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Microinsurance Decisions

Gendered Evidence from Rural Bangladesh

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Contents

Tables

Figures

ABSTRACT

Most index-based insurance products have been developed without giving explicit attention to gender. However, there is ample evidence that shocks affect men and women differently and that they allocate resources in different ways. In Bangladesh it is often assumed that women are less involved in agriculture, and therefore agricultural insurance might not be of interest to rural women. However, this assumption has not been tested in the field. This paper draws from a field research experiment to examine the gendered aspects of willingness to pay for index-based insurance in Bangladesh. Participants were presented with risky lotteries and a specific insurance contract and were asked to choose how much (if any) of the insurance they wanted to buy at a given price. The probability structure (whether the risk was catastrophic or moderate and whether there was high or low basis risk) varied within sessions. The price of the insurance varied across sessions. Each participant was also administered a short questionnaire, which collected information on demographic characteristics, risk preferences, agricultural risks, knowledge of insurance products, and asset ownership. Ninety-seven percent of the participants in the study decided to buy agricultural insurance, with no significant differences between men and women, even though women are less involved in agricultural decisionmaking. We find a small decrease in take-up for the low-probability event, driven by the women in the sample. When we examine the number of units bought, we find that men were likely to buy more units than women. Total wealth, as captured by total land owned, had no effect on units bought. However, among women total wealth mattered and had a positive correlation. Finally, we find that women had less education and lower financial literacy than their male counterparts, as well as less background in understanding agricultural risk. This placed them at a disadvantage when making insurance purchase decisions.

Keywords: Bangladesh, index insurance, gender, risk preference

JEL codes: Q14

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1. INTRODUCTION

Farmers in rural Bangladesh face a multitude of risks, ranging from the vagaries of weather, to crop disease and pests, to health shocks. Islam (2002) identifies cyclones, tornadoes, droughts, riverbank erosion, and waterlogging as the major natural disasters and stresses that affect Bangladesh. Health problems, destruction of life and property, disruption of cultivation, diminished access to commodities, and rises in prices are the major consequences of these disasters. The effects on rural farm households can be severe, and awareness of these risks often leads to suboptimal farming decisions. Although insurance products have the potential to mitigate these risks for farmers, insurance markets have failed to develop in rural Bangladesh.

Climate change poses particular challenges for the rural poor. Long-term changes in temperature and precipitation and an increase in climate variability, such as the number and intensity of extreme events, are results of climate change. Experts have noted that mitigation efforts alone will not be sufficient to prevent adverse impacts from climate change. As a result, adaptation strategies are important for increasing resilience to future climate change.

Moreover, there is ample evidence that shocks affect men and women differently (Dercon and Krishnan 2000; Doss 2001; Duflo and Udry 2003, Quisumbing 20011. There is also substantial literature showing that men and women allocate resources in different ways, with women spending more on schooling and food (Duflo and Udry 2003; Quisumbing and Malluccio 2003). There are also differences in the ways men and women cope with different shocks (Quisumbing, Kumar, and Behrman 2011). Given such evidence, it is likely that in the event of a drought that affects agricultural output, for example, men may be more likely to pull children out of school, which would lower women's utility. An agricultural insurance product might have the potential to keep children in school and thus improve outcomes for all parties.

Adverse selection (the inability to identify which farmers are at more risk) and moral hazard (reduced effort in response to insurance purchase) are two information asymmetries that make insurance products costly or unviable.

However, interest in developing index-based agricultural insurance products is growing (Clarke et al. 2012; WorldFish 2013). Index-based insurance relies on an independently observable index, which is correlated with losses incurred as a result of a specific calamity. This eliminates the problems of information asymmetry and the need for loss assessment and monitoring. For example, rainfall index insurance pays out when the rainfall is below a threshold level at a rainfall measuring station in the vicinity of the farmer in question and not based on the loss incurred by the farmer. The assumption is that the farm's output is correlated with the amount of rainfall it receives, which in turn is correlated with the amount of rainfall at the weather station. But because this correlation is not perfect, it introduces basis risk. Basis risk is the risk that a farmer may incur a large loss but receive no claim payment from the insurance contract due to an imperfect correlation between the loss and the index.

Most index-based insurance products have been developed without giving explicit attention to gender. Women in Bangladesh are often assumed to be less involved in agriculture due to cultural norms that value female seclusion (Balk 1996; Jaim and Hossain 2011). Under this assumption, agricultural insurance might not be of interest to rural women in Bangladesh. However, data on labor participation challenge the assumption about women's involvement in agriculture. The participation of women in the agricultural sector has increased over time (Asaduzzaman 2010). During 1999–2000 and 2005–2006, the number of employed persons in agriculture increased from 19.99 million to 22.93 million—about 15 percent. There has been an absolute decrease in male labor, of about 6 percent, while for females the participation number has increased from 3.76 million to 7.71 million—that is, by more than 100 percent. As a result of these changes, the proportion of women in the total agricultural labor force has increased from less than 20 percent to 34 percent. Nevertheless, agricultural production in Bangladesh is still very much a male domain, with most agricultural decisions taken by men.

