# The Effects of Performance Uncertainty in Microinsurance Markets

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# Motivation

**Contractual non-performance risk**

- Positive probability of insurer not paying a claim significantly reduces willingness to pay (Wakker, Thaler and Tversky, 1997)
- Insurance contract fails to perform, why?
  - Insurer's inability to pay (Doherty and Schlesinger, 1990)
  - Insurer's unwillingness to pay valid claims
  - Fraudulent processes (i.e., microinsurance agent fraud) (Churchill and Cohen, 2006)
- Is this the case for microinsurance? Is it even more extreme here?

# Motivation

**Development of Risk Perceptions under unknown probabilities**

- Key assumption of standard models of utility maximization: known loss distribution
- What happens when this assumption is relaxed?: when **loss probabilities are unknown (Ambiguity)?**
- Ambiguity or "uncertainty about one's uncertainty" affects choice (Ellsberg, 1961; Becker and Brownson, 1964)
- Greater willingness to insure at high prices when ambiguity is present than when it is not (83 vs. 50 percent) (Hogart and Kunreuther, 1985)

# Motivation

**Framing**

- Insurance default risk has been found extremely unattractive to most individuals. A considerable fraction of consumers completely refused to accept any default risk; others asked for large reductions in insurance premiums (Zimmer et al., 2009)
- Situations under ambiguity are even more sensitive to framing than situations under known risks (Maffioletti and Schmidt, 2005)
- How do different framings of contractual nonperformance impacts insurance up-take in this market?

# Motivation

What are the effects of contractual non-performance risk and loss risk perceptions on insurance take-up when exact probabilities are unknown to the insured?

1. Does contractual nonperformance risk reduces demand for insurance?
2. Does uncertainty about contractual nonperformance risk reduces insurance demand?
3. Does uncertainty about loss probabilities increases insurance demand?
4. Does framing of contractual nonperformance risk affects insurance demand?

# Experiment Setup

**Pre-Questionnaire**

**Lottery Game**

**Insurance Game (6 rounds)**

- Introduction (common to all participants)
- Step 1: Individual decision about insurance uptake (secretly)
- Step 2: Draw shock (loss no loss - secretly)
- Step 3: Draw claim payment if loss & insured (secretly)
- Step 4: Survey about participant's beliefs on probabilities (rounds 1, 2, 4 & 6)

*Start over from Step 1*

**Post-Questionnaire**

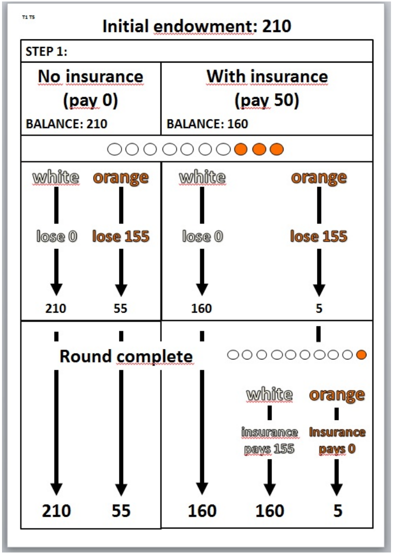
# Experiment Setup

- Implemented in Iloilo Province, Philippines during October-November 2013.
- Two stage randomization process:
  1. Villages (*barangays*) were randomly selected
  2. 12 individuals per village were invited and each was asked to bring one peer
- Peers remained together forming four groups of six participants
- Six treatments were randomized across these four groups
- Experiments were done in a total of 42 villages, with 1,008 participants

# Experiment Setup

- Participants played an Insurance and a Lottery Game, and answered a survey.
- Participants earned on average 156 Philippinian Pesos (PHP) in the Insurance Game and PHP 13 in the Lottery game, a total of PHP 170 ($\approx$ 3 EUR), on average
- Each participant received as well PHP 100 for showing up and an additional PHP 20 if they were the head of the household.

