Changes in the income distribution of the Dutch elderly between 1989-2020: a microsimulation

European Workshop on Dynamic microsimulation modelling, 4-5 March 2010
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Network for Studies on Pensions, Aging and Retirement
Motivation

“Run! 73 million baby boomers are about to retire!”

European Workshop on Dynamic microsimulation modelling, 4-5 March 2010 – 2 / 24
‘Commissie Goudswaard’: sustainability of the second pillar pension system. Trade-off pension ambition and pension risk

Description of the income distribution of previous and next generations of retirees

- Longevity
- Demographic composition
- Labour market positions
Predictions of income and inequality

The Netherlands

Other countries
Flood et al. (2006): The income of the Swedish baby boomers.

Our contribution:
- Predict future income distribution of elderly in the Netherlands using a dynamic microsimulation model, taking into account unobserved heterogeneity, and persistency and heteroskedasticity of income shocks.
Dutch income panel 1989-2007 (Inkomens Panelonderzoek, IPO)

- Administrative data
- Follows households and their income over time
- Attrition only as a result of emigration or death
- Institutional households are included

Population register 1995-2007 (Gemeentelijke Basis Administratie, GBA)
Composition age 65-90

- State Pension
- Occupational Pension
- Labour
- Capital income and profit
- Transfer income
Model classification

Source: Dekkers and Belloni (2008). A classification and overview of micro simulation models, and the choices made in MIDAS.
Microsimulation model

Motivation
Outline
Literature
Data
Model
Classification
Scheme

Income equation
Income shocks
Transition models
Differential mortality

Estimation results
Simulation results
Conclusion

GBA 1995-2007
IPO 1989-2007

transition models

parameters

income equation

parameters

residuals

households
2007

ageing module

repeated loop until 2020

data $t+1$

income module

income of all (representative) household until 2020
Income equation

Income equation, FE model

\[ y_{it} = \alpha + \beta x_{it} + \mu_i + \nu_{it} \]  

Three specifications:

1. Age and period effects (Deaton Paxson, 1994)
2. + Demographic variables
3. + Labour market status
Income shocks

Error terms might follow an autoregressive scheme

$$v_{it} = \rho_{it,1}v_{i,t-1} + \rho_{2}v_{i,t-2} + \epsilon_{it}$$ (2)

Persistency of a shock may depend on age

$$\rho_{it,1} = \rho_{0,1} + \rho_{1,1}(age_{it}/10) + \rho_{2,1}(age_{it}/10)^2$$ (3)

Future income shocks are drawn from the empirical distribution of idiosyncratic residuals. Distribution of income shocks may be different for households with different characteristics.
Transition models

- Marital status
- Children
- Labour market status

Multinomial logit models

Labour market choices of couples are interrelated
When we do not take differential mortality into account:
- low income households would survive relatively often,
- high income households would survive relatively less often.

Kalwij et al. (2009) find Q1/Q4
- men: 2.2
- women: 1.7
Coefficients income equation

- Age coefficients

- Demographic variables
- Labour market status
Persistency of income shocks

\[ v_{it} = \rho_{it,1} v_{i,t-1} + \rho_{2} v_{i,t-2} + \epsilon_{it} \]

<table>
<thead>
<tr>
<th>[ \rho_{it,1} ]</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Graph" /></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>[ \rho_2 ]</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.06 ( (0.001) )</td>
</tr>
</tbody>
</table>
Standard deviation of residuals is 40% higher in ‘young’ households (age key person ≤ 65), and is higher in households without labour or occupational pension income.

→ incorporate higher income shocks for younger households and for households without labour and/or occupational pension income.
Widowhood and occupational pensions

<table>
<thead>
<tr>
<th>Year</th>
<th>Widows (%)</th>
<th>Occupational pension men (%)</th>
<th>women (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008</td>
<td>39.5</td>
<td>87.0</td>
<td>54.0</td>
</tr>
<tr>
<td>2009</td>
<td>39.0</td>
<td>87.5</td>
<td>54.8</td>
</tr>
<tr>
<td>2010</td>
<td>37.7</td>
<td>88.0</td>
<td>55.3</td>
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<tr>
<td>2011</td>
<td>36.9</td>
<td>88.0</td>
<td>56.1</td>
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<tr>
<td>2012</td>
<td>35.7</td>
<td>87.6</td>
<td>56.9</td>
</tr>
<tr>
<td>2013</td>
<td>34.7</td>
<td>88.1</td>
<td>58.5</td>
</tr>
<tr>
<td>2014</td>
<td>33.8</td>
<td>88.8</td>
<td>60.1</td>
</tr>
<tr>
<td>2015</td>
<td>33.3</td>
<td>88.9</td>
<td>62.0</td>
</tr>
<tr>
<td>2016</td>
<td>32.8</td>
<td>89.5</td>
<td>63.9</td>
</tr>
<tr>
<td>2017</td>
<td>32.2</td>
<td>89.8</td>
<td>65.4</td>
</tr>
<tr>
<td>2018</td>
<td>31.5</td>
<td>90.0</td>
<td>67.3</td>
</tr>
<tr>
<td>2019</td>
<td>31.1</td>
<td>90.6</td>
<td>68.6</td>
</tr>
<tr>
<td>2020</td>
<td>30.8</td>
<td>90.9</td>
<td>70.4</td>
</tr>
</tbody>
</table>
Income predictions per age and cohort

Mean income retirees: +12-15%
Income growth age 65-90

Income growth

Theil decomposition

Results
Theil decomposition

Increasing inequality between households with and without occupational pension income?

