WHY IS THE TAKE-UP OF MICROINSURANCE SO LOW? EVIDENCE FROM A HEALTH INSURANCE SCHEME IN INDIA

SEIRO ITO AND HISAKI KONO

Insurance for the poor, called microinsurance, has recently drawn the attention of practitioners in developing countries. However, there are common problems among the various schemes: (1) low take-up rates, (2) high claim rates, and (3) low renewal rates. In this paper, we investigate take-up decisions using household data collected in Karnataka, India, especially focusing on prospect theory, hyperbolic preference, and adverse selection. Prospect theory presumes that people behave in a risk-averse way when evaluating gains but in a risk-loving way when evaluating losses. Since insurance covers losses, the risk-loving attitude toward losses may explain the low take-up rates and we find weak empirical support for this. Households with hyperbolic preference were more likely to purchase insurance, consistent with our theoretical prediction of demand for commitment. We also find some evidence on the existence of adverse selection: households with a higher ratio of sick members were more likely to purchase insurance.

Keywords: Microinsurance; Take-up

JEL Classification: F35, O19

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I. INTRODUCTION

Insurance for the poor, called microinsurance, has recently drawn the attention of health care service practitioners in developing countries. In India, a rapid increase in microinsurance schemes has been observed, due partly to the Insurance Regulation and Development Authority (IRDA) Regulations 2000 (July 14) which made it compulsory for the general insurance companies to provide 5% of their gross premium income to provide insurance in the rural and social sectors. The regulations opened up a door for the poor to obtain realistic opportunities to purchase health insurance.

There are, however, problems that are widely shared among health microinsurance practitioners in India: (1) low take-up rates, (2) high claim rates, and (3) low renewal rates. It is often said that the root cause of these symptoms is adverse selection. In the case of (1) and (3), unfamiliarity with insurance is cited as a reason as well. Similarly, in marketing research conducted by microfinance institutions (MFIs), it is commonly concluded that programs are not suitably designed to match the demand of the poor households (relatively large lump sum payments, significant transaction costs, dependence on relationships with unfamiliar parties), and that the poor are less educated and cannot understand the concept of insurance or risk management, thus justifying the necessity of financial education programs (Vimo SEWA 2006 and ILO Viet Nam 2007, for example).

While these are all valid conjectures, their relevance must be assessed empirically. This is particularly true if there are alternative hypotheses that can explain the symptoms. Despite the growing attention toward microinsurance, there is a limited amount of economic research which sheds light on the household's utilization of insurance. In this paper, we try to understand the mechanism behind low income households' insurance take-up decisions based on recent empirical insurance literature and on behavioral literature.

In line with the insurance literature which examines the extent of information asymmetry in the insurance markets of developed countries (e.g., Abbring, Chiappori, and Pinquet 2003; Chiappori 2000; Chiappori and Salanié 2000; Chiappori, Julien, Salanié, and Salanié, 2006; Cutler, Finkelstein, and McGarry 2006; Finkelstein and McGarry 2006), we test for the presence of adverse selection in microinsurance purchases in a developing country.

In contrast to other studies, we have direct information on health conditions which can be seen as a measure of riskiness. This allows us to use a univariate regression model of purchases on riskiness. In addition, our data ensure that there are no omitted variables that are incorporated in pricing as suggested by Chiappori and Salanié (2002). The insurer, the state government of

Karnataka in our case, applies a universal price and does not price discriminate. The insurance product, at least in theory, is available for sale to everyone. Hence there cannot be an omitted variable that may be relevant for sales of insurance.

If one regresses purchase on observable covariates, one leaves two important variables in the residual, namely, riskiness and risk preference. As we have a riskiness measure in our data, the consistency of the estimates depends on the orthogonality between riskiness and risk preference heterogeneity. It is not reasonable to assume that they are unorthogonal, so we use an identification strategy similar to that of Finkelstein and McGarry (2006): while they use a proxy of risk preference (cautious actions) to control for the preference heterogeneity, we condition on risk preference obtained from the experimental games with substantial monetary rewards. Specifically, conditional on individual's risk preference, we test for a negative correlation between current health conditions and insurance purchases.

Another novel feature of this paper is that we test for the preferences underlying prospect theory and hyperbolicity in relation to insurance purchases of poor households. We examine the validity of expected utility theory and prospect theory. In an early contribution, Slovic et al. (1977) conducted a lab experiment in the United States where subjects facing the risk of losses were asked whether they would purchase actuarially fair insurances. They set the probability of losses at 0.1%, 0.5%, 1%, 5%, 10%, and 25%. If subjects were risk averse, as expected utility theory usually presumes, they should always purchase the insurance and value the insurance more when the loss amount is larger (and thus the probability of losses is lower because of actuarial fairness). They find that when subjects faced a loss risk of 25%, about 80% of them purchased the actuarially fair insurance while when they faced a loss risk of 0.1% or 0.5%, only 20% of them purchased the actuarially fair insurance. In addition, 30% of them purchased the insurance against a loss risk of 1% and 40% of them purchased the insurance against a loss risk of 5%. These findings suggest that individuals tend to under-evaluate small-probability losses, which may explain why people do not purchase insurance to the extent that the standard theory predicts.

The most closely related work to ours is Giné, Townsend, and Vickery (2008), who investigate the take-up decisions of rainfall insurance based on a survey in rural Andhra Pradesh, India. Their main findings are: insurance take-up (1) decreased in basis risk between insurance payouts and income fluctuations, (2) increased in household wealth, (3) was lower among households who faced credit constraints, and (4) was higher among households who were familiar with the insurance vendor (in this case, a MFI) and who participated in a village network. Note that information asymmetry over risks does not play a role in explaining the low take-up, because rainfall shocks and their record are publicly observable. The authors also find that risk-averse households are more likely to purchase insurance among households with previous transactions with the MFI who sells the insurance, but for households without previous transactions, risk-averse households are less likely to purchase. This suggests that households unfamiliar with the insurance vendor seem to regard buying the insurance as a risky investment. If this interpretation is correct, it is due to an incomplete contract problem whose solution is simply a matter of trust between an MFI and farmers.

Another related work is Bauer, Chytilova, and Morduch (2008), who analyze the household decisions to participate in microcredit using household behavioral data collected in Karnataka, India. They find that individuals with hyperbolic discounting are more likely to participate in the microcredit program, with the reason being that the difficulty in saving makes them more likely to be credit constrained, leading to the demand for microcredit.

A straightforward research strategy based on these preceding works is to examine the relevance of behavioral economics in explaining the low take-up. According to prospect theory (Kahneman and Tversky 1979), individuals are risk averse toward gains but risk-loving toward losses. Since health insurance covers losses, individuals facing a decision on purchasing health insurance may act as if they are risk-loving. Further, as Slovic et al. (1977) suggest, prospect theory also allows subjective probabilities to be different from objective probabilities. We follow Tanaka, Camerer, and Nguyen (2009) to consider how much such discrepancies, or probability weighting, exist among the sampled individuals. Lastly, we hypothesize that hyperbolic discounters are more willing to buy the insurance as a commitment device, as long as they acknowledge their weaknesses. Unlike Bauer, Chytilova, and Morduch (2008) who focus on the saving difficulty caused by hyperbolic discounting, we focus on the demand for a commitment device. If individuals know that they tend to save less than they should, and thus will not have enough saving in the future, they feel vulnerable to shocks. Having assessed the likeliness of such adversity in the future, they may have an incentive to purchase the insurance now to protect themselves in the future from health shocks. This is possibly due to the unique characteristic of this insurance product that is sold to dairy cooperative members whose weekly income may be used for premium payments. To the best of our knowledge, this is the first work which links prospect theory and hyperbolic discounting to household decisions on purchasing insurance using household survey data.

The main contribution of this paper lies mainly in the well-designed survey that we conducted in Karnataka, India, to understand the nature of purchase decision of households. We have collaborated with Biocon Foundation, a nongovernmental organization (NGO), to investigate the underlying problems in the microinsurance market. In this paper, we find some evidence for the existence of adverse selection: households with a higher ratio of sick members are more likely to purchase the insurance. Interestingly, we also find that households with sick household heads are *less* likely to purchase the insurance. This may capture the fact that households with sick households have lower incomes and have difficulty in financing the insurance premium. In examining the behavioral explanation for low take-up, we elicit the risk attitudes toward gains and losses and relate them to the actual insurance purchase. We find that an unignorable portion of the surveyed individuals have a preference consistent with prospect theory. The respondents identified as loss-risk-loving were less likely to purchase the insurance, although this finding is statistically significant only in some specifications. On the other hand, risk aversiveness toward gains does not predict the insurance take-up. We also find that households whose prominent members (respondents) exhibit hyperbolicity are more likely to purchase the insurance, consistent with our conjecture.

The next section provides the brief description of the structure of health microinsurance in India and the insurance product we examine in this paper. Section III presents theoretical predictions on purchasing behavior. Section IV summarizes our experimental questions. The survey environment and empirical results are presented in Section V. The final section offers concluding remarks.

