

Motivated Beliefs, Attention, and Insurance

Shawn Cole
University of Pennsylvania

Vivek Shah
University of Pennsylvania

Jeremy Tobacman
University of Pennsylvania

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Risk Management and Decision Processes Center
The Wharton School, University of Pennsylvania
3730 Walnut Street, Jon Huntsman Hall, Suite 500
Philadelphia, PA, 19104
USA
Phone: 215-898-4589
Fax: 215-573-2130
<http://opim.wharton.upenn.edu/risk/>

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Abstract

Microinsurance is a rapidly growing component of microfinance activities, and it has considerable potential to mitigate the risks faced by the poor. I propose a model of insurance demand that incorporates two innovations. First, agents may have motivated beliefs: specifically, they may prefer to retain beliefs in a rosy future, even if that distorts their behavior so as to compromise their future fortunes. Second, agents may be loss averse. I generate predictions both for insurance demand and for demand for informative, framed marketing messages. I propose an experimental design in the context of a rainfall insurance product in rural India to test the implications of the model.

Introduction

Microinsurance is a rapidly growing component of microfinance activities, and it has considerable potential to mitigate the risks faced by the poor. Having uninsured risk leaves the poor vulnerable to serious or even catastrophic losses from unforeseen negative shocks. Without microinsurance the poor may be forced to adopt costly strategies to manage incomes and assets which might lower mean incomes. For example, uninsured households might cultivate low-risk crops to minimize income risk. However, low-risk crops imply lower returns and the poverty cycle runs as poor households engage in low-risk and low-income activities (Dercon 1996)¹ Microinsurance has

¹Dercon, S. (1996). Risk, Crop Choice and Savings: Evidence from Tanzania, *Economic Development and Cultural Change*, 44(3): 385-514.

the potential to reduce the welfare costs due to shocks and foregone profitable opportunities. By offering a payout when an insured loss occurs, the poor can avoid other costly ways of coping with the shock leaving future income earning opportunities intact. Moreover, with the security of being insured, they can avoid other costly ex-ante risk-management strategies.

In Cole et. al 2008 the authors study the adoption of an innovative rainfall insurance product designed to compensate low-income Indian farmers in case of deficient rainfall during the primary monsoon season. They document relatively low levels of adoption of the risk management technology: only 5-10% of households purchase insurance, even though rainfall variability is overwhelmingly cited by households as the most important risk they face. In testing theoretical predictions of why adoption rates might be low they consider price sensitivity, financial literacy, and the role of trust in insurance participation. In this paper we study another interesting avenue of inquiry: relating the marketing of microinsurance to consumer decisions and uptake. In their literature review on microinsurance the Insurance Innovation Facility provides an overview of the current state of research on microinsurance. One of the main questions they propose for further research is “How to expand access to valuable products in an efficient way?” This of course includes product innovation, technological solutions and efficiency of business processes on the suppliers, side as well as financial literacy on the demand side. However the subject of this paper which seems to be an overlooked gap in the literature is relating a model of insurance demand to the effective marketing of a microinsurance product.

One hypothesis for under adoption of insurance is that people don’t even like to contemplate bad outcomes. For example if someone is presented with a message pitching life insurance, they may ignore it because they don’t want to contemplate the possibility of their premature departure, and hence they may never get to the point of weighing the costs and benefits of the particular policy on offer. Similarly, people may avoid diagnostic medical tests because they don’t want to think about the possibility that the test will come back positive. Our model incorporates two innovations. First, agents may have motivated beliefs. Specifically, they may prefer to retain beliefs in a rosy future, even if that distorts their behavior so as to compromise their future fortunes. This affects both the attractiveness of insurance and the attractiveness of attending to positive and negative marketing messages. Second, agents may be loss averse.

In our model, agents might optimistically prefer to believe that a bad state is unlikely and this

enters their utility function additively. Utility from expectations or the anticipation of events that enter the utility function of an agent has been studied in the economics literature. For example, economic theories have recognized that when calculating the rate at which a future benefit is discounted, we must be careful to make allowance for the pleasures of expectation (Marshall 1981) and that anticipation of the future has an impact on immediate well-being (Loewenstein 1987). These observations can be traced to Bentham (1789), who included among the ingredients of utility, pleasures and pains that derive from anticipation. For Bentham, anticipation, like consumption itself, was an important source of pleasure and pain. Loewenstein (1987) formulates a model that modifies discounted utility theory by incorporating anticipation of the future in immediate well-being. He refers to the positive utility derived from anticipation of the future as “savouring” and the negative utility resulting from contemplation of the future as “dread”. Brunnermeier & Parker (2005) incorporate the intuition that if agents care about utility flows today and expected utility flows in the future, then they can be happier if they are more optimistic. They show that utility-based biases in beliefs can optimally balance the benefit of optimism against the costs of worse decision making by supposing that beliefs maximize average felicity. A small optimistic bias in beliefs typically leads to first-order gains in anticipatory utility and only second-order costs in realized outcomes. Thus, beliefs tend toward optimism—states with greater utility flows are perceived as more likely.

Peoples’ preferences over beliefs of future states of the world have also been explored in the literature on cognitive-dissonance. In Akerlof & Dickens (1982), the model incorporates that people not only have preferences over states of the world, but also over their beliefs about the state of the world. In their model, persons have some control over their beliefs; not only are people able to exercise some choice about belief given available information, they can also manipulate their own beliefs by selecting sources of information likely to confirm “desired” beliefs. Their model lends explanations to several forms of observed behavior. The explanations do not rely on an assumption that people are basically misinformed – if they believe something other than the truth, they do so by their own choice.

