invest in better seeds and organic fertilizer. As a result of higher risk aversion, the 2011 flood significantly reduced the plot investment of asset-poor households in non-flood-prone areas as reported in column (30).

6. Conclusions

This study contributes to the existing literature on the potential impacts of natural disasters on agricultural households. Given its rarity and severity, the 2011 flood serves as an ideal natural experiment for a study of how affected farming households cope with largely unexpected natural disasters and how these disasters affect their behavior. We examine the effects of the 2011 flood on preferences, subjective expectations, and behavior of rice-farming households by utilizing the discontinuity generated by the flood to construct a variation in severe flood experience across sampled villages and households in Thailand.

Our empirical analyses show that experiencing the 2011 flood significantly changed the preferences, subjective expectations of future floods, and safety net perceptions of households that were not prone to flooding. These significant changes can be observed especially among asset-poor households. However, the 2011 flood did not have any statistically significant effect on households in the high risk group whose farms had been flooded regularly. For preferences, households became more risk averse, more impatient, and more altruistic after being hit by the 2011 flood. An increase in risk aversion was found to be associated with higher demand for insurance, while reducing productive investment. Increasing impatience also reduced the flooded households' incentive to save. We did not find any evidence that being more altruistic induces social insurance among flooded households.

The 2011 flood made households adjust upward their subjective expectations of future severe floods. We find that even though households expected a higher chance of floods in the next 10 years, they were less likely to adopt self-insurance strategies that could help them manage and cope with future floods. After being hit by the 2011 flood, households felt less confident about their ability to deal with future flood events. Moreover, the flood also reduced their perceived dependability of social networks, probably because they started to realize the limitations of risk-sharing networks in the presence of aggregate or covariate shocks. Finally, the 2011 flood significantly increased subjective expectations of government assistance of non-flood-prone households in the middle wealth group. We also find that some self-insurance strategies was negatively correlated with the expectations of public insurance among households in this group. This finding highlights one of the crucial problems arising from the government's implicit insurance that crowds out private effort through self-insurance during the severe flood event. On the contrary, there was no crowding out effect of public insurance on household demand for market-based insurance.

The incidence of the 2011 flood brought some changes in the behavior of households. These behavioral changes could be mediated through the flood-induced changes in preferences and subjective expectations. We find that the flooded households had less savings and less productive investment in better seeds and organic fertilizer, especially among asset-poor households. This finding has important implications for long-term economic prosperity and the potential welfare impacts of catastrophic disasters. Experiencing the 2011 flood also reduced the incentive of flooded households to insure themselves against future flood risks through on-farm and off-farm diversification strategies. Flooded households had higher demand for market-based insurance than non-flooded households.

The 2011 flood is an exceptional case given its scale and magnitude. With the influence of climate change, we expect to see more frequent disasters of this kind and more severe damage in the years ahead. It is important to discuss some of the policy implications of our empirical findings. During the 2011 flood, the Thai government had a reputation for poor crisis management as well as for inconsistency and imprecision in communication. The government should first regain its reputation and give the Thai people confidence in public safety nets.

Second, a reduction of savings and productive investment among flooded households in the less wealthy groups signifies the importance of unexpected and severe disasters that could make affected households fall into the poverty trap. It is therefore important for the design of safety nets and development programs that help facilitate natural disaster risk-management and risk-coping strategies of agricultural households in the rural economy. The government's policy should aim to promote farm investment and the competiveness of agricultural households in the aftermath of severe disaster events−for example, the provision of investment loans at a low interest rate.

Third, the government should be more careful in providing assistance or compensation to flood victims through the official loss and damage assessment so that the provision of public insurance will not crowd out any private effort through self-insurance. Our finding suggests that households were less likely to insure themselves by engaging in on-farm and off-farm diversification strategies following the 2011 flood. The government should therefore encourage these households by giving technical assistance with their farming practices and flood prevention infrastructure. The government could also facilitate the access to non-agricultural occupation so that farming households can diversify their income away from such uncertain activities.

Finally, we find that flooded households may have realized the limitations of risk-sharing among families and social networks within the community in the presence of aggregate shocks, and that they are more likely to take out commercial insurance. Under such circumstances, the government and financial institutions should develop their insurance products so that farmers can benefit from the protection at a reasonable price. In addition, the government, in cooperation with the private sector, should also take part in building community resilience to future large-scale floods. Such programs should aim to improve coordination and collaboration among households in order to help strengthen risk-sharing arrangements between flooded and non-flooded households so that they can rely on each other, even in the absence of public or private assistance.

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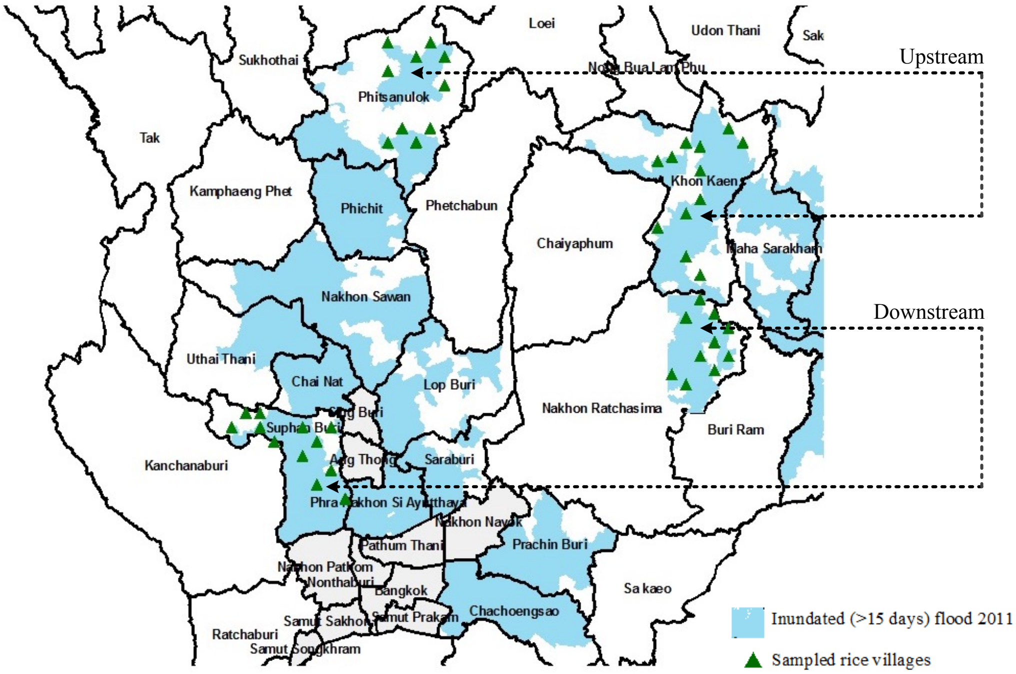
Figure 1: Map of studied villages and the 2011 flood inundation



Appendix A: Experimental Games and Preference Measures

A.1 Risk preferences

Suppose there were seven varieties of rice seeds. Each variety would give a different yield, which was also varied according to the situation. Some varieties gave a low yield, but were resistant to diseases, pests, and natural disasters. Some varieties gave a higher yield, but were not resistant to diseases, pests, and natural disasters, and would give a very low yield when diseases, pests, or natural disasters took place. If you did not know for sure whether such disasters would happen next year, but you knew that the chances that the disasters would happen and would not happen were equal, which variety of rice seed would you choose to grow next year?

Rice variety	Yield (kg per rai) in the year that diseases, pests, or natural disasters happened	Yield (kg per rai) in the year that diseases, pests, or natural disasters did not happen
1	700	700
2	630	1,330
3	560	1,680
4	420	2,100
5	280	2,240
6	140	2,660
7	0	2,800

By allowing the respondent to choose among different rice varieties, the respondent's seed choice hence reflected his or her degree of risk aversion. A risk aversion parameter was constructed based on the payoff of the chosen rice variety as an ordinal index ranging from 1 (least averse) to 5 (most averse):

Rice variety	Low payoff (Pr = 0.5)	High payoff (Pr = 0.5)	Expected payoff	Risk class	Risk aversion parameter
1	700	700	700	extreme	5
2	630	1,330	980	severe	4
3	560	1,680	1,120	intermediate	3
4	420	2,100	1,260	moderate	2
5	280	2,240	1,260	inconsistent	–
6	140	2,660	1,400	slightly-to-neutral	1
7	0	2,800	1,400	inconsistent	–

A.2 Time preferences

Suppose you had to choose between two choices (A or B) in eight situations. If you chose choice A, you would receive 1,000 baht tomorrow. On the other hand, if you chose choice B, you would receive more than 1,000 baht in the next 15 days. Which choice would you pick in each situation, when the amount of money in choice B increased as the experiment progressed from situations 1 to 8? An impatience index ranging from 0 to 7 was defined on the basis of when the respondent first switched from choice A to choice B. If the respondent did not switch by choosing choice A in all situations, an impatience index would be 8, representing the highest impatience level (least patience):

Situation	Choice A	Choice B	Impatience index if first switch to B
1	Get 1,000 baht tomorrow	Get 1,000 baht in 15 days	0 (not impatient)
2	Get 1,000 baht tomorrow	Get 1,010 baht in 15 days	1
3	Get 1,000 baht tomorrow	Get 1,020 baht in 15 days	2
4	Get 1,000 baht tomorrow	Get 1,050 baht in 15 days	3
5	Get 1,000 baht tomorrow	Get 1,100 baht in 15 days	4
6	Get 1,000 baht tomorrow	Get 1,400 baht in 15 days	5
7	Get 1,000 baht tomorrow	Get 1,700 baht in 15 days	6
8	Get 1,000 baht tomorrow	Get 2,000 baht in 15 days	7

A.3 Social preferences

[1] Suppose we gave you 1,000 baht in cash today and matched you with another farmer from your village, but you did not know who the other farmer was and the other farmer did not know who you were. If we gave you a chance to give that person a part or all of the 1,000 baht, while keeping your decision confidential, would you give that farmer any money? If so, how much?

[2] Suppose there was a severe flood in which everyone in your village, including you, was affected and your loss was approximately 50,000 baht. Now suppose that we gave you 20,000 baht as compensation and paired you with one of the flood victims from your village, but you did not know who the other farmer was and the other farmer did not know who you were. If we gave you the opportunity to give that person a part or all of the 20,000 baht, while keeping your decision confidential, would you give that flood-affected farmer any money? If so, how much?

Altruism parameters were constructed from the proportion of money that the respondent gave in each of the above situations. These continuous parameters thus ranged from 0 (least altruistic) to 1 (most altruistic).

Appendix B: Elicitation of Subjective Expectations

I would like to ask you a series of questions regarding the likelihood that some events will occur. I will give you 10 one-baht coins, and you will be asked to allocate them into given intervals to reflect the strength of your belief that each event will happen − each coin represents one chance out of 10 or 10 percent. The situation with greater number of coins assigned thus reflects the situation that you feel most likely to happen. Subjective expectation variables were constructed directly from the number of coins the respondent assigned to each situation as the percentage out of 10.

