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Recent financial liberalization in emerging economies has led to the rapid introduction of new financial products. Lack of experience with financial products, low levels of education, and low financial literacy may slow adoption of these products. This article reports on a field experiment that 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 the usefulness of formal hedging of agricultural production risks was offered to randomly selected farmers in Gujarat, India. The authors evaluate the effect of the financial literacy training and three marketing treatments using a randomized controlled trial. Financial education has a positive and significant effect on rainfall insurance adoption, increasing take-up from 8% to 16%. Only one marketing intervention, the money-back guarantee, has a consistent and large effect on farmers' purchase decisions. This guarantee, comparable to a price reduction of approximately 40%, increases demand by seven percentage points.

*Keywords*: financial decision making, insurance, field experiment, emerging markets

# Marketing Complex Financial Products in Emerging Markets: Evidence from Rainfall Insurance in India

Financial liberalization around the world has led to dramatic financial innovation, which holds the promise of introducing new products that 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 designated weather stations. This insurance, unknown a decade ago, is now available in dozens of settings around the world, including in India, Africa, and several countries in East Asia.[1] Possible benefits from adoption are large because rainfall insurance protects against adverse shocks that affect many members of informal insurance networks simultaneously.

Despite this promise, available evidence suggests that adoption of these products is quite slow (Cole, Sampson, and Zia 2011; Giné, Townsend, and Vickery 2008). Beyond the standard challenges associated with introducing a new product, a range of plausible causes for slow adoption also may exist. 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 that the company is better informed about the weather forecasts and therefore will take advantage of their

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[1]For a recent discussion of index-based insurance, which lists 36 ongoing pilots, see International Fund for Agricultural Development (2010). Hazell and Skees (2006), Manuamorn (2007), and Barrett et al. (2007) provide discussions on the emergence of rainfall insurance in different parts of the world and associated challenges with distributing the policies on a large scale.


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inability to correctly value rainfall insurance. Loss aversion and narrow framing may cause farmers to decline to purchase insurance because they fear that rain will be good and they will receive no benefit from the product. Finally, and perhaps most important, the product is complicated: It maps the distribution of rainfall over an entire growing season to a single payout number, using a metric (millimeters) that is unfamiliar to many farmers. A range of correlational evidence suggests that people with low levels of financial literacy are less likely to participate in financial markets (Lusardi and Mitchell 2007, 2008).

This article reports on a marketing experiment conducted in three districts in Gujarat, India, designed to test whether education and marketing can increase purchase of rainfall insurance. In the spring of 2009, the Development Support Center (DSC), a nonprofit organization well-known to farmers in the area, introduced rainfall insurance in 15 villages. From these villages, we identified 600 households as our study sample. Half this sample was offered a financial literacy training program, consisting of two three-hour sessions. Independent of this assignment, randomly selected farmers received one or more of the following additional treatments: a money-back guarantee for the insurance product, offering a full premium refund in case the policy did not make any payouts (MoneyBack); weather forecasts about the quality of the upcoming monsoon (Forecast); and a demonstration of the relationship between millimeters of rainfall (the metric used in insurance policies) and soil moisture (mmDemo). We describe these treatments in greater detail subsequently.

We find the following: The educational program is important. Our benchmark estimates indicate that the financial education module increased demand for the insurance product by 8.1 percentage points ($p$-value .037). The most expensive marketing treatment, MoneyBack, increased demand for insurance by 6.9 percentage points ($p$-value .049), and the other two marketing interventions, Forecast and mmDemo, had small and statistically insignificant effects on demand.

This study has several implications beyond the practical lessons it provides about promoting adoption of insurance. First, it demonstrates how large-scale field experiments, most frequently used to evaluate the impact of programs, also can be used to test theories of consumer demand and to assess the cost effectiveness of various means of marketing. Second, it presents the first evidence from a randomized trial that financial education influences financial behavior in a representative population.[2] Finally, because multiple marketing messages were also tested, the results may form the basis for developing a more coherent theory of how financial literacy improves financial decision making.

## *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 greatly affected by variations in rainfall. Late onset of the monsoon and prolonged dry spells significantly reduce crop yields. Almost nine of every ten 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, such as 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 (International Crops Research Institute for the Semi-Arid Tropics 1979; Rao 2008). 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 et al. 2008; Hazell and Skees 2006). Thus, weather risk may retard economic development (Gaurav 2008, 2009).

Index-based or parametric weather insurance is one financial innovation that promises to strengthen the resilience of farmers to weather shocks (Manuamorn 2007; Skees 2003).[3] With this insurance product, payouts are triggered when an index correlated with adverse crop outcomes reaches a prespecified strike point. Weather insurance has many theoretical advantages: It solves problems of adverse selection and moral hazard; it has low transaction costs because there is no need to verify claims; and high-quality historic data is available, which 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, Giné and Yang (2008) find that among farmers in Malawi, take-up of an agricultural loan bundled with an insurance contract was 13% *lower* than the take-up of a loan without insurance.

Studies on the barriers to household risk management (Cole et al. 2009: Giné, Townsend, and Vickery 2008) indicate that rural households have a limited understanding of rainfall insurance. A lack of trust impedes take-up, though Cole, Sampson, and Zia (2011) find no evidence that a short (less than five minute) financial literacy module was effective.

In this study, rainfall risk was underwritten by the Agriculture Insurance Company of India, the largest company of its kind in the country. The insurance product provides protection against deficit rainfall from July 1 to September 30, as well as excess rainfall from September 16 to October 15. The maximum insurance payout is Rs. 6,500 (US$144), with a premium of Rs. 800 (US$18). This insurance product is fairly typical of weather insurance offered in other regions in India and in other developing countries. Policies designed for groundnut (peanut) or cotton were available. Web Appendix Figure W1 (http://www.marketingpower.com/jmrnov11) shows a policy term sheet for groundnut in one of the study areas.

Explaining index-based, parametric rainfall insurance to people with low literacy and minimal participation in formal financial markets is challenging. Although farmers have an intuitive understanding of the correlation between rainfall and yield, the payout formulas for currently available

[2]Cole, Sampson, and Zia (2011) show that financial literacy education affects demand for bank accounts, but only among those with low levels of initial financial literacy.

[3]Turvey (2001) describes the use of weather derivatives in the United States, noting that the market developed from trading by providers and consumers of energy (e.g., heating degree days) but has expanded to cover agricultural buyers as well.

rainfall insurance products are complicated.[4] Because many initial efforts to introduce rainfall insurance have been met with extremely low adoption and low repurchase rates, the DSC decided to provide financial education to consumers before introducing the policy.

