Outline

1. Hidden Type and Hidden Action II

2. Empirical Economics: Intro

3. Empirical Economics: Home Insurance

4. Empirical Economics: Retirement Savings

5. Some Advice

6. Course Evaluation
1 Hidden Type and Action II

- Summary of how to separate moral hazard and adverse selection in credit card borrowing

- Adverse Selection. Compare two groups
  - Offered rate $r_{HI}$ and gets $r_{LO}$
  - Offered rate $r_{LO}$ and gets $r_{LO}$
  - This holds constant final offer ($r_{LO}$) and varies initial offer $\rightarrow$ Adverse Selection

- Moral Hazard. Compare two groups
  - Offered rate $r_{HI}$ and gets $r_{LO}$
  - Offered rate $r_{HI}$ and gets $r_{HI}$
  - This holds constant initial offer ($r_{HI}$) and varies final offer $\rightarrow$ Moral hazard
2 Empirical Economics: Intro

- So far we have focused on economic theory

- What have we learnt?

- Power of models

- **Consumers.** We tried to capture:
  
  - savings decisions (consumer today/consumer in future)
  
  - work-leisure trade-off (how much to work?)
  
  - attitudes toward risk (insurance, investment)
  
  - self-control problems (health club, retirement saving)
  
  - altruism (charitable contribution, volunteer work)
• Producers.

• Beauty of competitive markets:
  – price equals marginal costs
  – zero profit with entry into market
  – welfare optimality (no deadweight loss)

• Market power, the realistic scenario:
  – choice of price to maximize profits
  – single price or price discrimination
  – interaction between oligopolists
• But this is only half of economics!

• The other half is empirical economics

• Creative and careful use of data

• Get empirical answers to questions above (and other questions)

• Different methodologies —
  – Econometrics 140-141 to get started
  – Applied Econometrics 142
3 Empirical Economics: Home Insurance

Methodology I. Consumers choose in a menu of options

- Choice among options reveals preferences
  - Ex.: Health club paper (DellaVigna and Mal-mendier, 2006)
  - Ex. Choice of deductibles (Sydnor, 2006)
- Fields:
  * Consumption decisions
  * IO
  * Finance
• Choice of deductibles in home insurance (Sydnor, 2006)

• Risk Aversion $\Rightarrow$ Take insurance to limit risks

• However: Limit *large* risks, not small risks

• (Local risk-neutrality)
  
  – Insure house at all (large) vs. deductible at $250 or $500 (small)
  
  – Invest in stock market (large) vs. telephone wire insurance (small)
Dataset

- 50,000 Homeowners-Insurance Policies
  - 12% were new customers
- Single western state
- One recent year (post 2000)
- Observe
  - Policy characteristics including deductible
    - 1000, 500, 250, 100
  - Full available deductible-premium menu
  - Claims filed and payouts by company
Features of Contracts

- Standard homeowners-insurance policies (no renters, condominiums)
- Contracts differ only by deductible
- Deductible is *per claim*
- No experience rating
  - Though underwriting practices not clear
- Sold through agents
  - Paid commission
  - No “default” deductible
- Regulated state
## Premium-Deductible Menu

<table>
<thead>
<tr>
<th>Available Deductible</th>
<th>Full Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>1000</td>
<td>$615.82</td>
</tr>
<tr>
<td></td>
<td>(292.59)</td>
</tr>
<tr>
<td>500</td>
<td>+99.91</td>
</tr>
<tr>
<td></td>
<td>(45.82)</td>
</tr>
<tr>
<td>250</td>
<td>+86.59</td>
</tr>
<tr>
<td></td>
<td>(39.71)</td>
</tr>
<tr>
<td>100</td>
<td>+133.22</td>
</tr>
<tr>
<td></td>
<td>(61.09)</td>
</tr>
</tbody>
</table>

### Risk Neutral Claim Rates?

- \(100/500 = 20\%\)
- \(87/250 = 35\%\)
- \(133/150 = 89\%\)

* Means with standard deviations in parentheses
The graph in the upper left gives the fraction that chose either the $250 or $500 deductibles as a function of the insured home value.

