14.472 Public Finance II

Topic II: Adverse selection: welfare analysis when there is no market

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Recap

- Testing for selection [done]
- Empirical welfare analysis I: Using choices and claims [done]
  - EFC (2010); EFS (2010)
- Empirical welfare analysis II: When can’t use choices
  - Don’t accept revealed preference [done]
  - Markets don’t exist [up next]
If require random variation in prices to trace out demand, do we only observe this where cost of mispricing is low?

Looking only at welfare cost of price distortions of existing contracts, not distortions in contract space

The ultimate contract distortion: markets that have completely unraveled

Empirical work (behavioral and non-behavioral) we have discussed requires that we observe market choices
How do we empirically study markets that don’t exist?

To get a complete unraveling:

1. **MC curve**
2. **Quantity**
3. **Price**
4. **Q_{\text{max}} = Q_{\text{eff}} = 1**

Diagram:
- AC curve
- Demand curve
- MC curve

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How do we empirically study markets that don’t exist?

- Need new techniques to study private information and welfare in markets that don’t exist
- Will briefly describe several possible approaches
  - Randomized experiments (to estimate demand for products that don’t exist in equilibrium)
  - Eliciting private information about risk without observing choices - Hendren (EMA 2013)
  - Calibrated utility models (e.g. Brown and Finkelstein AER 2008)
  - Ex-post vs. ex ante welfare analysis [will discuss later]
Randomized experiments

- If market has unravelled completely cannot observe demand - nothing offered in equilibrium
- An RCT however can estimate demand (and AC) curve by randomizing prices offered
- Could also allow examination of welfare costs of adverse selection over "larger" insurance products than e.g. deductible choice
- Would be nice to see this....!
Eliciting private information without choices

- Hendren (EMA, 2013)

Motivating observation: Insurance rejections

- In many non-group insurance settings, insurance companies reject applicants with certain observable (often high risk) conditions despite absence of restrictions on charging a higher price
- e.g. In non-group health insurance, 1 in 7 applications to large insurance companies rejected
- e.g. in long-term care insurance, up to 25% of 65 year olds may have health conditions that trigger automatic rejections
The rejection puzzle

- Why reject on observables vs. charge a higher price?
- Potential explanations include
  - Liquidity constraints / cannot “afford” insurance
  - Agency problems with insurance agents
  - Political economy (bad pr; threat of regulation)
  - Private information “greater” among those rejected
- Hendren considers private information
  - Does not rule out role for other explanations
  - Interesting area for more work!
Motivating theory (loosely described)

- Shows how you can get rejections ("no trade", "unravelling") in market with endogeneous contracts
  - Previously only shown with fixed contracts (Akerlof 1970)
- Market unravels when WTP for small amount of insurance is less than pooled cost of providing this insurance to those of equal or higher risk, for all risk levels
  - Provides a precise way of defining what we mean by "more private information"
- Characterizes barrier to trade imposed by distribution of types in terms of implicit tax (or markup) individuals would have to pay on insurance premiums in order for market to exist
  - Implicit tax for a given risk type depends on the expected risk type of all those of higher risk type (whom he would have to pool with)
  - Key comparative static: implicit tax higher for rejectees than non-rejectees, and high enough to explain absence of trade for "plausible" values of WTP for insurance
Empirical exercises

- Do individuals who are rejected have private information (conditional on public information)?
- Do individuals who are rejected have more private information than non-rejects?
  - Precise definition of “more” private information given by theory
- Is quantity of private information large enough to explain rejections for “plausible” wtp for insurance?
**Approach**

- Use HRS panel data to study three markets: ltcins, life insurance, and non group health insurance.
- Data includes self-reported subjective probabilities on losses incurred in each market (+ subsequent realized losses).
  - Uses it to infer distributions of beliefs.
  - Specifically, uses information on joint distribution of elicitations and realized events corresponding to these elicitations to deal with potential errors in elicitations.
- Data also includes rich set of observable demographics and health information.
  - Uses this + underwriting guidelines to classify who would be rejected vs not in each market.
Results

- Rejectees have private information
  - Subjective probabilities are predictive of realized loss conditional on observable characteristics

- Rejectees have more private information
  - Subjective probabilities are more predictive for the rejectees than the non rejectees (conditional on observables)

- Once he has characterized the distribution of types he can estimate the implicit tax (i.e. expected risk type of all those of higher risk type relative to own risk type)
  - Estimates on order of 40-80% for rejectees (depending on market), much smaller for non rejectees