The study was motivated by the hypothesis that farmers would benefit from adoption of rainfall insurance, but information frictions suppress demand.[5] 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 (Slovic et al. 1977).

## SAMPLE

The sample was drawn from 15 rain-fed villages across three coastal districts (Amreli, Bharuch, and Bhavnagar) of Gujarat State in India. Farmers in these villages are predominantly cash crop growers who cultivate cotton and groundnut. The main crops, cotton and groundnut, are grown almost without irrigation.

The sampling frame was restricted to households that owned land and typically grew either cotton or groundnut. From these, we selected 40 households in each village for the study. Approximately two-thirds of the sample consist of marginal, small, and semimedium farmers (average land holding of less than 4 hectares), who experience substantial risk of significantly reduced crop yield if the monsoons are poor. In the main Kharif (summer) agricultural season of 2009, our field partners decided to promote rainfall insurance for the first time in these regions, and they coordinated with us to better understand the effects of financial literacy training and marketing treatments on rainfall insurance take-up.

Table 1 reports the key summary statistics from a household survey conducted at the end of the Kharif 2009 season (after the experimental interventions). The survey covered all 600 participants in the study and collected data on household demographics, socioeconomic conditions, livelihood, financial awareness, cognitive ability, and detailed farm and agricultural information.[6]

The respondents are primarily men, are 50 years of age on average, and have an average agricultural income of Rs. 81,405 per year (approximately $1,800). Average monthly per capita consumption expenditure is approximately Rs. 1,500 ($33), close to the price of a rainfall insurance policy.

The sample's literacy rate of 85% is above the national average (74%, according to the 2011 Census), with 37% completing only primary schooling and 41% completing up to lower secondary schooling. Only 7% graduated from high school.

[4]The complexity of the policies mirrors the complexity of the relationship between rainfall and crop yields. Simpler policies would be easier to explain but also increase the basis risk faced by farmers.

[5]As the term sheet in Web Appendix Figure W1 (http://www.marketingpower.com/jmrnov11) shows, the product is complicated. At Harvard Business School, a case study based on rainfall insurance is taught in an advanced financial engineering class.

[6]By the time of the survey, two of the original participants had died and one had permanently migrated from the village, thus making our final sample size 597.

Table 1
SUMMARY STATISTICS

| | *Mean* | *Median* | *SD* | *N* |
|---|---|---|---|---|
| *Household Characteristics* | | | | |
| Monthly consumption expenditure (Rs.) | 7,937 | 5,900 | 13,248 | 597 |
| Monthly per capita consumption expenditure (Rs.) | 1,500 | 1,144 | 2,209 | 597 |
| Household size | 5.82 | 5 | 2.95 | 597 |
| *Respondent Characteristics* | | | | |
| Male | .88 | 1 | .33 | 597 |
| Age | 49.83 | 50 | 14.38 | 596 |
| Years of schooling completed | 8.98 | 8 | 4.48 | 597 |
| Able to write | .79 | 1 | .41 | 597 |
| Math score (fraction correct) | .78 | .88 | .29 | 597 |
| Probability Score (fraction correct) | .80 | 1 | .27 | 597 |
| Financial aptitude score (fraction correct) | .33 | .25 | .23 | 597 |
| Debt literacy score (fraction correct) | .18 | 0 | .22 | 597 |
| Cognitive ability score (scale 0–2) | 1.58 | 1.67 | .44 | 597 |
| Financial literacy score (scale 0–2) | .51 | .5 | .32 | 597 |
| Risk averse | .10 | 0 | .31 | 597 |
| *Assets and Income* | | | | |
| Land (hectares) | 3.23 | 2.25 | 3.2 | 597 |
| Household has electricity | .96 | 1 | .19 | 597 |
| Household has phone | .68 | 1 | .47 | 597 |
| Household has television/radio | .53 | 1 | .5 | 597 |
| Number of bullocks owned | 1.03 | 1 | 1.01 | 597 |
| Housing value (June 2009, Rs. 100,000) | 1.23 | .8 | 1.56 | 597 |
| *Annual Income* | | | | |
| Total income (Rs.) | 99,203 | 65,000 | 138,968 | 597 |
| Own cultivation income (Rs.) | 81,405 | 50,000 | 137,760 | 597 |
| Other agricultural income (Rs.) | 8,970 | 0 | 17,404 | 597 |
| Nonagricultural income (Rs.) | 8,827 | 0 | 21,761 | 597 |

| | *Sample Share (%)* | *N* |
|---|---|---|
| *Caste* | | |
| Scheduled caste or scheduled tribe | 6.70 | 40 |
| Other backward class | 23.28 | 139 |
| *Education Categories* | | |
| Completed primary | 36.85 | 220 |
| Completed secondary | 40.87 | 244 |
| Completed beyond secondary education | 6.87 | 41 |
| Illiterate | 15.41 | 92 |
| All | | 597 |

Notes: This table reports summary statistics on household demographics and wealth among study participants, based on a survey conducted in December 2009. The sample consists of 597 farmers in Gujarat, India. Scheduled caste and scheduled tribe are historically disadvantaged groups. More detailed variable definitions are provided in Web Appendix Table W1.

## *FINANCIAL LITERACY AND FINANCIAL LITERACY EDUCATION*

Financial literacy is a concept similar to literacy or numeracy and defines a person's understanding of, comfort with, and ability to make financial decisions. We used questions inspired by Lusardi and Mitchell (2007, 2008) and adapted for the emerging market context by Cole, Sampson, and Zia (2011). These questions were found to have significant predictive power for financial behavior in India and Indonesia.

The questions measure understanding of interest rates, compound interest, inflation, and risk diversification. We augmented these measures of financial literacy with debt literacy questions, which we adapted from Lusardi and Tufano (2008). Credit is by far the most popular financial product in the sample (75% of respondents have at least one loan outstanding), so performance on these questions reflects plausibly consequential differences in knowledge.

It is important to note that the cognitive ability and financial literacy module was given in June, before marketing or the financial literacy education treatments. Deferring these questions until after the financial literacy training would have provided a useful manipulation check but also would have made it difficult to test whether respondents' baseline (e.g., preintervention) financial literacy was correlated with subsequent purchasing decisions.

Panel 2 of Web Appendix Table W1 (http://www.marketing-power.com/jmrnov11) provides the questions used. The questions are divided into four sections. Financial aptitude questions follow Lusardi and Mitchell (2008) and test respondents' understanding of interest rates, compound interest, inflation, and risk diversification. An attractive feature of these questions is their comparability; they have been asked in surveys in India, Indonesia, South Africa, Europe, and the United States. Debt literacy questions are adapted from Lusardi and Tufano (2008) and test whether respondents appreciate how quickly debt accumulates at a compound interest rate. Web Appendix Table W2 compares results from the sample with United States samples. The third and fourth groups of questions measure basic math and probability aptitude, and we derive our cognitive ability measures from them.