Peoples dislike to contemplate negative outcomes has been studied in the psychology literature especially in the context of diagnostic screening. This literature extensively studies anxiety, fear, or worry as an emotion variable that determines peoples’ actions. Previous studies have found

that a fear of cancer has been linked to poorer screening . A fear of “finding something wrong” has been cited as a key obstacle to screening and a feeling that “it is better not to know” is also a reported barrier to screening . Comparisons of screeners and non-screeners have suggested that trait anxiety was significantly more pronounced among women who did not attend a screening in response to an invitation than among those who did . Andersen et al. study worry about breast cancer risk (assessed using a 4 point ordinal scale response to five questions) and find a quadratic or inverted-U relationship between worry and screening (i.e., screening is greatest at intermediate levels of worry). Consumers who are concerned about having an underlying problem may have anxiety about a tests’ out-come, making them reluctant to find out whether their fears are justified (see McCaul et al. 1996). Although the long-term benefits of early problem detection are often great, the short-term outcome may be bad news. And many people are ambivalent about seeking out bad news (Cox et al. 2001).

Another related area in the psychology literature is the use of fear appeals in health promotion campaigns. Fear appeals are persuasive messages designed to scare people by describing the terrible things that will happen to them if they do not do what the message recommends. In their book “Designing health messages: approaches from communication theory and public health practice” Edward Maibach et al. discuss various explanations for fear appeals. A “resistance” explanation given by Janis and Feshbach (1953) posits that as fear-arousing message content increases, compliance with the message recommendations will decrease. They gave high school students one of three messages designed to promote better dental hygiene: a low, moderate or high fear appeal. They found that the low fear message lead to better dental hygiene and argued that the drive or anxiety produced by the moderate and high fear messages triggered defensive avoidance. Defensive avoidance is the tendency to ignore or deny the negative consequences depicted in the message. This gets at the question of whether and how the ”affect” of a stimulus affects attention to it. Reeves et al. show that positive affect leads to greater receptiveness of messages. Reeves et al. test the intuition that people ignore what is unpleasant, and consequently, only positive appeals – happy faces, and music, or at least neutral medical information – will be accepted and have a chance to change behavior . Their study shows subjects video-tapes with health messages and finds that messages with negative emotion, elicit less attention.

The remainder of this paper is organized as follows. Section 1 describes the rainfall insurance

product which is the context of our model and experiment. Section 2 introduces an innovative model of insurance demand. Section 3 describes the experiment and the experimental procedures. Section 4 goes through our experimental results. Section 5 concludes.

1 Product Description

Rainfall insurance is becoming increasingly common as a financial innovation made available to households in developing countries. Rainfall insurance policies are offered by a number of vendors, and sold in many regions of India, as well as other developing countries. Rainfall insurance contracts usually specify a threshold amount of rainfall, which is intended to approximate the minimum required for successful growth of a given crop. Policyholders are eligible to receive a payment if cumulative rainfall is lower than the specified threshold over a pre-specified period of time. For example, in some policies the payout amount might increase linearly with the size of the rainfall deficit relative to the threshold, reaching a maximum payout at a second threshold meant to approximate total crop failure. Policies covering the harvest period of the monsoon have a similar structure, except that the policy pays off when rainfall is particularly high, because flood or excess rain generally damages crops during the harvest. The policy is simple to understand and the policyholder does not have to file a claim in the event of a payout; the insurance company simply calculates payouts based on measured rainfall at a public weather station, and then delivers them through local agents, usually by setting up a table in the recipients' village to deliver payouts.

2 Three period model

Suppose there are two possible rainfall states, good and bad, and π is the true probability of bad rainfall. If the rainfall is good, farmers earn x , while if the rainfall is bad farmers experience loss L and earn a total of $x - L$. Farmers are exposed to marketing messages that can affect their beliefs about π , and they can choose how much attention to pay to those messages. Specifically, assume that the marketing messages can (exogenously) either prime negative or positive outcomes, corresponding to $m \in \{0, 1\}$, respectively. Farmers choose how much attention $\delta \in [0, 1]$ to pay to the marketing messages. This impacts their beliefs or preferences as described below; denote the

resulting posterior belief about π by p_1 . Then the farmers have the option to buy any amount I of actuarially fair insurance against the rainfall-related loss.

Our model combines two innovations. First, farmers may have motivated beliefs: specifically, they may prefer to retain belief in a rosy future, even if that belief distorts their behavior so as to compromise their future fortunes. This affects both the attractiveness of insurance and the attractiveness of attending to positive and negative marketing messages. Second, farmers may be loss averse.

We'll consider two cases. In Case 1, a continuum of farmers will all have the same reference point for income, but will have uniformly distributed priors $p_{0i} \sim U[0, 1]$ on the probability of bad rainfall which will be updated by the marketing message. In Case 2, the continuum of agents will all know π with certainty, but will have heterogeneous reference points for income which will be updated by the marketing message. The cases in more detail are as follows.

2.1 Case 1: Heterogeneity in priors

p_{0i} = base belief about bad state

p_{1i} = belief about state after hearing marketing message (broken up into a base belief of a bad state plus a component dependent on incorporating the marketing message)

$p_{1i} = (1 - \delta_i)p_{0i} + \delta_i(1 - m)$. If $\delta_i = 0$ i.e agent pays no attention and the marketing message does not affect the belief - agents belief is just the base belief. If $\delta_i = 1$ then agent pays full attention and belief is completely dependent on marketing message.

Let r be the fixed reference point for all agents.

Utility is piecewise linear:

$$E(U) = \left\{ (1 - p_{1i})(y - I\pi) \right. + \begin{cases} p_{1i}(y - L + I - I\pi) & , \text{if } I > \frac{L-y}{1-\pi} \\ \lambda p_{1i}(y - L + I - I\pi) & , \text{if } I \leq \frac{L-y}{1-\pi} \end{cases} + \left\{ \gamma(p_{1i}, L) \right.$$

where $\gamma(p_{1i}, L)$ is such that $\gamma_{p_{1i}}(p_{1i}, L) < 0$ i.e. agents derive utility from belief in a positive state

The if conditions arise because in a bad state if $x > r$ then $y - L + I - I\pi > 0$ and if $x < r$ then $y - L + I - I\pi < 0$ and loss aversion kicks in

