Retirement Behavior in the U.S. and Europe

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\textsuperscript{2}Universite du Quebec a Montreal and RAND Corporation

January 2015
Research question: **how do incentives in social insurance programs affect retirement behavior?**

- *Retirement around the world* (Gruber and Wise, 1999)
  - Reduced-form models
  - Clear link between behavior and incentives
  - Do not fit spikes in retirement hazard
  - Difficult to disentangle preferences from constraints

- Structural retirement models
  - Allow evaluation of effects of policy changes
  - Estimation limited to single country (often U.S.)
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Goal: understand preferences and constraints as drivers of international differences in retirement

- Structural retirement model that captures international institutional differences
  - Decisions: labor supply, claiming and saving
  - Exit routes: public pension, private pension, unemployment and disability
- *Estimate* preference parameters using comparable longitudinal data
  - U.S.: Health and Retirement Study (HRS)
  - The Netherlands, Spain, Germany: Survey of Health, Aging and Retirement in Europe (SHARE)
- Compare model fit for common/country-specific preferences
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Preliminary results

- Model with common preferences does *not* fit data
  - Institutional differences not enough to explain variation in saving and labor supply
- Counterfactual simulation: what if Europeans would have U.S. preferences?
  - They would save less (generous pensions)
  - Dutch and Spanish would work more
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Roadmap

1. **Introduction**
   - Motivation
   - Contribution
   - Results

2. **Model**

3. **Data**
   - Data
   - Auxiliary processes

4. **Results**
   - Estimates
   - Model fit
   - Counterfactual simulations

5. **Conclusion**
Overview of model

Dynamic structural model of employment with different exit routes:

- Unitary; discrete time; finite horizon (age 50-100)
- Pay-As-You-Go public pension in all countries (different incentives)

<table>
<thead>
<tr>
<th></th>
<th>United States</th>
<th>The Netherlands</th>
<th>Spain</th>
<th>Germany</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wealth ((w_t))</td>
<td>([0; 10^6])</td>
<td>([0; 10^6])</td>
<td>([0; 10^6])</td>
<td>([0; 10^6])</td>
</tr>
<tr>
<td>Wage ((j_t))</td>
<td>([5; 100])</td>
<td>([5; 100])</td>
<td>([5; 100])</td>
<td>([5; 100])</td>
</tr>
<tr>
<td>Health ((m_t))</td>
<td>(1 = ) poor,</td>
<td>(1 = ) poor,</td>
<td>(1 = ) poor,</td>
<td>(1 = ) poor,</td>
</tr>
<tr>
<td></td>
<td>2 = good</td>
<td>2 = good</td>
<td>2 = good</td>
<td>2 = good</td>
</tr>
<tr>
<td>DB pension ((db_t))</td>
<td>(1 = ) no DB scheme,</td>
<td>(1 = ) no DB scheme,</td>
<td>(1 = ) no DB scheme,</td>
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</tr>
<tr>
<td></td>
<td>2 = DB scheme</td>
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</tr>
<tr>
<td>Benefit level</td>
<td></td>
<td>(yrs\ yrswk_t,)</td>
<td>(yrs\ yrswk_t,)</td>
<td>(pts\ points_t)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(pre\ pre\ yrswk_t)</td>
<td>(pre\ pre\ yrswk_t)</td>
<td></td>
</tr>
<tr>
<td>DI ((di_t))</td>
<td>(1 = ) not eligible,</td>
<td>(1 = ) not eligible,</td>
<td>(1 = ) not eligible,</td>
<td>(1 = ) not eligible,</td>
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<tr>
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<tr>
<td></td>
<td>2 = eligible</td>
<td>4 = fully eligible</td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td></td>
<td></td>
<td>7 = fully eligible</td>
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*Note: The table entries are placeholders for the actual data.*
Preferences

\[ u(c_t, l_t, t) = n_t \frac{((c_t/n_t)^{\kappa}/l_t^{1-\kappa})^{1-\sigma} - 1}{1 - \sigma} \]

- Utility derived from consumption \((c_t)\) and leisure \((l_t)\)

\[ l_t = L_{\text{max}} - h_t - \gamma \mathbb{1} \{ h_t > 0 \} - \phi^{\text{claimdi}t} - \zeta^{\text{claimui}t} \]

\[ h_t \in \{0, 1500, 2000, 2500\} \]

\[ L_{\text{max}} = 4000 \]

- Bequest utility (French, 2005):

\[ b(w_t) = \theta \frac{(w_t + K)^{\kappa(1-\sigma)}}{1 - \sigma} \]
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Decisions

**U.S.**
- Consumption
- Labor supply
- UI
- DI
- DB pension
- Public pension

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- Consumption
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**Germany**
- Consumption
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- UI
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55 ERA DB; 62 NRA DB and ERA SS; 65 NRA SS.