Web Appendix Table W3 (http://www.marketingpower.com/jmrnov11) presents the results of our financial literacy tests.[7] Measured levels of financial literacy are very low (a common finding around the world). By splitting the sample by cognitive ability, we find that some, but not all, measures of financial literacy vary by cognitive ability.

The debt literacy questions were difficult, and few respondents answered correctly. When we construct the principal component of debt literacy and overall financial literacy for analysis, we exclude the third question, because some respondents may prefer the commitment features of a requirement to repay Rs. 100 ($2) pe month.

Respondents did quite well on many of the math questions, suggesting that the series of quiz-type questions were taken seriously, and low scores on the financial literacy questions reflect low actual levels of financial literacy. Further evidence of the value of our measures of financial literacy appears in Web Appendix Table W4 (http://www.marketingpower.com/jmrnov11), which demonstrates systematic correlation between individual characteristics and measured financial literacy.

### *Description of Financial Education Intervention*

In each taluka (similar to a U.S. county), two nongovernmental organization (NGO) employees participated in a rigorous two-day course conducted by one of the principal investigators. These employees then carried out the actual training of the farmers in their respective talukas under the supervision of our field staff. We conducted surprise visits and checks on the attendance rolls to ensure compliance and to prevent the contamination of the financial education treatment.

All village-level education sessions were completed before the marketing of the product in the village. The first half of each session provided general lessons on personal financial management, savings, credit management, and insurance and made use of custom designed training materials, including charts, posters, pamphlets, and a 30-minute video on the relevance of rainfall insurance. In the second half of the session, participants played a set of two interactive simulation games to learn about insurance mechanisms. This simulation gave the farmer first-hand experience of the benefits and limitations of insurance. One of the insurance games was an adaptation of the yield insurance education program for cotton farmers in the Pisco valley of Peru (Carter et al. 2008). The game helps farmers understand the power of insurance in protecting against covariate income shocks resulting from adverse weather conditions, as well as important limitations of the insurance mechanism. The second game focused on clarifying the frequency and severity of natural disasters and the benefits and limitations of crop insurance and rainfall insurance schemes.

Feedback from the games was positive: Farmers reported benefiting from the "learning-by-doing" feature of the game, which helped them understand probabilities of drought and payout and the concept of basis risk.[8] They gained a sense of comfort with how the product worked. From the NGO's perspective, the games were beneficial because they helped farmers appreciate the mechanism and complexity of the insurance business. Following our study, the NGO incorporated the financial education module into its marketing practices.

## *MARKETING INTERVENTIONS*

In addition to financial education, we measure the effect of marketing visits on household purchase behavior. Each household assigned to the marketing treatment receives one or more of three different marketing messages, described subsequently. The representative from the NGO was unaware of our hypotheses about the effectiveness of the marketing treatments.

The first message, money-back guarantee, offers clients who purchase insurance a 100% refund of the insurance

[7]Cognitive ability is measured with the math and probability questions given in the second panel of Web Appendix Table W1 (http://www.marketingpower.com/jmrnov11). We use the first principal component of all math and probability questions to construct a cognitive ability score.

[8]Basis risk refers to the risk that weather at the rainfall gauge may be good, even if the rainfall on a particular farmer's crop is bad.

Figure 1
STUDY DESIGN

| | No Marketing | MoneyBack | Forecast | mmDemo | MoneyBack & Forecast | mmDemo & Forecast | MoneyBack & mmDemo & Forecast |
|---|---|---|---|---|---|---|---|
| No Financial Education Invitation | 157 [6.4%] | 25 [12.0%] | 21 [19.0%] | 28 [10.7%] | 16 [6.3%] | 27 [7.4%] | 24 [12.5%] |
| Financial Education Invitation | 159 [13.2%] | 22 [13.6%] | 26 [3.8%] | 18 [11.1%] | 31 [22.6%] | 20 [5.0%] | 23 [30.4%] |

Notes: This figure describes the experimental design, as implemented. Each cell represents a treatment condition, and the number indicates the number of people assigned to that condition. The number in square brackets indicates the raw percentage of people in that particular treatment cell who purchased insurance. The marketing messages were a money-back guarantee (MoneyBack), a weather forecast (Forecast), and a demonstration of millimeters (mmDemo). No visits included just MoneyBack & mmDemo, so the design has two fewer cells than a full $2 \times 2 \times 2 \times 2$ factorial design. The "no marketing" conditions were deliberately overweighted in the random assignment.

premium at the expiration of the policy (approximately four months later) if the policy does not provide any payout. This is a costly offering from the viewpoint of the organization offering insurance: Historic rainfall data suggest that the money-back guarantee would be invoked on average 40% of the time. This intervention was motivated by two factors. First, rainfall insurance is a new and complex product. A large body of literature in marketing emphasizes the difficulty of persuading consumers to adopt new products. More specifically, when the vendors of a product may be better informed about the product than the consumers, a money-back guarantee may signal that the vendor is confident in the product quality (e.g., Moorthy and Srinivasan 1995). Second, in early focus groups, clients unfamiliar with the logic of insurance often complained that if they purchased rainfall insurance and rainfall was good, they would have "thrown away the money."

The second message, millimeter demonstration, provides prospective clients with a demonstration of how the payout trigger functions. Few clients are familiar with the metric system. Moreover, farmers typically think of weather in terms of soil moisture, not millimeters of rainfall. The NGO representative provided visual aids to demonstrate the millimeter triggers. Literature in marketing suggests that demonstrations increase new product acceptance because they enable consumers to learn about product benefits before purchase (Heiman, McWilliams, and Zilberman 2001; Heiman and Muller 1996). Therefore, because the demonstration reduces consumers' uncertainty about the benefits of the weather insurance, we expect this offer to increase adoption.

The third message, weather forecast (Forecast), was motivated by the intuition that "it's hard to sell rainfall insurance if it's raining." More generally, the time lag between the date the policy is priced and designed and the dates the policy becomes available for sale suggests the possibility of "temporal adverse selection." (Luo, Skees, and Marchant [1994] discuss this in the context of crop insurance.) Specifically, the price and coverage terms are set months before the onset of the monsoon, based on general expectations of the quality of the monsoon. Thus, a policy that was reasonably priced in February could, in theory, be a bad value for the farmer if new information available at the end of May suggests that the start of the monsoon is imminent. The weather forecasts provided in the marketing visit covered the next ten days, the longest period for which forecasts were available. The forecasts in each village intervention did not predict an early start to the monsoon. Thus, we expected the weather forecasts to have a (possibly modest) positive effect on demand. Weather forecasts are available on the radio at certain times of the day, as well in newspapers, so this intervention may have limited impact. However, we note that half the households do not have either a television or a radio, and few read newspapers, so the forecast likely provided farmers with some information.

