Public health insurance for the elderly

Medicare: Virtually everyone age 65+ is eligible
- No income or asset tests
- Pays for most medical services, but not all (e.g., nursing homes)
Public health insurance for the elderly

- Medicare: Virtually everyone age 65+ is eligible
  - No income or asset tests
  - Pays for most medical services, but not all (e.g., nursing homes)

- Medicaid: Means-tested health insurance that assists the poor or impoverished
  - Medicaid assists 70% of nursing home residents.
  - Nursing homes are very expensive.
Medicaid was designed to insure the poorest retirees against medical expenses. We ask:

- What is the degree of Medicaid redistribution?
  
  - How big are Medicaid payments for high-income versus low-income people?
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  - How big is this valuation for high-income versus low-income people?
Questions

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- What is the degree of Medicaid redistribution?
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- Is Medicaid of about the right size?
- Who pays for Medicaid?
AHEAD cohort of HRS

- Household heads aged 70 or older in 1993/4
- Consider only the retired singles
- Asset, medical expense data begins in 1996 (1994 data faulty), uses 2,673 individuals
- Use full, unbalanced panel
AHEAD cohort of HRS

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- Sort households by permanent income = average annuity income from Social Security + defined benefit pension plans over sample period
- 1996-2010 waves of the Medicare Current Beneficiary Survey for information on payments (coded the same way as AHEAD)
Figure: Fraction receiving Medicaid by age, birth cohort and permanent income quintile.
High income live longer than low income. Life expectancy at age 70

- 10th percentile of income distribution: 10.4 years.
- 90th percentile of income distribution: 14.4 years.
Forces working against redistribution

- High income live longer than low income. Life expectancy at age 70
  - 10th percentile of income distribution: 10.4 years.
  - 90th percentile of income distribution: 14.4 years.

- Two pathways to qualify for Medicaid
  - Categorically needy: low income
  - Medically needy: low income net of medical spending
    - High income retirees wind up on Medicaid only if they have catastrophic medical spending
<table>
<thead>
<tr>
<th>Permanent Income Quintile</th>
<th>Average Payment</th>
<th>Recipiency Rate</th>
<th>Average Payment/Beneficiary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bottom</td>
<td>9,080</td>
<td>.70</td>
<td>12,990</td>
</tr>
<tr>
<td>Fourth</td>
<td>5,720</td>
<td>.42</td>
<td>13,690</td>
</tr>
<tr>
<td>Third</td>
<td>2,850</td>
<td>.16</td>
<td>18,350</td>
</tr>
<tr>
<td>Second</td>
<td>1,950</td>
<td>.08</td>
<td>24,360</td>
</tr>
<tr>
<td>Top</td>
<td>1,280</td>
<td>.05</td>
<td>23,790</td>
</tr>
</tbody>
</table>

**Table:** Average Medicaid payments, recipiency, and payments per beneficiary, 1996-2010 waves of the Medicare Current Beneficiary Survey.
Lots of work on health effects of Medicaid/Medicare


**Small/zero effects:** Brook et al. 1983; Fisher et al. 2003; Finkelstein and McKnight 2008

Less on Medicaid/Medicare’s effect on savings/medical expenses:

Scholz et al. 2006; Brown and Finkelstein 2008; De Nardi, French, and Jones 2010; Kopecky and Koreshkova 2013; Braun, Kopecky and Koreshkova 2015

Most papers assume exogenous medical expenditure and/or little heterogeneity and do not focus on redistribution.
Key model features

- Single people aged 70 and older
- Consumption of medical and non-medical goods, and savings decision
- Medical care does not affect longevity
Key model features

- Single people aged 70 and older
- Consumption of medical and non-medical goods, and savings decision
- Medical care does not affect longevity
  - Consistent with many papers
  - Much of medical spending, especially late in life, is on long-term care
  - Spending improves quality of life, not length of life
Nursing home quality varies a lot
Model

- Single people aged 70 and older
- Flow utility from medical and non-medical consumption

$$u(c_t, m_t, \mu_t) = \frac{1}{1 - \nu} c_t^{1-\nu} + \mu_t \frac{1}{1 - \omega} m_t^{1-\omega},$$

where:

- \(t = \text{age}\);
- \(c_t = \text{non-medical consumption}\);
- \(m_t = \text{consumption of medical goods and services, includes}\)
  - nursing home, drugs, doctor visits;
  - items paid out of pocket as well as by Medicaid, Medicare, or other insurers
- \(\mu_t = \text{stochastic medical needs shifter}\).
Health transition probabilities are functions of:
- gender
- permanent income
- age
- past health
Health and lifespan

