Friends, Fear and Finance
Buying Health Insurance in rural Kenya

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Manila, 10 November 2010
Motivation

A pair of problems in practice:

1. Low demand
2. Adverse selection

and a pair of puzzles in the literature (Cole et al., 2008; Gine et al., 2008; Cai et al., 2010):

1. The risk averse are particularly unlikely to buy insurance in many cases.
2. Evidence suggests a role for trust in the purchasing of insurance: embeddedness in social networks, endorsements, and connectedness to marketing organizations findings which are “less consistent with the benchmark model” (Gine et al., 2008).
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We present evidence from a randomized, controlled trial, in the context of the roll-out of a composite health-insurance product in rural Kenya.

▶ The field experiment allows us to identify the shape of the demand curve for health insurance in this population.

▶ We provide a theoretical grounding for the interplay of risk aversion and trust that is consistent with expected utility theory.

▶ We undertake laboratory experiments in the field to provide measures of attitudes toward risk and trust, which correlate strongly with insurance adoption and replicate findings from the literature.

▶ Examine the role of peer influence to address a puzzle in responses to incentives.
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Theoretical motivation

Design and data
  - Baseline survey
  - Experimental design

Insurance adoption

Peers

Discussion
Outline

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Discussion
Perceptions and preferences in the demand for insurance

- We operationalize trust as the individual’s subjective belief about the likelihood of a payout, conditional on hospitalization.
- Together with a subjective probability distribution over the possible hospitalization costs, this defines a compound lottery (cf. Doherty and Schlesinger 1990, on insurer default; Clarke 2010, on basis risk).
- Claim: For sufficiently low levels of trust, and in cases where individuals place weight on sufficiently costly hospitalization events, an increase in risk aversion can have a negative effect on the difference in expected utilities with and without insurance:

\[
\frac{\partial}{\partial \rho} \{E[U(1; t, \rho, f)] - E[U(0, t, \rho, f)]\} < 0, \quad t < \bar{t} \quad (2.1)
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Population under study are tea growers in the Mount Kenya area, who belong to Wananchi SACCO.

- Wananchi members organized into 162 tea collection centres. We randomly selected 150 centres, subject to criteria of > 10 members, for inclusion.
- In each centre, we sample the delegate—an elected representative to Wananchi’s board—as well as nine randomly selected members.
- Each was administered a detailed questionnaire between December 2009–January 2010:
  - Survey-based measures of demographic, economic characteristics, health histories and perceptions.
  - Laboratory experiment in the field used to measure risk preferences (Holt & Laury 2002) and trust (Berg, Dickhaut & McCabe 1995).
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Measuring attitudes toward risk

Gamble-choice game

- In a series of 6 tasks, subjects choose between two lotteries (Holt & Laury (2002), Barr and Genicot (2008), Harrison, Humphrey & Verschoor (2010))

- Each task consists of two lotteries, a ‘risky’ choice with payoffs of (300,0) and a ‘safe’ choice with payoffs of (100,50).

- Probability of winning the larger prize is the same in each lottery within a given task, and varies from 0.3 to 0.8 across tasks.
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Trust is measured in a laboratory setting by a trust game (Berg et al. 1995, Barr 2003).

Delegate and one randomly selected ordinary member play the role of ‘trustee’ (Player 2); all other survey respondents randomly allocated to play with one of these (as Player 1).

Player 1 is allocated KShs 200, which she can divide between herself and Player 2. Any amount sent to P2 is tripled. P2 then decides how much to return to P1.

P2 plays by strategy method, with P2 payoffs determined by randomly pairing them with one of the four P1s with whom they play.
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Measuring trust

Graphs by trustgivetowho
Measuring beliefs

- We adapt approach of Manski (2004), Attanasio (2009) to measure subjective probability distribution over hospitalization costs.
- In two steps:
  1. Probability of non-zero hospitalization costs
  2. Distribution of hospitalization costs conditional on $h > 0$.
- Median expected hospitalization expenditure KShs 11,389 (sd 93,883). (Median monthly consumption KShs 13,431.)
- There is a lot of subjective uncertainty surrounding hospitalization costs, conditional on an event (sd $= 7,757$).
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The policy

*Bima ya Jamii*

- *Bima ya Jamii* is a composite health insurance product, offered by CIC Kenya, comprising:
  - In-patient hospital cover (NHIF);
  - Funeral insurance;
  - Disability;
  - Lost income during hospitalization stays for principal member; without exclusions for prior conditions.
- Annual premium of KShs 3,650 (approximately USD 41), payable up front.
- Marketing was undertaken in Wananchi tea centres from April of 2010.
  - As of July, Wananchi SACCO members were allowed to pay premium in advance against future tea bonus (now arriving).
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Experimental design

Experimental variation was introduced along two dimensions:

- Tea-collection centres were randomly allocated to one of four arms: control, marketing only, marketing + education, marketing + referral incentive.
- Individuals in treatment centres randomly allocated vouchers of 0, 10%, or 20% of premium, with probabilities of 1/3.

