Linking pension ages to occupational life expectancies

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Actuarial fairness

“Equal treatment for equal risks” — Landes, 2015, p. 521

- Generation
- Education
- Occupation
- …
‘Demanding’ occupations?

• Arbitrary criteria

• Life expectancy?
  
  • Actuarial fairness as more objective ground than demandingness

  • More objective metric

  • Derivable from register data
Occupational pension age?

Occupational changes
- Increasingly unstable careers
- Occupational ‘weights’ of years worked

RQ1: occupational differences in survival time?

Occupations change
- Mortality of 1970s builder ≈ life expectancy of builder today?
- Relative occupational medical consumption as intermediary?

RQ2: medical consumption mediates relation occupation-survival?
Longitudinal Aging Study Amsterdam (LASA)

3 regions
• Secularized
• Protestant
• Roman Catholic

Sample
• Random
• $N_{\text{baseline}} = 3.107$
• Baseline ages 55-85
• Start 1992-93
• Mortality follow-up until 2017

• Representative for NL
Realized probability of dying

= individual’s survival compared to peers (same age & sex)

RPD = 0,9: died when 90% of cohort still alive
RPD = 0: died as last survivor of cohort

22,1% still alive at end follow-up
→ RPD = % cohort still alive * 0,5
   (= avg. RPD for survivors)

Logit RPD = LRPD = ln(RPD/(1-RPD)) = normally distributed
→ Dependent variable in linear regression
RPD for men aged 65 (blue) and men aged 70 (brown) in 1993

RPD = 0.5 for a man age 70 in 1993, who died early 2006

RPD = 0.5 for a man age 65 in 1993, who died in the end of 2010
# Socio-demographic characteristics and survival (LRPD) of the selected sectors (N=2,529)

<table>
<thead>
<tr>
<th>Sector</th>
<th>N (%)</th>
<th>Male (%)</th>
<th>Female (%)</th>
<th>Education in years $^2$: Mean (SD)</th>
<th>LRPD $^3$: Mean (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Technical</td>
<td>679</td>
<td>77.5</td>
<td>22.5</td>
<td>8.6 (2.8)</td>
<td>+0.15 (1.63)</td>
</tr>
<tr>
<td>Transport</td>
<td>99</td>
<td>92.9</td>
<td>7.1</td>
<td>7.4 (2.3)</td>
<td>+0.28 (1.65)</td>
</tr>
<tr>
<td>Administrative</td>
<td>618</td>
<td>43.6</td>
<td>56.4</td>
<td>9.4 (2.8)</td>
<td>+0.06 (1.58)</td>
</tr>
<tr>
<td>Care</td>
<td>397</td>
<td>12.5</td>
<td>87.5</td>
<td>8.2 (3.5)</td>
<td>-0.02 (1.56)</td>
</tr>
<tr>
<td>Agriculture</td>
<td>194</td>
<td>79.4</td>
<td>20.6</td>
<td>8.1 (2.3)</td>
<td>-0.18 (1.61)</td>
</tr>
<tr>
<td>Teaching</td>
<td>107</td>
<td>46.8</td>
<td>53.2</td>
<td>13.7 (3.1)</td>
<td>-0.28 (1.67)</td>
</tr>
<tr>
<td>Others</td>
<td>435</td>
<td>52.3</td>
<td>47.7</td>
<td>9.5 (4.1)</td>
<td>-0.06 (1.64)</td>
</tr>
</tbody>
</table>

1. The gender differences between the sectors are significant at p<0.001
2. The educational differences between the sectors are significant at p<0.001
3. The survival differences between the sectors are significant at p=0.023
Realised probability of dying for men aged 65 (blue) and men aged 70 (brown) in 1993.