II. MICROINSURANCE: YESHASVINI SCHEME

As with microcredit, microsaving, or micro-*whatever*, there is no agreed upon definition of microinsurance. In this paper, we use the term to refer to the insurance schemes designed, marketed, and operated specifically for the poor.

Insurance is said to be a comparatively more complex concept than saving and credit services, and require the upfront payment of premium. Unlike saving and credit, insurance includes nonfinancial services (health care services) with substantial monetary transactions. This explains why in most microinsurance schemes there are as many as five parties involved: the insuree, insurer, care provider, third party administrator (TPA), and NGO/MFI (See Figure 1). The TPA provides insurance management services, such as policy verification, claim examination, and payment transactions, facilitates cash-free health care services which are essential to the cash-constrained poor, and examines the claims from the hospitals. TPAs are not unique to India, but are an integral part of providing microinsurance in a large and diverse country like India where one has to design products that are customized at a small scale.

[Figure 1 about here.]

In addition, there are many exceptions to its coverage mostly specified in tiny print on the back of brochures. These are just a few of the hurdles that the practitioners have to struggle with: they have to explain under what conditions indemnity will be paid out, how the policyholders can utilize health care services, how they can send the claims, when to pay the premium, and when they can receive the insurance cards. On top of this, microinsurance providers, mostly MFIs or NGOs, hesitate to impose examinations for preexisting conditions, because, according to a few founders of schemes, their raison-d'être is poverty reduction, not turning down the poors' requests when they have health problems.

All of these seem to lead to the symptoms described earlier: low take-up and renewal rates. Because the poor may not understand the concept fully, they may even think that they have been deceived when they remain healthy and do not utilize insurance since "they have paid the premium but gained nothing." Medical knowledge is scarce among the poor, and they have difficulty understanding what is and is not covered under the policy. Even when written explicitly, it turns out that, in some cases, the poor go to hospitals only to find out that the procedure for their symptom is not covered, a fact which is then versed as fraud by word of mouth. The inability to prepare cash in a short period of time also plays a role, as microinsurance is usually sold once a year in each region and not everyone is given sufficient time before the marketing day to prepare the cash. These are just issues that are unrelated to information asymmetry. Information asymmetry only complicates things further, by adding the problems of adverse selection, and *ex ante* and *ex post* moral hazard. The MFIs and NGOs who manage the schemes thus face tough challenges of controlling agency problems while educating and marketing for the poor. These may partly explain why no microinsurance has ever successfully scaled up its pilot projects.

The insurance product that we examine, Yeshasvini Co-operative Farmers Health Care Scheme (Yeshasvini, hereafter), is the most widespread health microinsurance scheme in Karnataka state. Yeshasvini was initiated on June 1, 2003, with the aim to provide cost-effective quality health care to dairy cooperative farmers and poor people across the state of Karnataka. It is a self-funded scheme that is not tied with any insurance company. It offers a low priced product covering over 1,600 defined surgical procedures to the farmers and their family members. The beneficiaries can receive cashless treatment at the network of over 135 hospitals, both public and private, across Karnataka. Yeshasvini is open to all cooperative society members those who have been in the co-operative society for at least six months. Ages of the insured range from 0 to 75. The policy is valid for one year and the beneficiaries need to pay the premium up-front. The premium is Rs 120 (approximately US$2.4) per year for an adult or a child. For families of five or more members, the premium is discounted by 15%. Notice that the premium does not depend on age, health status, or any other variable. This should, in theory, make the insurance more attractive to less healthy individuals, leading to higher claim rates. This is precisely the adverse selection problem which is often discussed among the practitioners in India.

The payout is limited to Rs 200,000 (approximately US$4,000) per year per individual and Rs 100,000 (approximately US$2,000) per surgery per individual. This is enough for almost all surgical treatments at the Network hospitals. All procedures are limited to one incidence per year. The policy excludes coverage for prosthesis, implants, joint replacement surgeries, transplants, chemotherapy, cosmetic surgery, burn treatments, dental surgeries and several other events and items. Normal delivery is covered. Children born prematurely or with low birth weight who require special care during the first seven days after birth are covered. In addition, the policyholders can receive free out-patient consultation at all participating hospitals, discounted tariffs for investigations and inpatient treatment for non-covered hospitalization.

III. THEORETICAL PREDICTIONS

A. *Riskiness*

Standard models of adverse selection (e.g., Rothschild and Stiglitz 1976) expect that riskier individuals are more likely to purchase the insurance given an equal premium and benefits. In this paper, we use information on the disease history of household members and current health conditions to examine such predictions.

B. *Expected Utility Theory and Prospect Theory*

Next we consider decisions on purchasing insurance based on expected utility theory and its alternative, prospect theory, developed by Kahneman and Tversky (1979).

Expected utility theory usually assumes that individuals are risk-averse and that their utility depends on the levels of consumption or wealth. Risk aversion implies that if the insurance is actuarially fair, individuals should purchase the full coverage. Even if the insurance premium is higher than the expected indemnity payout, individuals will purchase partial coverage if they are sufficiently risk averse. Given the risk probabilities, individuals with higher risk aversion are more likely to purchase the insurance.

While expected utility theory assumes that the utility depends on consumption or wealth levels, prospect theory focuses on the asymmetric evaluation of gains and losses by individuals. It assumes that people set a reference point and consider lower outcomes as losses and larger ones as gains. The characteristics of prospect theory can be summarized in the shape of its value function, v, which is described in Figure 2.

The value function, v, has three characteristics. First, it does not depend on the wealth level and solely depends on gains and losses relative to the reference point, which corresponds to the origin in Figure 2. Second, v is s-shaped, reflecting "diminishing sensitivity." This indicates that people attach greater importance to the difference between US$0 and US$100 than to the difference between US$10,000 and US$10,100, regardless whether they are losses or gains. A final point is that losses have a greater impact than gains, in what is called "loss aversion." v is kinked at the origin and given any value of x, $|v(x)| < |v(-x)|$.

The diminishing sensitivity or s-shaped value function implies that individuals are risk averse toward gains but risk-loving toward losses. Since health insurance only covers losses, individuals facing a decision on purchasing health insurance may act as if they are risk-loving. We should note that prospect theory has been used to explain "over-insurance" instead of "under-insurance." Cutler and Zeckhauser (2004) argue that loss aversion can explain why, in developed countries, people often buy insurance for newly purchased cars or electronic items whose premium is substantially more expensive than what the probability of failure may justify. This "over-insurance" is caused by the fact that decisions on purchasing insurance are made when they buy the cars or electronic items. In this case, the reference point is the point before they buy the cars or electronic items. Since they obtain gains from buying these items (this is why they buy them), we are looking over the positive (gains) region and risk aversiveness leads to "over-insurance." Cutler and Zeckhauser (2004) actually note that "over-insurance" is not observed when people buy insurance for cars which they already own. Thus "over-insurance" for newly purchased items and "under-insurance" for health insurance can be explained under the same framework of prospect theory. By directly surveying risk attitudes toward gains and losses and relating the response to the insurance take-up, we examine whether loss-risk lovingness can explain "under-insurance." It should also be noted that expected utility theory allows risk-lovingness, and Friedman and Savage (1948) point out the possibility of non-concavity of the utility function to explain the observation that people often buy insurance and lottery tickets at the same time. It is possible, by chance, that the utility function is convex for "gains" and for "losses." However, this possibility is low since the standard utility theory depends on consumption or wealth levels but not on a reference point. To account for our results with the standard expected utility theory, in the relevant range, each respondent's utility must be convex from below and concave from above exactly at the points of the respondent's wealth level at the time of our experiment. Thus, if we observe that a substantial portion of the individuals respond risk-aversely to gains and risk-lovingly to losses, and that they are less likely to purchase insurance, we can safely postulate that the loss-risk lovingness of prospect theory explains "under-insurance" in the microinsurance market.

In addition, prospect theory allows the subjective probabilities to be different from the objective probabilities. This can be captured by a probability weighting function, $w(p)$. It is often argued that people tend to overvalue gains from low probability events, but undervalue gains from medium and high probability events (Kahneman and Tversky 1979). On the other hand, Slovic et al. (1977) find that individuals tend to undervalue losses with low probability, which may explain why they do not purchase insurance covering large but infrequent losses as much as expected utility theory predicts.

C. Self-control Problem

We also focus on another behavioral economics issue, the self-control problem. There are a number of models for self-control. Laibson (1997) uses hyperbolic discounting models to show that individuals without perfect commitment technology will consume excessively in the current period. From a set of axioms, Gul and Pesendorfer (2001, 2004) derive temptation models consisting of a usual utility function and a temptation cost function which depends on the set of potential consumption. Fudenberg and Levine (2006) develop a dual self model, which gives simpler analytical solutions to the self-control problem than hyperbolic discounting models. Most of the predictions, however, are similar across these models. Individuals with a self-control problem expect that they will be tempted to consume and have difficulty making savings. These individuals have a demand for any commitment device if available. Ashraf, Karlan, and Yin (2006) find in the Philippines that individuals who are identified as time-inconsistent are more likely to participate in commitment saving in which they are restricted from withdrawing money from their account. In the context of insurance, individuals aware of self-control problems expect that they will be tempted to consume excessively, and that they will not have enough money for treatments when they do get sick. They thus have higher incentives to purchase insurance in order to ensure access to medical treatment in the future.