2.1.1 Second Stage Solution

$$U_{low} = (1 - p_{1i})(y - I\pi) + \lambda p_{1i}(y - L + I - I\pi) + \gamma(p_{1i}, L); \quad \text{if } I \leq \frac{L-y}{1-\pi}$$

$$= (1 - p_{1i} + \lambda p_{1i})(y - I\pi) + \lambda p_{1i}(I - L) + \gamma(p_{1i}, L)$$

$$\frac{\partial U_{low}}{\partial I} = -\pi(1 - p_{1i} + \lambda p_{1i}) + \lambda p_{1i}$$

$$= \lambda p_{1i}(1 - \pi) - \pi(1 - p_{1i})$$

$$= p_{1i}(\lambda - \lambda\pi + \pi) - \pi$$

Note that in the U_{low} case $0 < I^* \leq \frac{L-y}{1-\pi}$

so if $\frac{\partial U_{low}}{\partial I} < 0$, then $\arg \max_I U_{low} = 0$ and $I^* = 0$

and if $\frac{\partial U_{low}}{\partial I} > 0$, then $\arg \max_I U_{low} = \frac{L-y}{1-\pi}$ and $I^* = \frac{L-y}{1-\pi}$

Recall $p_{1i} = (1 - \delta_i)p_{0i} + \delta_i(1 - m)$

In general $\frac{\partial U_{low}}{\partial I} > 0$ i.e. a farmer would buy insurance when the following condition holds:

$$p_{0i} \geq \frac{1}{1 - \delta_{1i}} \left[\frac{\pi}{\lambda - \lambda\pi + \pi} - \delta_{1i}(1 - m) \right]$$

i.e. the second stage I^* is

$$I^* = \begin{cases} \frac{L-y}{1-\pi} & \text{if } p_{0i} \geq \frac{1}{1-\delta_{1i}} \left[\frac{\pi}{\lambda-\lambda\pi+\pi} - \delta_{1i}(1-m) \right] \\ 0 & \text{o.w.} \end{cases}$$

2.1.2 First Stage Solution

First Stage Solution \rightarrow solve for δ_i^*

$$U_{low} = (1 - p_{1i})(y - I\pi) + \lambda p_{1i}(y - L + I - I\pi) + \gamma(p_{1i}, L)$$

Recall $p_{1i} = (1 - \delta_i)p_{0i} + \delta_i(1 - m)$

$$\frac{\partial p_{1i}}{\partial \delta} = -p_{0i} + 1 - m$$

$$= 1 - p_{0i} - m$$

$$\geq 0 \quad \text{if } m = 0$$

$$< 0 \quad \text{if } m = 1$$

First Stage solution when $I = I^*$

Recall $p_{1i} = (1 - \delta_i)p_{0i} + \delta_i(1 - m)$

$$\frac{\partial p_{1i}}{\partial \delta} = -p_{0i} + 1 - m$$

$$= 1 - p_{0i} - m$$

$$\geq 0 \quad \text{if } m = 0$$

$$< 0 \quad \text{if } m = 1$$

$$U_{low} = (1 - p_{1i})(y - I^*\pi) + \lambda p_{1i}(y - L + I^* - I^*\pi) + \gamma(p_{1i}, L)$$

$$\frac{\partial U_{low}}{\partial \delta} = -(y - I^*\pi)\frac{\partial p_{1i}}{\partial \delta} + \lambda(y - L + I^* - I^*\pi)\frac{\partial p_{1i}}{\partial \delta} + \frac{\partial \gamma}{\partial \delta}$$

$$\frac{\partial U_{low}}{\partial \delta} = -(y - I^*\pi)(1 - p_{0i} - m) + \lambda(y - L + I^* - I^*\pi)(1 - p_{0i} - m) + \frac{\partial \gamma}{\partial \delta}$$

$$\frac{\partial U_{low}}{\partial \delta} = (1 - p_{0i} - m)[\lambda(y - L + I^* - I^*\pi) - (y - I^*\pi)] + \frac{\partial \gamma}{\partial \delta}$$

if $m = 0$

$$\frac{\partial U_{low}}{\partial \delta} = (1 - p_{0i})[\lambda(y - L + I^* - I^*\pi) - (y - I^*\pi)] + \frac{\partial \gamma}{\partial \delta} \leq 0$$

(when $m = 0$, $\frac{\partial p_{1i}}{\partial \delta} \geq 0$, $\frac{\partial \gamma}{\partial p_{1i}} \leq 0$, so $\frac{\partial \gamma}{\partial \delta} \leq 0$)

if $m = 1$

$$\frac{\partial U_{low}}{\partial \delta} = (-p_{0i})[\lambda(y - L + I^* - I^*\pi) - (y - I^*\pi)] + \frac{\partial \gamma}{\partial \delta} \geq 0$$

(when $m = 1$, $\frac{\partial p_{1i}}{\partial \delta} < 0$, $\frac{\partial \gamma}{\partial p_{1i}} \leq 0$, so $\frac{\partial \gamma}{\partial \delta} \geq 0$)

That is when second stage $I = I^*$

$$\delta^* = \begin{cases} 0 & \text{if } m = 0 \\ 1 & \text{if } m = 1 \end{cases}$$

2.1.3 Solve for share of population θ

Assume $\frac{\partial \gamma}{\partial \delta} = k$

Then when $m = 0, I = I^*$, then $\delta^* = 0$

$$p_{1i} = (1 - \delta_i) p_{0i} + \delta_i(1 - m)$$

i.e. $p_{1i} = p_{0i}$

Recall a farmer buys insurance if

$$p_{0i} \geq \frac{1}{1 - \delta_{1i}} \left[\frac{\pi}{\lambda - \lambda\pi + \pi} - \delta_{1i}(1 - m) \right]$$

When $m = 0, \delta^* = 0$

Farmer buys insurance if

$$p_{0i} \geq \frac{\pi}{\lambda - \lambda\pi + \pi}$$

If $p_{0i} \sim U[0 \ c\pi]$

Then θ , the share of population buying insurance is given by

$$\theta = \frac{c\pi - \frac{\pi}{\lambda - \lambda\pi + \pi}}{c\pi}$$

$$\theta = 1 - \frac{1}{c(\lambda - \lambda\pi + \pi)}$$

When $m = 1, \delta^* = 1$

$$p_{1i} = 0$$

and no one buys insurance

$$\theta = 0$$

3 The Experiment

3.1 Experimental Design:

We used a two by three between subjects' experimental design at the Centre for Microfinance laboratory in Ahmedabad, India. Each subject was randomly assigned to one of six marketing treatments. The two frames of marketing were either positive or negative and the three mediums

of marketing were plain text flyers, picture flyers and videos. Together the frame and medium of the message exogenously varied the probability that subjects placed on a negative outcome (i.e. influenced p_{1i} through m) and the amount of attention that the agent paid to the marketing message (δ_i). The marketing treatments were informative and educated the subjects about rainfall insurance and how it can help farmers mitigate risk. The english versions of the marketing flyers appear in the appendix.