<table>
<tr><td colspan="7">Question 1</td></tr>
<tr><td colspan="7">The likelihood that the following flood events will occur in the next 10 years</td></tr>
<tr><td>No flood
</td><td colspan="3">Mild flood (normal or seasonal flood)
</td><td colspan="3">Severe flood (similar to the 2011 flood)
</td></tr>
<tr><td>(coins)</td><td colspan="3">(coins)</td><td colspan="3">(coins)</td></tr>
<tr><td rowspan="8"></td><td colspan="3">Question 2</td><td colspan="3">Question 3</td></tr>
<tr><td colspan="3">The likelihood that the occurrence of mild flood will affect rice production</td><td colspan="3">The likelihood that the occurrence of severe flood will affect rice production</td></tr>
<tr><td>No damage</td><td>Partial damage</td><td>Total damage</td><td>No damage</td><td>Partial damage</td><td>Total damage</td></tr>
<tr><td>(coins)</td><td>(coins)</td><td>(coins)</td><td>(coins)</td><td>(coins)</td><td>(coins)</td></tr>
<tr><td rowspan="4"></td><td colspan="2">Question 4</td><td rowspan="4"></td><td colspan="2">Question 5</td></tr>
<tr><td colspan="2">The likelihood that farmer will receive relief when mild flood occurs</td><td colspan="2">The likelihood that farmer will receive relief when severe flood occurs</td></tr>
<tr><td>Yes</td><td>No</td><td>Yes</td><td>No</td></tr>
<tr><td>(coins)</td><td>(coins)</td><td>(coins)</td><td>(coins)</td></tr>
</table>

Table 1 Summary statistics of sampling and characteristics of 2011 flood among flooded households

	All		Suphan Buri		Phitsanulok		Khon Kaen		Nakorn Ratchasima	
A. Sampled households										
Total villages	44		12		10		12		10	
Flooded villages	22		6		5		6		5	
Total households	426		104		122		104		96	
Total flooded households	175		35		67		43		30	
Total non-flood prone households	248		65		80		65		38	
Flooded non-flood prone hhs	85		18		39		23		15	
B. Characteristics of flood 2011	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Starting month	8.78	1.24	9.02	0.13	7.67	1.08	9.59	0.86	9.89	0.71
Flood days	70.8	41.3	97.4	44.3	80.9	39.8	45.3	22.1	46.9	26.9
Affected rice farm (%)	0.86	0.26	0.82	0.28	0.85	0.25	0.89	0.25	0.88	0.25
Rice income lost (Baht)	143,599	139,151	148,434	149,016	159,494	157,871	69,433	78,021	44,540	71,146
Rice income lost (% rice income)	0.75	0.29	0.71	0.31	0.78	0.28	0.86	0.26	0.63	0.31
With house damage (%)	0.00	0.06	0.02	0.13	0.00	0.00	0.00	0.00	0.00	0.00
With productive asset lost (%)	0.02	0.15	0.07	0.26	0.02	0.14	0.00	0.00	0.00	0.00
With reduced consumption (%)	0.19	0.40	0.13	0.33	0.29	0.46	0.13	0.34	0.15	0.36
C. Coping strategies	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Collect forest product/fishing	0.07	0.26	0.23	0.43	0.05	0.22	0.00	0.00	0.00	0.00
Draw out saving and asset sale	0.05	0.21	0.04	0.19	0.05	0.22	0.04	0.19	0.07	0.25
Additional labor work	0.09	0.29	0.02	0.13	0.09	0.29	0.19	0.39	0.07	0.25
Borrowing from FN institutions	0.53	0.50	0.46	0.50	0.71	0.46	0.30	0.46	0.48	0.51
Friends, relatives and remittances	0.14	0.35	0.13	0.33	0.12	0.33	0.22	0.42	0.11	0.31
Governments	0.62	0.49	0.52	0.50	0.65	0.48	0.80	0.41	0.48	0.51
Debt moratorium	0.65	0.48	0.73	0.45	0.88	0.33	0.47	0.51	0.23	0.43
Crop insurance payouts	0.05	0.22	0.00	0.00	0.00	0.00	0.13	0.34	0.13	0.34

Note: Coping strategies reported as fraction of flooded households using the strategies. Flooded villages are villages identified using GIS flood map with more than 50% rice field inundated. Flooded households are households with rice field experiencing total crop lost from flood.

Table 2 Summary statistics of sampled households by 2011 flood exposures

	For non-flood prone households					
	Village flood (=1)			Household flood (=1)		
	Flooded	Not flooded	Difference	Flooded	Not flooded	Difference
A. Household demographics						
Female (=1)	0.467	0.615	-0.148**	0.506	0.589	-0.0831
	(0.502)	(0.488)	(0.0648)	(0.503)	(0.494)	(0.0665)
Age (years)	53.15	53.90	-0.752	52.86	54.02	-1.166
	(11.00)	(10.69)	(1.421)	(10.47)	(10.97)	(1.445)
Have education-primary (=1)	0.717	0.801	-0.0839	0.729	0.791	-0.0620
	(0.453)	(0.400)	(0.0553)	(0.447)	(0.408)	(0.0564)
Have education-secondary (=1)	0.228	0.154	0.0744	0.212	0.166	0.0461
	(0.422)	(0.362)	(0.0506)	(0.411)	(0.373)	(0.0517)
Household size	4.207	3.994	0.213	4.224	3.994	0.230
	(1.654)	(1.675)	(0.219)	(1.621)	(1.691)	(0.223)
Respondent is head (=1)	0.772	0.731	0.0410	0.718	0.761	-0.0431
	(0.422)	(0.445)	(0.0574)	(0.453)	(0.428)	(0.0584)
Member migrate (%)	0.217	0.224	-0.00697	0.259	0.202	0.0564
	(0.415)	(0.419)	(0.0548)	(0.441)	(0.403)	(0.0557)
B. Income and asset						
Income per capita ($)	99929.6	81186.9	18742.7	89512.6	87424.0	2088.6
	(119982.4)	(91122.1)	(13506.4)	(104525.5)	(102419.9)	(13799.6)
Rice income in total income (%)	0.523	0.579	-0.0557	0.592	0.541	0.0511
	(0.381)	(0.353)	(0.0478)	(0.387)	(0.351)	(0.0487)
Land per capita (ha)	5.044	5.393	-0.349	4.507	5.657	-1.150*
	(4.210)	(4.812)	(0.604)	(3.965)	(4.853)	(0.611)
Asset per capita ($)	220270.2	170459.6	49810.5*	227831.8	168655.6	59176.2**
	(300594.5)	(156117.6)	(29033.4)	(309202.6)	(155501.6)	(29485.4)
C. Rice production and plot characteristics						
Access to irrigation	0.514	0.625	-0.112*	0.642	0.554	0.0888
(% total agri land)	(0.494)	(0.476)	(0.0634)	(0.471)	(0.490)	(0.0647)
Sowing month (1,2,..,12)	5.173	5.338	-0.165	5.237	5.299	-0.0618
	(1.022)	(0.989)	(0.140)	(1.005)	(1.004)	(0.142)
Elevation (% low land)	0.442	0.420	0.0220	0.349	0.312	0.036
	(0.444)	(0.453)	(0.0591)	(0.407)	(0.427)	(0.0562)
D. Shocks						
Flood frequency in the past 5 yrs	0.391	0.417	-0.0254	0.447	0.387	0.0606
	(0.592)	(0.579)	(0.0767)	(0.567)	(0.591)	(0.0780)
Other shocks in the past 10 yrs	1.348	1.417	-0.0688	1.541	1.313	0.228*
	(0.943)	(0.930)	(0.123)	(1.041)	(0.864)	(0.124)
Had prepared for 2011 flood (=1)	0.0978	0.0930	0.00480	0.0941	0.104	-0.0102
	(0.299)	(0.292)	(0.0443)	(0.294)	(0.307)	(0.0404)
Benefit from rice mortgate policy	0.750	0.769	-0.0192	0.788	0.748	0.0398
(=1)	(0.435)	(0.423)	(0.0562)	(0.411)	(0.435)	(0.0571)
Benefit from village fund (=1)	0.739	0.647	0.0917	0.718	0.663	0.0551
	(0.442)	(0.479)	(0.0612)	(0.453)	(0.474)	(0.0625)
Benefit from farmer's credit card policy	0.663	0.737	-0.0741	0.741	0.693	0.0479
(=1)	(0.475)	(0.442)	(0.0597)	(0.441)	(0.463)	(0.0609)

Note: Had prepared for 2011 flood = 1 if household reported that they have done something to prepare for 2011 flood (e.g., adjusting cropping patterns). Elevation = 1 (lowland), 2(in-between), 3(slope), 4(highland). Sowing month = 1 (January),...,12(December). Standard deviations in parentheses. * p<0.1; ** p<0.05; *** p<0.01.

Table 2 Summary statistics of sampled households by 2011 flood exposures (continued)