Recent evidence supports the idea that men and women may respond differently to insurance schemes. A study on eliciting demand for different insurance types conducted in rural Bangladesh found that when presented with a menu of insurance products consisting of agricultural insurance as well as death and disability insurance, there were no significant differences between men and women in their demand for agricultural insurance products (Clarke et al. 2012). However, the study found two striking differences between men and women. First, men were slightly more likely to purchase dry-days insurance during the rainfed agricultural season than women. Second, women were overwhelmingly more likely to buy life insurance for their spouses than were men. Both of these findings highlight the fact that men are more engaged in agriculture: they better understand the main agricultural risks, and, because men are the main providers in these households, women value life insurance for their spouses.

Even though women are not primary decisionmakers in the realm of agriculture in rural Bangladesh, poor agricultural outcomes can have important indirect effects on women in terms of household income and food security. Therefore, agricultural insurance could still be an attractive option for women. In this paper we use field games to address the following questions:

- Is there demand for agricultural index insurance products by male and female Bangladeshi farmers?
- What factors govern the take-up of such products?
- Do farmers prefer to buy insurance against more frequent bad events or against bad events that occur less frequently?
- Are there gendered differences in demand for agricultural insurance products?

The rest of the paper is organized as follows. Section 2 describes the experimental design and the experimental sample. Section 3 presents the results, and Section 4 concludes.

2. EXPERIMENTAL DESIGN

We designed an insurance experiment to examine the demand for different types of insurance. In each session, subjects were presented with three decision problems- for each decision problem they were first presented the problem and then they were asked to make a decision which was recorded.[1] Then each subject randomly selected the decision problem he or she would play (and be paid for) by choosing one of three numbered tokens placed facedown on a table.[2] At the end of the session they played out, and were paid for, the randomly chosen decision problem; in addition, each participant was paid a show-up fee of 50 taka.[3] The daily wage for casual farm labor in rural areas in Bangladesh was between 113 and 194 taka in 2010 (Zhang et al. 2013). Minimum and maximum earnings in the experiment were 50 and 650 taka, respectively, and mean realized earnings, including the show-up fee, were 305 taka. The experiment included a benchmark decision problem, framed in the abstract, and four framed insurance decision problems.

Benchmark

The benchmark decision problem was as follows. Each subject was presented with a choice of six lotteries, shown in Table 2.1. Alternatives were ordered to be increasing in both the average payoff and the variance around that payoff. Alternative A was the safe option, offering an amount for certain, and alternative F had the highest payoff mean and variance. This lottery selection is identical to that used by Barr and Genicot (2008), but with all payoffs multiplied by 1.5. The gamble was framed in the gain domain,[4] and, whichever gamble was chosen, the payoff was determined by playing a game that involved guessing which of the facilitator's hands contained a blue rather than a yellow Lego piece. The decision problem was explained privately to each subject, who then made a private decision. After making their decisions, subjects were seated separately and were not allowed to talk to each other. This decision problem uses the ordered lottery selection design of Binswanger (1980, 1981) to elicit risk preferences. Although alternative methodologies have become popular in recent years for experiments with standard samples (Harrison and Rutström 2008), the simplicity of the ordered lottery selection design makes it well suited to nonstandard samples with low levels of formal education (Barr and Genicot 2008).

Insurance Decision Problems

All insurance purchase decisions were framed to be as similar as possible to a real insurance purchase decision, albeit in the controlled environment of the lab, with an objective probability structure, and with more time spent explaining and individually confirming understanding than would occur in the marketing process for a real product. Enumerators spent 20 minutes explaining each insurance decision problem to the group of subjects, and an additional 10–20 minutes privately confirming understanding and recording decisions. Game money was smaller and more brightly colored than Bangladeshi currency but was otherwise recognizably similar.

[1] Subjects in this study were recruited randomly from a list of all households that owned or farmed any land.

[2] This strategy was to ensure that the participants were incentivized to make each decision seriously, as they did not know beforehand which one they would end up playing and therefore receiving a payoff for.

[3] 1 US dollar = 73 Bangladeshi taka.

[4] This means that each option was associated with a gain (rather than a loss).

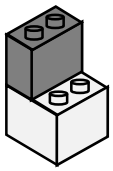
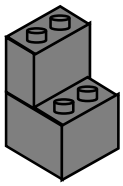
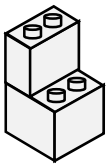
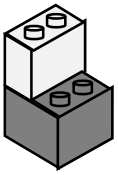
Table 2.1 Benchmark decision

Choice	Net Payoff (Taka)		Expected Payoff	Risk Aversion Range (CRRA)
	Prob. ½	Prob. ½		
A	150	150	150	(+, 7.51)
B	135	285	210	(7.51, 1.74)
C	130	360	240	(1.74, 0.81)
D	90	450	270	(0.81, 0.32)
E	30	570	300	(0.32, 0)
F	0	600	300	(0, -)

Source: Binswanger (1980).
Note: CRRA = constant relative risk aversion.