60 ERA DB; 65 NRA DB.

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Budget constraint

\[ x_t = w_t + y^n_t - oop_t \]

\( x_t \) cash-on-hand; \( w_t \) wealth; \( y^n_t \) net income; \( oop_t \) out-of-pocket medical expenditures

- Income from 6 sources:
  \[ y^n_t = \tau(y^e_t, y^{di}_t, y^{db}_t, y^{ui}_t, y^{ss}_t, y^w_t) \]

- Transfers:
  \[ tr_t = \max\{n_t c_{min} - x_t, 0\} \]

- Law of motion of wealth:
  \[ w_{t+1} = w_t + y^n_t + tr_t - c_t - oop_t \]
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Health and mortality

- Future health is uncertain
  - Health determines out-of-pocket expenditures
- First-order Markov process:
  \[
  p_m(m_t, t) = \frac{\exp(\gamma_0 + \gamma_t t + \gamma_m I\{m_t = 2\})}{1 + \exp(\gamma_0 + \gamma_t t + \gamma_m I\{m_t = 2\})}
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  - Certain death at age \( t = 100 \)
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Maximization problem

Value conditional on discrete choice $d$ (claiming and labor supply):

$$V^d(s_{t,k}, m_t) = \max_{c_t} \left\{ u(c_t; d_k, t) \right. \right.$$
$$+ \beta \left[ p_s^k(m_t, t) \mathbb{E} [V(s_{t+1,k})] + (1 - p_s^k(m_t, t)) b(w_{t+1}) \right] \right\}$$

s.t. budget constraints

Unconditional value:

$$V(s_{t,k}, m_t) = \max_{d_k \in D_k(s_{t,k}, m_t)} (V^1(s_{t,k}, m_t), \ldots, V^{D_k}(s_{t,k}, m_t))$$

- Model solved by backward induction on discretized state space
- Common or heterogenous preferences across countries
- Choice sets and constraints vary across countries

international retirement model
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Data

- **U.S.: Health and Retirement Study (HRS)**
  - 1992-2010
- **Europe: Survey of Health, Aging and Retirement in Europe (SHARE)**
  - 2004-2011

**Estimation sample:**
- Auxiliary processes: Men age 50-110
- Initial conditions: Age 50-56, wage worker in first interview
- Germany: only non-civil servants
- Data moments: All individuals from initial conditions
- Older men who worked at age 50
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Figure: Estimated health processes – the probability of being in good health next year as a function of age and current health
Figure: Estimated mortality processes – the probability of dying before next year as a function of age and current health
Out-of-pocket health costs

**Figure:** Estimated out-of-pocket medical spending – average expenditures as a function of age and current health
## Estimates of preference parameters

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Common preferences</th>
<th>United States</th>
<th>the Netherlands</th>
<th>Spain</th>
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</tr>
</thead>
<tbody>
<tr>
<td>$\sigma$ – concavity utility</td>
<td>3.85</td>
<td>4.95</td>
<td>4.99</td>
<td>4.55</td>
<td>4.53</td>
</tr>
<tr>
<td>$\gamma$ – fixed cost work (hrs)</td>
<td>628.4</td>
<td>669.7</td>
<td>1715.6</td>
<td>1179.7</td>
<td>12.4</td>
</tr>
<tr>
<td>$\kappa$ – consumption share</td>
<td>0.52</td>
<td>0.72</td>
<td>0.46</td>
<td>0.57</td>
<td>0.71</td>
</tr>
<tr>
<td>$\phi$ – stigma DI (hrs)</td>
<td>3546.1</td>
<td>3779.9</td>
<td>3451.9</td>
<td>1192.8</td>
<td>3411.6</td>
</tr>
<tr>
<td>$\zeta$ – stigma UI (hrs)</td>
<td>3695.1</td>
<td>3999.6</td>
<td>4000.0</td>
<td>2785.8</td>
<td>3568.3</td>
</tr>
<tr>
<td>$\beta$ – discount factor</td>
<td>0.50</td>
<td>0.86</td>
<td>0.50</td>
<td>0.52</td>
<td>0.998</td>
</tr>
<tr>
<td>$\theta$ – bequest weight</td>
<td>753.8</td>
<td>2099.8</td>
<td>14.0</td>
<td>571.8</td>
<td>2681.3</td>
</tr>
<tr>
<td>$K$ – beq. concavity (10,000 $)</td>
<td>144.3</td>
<td>39.6</td>
<td>56.0</td>
<td>166.4</td>
<td>2.63</td>
</tr>
<tr>
<td>Number of individuals</td>
<td>10,866</td>
<td>7,727</td>
<td>1,432</td>
<td>1,219</td>
<td>488</td>
</tr>
<tr>
<td>Number of observations</td>
<td>42,749</td>
<td>37,833</td>
<td>2,348</td>
<td>1,729</td>
<td>839</td>
</tr>
<tr>
<td>Objective function</td>
<td>4,736.5</td>
<td>221.0</td>
<td>103.7</td>
<td>99.8</td>
<td>200.5</td>
</tr>
</tbody>
</table>

ESTIMATES ARE PRELIMINARY – PLEASE DO NOT QUOTE
Standard errors to be added.
Model fit – net wealth quartiles

Figure: Data and simulated moments – net wealth
Model fit – average hours worked

Figure: Data and simulated moments – hours worked
U.S. preferences in all countries

Figure: Counterfactual simulations – U.S. preferences (median wealth)
U.S. preferences in all countries

Figure: Counterfactual simulations – U.S. preferences (mean hours worked)
Model with common preferences does not fit data
  - Institutions not enough to explain variation in saving and labor supply
Models with country-specific preferences do provide good fit
  - Exception: Germany (hard to rationalize high labor supply)
If Europeans would have U.S. preferences they would...
  - ...save less (generous welfare states)
  - ...work more (NL and SP)
Conclusion (preliminary)

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- Add exogenous income of spouse
- Analyze identification
  - Estimate model for different risk aversions
  - Estimate model for different discount factors
  - Add moments (condition on wage tertiles?)
- Finer discretization of state space
- ... (suggestions welcome)
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