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MARKETING COMPLEX FINANCIAL PRODUCTS IN EMERGING MARKETS: EVIDENCE FROM RAINFALL INSURANCE IN INDIA[1]

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ABSTRACT

Recent financial liberalization in emerging economies has led to the rapid introduction of new financial products. Lack of experience with financial products, and low levels of education and financial literacy may slow adoption of these products. This paper reports on a field experiment which offered an innovative new financial product, rainfall insurance, to 600 small scale farmers in India. A customized financial literacy and insurance education module communicating the need for personal financial management and utility of formal hedging of agricultural production risks was offered to randomly selected farmers in three districts of Gujarat state in India at the beginning of the 2009 Kharif agricultural season. The effect of the financial literacy training and six cross-cutting marketing treatments are evaluated using a randomized control trial. The training has a positive and significant effect on rainfall insurance adoption; only one of the six marketing treatments has a statistically significant effect on farmers' purchase decisions. This field experiment provides some of the first evidence that financial education can affect consumer decision-making.

INTRODUCTION

Financial liberalization around the world has led to dramatic financial innovation, which holds the promise of introducing new products to significantly improve household welfare. One prominent example of this is rainfall insurance, a financial derivative whose payouts are linked to the amount of rainfall measured at a designated station. These products, unheard of a decade ago, are now available in India, Africa, and several countries in East Asia.

Nevertheless, available evidence suggests adoption of these products is quite slow (Gine et al., 2007a; Cole at al., 2009). In addition to the standard challenges associated with introducing a new product, one may posit a range of plausible causes for slow adoption: insurance is an intangible "credence" good, and the relationship marketing necessary to sell it may take time to develop (Crosby and Stephens, 1987). Farmers may worry the insurer is better informed about the upcoming weather. Loss aversion and narrow framing may cause farmers to decline to purchase insurance, fearing that rain will be good, and they will receive no benefit from the product. Finally, and perhaps most importantly, the product is complicated: it maps the distribution of rainfall over an entire growing season to a single payout vector, using a metric, millimeters, unfamiliar to many farmers. There is a range of correlational evidence suggesting individuals with low levels of financial literacy are less likely to participate in financial markets (Lusardi and Tufano, 2008; Lusardi and Mitchell, 2007).

This paper reports on a series of marketing experiments conducted in three districts in Gujarat, India, designed to test behavioral constraints to the purchase of rainfall insurance. A non-profit organization, the Development Support Center (DSC), which is well-known to farmers in the area, introduced[2] rainfall insurance to six hundred study households. Half of our sample was offered a financial literacy training program, consisting of two sessions of

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[2] Rainfall Insurance was designed and marketed for the first time in the study districts. The policies were customized for the Kharif 2009 agricultural season, Kharif (summer farming) being the most important agricultural season for the farmers given the dependence on monsoon rainfall (June-October). Crop incomes constitute the most important source of livelihoods for households in our study districts with little off-farm diversification options.

three hours each. Independent of this assignment, randomly selected farmers received one or more of the following additional treatments: a money-back guarantee offer for the insurance product, offering a full refund in case the policy did not make any payouts; weather forecasts about the quality of the upcoming monsoon; and a demonstration of the relationship between millimeters of rainfall (the metric used in the insurance policies) and soil moisture. These treatments are described in greater detail below.

There is strong evidence of the importance of product education. The financial education module increased demand for the insurance product by 5.3 percentage points (p-value 0.03). When delivered in isolation, none of the additional marketing treatments, Money-back, Forecasts, and mm Demo had modest positive, but statistically insignificant effects on demand. However, when offered together, the combined treatment of money-back guarantee, rainfall forecasts, and mm demo dramatically increased demand, increasing the share of households purchasing rainfall insurance by 11 percentage points (p-value 0.06).

This study is important for reasons beyond the practical lessons it provides in promoting adoption of insurance. First, it demonstrates that large-scale field experiments, most frequently used to evaluate the impact of programs, can also be used to test theories of consumer demand. Second, it presents the first compelling evidence that financial education can influence financial behavior[3]. Finally, because a range of messages were tested, the results may form the basis for developing a more coherent theory of financial literacy.