	For flood prone households					
	Village flood (=1)			Household flood (=1)		
	Flooded	Not flooded	Difference	Flooded	Not flooded	Difference
A. Household demographics						
Female (=1)	0.533	0.616	-0.0837	0.544	0.602	-0.0578
	(0.502)	(0.489)	(0.0743)	(0.501)	(0.492)	(0.0744)
Age (years)	52.04	52.15	-0.108	52.09	52.10	-0.0134
	(10.30)	(8.639)	(1.430)	(9.090)	(9.963)	(1.429)
Have education-primary (=1)	0.772	0.744	0.0276	0.756	0.761	-0.00581
	(0.422)	(0.439)	(0.0645)	(0.432)	(0.429)	(0.0645)
Have education-secondary (=1)	0.174	0.209	-0.0354	0.211	0.170	0.0407
	(0.381)	(0.409)	(0.0592)	(0.410)	(0.378)	(0.0592)
Household size	4.761	3.988	0.772***	4.411	4.364	0.0475
	(2.072)	(1.475)	(0.271)	(1.823)	(1.877)	(0.277)
Respondent is head (=1)	0.728	0.674	0.0538	0.711	0.693	0.0179
	(0.447)	(0.471)	(0.0689)	(0.456)	(0.464)	(0.0689)
Member migrate (%)	0.370	0.326	0.0440	0.333	0.364	-0.0303
	(0.485)	(0.471)	(0.0718)	(0.474)	(0.484)	(0.0718)
B. Income and asset						
Income per capita ($)	79249.8	64191.3	15058.5	73929.9	69974.4	3955.5
	(116309.3)	(76216.7)	(14848.4)	(74656.6)	(119295.4)	(14881.2)
Rice income in total income (%)	0.530	0.576	-0.0465	0.549	0.555	-0.00610
	(0.360)	(0.390)	(0.0562)	(0.389)	(0.361)	(0.0563)
Land per capita (ha)	5.594	5.902	-0.309	5.360	6.135	-0.775
	(9.117)	(5.095)	(1.118)	(6.391)	(8.383)	(1.116)
Asset per capita ($)	254628.6	195139.8	59488.7	245355.1	205976.0	39379.1
	(519735.6)	(240529.9)	(61406.5)	(405142.5)	(414934.3)	(61467.3)
C. Rice production and plot characteristics						
Access to irrigation	0.341	0.409	-0.0679	0.376	0.372	0.00411
(% total agri land)	(0.461)	(0.482)	(0.0707)	(0.470)	(0.474)	(0.0708)
Sowing month (1,2,..,12)	5.278	5.117	0.162	5.160	5.240	-0.0795
	(0.973)	(0.858)	(0.147)	(0.928)	(0.913)	(0.148)
Elevation (% low land)	0.838	0.819	0.0195	0.825	0.832	-0.00695
	(0.254)	(0.274)	(0.0396)	(0.264)	(0.264)	(0.0396)
D. Shocks						
Flood frequency in the past 5 yrs	2.511	2.465	0.0458	2.478	2.500	-0.0222
	(0.524)	(0.568)	(0.0818)	(0.545)	(0.547)	(0.0818)
Other shocks in the past 10 yrs	1.163	1.419	-0.256	1.267	1.307	-0.0402
	(1.072)	(1.011)	(0.156)	(1.100)	(0.998)	(0.158)
Had prepared for 2011 flood (=1)	0.109	0.0962	0.0125	0.122	0.0682	0.0540
	(0.313)	(0.296)	(0.0397)	(0.329)	(0.254)	(0.0441)
Benefit from rice mortgate policy	0.761	0.733	0.0283	0.744	0.750	-0.00556
(=1)	(0.429)	(0.445)	(0.0655)	(0.439)	(0.435)	(0.0655)
Benefit from village fund (=1)	0.717	0.651	0.0662	0.700	0.670	0.0295
	(0.453)	(0.479)	(0.0699)	(0.461)	(0.473)	(0.0700)
Benefit from farmer's credit card policy	0.674	0.733	-0.0586	0.689	0.716	-0.0270
(=1)	(0.471)	(0.445)	(0.0688)	(0.466)	(0.454)	(0.0689)

Note: Had prepared for 2011 flood = 1 if household reported that they have done something to prepare for 2011 flood (e.g., adjusting cropping patterns). Elevation = 1 (lowland), 2(in-between), 3(slope), 4(highland). Sowing month = 1 (January),...,12(December). Standard deviations in parentheses. * p<0.1; ** p<0.05; *** p<0.01.

Table 3 Summary statistics of preference, subjective expectation and behavior variables

	For non-flood prone households					
	Village flood (=1)			Household flood (=1)		
	Flooded	Not flooded	Difference	Flooded	Not flooded	Difference
Preferences						
Risk aversion (1,2,..,5)	4.127	3.921	0.206	4.182	3.894	0.288*
	(1.055)	(1.186)	(0.161)	(1.073)	(1.169)	(0.161)
Impatience (0,1,2,..,8)	4.804	4.910	-0.106	5.212	4.693	0.519
	(2.405)	(2.804)	(0.350)	(2.426)	(2.763)	(0.355)
Altruism - % money given to	0.243	0.256	-0.0129	0.258	0.248	0.00918
villager during normal time (0-1)	(0.241)	(0.246)	(0.0321)	(0.248)	(0.243)	(0.0327)
Altruism - % assistance shared to	0.200	0.229	-0.0295	0.250	0.202	0.0474
flood victim in flood time (0-1)	(0.222)	(0.243)	(0.0310)	(0.237)	(0.234)	(0.0314)
Subjective expectations						
Probability of severe flood	0.275	0.202	0.0731***	0.302	0.191	0.112***
(0,0.1,0.2,…,1)	(0.228)	(0.203)	(0.0279)	(0.248)	(0.185)	(0.0279)
Probability of mild flood	0.461	0.419	0.0423	0.461	0.420	0.0409
(0,0.1,0.2,…,1)	(0.254)	(0.286)	(0.0361)	(0.268)	(0.279)	(0.0368)
Can rely on themselves	0.321	0.433	-0.112**	0.235	0.472	-0.237***
during flood (0,0.5,1)	(0.403)	(0.410)	(0.0536)	(0.341)	(0.420)	(0.0529)
Can rely on social network	0.353	0.519	-0.166***	0.329	0.525	-0.195***
during flood (0,0.5,1)	(0.352)	(0.376)	(0.0483)	(0.323)	(0.384)	(0.0488)
Can rely on government	0.359	0.378	-0.0195	0.436	0.337	0.0997**
during flood (0,0.5,1)	(0.318)	(0.349)	(0.0444)	(0.344)	(0.330)	(0.0448)
Behaviors						
Have saving (=1)	0.685	0.724	-0.0396	0.576	0.779	-0.203***
	(0.467)	(0.448)	(0.0599)	(0.497)	(0.416)	(0.0596)
Build flood protection/Adjust	0.467	0.340	0.128**	0.471	0.344	0.127*
farming practice (=1)	(0.502)	(0.475)	(0.0638)	(0.502)	(0.476)	(0.0649)
Diversify on farm (=1)	0.0471	0.0881	-0.0410	0.0559	0.0818	-0.0259
	(0.175)	(0.268)	(0.0312)	(0.219)	(0.247)	(0.0319)
Diversify off farm (=1)	0.120	0.0833	0.0362	0.129	0.0798	0.0497
	(0.326)	(0.277)	(0.0390)	(0.338)	(0.272)	(0.0396)
Contribute to building community	0.402	0.365	0.0368	0.412	0.362	0.0498
flood protection (=1)	(0.493)	(0.483)	(0.0640)	(0.495)	(0.482)	(0.0651)
Lend to or help others (=1)	0.163	0.141	0.0220	0.235	0.104	0.131***
	(0.371)	(0.349)	(0.0470)	(0.427)	(0.307)	(0.0471)
Demand market insurance (=1)	0.674	0.532	0.142**	0.847	0.448	0.399***
	(0.471)	(0.501)	(0.0644)	(0.362)	(0.499)	(0.0611)
Investment in better seeds and	0.696	0.801	-0.106*	0.765	0.761	0.00397
organic fertilizer (=1)	(0.463)	(0.400)	(0.0558)	(0.427)	(0.428)	(0.0572)

Note: Standard deviations in parentheses. * p<0.1; ** p<0.05; *** p<0.01

Table 3 Summary statistics of preference, subjective expectation and behavior variables (continued)

	For flood prone households					
	Village flood (=1)			Household flood (=1)		
	Flooded	Not flooded	Difference	Flooded	Not flooded	Difference
Preferences						
Risk aversion (1,2,..,5)	4.139	3.948	0.191	4.064	4.026	0.0385
	(1.083)	(1.213)	(0.184)	(1.177)	(1.128)	(0.185)
Impatience (0,1,2,..,8)	4.804	4.826	-0.0212	4.944	4.682	0.263
	(2.678)	(2.745)	(0.407)	(2.628)	(2.786)	(0.406)
Altruism - % money given to	0.235	0.306	-0.0710*	0.246	0.293	-0.0476
villager during normal time (0-1)	(0.246)	(0.233)	(0.0360)	(0.246)	(0.237)	(0.0362)
Altruism - % assistance shared to	0.234	0.262	-0.0283	0.210	0.286	-0.0762**
flood victim in flood time (0-1)	(0.234)	(0.236)	(0.0352)	(0.235)	(0.230)	(0.0348)
Subjective expectations						
Probability of severe flood	0.296	0.207	0.0887***	0.309	0.195	0.113***
(0,0.1,0.2,…,1)	(0.222)	(0.169)	(0.0298)	(0.228)	(0.155)	(0.0293)
Probability of mild flood	0.493	0.442	0.0516	0.509	0.427	0.0816**
(0,0.1,0.2,…,1)	(0.234)	(0.273)	(0.0380)	(0.242)	(0.262)	(0.0377)
Can rely on themselves	0.207	0.424	-0.218***	0.217	0.409	-0.192***
during flood (0,0.5,1)	(0.298)	(0.402)	(0.0528)	(0.336)	(0.376)	(0.0534)
Can rely on social network	0.293	0.459	-0.166***	0.294	0.455	-0.160***
during flood (0,0.5,1)	(0.289)	(0.336)	(0.0469)	(0.279)	(0.344)	(0.0470)
Can rely on government	0.396	0.365	0.0305	0.433	0.327	0.106**
during flood (0,0.5,1)	(0.359)	(0.320)	(0.0511)	(0.373)	(0.295)	(0.0505)
Behaviors						
Have saving (=1)	0.696	0.709	-0.0137	0.700	0.705	-0.00455
	(0.463)	(0.457)	(0.0690)	(0.461)	(0.459)	(0.0689)
Build flood protection/Adjust	0.348	0.267	0.0804	0.400	0.216	0.184***
farming practice (=1)	(0.479)	(0.445)	(0.0694)	(0.493)	(0.414)	(0.0683)
Diversify on farm (=1)	0.0604	0.0785	-0.0181	0.0463	0.0925	-0.0462
	(0.199)	(0.233)	(0.0324)	(0.173)	(0.251)	(0.0322)
Diversify off farm (=1)	0.0978	0.128	-0.0301	0.144	0.0795	0.0649
	(0.299)	(0.336)	(0.0476)	(0.354)	(0.272)	(0.0474)
Contribute to building community	0.228	0.314	-0.086	0.300	0.239	0.0614
flood protection (=1)	(0.422)	(0.467)	(0.0666)	(0.461)	(0.429)	(0.0667)
Lend to or help others (=1)	0.141	0.151	-0.010	0.178	0.114	0.0641
	(0.350)	(0.360)	(0.0533)	(0.384)	(0.319)	(0.0530)
Demand market insurance (=1)	0.837	0.628	0.209***	0.867	0.602	0.264***
	(0.371)	(0.486)	(0.0646)	(0.342)	(0.492)	(0.0634)
Investment in better seeds and	0.783	0.698	0.085	0.778	0.705	0.0732
organic fertilizer (=1)	(0.415)	(0.462)	(0.0657)	(0.418)	(0.459)	(0.0658)