At the start of each insurance purchase decision problem, subjects were physically given 300 taka of game money and told that they might lose 240 taka (equivalent to one to two days of casual farm labor at the experiment sites). They were then given the opportunity to purchase units of index insurance, which would each pay 40 taka if the index was bad and zero otherwise. The index was not perfectly correlated with the loss, and so in each treatment there were four possible joint realizations of the index and loss (see Table 2.2), selected by drawing a Lego brick from a bag.

Table 2.2 Four-state framework

State *s*	L0	LI	00	0I
Lego block				
Loss (taka)	240	240	0	0
Index insurance payout per unit (taka)	0	40	0	40

Source: Authors, based on experiment design.

We consider four treatments, denoted T1–T4, which differ in the probability of incurring a loss and in the price of insurance (Table 2.3). In all four treatments we set the probability of the index paying out to be equal to the probability of the loss being incurred. Denoting the probability of state *s* as π_s, this gives the restriction

$$\pi_{Lo} + \pi_{LI} = \pi_{LI} + \pi_{0I}.$$

Or, equivalently,

$$\pi_{L0} = \pi_{0I}.$$

Further, we assume that the probability of the index insurance policy paying out conditional on a loss having been incurred equals ¾, that is,

$$\frac{\pi_{LI}}{\pi_{L0} + \pi_{LI}} = \frac{3}{4}.$$

We then complete the characterization of each probability distribution by assuming that the probability of a claim payment ($\pi_{Lo} + \pi_{LI}$) equals 1/10 for treatments 1 and 2 (T1 and T2) and 1/3 for treatments 3 and 4 (T3 and T4). Finally, we characterize the price of index insurance, per unit of expected claim payment, as 1.5 for T1 and T3 and 0.75 for T2 and T4. We refer to the low-probability events as catastrophic events (since such events typically have low probabilities), T1 and T2, and refer to the high-probability events as bad events, T3 and T4.

Table 2.3 Treatments

Treatment	T1	T2	T3	T4
Probability of state L0, π_{L0} (probability of incurring a loss but the index is good)	$\frac{1}{40}$	$\frac{1}{40}$	$\frac{1}{12}$	$\frac{1}{12}$
Probability of state LI, π_{LI} (probability of incurring a loss and the index is bad)	$\frac{3}{40}$	$\frac{3}{40}$	$\frac{3}{12}$	$\frac{3}{12}$
Probability of state 00, π_{00} (probability of incurring no loss and index is good)	$\frac{35}{40}$	$\frac{35}{40}$	$\frac{7}{12}$	$\frac{7}{12}$
Probability of state 0I, π_{0I} (probability of incurring no loss and index is bad)	$\frac{1}{40}$	$\frac{1}{40}$	$\frac{1}{12}$	$\frac{1}{12}$
Price per unit (taka)	20	6	10	3
Claim payment per unit (taka)	40	40	40	40
Cost per taka of expected claim payment (taka)	1.5	0.75	1.5	0.75
Maximum number of units that can be purchased	6	6	3	6

Source: Authors, based on experiment design.

All 900 participants played the benchmark decision problem; 450 played the actuarially unfair index insurance decision problems (where the insurance was priced above the actuarially fair price), and 450 played the actuarially fair index insurance decision problems (where the insurance was priced at the actuarially fair price). In total there were two types of sessions, and each set of three problems was presented in two different orders, to enable us to control for order effects.

Experimental Sample

This study was conducted in September 2011 in two districts in Bangladesh, Manikganj and Bogra. There were a total of 60 sessions with 15 participants each across 20 villages, for a total of 900 participants.[5] Enumerators who were recruited in Dhaka administered a short socioeconomic survey to all participants before the games. These enumerators were experienced in administering standard socioeconomic surveys and were provided additional training on the experiment. Table 2.4 provides the summary statistics for the experimental sample. The average age of the respondent was about 39 years, and about half of the participants were household heads. We sampled to have an equal number of men and women participate in the games. The average respondent had completed at least four years of schooling. Following the gender distribution in our sample, about half of the participants were self-employed in agriculture, while the other half were involved primarily in housework and childcare.

[5] All participants were required to be from farming households with at least some farmland that they cultivated.

A large majority of the participants came from male-headed households, about 89 percent. This is reflective of the average share of male-headed households in Bangladesh at large. The average household size was five. We did require the participants to come from households that owned or had access to some land that they cultivated in order for them to be able to relate to decisions regarding insurance purchase. The average landholding was about 100 decimals, and most grew paddy in the rainfed Aman as well as the dry Boro season.[6]

Table 2.4 Sample summary statistics

Respondent's Characteristics	Mean	S.D.
Age (in years)	38.86	12.81
Proportion male	0.50	0.50
Proportion head of household	0.45	0.50
Completed years of education	4.63	4.14
Main occupation (percent selecting each option)		
Working for wage/salary	0.02	0.13
Self-employed in agriculture	0.44	0.50
Self-employed in nonagriculture activities	0.03	0.16
Unemployed	0.00	0.05
Retired/sick/disabled	0.01	0.07
Housework/childcare	0.47	0.50
In school/training	0.03	0.16
Household Characteristics		
Percent with male household head	0.89	0.31
Completed years of education of most educated household member	8.84	3.31
Household size (number of individuals)	4.75	1.98
Land owned (percent selecting each option)		
Homestead	14.97	15.85
Other	87.07	122.41
Percent growing paddy as the main crop in Aman season	92.66	26.25
Percent growing paddy as the main crop in Boro season	96.22	19.33

Source: Authors, based on experiment design.