PRODUCT INFORMATION

In many developing countries, households engaged in rain fed agriculture are highly susceptible to weather-related risks. In India, for example, where two-thirds of the nation's total net sown area is rain fed, farmers' incomes are substantially exposed to variations in rainfall. The high variability in the onset dates of monsoon and prolonged dry-spells significantly affect crop yield, exacerbated by falling ground water levels and the lack of protective well-irrigation and water harvesting structures (Gine et al., 2007a; Rosenzweig and Binswanger, 1993). Indeed, almost 9 out of every 10 households in a recent survey in India report that variation in local rainfall is the most important risk they face (Cole et al., 2009).

While informal risk management techniques like crop diversification and dependence on kinship and social institutions may be available to farmers, such strategies fail in the face of severe, correlated weather shocks and disastrous extreme events (Rao, 2008; ICRISAT, 1979). Without formal mechanisms to manage weather related risks, agricultural households may invest less, may not adopt profitable farming innovations, and may have less access to credit (Carter, 2008; Hazell and Skees, 2006). Moreover, sustained agricultural development requires that farmers' instable income streams and uninsured livelihoods be addressed, particularly in India (Gaurav, 2008; 2009).

Index-based or parametric weather insurance is one financial innovation that promises to strengthen the resilience of farmers to weather shocks (Skees, 2003; Syroka, 2007; Manuamorn, 2007). With this insurance product, payouts are triggered when an index correlated with adverse crop-outcomes reaches a pre-specified strike point. Weather insurance has numerous theoretical advantages: it solves problems of adverse selection and moral hazard; it has very low transaction costs, since there is no need to verify claims, and there is high-quality historical data insurance companies can use to price the product. However, despite these advantages, adoption of such products has been quite low. Cole et al., (2009) find that in India, less than 10% of their sample purchased weather insurance, despite its relatively low cost. Similarly, Gine and Yang (2009) find that among farmers in Malawi, take-up of a credit with insurance contract was 13% lower than the take-up of a credit contract without insurance.

Studies on the barriers to household risk management (Cole et al., 2009, Gine et al., 2008) indicate that rural households do have a limited understanding of rainfall insurance. A lack of trust impedes take-up, though Cole et al., (2009) did not find any evidence

[3] Cole, Sampson, and Zia, (2010) show that financial literacy education affects demand for bank accounts, but only among those with low levels of initial financial literacy.

that a short financial literacy module was effective. The rainfall risk was underwritten by the Agriculture Insurance Company of India (AICIL); the largest company its kind in the country. The insurance product provides protection against deficit rainfall from July 1 to September 30, while it covers excess rainfall from September 16 to October 15. The maximum insurance payout is Rs. 6500 (USD 130), with a total premium of Rs. 800 (USD 16). This insurance product is fairly typical of weather insurance offered in other regions in India, as well as in many developing countries. The policy term sheets for the insured crops, cotton and groundnut different in accordance to the riskiness and expected payout probability for each district in our study.

Communicating index-based, parametric rainfall insurance to people with low literacy and poor participation in formal financial markets is a challenge. Though the farmers have an intuitive understanding of the correlation between rainfall and yield, it is difficult to explain the basic payout mechanism of rainfall insurance. In response to observed extremely low adoption rates and low rates of customer repurchase, DSC (by way of its network of NGOs called 'Sajjata Sangh' introduced with the policy a sustained effort to educate consumers. The study was motivated by the hypothesis that farmers would benefit from adoption of rainfall insurance, but, due to information frictions, demand is suppressed. Insurance products in particular are a challenge for farmers, who cannot observe payout frequencies and may regard the premium as a waste of money in years when no payout is made.