IV. EXPERIMENTAL QUESTIONS

In the experimental questions, we aimed to identify the various preference characteristics: attitude toward risks in the positive region, risks in the negative region, hyperbolicity, probability weighting, and self-control. We also asked other important entitlement characteristics of households, namely, credit entitlement.

In an effort to identify households with credit constraints, we asked a series of questions regarding if they had tried to, if they had, and if they could borrow as much money as needed. If the answers to these questions were negative, we asked the reasons. With this information, we identify households with credit constraints. Concretely, we use the strong version of the definition of credit constrainedness described in Attanasio et al. (2008).[1] We define that a household is credit constrained if one of the following conditions is true:

- The household did not try to borrow because of anticipation of being rejected, not being familiar with the process, or feeling intimidated, or reasons other than "no need for credit."
- The household tried to borrow but did not get loans or did not get as much as wanted under the proposed conditions.

Controlling for the credit constrainedness is necessary as it may make the premium costlier. We expect this variable to be negatively correlated with the take-up decision, because constrained individuals may not buy while people just above the constrainedness may purchase in anticipation of possible future income shocks.

In the experimental questions, our main interest is on the risk preference parameters. The set of questions we used for eliciting risk preference parameters is presented in Table 1. First consider question QX3, where respondents can gain a certain amount of money by choosing a lottery. Notice that lottery B is most attractive in case 1 and gets gradually less attractive. In the last row, B is definitely a worse option than A. Thus a respondent will choose lottery B in case 1 and switch to lottery A at some point, or choose A in all the cases. There will be no double switches if respondents are logically coherent. Following Tanaka, Camerer, and Nguyen (2009), we assume a CRRA value function $v(y) = y^{\alpha}$, $\alpha > 0$, where y denotes the gains from lottery. $\alpha < 1$ implies risk averseness, $\alpha = 1$ risk neutrality, and $\alpha > 1$ risk lovingness. We denote lottery A by $L_A = (35, 40; 0.5, 0.5)$, expressing that the outcome of gaining 35 occurs with probability 0.5 and outcome of gaining 40 occurs with probably 0.5. Lottery B can be written as $L_B = (B, 10; 0.5, 0.5)$, where we vary the amount of gain in the first outcome, B. Since the probabilities of better outcomes and bad outcomes are equal, we ignore the probability weighting here. Thus when $E[v(L_A)] = E[v(L_B)]$, we have:

[1] Attanasio et al. (2008) note that there are two notions of credit constrainedness, strong and weak. The strong version is more widely used and implies that the person could not borrow as much as she wanted under the given conditions. The weak version defines a person as credit constrained if the borrowing and lending rates differ. We take the strong version of the definition because the weaker version may apply to almost everyone in the sample.

$$35^{\alpha} + 40^{\alpha} = 10^{\alpha} + B^{\alpha}.$$

This can be solved numerically for α by a root finding algorithm. If a respondent, who faces a series of lottery choice, switches her choice from B to A in the 7th question, for example, then we can deduce that her α lies between $\underline{\alpha}$ and $\bar{\alpha}$, where $\underline{\alpha}$ satisfies $35^{\underline{\alpha}} + 40^{\underline{\alpha}} = 10^{\underline{\alpha}} + 90^{\underline{\alpha}}$ and $\bar{\alpha}$ satisfies $35^{\bar{\alpha}} + 40^{\bar{\alpha}} = 10^{\bar{\alpha}} + 80^{\bar{\alpha}}$. The rightmost column presents the range of α which justify a switch in the choice of lottery from B to A.[2] According to the CRRA value function, a lack of nonzero values of 11 justifies the choice of lottery A in the first row (B = 150). Thus if the CRRA value function is reliable, few respondents will choose A in all the cases.

As discussed in the previous section, we want to examine whether respondents are risk averse or risk loving when they face the risk of loss. As in the above, we assume a CRRA value function, $v(y) = -(-y)^{\tilde{\alpha}}$, $\tilde{\alpha} > 0$, where $y < 0$ is the losses from the lottery. Notice that $\tilde{\alpha} < 1$ implies risk lovingness here. If $\alpha < 1$ and $\tilde{\alpha} < 1$, it is consistent with prospect theory. We expect that households with $\tilde{\alpha} < 1$ are less likely to purchase the insurance. We elicit $\tilde{\alpha}$ by question QX4, which is analogous to QX3 above. Notice that lottery B is least attractive in case 1 and gets gradually more attractive. In the last row, lottery B is definitely a better option than A. $\tilde{\alpha}$ can be elicited in the same way as α, by using information on the point at which a respondent switched her choice. Since the probability of better outcomes and poorer outcomes is fifty-fifty, we ignore the probability weighting in eliciting $\tilde{\alpha}$.

In addition, we investigate whether undervaluation of tragic but infrequent events is suppressing the 'rational' demand for health insurance. This can be expressed as a low probability being deflated while a high probability is inflated, or probability weighting. Following Tanaka, Camerer, and Nguyen (2009), we assume the subjective probability q to have a one-parameter form of Prelec's (1998) axiomatically derived weighting function:

$$q(p) = e^{-(-\ln p)^{b}}.$$

Note that undervaluation of low probability events occurs if $b > 1$ as $q - p$ is an inverse-U–shaped function.

[2] The columns titled "Difference in expected values" and "Open interval of α if subject switches to lottery B" were not shown to the respondents.

We set L_A = (–A; 1) and L_B = (–B, 0; 0.1, 0.9) in QX5, and L_A = (–A; 1) and L_B = (–B, 0; 0.02, 0.98) in QX6. If $E[v(L_A)] = E[v(L_B)]$, we can solve for b using:

$$v(-A) = qv(-B) + (1 - q)v(0) = qv(-B_1)$$

The last equality follows as $v(0) = 0$. Then, with the imputed value of $\tilde{\alpha}$ from QX4, we can get b:

$$b = \frac{\ln\tilde{\alpha} + \ln\{\ln(-B) - \ln(-A)\}}{\ln(-\ln p)}.$$

In Table 2 and 3, we present the median of the imputed ranges of b from QX5 and QX6, respectively.

As described later, the respondents have shown very few switches in QX3. The majority stuck with the initial choice, and it is only after we repeatedly explained that, in the last question of QX3, L_A is strictly less attractive for "everyone except one who enjoys the prospect of losing a larger amount of money without possible gains to cancel the loss out," that some switched to L_B on the last question. But only 10% of the respondents switched, and the rest stayed with L_A. In addition, there are irrational responses showing multiple switches on QX3, QX4, QX5, and QX6. Our enumerators tried to eliminate multiple switches by going back to the earlier questions at which the respondents switched, but, some respondents chose to have multiple switches. We define them as irrational and assigning them NAs in the respective dummy variables.

We are having a difficulty in reasoning with such results. We tried several variations in QX3 in the pretesting stage by wiggling the amounts of L_A and L_B, or by inflating or deflating the amounts, or by changing the difference of B between i-th and (i + 1)-th questions, or by going from the last question to the first, or by asking the same questions again on the other page of the questionnaire. We used visual tools by showing cards with the rupee amounts written and two boxes with the labels A and B. We took time to explain what the questions were asking by giving respondents training questions in QX1 and QX2, and explained the notion of choosing a box from which they could draw one card.

But the results were consistently at odds with our expectations. One should also note that we were providing an incentive, as Tanaka, Camerer, and Nguyen (2009) did in Vietnam, for respondents to be truthful to their own preference by explaining to the respondents before the questions that they would actually play the lottery that they chose. Our results are perplexing as Bauer, Chytilova, and Morduch's (2008) study successfully observed the switches in the majority of respondents. One of Bauer, Chytilova, and Morduch's (2008) surveys was conducted in a proximate location of peripheral Bangalore, and employed exactly the same format with a smaller range between $\max\{B\}$ and $\min\{B\}$, making the chance of observing a switch smaller, and they randomly picked only few respondents to actually play the lotteries which gave weaker incentives to be truthful than ours, as we let all the respondents play the lottery.

Nonetheless we can identify the attitudes, if not the actual parameter values, toward risks. We define an individual as being risk averse if $L_A \geq L_B$ where L_B is the mean preserving spread of L_A, and conversely, as risk loving if $L_A \leq L_B$. More specifically, in QX3, a risk neutral individual must switch from L_B to L_A at ninth question from above in which respondents were. So if the switch happens before question 9, we identify the person as risk averse in the positive region. A similar definition is employed for the loss risks in QX4, QX5, and QX6. There are some respondents who switched in reverse: from L_A to L_B. This goes against any classical notion of risk attitudes, as this implies that the individual favors lower mean returns and higher risks. Note that even risk lovers would not choose an inferior lottery when given the chance to choose higher mean returns. So these reverse switchers are defined as "irrational" and are assigned NAs in their risk attitudes. In the estimation, we use QX4 and QX6 but not QX5 because QX5 and QX6 are similar in mean and highly correlated, and QX6 has fewer missing values.