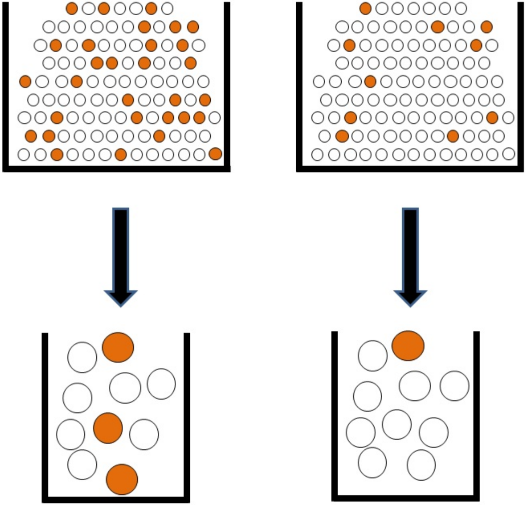
# Experiment Setup



# Experimental Treatment Plan

| Treatments | Control | $T_{NoDef}$ | $T_{Def}$ | $T_{Loss}$ | C-Fr | $T_{Def} - Fr$ |
|---|---|---|---|---|---|---|
| Loss Probability: | $p_{Loss}$ | $p_{Loss}$ | $p_{Loss}$ | ? | $p_{Loss}$ | $p_{Loss}$ |
| Default Probability: | $p_{Default}$ | $p_{Default}$ | ? | $p_{Default}$ | $p_{Default}$ | ? |
| Framing: | - | - | - | - | negative | negative |
| $p_{Loss}$ | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 |
| $p_{Default}$ | 0.1 | 0 | 0.1 | 0.1 | 0.1 | 0.1 |
| Insurance Cost (PHP) | 50 | 60 | 50 | 50 | 50 | 50 |
| N of sessions | 24 | 27 | 28 | 30 | 29 | 28 |
| N of individuals | 144 | 162 | 168 | 180 | 174 | 168 |

# Experiment Setup: ambiguity



# Estimation Strategy: Linear Probability Model

$$y_i = \alpha + \sum_{d=1}^{5} \beta_d T_{d,i} + \gamma X_i + \epsilon_i$$

Where $d = 1, \ldots, 5$.

- $y_i$ is the insurance decision and takes a value of 0 or 1
- $T_1, \ldots, T_5$ different treatments (Control omitted)
- $X_i$ is a vector of covariates: age, gender, years of education, employment, owned dwelling/land, marital status, household size, as well as risk aversion, math capabilities, shock experience, insurance ownership
- Clustered standard errors at the group level to correct for intragroup correlation

# Descriptive Statistics

| | (1) Control | (2) $T_{NoDef}$ | (3) $T_{Def}$ | (4) $T_{Loss}$ | (5) C-Fr | (6) $T_{Def}$-Fr |
|---|---|---|---|---|---|---|
| Age | 39.86 | 38.80 | 38.96 | 39.93 | 38.76 | 39.86 |
| | (10.50) | (10.08) | (9.966) | (10.98) | (10.94) | (9.755) |
| Gender (1=female) | 0.741 | 0.840* | 0.810 | 0.722 | 0.833* | 0.786 |
| | (0.439) | (0.368) | (0.394) | (0.449) | (0.374) | (0.412) |
| Married or in partnership (1=yes) | 0.903 | 0.889 | 0.869 | 0.911 | 0.902 | 0.899 |
| | (0.297) | (0.315) | (0.338) | (0.285) | (0.298) | (0.302) |
| Years of education | 9.573 | 9.580 | 9.911 | 9.594 | 9.552 | 9.381 |
| | (2.642) | (2.472) | (2.476) | (2.419) | (2.210) | (2.619) |
| Employment status (1=employed) | 0.465 | 0.358 | 0.387 | 0.433 | 0.351* | 0.429 |
| | (0.501) | (0.481) | (0.488) | (0.497) | (0.479) | (0.496) |
| Regular Income (1=yes) | 0.270 | 0.295 | 0.282 | 0.270 | 0.250 | 0.275 |
| | (0.447) | (0.460) | (0.453) | (0.446) | (0.436) | (0.449) |
| Seasonal Income (1=yes) | 0.716 | 0.787 | 0.732 | 0.663 | 0.653 | 0.637 |
| | (0.454) | (0.413) | (0.446) | (0.475) | (0.479) | (0.484) |
| Owned dwelling (1=yes) | 0.799 | 0.895* | 0.845 | 0.856 | 0.839 | 0.851 |
| | (0.402) | (0.307) | (0.363) | (0.353) | (0.369) | (0.357) |
| Reduced meals in last month (1=yes) | 0.273 | 0.210 | 0.214 | 0.156** | 0.218 | 0.244 |
| | (0.447) | (0.408) | (0.412) | (0.363) | (0.414) | (0.431) |
| Owns Land (1=yes) | 0.133 | 0.142 | 0.113 | 0.139 | 0.167 | 0.161 |
| | (0.341) | (0.350) | (0.318) | (0.347) | (0.374) | (0.368) |