SAMPLE

DSC identified three talukas (administrative sub-districts), from three coastal districts of Gujarat. Rainfed agriculture is the primary activity in these

Table 1 Summary Statistics

	Mean	s.d	N
Household Characteristics			
Household Size	5.82	2.95	597
Household Head Years of Schooling	11.52	3.13	597
Household has Telephone/Mobile	68%	0.47	597
			597
Respondent Characteristics			597
Able to Speak Gujarati	0.82	0.38	597
Able to Write Gujarati	0.79	0.41	597
Worked Outside Village in Kharif 2009	0.06	0.24	597
Completed Primary School	36.79		597
Completed Secondary School	40.97		597
Completed Higher Secondary School	3.85		597
Completed Graduation	3.01		597
Illiterate	15.38		597
Hindu	99%		597
Caste, OBC	23%		597
Caste, General	70%		597
Caste, SC	6%		597
Caste, ST	1%		597
			597
Discount Rate	0.73	0.35	597
Risk Aversion	10.4		597
Fatalism	0.47	0.19	597
			597
Cognitive Ability			597
Math Score	0.78	0.29	597
Financial Aptitude	0.32	0.22	597
Probability Score	0.80	0.27	597
Debt Literacy Score	0.18	0.22	597
Financial Literacy Score (out of 2)	0.51	0.50	597
			597
Household Assets and Income			597
MPCE (Rs)	1500	2209	597
Household has electricity	97%		597
Household has bullocks	55%		597
Household has T.V/Radio	53%		597
Household Land Ownership (ha)	3.32	3.20	597
Annual Income from Own Cultivation (Rs)	82234	138211	597
Annual Income from Agricultural Labour (Rs)	13865	13450	597
Annual Income from Farm Enterprise(Rs)	21132	23255	597
Annual Income from Casual Labour(Rs)	14233	19778	597
Annual Income from Regular Labour(Rs)	44293	29564	597
Annual Income from Non-farm Enterprise(Rs)	43528	37462	597
Annual Income from NREGA(Rs)	9796	14080	597
Annual Income from Rent(Rs)	15193	14644	597

N=597

talukas[4], and most households are exposed to significant monsoon risk. These sites are agro-climatically different, but the main crops, cotton and groundnut, are grown almost without irrigation, and the constraints set the farmer face in their decision making are similar. Five villages within each taluka were selected as study villages. From each, a random sample of 40 farmers were selected from a sampling frame comprising of all the landholding farmers of the village who had experience of growing cotton or groundnut.

[4] These talukas are Khambha in Amreli district, Jambusar in Bharuch district and Ghogha in Bhavnagar district.

Table 2 Financial Condition of Study Households

	All	Below Median Fin Lit	Above Median Fin Lit	Difference	
Formal Savings	66%	67%	65%	2%	
Cash at Home	66%	66%	66%	0%	
Jewellery	66%	61%	71%	10%	**
SHG Savings	2%	2%	2%	0%	
Other Savings	4%	6%	2%	4%	*
Total Formal Savings (Rs)	15892	13028	19256	6228	
Formal Loans Outstanding	55%	50%	60%	10%	**
Loans from Friends and Relatives	26%	29%	24%	5%	
Loans from MFI	24%	27%	20%	7%	
Loans from Moneylender	6%	7%	5%	2%	
Other Loans	19%	20%	19%	1%	
Total Formal Loans Outstanding (Rs)	56670	64632	47408	17224	
Crop Loan from Bank	39%	34%	43%	9%	**
Crop Loan from Friends and Relatives	11%	10%	11%	1%	
Crop Loan from MFI	13%	14%	12%	2%	
Crop loan from Moneylender	3%	3%	2%	1%	
Crop Loan from Other Sources	7%	7%	7%	0%	
Have Life Insurance	27%	25%	29%	4%	
Have Other Insurance	15%	14%	16%	2%	
N	597	297	300		

Note: *p< 0.10, **p< 0.05, ***p<0.01

In each taluka, two NGO employees were offered a rigorous two-day training conducted by one of the principal investigators. These trainers then carried out the actual training of the farmers in their respective talukas under supervision of our field staff. We also conducted surprise visits and checks on the attendance rolls to ensure compliance and prevent the contamination of our financial literacy treatment.