Table 2.5 presents the major sources of agricultural risk. The most important risk identified is the risk of pests: 37 percent of the participants identified pests as a major source of risk. About 17 percent of the participants noted deficient rain in the Aman season as a major source of agricultural risk, whereas 14 percent mentioned excess rain as an important risk. Relatedly, 12 percent identified floods as a major risk. A small fraction of the participants were worried about deficient irrigation water in the dry season, risk of crop diseases, untimeliness of rain, and chance of hailstorms as other important risk factors.

[6] 100 decimals = 1 acre.

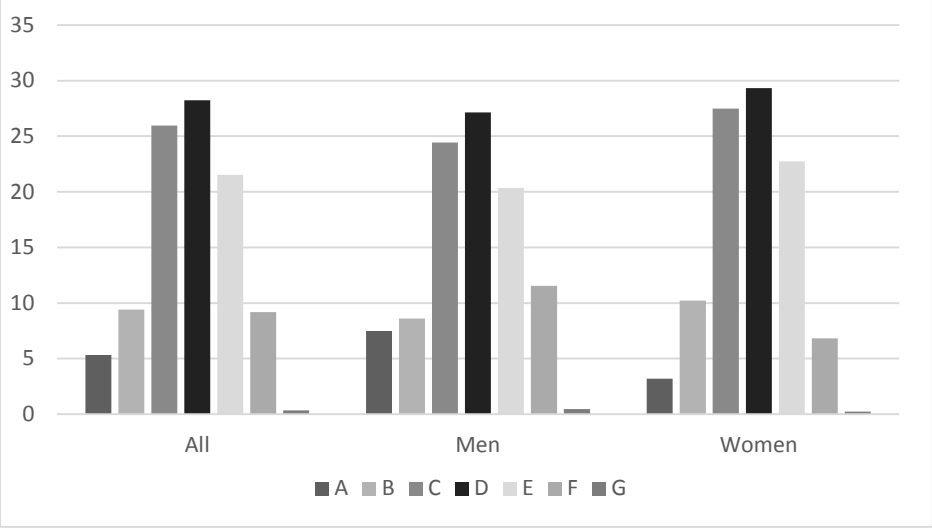
Table 2.5 Major sources of risk to agricultural income

Type of Risk	Percent Citing Risk
Risk of pests	37.49
Risk of deficient rain in Aman season	17.13
Risk of too much rain in Aman season	14.35
Risk of flood in Aman season	12.57
Risk of deficient irrigation water in Boro season	4.12
Risk of diseases	2.78
Risk of untimely rain in Aman season	2.67
Risk of hailstorm	2.45
Uncertainty about quality of inputs	2.34
Uncertainty about input prices	1.45
Uncertainty about availability of labor	0.89
Risk of deficient rain in Boro season	0.78
Uncertainty about crop prices	0.33
Uncertainty about terms of tenancy	0.22
Risk of theft of crop in field	0.11

Source: Authors, based on socioeconomic survey.

As noted above, all the participants played the benchmark game, which was based on an ordered lottery selection to assess risk aversion. Figure 2.1 shows the distribution of the responses among men and women. Note that option A is the safe option and G is the most risky option. We find that choices are concentrated around options C, D, and E. The average risk aversion among the men was 1.92, whereas it was 1.79 among the women, showing that the men were slightly more risk averse than the women. However, this difference is not statistically significant. The benchmark game was framed in the abstract as a pure lottery game. Therefore, responses to such a game may not reflect behavior in real-world situations.

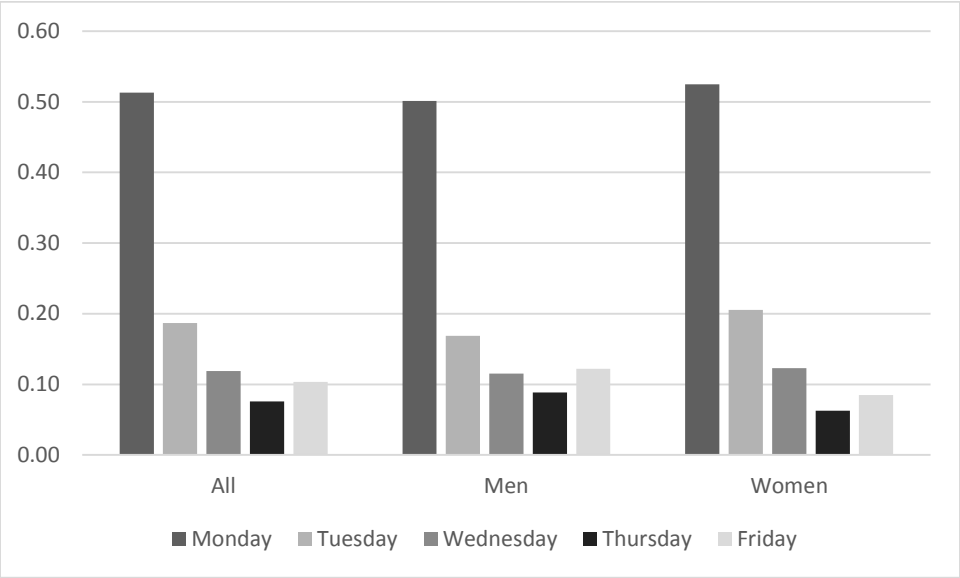
Figure 2.1 Distribution of choices in the benchmark game



Source: Authors.