| | (1) Control | (2) $T_{NoDef}$ | (3) $T_{Def}$ | (4) $T_{Loss}$ | (5) C-Fr | (6) $T_{Def}$-Fr |
|---|---|---|---|---|---|---|
| Math ability score (1 min 8 max) | 6.660 | 6.654 | 6.661 | 6.500 | 6.655 | 6.494 |
| | (1.698) | (1.815) | (1.630) | (1.851) | (1.612) | (1.754) |
| Purchasing insurance is risky[a] | 5.590 | 5.385 | 5.476 | 5.239* | 5.341 | 5.275 |
| | (1.875) | (2.016) | (1.917) | (2.007) | (1.948) | (2.050) |
| Insurance policy performance[a] | 5.306 | 5.590 | 5.101 | 5.217 | 5.249 | 5.156 |
| | (2.004) | (1.745) | (1.996) | (1.841) | (1.944) | (1.963) |
| Insurance ownership | 0.528 | 0.580 | 0.577 | 0.594 | 0.557 | 0.542 |
| | (0.501) | (0.495) | (0.495) | (0.492) | (0.498) | (0.500) |
| Illness/accident shock (1=yes) | 0.625 | 0.627 | 0.631 | 0.578 | 0.590 | 0.563 |
| | (0.486) | (0.485) | (0.484) | (0.495) | (0.493) | (0.498) |
| weather/livestock shock (1=yes) | 0.451 | 0.391 | 0.423 | 0.450 | 0.439 | 0.425 |
| | (0.499) | (0.490) | (0.495) | (0.499) | (0.498) | (0.496) |
| Avoid risky things [a] | 5.493 | 5.354 | 5.583 | 5.583 | 5.434 | 5.820* |
| | (1.840) | (1.935) | (1.859) | (1.830) | (1.989) | (1.744) |
| Observations | 144 | 162 | 168 | 180 | 174 | 168 |

Mean coefficients reported; standard errors in parentheses. [a] scores based on a 7 point likert-scale: 1-strongly disagree, 7-strongly agree. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$ significance level for equality of means t-test of all treatments versus the Control group.

# Results

| | Total Sample | | | Before Typhoon | After Typhoon |
|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) |
| $T_{NoDef}$ | 0.171*** | 0.172*** | 0.184*** | 0.136 | 0.214** |
| | (0.062) | (0.063) | (0.064) | (0.088) | (0.088) |
| $T_{Def}$ | -0.144* | -0.143* | -0.133* | -0.08 | -0.215* |
| | (.077) | (0.078) | (0.077) | (0.094) | (0.112) |
| $T_{Loss}$ | 0.034 | 0.037 | 0.039 | -0.028 | 0.069 |
| | (0.070) | (0.070) | (0.069) | (0.095) | (0.094) |
| C-Fr | -0.121 | -0.119 | -0.11 | -0.265** | 0.054 |
| | (0 .080) | (0.079) | (0.077) | (0.103) | (0.107) |
| $T_{Def}$-Fr | -0.104 | -0.101 | -0.102 | -0.192* | -0.02 |
| | (0.079) | (0.079) | (0.077) | (0.108) | (0.102) |
| Typhoon | | 0.043 | 0.044 | | |
| | | (0.039) | (0.037) | | |
| Constant | 0.707*** | 0.686*** | 0.562*** | 0.512*** | 0.473** |
| | (0.058) | (0.061) | (0.147) | (0.182) | (0.229) |
| Observations | 5,976 | 5,976 | 5,952 | 3,234 | 2,718 |
| $R^2$ | 0.055 | 0.057 | 0.078 | 0.100 | 0.127 |
| F | 12.09 | 10.55 | 3.97 | 4.54 | 4.09 |
| Covariates | | | Yes | Yes | Yes |

Standard errors in parentheses, clustered at the group level. Covariates: age, gender, years of education, employment,owns dwelling, married (or in partnership), household size, reduced meals in last month, owns lands,responsible for household decisions, score in math capabilities, experience, risk aversion, insurance ownership, health and weather/livestock shocks.* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$ significance level at 10, 5 and 1%.

# Conclusion

- Nonperformance risk reduces insurance demand by 17%
- Ambiguity about nonperformance risk reduces demand by further 14%
- Ambiguity does not seem to play a large role in loss probabilities
- There seem to be negative effects of framing of contractual nonperformance risk on insurance demand but the effect is only significant in pre-typhoon sample