### *DESIGN AND ANALYSIS*

The experimental design, depicted in Figure 1, can perhaps be explained most easily as a $2 \times 7$ design. First, half the sample (300) received an invitation to the financial literacy education program; the other half was not invited. Second, from the whole sample, we randomly selected 282 to receive marketing visits.[9] Each person receiving a marketing visit was assigned to receive one of six possible combinations of messages: MoneyBack, Forecast, mmDemo, MoneyBack & Forecast, mmDemo & Forecast, or mmDemo & Forecast & MoneyBack. Thus, $282/6 = 47$ people received each of these combinations. Although random assignment ensures that each respondent had the same probability of being assigned to any particular treatment as any other respondent, we chose to "overpopulate" the cells "no marketing and financial education" and "no marketing and no financial education" because we were especially interested in the effects of financial education.

The experiment was conceived as a 2 (financial education) $\times$ 2 (MoneyBack) $\times$ 2 (mmDemo) $\times$ 2 (Forecast) design, though two cells (MoneyBack $\times$ mmDemo and

[9] Attrition was limited to three people: one from the financial education and weather forecast marketing condition and two from the pure control (no financial education, no marketing).

MoneyBack × mmDemo × financial education) were intentionally left empty. This decision was driven by budgetary concerns. Each marketing treatment involved sending a marketer from the district office into the field, locating the farmer, and delivering the message. Because we were not particularly interested in message interactions, we omitted these cells. We discuss the results through the latter lens (a $2 \times 2 \times 2 \times 2$ model with two missing cells). However, we present results in an alternative design ($2 \times 7$) in Web Appendix Table W5 (http://www.marketingpower.com/jmrnov11).

In Table 2, we provide a test of the random assignment. Panel A compares respondents assigned to financial literacy education with those not assigned to financial literacy education. Not surprisingly, because randomization was done at the individual level, no systematic difference exists between the two groups. Financial literacy was measured before the intervention. It is unlikely that our treatment affected sex, age, or household size. The housing value was based on the December estimation of the value as of June 2009. It might be that the treatment affected risk aversion or other agricultural decisions. In practice, we find no systematic difference across any of the variables. Panel B conducts similar tests for random assignment of marketing messages.

Factorial designs are often chosen to study interactions across various treatments. However, they also offer the virtue of increasing statistical power to test multiple main effects, even in the absence of interaction effects (Duflo, Glennerster, and Kremer 2008, p. 3920).[10] We do not have strong theoretical predictions for the interactions, and therefore we focus our analysis and discussion on the main effects.[11] A joint test of the statistical significance of the higher-order interactions cannot reject the hypothesis that they are all equal to zero ($F(9, 584) = 1.10$, $p = .43$). For completeness, we report all 14 possible treatment effects in Web Appendix Table W6 (http://www.marketingpower.com/jmrnov11).

Random assignment to treatment groups facilitates causal interpretation of the results and suggests that a fairly simple strategy is sufficient to analyze the data. Compliance with the marketing treatments was perfect: Every respondent assigned to a particular treatment received a visit with the assigned message. In contrast, because the financial education events could not be made "compulsory," not all invitees attended. We follow standard practice and consider the invitation an "intention to treat" instrument, with attendance as the endogenous regressor. The invitation was successful in inducing variation in attendance. On average, 75% of households invited to the financial education session attended, while only 10% who were not invited attended.[12]

We adopt a regression framework rather than analysis of variance for three reasons. First, we are interested in analyzing the cost effectiveness of the interventions, which requires effect magnitudes, making it desirable to report relevant coefficients and standard errors in tables. Second, because attendance at the financial education program was not mandatory, the use of an instrumental variables estimator is required to measure the effect of financial education on purchase decisions. Instrumental variables estimates "scale up" the point estimates to account for only partial compliance with a treatment.[13] Third, analysis of variance would be complicated by sample sizes that are not equal across cells and by the two missing cells;[14] these issues are incorporated naturally in a regression framework. We use a linear probability model (Angrist and Pischke 2008). In particular, this facilitates instrumental variables estimates. The results using probit are reported in Web Appendix Tables W7 and W8 (http://www.marketingpower.com/jmrnov11) and are never substantially different than the linear probability model.

As a preliminary indication of drivers of insurance demand, Table 3 reports the unconditional correlation between insurance purchase decision (take-up) and a range of individual characteristics. Respondents who were more financially literate (before the intervention), older, and had higher housing values were more likely to purchase the insurance policy. Table 3 also reports correlations of the control variables used in subsequent regressions: housing value, financial literacy, sex, age, household size, and hectares of land.

### *RESULTS*

Table 4 presents the first-stage regression of a dummy variable for whether a farmer attended on a dummy variable for whether the farmer was invited to attend (Column 1). The coefficient .659 can be interpreted as the effect of an invitation to attend on actual participation in the financial education program. Columns 2–4 add to the regression sequentially the main effects of the marketing treatments (Columns 3 and 4) and household controls (Columns 2 and 4). The point estimate of the financial education effect does not vary across the four models.

Because the marketing messages had perfect compliance, we do not need to use an instrumental variables approach to analyze the effect of marketing messages. Therefore, we do not report first-stage estimates for the effect of marketing message assignment on marketing message receipt.

Columns 1–4 of Table 5 present reduced-form results—the effect of being assigned to financial education or the effect of being assigned to a particular marketing message on insurance purchase decisions. For financial education, not everyone assigned actually attended the treatment, so the coefficient for the invitation to financial education in

[10] If treatments are free, a balanced design maximizes statistical power; however, if, as was the case here, marketing visits are costly, optimal survey design will overweight the control group. For budgetary reasons, we did not assign anyone to the mmDemo × MoneyBack cell, and we reduced the size of other treatment cells from 50 to 47.

[11] This follows standard practice in economic field experiments. See also Duflo, Glennerster, and Kremer (2008, p. 3931) and Bertrand et al. (2010).

[12] Duflo and Saez (2003), using a similar encouragement design, report that 28% of university employees who were offered $20 to attend a benefits information fair at a U.S. university attended.

[13] Angrist and Pischke (2008, p. 87) and Duflo, Glennerster, and Kremer (2008, p. 3937) discuss the use of instrumental variables in experimental contexts in detail. Under standard assumptions that almost surely hold in our case, instrumental variables provide estimates of Local Average Treatment Effects: the average effect of the intervention (financial education) on people for whom the invitation to attend caused them to attend.