- For “plausible” wtp, these magnitudes of implicit taxes can explain why market doesn’t exist
  - Key step: don’t observe choices so calibrate (vs estimate) a WTP
Calibrating WTP

- Heavy lifting in Hendren is to characterize the distribution of private information using self-reported subjective probabilities (and ex post experience)
- Compares estimate of implicit tax to “willingness to pay” from other estimates (e.g. Brown and Finkelstein 2008 for ltcins)
- How do we come up with willingness to pay when market doesn’t exist?
  - Calibration exercises: write down and calibrate a utility maximizing model
  - Examples: Hosseini (JPE 2015) on annuities, Brown and Finkelstein (AER 2008) on ltcins, Mahoney (AER 2015) on high deductible health insurance
  - NB: Hosseini (2015) explores adverse selection with this approach. Other papers look at other reasons for markets non-existing...
Calibrated life cycle utility models

- Useful to have in your tool kit for e.g.
  - Wtp for insurance. Especially useful for products that aren’t traded in private market
    - e.g. Medicaid (De Nardi et al. AER 2016 "Medicaid Insurance in Old Age")
  - Optimal savings problems (e.g. Scholz et al. JPE 2006 “Are Americans Saving Optimally For Retirement?”)
- Highlights key parameters in calibration for which one might like more empirical estimates
Why do so few people buy long-term care insurance?

LTC: home health care (in community) + institutional care (NH, ALF)

- HHC is about one-third of total spending but many more people receive it
- NHs cost on average ~$6,000 per month
Background: Long-term care

- Large and growing expenditure risk:
  - In 2008, $200 billion, 9 percent of total health care and about 1.4% of GDP (CMS 2010)
  - Projected to rise substantially as share of (rising!) health spending as population ages

- Hugely under-studied area within pf and health (e.g. $/papers)
  - More background: Brown and Finkelstein (JEP 2011)
  - Likely opportunities to gain traction by wading into the (largely untapped) morass of Medicaid administrative data...
Background: Long-term care (con’t)

- Lifetime ltc expenditures very unevenly spread across population
- Large right tail of distribution
  - About 35-50% of 65 year olds will use a NH over remaining life
  - Of those who do, 10-20% will spend more than 5 years there
- Large, uncertain expenditure risk suggests great value to insurance
Most ltc expenditure risk not insured

About 4% of ltc expenditures paid by private insurance; 33% out of pocket

Overall for healthcare sector: private insurance pays about one-third; 12% out of pocket

Large role for public insurance → fiscal pressures
Public insurance covers ~60% of ltc expenditures

Medicaid is dominant public source

- State-federal joint funding
- Pays for ltc if have low enough income (or high enough expenses) that meet means-tested income and asset thresholds
- LTC = ~1/3 of all Medicaid spending (but much less of Medicaid research!)

Medicare covers relatively little

- NH care only if skilled (rare), follows hospitalization, and ≤100 days
- Some home health care coverage
2008 Private Long-Term Care Insurance Ownership Rates among the Elderly

<table>
<thead>
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<th></th>
<th>Whole sample</th>
<th>Top</th>
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<th>Third</th>
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<th>Bottom</th>
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<td>Whole sample</td>
<td>13.8%</td>
<td>26.9%</td>
<td>19.0%</td>
<td>10.7%</td>
<td>6.6%</td>
<td>4.1%</td>
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<td>By gender</td>
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<td>Men</td>
<td>13.6%</td>
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<td>28.0%</td>
<td>19.2%</td>
<td>10.3%</td>
<td>5.9%</td>
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<td>10.4%</td>
<td>23.5%</td>
<td>18.8%</td>
<td>11.2%</td>
<td>7.3%</td>
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<td>60–64</td>
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<td>18.7%</td>
<td>9.3%</td>
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<td>19.4%</td>
<td>8.8%</td>
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Notes: The sample consists of respondents in the 2008 Health and Retirement Study aged 60+. The average age is 70.9 years. The sample size is 13,260. All means are weighted using respondent weights. Wealth is defined as total (not just financial) wealth.
Only about 14% of 60+ year olds hold long term care insurance
Coverage rates relatively constant across ages 60+ and between men and women
Striking pattern of rising coverage with wealth
- 4% in bottom wealth quintile, to over 25% in top wealth quintile
- Role of Medicaid...?
“Typical” policy: $150 daily benefit that escalates at 5% nominal per year and covers institutional and home care with a 60-day deductible and a four year maximum benefit period

- (NB: Typical daily NH costs are currently $200 / day)

- Policy covers about 2/3 of EPDV ltc costs

- Typical premium for 65 year old = $4,500 per year
What is the “price” of insurance?