Note: Standard deviations in parentheses. * p<0.1; ** p<0.05; *** p<0.01

Table 4 Flood and risk aversion

	OLS			Ordered Probit		
	Village flood (=1)	Household flood (=1)	% Paddy field flooded	Village flood (=1)	Household flood (=1)	% Paddy field flooded
	(1)	(2)	(3)	(4)	(5)	(6)
Whole sample (N = 426)						
Flood	0.069	0.338**	0.262*	0.205	0.327**	0.310**
	(0.116)	(0.153)	(0.144)	(0.128)	(0.132)	(0.150)
Flood*Flood prone	-0.005	-0.277	-0.257	0.001	-0.270	-0.295
	(0.231)	(0.195)	(0.224)	(0.250)	(0.190)	(0.237)
Flood prone	0.001	0.087	0.072	0.034	0.143	0.141
	(0.142)	(0.177)	(0.181)	(0.148)	(0.170)	(0.170)
F - Joint signt. of all flood vars	0.30	2.93	2.15	3.88	6.48	4.56
Bottom Third (N = 142)						
Flood	0.179	0.772	0.763*	0.270	0.478***	0.556***
	(0.198)	(0.442)	(0.426)	(0.226)	(0.164)	(0.196)
Flood*Flood prone	0.195	-0.463	-0.725	0.108	-0.298	-0.607*
	(0.569)	(0.508)	(0.487)	(0.565)	(0.265)	(0.344)
Flood prone	-0.381	-0.178	-0.059	-0.076	0.092	0.211
	(0.407)	(0.235)	(0.231)	(0.405)	(0.211)	(0.196)
F - Joint signt. of all flood vars	0.80	1.64	1.81	3.76	8.52	8.94
Middle Third (N = 142)						
Flood	-0.118	0.247	0.095	0.027	0.529**	0.545**
	(0.366)	(0.237)	(0.198)	(0.309)	(0.207)	(0.243)
Flood*Flood prone	0.104	-0.027	0.090	0.234	-0.325	-0.372
	(0.367)	(0.297)	(0.294)	(0.402)	(0.250)	(0.281)
Flood prone	-0.051	-0.138	-0.147	-0.241	-0.068	-0.079
	(0.341)	(0.226)	(0.286)	(0.267)	(0.210)	(0.219)
F - Joint signt. of all flood vars	0.05	0.54	0.27	0.99	6.78	5.05
Upper Third (N = 142)						
Flood	0.088	0.114	-0.018	0.380	0.147	0.008
	(0.211)	(0.229)	(0.319)	(0.256)	(0.252)	(0.261)
Flood*Flood prone	-0.241	-0.157	0.119	-0.368	-0.395	-0.183
	(0.340)	(0.363)	(0.360)	(0.353)	(0.274)	(0.283)
Flood prone	0.324	0.373	0.257	0.432**	0.482*	0.365
	(0.198)	(0.248)	(0.225)	(0.213)	(0.258)	(0.234)
F - Joint signt. of all flood vars	0.27	0.14	0.06	2.23	2.60	0.59
Other controls	yes	yes	yes	yes	yes	yes
FE	subdistrict	village	village	-	-	-

Dependent variable is risk aversion. Robust standard errors in parentheses clustered at subdistrict level. * p<0.1; ** p<0.05; *** p<0.01. Other control variables included (but omited) are female, age, education-primary, education-secondary, household size, ln asset per capita, land per capita, number of past 10-yr shocks, whether household participated in rice mortgage policy and constant.

Table 5 Flood and impatience

	OLS			Ordered Probit		
	Village flood (=1)	Household flood (=1)	% Paddy field flooded	Village flood (=1)	Household flood (=1)	% Paddy field flooded
	(1)	(2)	(3)	(4)	(5)	(6)
Whole sample (N = 426)						
Flood	-0.238	0.336	0.504	-0.075	0.170*	0.165*
	(0.307)	(0.348)	(0.372)	(0.086)	(0.097)	(0.103)
Flood*Flood prone	0.142	0.053	-0.020	0.111	-0.054	-0.021
	(0.424)	(0.418)	(0.381)	(0.139)	(0.134)	(0.126)
Flood prone	0.001	-0.165	-0.144	-0.032	0.015	0.002
	(0.319)	(0.420)	(0.371)	(0.112)	(0.154)	(0.139)
F - Joint signt. of all flood vars	0.36	0.56	1.16	0.89	3.11	3.08
Bottom Third (N = 142)						
Flood	-1.304*	-1.919**	-1.731*	-0.402**	-0.326	-0.350*
	(0.734)	(0.897)	(0.973)	(0.197)	(0.201)	(0.212)
Flood*Flood prone	1.852**	1.234	1.520	0.701**	0.616*	0.865**
	(0.838)	(1.312)	(1.176)	(0.304)	(0.368)	(0.357)
Flood prone	-1.050	-0.604	-0.777	-0.439	-0.372	-0.423*
	(0.947)	(0.683)	(0.724)	(0.294)	(0.231)	(0.235)
F - Joint signt. of all flood vars	2.80	3.52	1.66	6.57	3.19	5.87
Middle Third (N = 142)						
Flood	0.204	0.486	0.861	0.127	0.462**	0.607***
	(0.388)	(0.546)	(0.844)	(0.131)	(0.187)	(0.215)
Flood*Flood prone	-0.338	0.068	0.110	-0.094	-0.581**	-0.681***
	(0.749)	(0.826)	(0.840)	(0.334)	(0.286)	(0.236)
Flood prone	0.843	0.554	0.425	0.253	0.416	0.391
	(0.508)	(0.621)	(0.546)	(0.260)	(0.280)	(0.245)
F - Joint signt. of all flood vars	0.14	0.57	1.69	1.03	6.77	10.41
Upper Third (N = 142)						
Flood	0.086	1.256*	1.559**	0.027	0.231	0.225
	(0.427)	(0.644)	(0.731)	(0.218)	(0.213)	(0.195)
Flood*Flood prone	-1.209	0.544	0.020	-0.251	0.091	-0.105
	(0.739)	(0.722)	(0.914)	(0.308)	(0.299)	(0.340)
Flood prone	0.558	-0.617	-0.365	0.034	-0.160	-0.063
	(0.686)	(0.507)	(0.572)	(0.285)	(0.212)	(0.230)
F - Joint signt. of all flood vars	1.84	3.44	3.58	1.21	2.35	1.84
Other controls	yes	yes	yes	yes	yes	yes
FE	subdistrict	village	village	-	-	-

Dependent variable is impatience. Robust standard errors in parentheses clustered at subdistrict level. * p<0.1; ** p<0.05; *** p<0.01. Other control variables included (but omited) are female, age, education-primary, education-secondary, household size, ln asset per capita, land per capita, number of past 10-yr shocks, whether household participated in rice mortgage policy and constant.

Table 6 Flood and altruism

	OLS			Ordered probit		
	Village flood (=1)	Household flood (=1)	% Paddy field flooded	Village flood (=1)	Household flood (=1)	% Paddy field flooded
	(1)	(2)	(3)	(4)	(5)	(6)
Whole sample (N = 852)						
Flood	-0.011	0.029	0.054	-0.055	0.015	0.112
	(0.035)	(0.039)	(0.044)	(0.169)	(0.171)	(0.202)
Flood*Flood prone	-0.066	-0.038	-0.034	-0.281	-0.267	-0.248
	(0.039)	(0.046)	(0.054)	(0.194)	(0.246)	(0.270)
Flood*Share when loss	-0.017	0.038*	0.022	-0.083	0.210**	0.140
	(0.025)	(0.020)	(0.024)	(0.125)	(0.096)	(0.110)
Flood*Flood prone*Share when loss	0.059	-0.067	-0.067	0.314	-0.340	-0.348
	(0.068)	(0.048)	(0.048)	(0.342)	(0.238)	(0.231)
Share when loss	-0.027	-0.046**	-0.039**	-0.101	-0.205**	-0.172**
	(0.019)	(0.017)	(0.015)	(0.091)	(0.084)	(0.078)
Flood prone	0.050**	0.048*	0.040	0.234***	0.216	0.172
	(0.019)	(0.026)	(0.023)	(0.080)	(0.133)	(0.111)
Flood prone*Share when loss	-0.017	0.039	0.036	-0.105	0.181	0.168
	(0.023)	(0.027)	(0.023)	(0.113)	(0.126)	(0.106)
F - Joint signt. of all flood vars	1.68	3.17	3.20	4.87	15.33	9.11
Bottom Third (N = 284)						
Flood	-0.051	0.144**	0.142**	-0.255	0.140	0.117
	(0.054)	(0.067)	(0.066)	(0.263)	(0.197)	(0.191)
Flood*Flood prone	-0.057	-0.264***	-0.252**	-0.155	-0.852***	-0.761***
	(0.081)	(0.072)	(0.087)	(0.414)	(0.246)	(0.293)
Flood*Share when loss	-0.006	0.033	0.032	-0.116	0.240	0.241
	(0.054)	(0.038)	(0.040)	(0.285)	(0.184)	(0.193)
Flood*Flood prone*Share when loss	-0.029	-0.017	-0.015	-0.031	-0.091	-0.072
	(0.127)	(0.100)	(0.075)	(0.650)	(0.477)	(0.350)
Share when loss	-0.045	-0.058**	-0.058**	-0.153	-0.269**	-0.266**
	(0.031)	(0.024)	(0.023)	(0.145)	(0.110)	(0.109)
Flood prone	-0.029	0.072	0.046	-0.223	0.049	-0.071
	(0.039)	(0.053)	(0.055)	(0.160)	(0.192)	(0.178)
Flood prone*Share when loss	0.083	0.067	0.068	0.352	0.310	0.316
	(0.063)	(0.063)	(0.048)	(0.327)	(0.311)	(0.229)
F - Joint signt. of all flood vars	3.52	4.30	2.69	9.79	25.68	8.84
Other control variables	yes	yes	yes	yes	yes	yes
FE	subdistrict	village	village	-	-	-

Dependent variable is altruism measured by proportion of grant money given to randomly matched villager during normal time or assistance money shared to randomly matched flood victim in the village in the situation when respondant also experiencing loss from flood. Share when loss is a binary variable = 0 when altruism is measured by the former and = 1 if measured by the latter when respondant also experiecing loss. Robust standard errors in parentheses clustered at subdistrict level. * p<0.1; ** p<0.05; *** p<0.01. Other control variables included (but omited) are female, age, education-primary, education-secondary, household size, ln asset per capita, land per capita, number of past 10-yr shocks, whether household participated in rice mortgage policy and constant.