- Health transition probabilities are functions of:
  - gender
  - permanent income
  - age
  - past health

- Mortality rates vary by:
  - gender
  - permanent income
  - age
  - health

⇒ Healthy, rich women live longer than poor, sick, men.
Medical needs shocks components

- A deterministic function of age, gender, and health status.
- A persistent shock.
- A transitory shock.

\[
\begin{align*}
\log(\mu_t(\cdot)) &= f(\text{age, health status, } \psi_t), \\
\psi_t &= \zeta_t + \xi_t, \quad \xi_t \sim N(0, \sigma^2_\xi), \\
\zeta_t &= \rho_m \zeta_{t-1} + \epsilon_t, \quad \epsilon_t \sim N(0, \sigma^2_\epsilon).
\end{align*}
\]
Two key features of the insurance system

- Private, Medicare, Veterans Administration health insurance
  - pay a share of total medical expenditure $m_t(1 - q(h_t))$
  - Using data from the MCBS we find
    - $q($nursing home$) = .68$
    - $q($good or bad$) = .27$
Two key features of the insurance system

- Private, Medicare, Veterans Administration health insurance
  - pay a share of total medical expenditure \( m_t(1 - q(h_t)) \)
  - Using data from the MCBS we find
    - \( q(\text{nursing home}) = .68 \)
    - \( q(\text{good or bad}) = .27 \)

- Social insurance programs (Medicaid and Supplemental Security Income (SSI))
  - Medicaid *utility* floors
Medicaid as providing utility floor

- Medicaid transfers vary with medical needs.
- But we (the econometricians) do not fully observe medical needs directly.
Medicaid as providing utility floor

- Medicaid transfers vary with medical needs.
- But we (the econometricians) do not fully observe medical needs directly.
- So we need a model that satisfies the criteria:
  - Medicaid transfers vary with medical needs.
  - Model matches distribution of Medicaid payments.
Calculating transfers for the medically needy...

- Government computes minimum expenditure \( x_{mt} = c_t + q(h_t)m_t \) to achieve

\[
\frac{1}{1 - \nu} c_t^{1-\nu} + \mu_t \frac{1}{1 - \omega} m_t^{1-\omega} = u,
\]
Calculating transfers for the medically needy...

- Government computes minimum expenditure $x_{mt} = c_t + q(h_t)m_t$ to achieve

$$\frac{1}{1 - \nu} c_t^{1-\nu} + \mu_t \frac{1}{1 - \omega} m_t^{1-\omega} = u,$$

- Government makes transfer $b_{mt}$ given expenditure $x_{mt}$

$$b_{mt} = \max \{0, x_{mt} - \text{resources}_t \},$$
Calculating transfers for the medically needy...

- Government computes minimum expenditure $x_{mt} = c_t + q(h_t)m_t$ to achieve
  \[ \frac{1}{1 - \nu} c_t^{1 - \nu} + \mu_t \frac{1}{1 - \omega} m_t^{1 - \omega} = u, \]

- Government makes transfer $b_{mt}$ given expenditure $x_{mt}$
  \[ b_{mt} = \max \{ 0, \ x_{mt} - \text{resources}_t \}, \]

- Given exogenous transfer, the person makes optimal decisions.
Modeling Medicaid tests and transfers

- *Categorically needy*: assets and income test
- *Medically needy*: total resources low compared to medical expenses

Two eligibility criteria
At the beginning of the period,

- the individual’s health status and medical needs shocks are realized,
- needs-based transfers are given,
- the individual chooses consumption, medical expenditures, and savings,
- the survival shock hits.
Recursive formulation

\[ V_t(a_t, g, h_t, l, \zeta_t, \xi_t) = \max_{c_t, m_t, a_{t+1}, l_M} \left\{ \frac{1}{1 - \nu} c_t^{1-\nu} + \frac{\mu(h_t, \zeta_t, \xi_t, t)}{1 - \omega} m_t^{1-\omega} \right. \]

\[ + \beta s_{g, h, l, t} E_t \left( V_{t+1}(a_{t+1}, g, h_{t+1}, l, \zeta_{t+1}, \xi_{t+1}) \right) \]

\[ + \beta (1 - s_{g, h, l, t}) \frac{\theta}{1 - \nu} (e(a_{t+1}) + k)^{1-\nu} \right\} , \]

s.t. \[ a_{t+1} = a_t + y_n(ra_t + y_t) + b_t l_M - c_t - m_t q(h_t) \geq 0, \]
\[ b_t = b(t, a_t, g, h_t, l, \zeta_t, \xi_t, u) \]
\[ a_{t+1} \leq A_d, \text{ if } l_M > 0. \]
Two-step estimation strategy

- First step: estimate parameters of income, health, mortality, and co-pay profiles.
Two-step estimation strategy

- First step: estimate parameters of income, health, mortality, and co-pay profiles.