- The relevant price of insurance is not the premium but the load!

Want to know the excess of premium over expected claims

\[ \text{Load} = 1 - \frac{\text{EPDV(Benefits)}}{\text{EPDV(Premiums)}} \]

Actuarially fair policy has a load of 0
Background: loads

\[ \text{Load} = 1 - \frac{\text{EPDV(Benefits)}}{\text{EPDV(Premiums)}} \]

- Need data (and assumptions) on Premiums \((P)\), benefits \((B)\), current and projected utilization rates \((Q)\), current and projected costs \((X)\), and interest rate to discount future \((i)\)

\[
\sum_{t=0}^{T} \sum_{s=1}^{S} \left( \frac{Q_{t,s} \min(X_{t,s}, B_{t,s})}{\prod_{j=0}^{t} (1+i_t)} \right)
\]

\[
\sum_{t=0}^{T} \sum_{s=1}^{S} \left( \frac{Q_{t,s} P_s}{\prod_{j=0}^{t} (1+i_t)} \right)
\]
Since utilization occurs on average 15-20 years after purchase (at age 65) results will be quite sensitive to

- projections of how utilization and costs will evolve
- Discount factor (premiums front-load vs. loaded relative to benefits)

Estimate load on typical policy for 65 year old about $0.32 on dollar

- Much higher for men than women (e.g. $0.55 vs $0.13)
- Higher if account for policy lapsation ($0.50 vs $0.32)
Why don’t people buy long term care insurance?

- Supply-side market failures create high prices and/or limited contracts
  - Transaction costs, imperfect competition, asymmetric information, dynamic problems in long-term contracting (learning and lapsing; aggregate risk)
  - [NB: adverse selection unlikely to raise prices in this setting. Why?]
- Limited demand
  - Imperfect but cheaper substitutes (Medicaid; financial transfers from kids; unpaid /informal care by kids)
  - Limited rationality
One attempt to (begin to) get at question of why people don’t buy LTC ins

Develop a utility-based model of a 65-year-old risk-averse individual who chooses an optimal intertemporal consumption path in the presence of uncertainty about long-term care expenditures

Calibrate model using data on the distribution of LTC expenditure risk, state Medicaid rules, and prices and coverages for typical private LTC policies

Use the model to calculate WTP for private LTC ins contracts
Consumer problem

- Consider a 65 year old with a stock of financial wealth and pre-determined annuity payments (e.g. from Social Security) who each month chooses an optimal monthly consumption path to maximize EPDV utility subject to budget constraint.
  - NB: Take stock of wealth at 65 as given (ideally would endogenize but...)

- Two key forms of uncertainty: mortality and ltc expenditures.
  - Each month $t$ with probability $Q_{s,t}$ individual is in care state $(s)$: home no care, hhc, alf, nh, dead (absorbing state).

- When alive, individual derives utility from real consumption $C_{s,t}$ and some consumption value from ltc (e.g. food and shelter that they would otherwise need to fund out of income or wealth) which we denote by $F_{s,t}$.

- Discount rate $\rho$
Consumer problem (con’t)

\[ \max_{C_s,t} \sum_{t=0}^{T} \sum_{s=1}^{5} \frac{Q_{t,s}}{(1 + \rho)^t} U_s(C_{s,t} + F_{s,t}) \]

subject to:
(1) Initial level of nonannuitized financial wealth \( W_0 \) and a given trajectory of annuity income from SS \( A_t \)
(2) No-borrowing constraint (to remove possibility of dying in debt)
(3) Wealth accumulation equation
Wealth accumulation equations depend on Medicaid and private insurance.

If not on Medicaid the wealth accumulation equation is:

$$W_{t+1} = (W_t + A_t + \min[B_{s,t}, X_{s,t}] - P_{s,t} - X_{s,t} - C_{s,t})(1 + r)$$

- $B_{s,t}$: maximum per period benefit
- $X_{s,t}$: incurred cost
- $P_{s,t}$: nominal premium

Medicaid alters wealth accumulation equation (will discuss momentarily).
Defining “willingness to pay”