In the socioeconomic survey we asked each respondent to make a selection in an ordered lottery, which was framed around the sale of agricultural produce on different days of the week. Figure 2.2 shows the distribution of the choices made in this game, where selling the output on Monday is the safe option, and both the average payoff and variability increase as the week progresses. The distribution of choices is now concentrated on the safe option. We find that the women played more cautiously in the framed game compared to the abstract game. Average risk aversion among men in this game was 1.95, and among women it was 2.06.

Figure 2.2 Distribution of choices in the framed ordered lottery selection



Source: Authors.

In the survey, we asked questions about whether rural households had ever bought an insurance product and their knowledge of how an insurance product works. As seen in Table 2.6, 16 percent of respondents' households had bought life insurance. No one in the sample had bought a health insurance product, which is partly a reflection of the low supply of such products in rural Bangladesh. There was some understanding of how an insurance product works. Three-quarters of the respondents knew that they could not buy insurance for a bad event once the bad event had occurred, and more than half knew that they would not get back the premium paid if the bad event did not occur. We also asked respondents about their ability to borrow 1,000 taka within a week in case of an emergency. This question was asked to get a sense of informal risk sharing in the sample. The majority said that they would be able to borrow money in case of an emergency.[7] Own cash and loans were identified as the main means of obtaining these emergency funds. A small fraction of the respondents had bank accounts. Eighty-five percent of the respondents had cash savings, and the average value of these savings is about 20,000 taka.

[7] This may be because of the low amount specified.

Table 2.6 Experience and knowledge of insurance products

Percentage of respondents that had bought life insurance	12
Percentage of respondents that had bought health insurance	0
Percentage of households that had bought life insurance	16
Percentage of households that had bought health insurance	0
Percentage of respondents that agreed with the following statements:	
If you buy insurance to protect against a bad event, and the bad event does not happen, you get the money you paid for insurance back	38
I can buy insurance against a bad event, once the bad event has already happened	24
Percentage of households that could obtain 1,000 taka for an emergency within a week	98
Means of obtaining the 1,000 taka (percentage citing each option):	
Sale of crops	31.7
Own cash	27.39
Loan	27.39
Sale of animals	4.55
Other	3.3
Savings association / nongovernmental organization	2.27
Sale of household asset	2.05
Sale of other farm/business assets	1.36
Percentage of respondents that have a bank account	17
Percentage of households that have a bank account	15
Percentage of respondents that have another kind of savings account	42
Percentage of households that have cash savings	85
Value of cash savings held (in taka)	21,413
Percentage of households that receive regular transfers	15
Percentage of households that send regular transfers	3

Source: Authors, based on socioeconomic survey.

3. RESULTS

In this section we describe the results from the regression analysis. We begin by examining which individual characteristics affect the decision to purchase insurance. We do this by regressing the binary variable indicating whether or not the individual bought insurance on individual characteristics. These regressions are linear probability models with union fixed effects and robust standard errors clustered at the session level. Throughout the regression analysis, we use only the data from the first decision of each of the respondents. This avoids any contamination by learning effects or participation fatigue. Given the near-universal take-up of insurance in the game, we do not find any individual characteristics highly correlated with take-up (Table 3.1). There is a small negative effect on take up if the insurance is for a catastrophic event, which is being driven by the women in the sample. Individuals in Bogra were less likely to buy any insurance. This could be driven partly by the fact that the participants from Bogra were slightly wealthier and had a larger amount in cash savings compared to those in Manikganj. There were some differences between the men's and women's responses. Among women, older women and those who had a bank account were slightly more likely to purchase insurance.

Table 3.1 Determinants of insurance take-up

Variable	Whole sample (1)	Men (2)	Women (3)
Gender (male=1)	-0.012		
	(0.012)		
Age	0.001	0.000	0.002*
	(0.000)	(0.000)	(0.001)
No. of years of schooling	-0.003	-0.005	-0.001
	(0.005)	(0.007)	(0.007)
No. of years of schooling squared	0.000	0.000	0.000
	(0.000)	(0.001)	(0.001)
Total land owned, acres	-0.008	-0.012	-0.005
	(0.008)	(0.013)	(0.008)
Total land owned, acres squared	0.001	0.001	0.001
	(0.001)	(0.001)	(0.001)
Know about insurance	0.013	0.027	-0.003
	(0.013)	(0.020)	(0.013)
Able to borrow 1,000 taka for emergency	0.076	0.086	0.072
	(0.063)	(0.090)	(0.072)
Have a bank account	-0.008	-0.030	0.031**
	(0.015)	(0.021)	(0.014)
Financial literacy score	0.016	0.042	0.004
	(0.026)	(0.049)	(0.022)
Risk aversion	0.012	0.027	-0.005
	(0.013)	(0.020)	(0.014)
Risk aversion squared	-0.002	-0.004*	-0.001
	(0.002)	(0.002)	(0.002)
Bogra	-0.048***	-0.043***	-0.053***
	(0.010)	(0.015)	(0.015)
Expensive insurance	-0.010	-0.022	-0.004
	(0.013)	(0.023)	(0.014)
Insurance for catastrophic event	-0.026**	-0.018	-0.036**
	(0.011)	(0.019)	(0.017)
Expensive insurance * Insurance for catastrophic event	-0.004	0.003	0.001
	(0.023)	(0.040)	(0.024)
Constant	0.918***	0.887***	0.907***
	(0.065)	(0.106)	(0.076)
Observations	882	442	440
R-squared	0.060	0.068	0.076