- Second step: taking as given the estimated first-step parameters, choose preference parameters, utility floor, and medical needs shocks to match
  - Median assets
  - Medicaid recipiency rate
  - Median and 90th percentile of out-of-pocket medical expenditures
  - First and second autocorrelations of medical expenditures by PI quintile, cohort and age, using the method of simulated moments (MSM).
Results from first step estimation

Look at
- Income quintiles
- Life expectancy
- Nursing home risk
Income quintiles by age
Health and Mortality

- We model current health \( \in \{ \text{good, bad, nursing home, dead} \} \) as a function of
  - past health, gender, permanent income, age
- Starting with the initial joint distribution of the state variables, we simulate demographic histories using the estimated transition probabilities.
<table>
<thead>
<tr>
<th>Income Percentile</th>
<th>Nursing Home Males</th>
<th>Good Health Males</th>
<th>Nursing Home Females</th>
<th>Good Health Females</th>
<th>All</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>1.65</td>
<td>6.02</td>
<td>7.51</td>
<td>2.48</td>
<td>10.44</td>
</tr>
<tr>
<td>50</td>
<td>1.69</td>
<td>7.32</td>
<td>9.47</td>
<td>2.73</td>
<td>12.53</td>
</tr>
<tr>
<td>90</td>
<td>1.75</td>
<td>8.81</td>
<td>11.31</td>
<td>3.00</td>
<td>14.39</td>
</tr>
</tbody>
</table>

Men: 9.71
Women: 13.55
Bad Health: 10.69
Good Health: 13.99

**Table**: Life expectancy at age 70.
<table>
<thead>
<tr>
<th>Income Percentile</th>
<th>Males</th>
<th></th>
<th>Females</th>
<th></th>
<th>All†</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Bad Health</td>
<td>Good Health</td>
<td>Bad Health</td>
<td>Good Health</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>26.4</td>
<td>30.1</td>
<td>41.2</td>
<td>45.2</td>
<td>40.7</td>
</tr>
<tr>
<td>50</td>
<td>27.2</td>
<td>32.0</td>
<td>43.6</td>
<td>47.9</td>
<td>43.3</td>
</tr>
<tr>
<td>90</td>
<td>27.2</td>
<td>32.4</td>
<td>44.4</td>
<td>49.0</td>
<td>43.9</td>
</tr>
</tbody>
</table>

Men  30.6  
Women  46.1  

Bad Health  39.9  
Good Health  45.0  

**Table:** Percent ever entering a nursing home, people alive at age 70.
Second step estimates

flow utility \[= \frac{1}{1 - \nu} c_t^{1 - \nu} + \mu_t \frac{1}{1 - \omega} m_t^{1 - \omega}\]

bequest utility \[= \frac{\theta}{1 - \nu} (e(a_{t+1}) + k)^{1 - \nu}\]

Estimated parameters:

- \(\beta = 0.994, \nu = 2.83, \omega = 2.99 \implies \text{model-predicted price elasticity of medical expenditure} = 0.25.\)

- Categorically needy income limit = $6,420.

- Utility floor (consumption equivalent) = $5,260.

- Bequest motives parameters imply MPC out of terminal wealth of 17% and bequest threshold of $3,600.
Medicaid recipieny

Medicaid Recipieny: Data (Solid) vs. Model (Dashed)
Medicaid recipiency

Medicaid Recipiency: Data (Solid) vs. Model (Dashed)
<table>
<thead>
<tr>
<th>Income Quintile</th>
<th>Medicaid payments</th>
<th></th>
<th>Out-of-pocket expenses</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>MCBS Data</td>
<td>Model</td>
<td>MCBS Data</td>
<td>AHEAD Data</td>
</tr>
<tr>
<td>Bottom</td>
<td>9,080</td>
<td>10,070</td>
<td>4,050</td>
<td>2,550</td>
</tr>
<tr>
<td>Fourth</td>
<td>5,720</td>
<td>7,960</td>
<td>5,340</td>
<td>4,270</td>
</tr>
<tr>
<td>Third</td>
<td>2,850</td>
<td>6,000</td>
<td>6,470</td>
<td>5,050</td>
</tr>
<tr>
<td>Second</td>
<td>1,950</td>
<td>3,910</td>
<td>7,300</td>
<td>6,360</td>
</tr>
<tr>
<td>Top</td>
<td>1,280</td>
<td>2,250</td>
<td>8,020</td>
<td>7,000</td>
</tr>
<tr>
<td>Men</td>
<td>2,850</td>
<td>3,780</td>
<td>5,440</td>
<td>4,760</td>
</tr>
<tr>
<td>Women</td>
<td>4,410</td>
<td>5,980</td>
<td>6,470</td>
<td>5,230</td>
</tr>
</tbody>
</table>