(Polarization in the distribution of work in Britain, Gregg and Wadsworth, 2004)

Theil index

\[ T = \frac{1}{N} \sum_{i=1}^{N} \frac{y_i}{\bar{y}} \log \left( \frac{y_i}{\bar{y}} \right) \]  

(4)

can be rewritten as

\[ T = (s_1 T_1 + s_2 T_2) + (s_1 \log(\frac{\bar{y}_1}{\bar{y}}) + s_2 \log(\frac{\bar{y}_2}{\bar{y}})) \]  

(5)

within group inequality + between group inequality
Results Theil decomposition

Table 2: Theil decomposition

<table>
<thead>
<tr>
<th>Year</th>
<th>2010</th>
<th>2015</th>
<th>2020</th>
</tr>
</thead>
<tbody>
<tr>
<td>% Households without occ. pension</td>
<td>21</td>
<td>18</td>
<td>15</td>
</tr>
<tr>
<td>Average income, households without occ. pension</td>
<td>12608</td>
<td>13448</td>
<td>13859</td>
</tr>
<tr>
<td>Average income, households with occ. pension</td>
<td>14825</td>
<td>15776</td>
<td>16030</td>
</tr>
<tr>
<td>Theil index, households without occ. pension</td>
<td>0.033</td>
<td>0.039</td>
<td>0.039</td>
</tr>
<tr>
<td>Theil index, households with occ. pension</td>
<td>0.013</td>
<td>0.016</td>
<td>0.022</td>
</tr>
<tr>
<td>Within group inequality</td>
<td>0.0167</td>
<td>0.0197</td>
<td>0.0240</td>
</tr>
<tr>
<td>Between group inequality</td>
<td>0.0020</td>
<td>0.0017</td>
<td>0.0012</td>
</tr>
<tr>
<td>% Between group inequality</td>
<td>11</td>
<td>8</td>
<td>5</td>
</tr>
</tbody>
</table>

This table concentrates on the lower half of the distribution and shows the inequality within and between households with and without occupational pension income.
Conclusion

For adequate policies insights into the income distribution of current and next generations of pensioners is necessary.

Less widows. More women occupational pension.

Next generations of retirees have higher incomes. 2008-2020: +12-15%

Inequality increases in lower part of the distribution, decreases in upper part. Inequality between households with occupational pension and inactive households will not increase.

“Fiscalisation”: majority of future retirees will be considerably wealthier than the current ones. This does not increase inequality at the lower part of the distribution further.
## Simulation results age 65-90

<table>
<thead>
<tr>
<th>Year</th>
<th>Mean</th>
<th>p10</th>
<th>p50</th>
<th>p90</th>
<th>p90/p10</th>
<th>p90/p50</th>
<th>p50/p10</th>
<th>Gini</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008</td>
<td>20267</td>
<td>12214</td>
<td>17805</td>
<td>31156</td>
<td>2.55</td>
<td>1.75</td>
<td>1.46</td>
<td>0.225</td>
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<tr>
<td>2009</td>
<td>20611</td>
<td>12147</td>
<td>18122</td>
<td>31940</td>
<td>2.63</td>
<td>1.76</td>
<td>1.49</td>
<td>0.230</td>
</tr>
<tr>
<td>2010</td>
<td>20875</td>
<td>12280</td>
<td>18443</td>
<td>32162</td>
<td>2.62</td>
<td>1.74</td>
<td>1.50</td>
<td>0.229</td>
</tr>
<tr>
<td>2011</td>
<td>21252</td>
<td>12377</td>
<td>18862</td>
<td>32715</td>
<td>2.64</td>
<td>1.73</td>
<td>1.52</td>
<td>0.229</td>
</tr>
<tr>
<td>2012</td>
<td>21508</td>
<td>12437</td>
<td>19188</td>
<td>33144</td>
<td>2.66</td>
<td>1.73</td>
<td>1.54</td>
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<tr>
<td>2013</td>
<td>21754</td>
<td>12522</td>
<td>19396</td>
<td>33332</td>
<td>2.66</td>
<td>1.72</td>
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<td>0.229</td>
</tr>
<tr>
<td>2014</td>
<td>21951</td>
<td>12734</td>
<td>19612</td>
<td>33716</td>
<td>2.65</td>
<td>1.72</td>
<td>1.54</td>
<td>0.227</td>
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<tr>
<td>2015</td>
<td>22212</td>
<td>12829</td>
<td>19890</td>
<td>34059</td>
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<td>1.71</td>
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<td>12836</td>
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<td>22672</td>
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<td>2.66</td>
<td>1.69</td>
<td>1.58</td>
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<tr>
<td>2020</td>
<td>22874</td>
<td>12976</td>
<td>20632</td>
<td>34925</td>
<td>2.69</td>
<td>1.69</td>
<td>1.59</td>
<td>0.230</td>
</tr>
</tbody>
</table>

*Specification 3*