The graph in the upper right represents the average expected savings from switching to the $1000 deductible for customers who chose one of the lower deductibles. The potential savings is calculated at the individual level and then the kernel regressions are run. Because they filed no claims, for most customers this measure is simply the premium reductions they would have seen with the $1000 deductible. For the roughly 4% of customers who filed claims the potential savings is typically negative.

The curves in the upper graphs are fan locally-weighted kernel regressions using a quartic kernel. The dashed lines give 95% confidence intervals calculated using a bootstrap procedure with 200 repetitions.

The range for insured home value covers 99% of the available data.

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**Fraction Choosing $500 or Lower Deductible**

![Graph showing the fraction choosing $500 or lower deductibles as a function of insured home value.]

**Potential Savings with the Alternative $1000 Deductible**

![Graph showing potential savings with the alternative $1000 deductible as a function of insured home value.]

**Kernel Density of Insured Home Value**

![Graph showing the kernel density of insured home value.]

Quartic kernel, bw = 25

Epanechnikov kernel, bw = 25
## Potential Savings with 1000 Ded

<table>
<thead>
<tr>
<th>Chosen Deductible</th>
<th>Number of claims per policy</th>
<th>Increase in out-of-pocket payments per claim with a $1000 deductible</th>
<th>Increase in out-of-pocket payments per policy with a $1000 deductible</th>
<th>Reduction in yearly premium per policy with $1000 deductible</th>
<th>Savings per policy with $1000 deductible</th>
</tr>
</thead>
<tbody>
<tr>
<td>$500</td>
<td>0.043 (0.0014)</td>
<td>469.86 (2.91)</td>
<td>19.93 (0.67)</td>
<td>99.85 (0.26)</td>
<td>79.93 (0.71)</td>
</tr>
<tr>
<td>$250</td>
<td>0.049 (0.0018)</td>
<td>651.61 (6.59)</td>
<td>31.98 (1.20)</td>
<td>158.93 (0.45)</td>
<td>126.95 (1.28)</td>
</tr>
<tr>
<td></td>
<td>N=23,782 (47.6%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>N=17,536 (35.1%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Average forgone expected savings for all low-deductible customers: $99.88

* Means with standard errors in parentheses
Back of the Envelope

- **BOE 1:** Buy house at 30, retire at 65, 3% interest rate $\Rightarrow$ $6,300$ expected
  - With 5% Poisson claim rate, only $0.06\%$ chance of losing money

- **BOE 2:** (Very partial equilibrium) 80% of 60 million homeowners could expect to save $100$ a year with “high” deductibles $\Rightarrow$ $4.8$ billion per year
Consumer Inertia?

Percent of Customers Holding each Deductible Level

Number of Years Insured with Company

- 0-3
- 3-7
- 7-11
- 11-15
- 15+

Deductible Levels:
- 1000
- 500
- 250
- 100
Risk Aversion?

- Simple Standard Model
  - Expected utility of wealth maximization
  - Free borrowing and savings
  - Rational expectations
  - Static, single-period insurance decision
  - No other variation in lifetime wealth
Model of Deductible Choice

- Choice between \((P_L, D_L)\) and \((P_H, D_H)\)
- \(\pi\) = probability of loss
  - Simple case: only one loss
- EU of contract:
  - \(U(P, D, \pi) = \pi u(w-P-D) + (1- \pi)u(w-P)\)
Bounding Risk Aversion

Assume CRRA form for $u$:

$$u(x) = \frac{x^{(1-\rho)}}{(1-\rho)} \quad \text{for } \rho \neq 1, \quad \text{and} \quad u(x) = \ln(x) \quad \text{for } \rho = 1$$