The frame of the marketing message corresponds to either a negative or positive message ($m = \{0, 1\}$) in the model. We hypothesize that a negative message induces subjects' to contemplate a bad outcome (raising p_{1i}) and that this acts through the motivated belief component of the agents' utility function to negatively impact attitudes towards the insurance. Vice-versa, a positive message induces subjects' to think about a rosy future and place a lower probability on a bad state (lowering p_{1i}) and that this acts through the motivated belief component of the agents' utility function to positively impact attitudes towards the insurance. Also if people dislike contemplating negative outcomes they might terminate the allocation of attention to a negative message more quickly than compared with attention paid to a positive message. However subjects' attention may also vary based on whether the subject is presented with a flyer or a video. We hypothesize that a subjects' attention (corresponding to $\delta_i \in [0, 1]$ in the model) is partially dependent on the medium of the marketing message. Videos might be entertaining enough to overcome aversion to attend to a negative message and induce subjects to pay more attention. Conditional on attention we expect a negative message to have a larger impact on insurance uptake measured in our experiment by subjects attitudes towards the product.

Subjects participated in the experiment by taking a survey on computers. Subjects were taught how to use a mouse and click through a few practice questions. After subjects learnt how to use the mouse and click through questions by finishing the practice section they were given the following instruction:

“This experiment is about decisions to purchase a risk mitigation product. First you will be shown some materials. You will then be asked to answer a few questions about the materials.

Please click NEXT when you are ready to begin. “

Subjects were then randomly presented with one of the six marketing treatments. The treatments also said that once the subjects clicked NEXT they would not be allowed to view the

treatments again. After subjects had finished viewing the treatment, the following instructions appeared on the screen:

“The materials have now concluded. You will be asked a series of questions. Every question answered correctly will be rewarded with an additional Rs. 20

Please note: once a question has been answered you will be unable to go back and change your answer.

Please click NEXT when you are ready to begin.”

It was important to not mention the incentive payment to subjects before the treatments so as not to induce artificial attention to the treatments. The instructions were then followed by a set of questions that tested for recall. Seven questions tested subjects on substantive components of the marketing messages and components of rainfall insurance. Another 3 randomly presented questions tested subjects about non-substantive components of the marketing messages. (Should I give example questions here or refer reader to all questions in an appendix? Or can make a table with all the questions and a column indicating whether each question is substantive or non-substantive) All questions were multiple choice with six answer options.

Based on the score of correctly answered substantive questions we can test our hypothesis of the differential recall between the various marketing treatments. We expect the difference in recall between positive and negative flyers to be greater than the difference in recall between positive and negative videos. That is we expect positive frames to induce higher attention and hence higher recall than negative frames; but since videos may be entertaining enough to compensate for some of the inattention to negative messages based on its entertainment value, we expect this difference to be lower for video treatment. The non-substantive recall questions can help us test whether subjects’ attention may have been diverted to non-substantive components of the marketing, resulting in lower recall of substantive components of the marketing.

Questions that tested for recall were finally followed by questions on attitudes towards the rainfall insurance. Subjects were asked how likely they were to purchase rainfall insurance, how likely they were to recommend purchase of rainfall insurance to friends and family, how important they thought it was to purchase rainfall insurance and the price they were willing to pay for a policy on one bigha of land that would pay up to Rs. 500 in case of bad rainfall.

We timed survey responses, the time each marketing treatment was viewed and the time taken

to answer each subsequent question. We are able to test whether recall is correlated with length of viewing treatment and whether negatively framed messages are dismissed quicker than positively framed messages.

3.2 Subject Recruitment:

Most farmers sell their grain and produce in the city of Ahmedabad through vendors and not themselves. It was not possible to recruit farmers from market places within Ahmedabad. Farmers were recruited from smaller villages around Ahmedabad. We hired a driver who was familiar with villages surrounding Ahmedabad. Each day the driver drove to a new village outside Ahmedabad city limits and recruited 20 farmers by showing them the flyers created to recruit subjects. (footnote and attach recruitment flyer in appendix) No village was repeated. No treatment village from Cole et. al. was revisited. Each day we recruited two sets of 10 farmers each. Farmers were told that their participation was required for a study that sought to understand how farmers made decisions. The experiment was run in mid-June and due to the extreme temperatures in Ahmedabad most farmers were done working in the fields before 10am, the time when the driver recruited the first set of farmers. As such the farmers did not have much work after this time and were usually free. The driver reported that recruiting farmers was easy. Farmers were amenable to participate in the experiment just based on being offered free transportation back and forth and refreshments upon arrival at the lab. They were also told that they would be compensated between Rs. 100 and Rs. 300 for their participation in the experiment and if they decided not to participate in the experiment they were free to withdraw at any time and would still be paid Rs. 100 for their time. Farmers were screened for literacy. They were given a Gujarati newspaper ad were asked to read a paragraph and were only allowed to participate in the experiment if they could read.