Table 6 Flood and altruism (continued)

	OLS			Ordered probit		
	Village flood (=1)	Household flood (=1)	% Paddy field flooded	Village flood (=1)	Household flood (=1)	% Paddy field flooded
	(1)	(2)	(3)	(4)	(5)	(6)
Middle Third (N = 284)						
Flood	0.075	0.002	0.023	0.185	0.068	0.153
	(0.072)	(0.039)	(0.074)	(0.346)	(0.260)	(0.435)
Flood*Flood prone	-0.182*	-0.135*	-0.147*	-0.763	-0.697	-0.784
	(0.092)	(0.068)	(0.081)	(0.492)	(0.478)	(0.556)
Flood*Share when loss	-0.073	0.001	0.029	-0.317	0.006	0.173
	(0.043)	(0.036)	(0.035)	(0.208)	(0.182)	(0.199)
Flood*Flood prone*Share when loss	0.066	0.027	-0.020	0.322	0.173	-0.091
	(0.067)	(0.066)	(0.058)	(0.363)	(0.344)	(0.313)
Share when loss	0.010	-0.017	-0.023	0.068	-0.057	-0.091
	(0.025)	(0.024)	(0.026)	(0.133)	(0.125)	(0.138)
Flood prone	0.129**	0.156***	0.147***	0.670***	0.605**	0.599***
	(0.046)	(0.041)	(0.033)	(0.230)	(0.248)	(0.216)
Flood prone*Share when loss	-0.070	-0.059*	-0.044	-0.370	-0.312*	-0.237
	(0.047)	(0.033)	(0.035)	(0.238)	(0.174)	(0.188)
F - Joint signt. of all flood vars	2.78	1.71	2.67	8.97	3.48	7.31
Upper Third (N = 284)						
Flood	-0.042	0.003	0.074	-0.222	-0.165	0.095
	(0.055)	(0.064)	(0.093)	(0.281)	(0.300)	(0.364)
Flood*Flood prone	0.017	0.040	0.036	0.117	0.519	0.594
	(0.052)	(0.066)	(0.102)	(0.284)	(0.380)	(0.513)
Flood*Share when loss	0.031	0.081*	0.014	0.197	0.410*	0.059
	(0.056)	(0.042)	(0.060)	(0.278)	(0.214)	(0.318)
Flood*Flood prone*Share when loss	0.119	-0.216**	-0.177	0.570	-1.108**	-0.932
	(0.084)	(0.085)	(0.125)	(0.412)	(0.432)	(0.640)
Share when loss	-0.048	-0.069**	-0.040	-0.245	-0.335**	-0.183
	(0.037)	(0.030)	(0.031)	(0.195)	(0.162)	(0.169)
Flood prone	0.052**	0.069*	0.067*	0.285*	0.073	0.073
	(0.022)	(0.036)	(0.033)	(0.165)	(0.208)	(0.222)
Flood prone*Share when loss	-0.045	0.120**	0.090	-0.228	0.583**	0.433
	(0.050)	(0.051)	(0.060)	(0.249)	(0.259)	(0.303)
F - Joint signt. of all flood vars	2.27	7.17	2.15	8.18	13.62	4.14
Other control variables	yes	yes	yes	yes	yes	yes
FE	subdistrict	village	village	-	-	-

Dependent variable is altruism measured by proportion of grant money given to randomly matched villager during normal time or assistance money shared to randomly matched flood victim in the village in the situation when respondant also experiencing loss from flood. Share when loss is a binary variable = 0 when altruism is measured by the former and = 1 if measured by the latter when respondant also experiecing loss. Robust standard errors in parentheses clustered at subdistrict level. * p<0.1; ** p<0.05; *** p<0.01. Other control variables included (but omited) are female, age, education-primary, education-secondary, household size, ln asset per capita, land per capita, number of past 10-yr shocks, whether household participated in rice mortgage policy and constant.

Table 7 Flood and subjective probability of flood

	OLS			Ordered probit		
	Village flood (=1)	Household flood (=1)	% Paddy field flooded	Village flood (=1)	Household flood (=1)	% Paddy field flooded
	(1)	(2)	(3)	(4)	(5)	(6)
Whole sample (N = 852)						
Flood	0.048	0.056	0.045	0.048	0.500***	0.442*
	(0.044)	(0.044)	(0.059)	(0.044)	(0.189)	(0.242)
Flood*Flood prone	0.022	-0.001	0.031	0.022	0.040	0.198
	(0.025)	(0.026)	(0.039)	(0.025)	(0.133)	(0.184)
Flood*For mild flood	-0.031	-0.071	-0.036	-0.031	-0.369	-0.245
	(0.056)	(0.067)	(0.093)	(0.056)	(0.268)	(0.377)
Flood*Flood prone*For mild flood	-0.006	0.039	-0.020	-0.006	0.145	-0.091
	(0.054)	(0.038)	(0.055)	(0.054)	(0.166)	(0.235)
For mild flood	0.217***	0.229***	0.215***	0.217***	1.007***	0.946***
	(0.042)	(0.036)	(0.033)	(0.042)	(0.165)	(0.147)
Flood prone	0.009	0.005	-0.005	0.009	0.032	-0.010
	(0.017)	(0.018)	(0.020)	(0.017)	(0.116)	(0.131)
Flood prone*For mild flood	0.018	0.002	0.023	0.018	-0.001	0.085
	(0.051)	(0.052)	(0.044)	(0.051)	(0.212)	(0.176)
F - Joint signt. of all flood vars	2.22	1.14	1.84	12.51	25.87	33.30
Bottom Third (N = 284)						
Flood	0.046	0.133**	0.144*	0.307	0.780***	0.801***
	(0.067)	(0.061)	(0.073)	(0.245)	(0.207)	(0.241)
Flood*Flood prone	0.055	-0.045	0.002	0.473***	0.108	0.278
	(0.049)	(0.051)	(0.060)	(0.144)	(0.167)	(0.221)
Flood*For mild flood	-0.032	-0.217	-0.234	-0.114	-0.976**	-1.045**
	(0.098)	(0.142)	(0.150)	(0.367)	(0.478)	(0.518)
Flood*Flood prone*For mild flood	-0.042	0.072	-0.010	-0.277	0.359	0.025
	(0.096)	(0.145)	(0.143)	(0.366)	(0.508)	(0.507)
For mild flood	0.194**	0.254***	0.256***	0.774**	1.072***	1.080***
	(0.086)	(0.050)	(0.048)	(0.355)	(0.171)	(0.168)
Flood prone	0.017	0.045	0.036	-0.079	0.057	0.087
	(0.023)	(0.033)	(0.034)	(0.096)	(0.143)	(0.136)
Flood prone*For mild flood	-0.002	-0.029	-0.010	-0.018	-0.209	-0.136
	(0.086)	(0.095)	(0.086)	(0.320)	(0.335)	(0.302)
F - Joint signt. of all flood vars	0.76	1.20	1.23	28.48	27.44	16.05
Other control variables	yes	yes	yes	yes	yes	yes
FE	subdistrict	village	village	-	-	-

Dependent variable are subjective expectations of probability of severe and mild flood. For mild flood is a binary variable =1 if mild flood and = 0 if severe flood. Robust standard errors in parenthesesclustered at subdistrict level. * p<0.1; ** p<0.05; *** p<0.01. Other control variables included (but omited) are female, age, education-primary, education-secondary, household size, ln asset per capita, land per capita, number of past 10-yr shocks, whether household participated in rice mortgage policy and constant.

Table 7 Flood and subjective probability of flood (continued)

	OLS			Ordered probit		
	Village flood (=1)	Household flood (=1)	% Paddy field flooded	Village flood (=1)	Household flood (=1)	% Paddy field flooded
	(1)	(2)	(3)	(4)	(5)	(6)
Middle Third (N = 284)						
Flood	0.045	0.015	-0.024	0.525**	0.462***	0.392***
	(0.054)	(0.046)	(0.036)	(0.257)	(0.171)	(0.146)
Flood*Flood prone	0.028	0.071	0.127**	-0.204	0.233	0.359
	(0.044)	(0.065)	(0.054)	(0.253)	(0.234)	(0.273)
Flood*For mild flood	-0.034	-0.048	0.024	-0.237	-0.216	0.061
	(0.069)	(0.081)	(0.084)	(0.286)	(0.339)	(0.338)
Flood*Flood prone*For mild flood	0.063	0.034	-0.041	0.295	0.013	-0.303
	(0.090)	(0.067)	(0.076)	(0.360)	(0.304)	(0.322)
For mild flood	0.198***	0.200***	0.181***	0.962***	0.941***	0.863***
	(0.044)	(0.049)	(0.046)	(0.220)	(0.246)	(0.225)
Flood prone	0.006	-0.033	-0.045	0.099	-0.125	-0.173
	(0.032)	(0.047)	(0.042)	(0.175)	(0.201)	(0.207)
Flood prone*For mild flood	0.026	0.045	0.065	0.086	0.241	0.329
	(0.066)	(0.079)	(0.073)	(0.299)	(0.348)	(0.324)
F - Joint signt. of all flood vars	5.29	0.93	1.71	9.77	26.46	35.97
Upper Third (N = 284)						
Flood	0.064	0.002	-0.042	0.311	0.248	0.005
	(0.061)	(0.050)	(0.051)	(0.235)	(0.289)	(0.330)
Flood*Flood prone	-0.062	-0.022	0.033	-0.224	-0.186	0.139
	(0.060)	(0.067)	(0.073)	(0.309)	(0.348)	(0.425)
Flood*For mild flood	-0.034	0.025	0.127	-0.177	0.057	0.512
	(0.060)	(0.081)	(0.095)	(0.260)	(0.360)	(0.458)
Flood*Flood prone*For mild flood	-0.007	0.038	-0.043	0.030	0.176	-0.186
	(0.083)	(0.119)	(0.149)	(0.343)	(0.551)	(0.718)
For mild flood	0.263***	0.238***	0.208***	1.169***	1.078***	0.942***
	(0.042)	(0.032)	(0.037)	(0.213)	(0.180)	(0.180)
Flood prone	0.045	-0.002	-0.023	0.146	0.132	0.001
	(0.041)	(0.034)	(0.044)	(0.205)	(0.217)	(0.256)
Flood prone*For mild flood	0.016	-0.014	0.014	0.064	-0.037	0.090
	(0.069)	(0.050)	(0.062)	(0.288)	(0.242)	(0.297)
F - Joint signt. of all flood vars	0.41	0.22	0.65	2.27	2.68	8.50
Other control variables	yes	yes	yes	yes	yes	yes
FE	subdistrict	village	village	-	-	-

Dependent variable are subjective expectations of probability of severe and mild flood. For mild flood is a binary variable =1 if mild flood and = 0 if severe flood. Robust standard errors in parenthesesclustered at subdistrict level. * p<0.1; ** p<0.05; *** p<0.01. Other control variables included (but omited) are female, age, education-primary, education-secondary, household size, ln asset per capita, land per capita, number of past 10-yr shocks, whether household participated in rice mortgage policy and constant.