To account for hyperbolic preference, one must choose the extent of the distant future, n days from now, to construct the discount rates between two dates that are separated by k days. Let us denote the discount rate $\beta \in [0, 1]$ between today (0 day from now) and k days later as $\beta(0, k)$, and between n days from now and $n + k$ days from now as $\beta(n, n + k)$. Then, an individual is said to be hyperbolic if:

$$\beta(0, k) < \beta(n, n + k), \qquad n > 0, k > 0.$$

There can be four possibilities if we can compute the discount rates $\beta(0, k)$, $\beta(n, n + k)$. In the classification shown in Table 4, an individual choosing earlier dates on both occasions is called impatient, while one choosing the later dates on both occasions is called patient. Hyperbolicity is identified by the lower left quadrant of the table where the individual chooses the earlier date for the present and the later date for n days after. The upper right quadrant has no name so we just call it "inconsistent." As with the risk preference question of QX3, we tried a variety of configurations and we have observed that one should not use the immediate future for k, such as $k = 1, 2$, and that one should set at least a few months time for n. So we set $k = 7$ or one week, and $n = 180$ or six months, as presented in Table 5.

Regardless of whether the respondent was hyperbolic or not, we asked in QX7 whether the respondents prefer periodic installments or a lump-sum payment at the end of the period. In a series of questions contrasting periodic installments and a lump-sum including interest payments, we define a respondent as “sophisticated” when she chooses the periodic installments for all choices. In the argument of hyperbolic discounting, it is important to see whether an individual is “naive” or “sophisticated.” Sophisticated individuals know that they are tempted to overvalue current consumption. They are willing to utilize commitment devices, if available (Ashraf, Karlan, and Yin 2006). It is not yet clear how these sophisticated individuals reply to questions like QX1. If they are quite sophisticated, they may choose larger gains in the future as a measure of commitment and there may be no difference in the elicited discount rates of $\beta(0, k)$ and $\beta(n, n+k)$ even if they are sophisticated hyperbolic discounters. Fernandez-Villaverde and Mukherji (2002) propose to directly detect the preference for commitment by asking whether respondents prefer (a) 180 minutes of access to a videogame for three days with a constraint on time allocation (60 minutes a day), or (b) 180 minutes of access to a videogame for three days without any constraint on time allocation. Along the same line, we use questions asking whether the respondents prefer periodic installments or a lump-sum payment at the end of a period, in order to detect the preference for commitment.

V. EMPIRICAL RESULTS

In order to investigate take-up decisions of Yeshasvini, two hundred and nine households were randomly selected from three villages in rural Bangalore, Karnataka in September 2008. The villages are characterized as being mostly semi-urban and are under rapid development due to surrounding factory outlets. Villages are within a half-hour distance of both private and public hospitals, including a clinic run by the insurer. As customary in the state of Karnataka, households engaging in dairy production have been exposed to Yeshasvini or a state-funded surgical insurance scheme. Villages were purposefully selected to study the areas without significant commercial medical insurance penetration while being availed of an array of health care providers.

The interviewers visited the selected households and distributed invitations to the survey to be conducted in the village halls. Household members were assigned one hour intervals from 9 a.m. to 3 p.m. to show up in the hall. The questionnaire consisted of two parts, one on household background information and perceptions on insurance, and another on results from experiments.

Table 6 give the descriptive statistics for the data we obtained. We explain only briefly as the tables are self-explanatory. The variables can be categorized into three groups: household level (Table 7), individual level,[3] and experimental (Table 8). Household level information gives the

[3] The descriptive statistics for this group are not shown as they are only used for relating the respondents to other

standard household background information including roster and members' education levels. Individual level information gives the information of the respondents, including self-reported health conditions. Experimental information gives the responses to our experimental questions. As seen in Table 8, 22% of our respondents are from BPL (below poverty line) households, although they have relatively high values of land assets, reflecting the fact that our site is near Bangalore. Still, only 66% have a latrine or a toilet, and only 26% have a water tap on their premises.

Table 8 summarizes the results of the experimental questions. It shows that among all non-NA respondents, 62% are risk averse in the positive region (gain-risk averters) while around 80% are risk loving in the negative region (or loss-risk lovers). There are variations in the ratio of loss-risk lovers depending on which lottery table one looks at, but the variation is not large and hovering around 80%. This is striking, because the sole purpose of insurance is to cover the prospect of loss, while the results show that the people welcome such prospect. The two boxes in Table 9 cross-tabulate the distribution of gain-risk aversion and loss-risk aversion. It turns out that a substantial number of respondents behave in a way consistent with prospect theory: risk averse in the positive region and risk loving in the negative region. Fisher exact tests are performed to see if gain-risk averters and lovers differ significantly in their loss-risk attitudes.[4] The result from the table for QX4 is not significant while that for QX6 is. This indicates that one should control both gain-risk attitudes and loss-risk attitudes to better explain the insurance purchase decisions.

We identified only 5% of our respondents as hyperbolic, as shown in Table 8. This is too small a variation to be used as a dummy variable with efficiency. This may due to the fact that we subsequently asked the respondents to make a choice between the present and one week later, and, immediately after that, a question on a choice between six months later and six months and one week later, causing people to take the same choice. Whatever the underlying reason for the low hyperbolic population, we need to be careful when interpreting the results on this variable as it has large standard errors. Sophistication associated with preference towards periodic installments is found in 85% of respondents. Table 10 shows that the majority of hyperbolic respondents are sophisticated, though the Fisher test shows that non-hyperbolic individuals also show a similar preference.

Using probit, we estimate purchases of Yeshasvini in Table 11 and Table 12, and general

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household members.

4 A Fisher exact test examines, in a 2×2 table, if the row (column) ratios are significantly different. In our context, it tests if the ratios of loss risk averters between gain-risk averters and lovers differ significantly. A small *p* value indicates occurrence of a rare event, or 2 groups coming from 2 different populations.

health insurance including Yeshasvini in Table 13 and Table 14. A comparison of the tables reveals that the estimated results from Table 11 and Table 12 show a similarity with those of Table and Table 14.

In both Table 12 and Table 14, households with healthy head members are more likely to purchase the policies as indicated by the negative estimates on *headill*. This is surprising as Yeshasvini is losing money and is considered to be afflicted with adverse selection. However, the ratio of sick members contributes positively to the purchase, implying the existence of adverse selection. Although this is cross-sectional data and one cannot directly identify the causation, it is unlikely that reverse causation or any other omitted variable may negate adverse selection. One explanation is that households with a sick household head had less income flow (our data set do not include information on income flow) and had difficulty in financing the insurance premium. The negative coefficient of household size (Tables 12 and 14) may also capture the higher income of smaller households. Negative estimates on land values for Yeshasvini in Table 12 may have captured the fact that dairy cooperative members have smaller plots of land.

One village dummy (*kyalasanahalli*) is significantly negative because that village do not have dairy cooperatives while other two do. Households owning barns (*barn*) are also more likely to purchase policies, a fact which simply depicts the reality that Yeshasvini is a dairy cooperative-based insurance scheme.

As for risk attitude, estimates on risk aversion in the domain of gain change the sign, and none are statistically significant. Combined with the fact that many of respondents show a pattern of choice which is consistent with the prospect theory, this seems to suggest that risk attitude toward gains is not useful for predicting the insurance take-up decision. The coefficient of loss-risk lover dummies is always negative, though only the loss-risk loving attitude identified from QX6 are statistically significant at the 10% level in (9) and (10) of Table 11, partly due to our small sample size.

The hyperbolicity coefficient is positive and statistically significant. Although we need to exercise caution in interpreting this result because we see few variations in this variable, this positive sign is consistent with the theoretical prediction that households with hyperbolic discounting are more likely to buy insurance as a measure of commitment. On the other hand, the sophistication dummy has positive signs for Yeshasvini purchases but negative signs for all health insurance, and it is difficult to interpret the results.

Estimates on credit constraints are generally negative (but not significant) in all tables, consistent with the results of Giné, Townsend, and Vickery (2008) who investigate the take-up decision of rainfall insurance in India. The negative coefficient implies that credit constrained households are cash constrained in buying insurance, and/or that near-constrained households are forward looking enough to buy insurance.

VI. CONCLUSION

Following the rapid expansion of microcredit, microinsurance has drawn the attention of practitioners and academics. However, take-up rates of microinsurance have been low despite its perceived need and the enthusiasm of microfinance practitioners. In this paper, we focused on the take-up decision of health microinsurance in India, using originally collected household data.

We find some evidence that people behave in a risk-loving way when facing the risk of losses, which is consistent with prospect theory. Since insurance covers losses, we suspect that these people are less likely to take up insurance and we find some evidence supporting this view. We also find that hyperbolic discounters are more likely to purchase insurance, a fact which can be explained by the demand for commitment among sophisticated hyperbolic discounters have. However, this result should be interpreted with caution because of the small size of our sample. We also find some evidence on the existence for adverse selection: households with a higher ratio of sick members are more likely to purchase insurance. Interestingly, we also find that households with a sick household head are less likely to purchase the insurance. This may capture the fact that households with a sick household head have less income flow and have difficulty in financing the insurance premium.