3.3 Experimental Procedures:

The farmers were then driven to the lab in a 10 passenger van. Each day the first van arrived at 12:00pm and a second van arrived at 2:00pm. Since the experiment lasted about an hour (calculate actual average here) , usually these two sets of farmers were not present at our lab facilities at the same time. When the farmers arrived at the lab there were made to sit in a waiting area and were offered tea and a light snack. Our experimental sessions were run in a lab with 5 computers. There

were two survey administrators to oversee the running of the experiment. The first set of 5 farmers were taken into the lab and made to sit down in front of a computer. Each computer was divided and farmers were prevented from looking into other computers. They were made to wait while the survey administrators filled in a few details on the first screen of the survey. These included name, a unique id number, date, and village from where the farmer was recruited. An announcement was made to all farmers that they would individually be explained how to proceed with the experiment and that until a survey administrator asked them to proceed they were to sit at their computer screen and not touch the mouse or talk to any other farmers. Farmers were instructed that if they needed any help during the experiment or if they did not understand any of the questions they should raise their hand until assisted by a survey administrator. All keyboards were hidden since all questions were multiple-choice and the experiment did not require farmers to type in any responses. Most farmers had never used a computer before and each farmer was explained individually how to use the mouse and proceed with the experiment. The experiment was coded such that a farmer could not proceed without answering every question. The experiment started with a few practice questions which ensured that farmers could read and also gave the farmers some practice with using the mouse. Examples include the name of the state and city that the farmers were in currently and the kinds of food they liked. These questions were followed by the randomized treatment and the main experiment related questions. After a farmer finished the experiment, he was given a card with his name and unique identifier on it and escorted to a room separate from the waiting area and not allowed to interact with farmers that had not yet completed the experiment. A new farmer from the waiting area was then invited into the lab and explained how to use the mouse and proceed with the experiment.

After all ten farmers had completed the experiment, answers were tabulated and payments were made to farmers in sealed envelopes. Each farmer received a minimum of Rs. 100 and another Rs. 20 for each correctly answered question (up to 10 questions). The name of the farmer, unique id and number of correct answers was written on the top of the envelope. The farmers were brought into the waiting room and collectively told in the presence of the driver that their envelopes were being given to the driver and would be handed to each one individually when they were dropped off at their village. At the drop off the driver matched the names and unique ids and handed the farmers their envelopes. The driver reported that farmers did not discuss the experiment and

compensation on the way home.

4 Results

The set of recall questions that followed the marketing treatments is included in the appendix. We divide the set of recall questions into two sets. Ones that were diagnostic of simple attention paid to the most substantive components of the marketing messages and those that were not diagnostic of attention to the most important components of the marketing messages but tested attention of subjects to other information presented in the messages. The order of the questions as well as answer choices was randomized. We find that subjects recall score was in general quite low. Table 1 reports the proportion of correct answers across questions and treatments. Aggregating across all subjects and all questions the overall average correct response rate for the substantive recall questions was just over 41%. Across individual questions the number of average correct responses varied widely from 17% for question 4 to 67% for question 2. Across the six marketing treatments the correct response rate varied less, from 37% for negative picture flyers to 45% for negative text flyers. Together this tells us that certain questions might have been easier to answer for certain treatments. Some of these questions were directly related to the marketing materials, whereas some questions required subjects to extrapolate or infer the correct answer. We find that subjects performed extremely poorly when inferring an answer which was not directly stated in the marketing materials. Question 6 asked subjects which crops the rainfall insurance product would protect against in case of a draught. The marketing messages themselves did not state anything explicitly about any particular crop. Most farmers picked an individual crop as the answer choice rather than the correct response that the insurance would help protect against drought related loss for any crop. The correct response rate for question 4 was only 17%, just about as good as guessing.

On the other hand some questions were easier to answer by certain treatment groups, likely due to the difference in information presented in videos and flyers. (footnote that videos were hard to reenact and marketing videos from Cole et. al were used for the treatments). For example question 5 asked “How can you get the benefits of rainfall insurance?” The correct answer “By buying a rainfall insurance policy before the sowing period” was directly a line from the video marketing messages (both in the positively and negatively framed videos). However the flyer treatments only

mentioned the following line: “By putting in a little money right now you can get money when you need it the most.” This is reflected in Table 1 where the average correct response rate for question 5 is nearly 10% larger for video treatments (nv and pv) rather than flyer treatments (npf, ppf, ntf, ptf).

Similarly for question 3, “What were the materials you just viewed about?” the correct response “Rainfall Insurance” was more salient for flyer subjects than video subjects. All four flyer treatments were titled “Rainfall Insurance” in bold on each screen. Videos on the other hand did not have a title saying “Rainfall Insurance” and were enacted as a story showing a farmer in a field looking up at the clouds and with an insurance agent coming to a farmer’s house to explain about rainfall insurance. Distractions such as trees, fields, clouds, individuals and crops in the video might have been a factor in detracting subjects from inferring that the main take-away message of the treatment was related to rainfall insurance. Over 21% of all video subjects answered that the videos were about methods to grow crops. Again this is reflected in Table 1 where the correct response rate for question 1 is nearly 10% larger for flyer treatments (npf, ppf, ntf, ptf) rather than video treatments (nv and pv).

The diagnostic recall questions that fit best with our hypothesis regarding simple attention paid to informative messages in the marketing materials are those that ask specifically about the main takeaway regarding the rainfall insurance product itself. The main takeaway is that rainfall insurance can protect farmers against crop related loss resulting from a shortage of rainfall by paying out money if a farmer had bought a rainfall insurance policy that year. It is also important that farmers understood that rainfall insurance does not pay out for crop related loss resulting from other sources such as attacks by locusts or government water cuts. The diagnostic questions in the appendix were designed to be clear indicators of simple attention paid to the marketing materials regarding this main takeaway.

Table II reports the mean recall scores on the 7 questions that were constant across all treatment groups and the mean time that each treatment was viewed by subjects. Subjects clicked their way through the picture and text flyer treatments and could view the flyers as long as desired. The flyers consisted of three slides each and after progressing from one slide subjects were not able to go back to the same slide. The video treatments were however of a fixed length and viewing videos again was not permitted. Hence the video viewing times are not very informative of how long a

subject wished to watch the video treatments. We see in table II that negative picture flyers were viewed for a shorter duration of time on average than positive picture flyers. This effect was not true for text flyers.