While our study villages necessarily represent a particular geography in Gujarat, our sample is representative within that population Thus, we are optimistic the lessons from this setting will be of general use.

STUDY DESIGN

Treatment was randomly assigned, at the individual level, in the following manner: of the 600 farmers in

Table 3 Test of Random Assignment

	Not Invited	Invited	Difference	p-value
MPCE	1458.16	1542.64	84.480	0.6407
Household Size	5.79	5.84	0.050	0.8445
Age	49.68	49.97	0.282	0.8108
Landholding (ha)	3.16	3.30	0.145	0.2890
Years of Schooling	9.00	8.96	0.040	0.9056
Write Gujarati	1.23	1.19	0.040	0.2214
Financial Literacy Score	0.51	0.51	0.010	0.8398
Cognitive Ability	1.57	1.58	0.008	0.8272
Fatalism	0.47	0.47	0.003	0.8329
Have Savings	0.71	0.68	-0.026	0.2470
Have Loans Outstanding	0.74	0.77	0.028	0.7820
Have Life Insurance	0.26	0.28	0.023	0.6710
Have Other Insurance	0.15	0.15	0.006	0.0600
N=597	298	299		

the sample, half were assigned to receive financial literacy education. This treatment comprised of an invitation to attend the financial literacy training to be held in the village before the rainfall insurance product was marketed. The comparison group of 300 farmers received nothing.

Randomization allows us to measure the causal impact of the effect of financial literacy training intervention on weather insurance purchase.[5] Because compliance was near perfect (597 of 600 invited attended), we focus on the intention to treat (ITT) estimates, rather than the treatment on treated (also called Instrumental Variable) estimates.

FINANCIAL LITERACY TREATMENT

These training sessions were completed prior to the marketing of the product in the village. The first half provided general lessons on personal financial management, savings, credit management and insurance and made use of custom designed training materials: charts, posters, pamphlets and a thirty minute video on the relevance of rainfall insurance. In the second session, a set of two interactive simulation games to learn insurance mechanism were played by the participants. This gave the farmer a firsthand experience of the benefits and limitations of insurance per se.

One of the insurance games[6] was an adaptation of the yield insurance program of the cotton farmers in Pisco valley of Peru (Carter, 2008), where the farmers understand the power of insurance in protecting against covariate income shocks in the eventuality of adverse rainfall shocks as well as the limitations of the insurance mechanism. The second game focused on making the farmers understand the interactions of the frequency and severity of natural disasters and the benefits and limitations of crop insurance (Skees et al., 1999; Mishra, 1996) and rainfall insurance schemes. Feedback from the games was positive. From the NGO's perspective, the games were attractive as they allowed farmers to appreciate the mechanism and complexity of insurance business.

ONGOING MARKETING TREATMENTS

[5] Duflo, Glennerster and Kremer, (2006) has an in-depth discussion on the merits and limitations of randomization as a tool for impact evaluation.

[6] Patt, Suarez and Hess (2010) provide evidence on the role of simulation games in index-based insurance adoption among smallholder farmers in Malawi and Ethiopia.

Six additional cross-cutting orthogonal marketing manipulations to randomly assigned groups of 47[7] Summary statistics are presented in Table 4.

Table 4 Experimental Sample: Summary Statistics

			Purchased Rainfall Insurance	
	N	Percent	N	Percent
Surveyed Individuals	600			
Of Whom Participated	597	99.5	68	11.4
Of Whom have Life Insurance	161	27		
Of Whom have Other Insurance	90	15		
Treatment Status		**Adopters**	**N**	**Take Up Rate (%)**
Financial Literacy Treatment:				
Invited to Financial Literacy Training		42	299	14.05
Not Invited to Financial Literacy Training		26	298	8.72
Total		**26**	**298**	8.72
Marketing Treatments:				
Treatment A		10	47	21.28
Treatment B		8	47	17.02
Treatment C		6	47	12.77
Treatment D		5	47	10.64
Treatment E		5	46	10.87
Treatment F		3	47	6.38
Total		**37**	**281**	13.17
Financial Literacy and Marketing Treatment:				
Training + Treatment A		7	23	30.43
Training + Treatment B		7	31	22.58
Training + Treatment C		3	22	13.64
Training + Treatment D		1	26	3.85
Training + Treatment E		2	18	11.11
Training + Treatment F		1	20	5.00
Total		**21**	140	15.00
Marketing Treatment for Comparison Group Farmers:				
Not Training + Treatment A		3	24	12.50
Not Training + Treatment B		1	16	6.25
Not Training + Treatment C		3	25	12.00
Not Training + Treatment D		4	21	19.05
Not Training + Treatment E		3	28	10.71
Not Training + Treatment F		2	27	7.41
Total		**16**	**141**	11.35
Pure Comparison Group		10	157	6.37