Indifferent between contracts iff:

$$\pi \frac{(w - P_L - D_L)^{(1-\rho)}}{(1-\rho)} + (1-\pi) \frac{(w - P_L)^{(1-\rho)}}{(1-\rho)} = \pi \frac{(w - P_H - D_H)^{(1-\rho)}}{(1-\rho)} + (1-\pi) \frac{(w - P_H)^{(1-\rho)}}{(1-\rho)}$$
## CRRA Bounds

<table>
<thead>
<tr>
<th>Chosen Deductible</th>
<th>Measure of Lifetime Wealth (W): (Insured Home Value)</th>
<th>( \min \rho )</th>
<th>( \max \rho )</th>
</tr>
</thead>
<tbody>
<tr>
<td>$1,000 \text{ (39.5%)}$</td>
<td>$256,900$</td>
<td>- infinity</td>
<td>$794 \text{ (9.242)}$</td>
</tr>
<tr>
<td>$500 \text{ (54.6%)}$</td>
<td>$190,317$</td>
<td>$397$</td>
<td>$1,055 \text{ (8.794)}$</td>
</tr>
<tr>
<td>$250 \text{ (5.9%)}$</td>
<td>$166,007$</td>
<td>$780$</td>
<td>$2,467 \text{ (59.130)}$</td>
</tr>
<tr>
<td>( N = 2,474 )</td>
<td>{113,565}</td>
<td></td>
<td></td>
</tr>
<tr>
<td>( N = 3,424 )</td>
<td>{64,634}</td>
<td>(3.679)</td>
<td>(8.794)</td>
</tr>
<tr>
<td>( N = 367 )</td>
<td>{57,613}</td>
<td>(20.380)</td>
<td>(59.130)</td>
</tr>
</tbody>
</table>
### Choices: Observed vs. Model

<table>
<thead>
<tr>
<th>Chosen Deductible</th>
<th>Predicted Deductible Choice from Prospect Theory NLIB Specification: $\lambda = 2.25, \gamma = 0.69, \beta = 0.88$</th>
<th>Predicted Deductible Choice from EU(W) CRRA Utility: $\rho = 10, W = $Insured Home Value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1000</td>
<td>500</td>
</tr>
<tr>
<td>$1,000$</td>
<td>87.39%</td>
<td>11.88%</td>
</tr>
<tr>
<td>N = 2,474 (39.5%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$500$</td>
<td>18.78%</td>
<td>59.43%</td>
</tr>
<tr>
<td>N = 3,424 (54.6%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$250$</td>
<td>3.00%</td>
<td>44.41%</td>
</tr>
<tr>
<td>N = 367 (5.9%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$100$</td>
<td>33.33%</td>
<td>66.67%</td>
</tr>
<tr>
<td>N = 3 (0.1%)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Conclusions

- (Extreme) aversion to moderate risks is an empirical reality in an important market
- Seemingly anomalous in Standard Model where risk aversion = DMU
- Fits with existing parameter estimates of leading psychology-based alternative model of decision making
Alternative Explanations

- Misestimated probabilities
  - \( \approx 20\% \) for single-digit CRRA
  - Older (age) new customers just as likely
- Liquidity constraints
- Sales agent effects
  - Hard sell?
  - Not giving menu? ($500?, data patterns)
  - Misleading about claim rates?
- Menu effects
4 Empirical Economics: Retirement Savings

- **Methodology II.** Differences-in-differences

  - Consider effect of a change in variable $x$ on variable $y$

  - Ex.: Minimum wage ($x$) and employment ($y$) (Card and Krueger, 1991)

  - Ex.: AIDS death of parent ($x$) and education of child ($y$) (Evans and Miguel, 2004)

  - Ex.: Fox News Exposure ($x$) and voting behavior ($y$) (DellaVigna and Kaplan, 2004)

- Fields:
  * Labor Economics
  * Health Economics
• Retirement Savings

• In the US, most savings for retirement are voluntary (401(k))

• Actively choosing to save is... hard

• Self-control problems: Would like to save more...

