The Effect of Partial Retirement on the Labor Supply of Elderly Employees in Germany

Songül Tolan
Outline

1. Introduction
2. Institutional Background
3. Model
4. Data
5. Results
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7. Summary
Motivation I

Population aging puts pressure on pay-as-you-go funded public pension systems
Motivation II

Demographic development of working population 2000-2015

- aged 55-64 of all working
- aged 25-54 of all working
- working 55-64 of population 55-64
- working 25-54 of population 25-54

Source: Own calculations based on German Statistical Office
Motivation I

- Population aging puts pressure on pay-as-you-go funded public pension systems
- Policy strategy that aims at encouraging later transitions into retirement: Allowing for partial retirement
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Motivation I

► Population aging puts pressure on pay-as-you-go funded public pension systems
► Policy strategy that aims at encouraging later transitions into retirement: Allowing for partial retirement
► Effects are ambiguous
  ► Positive if partial retirement substitutes early retirement or unemployment
  ► Negative if it crowds out full-time employment
Motivation III

**Table:** Quasi-experimental empirical literature on labour supply effects of partial retirement

<table>
<thead>
<tr>
<th>Author</th>
<th>Country</th>
<th>Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ghent et al. (2001)</td>
<td>University of North Carolina</td>
<td>−</td>
</tr>
<tr>
<td>Wadensjö (2006)</td>
<td>Sweden</td>
<td>+</td>
</tr>
<tr>
<td>Graf et al. (2011)</td>
<td>Austria</td>
<td>−</td>
</tr>
<tr>
<td>Berg et al. (2015)</td>
<td>Germany</td>
<td>+</td>
</tr>
<tr>
<td>Huber et al. (2016)</td>
<td>Germany (east)</td>
<td>+</td>
</tr>
<tr>
<td>Huber et al. (2016)</td>
<td>Germany (west)</td>
<td>0</td>
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</table>
Research Approach
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- Labor supply effects depend on the **structure** of the partial retirement program
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- Retirement decisions contain a **dynamic** perspective

→ **Dynamic structural retirement model with partial retirement**
- Structure of the particular partial retirement program can be explicitly modeled
- Decisions are considered in a dynamic framework
- Allows for **ex ante** policy simulation
Research Question

What is the effect of partial retirement on retirement age / average age at labor market exit?

How do effects of different retirement policies differ with partial retirement?

Adjust early retirement age for unemployed / partial retirees to regular early retirement age

Increase normal retirement age from 65 to 67
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- Dynamic structural retirement models
  - (Rust, 1989; Stock and Wise, 1990; Rust and Phelan, 1997; Benitez-Silva, 2000; Heyma, 2004; Karlstrom et al., 2004; French, 2005; Blau, 2008)
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- Alternative paths into retirement
  - (Staubli, 2011; Inderbitzin et al., 2016)
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➤ Alternative paths into retirement
  ➤ (Staubli, 2011; Inderbitzin et al., 2016)

➤ Effects of an increase in early or normal retirement age
  ➤ (Duggan et al., 2007; Li and Maestas, 2008; Staubli and Zweimüller, 2013; Atalay and Barrett, 2015)
Institutional Background

- Pay-as-you-go funded pension system
- Pension level is determined by employment history and lifetime income
- Normal retirement age is 65
- Early retirement age after full-time employment is 63
- Studied cohorts can opt for early retirement at 60 after unemployment or partial retirement
- Deductions of 0.3% for each month of retirement prior normal retirement age
Partial Retirement

- Altersteilzeit (ATZ) policy introduced in 1996
- Reduction of work hours by 50% for every employee aged 55 and older
- Not legally binding, option for ATZ depends on employer-employee agreements
- Subsidies for ATZ
  - Minimum compensation of 20% for wage loss
  - Minimum compensation of 40% for pension contributions
Retirement after Unemployment

- Workers are eligible to 18-32 months of unemployment insurance (UI) receipt, depending on employment history.
- Studied cohorts can enter retirement after unemployment at age 60.
- Allows factual labor market exit at age 58.
- About 60% replacement rate of previous net earnings.
- 80% of previous pension contributions during UI receipt.
Basic Settings

- Forward-looking individual maximizes present discounted utility
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- Utility depends on consumption ($C_{it}$) and different preferences for employment states ($\Gamma_{it}^k$)
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- Individual’s horizon $= [55,100]$; decision horizon $[55,65]$
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- Individual’s horizon $= [55,100]$; decision horizon $[55,65]$.
- Everyone is retired at age 65.
Basic Settings