Understanding the take-up decision is only a part of efforts toward making microinsurance more popular among the poor. Identifying the means for increasing take-up rates and decreasing dropout rates while keeping the policy financially sustainable is equally important. We leave this task for our ongoing project and future works.

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Figure 1: A Typical Microinsurance Contract

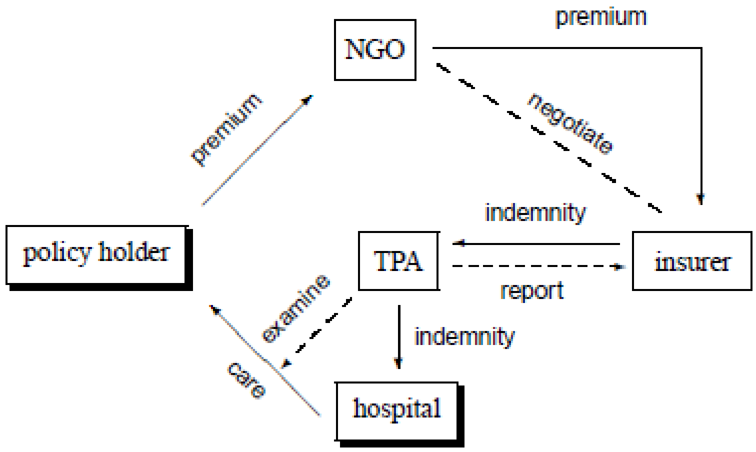

Figure 2 prospect theory

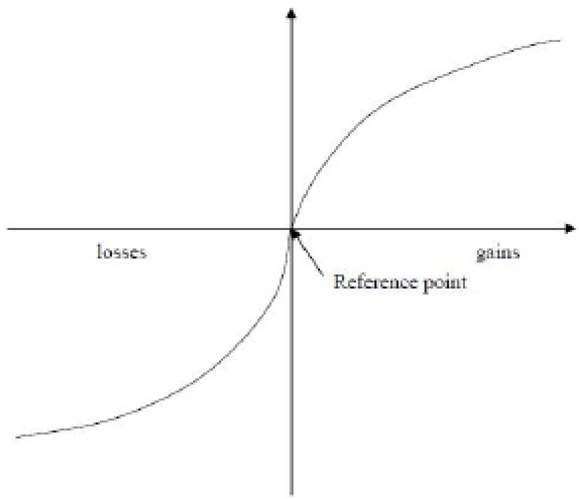

TABLE 1

Questions for Eliciting Risk Preference

QX3 Now consider the following draws. This time one of the following rows will be randomly selected and you actually gain the amount of the money described according to your choice (A or B) and your draw. Note that B is most attractive in case 1 and gets gradually less attractive. In the last row, B is definitely a worse option than A.

Gain	A		B		Choice	Difference in Expected Values	Open Interval of α if Subject Switches to Lottery b
	Note 1	Note 2	Note 1	Note 2			
1	40	35	150	10	A / B	-42.5	
2	40	35	130	10	A / B	-32.5	(0, 0.045)
3	40	35	120	10	A / B	-27.5	(0.045, 0.100)
4	40	35	110	10	A / B	-22.5	(0.100, 0.169)
5	40	35	100	10	A / B	-17.5	(0.169, 0.258)
6	40	35	90	10	A / B	-12.5	(0.258, 0.378)
7	40	35	80	10	A / B	-7.5	(0.378, 0.547)
8	40	35	70	10	A / B	-2.5	(0.547, 0.808)
9	40	35	60	10	A / B	2.5	(0.808, 1.267)
10	40	35	50	10	A / B	7.5	(1.267, 2.357)
11	40	35	40	10	A / B	12.5	

QX4 This time you have to choose an unlucky draw from one of the two bags. Which bag do you choose? One of the following rows in QX4 to QX6 will be randomly selected and you actually have to pay the amount of money described according to your choice and your draw. Note that B is least attractive in case 1 and gets gradually more attractive. In the last row, B is definitely a better option than A.

Loss	A		B		Choice	Difference in Expected Values
	Note 1	Note 2	Note 1	Note 2		
1	-40	-35	-150	-10	A / B	42.5
2	-40	-35	-130	-10	A / B	32.5
3	-40	-35	-120	-10	A / B	27.5
4	-40	-35	-110	-10	A / B	22.5
5	-40	-35	-100	-10	A / B	17.5
6	-40	-35	-90	-10	A / B	12.5
7	-40	-35	-80	-10	A / B	7.5
8	-40	-35	-70	-10	A / B	2.5
9	-40	-35	-60	-10	A / B	-2.5
10	-40	-35	-50	-10	A / B	-7.5
11	-40	-35	-40	-10	A / B	-12.5

QX5 As in QX4, you have to choose an unlucky draw from one of the two bags. Which bag do you choose? As stated in QX4, one of the rows in QX4 to QX6 will be randomly selected and you actually have to pay the amount of money described according to your choice and your draw. Note that B is least attractive in case 1 and gets gradually more attractive. In the last row, B is definitely a better option than A.

Loss	A	B		Choice	Difference in Expected Values
	All 10 Notes	1 Notes	9 Notes		
12	-10	-200	0	A / B	10
13	-10	-175	0	A / B	7.5
14	-10	-150	0	A / B	5
15	-10	-125	0	A / B	2.5
16	-10	-100	0	A / B	0
17	-10	-75	0	A / B	-2.5
18	-10	-50	0	A / B	-5
19	-10	-25	0	A / B	-7.5
20	-10	-10	0	A / B	-9

QX6 As in QX4, you have to choose an unlucky draw from one of the two bags. Which bag do you choose? As stated in QX4, one of the rows in QX4 to QX6 will be randomly selected and you actually have to pay the amount of money described according to your choice and your draw. Note that B is least attractive in case 1 and gets gradually more attractive. In the last row, B is definitely a better option than A.

Loss	A	B		Choice	Difference in Expected Values
	All 50 Notes	1 Note	49 Notes		
21	-2	-200	0	A / B	2
22	-2	-175	0	A / B	1.5
23	-2	-150	0	A / B	1
24	-2	-125	0	A / B	0.5
25	-2	-100	0	A / B	0
26	-2	-75	0	A / B	-0.5
27	-2	-50	0	A / B	-1
28	-2	-25	0	A / B	-1.5
29	-2	-10	0	A / B	-1.8
30	-2	-2	0	A / B	-1.96

TABLE 2

Probability Weights Derived from QX5

		Loss Switch								
		12	13	14	15	16	17	18	19	20
Risk Switch	2	–1.85	–1.90	–1.97	–2.05	–2.17	–2.33	–2.59	–3.27	–∞
	3	–1.10	–1.16	–1.23	–1.31	–1.42	–1.58	–1.85	–2.52	–∞
	4	–0.55	–0.61	–0.67	–0.75	–0.87	–1.03	–1.30	–1.97	–∞
	5	–0.08	–0.13	–0.20	–0.28	–0.39	–0.55	–0.82	–1.50	–∞
	6	0.37	0.32	0.25	0.17	0.05	–0.11	–0.38	–1.05	–∞
	7	0.82	0.77	0.70	0.62	0.50	0.34	0.08	–0.60	–∞
	8	1.32	1.26	1.19	1.11	1.00	0.84	0.57	–0.10	–∞
	9	1.93	1.87	1.81	1.72	1.61	1.45	1.18	0.51	–∞
	10	2.96	2.90	2.83	2.75	2.64	2.48	2.21	1.53	–∞

TABLE 3

Probability Weights Derived from QX6

		Loss Switch									
		21	22	23	24	25	26	27	28	29	30
Risk Switch	2	–1.33	–1.37	–1.41	–1.46	–1.53	–1.62	–1.76	–2.05	–2.59	–∞
	3	–0.59	–0.62	–0.67	–0.72	–0.78	–0.88	–1.02	–1.31	–1.85	–∞
	4	–0.03	–0.07	–0.11	–0.16	–0.23	–0.32	–0.46	–0.75	–1.30	–∞
	5	0.44	0.40	0.36	0.31	0.24	0.15	0.01	–0.28	–0.82	–∞
	6	0.89	0.85	0.81	0.76	0.69	0.60	0.46	0.17	–0.38	–∞
	7	1.34	1.30	1.26	1.21	1.14	1.05	0.91	0.62	0.08	–∞
	8	1.83	1.80	1.75	1.70	1.64	1.54	1.40	1.11	0.57	–∞
	9	2.45	2.41	2.37	2.32	2.25	2.16	2.02	1.72	1.18	–∞
	10	3.47	3.44	3.39	3.34	3.27	3.18	3.04	2.75	2.21	–∞

TABLE 4
Hyperbolicity

	Today	*k* days later
n days later	impatient	“inconsistent”
n + *k* days later	hyperbolic	patient

TABLE 5

Questions for Eliciting Risk Preference

QX1 You will be given a prize on one of below dates. If you choose later, a trustful agent will deliver the prize. Which date do you choose?