[14] We were primarily interested in testing the four main effects against the control treatment and thus did not use a balanced design.

## Table 2
TESTS OF RANDOM ASSIGNMENT

*Panel A: Financial Education*

| | *Not Invited* | *Invited* | p-*value* |
|---|---|---|---|
| Financial literacy | .01 | −.01 | .82 |
| Cognitive ability | .00 | .00 | .92 |
| Male | 1.14 | 1.10 | .17 |
| Age | 49.68 | 49.98 | .80 |
| Household size | 5.80 | 5.85 | .84 |
| Home value (June 2009, Rs. 100,000) | 1.14 | 1.32 | .16 |
| Drought experience | 2.22 | 1.93 | .08 |
| Hectares of land | 3.30 | 3.15 | .58 |
| Risk aversion | .09 | .11 | .43 |
| Years of schooling | 9.00 | 8.96 | .91 |
| N = 597 | 298 | 299 | |

*Panel B: Marketing Messages*

| | *No Marketing* | *MoneyBack & Forecast & mmDemo* | *MoneyBack & Forecast* | *MoneyBack* | *Forecast* | *mmDemo* | *Forecast & mmDemo* | *F-Statistic* | p-*value* |
|---|---|---|---|---|---|---|---|---|---|
| Financial literacy | .003 | .003 | .070 | −.091 | .056 | −.120 | .057 | .686 | .661 |
| Cognitive ability | −.008 | −.103 | .123 | −.195 | .191 | .112 | −.073 | 1.103 | .359 |
| Male | 1.142 | 1.085 | 1.106 | 1.085 | 1.106 | 1.152 | 1.064 | .930 | .473 |
| Age | 49.524 | 53.872 | 49.021 | 49.170 | 49.894 | 48.391 | 50.702 | .809 | .563 |
| Household size | 5.734 | 6.191 | 6.149 | 5.681 | 6.043 | 5.283 | 6.170 | .766 | .597 |
| Home value (June 2009, Rs. 100,000) | 1.151 | 1.378 | 1.329 | 1.659 | 1.224 | 1.158 | 1.109 | .728 | .627 |
| Drought experience | 2.165 | 1.957 | 2.362 | 1.362 | 1.745 | 2.370 | 2.085 | 2.161 | .045 |
| Hectares of land | 3.259 | 3.620 | 2.801 | 3.153 | 2.741 | 3.582 | 3.261 | .730 | .625 |
| Risk aversion | .098 | .106 | .085 | .128 | .128 | .130 | .085 | .213 | .973 |
| Years of schooling | 9.171 | 8.553 | 8.234 | 8.426 | 10.021 | 8.391 | 8.936 | 1.065 | .382 |
| N = 597 | | | | | | | | | |

Notes: This table provides a test of randomization for a field experiment on financial education and marketing interventions among farmers in Gujarat, India. Panel A tests whether farmers invited for financial education were different than those not invited for financial education. The *p*-values in the last column of Panel A report the statistical significance of a test for the difference in means of those invited to financial education and those not invited. Panel B reports the average respondent characteristics by original marketing assignment. The F-Statistic and *p*-value columns correspond to a test of the joint hypothesis that there is no difference in means across the groups.

## Table 3
UNIVARIATE CORRELATIONS BETWEEN RAINFALL INSURANCE PURCHASE AND OTHER VARIABLES

| | *Bought Insurance* | *Financial Literacy* | *Cognitive Ability* | *Male* | *Age* | *Household Size* | *June '09 Home Value* | *Drought Experience* | *Hectares of land* | *Risk Averse* | *Per Capita Consumption* |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Bought insurance | 1 | | | | | | | | | | |
| Financial literacy | .07*** | 1 | | | | | | | | | |
| Cognitive ability | .02 | .12* | 1 | | | | | | | | |
| Male | .01 | .07*** | .15* | 1 | | | | | | | |
| Age | .08*** | .02 | −.10** | .17* | 1 | | | | | | |
| Household size | .05 | .01 | .06 | −.04 | −.06 | 1 | | | | | |
| Home value (June 2009, Rs. 100,000) | .13* | .05 | .05 | −.06 | −.02 | .03 | 1 | | | | |
| Drought experience | .02 | .07 | .12* | .16* | .13* | −.13* | −.07*** | 1 | | | |
| Hectares of land | .05 | .01 | .10** | .01 | .01 | .14* | .08** | −.07*** | 1 | | |
| Risk averse | .05 | .04 | −.09** | −.06 | −.01 | −.01 | −.01 | −.15* | .01 | 1 | |
| Per capita consumption | .12* | .02 | .09** | −.05 | −.10** | .40* | .21* | −.26* | .22* | .05 | 1 |

*$p < .01$.
**$p < .05$.
***$p < .10$.

Notes: This table describes the pairwise correlation between rainfall insurance take-up and other variables used along with a pairwise correlation matrix. Drought experience is the number of years out of the past five that the respondent reports having suffered because of drought. Hectares of land, drought experience, risk aversion, and per capita consumption refer to values measured in December 2009, after the intervention was complete.

Table 4
FIRST STAGE: EFFECT OF INVITATION ON ATTENDANCE

| | *OLS (1)* | *OLS (2)* | *OLS (3)* | *OLS (4)* |
|---|---|---|---|---|
| Invited to financial education | .659* (.030) | .663* (.030) | .66* (.030) | .664* (.030) |
| Money-back guarantee | | | −.001 (.040) | −.007 (.039) |
| Weather forecast | | | .008 (.039) | .018 (.039) |
| mmDemo | | | .031 (.039) | .021 (.039) |
| Home value (June 2009, Rs. 100,000) | | .013 (.010) | | .013 (.010) |
| Financial literacy factor | | −.019 (.025) | | −.019 (.025) |
| Male | | .056 (.049) | | .058 (.049) |
| Age | | .001 (.001) | | .000 (.001) |
| Household size | | −.001 (.004) | | −.001 (.004) |
| Hectares of land | | .016* (.005) | | .016* (.005) |
| Constant | .094* (.017) | −.057 (.089) | .084* (.021) | −.065 (.090) |
| R-squared | .444 | .462 | .445 | .462 |
| N | 597 | 596 | 597 | 596 |

*$p < .01$.

Notes: Column 1 presents a regression of a dummy variable indicating whether a farmer attended financial literacy education on an indicator variable for whether the farmer was invited for financial education. Column 3 adds dummy variables indicating whether a farmer received a particular marketing message. For a household receiving both MoneyBack and Forecast, both dummies would be "switched on." Columns 2 and 4 include individual-level controls. OLS = ordinary least squares.