- Forward-looking individual maximizes present discounted utility
- Utility depends on consumption \( (C_{it}) \) and different preferences for employment states \( (\Gamma_{it}^k) \)
- Individual’s horizon = [55,100]; decision horizon [55,65]
- Everyone is retired at age 65
- Annual decision between continue working and labor market exit through different retirement paths
Structure of the decision problem

unemployment
before 58

Φ^u_{it}

work
from 54

Φ^p

partial retirement
for 1-6 years

unemployment
from 58
for 0-3 years

Φ^u_{it}

retirement
from 60

retirement
from 63

Source: Own illustration
Utility Function

\[ U_{it}^k = \frac{(C_{it}^k)^{(1-\rho)} - 1}{1 - \rho} + \Gamma_{it}^k(X_{it}^k) + \epsilon_{it}(d_{it}) \]  

\( \rho \) is CRRA parameter
\( \epsilon_{it} \) is a TIEV error
\( \Gamma_{it}^k \) is preference of different employment states \( k \)
\( X_{it}^k \) are personal characteristics for different employment states \( k \)
State-specific preferences

\[ \Gamma_{it}(X_{it}^k) = \begin{cases} 
0 & \text{if } k = f \\
\Lambda_{it} & \text{if } k = r \\
\Theta_{it} & \text{if } k = p \\
\Upsilon_{it} & \text{if } k = u 
\end{cases} \]  

and

\[ \Lambda_{it} = \lambda_0 + \lambda_1 \cdot (age_{it} - 54) \]  
\[ \Theta_{it} = \theta_0 + \theta_1 \cdot educ_i \]  
\[ \Upsilon_{it} = \nu_0 + \nu_1 \cdot 1[age \geq 60] \cdot (age_{it} - 59) \]
Budget Constraint I

- Full-time employment

\[ y_{it+1}^f = G^1((1 + g)w_{it}^f) \] (6)
Budget Constraint I

- **Full-time employment**

  \[ y_{it+1}^f = G^1((1 + g)w_{it}^f) \]  

- **Partial Retirement**

  \[ y_{it+1}^p = G^1((\frac{1}{2} + sub_j^w)w_{it}^f) \]
Budget Constraint II

- **Unemployment**

\[ y_{it+1}^U = 0.6 \cdot (G^1((1 + g)w_{it}^f)) \]  

(8)
Budget Constraint II

- **Unemployment**

\[ y_{it+1}^u = 0.6 \cdot (G^1((1 + g)w_{it})) \]  

- **Retirement**

\[
pp_{it} = \begin{cases} 
pp_{it-1} + G^2(y_{it}^f) & \text{if } k_t = f \\
p_{it-1} + ((\frac{1}{2} + sub_j^r))G^2(y_{it}^p) & \text{if } k_t = p \\
G^2(y_{it}^u) & \text{if } k_t = u
\end{cases}
\]
Data

- Biographical Data of Social Insurance Agencies in Germany (BASiD, version 1951-2009)
- Combines data from Statutory Pension Insurance and Federal Employment Agency
- Sample:
  - Not eligible for disability insurance, no registered health shocks
  - At least five contribution years to statutory pension fund
  - Full-time employed at age 54
  - At least two years tenure
- 5012 individuals with 2832 observed retirement entries
## Descriptive Statistics I

**Table**: Summary statistics by retirement path

<table>
<thead>
<tr>
<th></th>
<th>Regular</th>
<th>Unemployment</th>
<th>ATZ</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mean</strong></td>
<td><strong>St. Dev</strong></td>
<td><strong>Mean</strong></td>
<td><strong>St. Dev</strong></td>
</tr>
<tr>
<td>Ret. age</td>
<td>64.189</td>
<td>0.865</td>
<td>61.360</td>
</tr>
<tr>
<td>Pension (mon)</td>
<td>1362.783</td>
<td>360.125</td>
<td>1161.962</td>
</tr>
<tr>
<td>Pension points</td>
<td>54.154</td>
<td>14.298</td>
<td>52.597</td>
</tr>
<tr>
<td>German</td>
<td>0.815</td>
<td>0.388</td>
<td>0.855</td>
</tr>
<tr>
<td>Education</td>
<td>2.701</td>
<td>1.533</td>
<td>2.457</td>
</tr>
<tr>
<td>Contrib. years</td>
<td>44.985</td>
<td>6.511</td>
<td>43.921</td>
</tr>
<tr>
<td>$U_{pr}$</td>
<td>0.015</td>
<td>0.023</td>
<td>0.030</td>
</tr>
<tr>
<td><strong>N</strong></td>
<td>1253</td>
<td>763</td>
<td>816</td>
</tr>
</tbody>
</table>