Note:
1. Treatment A: Money-back *Forecasts*mm Demo; Treatment B: Money-back*Forecasts, Treatment C: Money-back; Treatment D: Forecasts; Treatment E: mm Demo; Treatment F: mm*Demo*Forecasts
2. Pure Comparison Group means the farmers who were not invited and did not get any marketing treatment

The treatments are as follows:

Treatment A: Money-back offer, Weather Forecasts, and millimeter demonstration

Treatment B: Money-back offer and Weather Forecasts

Treatment C: Money-back offer only

Treatment D: Weather Forecasts only

Treatment E: 'mm' Demonstration only

Treatment F: 'mm' Demonstration and Weather Forecasts

The money-back offer provided those purchasing insurance with a complete refund at the end of the policy period, if the insurance policy made no payouts.

[7] Initially six blocks of 50 farmers each was designed, but given budget constraints and our power calculations, 47 turned out to be the optimal value for number of farmers to be included in each of the six blocks.

The ceiling to the refund was one unit of insurance. While this is not a standard offer in insurance setting, it is similar in spirit to the "no claims" bonus offered by insurance customers to clients.

Marketing treatments were conducted at the doorsteps of the farmers, with the intention of improving the farmers' understanding of the rainfall insurance product being marketed. In addition to the experimental treatments described above, the NGO held informational meetings open to all villagers, and the policies were offered for sale in all villages.

HOUSEHOLD SURVEY, MAIN RESULTS, AND EXPERIMENTAL FINDINGS

The intervention was complemented with a household survey, conducted in November-December 2009.

While in principle it would be attractive to know farmer characteristics prior to the intervention, conducting the household survey after the intervention avoids the possibility that surveying itself affects behavior. The survey covering all the 600 participants[8] in our study had modules on the household demographics, socio-economic conditions, livelihood, financial awareness and detailed farm and farmer related information. Pre-intervention or baseline information on cognitive ability questions was available.

[8] During the study two of the original participants had died and one had permanently migrated out of the village, thus making our final sample size 597.

Table 5 Predictors of Financial Literacy

Dependent Variable:	Financial Literacy Score	
	OLS1	OLS2
Ln MPCE*	-0.019	-0.018
	(0.02)	(0.02)
Female	-0.043	-0.015
	(0.04)	(0.04)
Age	0.002*	0.001
	(0.00)	(0.00)
Age Squared	0.0003***	0.0003***
	(0.00)	(0.00)
Years of Schooling	0.002	0.002
	(0.00)	(0.00)
Write Gujarati	-0.115***	-0.108***
	(0.04)	(0.04)
Landholding in hectares	0.007*	0.007*
	(0.00)	(0.00)
Muslim	0.048	0.034
	(0.07)	(0.07)
Christian	-0.119**	-0.132*
	(0.06)	(0.07)
Other Religion	-0.306***	-0.301***
	(0.07)	(0.07)
Scheduled Tribe (ST)	0.059	0.075
	(0.08)	(0.09)
Other Backward Class (OBC)	-0.150**	-0.142**
	(0.06)	(0.06)
General Caste	-0.103*	-0.089
	(0.06)	(0.06)
Cognitive Ability	0.187***	0.167***
	(0.03)	(0.03)
Risk Aversion		-0.039
		(0.04)
Fatalism		-0.037
		(0.07)
Discount Rate		-0.0004***
		(0.00)
R Squared	0.134	0.156
Bayesian (Schwarz) Information Criteria	344.951	348.543
N	597	597