	Now			+6 Months	
	Now	1 Week Later		6 Months Later	6 Months + 1 Week
1	Rs 200	Rs 320	1	Rs 200	Rs 320
2	Rs 200	Rs 300	2	Rs 200	Rs 300
3	Rs 200	Rs 280	3	Rs 200	Rs 280
4	Rs 200	Rs 260	4	Rs 200	Rs 260
5	Rs 200	Rs 240	5	Rs 200	Rs 240
6	Rs 200	Rs 220	6	Rs 200	Rs 220
7	Rs 200	Rs 200	7	Rs 200	Rs 200

TABLE 6

Description of Variables

Variables	Description
Household-level variables	
HH	Household ID
hhtype	0 = landless, 1 = farmer, 2 = nonagricultural
bpl	1 if household is BPL, 0 otherwise
landval	Value of land assets in Rs 10,000
nonlandval	Value of nonland assets in Rs 10,000
tap	1 if household has piped water access, 0 otherwise
osew	1 if household has open sewerage, 0 otherwise
csew	1 if household has covered sewerage, 0 otherwise
toilet	1 if household has a toilet, 0 otherwise
latrine	1 if household has a latrine, 0 otherwise
barn	1 if household has a barn, 0 otherwise
anycc1	1 if household is credit constrained to at least one lender
bank.cc1	1 if household is credit constrained to a bank
HHsize	Household size
adultfemr	Number of adult female members divided by household size
kidsr	Number of child members divided by household size
elderlyr	Number of elder members divided by household size
hdage	Headage
hdmarage	Head age at marriage
hdedu	1 if head's education level is above 5th standard
hdtopincrank	1 if head is ranked as first in income earning
headsick	1 if household head is sick in QM, 0 otherwise
sickpeople	Number of sick members in QM
sickr	Number of sick members divided by household size in QM
headill	1 if household head is ill in QR, 0 otherwise
illfor6	Number of members who have been sick for more than six months in QR
illmonr	Household total months of illness divided by household size
knowhi	1 if knows about health insurance, 0 otherwise
havey	1 if has Yeshasvini, 0 otherwise
havehi	1 if has health insurance, 0 otherwise
hipeople	Number of people whom respondent knows to have health insurance
numdia	Number of members with diarrhea in last 30 days
numresp	Number of members with upper respiratory infection in last 30 days
numdiafor3	Number of members with diarrhea for at least 3 days in last 30 days
numrespfor3	Number of members with upper respiratory infection for at least 3 days in last 30 days
numwlk	Number of members who could not walk for 10 minutes in last three months
numrun	Number of members who could not run for 100 meters in last three months
numwlkfor3	Number of members who could not walk for 10 minutes for at least 3 days in last three months
numrunfor3	Number of members who could not run for 100 meters for at least 3 days in last three months
kyalasanahalli	Village dummy variable for Kyalasanahalli
shrirampura	Dummy variable for Shrirampura
Individual-level variables	
sex	1 if female, 0 if male
age	Age of member
years	Years if below 5 years old
months	Months if below 5 years old
reltohd	Relationship to head

marital	1 if married, 0 otheriwse
marage	Age at marriage
spID	Spouse ID
faID	Father ID
moID	Mother ID
edu	0. never in school; 1. 1st grade; 2. 2nd grade; 3. 3rd grade; 4. 4th grade; 5. 5th grade; 6. 6th grade; 7. 7th grade; 8. 8th grade; 9. 9th grade; 10. 10th grade; 11. 11th grade; 12. 12th grade; 13. pre-university; 14. degree college; 15. university; 16. professional school, technical course; 17. post-graduate; 18. correspondence school; 19. other (specify ______)
attend	Attending to school
incrank	Rank of income earned in household
hearank	1 = very healthy, 2 = healthy, 3 = not always healthy, 4 = healthy with medication, 5 = sick

Experimental variables

hyperbolic	1 if hyperbolic, 0 otherwise
sophisticated	1 if prefers periodic installments in all 6 choices, 0 otherwise
posriskaverse	1 if risk averse in positive region of QX3, 0 otherwise
lossrisklove1	1 if risk loving in negative region of QX4, 0 otherwise
lossrisklove2	If risk loving in negative region of QX5, 0 otherwise
lossrisklove3	If risk loving in negative region of QX6, 0 otherwise

TABLE 7

Household Information

	Minimum	25%	Median	75%	Maximum	Mean	Standard deviation	0s*	NAs	*Number of observations*
HH	1	53	105	157	209	105.00	60.48	0	0	209
hhtype	0	1	2	2	2	1.38	0.79	40	0	209
HHsize	2	4	5	6	10	4.82	1.58	0	0	209
kidsr	0	0	0	0	1	0.26	0.21	60	0	209
elderlyr	0	0	0	0	1	0.09	0.16	144	0	209
adultfemr	0	0	0	0	1	0.36	0.14	2	0	209
bpl	0	0	0	0	1	0.22	0.41	155	11	209
gain	1	3	5	8	11	5.62	3.10	0	0	209
gamount	10	35	40	40	150	46.87	32.58	0	0	209
loss	1	7	14	21	27	14.05	8.04	0	0	209
lamount	–150	–35	–10	–2	–2	-21.09	24.08	0	9	209
day	1	24	26	29	30	23.68	8.54	0	0	209
landval (Rs 10,000)	0	24	100	252	2,000	203.10	305.09	0	137	209
nonlandval (Rs 10,000)	0	6	18	44	503	36.92	59.33	4	0	209
tap	0	0	0	1	1	0.26	0.44	151	4	209
osew	0	0	0	1	1	0.32	0.47	139	4	209
csew	0	0	0	1	1	0.36	0.48	132	4	209
toi	0	0	1	1	1	0.61	0.49	80	4	209
lat	0	0	1	1	1	0.66	0.48	70	4	209
barn	0	0	0	0	1	0.21	0.41	162	4	209
anycc1	0	0	0	1	1	0.35	0.48	135	0	209
hdage	0	32	40	50	90	43.13	14.64	3	0	209
hdmarage	12	22	25	28	52	24.91	4.64	0	4	209
hdedu	0	0	1	1	1	0.62	0.49	80	0	209
hdtopincrank	0	1	1	1	1	0.83	0.38	36	0	209
headill	0	0	0	1	1	0.25	0.44	156	0	209
headsick	0	0	0	1	1	0.38	0.49	86	70	209
numsick6	0	0	1	1	3	0.90	0.69	39	70	209
sickpeople	0	0	0	1	3	0.36	0.65	145	4	209
sickr	0	0	0	0	1	0.16	0.21	107	0	209
illfor6	0	0	0	1	1	0.48	0.50	109	0	209
knowhi	0	0	1	1	1	0.58	0.50	87	4	209
havey	0	0	0	1	1	0.32	0.47	139	4	209
havehi	0	0	0	1	3	0.48	0.71	130	4	209
hipeople	0	0	0	2	6	0.93	1.38	127	4	209
numdia	0	0	0	1	3	0.61	0.70	77	59	209
numresp	0	1	1	1	6	1.25	0.99	22	59	209
numdiafor3	0	0	0	0	2	0.25	0.46	114	60	209
numrespfor3	0	0	0	1	6	0.65	0.90	79	59	209
numwlk	0	1	1	1	4	1.10	0.68	11	122	209
numrun	0	0	1	1	3	0.76	0.75	35	122	209
numwlkfor3	0	0	1	1	4	0.90	0.72	23	122	209
numrunfor3	0	0	1	1	3	0.70	0.72	38	122	209

Notes: * Number of observations whose values are 0.