Source: Own calculations based on BASID
Descriptive Statistics II

Retirement entry by age

Source: Own calculations based on BASID sample with monthly observations
Descriptive Statistics III

Relative shares in employment by age and retirement path

Source: Own calculations based on BASID, Shares are relative to the retirement path group size
## Model Estimates

**Table: Structural parameters**

<table>
<thead>
<tr>
<th></th>
<th>Value</th>
<th>Std.Err</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Utility function</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$\beta$</td>
<td>0.95</td>
<td>-</td>
</tr>
<tr>
<td>$\rho$</td>
<td>2.6659***</td>
<td>0.0071</td>
</tr>
<tr>
<td><strong>Retirement</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$\lambda_0$</td>
<td>0.5517***</td>
<td>0.0148</td>
</tr>
<tr>
<td>$\lambda_1$</td>
<td>0.0016</td>
<td>0.0230</td>
</tr>
<tr>
<td><strong>Partial retirement</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$\theta_0$</td>
<td>0.4918***</td>
<td>0.0102</td>
</tr>
<tr>
<td>$\theta_1$</td>
<td>0.0325***</td>
<td>0.0096</td>
</tr>
<tr>
<td><strong>Unemployment</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$\upsilon_0$</td>
<td>1.5539***</td>
<td>0.0045</td>
</tr>
<tr>
<td>$\upsilon_1$</td>
<td>-0.6227***</td>
<td>0.0056</td>
</tr>
<tr>
<td>$|l|$</td>
<td>-13545</td>
<td></td>
</tr>
</tbody>
</table>

*, ** and *** denote significance level of 10%, 5% and 1%, respectively.
Model Fit

(a) Full-time

(b) Retirement

(c) Partial Retirement

(d) Unemployment
Policy Simulation: 100% access to partial retirement

(a) Full-time

(b) Retirement

(c) Partial retirement

(d) Unemployment
Policy Simulation: No early retirement for retirement after unemployment/ATZ

(a) Full-time

(b) Retirement

(c) Partial retirement

(d) Unemployment
Policy Simulation: 100% access to partial retirement and no early retirement for retirement after unemployment/ATZ

(a) Full-time

(b) Retirement

(c) Partial retirement

(d) Unemployment
Table: Summary: retirement and employment exit ages

<table>
<thead>
<tr>
<th>ATZ access: 35%</th>
<th>ATZ access: 100%</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Ret. age</td>
</tr>
<tr>
<td>Basic</td>
<td>62.77</td>
</tr>
<tr>
<td>No early ret.</td>
<td>63.81</td>
</tr>
<tr>
<td>NRA 67</td>
<td>63.34</td>
</tr>
<tr>
<td>NRA 67, No early ret.</td>
<td>65.63</td>
</tr>
</tbody>
</table>

percentage point path changes

<table>
<thead>
<tr>
<th></th>
<th>Regular</th>
<th>Unemp</th>
<th>Partial</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic</td>
<td>-30.89</td>
<td>-24.15</td>
<td>55.04</td>
</tr>
<tr>
<td>No early ret.</td>
<td>-39.29</td>
<td>-13.62</td>
<td>52.51</td>
</tr>
<tr>
<td>NRA 67</td>
<td>-26.03</td>
<td>-25.72</td>
<td>51.75</td>
</tr>
<tr>
<td>NRA 67, No early ret.</td>
<td>-34.86</td>
<td>-14.69</td>
<td>49.55</td>
</tr>
</tbody>
</table>
Summary

- Increasing access to partial retirement leads to an increase in partial retirement takeup and a reduction in full-time employment as well as retirement via unemployment.
- A reduction in regular retirement leads to a decrease in average retirement age.
- This reduction becomes smaller when removing the earlier retirement option after unemployment/ATZ but does not diminish.
- Increasing partial retirement leads to an overall increase in the average employment exit age.
- Partial retirement yields positive employment effects by substituting retirement via unemployment with partial retirement.
Thank you!

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References I


Benitez-Silva, H. (2000). A dynamic model of labor supply, consumption/saving, and annuity decisions under uncertainty. Department of economics working papers, Stony Brook University, Department of Economics.

References II


References III


References IV


References V


References VI