Result is a factorial design:

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- Theoretical motivation
- Design and data
- Insurance adoption
- Peers
- Discussion
Insurance adoption

*Experimental results: prices and demand*
## Insurance adoption

*Experimental results: treatments and interactions*

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<thead>
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<th>(1)</th>
<th>(2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>voucher, 365 KShs</td>
<td>0.0678** (0.03)</td>
<td>0.0667 (0.05)</td>
</tr>
<tr>
<td>voucher, 730 KShs</td>
<td>0.106*** (0.03)</td>
<td>0.131** (0.07)</td>
</tr>
<tr>
<td>referral incentive</td>
<td>-0.0807** (0.04)</td>
<td>-0.0685 (0.05)</td>
</tr>
<tr>
<td>learning intervention</td>
<td>-0.0240 (0.04)</td>
<td>-0.0109 (0.05)</td>
</tr>
<tr>
<td>voucher, 365 KShs × referral incentive</td>
<td>-0.0106 (0.07)</td>
<td></td>
</tr>
<tr>
<td>voucher, 365 KShs × learning intervention</td>
<td>0.0130 (0.07)</td>
<td></td>
</tr>
<tr>
<td>voucher, 730 KShs × referral incentive</td>
<td>-0.0262 (0.07)</td>
<td></td>
</tr>
<tr>
<td>voucher, 730 KShs × learning intervention</td>
<td>-0.0499 (0.08)</td>
<td></td>
</tr>
<tr>
<td>Constant</td>
<td>0.142*** (0.03)</td>
<td>0.133*** (0.04)</td>
</tr>
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<tr>
<td>Obs</td>
<td>891</td>
<td>891</td>
</tr>
<tr>
<td>(i): F stat (p value)</td>
<td>0.342 (0.560)</td>
<td></td>
</tr>
<tr>
<td>(ii): F stat (p value)</td>
<td></td>
<td>0.223 (0.925)</td>
</tr>
</tbody>
</table>

Notes: Robust standard errors, clustered by tea-collection center. Test statistics for hypotheses that (i) coefficient on voucher of 730 is twice coefficient on voucher of 365; (ii) interaction effects are jointly insignificant.
## Correlates of demand

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<tr>
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<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
<th>(5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>voucher ∈ {0, 1, 2}</td>
<td>0.055***</td>
<td>0.077***</td>
<td>0.084***</td>
<td>0.113***</td>
<td>0.070</td>
</tr>
<tr>
<td></td>
<td>(0.014)</td>
<td>(0.029)</td>
<td>(0.029)</td>
<td>(0.036)</td>
<td>(0.053)</td>
</tr>
<tr>
<td>Pr(hosp costs &gt; 0)</td>
<td>0.074</td>
<td>0.122*</td>
<td>0.124*</td>
<td>0.137*</td>
<td>0.009</td>
</tr>
<tr>
<td></td>
<td>(0.053)</td>
<td>(0.070)</td>
<td>(0.071)</td>
<td>(0.078)</td>
<td>(0.092)</td>
</tr>
<tr>
<td>ln HH consumption</td>
<td>-0.006</td>
<td>-0.006</td>
<td>-0.007</td>
<td>-0.004</td>
<td>0.009</td>
</tr>
<tr>
<td></td>
<td>(0.010)</td>
<td>(0.010)</td>
<td>(0.010)</td>
<td>(0.011)</td>
<td>(0.017)</td>
</tr>
<tr>
<td>voucher × Pr(hosp costs &gt; 0)</td>
<td>-0.000</td>
<td>-0.000</td>
<td>-0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td></td>
<td>(0.000)</td>
<td>(0.000)</td>
<td>(0.000)</td>
<td>(0.000)</td>
<td>(0.000)</td>
</tr>
<tr>
<td>fraction safe</td>
<td>-0.094**</td>
<td>-0.111**</td>
<td>-0.224***</td>
<td></td>
<td></td>
</tr>
<tr>
<td>lotteries chosen</td>
<td>(0.040)</td>
<td>(0.046)</td>
<td>(0.067)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>trust game: share sent</td>
<td></td>
<td>0.078*</td>
<td>0.139**</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.043)</td>
<td>(0.061)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Constant</td>
<td>0.129</td>
<td>0.109</td>
<td>0.156</td>
<td>0.058</td>
<td>-0.022</td>
</tr>
<tr>
<td></td>
<td>(0.096)</td>
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<td>(0.112)</td>
<td>(0.168)</td>
</tr>
<tr>
<td>Observations</td>
<td>884</td>
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<td>874</td>
<td>679</td>
<td>313</td>
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Discussion
Peer effects: Motivation