We use a difference in difference approach to test our hypothesis of differential recall. Since we have a 3*2 design in our experiment we specify the following regression:

$$\text{Recall Score} = \beta_0 + \beta_1 * \text{I}(\text{picture flyer}) + \beta_2 * \text{I}(\text{text flyer}) + \beta_3 * \text{I}(\text{positive}) + \beta_4 * \text{I}(\text{positive}) * \text{I}(\text{picture flyer}) + \beta_5 * \text{I}(\text{positive}) * \text{I}(\text{text flyer}) \quad (1)$$

The variables following the “I” are all indicator variables corresponding to the medium or the frame of the received treatment. For example β_1 is the coefficient on an indicator variable for subjects that randomly received picture flyer treatment and β_4 is the coefficient of the interaction between indicator variables for subjects that randomly received a positive frame and those that received a picture flyer. In this specification the left out categories are the “negative” frame and “video” treatment and form our comparison groups. The coefficients β_4 and β_5 are the difference in difference estimators that we are interested in. That β_4 and β_5 are the coefficients of interest is easy to see. Based on (regression number) we have:

$$E(\text{recall score} | \text{ppf}) = \beta_0 + \beta_1 + \beta_3 + \beta_4$$

$$E(\text{recall score} | \text{npf}) = \beta_0 + \beta_1$$

$$E(\text{recall score} | \text{ptf}) = \beta_0 + \beta_2 + \beta_3 + \beta_5$$

$$E(\text{recall score} | \text{ntf}) = \beta_0 + \beta_2$$

$$E(\text{recall score} | \text{pv}) = \beta_0 + \beta_3$$

$$E(\text{recall score} | \text{nv}) = \beta_0$$

$$E(\text{recall score} | \text{ppf}) - E(\text{recall score} | \text{npf}) = \beta_3 + \beta_4$$

$$E(\text{recall score} | \text{ptf}) - E(\text{recall score} | \text{ntf}) = \beta_3 + \beta_5$$

$$E(\text{recall score} | \text{pv}) - E(\text{recall score} | \text{nv}) = \beta_3$$

$$[E(\text{recall score} | \text{ppf}) - E(\text{recall score} | \text{npf})] - [E(\text{recall score} | \text{pv}) - E(\text{recall score} | \text{nv})] = \beta_4$$

$$[E(\text{recall score} | \text{ptf}) - E(\text{recall score} | \text{ntf})] - [E(\text{recall score} | \text{pv}) - E(\text{recall score} | \text{nv})] = \beta_5$$

The coefficient β_4 is the difference in difference estimate which measures the difference in recall score between positive versus negative picture flyers and positive versus negative videos. The

coefficient β_5 is the difference in difference estimate which measures the difference in recall score between positive versus negative text flyers and positive versus negative videos. Our hypothesis that the difference in attention paid to positive and negative messages is greater for videos than for flyers would indicate that both β_4 and β_5 are positive.

To estimate the third difference in difference coefficient between the picture flyer and text flyer groups we can specify a regression similar to (1), by switching the omitted groups to “picture flyer” and “negative”. Note that equation (2) below is identical to equation (1) but for the omitted groups. This specification gives us the difference in difference estimates between picture flyers and text flyers and also between picture flyers and videos. The latter coefficient should be identical to the coefficient between the same two groups from equation (1) except that the sign will be reversed.

$$\begin{aligned} \text{Recall Score} = & \beta_0 + \beta_1 * \text{I}(\text{video}) + \beta_2 * \text{I}(\text{text flyer}) + \beta_3 * \text{I}(\text{positive}) + \beta_4 * \text{I}(\text{positive}) * \text{I}(\text{video}) \\ & + \beta_5 * \text{I}(\text{positive}) * \text{I}(\text{text flyer}) \end{aligned} \quad (2)$$

Table III a and III b report the results of difference in difference estimates for equations (1) and (2) for responses to an overall recall score, the score on the set of diagnostic recall questions and score on the set of non-diagnostic recall questions. In Table III a, the coefficient of 0.44 on the interaction between the picture flyer dummy and the positive frame dummy implies that on an overall score of seven, a positively framed marketing message increased recall score by 0.44 points more for picture flyers compared with videos. Although not significant the sign of the estimate fits with our hypothesis that positively framed messages might induce higher attention or vice versa that negatively framed messages might create aversion amongst subjects to attend to the message resulting in lower recall scores. The estimate of the coefficient on the interaction between the text flyer dummy and the positive frame dummy has the opposite sign but is extremely small and insignificant. When we restrict the score to the diagnostic questions (column 2) we get a larger and statistically significant coefficient on the difference in difference estimate between picture flyers and videos. Results for the non-diagnostic questions are smaller and statistically insignificant. This validates our theory that on the questions that test specifically the information that the marketing messages were designed to dissipate, attention suffered on negatively framed messages and the effect was larger for picture flyers than for videos. Videos might have been entertaining enough

to overcome aversion to the negatively framed message. The coefficient of 0.5 on the interaction between the picture flyer dummy and the positive frame dummy implies that on a score of three, a positively framed marketing message increased recall score by 0.5 points more for picture flyers compared with videos. Although not statistically significant, the difference in difference estimate between text flyers and videos when restricted to the score on diagnostic questions has the expected sign and is of a larger magnitude. Negative picture flyers may induce more aversion when attended to because of the increased salience of a negative picture along with the negative frame. Videos on the other hand might have been entertaining enough to overcome some of the aversion to the negatively framed message. Text flyers contained the same text as the picture flyers but did not include the picture. In our experiment the negative picture flyer had a picture of a farmer on a barren dry field with no crops. This might have been more aversive than just the negative text flyer. These results fit with the hypothesis that negative framed materials are attended to less than positive framed materials and that this effect is magnified the more negative the materials are: the difference between positive and negative frames is much larger and more significant for the difference between videos and picture flyers than between videos and text flyers.