Note: *p< 0.10, **p< 0.05, ***p<0.01

*Ln MPCE denotes natural log of monthly per capital consumption expenditure (30 day recall)

PREDICTORS OF FINANCIAL LITERACY

In Table 5, we use data from our survey, which measured household characteristics and financial literacy, to explore the predictors of financial literacy. While coefficients cannot be given a causal interpretation, it is nevertheless informative to understand what individual characteristics are correlated with financial literacy. Age is a statistically significant variable and positively predicts financial literacy. Older individuals are generally more financially literate. However, and quite surprisingly, education does not have any significance in predicting financial literacy. Landholding is also a significant predictor of financial literacy. Membership in caste categories has significance in the sense that members of the "Other Backward Classes (OBC)," a historically disadvantaged group, score substantially lower. Cognitive ability is also a significant determinant of financial literacy: this is consistent with other evidence from Indonesia and India (Cole, Sampson, and Zia, 2010; Cole et al., 2009).

Column (2) adds a set of respondent characteristics like risk aversion[9], fatalism (measured by general feeling of affectedness vis-à-vis others and a subjective well being assessment of having control over one's life and life's events) and discount rate (measured by the impatience elicited by the farmer in a series of options where a preference over Rs.7 today vis-à-vis increasing amounts of money one month from today are offered). Most variables retain their predictive power, though education is no longer statistically significant. This may be because the schooling curriculum does not provide any financial literacy training. Discount rate has a negative and statistically significant effect on financial literacy scores, indicating respondents having higher discount rates (those who prefer the present to the future) or those who are more impatient end up having lower financial literacy scores. This could be arising out of the fact that impatient respondents perhaps did not give well thought-out and calculated answers to the questions that go on to determine the financial literacy scores, unlike their more patient counterparts.

IMPACT OF FINANCIAL LITERACY ON RAINFALL INSURANCE ADOPTION

This section describes the effect of marketing experiments on take-up of rainfall insurance. We first verify that random assignment was successful, in the sense that there are no systematic differences between the treatment and control groups. Results for key variables are presented in Table 3. Treatment and control groups are statistically (and economically) similar across a range of measures: demographics (age, household size), wealth (per capita expenditure, savings account) and education.

Table 6 (following page) presents the main results of the paper. Column (1) estimates a simple (OLS) model, of purchase of rainfall insurance, on a dummy variable indicating the household was invited to training. We find a positive and statistically significant result: the training and education program increases take-up by 5.3 percentage points, relative to a take-up rate in the control group of 8.7%.

[9] We measure risk aversion by offering respondents a choice between Rs. 2 with certainty, or a lottery with a 50% chance of winning Rs. 5, and a 50% chance of winning nothing.

While the marketing campaign was effective, it would not be cost-effective, as the cost of visiting households and running the informational campaign far exceeded the commission on premiums (inclusive of the 10.3% sales tax) that the DSC NGOs could expect.

Column (2) presents the 'full' model, with a dummy for 'invited to training', as well as dummies for the various possible combinations of treatment. The strongest treatment, a combination of all modules, proved quite effective: offering a money back guarantee, in combination with a demonstration of millimeters and weather forecasts. Take-up increased by 11.5 percentage points, a very substantial impact. This would not be a particularly cost-effective treatment, as the money-back guarantee has high expected costs. (Analysis of similar rainfall insurance policies suggests they payout only 1 in 11 years; Gine et al., 2007b).

None of the other individual treatments appear to have a statistically significant effect on insurance take-up. However, the point estimates are typically positive, and the confidence intervals admit the possibility of economically meaningful effects. Because of random assignment, the point estimates in column (1) and (2) are unbiased even in the absence of omitted variables. In column (3), we include a full host of demographic controls, which could reduce variation and increase precision. The point estimates are nearly identical following the addition of controls, and the main effect of training invitation, as well as the combined money back, millimeter demonstration and weather forecasts remains statistically significant. The final rows of Table 6 provide F-tests and the corresponding p-values for all the variables in the model. We can reject the hypothesis that marketing has no effect in column (1) at the 5 per cent level, and in column (2) at the 11 per cent level. Only in column (3), which includes 25 regressors, can we not reject the hypothesis that the point estimates of all the coefficients are statistically significantly different from zero.