• Just not today!

• Saving 10% today means lower net earnings today
• Brilliant idea: SMRT Plan (Benartzi and Thaler, 2005)

• Offer people to save... tomorrow.

• Three components of plan:

  1. Retirement contribution to 401(k) increases by 3% at every future wage increase

  2. This is just default – can change at any time

  3. Contribution to 401(k) goes up only when wage is increased
• This works around your biases to make you better off:

1. **Self-control problem.** Would like to save more, not today

2. **Inertia.** People do not change the default

3. **Aversion to nominal (not real) losses.**
• The results...

• Setting:
  – Midsize manufacturing company
  – 1998 onward

<table>
<thead>
<tr>
<th>TABLE 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>PARTICIPATION DATA FOR THE FIRST IMPLEMENTATION OF SMarT</td>
</tr>
<tr>
<td>Number of plan participants prior to the adoption of the SMarT plan</td>
</tr>
<tr>
<td>Number of plan participants who elected to receive a recommendation from the consultant</td>
</tr>
<tr>
<td>Number of plan participants who implemented the consultant’s recommended saving rate</td>
</tr>
<tr>
<td>Number of plan participants who were offered the SMarT plan as an alternative</td>
</tr>
<tr>
<td>Number of plan participants who accepted the SMarT plan</td>
</tr>
<tr>
<td>Number of plan participants who opted out of the SMarT plan between the first and second pay raises</td>
</tr>
<tr>
<td>Number of plan participants who opted out of the SMarT plan between the second and third pay raises</td>
</tr>
<tr>
<td>Number of plan participants who opted out of the SMarT plan between the third and fourth pay raises</td>
</tr>
<tr>
<td>Overall participation rate prior to the advice</td>
</tr>
<tr>
<td>Overall participation rate shortly after the advice</td>
</tr>
</tbody>
</table>
• Result 1: High demand for commitment device

• Result 2: Phenomenal effects on savings rates

<table>
<thead>
<tr>
<th>TABLE 2</th>
<th>AVERAGE SAVING RATES (%) FOR THE FIRST IMPLEMENTATION OF SMarT</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Participants Who Did Not Contact the Financial Consultant</td>
</tr>
<tr>
<td>Participants initially choosing each option*</td>
<td>29</td>
</tr>
<tr>
<td>Pre-advice</td>
<td>6.6</td>
</tr>
<tr>
<td>First pay raise</td>
<td>6.5</td>
</tr>
<tr>
<td>Second pay raise</td>
<td>6.8</td>
</tr>
<tr>
<td>Third pay raise</td>
<td>6.6</td>
</tr>
<tr>
<td>Fourth pay raise</td>
<td>6.2</td>
</tr>
</tbody>
</table>

* There is attrition from each group over time. The number of employees who remain by the time of the fourth pay raise is 229.
• Incredible results: Plan triples savings in 4 years

• Currently offered to more than tens of millions of workers

• Law passed in Congress that gives incentives to firms to offer this plan: *Automatic Savings and Pension Protection Act*

• Psychology & Economics & Public Policy:
  
  – Leverage biases to help biased agents
  
  – Do not hurt unbiased agents (cautious paternalism)

• For example: Can we use psychology to reduce energy use?
• Summary on Empirical Economics

• Economics offers careful models to think about human decisions

• Economics also offers good methods to measure human decisions

• Starts with Econometrics (140/141)

• Empirical economics these days is precisely-measured social science
5 Advice

1. Listen to your heart

2. Trust yourself
3. Take ‘good’ risks:

   (a) hard courses

   (b) internship opportunities

   (c) (graduate classes?)

4. Learn to be curious, critical, and frank
5. Be nice to others! (nothing in economics tells you otherwise)