- Have defined a constrained dynamic optimization problem
  - Can translate into recursive Bellman equation and solve, subject to constraints, using numerical techniques
- Can use results to ask: how much would a risk averse life-cycle consumer be willing to pay, over and above required premium, to purchase a specific long-term care insurance contract
- Calculating WTP
  - Solve for optimal consumption path given an insurance contract [standard dynamic programming problem] and calculate max EPDV utility
  - Take away insurance contract and find increment to financial wealth such that, when individual follows new optimal consumption path, achieves same level of EPDV utility as when insured
  - This increment to financial wealth = WTP
    - Analog of equivalent variation
Eligible for Medicaid if receiving care and income and assets (after care costs) fall below threshold \( (C_s, W) \)

Medicaid will pay for incurred costs
- After individuals “spends down” income and assets
- After any private insurance payments

Private insurance reduces expected Medicaid payments:
- Protects assets / reduces eligibility
- Medicaid is secondary payer
Medicaid Implicit Tax on Private Insurance

- Portion of EPDV benefits from private policy that replace what Medicaid would otherwise have paid

\[
\text{Implicit Tax} = \frac{\Delta(\text{EPDV Medicaid Expenditures due to LTCI})}{\text{EPDV (Gross Benefits from LTCI)}}
\]

- Implicit Tax captures difference between gross and net benefits from private policy, as fraction of gross
  - Why do we need to solve consumer constrained dynamic optimization problem to calculate numerator?
  - Do we need it for denominator?
Parameterization

- Transition probabilities across states of care - Robinson actuarial model
- Current and Future LTC costs \((X_{s,t})\) - MetLife Surveys + assumptions about growth
- Medicaid Thresholds \((W, C_s)\)
- Assumptions about: risk aversion, bequest motive, state-dependence, consumption floor \((F_{s,t})\)
- Nature of current policies (including loads)
- Wealth distribution - from HRS (+ equivalence scale)
to pay to insure a given absolute loss should be decreasing with total wealth. We show below how the structure of Medicaid makes private insurance more appealing to wealthier individuals.

Medicaid expenditures are determined in the model by individuals’ life-cycle consumption choices, which in turn affect their Medicaid eligibility. On average across the wealth distribution, our model predicts that 55 percent of EPDV long-term care expenditures are paid by Medicaid. This is broadly consistent with the CBO (2004, Table 1–2) estimates that about half of long-term care expenditures in 2004 were paid by Medicaid.2

IV. The Impact of Medicaid

A. The Medicaid Crowd-Out Effect

The results in Figure 1 contain several suggestions of a crowd-out effect of Medicaid. Demand may also, however, be affected by the features of current policies. The $100 constant nominal daily benefit cap covers less than half of the EPDV of long-term care expenditures (Brown and Finkelstein, 2008).

Figure 1. Willingness to Pay for Private LTC Insurance
($100 daily benefit, market load)

Notes:

Willingness to pay (expressed in $000s) for private insurance for deciles below the third are worse than losing all financial wealth and are not reported here. The financial wealth deciles (and fraction of financial wealth annuitized at that point) are, respectively: 1. $58.5k (98 percent); 2. $93.4k (91 percent); 3. $126.9k (82 percent); 4. $169.9k (70 percent); 5. $222.6k (60 percent); 6. $292.8k (52 percent); 7. $385.5k (41 percent); 8. $526k (35 percent); 9. $789.5k (26 percent). The market loads are 0.50 for men, and 0.20 for women; loads are defined as 1 – (EPDV benefits / EPDV premiums).
Reality check: Model broadly consistent with facts

- Given current prices and structure of Medicaid model produces WTP estimates consistent with data:
  - WTP increases with wealth distribution
  - WTP negative for most of wealth distribution
  - Men and Women have similar WTP (despite different loads)

- Now can do counterfactual simulations: what if change prices? Medicaid? etc

- (Holmstrom: Good model as good conversation partner)
Three principle findings

- Large crowd out effect of Medicaid
  - Even if (contrary to fact) comprehensive private insurance was available with zero load, about 2/3 of wealth distribution would not buy
  - Suggests Medicaid reform necessary (not clear sufficient) for large private market to develop

- Medicaid crowd out stems from high implicit tax on private policy
  - For median wealth male (female), 60 (75) percent of benefits from private policy redundant of what Medicaid would otherwise have paid
  - Stems from combination of means testing and secondary payer (getting rid of one but not the other doesn’t do much)

- Medicaid provides relatively little consumption smoothing for all but poorest of individuals (deductible of essentially all one’s assets)
  - WTP (above cost) for full coverage relative to Medicaid = high
  - e.g. median wealth individual’s welfare gain from being able to “top up” Medicaid would be equivalent to ~10% of wealth
Policy question: Medicaid redesign?

