Financing Medicare: A General Equilibrium Analysis

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The escalation of Medicare costs

Chart B–Social Security and Medicare Cost as a Percentage of GDP

Calendar year

Historical

Estimated

HI + SMI
(including Part D)

OASI + DI


0% 2% 4% 6% 8% 10% 12%

Plan of the paper

- **Question:** What are the macroeconomic and welfare consequences of different financing schemes for Medicare?
Plan of the paper

• **Question:** What are the macroeconomic and welfare consequences of different financing schemes for Medicare?

• **Methodology:**
  - Build a **structural general-equilibrium, overlapping-generations model** of the US economy
  - Parameterize the model based on micro and macro data
  - Simulate US economy for the next 100 years, under different policy scenarios
  - Compute implications for the macroeconomy and for welfare of various demographic groups
Overview of the model

• **Demographics:** OLG of households with uncertain lifetime

• **Working households:** (i) choose consumption/saving and labor supply, and (ii) are subject to labor productivity and health shocks

• **Retired households:** (i) choose consumption/saving, and (ii) are subject to health shocks

• **Technology:** CRS aggregate production function in \((K, L)\)

• **Markets:** Competitive labor, capital (only a risk-free asset) and health insurance markets

• **Government:** (i) progressive taxation, (ii) public debt, (iii) social security, (iv) social assistance (i.e., Medicaid), and (v) Medicare
Demographic structure

- $J$ overlapping generations of households indexed by $j = 1, ..., J$

- Time-varying life-expectancy:
  - Two types of households: low-education and high-education indexed by $e \in \{0, 1\}$
  - Household of type $(e, j)$ at date $t$ survives into age $j + 1$ with probability $\pi_{j,t}^e$
Demographic structure

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- Parameterization: Combine current estimates of age/education specific survival rates with projections on average survival rates by age compiled by SSA
  - Assumption: constant survival differential by education
Survival rates by age and education group

![Graph showing survival rates by age and education group for low and high education groups with data points for 2008 and 2050.]
Health status and medical expenditures

- Households face idiosyncratic fluctuations in health status $h$ driven by Markov chain $\Gamma^j_{h}(h', h)$

- Gross medical expenditures $m$ are random draws from distribution $G^{j,e,h}(m)$
  - Persistence in medical expenditures inherited from persistence in health status

- No feedback from medical expenditures to health status

- No feedback from health status to survival rates
Health insurance

- **Working households** (insurance not a choice):
  - An exogenous fraction is *uninsured*
  - Remaining households are offered *group-insurance* contract covering a fraction $\kappa(m)$ and requiring equilibrium premium $p$
  - If cash-in-hand falls below $\bar{c}$, government pays all residual medical expenditures (i.e., *Medicaid*)
Health insurance

- **Working households** (insurance not a choice):
  - An exogenous fraction is uninsured
  - Remaining households are offered group-insurance contract covering a fraction \( \kappa(m) \) and requiring equilibrium premium \( p \)
  - If cash-in-hand falls below \( \bar{c} \), government pays all residual medical expenditures (i.e., Medicaid)

- **Retired households** (insurance a choice):
  - All entitled to Medicare covering a fraction \( \kappa^{med}(m) \) at the fixed premium \( p^{med} \)
  - They can buy additional private insurance on competitive markets covering \( \kappa^{gap}(m) \) at equilibrium premium \( p^{gap} \)
  - Medicaid (as above)
Labor productivity

• **Endogenous labor supply**: key to quantify *distortions* from higher tax rates needed to fund Medicare
Labor productivity

- **Endogenous labor supply**: key to quantify distortions from higher tax rates needed to fund Medicare

- Define a “household hourly wage” $W_{it}$ measured as household earnings divided by household hours worked

\[
\ln W_{ijt} = \ln w_t + \epsilon_j^e + \omega^e(h_{it}) + \eta_{it}^e
\]

  - Equilibrium price of efficiency unit of labor: $w_t$
  - Age-efficiency profile: $\epsilon_j^e$
  - **Effect of health-status on productivity**: $\omega^e(h_{it})$
  - Idiosyncratic labor productivity shocks: $\eta_{it}^e$
Summary: state variables

1. **Age** affects: 1) survival rates, 2) age-earnings profile, 3) medical expenditures, 4) Medicare entitlement, 5) Social Security entitlement

2. **Education** affects: 1) survival rates, 2) age-earnings profile, and 3) labor-productivity shocks

3. **Health status** affects: 1) labor productivity, 2) medical expenditures

4. **Insurance status** (for working households)

5. **Labor productivity shocks** affect: earnings

6. **Cash-in-hand** affects: entitlement to Medicaid
Micro data source: MEPS

- The Household component of the Medical Expenditure Panel Survey (MEPS) is a representative sample of US families.

- Information on: demographic characteristics, health status, use of medical services, expenditures and source of payments, health insurance coverage, income, etc.

- Data from survey year 2004.

