The effect of pension reforms on old-age income inequality.

Stefan Etgeton (DIW Berlin & FU Berlin)
The shift of the normal retirement age (NRA) ↑ is meant to incentivize individuals to work longer (in GER, UK, ITA, ...)
However, incentives come to nothing if there’s no choice (lay-offs, expiring contracts, plant closures and suspensions)
Poor people usually face a higher risk of involuntary job loss
Labor market frictions are relevant in GER

Every year 5% of W-German men aged 60+ involuntarily lose jobs (SOEP): Primarily low-paid and low educated workers, migrants and those on temporary contracts.

At age 60+, becoming unemployed $\approx$ end of working life (less than 10% ever find a job again)
The German statutory pension scheme

- Little redistributive elements; pension benefits are linked proportionally to life time labor income
- Early retirement implies actuarial deductions
- Pension benefits are the most important income source of the elderly

⇒ Early career endings are costly
Research questions

→ Accounting for labor market frictions, how will upward-shifting the NRA from 65 to 67 affect retirement timing and benefit levels?

→ Will already poverty-vulnerable groups be affected differently?
A Dynamic Discrete Choice Model of Retirement – Structure

- Flow Utilities
- Value Functions
- Intuition

Work

Work?

Involuntary Job Loss

Unemployment

Retirement

Φ

No Frictions

1 − Φ

Frictions

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Data

- Precise administrative panel data set of Federal Employment Agency and Pension Scheme
- All in all, 6621 person-year observations from ages 60-65 of 2439 W-German men of cohorts 1940-44 who still worked when aged 60 → positively selected sample
- Probability of labor market frictions, Φ, imputed using SOEP-survey data
- Likewise, wealth and homeownership imputed using the SOEP
Model Fit: Survival Function — Share of People Employed
Simulating a shift of the NRA from 65→67:

How are retirement age and benefits goin to be affected?

Procedure: Take estimated model parameters and apply to changed incentive context.
Survival Function, NRA65 $\rightarrow$ NRA67, Simulation

[Graph showing survival function with two lines labeled reg67 and reg65.]
Simulation: retirement age and pension benefits, averages

<table>
<thead>
<tr>
<th>Simulation (100k draws, cohorts 43-44)</th>
<th>NRA65</th>
<th>NRA67</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age at exit from employment</td>
<td>62.96</td>
<td>63.56</td>
</tr>
<tr>
<td>Age at legal retirement</td>
<td>63.63</td>
<td>64.26</td>
</tr>
<tr>
<td>Pension benefits [EUR]</td>
<td>1327</td>
<td>1296</td>
</tr>
</tbody>
</table>
Are effects heterogeneous?

Procedure: Splitting the sample in 10%-blocks along projected pension benefits (NRA65); Thus, there’s deciles running from 1 (around 700EUR) to 10 (around 1800EUR)
Age at employment exit: NRA65→NRA67

Share of winners qua benefit level

INTRODUCTION  MODEL  DATA  ESTIMATION  SIMULATION  CONCLUSION

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Projected pension benefits — Reducing frictions

- benefits – disutility of work

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Pension Reform & Inequality
Table: Inequality of Monthly Pension Benefits

<table>
<thead>
<tr>
<th></th>
<th>NRA65</th>
<th>NRA67</th>
<th>NRA67$_{\nu \downarrow}$</th>
<th>NRA67</th>
<th>NRA67$_{\nu \downarrow}$</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Baseline</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>90/10 ratio</td>
<td>1.984</td>
<td>2.028</td>
<td>2.039</td>
<td>1.994</td>
<td>1.996</td>
</tr>
<tr>
<td>90/50 ratio</td>
<td>1.309</td>
<td>1.321</td>
<td>1.325</td>
<td>1.315</td>
<td>1.315</td>
</tr>
</tbody>
</table>

Note: 100,000 draws. Measured at age 67 (after everybody retired).
Conclusion

- Labor market frictions hamper the behavioral reaction to an increase of the NRA – in a heterogeneous way.
- Already poverty-vulnerable workers suffer the highest relative losses to their pension benefits.
- The 90/10 ratio of pension benefits is increased – and an homogeneous decrease of the disutility of work will not alter this trend.
Thank you for your attention!
APPENDIX
Individuals are making decisions trying to maximize their discounted life time utility.