In table III b we present the estimates from equation (2) above. Equation (2) is similar to (1), but only changes the omitted groups to “negative” and “text flyer”. This gives us the third difference in difference estimate and standard error for, the difference in difference comparison between picture flyers and text flyers. Note that in column 1, for the set of all recall questions the -0.44 coefficient on the interaction between the video dummy and the positive dummy is identical to that from table III a column 1 with an opposite sign. These coefficients are the same difference in difference estimate for the comparison between picture flyers and videos. The coefficient on the interaction between the text flyer dummy and the positive dummy gives us the third difference in difference estimator for the comparison between picture and text flyers. In column (2) note that since we are interested in the difference in difference estimate between picture and text flyers, and the question “What are the materials you just viewed about?” is equally salient in both treatments, we have included that in the set of diagnostic questions. The negative and significant coefficient of -0.67 for the diagnostic questions subset (column 2) means that on a score of four, a positively framed marketing message increased recall score by 0.67 points more for picture flyers compared with text flyers. This result would fit with our theory if negative picture flyers were more aversive

than negative text flyers and hence induced less attention and recall in subjects. This might be the case since a negative picture of a farmer on an extremely parched field might be more salient in priming subjects' beliefs about a negative state causing subjects to dismiss viewing negative picture flyers sooner. In table II we see that negatively framed picture flyers were viewed for 12 seconds less than positively framed picture flyers, whereas this was not true for text flyers. The coefficients on the set of all questions and on the set of non-diagnostic questions are smaller and not statistically significant. These results again fit with the hypothesis that negative framed materials are attended to less than positive framed materials and that this effect is magnified the more negative the materials are: the difference between positive and negative frames is larger and more significant for the difference between picture flyers than between text flyers.

5 Conclusion

Having uninsured risk leaves the poor vulnerable to serious or even catastrophic losses from unforeseen negative shocks. Microinsurance is a rapidly growing component of microfinance activities, and it has considerable potential to mitigate the risks faced by the poor. However, getting the poor to understand the benefits of insurance has been challenging and take up rates have been low (Dercon et al. 2008). It is crucial to obtain a better understanding of why people do or do not take up insurance products when offered: what limits the usage of insurance? Increased demand through well-informed choices of individuals is a prerequisite for scaling up microinsurance products to reach large numbers of poor people. This paper is a step in that direction and seeks to understand how people make insurance purchase decisions and how appropriately framed and informative marketing messages can help people make better decisions. One hypothesis for under adoption of insurance is that people don't even like to contemplate bad outcomes. This hypothesis can be tested using our experimental design. Randomly varying the frame of marketing messages we find that recall is lower for negative frames than for positive frames and this effect is larger for flyers than for videos. Videos are entertaining and overcome some of the aversion to attend to a negative message. Our theory and experiment confirm that agents may have motivated beliefs and may prefer to retain beliefs in a rosy future, even if that distorts their behavior. Also, owing to loss aversion we predict that conditional on recall, negative frames increase insurance take up

more than positive frames. This has important implications for the design of informative marketing materials that are aimed at increasing microinsurance adoption. Future work should be aimed at taking these predictions out to the field where actual insurance policies can be offered.

Table I

Panel a

Percentage of subjects that correctly answered recall questions constant across all treatments.

Treatment	diagnostic			non-diagnostic				avg.
	q1	q2	q3	q4	q5	q6	q7	
positive video	65.0%	20.0%	28.3%	53.3%	51.7%	25.0%	43.3%	41.0%
negative video	70.2%	38.6%	22.8%	59.6%	52.6%	19.3%	40.4%	43.4%
positive picture flyer	61.1%	31.5%	50.0%	61.1%	44.4%	14.8%	24.1%	41.0%
negative picture flyer	54.8%	25.8%	30.6%	58.1%	43.5%	17.7%	29.0%	37.1%
positive text flyer	69.0%	25.9%	48.3%	50.0%	39.7%	13.8%	46.6%	41.9%
negative text flyer	79.1%	25.6%	41.9%	79.1%	44.2%	11.6%	34.9%	45.2%
average for question	66.5%	27.9%	37.0%	60.2%	46.0%	17.0%	36.4%	41.6%

Panel b

Percentage of subjects that correctly answered non-diagnostic recall questions - picture flyers and video treatments

Treatment	q8	q9	q10	q11	q12	q13	avg.
positive video	73.3%	55.0%	68.3%	-	-	-	65.6%
negative video	73.7%	56.1%	80.7%	-	-	-	70.2%
positive picture flyer	-	-	-	48.1%	55.6%	42.6%	48.8%
negative picture flyer	-	-	-	54.8%	80.6%	41.9%	59.1%

Notes : Subjects receiving text flyer treatments were not asked incidental recall questions

Table 2

Mean recall scores (on total of 7 questions constant across all treatments) and treatment viewing times by treatment group

<u>treatment</u>	<u>mean recall</u>	<u>sd</u>	<u># obs</u>	<u>mean treat time</u>
positive video	2.866	1.567	60	144.31
negative video	3.035	1.721	57	153.28
positive picture flyer	2.870	1.770	54	233.51
negative picture flyer	2.596	1.603	62	221.20
positive text flyer	2.931	1.725	58	205.65
negative text flyer	3.162	1.413	43	214.99

Table III a

Difference in Difference estimates for score on substantive recall questions. DD estimates are interpreted as the difference in recall between positively and negatively framed messages for each of the groupwise comparisons

	Difference in positive vs. negative frame picture flyer - videos & text flyer - videos		
	(1)	(2)	(3)
	all	diag.	non_diag
constant	3.04 *** (0.22)	1.32 *** (0.13)	1.72 *** (0.14)
d(picture flyer)	-0.44 (0.30)	-0.20 (0.17)	-0.24 (0.19)
d(text flyer)	0.13 (0.33)	0.15 (0.19)	-0.02 (0.21)
d(positive)	-0.17 (0.30)	-0.18 (0.18)	0.01 (0.19)
d(picture flyer*positive) (DD picture flyers - videos)	0.44 (0.43)	0.50 ** (0.25)	-0.05 (0.27)
d(text flyer*positive) (DD text flyers - videos)	-0.06 (0.45)	0.15 (0.26)	-0.21 (0.28)

Notes : Standard Errors in Parentheses. Important (Imp) questions are ones that were determined to be the best indicators of simple attention towards understanding the rainfall insurance product described in marketing treatments