Column 1 is less than the effect of financial education itself. Instrumental variables regressions, discussed subsequently, scale up the reduced-form estimates to account for noncompliance. For marketing messages, because compliance is perfect, the effect of being assigned to a particular treatment is equal to the effect of actually receiving the treatment. Column 1 presents the main contrast of our research—the effect of being invited to financial education. We find that invited households are 5.3 percentage points more likely to purchase insurance ($p$-value .047) than those who are not invited.

Column 3 presents the point estimates of the three main marketing interventions. Here, the money-back guarantee increases take-up of weather insurance by seven percentage points ($p$-value .053). Column 3 includes all the main effects of interest, and Column 4 includes household-level controls. As Column 4 shows, the results are unaffected by inclusion of controls. Column 4 suggests that wealthier households (specifically, those with higher housing values) and older consumers are more likely to purchase insurance.

In Columns 5–7, we present the instrumental variables equivalents of Columns 1, 3, and 4 using invitation as an instrument for attendance. In Column 5, the point estimate for the effect of attending financial education is .08.[15] This scaled coefficient is larger (by 50%) than the Intention to Treat estimate in Column 1, consistent with the fact that the invitation did not cause everyone to attend. Columns 6 and 7 present the instrumental variables estimates for the full model. The inclusion of the marketing treatments (which do not require instruments because of perfect compliance) does not materially affect the measured impact of financial education.

For the sake of completeness, Web Appendix Table W6 reports the model with all 13 possible conditions (the omitted condition is the pure control). Column 1 presents the results without controls, and Column 2 presents the results with controls. Instead of interactions, we report the cell mean (e.g., in Column 1, .127 indicates that of the households not assigned to financial education and assigned to weather forecast, 12.7% purchased insurance). Because only 47% of households were assigned to any marketing message, the cell sizes are quite small (see Figure 1). The results suggest that financial education on its own did increase take-up. Marketing messages alone do not have significant effects, though some of the point estimates are economically quite meaningful. Financial education was particularly effective when combined with the MoneyBack & Forecast treatment, and when combined with the MoneyBack & Forecast & mmDemo treatment, it increases take-up by 16.2% and 24.1%, respectively, relative to the pure controls. Thus, we conclude that financial education is effective in stimulating demand. The result is quite robust across a range of estimation techniques.

### *HETEROGENEOUS EFFECTS*

The previous section shows robust evidence for the effects of the financial education and the money-back guarantee on average. To the extent that there is variation in the effects across observable characteristics, cost-effective targeting of the interventions might be feasible. In addition, we hypothesized (as do Cole, Sampson, and Zia 2011) that the financial education would provide more novel and valuable information to respondents with lower levels of education and financial sophistication and therefore have a greater impact on insurance adoption for those households.

In light of these considerations, we reestimate the reduced-form regressions for several subsamples in Table 6. First, we split the sample at the medians of summary measures of cognitive ability and financial literacy.[16] We split by cognitive ability (the first principal factor from factor analysis of indicators for whether respondents correctly answered the Basic Math questions and the Probability questions in the survey), schooling, financial literacy (first principal factor of the Lusardi–Mitchell questions and Debt Literacy questions), and a combined Cognitive Ability and Financial Literacy (combined CA/FL) first principal factor. Second, we use factor analyses rather than raw scores because correct answers to some of these multiple choice

[15]This is known as the Wald estimator and is a simple ratio of difference of means: ([% of invited who purchase] − [% of noninvited who purchase])/([% of invited who attend] − [% of noninvited who attend]).

[16]When more than one person has exactly the median value of a measure, we include that person in both the "high" and "low" regressions so that the numbers of observations sum to at least 597.

Table 5
REDUCED-FORM AND INSTRUMENTAL VARIABLES ESTIMATES

| | *OLS (1)* | *OLS (2)* | *OLS (3)* | *OLS (4)* | *IV (5)* | *IV (6)* | *IV (7)* |
|---|---|---|---|---|---|---|---|
| Invited to financial education | .053* | .05** | .052* | .049** | | | |
| | (.026) | (.025) | (.026) | (.026) | | | |
| Attended financial education | | | | | .081* | .078* | .074** |
| | | | | | (.039) | (.039) | (.038) |
| Money-back guarantee | | | .069** | .062** | | .069* | .062** |
| | | | (.036) | (.036) | | (.035) | (.035) |
| Weather forecast | | | .001 | −.003 | | .001 | −.004 |
| | | | (.034) | (.035) | | (.034) | (.034) |
| mmDemo | | | .014 | .014 | | .012 | .012 |
| | | | (.036) | (.035) | | (.034) | (.034) |
| Home value (June 2009, Rs. 100,000) | | .025* | | .023* | | | .022* |
| | | (.010) | | (.010) | | | (.010) |
| Financial literacy factor | | .035 | | .036 | | | .037 |
| | | (.024) | | (.024) | | | (.023) |
| Male | | .008 | | .013 | | | .009 |
| | | (.041) | | (.041) | | | (.040) |
| Age | | .002** | | .002** | | | .002** |
| | | (.001) | | (.001) | | | (.001) |
| Household size | | .005 | | .004 | | | .004 |
| | | (.004) | | (.004) | | | (.004) |
| Hectares of land | | .003 | | .003 | | | .002 |
| | | (.004) | | (.004) | | | (.004) |
| R-squared | .005 | .026 | .01 | .028 | .034 | .038 | .053 |
| N | 597 | 596 | 597 | 596 | 597 | 597 | 596 |

*$p < .05$.
**$p < .10$.

Notes: This table presents the reduced-form and instrumental variables estimates of the effects of financial education and marketing messages on a farmer's decision to purchase insurance. The dependent variable equals 1 if the farmer purchases insurance and 0 if otherwise. Column 1 regresses purchase on a dummy variable indicating whether a farmer was invited for financial education. Column 3 adds dummy variables indicating whether a farmer received a particular marketing message. For a household receiving both MoneyBack and Forecast, both dummies would be "switched on." Columns 2 and 4 include individual-level controls. Columns 5, 6, and 7 present the corresponding instrumental variables estimates, where the invitation for financial education serves as an instrument for the endogenous dummy variable indicating whether the farmer attended the financial education course. OLS = ordinary least squares.

questions were more informative than correct answers to others (not all questions had the same number of choices, and the probability questions were asked in three pairs, in which the latter question in each pair was the same as the former but also included an illustrative diagram). Finally, we split the sample by the amount of land owned.