Each period, individuals involuntarily lose jobs with probability \( \Phi \). The probability \( \Phi \) is derived by regressing involuntary job losses on various socio-demographics and varies from 3-28%.

Not losing jobs allows for quitting nevertheless, but it also allows for continuing employment.

Employment reduces deductions and implies labor income, contributions and working disutility.

Working disutility linearly rises with age.
Both voluntary and involuntary job losses allow for a transition to both unemployment and retirement.

UI benefit receipt is *stigmatizing*. The eventual transition into retirement is deterministic (eligibility varies from 12-32 month).

Retirement is an *absorbing state*.

Thus, practically I model the exit from employment and the following first choice whether to retire or take up UI benefits — the rest is deterministic.
Flow Utilities

\[ u_W = \frac{(Y_w + H + I)^{1-\gamma} - 1}{1 - \gamma} + \nu_k + \epsilon_W \] (1)

with \( \nu_k = c_{1,k} + \alpha \cdot (a - 60) + \beta_1 X_1 \)

\[ u_U = \frac{(Y_{ui} + H + I)^{1-\gamma} - 1}{1 - \gamma} + \tau_{stigma} + \epsilon_U \] (2)

with \( \tau_{stigma} = c_2 + \beta_2 x_2 \)

\[ u_R = \frac{(Y_r + H + I)^{1-\gamma} - 1}{1 - \gamma} + \epsilon_R \] (3)

with primary income \( Y \), interest income \( I \), rent imputation for owner-occupied houses \( H \). Disutility of work \( \nu_k, k = \{ \text{Type1}, \text{Type2} \} \), age \( a \) and \( X_1 = \text{Unskilled}, \text{SkilledBlueColl}, \text{WhiteColl}, \text{German} \). \( \tau_{stigma} \) with \( x_2 = \) (in Firm > 5yrs); \( \epsilon_R, \epsilon_U, \epsilon_W \sim \text{EV1} \).
Value functions of work, unemployment and retirement

\[ V_{a}^{W} = u_{W} + \delta \cdot \pi_{a+1|a} \cdot [\Phi_{a+1} \cdot E \max\{V_{a+1}^{U}, V_{a+1}^{R}\}] \\
+ (1 - \Phi_{a+1}) \cdot E \max\{E \max\{V_{a+1}^{U}, V_{a+1}^{R}\}, V_{a+1}^{W}\} \]  \hspace{1cm} (4)

\[ V_{a}^{U} = u_{U} + \sum_{t=a+1}^{t_{u}} \delta^{t-a} \cdot \pi_{t|a} \cdot E[u_{U}] + \sum_{t=t_{u}+1}^{T} \delta^{t-a} \cdot \pi_{t|a} \cdot E[u_{R}] \]

Unemployment until \( t_{u} \) \hspace{5cm} Pension from \( t_{u} + 1 \) on

(5)

\[ V_{a}^{R} = u_{R} + \sum_{t=a+1}^{T} \delta^{t-a} \cdot \pi_{t|a} \cdot E[u_{R}] \]  \hspace{1cm} (6)

with discount factor: \( \delta = 0.94 \), Survival Prob \( a \to t \): \( \pi_{t|a} \), Prob of involunt. job loss: \( \Phi \)
Likelihood