Table III b

Difference in Difference estimates for score on substantive recall questions. DD estimates are interpreted as the difference in recall between positively and negatively framed messages for each of the groupwise comparisons

	Difference in positive vs. negative frame videos - picture flyer & text flyer - picture flyer		
	(1)	(2)	(3)
	all	diag.	non_diag
constant	2.60 *** (0.21)	1.69 *** (0.15)	0.90 *** (0.10)
d(video)	0.44 (0.30)	0.22 (0.22)	0.22 (0.15)
d(text flyer)	0.57 (0.33)	0.56 (0.24)	0.00 (0.16)
d(positive)	0.27 (0.31)	0.34 (0.22)	-0.07 (0.15)
d(video*positive) (DD videos - picture flyers)	-0.44 (0.43)	-0.59 * (0.32)	0.15 (0.21)
d(text flyer*positive) (DD text flyers - picture flyers)	-0.51 (0.45)	-0.67 ** (0.33)	0.16 (0.22)

Notes : Standard Errors in Parentheses. Diagnostic questions are ones that were determined to be the best indicators of simple attention towards understanding the rainfall insurance product described in marketing treatments

Appendix I

This appendix enlists the recall questions that were asked to subjects following each of the marketing treatments. Questions are categorised as diagnostic recall questions and non-diagnostic recall questions.

Diagnostic Questions

- 1) In what circumstance will rainfall insurance pay you money?
 - a) Every year
 - b) Whenever the rains are insufficient
 - c) Whenever there are government water cuts
 - d) Whenever your crops grow well
 - e) Whenever you need food
 - f) When the rains are good

- 2) The insurance product described in the materials you just viewed protects a farmer against which of the following?
 - a) Attack to the crop by termites/locust
 - b) Reduction in the prices of crops
 - c) Reduction in the demand for crops
 - d) Government water cuts
 - e) None of the above
 - f) All of the above

- 3) How does buying insurance benefit you?
 - a) By paying you money back every year
 - b) By helping you grow the right crops when rainfall might be bad
 - c) By giving you information on bad rains in advance
 - d) By providing you with food when rains are bad
 - e) By paying you money when rains are bad
 - f) By preventing bad rains in your village

Non-diagnostic questions:

4) What were the materials you just viewed about?

- a) The weather in Gujarat
- b) Fertilizer usage
- c) Rainfall insurance
- d) Ways to save money
- e) Methods to grow crops
- f) Life in Ahmedabad

5) How can you get the benefits of rainfall insurance?

- a) By hoping for shortage of rain
- b) By buying a rainfall insurance policy after the sowing period
- c) By buying a rainfall insurance policy before the sowing period
- d) By a lottery
- e) By getting insurance from the government
- f) Everyone gets it

6) In case of a drought, the rainfall insurance product can be useful for a farmer if he grows

which of the following crops?

- a) Wheat
- b) Bajra
- c) Jowar
- d) Rice
- e) All of the above
- f) None of the above

7) Which of the following statements are true?

- i) The rainfall insurance will pay out in 2 consecutive years for every 10 year period
- ii) Once a farmer purchases rainfall insurance, he need not work since he is covered by the insurance

iii) Rainfall insurance can help farmers mitigate risk by paying out in years when the rainfall is too low

- a) All of the above
- b) (i) and (ii)
- c) (i) and (iii)
- d) (i) only
- e) (ii) only
- f) (iii) only

Video Non-Diagnostic Questions

8) In the video, what tool does the farmer have when shown working in the field?

- a) Axe
- b) Shovel
- c) Plough
- d) Saw
- e) Hammer
- f) Scissor

9) In the video, how did the representative arrive at the farmers' house?

- a) By car
- b) Walking
- c) By bullockcart
- d) On motorcycle
- e) By cycle
- f) By horse

10) In the video, why had the representative gone to the farmers house?

- a) To have a cup of tea
- b) To spend an evening with the farmer
- c) To educate the farmer about rainfall insurance
- d) To help the farmer cultivate his land

- e) To sell the farmer some goods
- f) To collect money from the farmer

Flyers non-Diagnostic Questions

11) Which of the following best describes the picture in the materials you just viewed?

- a) A woman selling vegetables
- b) A woman cooking
- c) A man and a woman walking in a field
- d) A woman being helped by another to carry a load on her head
- e) Women attending a village meeting
- f) A woman cleaning

12) How many people were present in the picture you just viewed?

- a) 1
- b) 2
- c) 3
- d) 4
- e) 5
- f) 6

13) How many separate screens did you view in the materials above?

- a) 1
- b) 2
- c) 3
- d) 4
- e) 5
- f) 6

Appendix II

This appendix contains the marketing flyers there were presented to the subjects. Flyers treatments consisted of three screens. The first and the third screens were constant across all 4 flyer treatments. The flyers screens labeled “positive frame” and “negative frame” are the second screen of the picture flyer treatments that differed for positive picture flyers and negative picture flyers. Text flyers were the same except they did not contain the pictures.

Rainfall Insurance

Screen 1

Do you toil in the fields in order to reap a good crop?

Is your income dependent on the amount of rainfall?

Positive Frame

Rainfall Insurance

Screen II



Do you want to keep your income safe from lack of rainfall or floods?

You could secure your income regardless of the amount of rainfall.

Whatever happens in terms of rainfall your family can be sure to have money to eat.

Rainfall insurance helps you attain protection and security.

Negative Frame

Rainfall Insurance

Screen II



Do you worry about losing your income due to lack of rainfall or floods?

Drought or flood due to a bad monsoon could ruin your crop and slash your income.

Your family may starve in case of inadequate rainfall or flood.

With no rainfall insurance you are exposed to catastrophe and disaster.

Rainfall Insurance

Screen III

Rainfall insurance will pay you money when there is a shortage or excess rainfall enough to cause draught or flood in your village

By putting in a little money right now you can get money when you need it the most.

Rainfall level will be measured at a public weather station near your village and payment will be automatic.

On average the insurance would have paid out in 2 of the past 10 years.

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