Source: Authors, based on experiment and socioeconomic survey.
Notes: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Given the high take-up of insurance, it becomes interesting to study what influenced greater take-up, as measured by the number of units bought. Because the dependent variable is the number of insurance units that were bought, we ran a Tobit model with the lower limit set as zero and the upper limit determined by the maximum number of units that could be purchased. These regressions control for union fixed effects and have robust standard errors clustered at the session level. These are presented in Table 3.2. We find that on average the men were more likely to buy more units of insurance than the women. Wealth, as captured by total land owned, had no apparent effect on the total number of units bought, but wealthier women bought more units at a decreasing rate.

Table 3.2 Determinants of number of units of insurance bought

Variable	Whole Sample (1)	Men (2)	Women (3)	Whole Sample (4)	Men (5)	Women (6)
Gender (male=1)	0.296*			0.273*		
	(0.154)			(0.153)		
Age	0.004	0.006	-0.003	0.004	0.007	-0.003
	(0.006)	(0.008)	(0.011)	(0.006)	(0.008)	(0.011)
No. of years of schooling	-0.063	-0.085	-0.020	-0.061	-0.087	-0.014
	(0.053)	(0.092)	(0.072)	(0.052)	(0.091)	(0.070)
No. of years of schooling squared	0.012***	0.014*	0.008	0.012***	0.015*	0.008
	(0.005)	(0.008)	(0.006)	(0.005)	(0.007)	(0.006)
Total land owned, acres	-0.001	-0.141	0.379**	-0.003	-0.146	0.371**
	(0.091)	(0.138)	(0.157)	(0.091)	(0.139)	(0.154)
Total land owned, acres squared	0.004	0.015	-0.047*	0.005	0.016	-0.045*
	(0.009)	(0.013)	(0.026)	(0.009)	(0.013)	(0.026)
Know about insurance	0.069	0.332	-0.162	0.076	0.325	-0.149
	(0.120)	(0.217)	(0.102)	(0.120)	(0.217)	(0.099)
Able to borrow 1,000 taka for emergency	0.498	0.406	0.386	0.553	0.415	0.453*
	(0.343)	(0.629)	(0.239)	(0.339)	(0.637)	(0.243)
Have a bank account	0.186	0.285	0.059	0.198	0.310	0.063
	(0.201)	(0.284)	(0.292)	(0.202)	(0.284)	(0.288)
Financial literacy score	0.129	0.872	-0.277	0.790	1.579*	0.312
	(0.352)	(0.605)	(0.401)	(0.520)	(0.834)	(0.619)
Financial literacy score * Expensive insurance				-1.420**	-1.894*	-1.125
				(0.565)	(1.004)	(0.704)
Risk aversion	-0.655***	-0.895***	-0.403*	-0.631***	-0.868***	-0.390*
	(0.179)	(0.289)	(0.215)	(0.181)	(0.293)	(0.215)
Risk aversion squared	0.061***	0.090**	0.030	0.058***	0.087**	0.028
	(0.022)	(0.035)	(0.027)	(0.022)	(0.035)	(0.027)
Bogra	-1.095**	-0.013	-1.808***	-1.102**	-0.019	-1.870***
	(0.487)	(0.577)	(0.653)	(0.523)	(0.604)	(0.680)
Expensive insurance	-1.711***	-1.932***	-1.719***	-0.663	-0.429	-0.958
	(0.201)	(0.249)	(0.438)	(0.534)	(0.865)	(0.741)
Insurance for catastrophic event	-0.094	0.429	-0.562	-0.092	0.422	-0.573
	(0.264)	(0.494)	(0.349)	(0.266)	(0.489)	(0.350)
Expensive insurance * Insurance for catastrophic event	2.180***	2.415***	2.270***	2.140***	2.312***	2.286***
	(0.346)	(0.736)	(0.471)	(0.350)	(0.723)	(0.472)
Observations	882	442	440	882	442	440

Source: Authors, based on experiment and socioeconomic survey.

Notes: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Columns 4,5 and 6 control for interaction between financial literacy and the expensive insurance product.