Table 8 examines whether there are any heterogeneous treatment effects. We split the sample in the following ways. First because different crops have different water requirements, and may

differentially benefit from rainfall insurance, we examine whether behavior is different for farmers who grow primarily cotton, or for farmers who grow primarily ground-nut.

Table 6 Determinants of Rainfall Insurance Take-up

Dependent Variable:		
	OLS1	OLS2
Invited to Training	0.053**	0.050*
	(0.03)	(0.03)
Money-back*Forecasts*mm Demo		0.115*
		(0.06)
Money-back*Forecasts		0.064
		(0.06)
Money-back		0.031
		(0.05)
Forecasts		0.006
		(0.05)
mm Demo		0.016
		(0.05)
mm*Forecasts		-0.030
		(0.04)
Female		
Age		
Age Squared		
Years of Schooling		
Write Gujarati		
Landholding in hectares		
Muslim		
Christian		
Other Religion		
Scheduled Tribe (ST)		
Other Backward Class (OBC)		
General Caste		
Cognitive Ability		
Risk Aversion		
Fatalism		
Discount Rate		
R Squared	0.007	0.020
F	4.207	1.341
p	0.041	0.228
N	597	597

Note: *p< 0.10, **p< 0.05, ***p<0.0

Second, we test whether the treatment varies by level of financial literacy. Finally, we test whether the effects are greater for individuals with monthly per-capita expenditure (MPCE, based on 30 day recall) levels above or below the median.

Most sample restrictions result in significantly fewer observations. The point estimate for training invitation remains positive and close to 5 per cent regardless of the sample restriction; however, the standard error increases, and the main treatment is significant only for the sub-sample which had below median financial literacy (Column (6)). This result is consistent with Cole et al., (2009), which finds that financial literacy education about bank accounts is effective for those with low initial levels of financial literacy, but not for the general population. One other result merits mention: groundnut farmers appear more influenced by the money-back offer (treatment effect of 19 percentage points, statistically significant at the 5 per cent level).

CONCLUSION

This paper describes a set of interventions designed to improve our understanding of the demand for financial risk management tools. The primary intervention, an educational module covering financial literacy and rainfall insurance specifically, has a positive and significant effect on take-up. This result is consistent with Cole et al., (2009), which finds that marketing visits in Andhra Pradesh increase take-up substantially. Perhaps surprisingly, the offer of a money-back guarantee has a quite limited effectiveness: offered in isolate, it has no statistically significant effect on demand, though the confidence interval would admit an effect of up to 13 percentage points. A module relating millimeters of rainfall to soil moisture appears ineffective, as does the offering of rainfall forecasts.

These results reinforce the emerging view that financial literacy matters: individuals educated in financial literacy and insurance are significantly more likely to purchase rainfall insurance. The findings from the financial literacy and debt-literacy tests reveal the low financial awareness of the study farmers as a formidable barrier to adoption of complex financial products like rainfall insurance. The results are similar to those in Patt, Suarez and Hess (2010) as a large proportion of the farmers have difficulty in understanding most of the fundamental concepts of insurance that would be necessary to make a fully informed and educated choice even after learning about index insurance through conventional education sessions or simulation games.