Table 8 Flood and safety net perceptions

	OLS					
	Can rely on themselves		Can rely on social		Can rely on government	
	Village flood (=1)	Household flood (=1)	Village flood (=1)	Household flood (=1)	Village flood (=1)	Household flood (=1)
	(1)	(2)	(3)	(4)	(5)	(6)
Whole sample (N = 426)						
Flood	-0.028	-0.114	-0.090	-0.102**	-0.060	0.123**
	(0.047)	(0.069)	(0.053)	(0.046)	(0.044)	(0.047)
Flood*Flood prone	-0.134**	0.022	-0.050	0.044	0.039	-0.010
	(0.060)	(0.065)	(0.061)	(0.058)	(0.061)	(0.059)
Flood prone	-0.005	-0.037	-0.034	-0.051	0.011	-0.019
	(0.044)	(0.065)	(0.051)	(0.039)	(0.042)	(0.034)
F - Joint signt. of all flood vars	6.07	2.17	3.84	2.85	1.48	3.96
Bottom Third (N = 142)						
Flood	-0.107	-0.302***	-0.094	-0.148**	-0.116	0.057
	(0.093)	(0.093)	(0.068)	(0.063)	(0.072)	(0.111)
Flood*Flood prone	-0.173	0.140	-0.103	0.063	0.012	0.125
	(0.154)	(0.108)	(0.130)	(0.098)	(0.161)	(0.136)
Flood prone	-0.025	-0.140	-0.027	-0.074	-0.015	-0.131
	(0.101)	(0.115)	(0.084)	(0.073)	(0.114)	(0.117)
F - Joint signt. of all flood vars	4.31	5.58	3.21	3.83	1.44	1.33
Middle Third (N = 142)						
Flood	-0.027	0.004	-0.104	-0.068	0.054	0.179*
	(0.118)	(0.114)	(0.083)	(0.069)	(0.106)	(0.092)
Flood*Flood prone	-0.286**	-0.106	-0.182**	0.106	-0.097	-0.109
	(0.108)	(0.140)	(0.067)	(0.118)	(0.138)	(0.160)
Flood prone	0.136**	0.089	0.067	-0.020	0.076	0.018
	(0.058)	(0.109)	(0.068)	(0.063)	(0.072)	(0.041)
F - Joint signt. of all flood vars	7.03	0.51	5.05	0.60	0.27	1.95
Upper Third (N = 142)						
Flood	0.069	0.035	-0.090	-0.026	-0.111	0.016
	(0.089)	(0.159)	(0.084)	(0.100)	(0.121)	(0.071)
Flood*Flood prone	-0.058	-0.150	0.077	-0.145*	0.116	-0.045
	(0.076)	(0.141)	(0.081)	(0.082)	(0.173)	(0.166)
Flood prone	-0.078	0.035	-0.088	0.025	0.018	0.070
	(0.052)	(0.082)	(0.051)	(0.062)	(0.102)	(0.092)
F - Joint signt. of all flood vars	0.38	1.89	0.70	3.58	0.48	0.04
Other control variables	yes	yes	yes	yes	yes	yes
FE	subdistrict	village	subdistrict	village	subdistrict	village

Dependent variables are subjective probabilities that respondent can rely on themselves (1-2, 7-8), on social network (3-4, 9-10) and on government (5-6, 11-12) when flood occurs. Models with flood intensity variable were also estimated with qualitatively similar results, so omited. Robust standard errors in parentheses clustered at subdistrict level. * p<0.1; ** p<0.05; *** p<0.01. Other control variables included (but omited) are female, age, education-primary, education-secondary, household size, ln asset per capita, land per capita, number of past 10-yr shocks, whether household participated in rice mortgage policy and constant.

Table 8 Flood and safety net perceptions (continue)

	Order probit					
	Can rely on themselves		Can rely on social		Can rely on government	
	Village flood (=1)	Household flood (=1)	Village flood (=1)	Household flood (=1)	Village flood (=1)	Household flood (=1)
	(7)	(8)	(9)	(10)	(11)	(12)
Whole sample (N = 426)						
Flood	-0.333***	-0.679***	-0.541***	-0.577***	-0.076	0.395***
	(0.116)	(0.141)	(0.171)	(0.106)	(0.146)	(0.131)
Flood*Flood prone	-0.408*	0.066	-0.098	0.056	0.089	-0.055
	(0.222)	(0.192)	(0.202)	(0.182)	(0.206)	(0.150)
Flood prone	-0.020	-0.184	-0.186	-0.236	-0.017	-0.015
	(0.134)	(0.169)	(0.191)	(0.168)	(0.144)	(0.123)
F - Joint signt. of all flood vars	16.12	40.12	14.84	42.14	0.27	9.70
Bottom Third (N = 142)						
Flood	-0.483**	-0.935***	-0.644***	-0.520**	-0.203	0.175
	(0.214)	(0.202)	(0.165)	(0.223)	(0.248)	(0.319)
Flood*Flood prone	-0.722	-0.068	-0.295	-0.023	-0.058	0.730
	(0.497)	(0.315)	(0.488)	(0.358)	(0.476)	(0.484)
Flood prone	-0.009	-0.279	-0.244	-0.392	0.003	-0.454
	(0.292)	(0.299)	(0.317)	(0.270)	(0.313)	(0.335)
F - Joint signt. of all flood vars	14.77	29.99	22.72	10.79	1.11	10.48
Middle Third (N = 142)						
Flood	-0.372	-0.744***	-0.566**	-0.763***	0.048	0.644***
	(0.274)	(0.242)	(0.274)	(0.258)	(0.276)	(0.191)
Flood*Flood prone	-0.782**	0.255	-0.324	0.210	-0.320	-0.745**
	(0.319)	(0.383)	(0.319)	(0.426)	(0.436)	(0.334)
Flood prone	0.385**	-0.019	0.166	-0.033	0.186	0.284*
	(0.183)	(0.290)	(0.180)	(0.213)	(0.210)	(0.148)
F - Joint signt. of all flood vars	21.99	18.81	6.56	9.33	1.88	11.51
Upper Third (N = 142)						
Flood	-0.148	-0.338	-0.586*	-0.532*	-0.074	0.408
	(0.263)	(0.315)	(0.313)	(0.305)	(0.342)	(0.267)
Flood*Flood prone	-0.065	-0.240	0.303	-0.177	0.421	-0.235
	(0.323)	(0.377)	(0.313)	(0.354)	(0.549)	(0.381)
Flood prone	-0.144	-0.031	-0.363*	-0.120	-0.158	0.123
	(0.222)	(0.264)	(0.205)	(0.263)	(0.361)	(0.235)
F - Joint signt. of all flood vars	0.66	14.42	3.51	12.94	2.12	2.38
Other control variables	yes	yes	yes	yes	yes	yes
FE	-	-	-	-	-	-

Dependent variables are subjective probabilities that respondent can rely on themselves (1-2, 7-8), on social network (3-4, 9-10) and on government (5-6, 11-12) when flood occurs. Models with flood intensity variable were also estimated with qualitatively similar results, so omited. Robust standard errors in parentheses clustered at subdistrict level. * p<0.1; ** p<0.05; *** p<0.01. Other control variables included (but omited) are female, age, education-primary, education-secondary, household size, ln asset per capita, land per capita, number of past 10-yr shocks, whether household participated in rice mortgage policy and constant.

Table 9 Flood and behaviors

	Saving				Self insurance											
	Have saving = 1				Build flood protection/Adjust farming practice = 1				Diversify on farm = 1				Diversify off farm = 1			
	All	Bottom Third	Middle Third	Upper Third	All	Bottom Third	Middle Third	Upper Third	All	Bottom Third	Middle Third	Upper Third	All	Bottom Third	Middle Third	Upper Third
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Flood	-0.611***	-0.664**	-1.125**	-0.340	0.232	-0.058	-0.116	0.438	-0.341	0.102	-5.819***	-0.567	-0.232	-0.862*	-0.750	-0.031
	(0.161)	(0.318)	(0.472)	(0.354)	(0.216)	(0.451)	(0.280)	(0.376)	(0.310)	(0.427)	(0.802)	(0.361)	(0.247)	(0.462)	(0.513)	(0.478)
Flood*Flood prone	0.671**	0.688	1.071**	0.633	0.302	0.169	0.594	0.339	-0.015	0.095	-0.230	-0.424	0.420**	-0.009	2.103**	0.378
	(0.263)	(0.428)	(0.496)	(0.452)	(0.210)	(0.549)	(0.463)	(0.568)	(0.264)	(0.510)	(1.221)	(0.533)	(0.213)	(0.689)	(0.835)	(0.553)
Flood prone	-0.247	-0.471	0.072	-0.303	-0.418**	-0.798	-0.499	-0.221	0.180	0.367	-0.022	0.806***	-0.126	-0.357	-0.723	-0.067
	(0.222)	(0.323)	(0.298)	(0.242)	(0.204)	(0.514)	(0.431)	(0.381)	(0.143)	(0.439)	(0.527)	(0.305)	(0.256)	(0.443)	(0.555)	(0.579)
Risk aversion	-0.060	0.016	-0.007	-0.148	-0.038	-0.077	-0.054	0.045	0.010	0.156	-0.054	-0.183	0.115	0.074	0.076	0.306
	(0.038)	(0.108)	(0.075)	(0.113)	(0.054)	(0.086)	(0.122)	(0.144)	(0.071)	(0.153)	(0.220)	(0.183)	(0.092)	(0.148)	(0.138)	(0.200)
Impatience	-0.023	0.075	-0.142*	-0.142**	0.006	-0.037	-0.001	0.088	-0.004	0.024	0.240**	-0.085	0.033	-0.067	0.163**	0.028
	(0.032)	(0.046)	(0.084)	(0.060)	(0.021)	(0.057)	(0.043)	(0.079)	(0.035)	(0.088)	(0.097)	(0.081)	(0.030)	(0.057)	(0.072)	(0.065)
Altruism when gain	-0.493*	-1.386***	0.011	-1.010*	0.246	-0.407	0.476	0.222	0.384	0.388	-0.590	1.223*	-0.224	-1.082**	-1.491**	0.243
	(0.263)	(0.511)	(0.587)	(0.614)	(0.424)	(0.907)	(0.771)	(0.302)	(0.371)	(0.527)	(1.589)	(0.663)	(0.338)	(0.497)	(0.756)	(1.029)
Altruism when loss	0.298	0.845*	0.045	0.468	0.246	0.399	0.693	0.232	0.377	-0.340	5.790***	0.460	0.320	0.622	1.903**	0.357
	(0.315)	(0.469)	(0.720)	(0.541)	(0.297)	(0.678)	(0.648)	(0.418)	(0.409)	(0.684)	(2.056)	(0.546)	(0.407)	(0.714)	(0.883)	(0.771)
Sjt. prob of severe flood	-0.020	-0.633	0.741	0.674	0.786***	0.752*	1.366**	0.260	0.210	0.813	-3.799*	0.357	0.141	0.305	1.457*	-1.846
	(0.397)	(0.405)	(0.734)	(1.019)	(0.305)	(0.455)	(0.548)	(0.635)	(0.306)	(0.577)	(2.084)	(0.574)	(0.366)	(0.789)	(0.799)	(1.259)
Sjt. prob of mild flood	0.069	0.132	0.886***	-0.858*	0.791**	0.408	0.330	1.407**	-0.470	0.294	0.120	-0.808**	0.074	-0.594	-0.328	0.783
	(0.319)	(0.509)	(0.292)	(0.519)	(0.350)	(0.431)	(0.482)	(0.572)	(0.469)	(0.708)	(1.453)	(0.412)	(0.331)	(0.571)	(0.825)	(0.645)
Can rely on themselves	0.336*	-0.600	1.159***	0.682**	-0.328**	-0.849	-0.429	-0.284	-0.074	-0.253	-0.361	0.035	-0.576	-0.890*	-1.368	-1.087*
	(0.202)	(0.445)	(0.390)	(0.326)	(0.152)	(0.583)	(0.404)	(0.401)	(0.271)	(0.572)	(0.769)	(0.414)	(0.386)	(0.538)	(0.860)	(0.612)
Can rely on social	-0.773***	0.077	-1.182**	-0.926***	0.280	0.868*	0.111	0.139	0.288	0.903	-0.895	0.542	-0.229	0.804*	-2.289**	0.489
	(0.260)	(0.602)	(0.538)	(0.326)	(0.258)	(0.475)	(0.407)	(0.495)	(0.306)	(0.564)	(0.586)	(0.441)	(0.288)	(0.434)	(0.915)	(0.546)
Can rely on government	-0.131	-0.123	-0.196	-0.050	-0.053	-0.250	0.243	-0.153	0.361	0.798	-3.400***	0.416	-0.014	-0.309	0.349	0.163
	(0.225)	(0.380)	(0.517)	(0.394)	(0.160)	(0.442)	(0.222)	(0.335)	(0.328)	(0.617)	(1.197)	(0.679)	(0.218)	(0.361)	(0.658)	(0.452)
F - Joint signt. of all flood vars	14.54	4.41	6.34	2.04	17.69	0.12	1.68	6.44	2.65	0.09	75.54	13.82	3.89	7.55	6.73	0.59
N	426	142	142	142	426	142	142	142	426	142	142	142	426	142	142	142