**Table:** Average Medicaid payments and out-of-pocket expenses.
Changing Medicaid

Fix preference parameters at baseline estimates and

- Reduce consumption value of both categorically and medically needy floors by 10%
- Increase consumption value of both floors by 10%
<table>
<thead>
<tr>
<th>Permanent Income Quintile</th>
<th>(1) Reduction in PDV of Payments</th>
<th>(2) Compensating Variation</th>
<th>(3) Ratio of (2)/(1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bottom</td>
<td>4,500</td>
<td>6,300</td>
<td>1.40</td>
</tr>
<tr>
<td>Fourth</td>
<td>4,000</td>
<td>5,000</td>
<td>1.25</td>
</tr>
<tr>
<td>Third</td>
<td>2,900</td>
<td>4,400</td>
<td>1.52</td>
</tr>
<tr>
<td>Second</td>
<td>2,200</td>
<td>4,100</td>
<td>1.86</td>
</tr>
<tr>
<td>Top</td>
<td>1,400</td>
<td>4,400</td>
<td>3.14</td>
</tr>
<tr>
<td>Men</td>
<td>1,300</td>
<td>1,100</td>
<td>0.85</td>
</tr>
<tr>
<td>Women</td>
<td>3,100</td>
<td>5,600</td>
<td>1.81</td>
</tr>
<tr>
<td>Good Health</td>
<td>2,600</td>
<td>4,800</td>
<td>1.85</td>
</tr>
<tr>
<td>Bad Health</td>
<td>3,300</td>
<td>5,000</td>
<td>1.52</td>
</tr>
</tbody>
</table>

**Table:** The costs and benefits of cutting Medicaid by 10%.
<table>
<thead>
<tr>
<th>Permanent Income Quintile</th>
<th>(1) Payment Increase</th>
<th>(2) Compensating Variation</th>
<th>(3) Ratio (2)/(1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bottom</td>
<td>4,700</td>
<td>2,600</td>
<td>0.55</td>
</tr>
<tr>
<td>Fourth</td>
<td>4,200</td>
<td>3,100</td>
<td>0.74</td>
</tr>
<tr>
<td>Third</td>
<td>3,100</td>
<td>3,600</td>
<td>1.16</td>
</tr>
<tr>
<td>Second</td>
<td>2,300</td>
<td>2,900</td>
<td>1.26</td>
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<tr>
<td>Top</td>
<td>1,300</td>
<td>2,600</td>
<td>2.00</td>
</tr>
<tr>
<td>Men</td>
<td>1,400</td>
<td>600</td>
<td>0.43</td>
</tr>
<tr>
<td>Women</td>
<td>3,300</td>
<td>3,500</td>
<td>1.06</td>
</tr>
<tr>
<td>Good Health</td>
<td>2,500</td>
<td>3,000</td>
<td>1.20</td>
</tr>
<tr>
<td>Bad Health</td>
<td>3,500</td>
<td>3,000</td>
<td>0.86</td>
</tr>
</tbody>
</table>

**Table:** The costs and benefits of increasing Medicaid payments by 10%.
<table>
<thead>
<tr>
<th>Permanent Income Quintile</th>
<th>(1) Marginal Valuation</th>
<th>(2) Tax Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bottom</td>
<td>0.55</td>
<td>0.20</td>
</tr>
<tr>
<td>Fourth</td>
<td>0.74</td>
<td>0.29</td>
</tr>
<tr>
<td>Third</td>
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<td>1.01</td>
</tr>
<tr>
<td>Second</td>
<td>1.26</td>
<td>2.00</td>
</tr>
<tr>
<td>Top</td>
<td>2.00</td>
<td>4.59</td>
</tr>
</tbody>
</table>

**Table:** The benefits of increasing Medicaid payments by 10% and their tax cost.
Key Findings

- High income people ...
  - receive significant Medicaid transfers
  - value these transfers a lot
- Medicaid provides valuable insurance and its size is about right.