The results of the cross-cutting marketing treatments suggest that a range of apparently sensible interventions may not have an effect, if offered in isolation. The combination of all three additional treatments had a substantial effect on take-up. Taken together, these results suggest that it is possible to influence adoption behavior through information campaigns. However, the relatively low take-up, even among the most intensely treated, and the high cost of treatment, suggest that substantial increases in the

Table 7 Financial Literacy by Cognitive Ability and MPCE Class

	Cognitive Ability				MPCE			
	All	Below Median	Above Median	Difference*	All	Below Median	Above Median	Difference*
Correct Answer %	14	17	6	11	14	14	13	1
Correct Answer %	41	20	43	23	41	40	42	3
Correct Answer %	27	22	26	4	25	24	25	4
Correct Answer %	44	42	47	5	49	48	50	3
Financial Aptitude	0.3				0.3			
Mean Score	3	0.14	0.41	0.27	2	0.31	0.33	0.02
N	597	298	299		597	298	299	

Note:

1. Financial Aptitude Questions

A. Suppose you borrowed Rs. 100 from a moneylender, and the rate of interest was 2% per month. If you made no repayment for three months, How much would you owe: Less than Rs. 102, exactly Rs. 102, or more than Rs. 102.

B. Suppose you need to borrow Rs 500. Two people offer you a loan. One loan requires you pay back Rs. 600 in one month. The second loan also requires you pay back in one month, Rs. 500 plus 15 percent interest. Which loan represents a better deal for you?

C. Imagine that you saved Rs. 100 in a savings account, and were earning an interest rate of 1% per year. If prices were increasing at a rate of 2% per year, after one year, would you be able to buy more than, less than, or exactly the same amount as today with the money in the account?

D. Do you think the following statement is 'true' or 'false'? Planting one crop is usually safer than planting multiple crops?

2. MPCE represents monthly per capital consumption expenditure (30 day recall).

3.* Differences are significant at the 1 per cent level.

Table 8 Theoretically Motivated Interactions and Sample Restrictions

	Cotton	Cotton	Groundnut	Groundnut	<Median FL	<Median FL	>Median FL	>Median FL	<Median MPCE	<Median MPCE	>Median MPCE	>Median MPCE
Invited to Training	0.033	0.038	0.025	0.031	0.008	0.073**	0.047	0.059	0.047	0.048	0.056	0.059
	-0.04	-0.04	-0.04	-0.04	-0.04	-0.03	-0.03	-0.04	-0.03	-0.03	-0.04	-0.04
mm Demo	-0.06	-0.05	-0.062	-0.069	-0.008	0.03	0.027	-0.017	0.027	0.051	-0.021	-0.017
	-0.06	-0.06	-0.07	-0.08	-0.07	-0.07	-0.08	-0.07	-0.08	-0.08	-0.07	-0.07
Money-back Offer	0.079	0.088	0.190**	0.182**	0.029	0.092	-0.053	0.109	-0.053	-0.028	0.105	0.109
	-0.08	-0.08	-0.09	-0.09	-0.06	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07
Forecasts	-0.048	-0.039	-0.069	-0.076	-0.07	-0.025	-0.02	-0.073	-0.02	0.004	-0.078	-0.073
	-0.07	-0.07	-0.07	-0.07	-0.08	-0.06	-0.06	-0.08	-0.06	-0.06	-0.08	-0.08
mm*Forecasts		-0.088		-0.126		-0.002		-0.043		0.049		-0.043
		-0.07		-0.08		-0.06		-0.08		-0.06		-0.08
Money-back*Forecasts		0.045		-0.004		0.053		-0.046		0.124*		-0.046
		-0.07		-0.08		-0.07		-0.07		-0.07		-0.07
Money-back*Forecasts*mm		0.14**		0.028		0.132*		0.142*		0.089		0.142*
		-0.07		-0.07		-0.07		-0.08		-0.06		-0.08
R Squared	0.013	0.039	0.028	0.038	0.007	0.026	0.008	0.038	0.008	1.019	0.022	0.038
F	0.883	1.561	1.794	1.391	0.308	1.546	0.61	1.652	0.61	0.418	1.645	1.652
p	0.475	0.147	0.13	0.209	0.872	0.15	0.656	0.121	0.656	298	0.163	0.121
N	277	277	257	257	190	407	298	299	298	298	299	299

Note: *p< 0.10, **p< 0.05, ***p<0.01

efficiency of delivery are necessary before rainfall insurance becomes a financially sustainable product.

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