- Medicaid provides highly imperfect insurance but crowds out private insurance
- Consider possible Medicaid reforms:
  - Get rid of asset test and secondary payer (Now 100% implicit tax but comprehensive coverage)
  - Get rid of Medicaid (no implicit tax, no consumption floor)
  - Pay individuals who buy “adequate” private insurance a lump sum = EPDV of Medicaid expenditures
    - Thoughts on this policy?
Methodological comments

- This type of life cycle modeling can be useful
  - When market doesn’t exist (e.g. how study crowd out?!)  
  - For sense of magnitudes: are loads “big enough” to explain lack of market  
  - For welfare analysis (e.g. Scholz et al. on whether saving optimally for retirement)  
- Also highlights key assumptions about which there is need for more work!
(Some) things we need more work on

- Long-term care
  - Moral hazard?
  - Disutility from hhc vs nh
  - “Medicaid aversion”
  - Informal care

- General
  - Risk aversion
  - State-dependent utility (Finkelstein, Luttmer and Notowidigdo 2013)
  - Bequest motives
  - Discounting
  - Household decision making / joint utility (we punted on)
  - Equivalence scales
  - Role of housing wealth
  - Consumption floor
From calibrated models to data

- Results from calibrated models can serve to motivate/complement/cross-validate empirical work
- Brown, Coe and Finkelstein (Tax Policy and the Economy, 2007)
- Goda (JPubEc 2010)
Brown and Finkelstein used calibrated life cycle model to suggest that decreasing asset eligibility threshold will increase demand for LTCI but not by quantitatively large amount (bc of secondary payer status).

BCF (TPE 2007) look empirically at role of asset eligibility threshold on LTC ownership in HRS. They use state x year x marital status variation in asset eligibility requirements, find that decreases in asset threshold for eligibility increase demand but not by much. If all states moved from current thresholds to most stringent allowed, would decrease average protected assets by $25,000, and increase LTC demand by 2.7 percentage points (30 percent off of 9.1 base).
Brown and Finkelstein calibrated life cycle model suggests

- Lower premiums will increase demand but not by a quantitatively large amount (bc of implicit tax imposed by Medicaid)

Goda (JPubEc 2010)

- Uses state x year variation in adoption and generosity of state tax subsidies
Impact of Subsidies

Figure 1: Private Long-Term Care Insurance Coverage, Age 50-69

Source: Health and Retirement Study (HRS), Waves 3-8, 1996-2006.


df 
Subsidy Began 1998-1999
Subsidy Began 2000-2001
Never Implemented Subsidy

Source: Tax subsidy characteristics obtained from state tax forms. Average subsidy value calculated using sample from 1996-2006 waves of Health and Retirement Study (HRS) and NBER's TAXSIM calculator. See Appendix for more details.
Finds tax subsidies increase purchases but quantitatively not large
  - Average tax subsidy raises coverage by 2.7 percentage points (28 percent)

Effect concentrated among populations with lower probabilities of ending up on Medicaid (high income and asset-rich individuals)
  - Consistent with role for Medicaid implicit tax in blunting effectiveness of tax subsidies
  - Also important for scope of potential public sector Medicaid savings from public sector tax subsidies
Studying Markets That Don’t Exist: Recap

- Randomized evaluations - would be nice to see
- Eliciting private information from beliefs (Hendren EMA) [done]
- Calibrated utility models (e.g. Brown and Finkelstein AER 2008) [done]
- Ex-post (vs. ex ante) welfare analysis [coming later]
Ex Post Welfare Analysis

- Work thus far has taken an ex-ante approach to welfare analysis:
  - Estimate willingness to pay for health insurance relative to costs and use it to back out welfare consequences of lack of insurance
  - In practice, therefore, focus on relatively small variations in prices and contracts (where the variation in the data is)
- Can’t study welfare of insurance products that aren’t traded
  - E.g. Medicaid - public health insurance provided for free to uninsured low income individuals
- Can we use behavioral impacts of insurance to value it?
  - Bridge to upcoming topic: welfare analysis of optimal social insurance level (Baily; Chetty)
    - Use behavioral impacts of insurance (unemployment insurance) to derive optimal benefit level
  - Will return to when we study valuing in-kind transfers
    - Finkelstein, Hendren, Luttmer (2015) try to use ex-post impacts of Medicaid from Oregon HIE for welfare analysis
- But first: that other market failure... moral hazard