The graph shows the probability of completing an application (Pr(completes application)) as a function of the fraction of one's acquaintances who have completed the application. The graph demonstrates a positive correlation, indicating that the probability of completing the application increases as the fraction of acquaintances who complete the application increases.
Peer effects: Identification

Correlated adoption among friends is a case of Manski’s (1993) reflection problem:

- endogenous effects
- contextual effects
- correlated effects

Resolved here by using friends’ prices as instrument for their decisions.

Estimate linear-in-means model

\[ y_i = \beta_0 + \beta_p p_i + \beta_t t_i + \theta y_j + e_{ij} \]  

(5.1)

instrumenting \( y_j \) with \( p_j \), for all \( ij \) pairs defined by a given network metric.
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- Estimate linear-in-means model

\[ y_i = \beta_0 + \beta_p p_i + \beta_t t_i + \theta y_j + e_{ij} \quad (5.1) \]

instrumenting \( y_j \) with \( p_j \), for all \( ij \) pairs defined by a given network metric.
## Peer effects: IV results

<table>
<thead>
<tr>
<th></th>
<th>(1) Acq</th>
<th>(2) Acq</th>
<th>(3) Delegate</th>
<th>(4) Funeral</th>
<th>(5) Microcredit</th>
</tr>
</thead>
<tbody>
<tr>
<td>applied&lt;sub&gt;j&lt;/sub&gt;</td>
<td>-0.0928 (0.138)</td>
<td>-0.273 (0.211)</td>
<td>-0.418 (0.556)</td>
<td>-0.519 (0.383)</td>
<td>-0.305 (0.215)</td>
</tr>
<tr>
<td>voucher (%)</td>
<td>0.00582*** (0.00147)</td>
<td>0.00558*** (0.00155)</td>
<td>0.00526*** (0.00167)</td>
<td>0.00592** (0.00251)</td>
<td>0.00290 (0.00213)</td>
</tr>
<tr>
<td>T2: referral</td>
<td>-0.0767* (0.0425)</td>
<td>-0.163*** (0.0593)</td>
<td>-0.262* (0.151)</td>
<td>-0.211** (0.0891)</td>
<td>-0.178*** (0.0685)</td>
</tr>
<tr>
<td>T3: education</td>
<td>-0.0233 (0.0490)</td>
<td>-0.0266 (0.0568)</td>
<td>-0.0410 (0.0735)</td>
<td>0.00628 (0.0752)</td>
<td>0.00564 (0.0623)</td>
</tr>
<tr>
<td>T2 × applied&lt;sub&gt;j&lt;/sub&gt;</td>
<td>0.563** (0.243)</td>
<td>0.717 (0.660)</td>
<td>0.832* (0.440)</td>
<td>0.570** (0.280)</td>
<td></td>
</tr>
<tr>
<td>Constant</td>
<td>0.157*** (0.0431)</td>
<td>0.197*** (0.0584)</td>
<td>0.247* (0.133)</td>
<td>0.237*** (0.0897)</td>
<td>0.216*** (0.0693)</td>
</tr>
<tr>
<td>Observations</td>
<td>5924</td>
<td>5924</td>
<td>725</td>
<td>1913</td>
<td>2920</td>
</tr>
</tbody>
</table>

Standard errors clustered by tea centre.
Outline

Theoretical motivation

Design and data

Insurance adoption

Peers

Discussion
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- Demand is remarkably sensitive to price.
  - Bad news: premiums have just been raised.
- We find only limited, and somewhat fragile, evidence of selection on subjective health expectations.
  - Apparent fragility of reduced-form results may arise because theory predicts a non-monotonic relationship between risk and demand (when trust an issue).
  - Role of risk and trust is consistent with theory and the empirical literature.
- Peer effects are generally weak—perhaps even negative—but strengthened by the referral treatment.
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