Individual and type-specific choice probabilities

\[ P^W_k = (1 - \Phi) \cdot Pr(\bar{V}^W < V^W) \]  \hspace{1cm} (7)
\[ P^U_k = \langle \Phi + (1 - \Phi) \cdot Pr(\bar{V}^W > V^W) \rangle \cdot Pr(V^U > V^R) \]  \hspace{1cm} (8)
\[ P^R_k = \langle \Phi + (1 - \Phi) \cdot Pr(\bar{V}^W > V^W) \rangle \cdot Pr(V^U < V^R). \]  \hspace{1cm} (9)

that are summed up individual-wise over types and age

\[ l_i = \sum_{k=1}^{2} p_k \prod_{\text{age}} P^C_{i,k} \]  \hspace{1cm} (10)

\[ \Rightarrow LL = \sum_{i=1}^{N} \log l_i \]  \hspace{1cm} (11)
Estimation

- Recursive calculation of value functions
- Assumptions on error terms allow for closed form solutions
- Identification of parameters eased through both cross-sectional and policy variation (Phase-in of early retirement deductions)
- Maximum Likelihood Estimation
### Parameter Estimates

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
<th>Std.Dev.</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\gamma$</td>
<td>2.46</td>
<td>0.27</td>
<td>Risk aversion</td>
</tr>
<tr>
<td>$p_1$</td>
<td>0.46</td>
<td>0.18</td>
<td>$\Pr(\text{Type1})$</td>
</tr>
<tr>
<td>$\alpha(\text{Alter})$</td>
<td>0.64</td>
<td>0.08</td>
<td></td>
</tr>
<tr>
<td>$c_{1,\text{Typ1}}$</td>
<td>-5.07</td>
<td>0.37</td>
<td>disutility $\nu$</td>
</tr>
<tr>
<td>$c_{1,\text{Typ2}}$</td>
<td>-.66</td>
<td>0.25</td>
<td></td>
</tr>
<tr>
<td>$\beta_{\nu,0}$ (White Coll)</td>
<td></td>
<td></td>
<td>Base cat.</td>
</tr>
<tr>
<td>$\beta_{\nu,1}$ (Unskilled)</td>
<td>1.40</td>
<td>0.16</td>
<td></td>
</tr>
<tr>
<td>$\beta_{\nu,2}$ (Skilled Blue Coll)</td>
<td>0.17</td>
<td>0.18</td>
<td></td>
</tr>
<tr>
<td>$\tau : c_2 + \beta_\tau X_2$</td>
<td>0.62</td>
<td>0.26</td>
<td>UI stigma</td>
</tr>
<tr>
<td>$\delta = 0.94$, N=6,000</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Model Fit: Survival Function — Share of People Employed
Hazard Rate, Sample and Prediction

Pathways R1 & R2 summed up; Pr of Job Loss for comparison
Survival Function: Influence of Frictions
Central characteristics along benefit deciles, Age 60
Employment Exit along Deciles, Varying Frictions

Pension Benefit Deciles (based on NormRetAge=65)
Untimely Career Endings — The Role of Frictions, NRA65

Variation of Frictions, NRA67
### Table: Winners along Deciles [in %]

<table>
<thead>
<tr>
<th>Decile</th>
<th>Change&gt;0EUR</th>
<th>Change&gt;50EUR</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>28</td>
<td>16</td>
</tr>
<tr>
<td>2</td>
<td>29</td>
<td>21</td>
</tr>
<tr>
<td>3</td>
<td>30</td>
<td>22</td>
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<td>4</td>
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<td>5</td>
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<td>7</td>
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<td>9</td>
<td>35</td>
<td>29</td>
</tr>
<tr>
<td>10</td>
<td>35</td>
<td>30</td>
</tr>
</tbody>
</table>

### Table: Winners along Socio-Demographics [in %]

<table>
<thead>
<tr>
<th>White Coll.</th>
<th>Skill. Lab</th>
<th>Unsk. Lab</th>
<th>Type1</th>
<th>Type2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Change&gt;0</td>
<td>36</td>
<td>31</td>
<td>29</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>54</td>
</tr>
</tbody>
</table>
Projected pension benefits — Reducing the disutility of work by the equivalence of 2 years of age