We focus on the reduced-form regressions on indicators for the financial education invitation and the MoneyBack, Forecast, and mmDemo main effects. Column 1 of Table 6 repeats the benchmark results from Table 5. Columns 3, 4, and 6 indicate that invitations to the financial education training had a significant impact (at the 10% level) on insurance take-up for households with relatively low cognitive ability, high schooling attainment, and high financial literacy. Column 9 indicates that respondents with below-median values of the first principal component of a combined cognitive ability and financial literacy factor analysis showed a stronger impact. The effect of the invitation to the financial education training is even more economically and statistically significant for those with high land holdings (Column 10). Broad-based financial education of the type studied here might efficiently be targeted to people with these characteristics.

Standard errors are larger throughout the table because of the reductions in sample size. No regression has a coefficient on the invitation that differs statistically from the 5.2 percentage point baseline effect of the invitation.

We continue to estimate a positive effect of money-back guarantee on insurance adoption for all the Table 6 subsamples. The effect is only statistically significant (at the 10% level) for the below-median financial literacy and combined CA/FL groups, but in every specification, it remains comparable in size to the effect of the financial education training.

A possible explanation for this pattern is that people develop higher levels of financial literacy by using financial products, and underlying variation comes from heterogeneous trust in financial institutions. Next, high-trust respondents might have adopted other products more readily, developed higher financial literacy, and been more responsive to the highly informative (and trust-reinforcing) financial education training. In contrast, low-trust and low-financial literacy respondents might have been more responsive to a money-back guarantee that mitigated their distrust. The Forecast and mmDemo treatments were not significant for any subgroup in Table 6. Analogous IV specifications appear in Web Appendix Table W9, along with

Table 6
HETEROGENEOUS EFFECTS, REDUCED-FORM REGRESSIONS

| | *Entire Sample* (1) | *High Cognitive Ability* (2) | *Low Cognitive Ability* (3) | *High Schooling* (4) | *Low Schooling* (5) | *High Financial Literacy* (6) | *Low Financial Literacy* (7) | *High Combined CA/FL* (8) | *Low Combined CA/FL* (9) | *High Land Amount* (10) | *Low Land Amount* (11) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Invited to financial education | .052* | .041 | .061** | .067** | .035 | .068** | .041 | .041 | .062** | .1* | .001 |
| | (.026) | (.037) | (.037) | (.038) | (.036) | (.040) | (.034) | (.038) | (.035) | (.040) | (.033) |
| Money-back guarantee | .069** | .072 | .068 | .087 | .053 | .055 | .086** | .06 | .8** | .081 | .061 |
| | (.036) | (.055) | (.047) | (.057) | (.046) | (.054) | (.048) | (.056) | (.046) | (.052) | (.051) |
| Weather forecast | .001 | −.003 | 0 | −.004 | .009 | −.012 | .006 | −.008 | .004 | −.014 | .017 |
| | (.034) | (.048) | (.050) | (.053) | (.044) | (.051) | (.046) | (.050) | (.048) | (.049) | (.049) |
| mmDemo | .014 | −.026 | .051 | .056 | −.02 | .046 | −.008 | .006 | .026 | .028 | 0 |
| | (.036) | (.049) | (.051) | (.059) | (.043) | (.056) | (.045) | (.053) | (.048) | (.053) | (.045) |
| R-squared | .016 | .014 | .025 | .03 | .009 | .016 | .023 | .009 | .029 | .03 | .012 |
| N | 597 | 300 | 297 | 285 | 312 | 300 | 297 | 300 | 297 | 301 | 296 |

*$p < .05$.
**$p < .10$.
Notes: This table provides reduced-form analysis of the effect of financial education and marketing messages on a farmer's decision to purchase insurance. Column 1 reproduces the baseline result, and Columns 2–11 split the sample at the median of the variable indicated at the top of the column.

reduced-form specifications that include demographic controls in Web Appendix Table W10 (http://www.marketing-power.com/jmrnov11). Both show similar patterns.

*Limitations*

This field experiment features high-stakes decisions for a highly relevant subject pool. Along with these advantages, the setting imposes several limitations. First, a large body of literature examines the effect of communication among consumers on product adoption (e.g., Mahajan, Muller, and Bass 1990). If respondents talk about the information obtained in the financial education (or marketing) treatments, any spillover effects should work against us, making us less likely to find statistically significant effects. In the worst case, we provide an underestimate of the effect of financial education.

For several reasons, we are not particularly concerned about spillovers. Villages are not small (the average population is 1854) and are geographically dispersed. Those who were invited were not encouraged to bring a friend, and attendance among the control group was low (less than 10%). The period between the intervention and the last day of sales was about one week, during a very busy time (planting). Furthermore, the education program involved a video, visual aids, and "experiential" complex games that would be difficult for a respondent to talk about with another person without training or access to materials. In the follow-up survey, we explicitly asked households if they had spoken with someone from the financial education group: Only 6 of the 26 farmers in the no financial literacy group who purchased insurance reported having had any interaction (for any reason) with someone who received financial education before the close of sales.

A second issue is the possibility that the personal interaction involved in financial education and marketing treatments created social pressure to purchase insurance. We believe this is unlikely for several reasons. First, as an NGO, DSC did not make a normative recommendation to farmers to purchase the policy—rather, the firm conveyed information. Second, the visits did not involve any sales. Farmers seeking to purchase insurance traveled to the district office, typically 5–10 kilometers away, purchasing insurance from a different person than the provider of education or marketing. DellaVigna, List, and Malmendier (2011) provide an estimate of the cost of saying no to an NGO; they estimate it to be $3.57 in suburban Chicago, which represents approximately .2% of average U.S. monthly per capita expenditure.[17] In contrast, the rainfall insurance policy offered in this study represents 60% of per capita monthly household expenditure (an equivalent purchase for a U.S. consumer would cost $980). Thus, even if social pressures are significantly greater in rural India than suburban Chicago, it is unlikely that they explain the increase in take-up.

A third concern is whether we are measuring a true effect of financial literacy education or whether the findings could be driven by other factors, such as causing rainfall insurance to enter a farmer's consideration set (Nedungadi 1990) or through a "foot in the door" (Freedman and Fraser 1966). Both suggest that persuasion works in multiple stages.

The consideration set effect works by causing people to include a previously ignored option in their choice set when making purchasing decisions, and it typically applies to brand choice. Although we cannot rule this out, we believe that this is precisely what financial education *should* do: cause consumers to consider a product, insurance, with which they previously had little or no experience. We are not aware of any evidence of the importance of consideration effects for such high-stakes purchasing decisions.