Dependent variable are binary behavioral choice variables observed in the data. Hence a probit model is used for binary variables (OLS FE model was also reported for robustness check with qualitatively similar results in the Appendix). Diversification on farm includes growing multiple crops each season and/or intercroping. Diversification off farm includes allocating labor to wage, salary, trade business or other off farm works. Flood variable is whether household experienced floood in 2011. Robust standard errors in parentheses clustered at subdistrict level. * p<0.1; ** p<0.05; *** p<0.01. Other control variables included (but omited) are female, age, education-primary, education-secondary, household size, ln asset per capita, land per capita, number of past 10-yr shocks, whether household participated in rice mortgage policy and constant.

Table 9 Flood and behaviors (continued)

	Social insurance								Market-based insurance				Productive investment			
	Contribute to building community flood protection = 1				Lend to or help others = 1				Demand market insurance = 1				Investment in better seeds and organic fertilizer = 1			
	All	Bottom Third	Middle Third	Upper Third	All	Bottom Third	Middle Third	Upper Third	All	Bottom Third	Middle Third	Upper Third	All	Bottom Third	Middle Third	Upper Third
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Flood	0.406	0.815	-0.519	0.628	0.104	0.076	-0.283	0.481	0.867***	1.616***	1.369***	0.428	-0.030	-0.923***	0.352	0.266
	(0.350)	(0.598)	(0.533)	(0.422)	(0.143)	(0.425)	(0.305)	(0.364)	(0.238)	(0.472)	(0.269)	(0.446)	(0.219)	(0.297)	(0.463)	(0.427)
Flood*Flood prone	-0.220	-0.515	0.354	-0.461	0.189	0.913	1.010	-0.423	-0.287	-0.358	-0.486	-0.038	0.230	0.545	-0.382	-0.099
	(0.413)	(0.787)	(0.836)	(0.774)	(0.238)	(0.651)	(0.650)	(0.611)	(0.357)	(0.607)	(0.452)	(0.548)	(0.232)	(0.413)	(0.621)	(0.422)
Flood prone	0.053	-0.424	0.196	0.137	-0.437**	-0.888***	-0.879**	0.088	0.587***	0.410	0.992***	0.874**	-0.305*	-0.346	-0.928***	0.061
	(0.307)	(0.646)	(0.502)	(0.558)	(0.180)	(0.284)	(0.441)	(0.289)	(0.121)	(0.304)	(0.204)	(0.380)	(0.168)	(0.311)	(0.265)	(0.299)
Risk aversion	-0.052	-0.186	0.020	0.082	-0.137**	-0.325***	-0.154*	-0.029	-0.023	-0.038	0.040	-0.143	0.095	0.084	0.176*	-0.005
	(0.065)	(0.192)	(0.134)	(0.138)	(0.053)	(0.124)	(0.085)	(0.100)	(0.095)	(0.106)	(0.210)	(0.226)	(0.082)	(0.129)	(0.105)	(0.158)
Impatience	-0.066***	-0.196**	-0.042	0.012	0.030	0.045	0.000	0.030	0.002	0.077**	-0.048	-0.096*	-0.022	-0.010	-0.029	-0.013
	(0.025)	(0.093)	(0.048)	(0.029)	(0.024)	(0.059)	(0.050)	(0.041)	(0.019)	(0.039)	(0.091)	(0.057)	(0.039)	(0.053)	(0.036)	(0.060)
Altruism when gain	-0.260	-2.440**	-0.647	0.115	0.327	0.732	-0.246	0.338	0.317	1.543	-0.262	-1.217	-0.543	-2.558**	1.195*	-0.613
	(0.385)	(1.121)	(0.620)	(0.503)	(0.294)	(0.845)	(0.822)	(0.594)	(0.480)	(1.000)	(0.465)	(0.829)	(0.394)	(1.008)	(0.679)	(0.648)
Altruism when loss	0.062	0.328	1.763*	-0.733	-0.282	0.138	0.014	-1.015***	-0.212	-1.452**	1.055*	-0.544	0.342	2.000***	0.702	-0.405
	(0.515)	(0.982)	(0.980)	(0.559)	(0.289)	(0.752)	(0.715)	(0.314)	(0.400)	(0.704)	(0.620)	(0.634)	(0.480)	(0.688)	(0.823)	(0.728)
Sjt. prob of severe flood	0.149	0.221	0.075	0.687	0.118	-0.353	-0.192	1.332**	1.115***	0.836	2.166***	2.305**	0.361	0.577	1.891***	-0.159
	(0.448)	(1.093)	(0.795)	(0.841)	(0.376)	(0.576)	(0.690)	(0.663)	(0.374)	(0.656)	(0.786)	(1.110)	(0.412)	(1.089)	(0.694)	(0.743)
Sjt. prob of mild flood	0.131	0.466	0.645	0.077	0.200	0.137	-0.627	1.080***	0.787**	0.498*	0.968	1.874**	0.418	0.635	1.025**	0.500
	(0.278)	(1.164)	(0.641)	(0.574)	(0.412)	(0.423)	(0.494)	(0.358)	(0.327)	(0.296)	(0.713)	(0.807)	(0.266)	(0.425)	(0.423)	(0.432)
Can rely on themselves	-0.429*	-2.517***	0.140	-0.442	-0.145	0.258	-0.888**	0.245	-0.259	0.001	0.059	-0.496	0.127	-1.666**	0.382	0.887*
	(0.256)	(0.923)	(0.481)	(0.531)	(0.133)	(0.319)	(0.448)	(0.276)	(0.242)	(0.528)	(0.416)	(0.582)	(0.253)	(0.648)	(0.346)	(0.466)
Can rely on social	0.137	2.710***	-0.338	0.083	0.104	-0.333	0.093	0.189	-0.274	0.350	-1.104***	-0.783*	-0.137	1.277**	0.427	-0.563
	(0.362)	(0.771)	(0.503)	(0.586)	(0.276)	(0.351)	(0.508)	(0.372)	(0.200)	(0.516)	(0.294)	(0.416)	(0.297)	(0.632)	(0.693)	(0.623)
Can rely on government	0.121	-0.752**	0.648	0.084	-0.483**	-0.703**	-0.477	-0.569	0.510***	0.059	0.348	0.726	0.419**	0.454	0.551	0.503
	(0.277)	(0.338)	(0.506)	(0.407)	(0.216)	(0.295)	(0.313)	(0.360)	(0.180)	(0.325)	(0.418)	(0.475)	(0.181)	(0.418)	(0.796)	(0.350)
F - Joint signt. of all flood vars	1.70	2.15	1.26	2.30	1.71	3.41	2.53	2.54	19.25	22.45	31.73	1.27	4.05	9.69	0.59	0.64
N	426	142	142	142	426	142	142	142	426	142	142	142	426	142	142	142

Dependent variable are binary behavioral choice variables observed in the data. Hence a probit model is used for binary variables (OLS FE model was also reported for robustness check with qualitatively similar results in the Appendix). Demand market insurance represents the situation when household reported willing to pay for commercialized flood, weather or crop insurance. Flood variable is whether household experienced floood in 2011. Robust standard errors in parentheses clustered at subdistrict level. * p<0.1; ** p<0.05; *** p<0.01. Other control variables included (but omited) are female, age, education-primary, education-secondary, household size, ln asset per capita, land per capita, number of past 10-yr shocks, whether household participated in rice mortgage policy and constant.

Table A1 Summary of risk aversion parameter based on Binswanger (1980)

Option	Low Payoff (Pr = 0.5)	High Payoff (Pr=0.5)	Expected Payoff	S.D. Payoff	CRRA interval	Geometric mean	Risk class	Our risk aversion parameters
1	1000	1000	1000	0	R>7.5	7.5*	extreme	5
2	900	1900	1400	707	1.74<R<7.5	3.61	severe	4
3	800	2400	1600	1131	0.81<R<1.74	1.19	intermediate	3
4	600	3000	1800	1697	0.31<R<0.81	0.50	moderate	2
5	400	3200	1800	1980	Inconsistent	Inconsistent	Inconsistent	-
6	200	3800	2000	2546	0<R<0.31	0.15**	slightly-to-neutral	1

*Assume the lower bound of extreme risk aversion, ** Arithmatic mean was used, *** Assume the upper bound, i.e., risk neutral

Table A2 Impatience index

Situation	Option A	Option B	Impatience index if first switch to B in
1	We give you $50 tomorrow	We give you $50 in 15 days	0
2	We give you $50 tomorrow	We give you $50.5 in 15 days	1
3	We give you $50 tomorrow	We give you $51 in 15 days	2
4	We give you $50 tomorrow	We give you $52.5 in 15 days	3
5	We give you $50 tomorrow	We give you $55 in 15 days	4
6	We give you $50 tomorrow	We give you $70 in 15 days	5
7	We give you $50 tomorrow	We give you $85 in 15 days	6
8	We give you $50 tomorrow	We give you $100 in 15 days	7

Table B1 Flood and risk aversion (Robustness check)

	OLS with FE			Ordered Probit		
	Village flood (=1)	Household flood (=1)	% Paddy field flooded	Village flood (=1)	Household flood (=1)	% Paddy field flooded
Stratified regression by flood prone group						
Not flood prone						
Flood	0.139	0.269**	0.274*	0.206	0.357***	0.341**
	(0.108)	(0.120)	(0.129)	(0.142)	(0.124)	(0.143)
Flood prone						
Flood	0.049	-0.060	-0.057	0.203	0.042	-0.006
	(0.208)	(0.262)	(0.302)	(0.220)	(0.197)	(0.238)
	Probit					
Binary measures of risk aversion						
	Risk aversion (5 vs. <5)			Risk aversion (4-5 vs. <4)		
Flood	0.140	0.380***	0.396**	0.107	0.378**	0.382**
	(0.115)	(0.129)	(0.158)	(0.117)	(0.175)	(0.188)
Flood*Flood prone	-0.009	-0.256	-0.263	-0.098	-0.490**	-0.575**
	(0.203)	(0.242)	(0.275)	(0.193)	(0.220)	(0.241)
	Risk aversion (3-5 vs. <3)			Risk aversion (2-5 vs. 1)		
Flood	0.017	0.122	0.074	-0.047	0.200	0.206
	(0.110)	(0.118)	(0.144)	(0.177)	(0.178)	(0.215)
Flood*Flood prone	-0.011	-0.162	-0.135	0.028	-0.334	-0.382
	(0.204)	(0.186)	(0.235)	(0.316)	(0.231)	(0.248)

Full model is run in each regression with full sample. Robust standard errors in parentheses clustered at subdistrict level. * p<0.1; ** p<0.05; *** p<0.01.