TABLE 8

Results of Experiments

	Minimum	25%	Median	75%	Maximum	Mean	Standard deviation	0s*	NAs	*Number of observations*
HH	1	52	104	155	209	104.03	60.11	0	0	205
hyperbolic	0	0	0	0	1	0.05	0.23	190	4	205
posriskaverse	0	0	1	1	1	0.62	0.49	75	7	205
lossrisklove1	0	1	1	1	1	0.78	0.42	45	4	205
lossrisklove2	0	1	1	1	1	0.85	0.36	29	10	205
lossrisklove3	0	1	1	1	1	0.86	0.35	29	1	205

TABLE 9

Risk Attitudes

QX3 and QX4

		Loss	
		Averse	Loving
Gain	Averse	0.117	0.483
	Loving	0.102	0.249
Fisher test		$p = 0.159$	

QX3 and QX6

		Loss	
		Averse	Loving
Gain	Averse	0.059	0.537
	Loving	0.083	0.283
Fisher test		$p = 0.021$	

TABLE 10

Hyperbolicity and Sophistication

		Sophisticated	
		Yes	No
Hyperboic	Yes	0.148	0.794
	No	0.005	0.053
Fisher test		$p = 0.999$	

TABLE 11

Probit Estimation Results of Yeshasvini, Part 1

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
(Intercept)	–0.284***	–0.250	–0.204	–0.715**	–0.610*	–0.225	–0.083	–0.504	0.357	0.335
	(0.103)	(0.443)	(0.456)	(0.425)	(0.418)	(0.467)	(0.413)	(0.450)	(0.583)	(0.625)
headill	–0.833***	–0.907***	–0.993***	–1.041***	–1.015***	–0.988***	–0.964***	–0.957***	–0.952***	–0.927***
	(0.241)	(0.238)	(0.226)	(0.212)	(0.211)	(0.232)	(0.235)	(0.231)	(0.234)	(0.241)
hdage		0.009*	0.009*	0.014**	0.013**	0.009*	0.009*	0.014**	0.008	0.010*
		(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.006)	(0.007)	(0.006)
hdmarage		0.002	0.004	0.001	0.001	0.003	0.001	0.006*	0.004	0.002
		(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.003)	(0.004)
hdedu		0.062	–0.024	–0.030	–0.041	–0.019	–0.047	0.046	–0.057	–0.006
		(0.226)	(0.224)	(0.238)	(0.253)	(0.231)	(0.218)	(0.216)	(0.227)	(0.216)
kyalasanahalli		–1.394***	–1.469***	–1.415***	–1.419***	–1.447***	–1.586***	–1.530***	–1.538***	–1.695***
		(0.249)	(0.247)	(0.250)	(0.267)	(0.243)	(0.259)	(0.268)	(0.273)	(0.305)
shrirampura		–0.354*	–0.287	–0.131	–0.149	–0.287	–0.288	–0.242	–0.320	–0.287
		(0.238)	(0.250)	(0.260)	(0.256)	(0.259)	(0.253)	(0.251)	(0.256)	(0.263)
landval			–0.335	–0.654	–0.613	–0.332	–0.288	–0.290	–0.292	–0.187
			(0.520)	(0.590)	(0.576)	(0.524)	(0.593)	(0.482)	(0.527)	(0.570)
nonlandval			1.636	1.025	1.077	1.675	1.123	1.410	1.600	0.967
			(2.155)	(1.998)	(2.020)	(2.173)	(1.900)	(2.023)	(2.101)	(1.902)
bpl			–0.186	–0.190	–0.214	–0.172	–0.228	–0.186	–0.137	–0.221
			(0.211)	(0.220)	(0.220)	(0.215)	(0.222)	(0.212)	(0.224)	(0.234)
tap				0.099	0.057					
				(0.273)	(0.267)					
toilet				0.196	0.237					
				(0.194)	(0.192)					
csew				0.154	0.128					
				(0.220)	(0.252)					
osew				0.068	0.073					
				(0.223)	(0.220)					
barn				0.528**	0.502**					
				(0.265)	(0.260)					
bank.cc1					–0.245					–0.384*
					(0.344)					(0.270)
numdiarh						–0.085				
						(0.176)				
numresp						0.056				
						(0.092)				
hyperbolic							0.979**			0.995**
							(0.485)			(0.594)
posriskaverse								–0.027		0.004
								(0.206)		(0.216)
lossrisklove1									–0.104	–0.076
									(0.263)	(0.261)
lossrisklove3									–0.461*	–0.455*
									(0.303)	(0.326)

Notes. 1. Probit estimation with robust standard errors.
2. Asset values are in Rs 10 million.

TABLE 12

Probit Estimation Results of Yeshasvini, Part 2

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
(Intercept)	–0.396***	0.141	0.367	0.256	–1.079	–1.069	–0.863	–1.547*	–0.546	–0.845
	(0.141)	(0.209)	(0.477)	(0.605)	(0.954)	(0.942)	(0.961)	(0.994)	(1.008)	(1.059)
headill	–0.906***	–0.919***	–1.094***	–1.259***	–1.317***	–1.315***	–1.379***	–1.359***	–1.270***	–1.376***
	(0.288)	(0.261)	(0.308)	(0.242)	(0.269)	(0.267)	(0.278)	(0.268)	(0.278)	(0.315)
illfor6	–0.086	–0.195	–0.227	–0.341	–0.332	–0.318	–0.425*	–0.283	–0.265	–0.262
	(0.255)	(0.249)	(0.303)	(0.282)	(0.263)	(0.257)	(0.260)	(0.292)	(0.261)	(0.285)
illmonr	–0.007	–0.001	–0.002	0.000	–0.001	–0.001	0.004	0.001	–0.001	0.004
	(0.010)	(0.015)	(0.024)	(0.020)	(0.016)	(0.016)	(0.014)	(0.018)	(0.012)	(0.013)
sickr	1.292***	1.251***	1.340***	1.266***	1.441***	1.442***	1.544***	1.514***	1.459***	1.573***
	(0.508)	(0.432)	(0.435)	(0.476)	(0.462)	(0.462)	(0.459)	(0.447)	(0.468)	(0.451)
kyalasanahalli		–1.383***	–1.349***	–1.387***	–1.346***	–1.346***	–1.514***	–1.421***	–1.452***	–1.591***
		(0.266)	(0.268)	(0.268)	(0.248)	(0.259)	(0.251)	(0.244)	(0.278)	(0.289)
shrirampura		–0.423**	–0.415**	–0.282	–0.203	–0.204	–0.134	–0.162	–0.263	–0.164
		(0.230)	(0.239)	(0.317)	(0.278)	(0.278)	(0.310)	(0.275)	(0.281)	(0.309)
kidsr			–0.046	0.151	0.592	0.594	0.516	0.520	0.651	0.591
			(0.504)	(0.605)	(0.735)	(0.744)	(0.771)	(0.735)	(0.679)	(0.731)
elderlyr			0.648	0.637	0.110	0.109	0.485	–0.138	–0.077	0.200
			(0.708)	(0.980)	(0.962)	(0.960)	(1.070)	(0.932)	(0.944)	(1.022)
adultfemr			0.806	1.156*	1.347**	1.342**	1.141*	1.353**	1.366**	1.323**
			(0.775)	(0.730)	(0.742)	(0.751)	(0.765)	(0.743)	(0.743)	(0.789)
HHsize			–0.114**	–0.160***	–0.153**	–0.151**	–0.126**	–0.151**	–0.166**	–0.133**
			(0.068)	(0.063)	(0.069)	(0.077)	(0.065)	(0.069)	(0.077)	(0.074)
landval				–0.589	–0.661*	–0.646*	–0.554	–0.676*	–0.584	–0.474
				(0.521)	(0.483)	(0.492)	(0.552)	(0.462)	(0.479)	(0.536)
nonlandval				1.283	1.385	1.388	0.324	1.031	1.619	0.606
				(2.221)	(1.899)	(1.917)	(1.951)	(1.777)	(1.689)	(1.697)
bpl				–0.241	–0.236	–0.243	–0.264	–0.231	–0.192	–0.262
				(0.220)	(0.233)	(0.235)	(0.239)	(0.232)	(0.246)	(0.241)
tap				0.083	0.044	0.031	0.092	0.099	–0.102	–0.075
				(0.370)	(0.310)	(0.303)	(0.320)	(0.303)	(0.259)	(0.266)
toilet				0.018	0.115	0.125	0.006	0.133	0.190	0.167
				(0.215)	(0.221)	(0.221)	(0.218)	(0.212)	(0.219)	(0.222)
csew				0.097	0.141	0.135	0.222	0.062	0.072	0.054
				(0.225)	(0.222)	(0.225)	(0.216)	(0.216)	(0.232)	(0.234)
osew				0.098	0.105	0.105	0.172	0.145	0.121	0.202
				(0.264)	(0.249)	(0.249)	(0.263)	(0.253)	(0.234)	(0.248)
barn				0.699***	0.679***	0.669**	0.672***	0.730***	0.709**	0.702**
				(0.284)	(0.284)	(0.288)	(0.282)	(0.283)	(0.307)	(0.318)
hdage					0.018**	0.018**	0.015*	0.026***	0.018**	0.020**
					(0.011)	(0.011)	(0.011)	(0.010)	(0.011)	(0.011)
hdmarage					0.005	0.005	0.002	0.006	0.006*	0.006*
					(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
hdedu					0.048	0.044	0.035	0.168	–0.003	0.089
					(0.284)	(0.287)	(0.280)	(0.254)	(0.265)	(0.250)
hdtopincrank					0.138	0.136	0.037	0.196	0.199	0.144
					(0.367)	(0.364)	(0.378)	(0.357)	(0.296)	(0.297)
bank.cc1						–0.062				–0.222
						(0.351)				(0.268)
hyperbolic							1.182***			1.006***
							(0.370)			(0.427)
posriskaverse								–0.094		–0.034
								(0.200)		(0.206)
lossrisklove1									–0.299	–0.262
									(0.252)	(0.258)
lossrisklove3									–0.383	–0.378
									(0.387)	(0.378)

Notes. 1. Probit estimation with robust standard errors.
2. Asset values are in Rs10 million.