Note that two of the marketing treatments had no statistically detectable effects, suggesting that merely identifying the availability of a product (and causing it to

[17]Mean per capita expenditure in the United States is $49,000, and mean household size is 2.5. The Chicago suburbs in which the experiments were conducted were likely wealthier than average.

enter a consumer's consideration set) is not sufficient to induce purchase. An important goal of additional research on financial education should be to understand the exact channels through which financial behavior affects decision making.

The foot-in-the-door technique exploits people's desire for self-consistency. For example, attending the financial education may have caused someone to become slightly predisposed toward insurance, and the marketing visit could then have decisively pushed him or her toward purchase. However, we find weak evidence that the marketing messages are more effective when they follow financial education than when they are offered in isolation. However, that insurance purchase required a visit to a distant office in a narrow window of time suggests that it is not a simple behavioral response. Moreover, the foot-in-the-door phenomena cannot fully explain the effect of the financial literacy education program, because the education has a large and significant effect on purchase on its own. By restricting the sample to people who did not receive marketing visits, the first row of Web Appendix Table W6 reveals that the effect of being invited to the financial education session is 6.8 percentage points ($p$-value .04), similar to our estimate for the entire sample.

*Policy Implications*

We highlight three important policy implications from this study. First, we note that 28 U.S. states require financial education as part of the high school curriculum, and dozens of governments and aid organizations spend millions of dollars per year on financial education, though to date there is no evidence that any financial programs are generally effective (Cole and Shastry 2010). This article provides the first experimental evidence that financial education can have a meaningful impact on the average consumer's financial decision making. This is demonstrated for a complicated product that has high stakes for the purchaser and may substantially improve welfare.

Second, we carefully recorded the cost of marketing interventions, which enabled us to compare the relative cost effectiveness of the alternative marketing techniques.[18] Because the financial literacy education intervention required rental of a hall and highly trained instructors, it was relatively expensive, at $3.33 per person, or $62.83 per policy sold.[19] In contrast, the cost of a marketing visit was $2.21. Thus, offering a money-back guarantee would cost $43.62 per policy sold.[20]

A nonexperimental implementation could reduce the cost of financial education by perhaps 25%, by issuing general invitations (reducing outreach costs) and combining the education program with another meeting. A nonexperimental implementation of money-back guarantees would have fewer economies of scale but would still be cheaper than financial education.

These are high costs, but they should be evaluated in the light of marketing financial services in poor, rural areas: Transaction costs are roughly constant over the value of a particular product (e.g., loan, insurance policy), while the financial income from a product typically scales with its size. In all cases, the cost of marketing the policy is significantly higher than the premium obtained by DSC. This does not necessarily mean that marketing the policy is socially inefficient: In the event of a severe drought, both the government and DSC would likely provide relief services. Relief efforts are costly, involve significant loss due to corruption as well as deadweight loss of taxation, and cannot be effectively targeted. In contrast, purchasers of weather insurance identify their vulnerability *ex ante*, and the claims settlement is swift with low transaction costs. Moreover, if either or both of these marketing techniques cause consumers to continue to repurchase insurance in subsequent years, the initial marketing cost may be amortized over subsequent commissions.

Although the money-back guarantee is effective in a statistical sense, we find it surprising that it increased adoption by only about seven percentage points, even in the sample that received financial education. Farmer concern about counterparty risk was likely not an issue, as DSC had a long-standing presence in these villages. This clearly indicates that a free trial offer may be much more effective in promoting experience with the policy than a money-back guarantee.[21] However, even initial low levels of adoption may lead to greater diffusion if nonadopters observe adopters receiving payouts (Stein 2011).

The results of the heterogeneous effects suggest that targeted messages are effective. Although it is not obvious how sales agents would be able to inexpensively identify people with differing degrees of financial literacy, we found two easily observable variables on which to target. Households in the top half of the land-holding distribution and households with more than a primary school education were more responsive than those holding less land or attaining less education. Targeting on either of these characteristics would roughly double the cost effectiveness of a financial education invitation.

Third, left on its own, the market may not find it profitable to offer rainfall insurance. Introducing a new financial product in isolation is not immediately profitable. The size of commission ($2) for sale of a policy pales in comparison with the cost of marketing the policy.

We note that there is a significant public goods aspect to providing financial education and marketing; it facilitates entry of other insurance providers and may, in the long run, have spillover effects as consumers experience the product. The results suggest that in the short run, adoption can be more cost-effectively promoted through money-back guarantees, though it remains an open question whether the financial education effect remains more durable.

More optimistically, Cole (2007) and Cole and Tufano (2007) conduct an analysis of the offering of rainfall insurance by BASIX, a large microfinance organization in

[18]We thank an anonymous reviewer for suggesting we undertake this analysis.

[19]The point estimate of the effect of a financial education invitation is .053, yielding a cost per policy sold of $3.33/.053 = $62.83.

[20]The point estimate of the effect of a money-back guarantee is .069. This suggests an outreach cost of $32.03 per policy sold. The cost of the money-back guarantee is as follows: The MoneyBack policy is expected to pay out 40% of the time, and a $2 administrative cost in case of a premium refund yields $11.59 per policy sold. Thus, the total marketing cost is $43.62 per policy sold.

[21]At least two subsequent studies, one in Africa and one in India, have taken this approach.

southern India. Because loan officers who already make household visits to service loans sell the insurance policies, BASIX can offer rainfall insurance in a profitable manner, though the firm suffers from relatively low take-up as well.

## *CONCLUSION*

This article offers practical answers to what the International Labor Organization identifies as a critical constraint to the spread of microinsurance: "Achieving scale through cost-effective distribution is one of the biggest challenges facing insurers in low premium environments where customers are typically unfamiliar with insurance products and often skeptical of providers" (Smith, Smit, and Chamberlain 2011, p. 1).

We describe a set of interventions designed to improve 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. Perhaps surprisingly, the offer of a money-back guarantee to consumers, which is extremely advantageous, has relatively limited efficacy. Three of the five types of policies sold did not result in payouts, resulting in refunds to purchasers who had been offered a money-back guarantee. We did find some evidence that certain combinations of treatments (financial education and money-back guarantee) had even greater treatment effects, though these estimates are based on relatively small cell sizes.

Relatively low take-up rates, even among the most intensely treated, combined with the high cost of the education and effective marketing intervention, suggest that substantial increases in the efficiency of delivery would be necessary for rainfall insurance to become a financially sustainable product. In addition, our results imply that a range of apparently sensible interventions may not have an effect if offered in isolation. However, we find robust evidence that financial education matters: Despite the complexity and novelty of the product, people educated in financial literacy and insurance are significantly more likely to adopt rainfall insurance.

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