LRPD = 0.28 → RPD = 0.57 →

Loss of 21 months (age 65 in 1993); Loss of 17 months (age 70 in 1993)
# Linear regression models of LRPD on sector

<table>
<thead>
<tr>
<th>Sector</th>
<th>Model 1</th>
<th></th>
<th></th>
<th>Model 2</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B (SE)</td>
<td>Sign.ce</td>
<td>p-value</td>
<td>B (SE)</td>
<td>Sign.ce</td>
</tr>
<tr>
<td>Technical</td>
<td>0.203 (0.099)</td>
<td>0.041</td>
<td>0.155 (0.099)</td>
<td>0.117</td>
<td></td>
</tr>
<tr>
<td>Transport</td>
<td>0.340 (0.179)</td>
<td>0.058</td>
<td>0.230 (0.180)</td>
<td>0.200</td>
<td></td>
</tr>
<tr>
<td>Administrative</td>
<td>0.112 (0.101)</td>
<td>0.267</td>
<td>0.082 (0.101)</td>
<td>0.417</td>
<td></td>
</tr>
<tr>
<td>Care</td>
<td>0.040 (0.112)</td>
<td>0.720</td>
<td>-0.032 (0.112)</td>
<td>0.773</td>
<td></td>
</tr>
<tr>
<td>Agriculture</td>
<td>-0.119 (0.139)</td>
<td>0.394</td>
<td>-0.169 (0.139)</td>
<td>0.225</td>
<td></td>
</tr>
<tr>
<td>Teaching</td>
<td>-0.220 (0.174)</td>
<td>0.205</td>
<td>-0.044 (0.178)</td>
<td>0.805</td>
<td></td>
</tr>
<tr>
<td>Education (yrs)</td>
<td></td>
<td></td>
<td>-0.045 (0.010)</td>
<td>&lt;0.001</td>
<td></td>
</tr>
</tbody>
</table>

1 Each sector is compared to the non-defined sectors

Model 1: adjusted for age; Model 2: adjusted for age and education

Education explains…
Potential mediators: health and medical consumption

**Number of days sick in bed**
Number of medications
Hospital admission past 6 mo.
Outpatient visits “
General practice contact “
### Linear regression models of LRPD on sector\(^1\)

<table>
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<tr>
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<th>Model 2</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Regression coeff. B (SE)</td>
<td>Sign.ce (p-value)</td>
<td>Regression coefficient B (SE)</td>
</tr>
<tr>
<td><strong>Sick days</strong></td>
<td>(n=2,519)</td>
<td></td>
<td><strong>Sick days</strong></td>
</tr>
<tr>
<td>Technical</td>
<td>0.208 (0.099)</td>
<td>0.036</td>
<td>0.187 (0.099)</td>
</tr>
<tr>
<td>Transport</td>
<td>0.334 (0.179)</td>
<td>0.062</td>
<td>0.317 (0.178)</td>
</tr>
<tr>
<td>Administrative</td>
<td>0.094 (0.101)</td>
<td>0.351</td>
<td>0.082 (0.101)</td>
</tr>
<tr>
<td>Care</td>
<td>0.028 (0.112)</td>
<td>0.801</td>
<td>0.035 (0.111)</td>
</tr>
<tr>
<td>Agriculture</td>
<td>-0.101 (0.139)</td>
<td>0.469</td>
<td>-0.084 (0.138)</td>
</tr>
<tr>
<td>Teaching</td>
<td>-0.221 (0.173)</td>
<td>0.203</td>
<td>-0.205 (0.173)</td>
</tr>
<tr>
<td>Sick days</td>
<td></td>
<td>0.265</td>
<td></td>
</tr>
</tbody>
</table>

\(^1\) Each sector is compared to the non-defined sectors

Model 1: adjusted for age; Model 2: adjusted for age and health

* Quadratic term
Conclusion:
Proof of principle

- Survival
  - Shorter in technical and transport sectors
  - Longer in education
- Partly explained by
  - Education
  - Health

- Future
  - Replication using Danish registers?
    - More detailed distinctions
    - Career trajectories