More risk-averse individuals bought fewer units of insurance, and this relationship became stronger at higher levels of risk aversion. From standard insurance literature this seems unreasonable, as one would expect more risk-averse individuals to want to cover for their risks. However, in the case of index insurance, because the payout is tied to the index rather than the loss incurred (basis risk), the product can be less attractive to risk-averse individuals (Clarke 2011; also see Hill et al. 2013). Participants in Bogra on average bought one unit of insurance fewer than those in Manikganj. This result was primarily driven by the women in Bogra, who bought almost two units fewer than the women in Manikganj. Because we have only two prices, we cannot estimate a demand curve. As expected, fewer units of insurance were bought when insurance was offered at a marked-up price, except for the case of the catastrophic event. It is unclear what is driving this last result. One explanation could be that the participants related the high price to quality for the catastrophic event insurance.

We now examine whether the effect of different respondent and household characteristics differs across the different insurance products. For the catastrophic event insurance (treatments T1 and T2), as seen in Table 3.3, years of schooling is positively associated with the number of units bought, whereas risk aversion and living in Bogra have a negative effect. However, there is one interesting distinction between men and women. Women bought more when the insurance was offered at the higher price, whereas men bought less. In the case of insurance against a bad event (treatments T3 and T4), being able to borrow 1,000 taka is positively correlated with the amount of insurance bought (more so among the men). Respondents may have been considering insurance as a substitute to borrowing from peers in case of an emergency. A difference in this case is that the negative coefficient on Bogra is now positive (though not significant). In this case, women in Bogra bought 1.2 units more of the insurance compared to women in Manikganj. Possibly they were exposed to more frequent shocks, and therefore buying insurance for such an event seemed reasonable to them.

For insurance purchases, when we restrict the sample to participants who were offered only the cheaper (actuarially fair, treatments T2 and T4) insurance, we find that among the men, having more land led to the purchase of fewer units of insurance. However, this effect is reversed among the women. Women bought fewer units of catastrophic event insurance. Among those participants who were offered the more expensive insurance product (treatments T1 and T3), men bought 0.48 units more, on average. Participants with more land and those who were able to borrow in emergencies also bought more insurance units. Among the women, a higher financial literacy score led to a lower number of units bought. Men in Bogra bought about half a unit more of the insurance compared to men in Manikganj. Participants who were offered the more expensive insurance product bought more (more than 2 units) insurance if it was for the catastrophic event.

Table 3.3 Determinants of number of units of insurance bought by type and price of insurance

	Catastrophic Event			Bad Event			Cheap Insurance			Expensive Insurance		
Variable	Whole sample	Men	Women	Whole sample	Men	Women	Whole sample	Men	Women	Whole Sample	Men	Women
Gender (male=1)	0.385			0.199			0.204			0.480**		
	(0.258)			(0.210)			(0.259)			(0.218)		
Age	0.010	0.012	0.000	-0.001	0.003	-0.010	-0.000	0.006	-0.026	0.004	0.004	0.008
	(0.011)	(0.014)	(0.023)	(0.007)	(0.009)	(0.008)	(0.010)	(0.012)	(0.026)	(0.007)	(0.011)	(0.009)
No. of years of schooling	-0.121	-0.304	-0.032	-0.011	-0.016	-0.041	-0.035	-0.018	-0.064	-0.088	-0.212	0.026
	(0.101)	(0.220)	(0.132)	(0.051)	(0.079)	(0.083)	(0.071)	(0.116)	(0.111)	(0.087)	(0.158)	(0.105)
No. of years of schooling squared	0.019**	0.034**	0.013	0.007	0.009	0.007	0.015**	0.014	0.012	0.010	0.018	0.005
	(0.008)	(0.017)	(0.011)	(0.005)	(0.008)	(0.007)	(0.007)	(0.011)	(0.011)	(0.007)	(0.012)	(0.008)
Total land owned, acres	0.127	-0.198	0.369	-0.109	-0.193*	0.091	-0.239	-0.644**	0.862***	0.165**	0.172	-0.060
	(0.229)	(0.396)	(0.645)	(0.077)	(0.099)	(0.180)	(0.225)	(0.271)	(0.249)	(0.074)	(0.105)	(0.226)
Total land owned, acres squared	0.019	0.049	0.035	0.006	0.010	-0.007	0.039	0.095***	-0.101**	-0.007	-0.008	0.064
	(0.029)	(0.043)	(0.205)	(0.006)	(0.007)	(0.023)	(0.035)	(0.037)	(0.040)	(0.006)	(0.009)	(0.060)
Know about insurance	0.096	0.561	-0.129	0.001	0.166	-0.091	0.045	0.260	-0.268	0.010	0.403	-0.165
	(0.218)	(0.423)	(0.138)	(0.108)	(0.178)	(0.140)	(0.154)	(0.239)	(0.223)	(0.168)	(0.385)	(0.117)
Able to borrow 1,000 taka for emergency	0.033	-0.989	0.505*	0.848**	1.166	0.180	-0.215	-0.293		0.982**	3.516***	0.523***
	(0.528)	(1.224)	(0.264)	(0.400)	(0.728)	(0.326)	(0.542)	(0.523)		(0.415)	(1.063)	(0.199)
Have a bank account	0.302	-0.013	0.549	0.138	0.565*	-0.480*	0.375	0.589	0.058	0.163	0.160	0.203
	(0.400)	(0.555)	(0.506)	(0.204)	(0.310)	(0.248)	(0.288)	(0.396)	(0.476)	(0.279)	(0.446)	(0.331)
Financial literacy score	0.370	1.600	-0.490	-0.060	0.265	-0.342	0.691	1.115	0.317	-0.465	-0.011	-0.930**
	(0.527)	(1.048)	(0.654)	(0.481)	(0.728)	(0.476)	(0.580)	(0.924)	(0.628)	(0.373)	(0.698)	(0.464)