- Two-year panel component useful to estimate: 1) health status dynamics and 2) labor income dynamics.
Health status dynamics

<table>
<thead>
<tr>
<th>Age group</th>
<th>Education</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Low</td>
</tr>
<tr>
<td>Workers 20-64</td>
<td>26.6</td>
</tr>
<tr>
<td>Retirees 65+</td>
<td>44.8</td>
</tr>
</tbody>
</table>

Percentage of households with bad health
Health status dynamics

<table>
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Percentage of households with bad health

Good  Bad

Retirees, Low Edu = \[
\begin{bmatrix}
0.863 & 0.137 \\
0.139 & 0.861 \\
\end{bmatrix}
\]

Retirees, High Edu = \[
\begin{bmatrix}
0.896 & 0.104 \\
0.208 & 0.792 \\
\end{bmatrix}
\]

Transition probabilities across health states
### Effect of health status on productivity

#### Education

<table>
<thead>
<tr>
<th></th>
<th>Low</th>
<th>High</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>2.0774</td>
<td>2.5373</td>
</tr>
<tr>
<td></td>
<td>(0.0233)</td>
<td>(0.0519)</td>
</tr>
<tr>
<td>Age</td>
<td>0.0321</td>
<td>0.0457</td>
</tr>
<tr>
<td></td>
<td>(0.0025)</td>
<td>(0.0050)</td>
</tr>
<tr>
<td>Age²</td>
<td>-0.00050</td>
<td>-0.00079</td>
</tr>
<tr>
<td></td>
<td>(0.00006)</td>
<td>(0.00010)</td>
</tr>
<tr>
<td>Bad health</td>
<td>-0.19803</td>
<td>-0.10470</td>
</tr>
<tr>
<td></td>
<td>(0.02060)</td>
<td>(0.03971)</td>
</tr>
</tbody>
</table>

Dependent variable: log hourly wage
Gross health expenditures: means

<table>
<thead>
<tr>
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<th>Health status</th>
<th>Education</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Low</td>
<td>High</td>
</tr>
<tr>
<td>Workers</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20-64</td>
<td>Good</td>
<td>2,105</td>
</tr>
<tr>
<td>20-64</td>
<td>Bad</td>
<td>6,341</td>
</tr>
<tr>
<td>Retirees</td>
<td></td>
<td></td>
</tr>
<tr>
<td>65+</td>
<td>Good</td>
<td>5,859</td>
</tr>
<tr>
<td>65+</td>
<td>Bad</td>
<td>11,170</td>
</tr>
</tbody>
</table>

Expenditures are expressed in current dollars (2004)
Gross health expenditures: distribution (65+)

**Good Health**

**Bad Health**
### Gross health expenditures: source of coverage (%)

<table>
<thead>
<tr>
<th>Source of Coverage</th>
<th>Workers 20-64</th>
<th>Retired 65+</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>Medicare</td>
<td>4.8</td>
<td>51.0</td>
</tr>
<tr>
<td>Medicaid</td>
<td>11.2</td>
<td>5.7</td>
</tr>
<tr>
<td>Private insurance</td>
<td>55.7</td>
<td>17.0</td>
</tr>
<tr>
<td>Out-of-pocket</td>
<td>19.5</td>
<td>19.3</td>
</tr>
<tr>
<td>Other sources</td>
<td>8.5</td>
<td>6.8</td>
</tr>
</tbody>
</table>

Other sources include payment by other public programs (e.g., community clinics), Workers’ Compensation, Dept. of Veterans Affairs, and Tricare for military.
### MEPS vs National Accounts (1999)

<table>
<thead>
<tr>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
<th>(5)</th>
<th>(6)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>physician &amp; clinical care</td>
<td>prescr. drugs</td>
<td>nursing home</td>
<td>other serv.</td>
<td>Total Personal Health Care</td>
</tr>
<tr>
<td>all</td>
<td>1,744</td>
<td>1,146</td>
<td>482</td>
<td>447</td>
<td>895</td>
</tr>
<tr>
<td>19-64</td>
<td>1,234</td>
<td>944</td>
<td>393</td>
<td>97</td>
<td>685</td>
</tr>
<tr>
<td>65+</td>
<td>4,132</td>
<td>2,092</td>
<td>900</td>
<td>2,087</td>
<td>1,879</td>
</tr>
</tbody>
</table>

Source: Our own calculation from MEPS and Keehan et al. (2004) for National Accounts

- **Severe misalignment** between MEPS and National Accounts
## Health insurance statistics

<table>
<thead>
<tr>
<th></th>
<th>Education Low</th>
<th>Education High</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
<td>32.5</td>
<td>8.9</td>
</tr>
<tr>
<td>Good Health</td>
<td>29.1</td>
<td>7.9</td>
</tr>
<tr>
<td>Bad Health</td>
<td>43.2</td>
<td>16.0</td>
</tr>
</tbody>
</table>

Percentage of uninsured households in working age (20-64)
Aggregate equilibrium targets for 2004

- Health expenditures as fraction of GDP: 16%
- Medicare costs as fraction of GDP: 2.3%
- Social assistance transfers as fraction of GDP: 4%
- Social security outlays as fraction of GDP: 4.2%
- Tax revenues as fraction of GDP: 15.5%
- Capital - output ratio: 3.5
Open issues

- Medicare covers disabled (15% of total Medicare beneficiaries)
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- Modelling insurance markets: pooling or separating equilibrium (by age, education, health status)?
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• Medicare Part D ignored (no micro data...)

Attanasio-Kitao-Violante, “Financing Medicare” – p. 20/21
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• Modelling insurance markets: pooling or separating equilibrium (by age, education, health status)?

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• Projections:
  ▶ Demographics-induced change in health expenditures lower than projections: we need to add cost-inflation
  ▶ Health expenditures determined truly by age or rather by “distance from death”?
Possible policy experiments

- **Benchmark simulation:** increase in Medicare tax needed to finance growth in Medicare costs

- **Additional experiments:**
  - Reduction in Medicare coverage rates $\kappa^{med}(m)$
  - Increase in Medicare premium $p^{med}$
  - Increase in Medicare entitlement age, or means-tested access to Medicare benefits
  - Pre-funding, e.g. private medical expense accounts