Table B2 Flood and impatience (Robustness check)

	OLS with FE			Ordered Probit		
	Village flood (=1)	Household flood (=1)	% Paddy field flooded	Village flood (=1)	Household flood (=1)	% Paddy field flooded
Stratified regression by flood prone group						
Not flood prone						
Flood	-0.079	0.366	0.510	-0.080	0.143	0.131
	(0.358)	(0.390)	(0.383)	(0.104)	(0.120)	(0.129)
Flood prone						
Flood	-0.261	0.016	0.213	0.023	0.123	0.146
	(0.317)	(0.608)	(0.599)	(0.115)	(0.120)	(0.106)
	Probit					
Binary measures of impatience						
	Impatience (7 vs. <7)			Impatience (6-7 vs. <6)		
Flood	-0.207	0.118	0.168	-0.110	0.183	0.159
	(0.136)	(0.107)	(0.131)	(0.089)	(0.127)	(0.133)
Flood*Flood prone	0.274	-0.039	-0.067	0.182	-0.163	-0.164
	(0.184)	(0.218)	(0.187)	(0.160)	(0.229)	(0.222)
	Impatience (5-7 vs. <5)			Impatience (4-7 vs. <4)		
Flood	0.181	0.297	0.239	0.083	0.393***	0.420***
	(0.163)	(0.186)	(0.180)	(0.145)	(0.152)	(0.163)
Flood*Flood prone	-0.289	-0.296	-0.179	-0.091	-0.275	-0.270
	(0.273)	(0.234)	(0.237)	(0.278)	(0.218)	(0.242)
	Impatience (3-7 vs. <3)			Impatience (2-7 vs. <2)		
Flood	0.055	0.331**	0.341**	0.125	0.365**	0.420*
	(0.161)	(0.144)	(0.154)	(0.153)	(0.174)	(0.217)
Flood*Flood prone	-0.076	-0.233	-0.124	-0.111	-0.312	-0.221
	(0.278)	(0.164)	(0.147)	(0.286)	(0.239)	(0.206)
	Impatience (1-7 vs. 0)					
Flood	0.459*	0.091	0.038			
	(0.257)	(0.211)	(0.243)			
Flood*Flood prone	0.017	0.567	0.480			
	(0.414)	(0.462)	(0.530)			

Full model is run in each regression with full sample. Robust standard errors in parentheses clustered at subdistrict level. * p<0.1; ** p<0.05; *** p<0.01.

Table B3 Flood and altruism (Robustness check)

	OLS with FE			Ordered probit		
	Village flood (=1)	Household flood (=1)	% Paddy field flooded	Village flood (=1)	Household flood (=1)	% Paddy field flooded
Stratified regression by flood prone group						
Not flood prone						
Flood	0.001	0.018	0.044	-0.043	0.038	0.131
	(0.032)	(0.035)	(0.041)	(0.159)	(0.164)	(0.200)
Flood*Share when loss	-0.017	0.038*	0.022	-0.079	0.207**	0.137
	(0.025)	(0.020)	(0.024)	(0.120)	(0.095)	(0.108)
Flood prone						
Flood	-0.106**	0.004	0.033	-0.358*	-0.275*	-0.151
	(0.038)	(0.046)	(0.052)	(0.204)	(0.146)	(0.166)
Flood*Share when loss	0.043	-0.029	-0.045	0.238	-0.134	-0.214
	(0.056)	(0.045)	(0.048)	(0.277)	(0.229)	(0.240)
	Probit					
Binary measures of altruism						
	Altruism (>0 vs. 0)			Altruism (>=0.5 vs.<0.5)		
Flood	-0.002	-0.048	0.073	-0.081	0.090	0.175
	(0.176)	(0.185)	(0.217)	(0.179)	(0.171)	(0.219)
Flood*Flood prone	-0.413**	-0.277	-0.278	-0.181	-0.250	-0.223
	(0.203)	(0.288)	(0.313)	(0.200)	(0.221)	(0.247)
Flood*Share when loss	-0.006	0.215*	0.092	-0.130	0.176	0.130
	(0.133)	(0.114)	(0.137)	(0.138)	(0.125)	(0.152)
Flood*Flood prone*Share when loss	0.327	-0.369	-0.329*	0.289	-0.320	-0.334
	(0.382)	(0.239)	(0.196)	(0.348)	(0.299)	(0.313)

Full model is run in each regression with full sample. Robust standard errors in parentheses clustered at subdistrict level. * p<0.1; ** p<0.05; *** p<0.01.

Table B4 Flood and subjective probability of flood (Robustness check)

	OLS			Ordered probit		
	Village flood (=1)	Household flood (=1)	% Paddy field flooded	Village flood (=1)	Household flood (=1)	% Paddy field flooded
Stratified regression by flood prone group						
Not flood prone						
Flood	0.056	0.045	0.036	0.329*	0.479***	0.414*
	(0.046)	(0.041)	(0.055)	(0.172)	(0.173)	(0.219)
Flood*For mild flood	-0.031	-0.071	-0.036	-0.170	-0.358	-0.240
	(0.056)	(0.067)	(0.094)	(0.228)	(0.256)	(0.359)
Flood prone						
Flood	0.069	0.051	0.076	0.463***	0.571***	0.687***
	(0.051)	(0.044)	(0.044)	(0.165)	(0.138)	(0.146)
Flood*For mild flood	-0.037	-0.032	-0.055	-0.206	-0.236	-0.358
	(0.061)	(0.052)	(0.056)	(0.276)	(0.233)	(0.242)
	Probit					
Binary measures of subjective probability						
	Pr (>0 vs. 0)			Pr (>0.5 vs.<=0.5)		
Flood	0.582**	0.576**	0.656**	0.166	0.549***	0.320
	(0.249)	(0.293)	(0.297)	(0.155)	(0.195)	(0.250)
Flood*For mild flood	-0.166	-0.440	-0.613*	0.056	-0.523*	-0.174
	(0.326)	(0.273)	(0.321)	(0.250)	(0.271)	(0.377)
Flood*Flood prone	0.064	0.224	0.328	0.257	-0.013	0.270
	(0.286)	(0.412)	(0.486)	(0.214)	(0.220)	(0.205)
Flood*Flood prone*For mild flood	0.123	0.032	-0.146	-0.069	0.418	0.061
	(0.416)	(0.337)	(0.305)	(0.339)	(0.297)	(0.301)

Full model is run in each regression with full sample. Robust standard errors in parentheses clustered at subdistrict level. * p<0.1; ** p<0.05; *** p<0.01.

Table B5 Flood and safety net perceptions (robustness check)

	OLS						Order probit					
	Can rely on themselves		Can rely on social		Can rely on government		Can rely on themselves		Can rely on social		Can rely on government	
	Village flood (=1)	Household flood (=1)	Village flood (=1)	Household flood (=1)	Village flood (=1)	Household flood (=1)	Village flood (=1)	Household flood (=1)	Village flood (=1)	Household flood (=1)	Village flood (=1)	Household flood (=1)
Stratified regression by flood prone group												
Not flood prone												
Flood	-0.077	-0.088	-0.120**	-0.076	0.057	0.133*	-0.312***	-0.673***	-0.523***	-0.519***	-0.067	0.328**
	(0.046)	(0.084)	(0.052)	(0.062)	(0.111)	(0.064)	(0.118)	(0.151)	(0.173)	(0.110)	(0.154)	(0.145)
Flood prone												
Flood	-0.102	-0.054	-0.115	-0.021	0.021	0.073	-0.832***	-0.631***	-0.720***	-0.561***	0.052	0.312*
	(0.061)	(0.065)	(0.072)	(0.056)	(0.028)	(0.052)	(0.244)	(0.172)	(0.247)	(0.163)	(0.125)	(0.175)
	Probit											
	Can rely (>0 Vs. 0)						Can rely (>0.5 Vs. <=0.5)					
Flood	-0.397***	-0.614***	-0.462***	-0.385***	0.020	0.395***	-0.233	-0.770***	-0.589***	-0.809***	0.007	0.403**
	(0.135)	(0.158)	(0.169)	(0.130)	(0.150)	(0.138)	(0.181)	(0.175)	(0.216)	(0.170)	(0.201)	(0.173)
Flood*Flood prone	-0.281	-0.108	-0.148	-0.036	-0.112	-0.428***	-0.834***	0.306	-0.375	-0.198	0.113	0.183
	(0.272)	(0.222)	(0.210)	(0.210)	(0.212)	(0.153)	(0.281)	(0.245)	(0.404)	(0.286)	(0.325)	(0.206)

Full model is run in each regression with full sample. Robust standard errors in parentheses clustered at subdistrict level. * p<0.1; ** p<0.05; *** p<0.01.

Table B6 Flood and behaviors (Robustness check)

	Saving	Self insurance			Social insurance		Market insurance	Investment
	Have saving	Build flood protection/Adjust farming practice	Diversify on farm	Diversify off farm	Community flood protection	Lend to or help others	Demand market insurance	Investment in better seeds and organic fertilizer
	Probit							
Stratified regression by flood prone group								
Not flood prone								
Flood	-0.878***	0.203	-0.369	-0.226	0.119	0.453	0.912***	-0.028
	(0.165)	(0.250)	(0.310)	(0.295)	(0.130)	(0.321)	(0.250)	(0.229)
Flood prone								
Flood	-0.119	0.749***	-0.599*	0.183	0.348	0.213	0.581**	0.304*
	(0.189)	(0.158)	(0.338)	(0.259)	(0.297)	(0.285)	(0.242)	(0.183)
	OLS with village FE							
Flood	-0.333***	0.081	-0.035	-0.000	-0.021	0.038	0.181**	-0.060
	(0.049)	(0.069)	(0.024)	(0.060)	(0.039)	(0.067)	(0.079)	(0.059)
Flood*Flood prone	0.267***	0.101	0.002	0.046	0.114	-0.007	-0.113	0.069
	(0.079)	(0.098)	(0.027)	(0.035)	(0.075)	(0.082)	(0.090)	(0.059)

Full model is run in each regression with full sample. Robust standard errors in parentheses clustered at subdistrict level. * p<0.1; ** p<0.05; *** p<0.01.