Table 3.3 Continued

	Catastrophic Event			Bad Event			Cheap Insurance			Expensive Insurance		
Variable	Whole sample	Men	Women	Whole sample	Men	Women	Whole sample	Men	Women	Whole Sample	Men	Women
Risk aversion	-0.694**	-1.177**	-0.512	-0.560***	-0.759**	-0.231	-0.969***	-1.165**	-0.905**	-0.412**	-0.699*	-0.156
	(0.313)	(0.491)	(0.349)	(0.211)	(0.336)	(0.236)	(0.321)	(0.458)	(0.388)	(0.201)	(0.388)	(0.206)
Risk aversion squared	0.068*	0.124**	0.049	0.045*	0.074*	0.003	0.089**	0.119**	0.076	0.040*	0.072	0.011
	(0.037)	(0.057)	(0.044)	(0.027)	(0.044)	(0.030)	(0.039)	(0.056)	(0.050)	(0.024)	(0.045)	(0.026)
Bogra	-1.300**	-1.166**	-2.034***	0.147	0.717	1.219***	-1.693***	-1.215**	-2.267***	-0.441*	0.496***	-0.537
	(0.628)	(0.455)	(0.742)	(0.187)	(0.467)	(0.224)	(0.532)	(0.477)	(0.642)	(0.248)	(0.148)	(0.389)
Expensive insurance	0.228	-1.240***	0.802***	-1.501***	-1.905***	-0.491***						
	(0.350)	(0.390)	(0.205)	(0.178)	(0.116)	(0.148)						
Insurance for catastrophic event							-0.589	0.250	-0.652***	2.274***	3.237***	2.028***
							(0.460)	(0.824)	(0.130)	(0.221)	(0.245)	(0.306)
Observations	447	201	246	435	241	194	448	269	179	434	173	261

Source: Authors, based on experiment and socioeconomic survey.
Notes: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

4. CONCLUDING COMMENTS

The objective of this exercise was to examine whether there is demand for agricultural index insurance products in rural Bangladesh and to understand gender differences in this demand. In particular, we offered participants index insurance products with different trigger probabilities. In terms of insurance take-up, 96.7 percent of the participants decided to buy insurance, with no significant differences between men and women. There was a small increase in take-up for the low-probability event, a result driven by the women in the sample. When we examine the number of units bought, we find that the men were more likely to buy more units than the women. This could be due to the fact that the women faced higher liquidity constraints or were not the primary decisionmakers regarding agriculture. On average, total wealth, as captured by total land owned, had no effect on units bought. However, among women total wealth mattered and had a positive correlation.

Some of the results among the women reflect the importance of understanding insurance products and financial literacy. When offered insurance for the low-probability event, women bought more units at the higher price. They either inferred quality from the higher price or simply did not understand the product. Second, when offered insurance at the actuarially unfair price, women with higher financial literacy scores tended to buy fewer units. However, this was not the case among men.

In examining the results from the abstract lottery game, we find that, contrary to existing literature on gender differences in risk preference, men are more risk averse than women. Women in our sample played the lottery game in a more risk-loving manner than the men. However, when we compare this response to a lottery game framed as an agricultural transaction, we find that women are more risk averse than men. This is in line with the discussion in a recent paper that finds mixed evidence on gender differences in risk preferences (Nelson 2013).

The findings of this study suggest that there is significant demand for agricultural index insurance products in rural Bangladesh and that the following gendered implications can be inferred. First, if given the opportunity, women are just as likely as men to purchase agricultural insurance. Even though women are less involved in agriculture they value insuring the production risk faced by the household. Second, financial literacy and an understanding of the insurance product are important factors affecting take-up. Women in this context, on average, have fewer years of schooling and lower financial literacy than men. Therefore, women are at a disadvantage as compared to men when faced with an insurance purchase decision. Insurance companies or other microfinance institutions marketing insurance products should be sensitive to this issue and provide extensive training and information sessions before selling the products. This finding is supported by related work in Bangladesh (Clarke et al. 2012).

A few caveats are in order. The first is on external validity. These studies were conducted in two districts in rural Bangladesh with smallholder and tenant farmers. These study areas do not represent all the agroecological zones, inundation land types, and soil types of the country and are therefore not representative of rural Bangladesh, let alone of other developing-country contexts. Therefore, the findings are specific to this context and can be extrapolated only to scenarios that are similar. Second, these studies focused on agricultural insurance, which gave the topic salience among the participants. Third, even though the product was designed to be as similar to a real insurance product as possible, it was provided in a lab setting. Such a setting is accompanied by a greater amount of time spent explaining the product and confirming understanding. Therefore, we cannot read too much into the absolute demand for the insurance products but must focus more on the relative demand.

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