TABLE 13

Probit Estimation Results of Any Health Insurance, Part 1

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
(Intercept)	–0.149*	–0.005	0.018	–0.243	–0.100	0.165	0.187	–0.344	0.536	0.494
	(0.102)	(0.408)	(0.435)	(0.442)	(0.434)	(0.473)	(0.434)	(0.468)	(0.591)	(0.630)
headill	–0.883***	–0.886***	–0.969***	–0.978***	–0.953***	–0.933***	–0.938***	–0.925***	–0.921***	–0.898***
	(0.234)	(0.221)	(0.211)	(0.202)	(0.200)	(0.219)	(0.219)	(0.218)	(0.217)	(0.236)
hdage		0.002	0.001	0.002	0.001	–0.001	–0.001	0.004	–0.000	–0.000
		(0.007)	(0.007)	(0.008)	(0.007)	(0.008)	(0.008)	(0.007)	(0.007)	(0.008)
hdmarage		0.006*	0.011***	0.008**	0.007**	0.009***	0.006**	0.014***	0.010***	0.007**
		(0.003)	(0.003)	(0.004)	(0.004)	(0.004)	(0.004)	(0.003)	(0.003)	(0.004)
hdedu		0.010	–0.056	–0.069	–0.075	–0.030	–0.064	–0.000	–0.089	–0.031
		(0.197)	(0.200)	(0.206)	(0.211)	(0.203)	(0.205)	(0.204)	(0.203)	(0.216)
kyalasanahalli		–0.941***	–1.011***	–0.956***	–0.968***	–1.010***	–1.080***	–0.977***	–1.084***	–1.123***
		(0.238)	(0.251)	(0.261)	(0.268)	(0.244)	(0.274)	(0.262)	(0.264)	(0.288)
Shrirampura		–0.292	–0.198	–0.111	–0.132	–0.239	–0.207	–0.131	–0.225	–0.161
		(0.234)	(0.248)	(0.259)	(0.256)	(0.262)	(0.255)	(0.249)	(0.253)	(0.263)
landval			0.436	0.266	0.336	0.389	0.533	0.512	0.510	0.718*
			(0.404)	(0.493)	(0.487)	(0.402)	(0.450)	(0.402)	(0.419)	(0.497)
nonlandval			1.014	0.748	0.803	0.984	0.450	0.743	0.980	0.174
			(2.086)	(2.086)	(2.116)	(2.001)	(1.952)	(1.968)	(2.017)	(2.061)
bpl			–0.255	–0.236	–0.273	–0.232	–0.284	–0.255	–0.231	–0.321
			(0.240)	(0.256)	(0.260)	(0.244)	(0.261)	(0.244)	(0.243)	(0.273)
tap				0.054	0.001					
				(0.248)	(0.245)					
toilet				0.088	0.145					
				(0.209)	(0.211)					
csew				0.103	0.065					
				(0.223)	(0.235)					
osew				0.150	0.151					
				(0.214)	(0.212)					
barn				0.298	0.265					
				(0.263)	(0.258)					
bank.cc1					–0.348					–0.478**
					(0.272)					(0.283)
numdiarh						–0.206				
						(0.176)				
numresp						0.028				
						(0.096)				
hyperbolic							0.962**			1.127*
							(0.498)			(0.797)
posriskaverse								0.093		0.151
								(0.200)		(0.212)
lossrisklove1									–0.188	–0.173
									(0.251)	(0.268)
lossrisklove3									–0.341	–0.318
									(0.299)	(0.319)

Notes: 1. Probit estimation with robust standard errors.
2. Any health insurance including Yeshasvini.
3. Asset values are in Rs 10 million.

TABLE 14
Probit Estimation Results of Any Health Insurance, Part 2

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
(Intercept)	–0.177*	0.243	0.697*	0.560	–0.095	–0.081	0.251	–0.485	0.347	0.264
	(0.136)	(0.204)	(0.454)	(0.551)	(0.844)	(0.834)	(0.824)	(0.870)	(0.950)	(0.974)
headill	–0.873**	–0.861**	–0.990**	–1.148**	–1.144**	–1.144**	–1.199**	–1.129**	–1.083**	–1.142**
	(0.278)	(0.253)	(0.276)	(0.235)	(0.240)	(0.236)	(0.244)	(0.239)	(0.248)	(0.272)
illfor6	–0.233	–0.315*	–0.293	–0.374*	–0.397*	–0.377*	–0.494**	–0.384*	–0.356*	–0.400*
	(0.248)	(0.239)	(0.275)	(0.270)	(0.261)	(0.257)	(0.259)	(0.281)	(0.253)	(0.282)
illmonr	–0.008	–0.004	–0.006	–0.004	–0.004	–0.004	0.001	–0.003	–0.004	0.002
	(0.010)	(0.012)	(0.019)	(0.018)	(0.015)	(0.014)	(0.013)	(0.015)	(0.013)	(0.012)
sickr	1.141**	1.075***	1.068***	1.016**	1.095***	1.098***	1.176***	1.119***	1.102***	1.152***
	(0.505)	(0.455)	(0.458)	(0.455)	(0.450)	(0.446)	(0.463)	(0.457)	(0.446)	(0.470)
kyalasana		–0.943**	–0.885**	–0.913**	–0.878**	–0.879**	–1.008**	–0.816**	–0.966**	–0.956**
		(0.242)	(0.234)	(0.257)	(0.251)	(0.258)	(0.268)	(0.261)	(0.273)	(0.302)
shrirampu		–0.337*	–0.324*	–0.158	–0.122	–0.123	–0.073	–0.067	–0.175	–0.059
		(0.235)	(0.240)	(0.288)	(0.273)	(0.273)	(0.300)	(0.272)	(0.277)	(0.311)
kidsr			0.198	0.574	0.847*	0.844*	0.740	0.775	0.902*	0.780
			(0.498)	(0.524)	(0.632)	(0.630)	(0.648)	(0.656)	(0.629)	(0.693)
elderlyr			0.756	0.828	0.646	0.649	1.018	0.440	0.492	0.810
			(0.667)	(0.879)	(0.933)	(0.933)	(1.012)	(0.931)	(0.941)	(1.032)
adultfemr			0.161	0.443	0.590	0.578	0.334	0.562	0.627	0.482
			(0.789)	(0.791)	(0.835)	(0.839)	(0.824)	(0.854)	(0.841)	(0.886)
HHsize			–0.131**	–0.182**	–0.176**	–0.172**	–0.160**	–0.182**	–0.185**	–0.173**
			(0.056)	(0.053)	(0.065)	(0.069)	(0.062)	(0.064)	(0.074)	(0.072)
landval				0.449	0.480	0.508	0.591	0.519	0.595	0.775*
				(0.585)	(0.554)	(0.553)	(0.590)	(0.547)	(0.554)	(0.601)
nonlandval				0.919	1.012	1.016	–0.022	0.744	1.128	0.037
				(2.077)	(1.970)	(1.993)	(1.994)	(1.877)	(1.815)	(1.879)
bpl				–0.298	–0.291	–0.304	–0.308	–0.277	–0.274	–0.330
				(0.244)	(0.256)	(0.262)	(0.264)	(0.272)	(0.255)	(0.274)
tap				0.100	0.075	0.054	0.121	0.097	–0.015	–0.014
				(0.276)	(0.263)	(0.254)	(0.266)	(0.270)	(0.250)	(0.262)
toilet				0.000	0.072	0.090	–0.056	0.099	0.143	0.108
				(0.214)	(0.220)	(0.225)	(0.218)	(0.231)	(0.219)	(0.230)
csew				0.054	0.064	0.053	0.145	–0.017	0.004	–0.012
				(0.223)	(0.225)	(0.223)	(0.219)	(0.236)	(0.217)	(0.228)
osew				0.191	0.174	0.174	0.247	0.201	0.182	0.271
				(0.233)	(0.230)	(0.229)	(0.238)	(0.232)	(0.226)	(0.240)
barn				0.508**	0.463*	0.447*	0.468**	0.476**	0.480**	0.472*
				(0.280)	(0.282)	(0.285)	(0.280)	(0.280)	(0.290)	(0.301)
hdage					0.007	0.007	0.003	0.012*	0.007	0.006
					(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.010)
hdmarage					0.005	0.005	0.002	0.008*	0.007*	0.007*
					(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
hdedu					–0.011	–0.015	–0.008	0.087	–0.059	0.045
					(0.250)	(0.253)	(0.253)	(0.234)	(0.237)	(0.240)
hdtopincra					0.037	0.034	–0.060	0.066	0.072	–0.028
					(0.290)	(0.286)	(0.285)	(0.280)	(0.285)	(0.275)
bank.cc1						–0.110				–0.245
						(0.302)				(0.314)
hyperbolic							1.202***			1.180**
							(0.379)			(0.538)
posriskave								0.079		0.163
								(0.202)		(0.207)

lossrisklov	–0.287 (0.254)	–0.275 (0.257)
lossrisklov	–0.258 (0.365)	–0.247 (0.364)

Notes: 1. Probit estimation with robust standard errors.
2. Any health insurance including Yeshasvini.
3. Asset values are in Rs 10 million.