Individual Income and Remaining Life Expectancy at the Statutory Retirement Age of 65 in the Netherlands

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Network for Studies on Pensions, Aging and Retirement

Motivation

A positive association between individual income and life expectancy implies

1. individuals' internal rate of return of a uniform priced pension scheme is positively related to income
   (Brown, 2000, Bonenkamp, 2007)

2. an adverse effect on the degree of income redistribution inherent to the public pension system
   (Menchik, 1993, Nelissen, 1999)

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Contributions to the literature

1. We estimate the association between individual income and remaining life expectancy at age 65 in the Netherlands

2. We estimate the association between individual's remaining life expectancy at age 65 and the income of the spouse

3. The statistical model explicitly controls for unobserved individual specific heterogeneity (random effects)

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Previous literature

The ratio of mortality risk of low income individuals over that of high income individuals ranges from around two in Europe up to three for the U.S.

(Duleep, 1986; Attanasio and Hoynes, 2000; Osler et al. 2002; Attanasio and Emmerson, 2003;Blakely et al., 2004; Gaudecker and Scholz, 2006)

Beyond the scope of this paper are issues concerning causality and pathways through which income may affect health status and mortality

(Marmot et al., 1991; Smith, 1999; Snyder and Evans, 2006)

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Data sources

- Dutch Income Panel Study 1996-2007
  (Inkomens Panel Onderzoek, IPO)
  - Administrative panel data on about 95,000 individuals
  - Main advantage: no unit non-response and no panel attrition (apart from emigration and mortality)

- Causes of Death, 1997-2008
  (Doodsoorzaken, DO)
  - Registry data (medical records)
  - Main advantage: covers the whole population

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Data selection & variables

- Key persons that are 65 years of age or over
- Missing values, mainly on income: about 6% of the observations
- Finale sample: 11,601 women and 7,657 men
- Dependent variable: mortality (deceased next year)
- Covariates
  - Year, age and gender
  - individual income (gross of income tax and social insurance contributions)
  - income of the spouse
  - Marital status
    - single (including divorce)
    - married (incl. cohabitation)
    - widowed

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Mortality risk by income quartile

	Single and widowed men					Single and widowed women				
	Income quartile					Income quartile				
	Q1	Q2	Q3	Q4	Q1/Q4	Q1	Q2	Q3	Q4	Q1/Q4
Age	%	%	%	%	%	%	%	%	%	%
65-69	5.5	4.2	3.4	3.8	1.4	2.7	1.2	1.4	1.4	1.9
70-74	6.6	7.5	5.2	3.5	1.9	3.8	2.5	2.4	1.8	2.1
75-79	12.0	8.2	6.9	7.3	1.6	6.2	4.7	3.5	3.5	1.8
80-84	16.4	12.1	12.2	11.4	1.4	10.1	7.7	7.1	7.5	1.3
85-89	22.1	19.1	18.8	15.6	1.4	17.8	11.3	11.2	12.1	1.5
90-94	35.7	30.8	27.0	23.5	1.5	22.3	22.4	17.9	16.3	1.4
95+	-	-	-	-	-	40.3	33.7	26.7	30.0	1.3
All	12.6	9.3	7.5	7.3	1.7	9.8	6.2	5.0	5.2	1.9

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70-74	6.6	7.5	5.2	3.5	1.9	3.8	2.5	2.4	1.8	2.1
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	Q1	Q2	Q3	Q4	Q1/Q4	Q1	Q2	Q3	Q4	Q1/Q4
Age	%	%	%	%	%	%	%	%	%	%
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95+	-	-	-	-	-	40.3	33.7	26.7	30.0	1.3
All	12.6	9.3	7.5	7.3	1.7	9.8	6.2	5.0	5.2	1.9

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Mortality risk by income quartile

	Married men					Married women				
	Income quartile					Income quartile				
	Q1	Q2	Q3	Q4	Q1/Q4	Q1	Q2	Q3	Q4	Q1/Q4
Age	%	%	%	%	%	%	%	%	%	%
65-69	3.2	1.8	1.0	1.0	3.3	1.5	1.0	0.8	0.7	2.1
70-74	4.6	3.6	3.3	2.3	2.0	2.3	1.2	1.5	1.3	1.7
75-79	7.2	6.5	5.4	4.6	1.6	3.4	2.9	2.5	3.2	1.1
80-84	11.3	10.0	8.5	8.2	1.4	7.6	7.2	6.9	5.3	1.4
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90-94	28.3	20.4	21.4	14.7	1.9	34.8	14.8	6.3	26.5	1.3
95+	-	-	-	-	-	-	-	-	-	-
All	7.1	4.8	3.4	3.0	2.4	2.8	2.2	2.1	2.0	1.4

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Mortality risk by spouse's income quartile

	Married men					Married women				
	Spouse's income quartile					Spouse's income quartile				
	Q1	Q2	Q3	Q4	Q1/Q4	Q1	Q2	Q3	Q4	Q1/Q4
Age	%	%	%	%	%	%	%	%	%	%
65-69	1.8	1.3	1.6	1.4	1.3	1.3	1.1	1.1	0.8	1.7
70-74	4.3	3.1	3.1	3.3	1.3	2.1	1.1	1.7	1.6	1.3
75-79	7.2	6.4	5.1	5.5	1.3	2.9	3.1	3.6	2.7	1.1
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90-94	25.4	32.5	15.6	26.3	1.0	27.5	16.7	19.4	10.7	2.6
95+	-	-	-	-	-	-	-	-	-	-
All	5.3	4.4	4.4	4.0	1.3	3.1	2.0	2.3	1.9	1.6

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Mortality risk by spouse's income quartile

	Married men					Married women				
	Spouse's income quartile					Spouse's income quartile				
	Q1	Q2	Q3	Q4	Q1/Q4	Q1	Q2	Q3	Q4	Q1/Q4
Age	%	%	%	%	%	%	%	%	%	%
65-69	1.8	1.3	1.6	1.4	1.3	1.3	1.1	1.1	0.8	1.7
70-74	4.3	3.1	3.1	3.3	1.3	2.1	1.1	1.7	1.6	1.3
75-79	7.2	6.4	5.1	5.5	1.3	2.9	3.1	3.6	2.7	1.1
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95+	-	-	-	-	-	-	-	-	-	-
All	5.3	4.4	4.4	4.0	1.3	3.1	2.0	2.3	1.9	1.6

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Empirical strategy

1. We estimate a statistical model for mortality risk
   - relate individual's characteristics to next year's mortality risk
   - a random effects Logit model (controls for unobserved individual specific heterogeneity)
   - Model selection: for both men and women we do not reject linear age effects and linear log-income effects (in the index)

2. We use the estimation results to quantify the association between income and remaining life expectancy at 65 for different types of households.
   - Hereby we take into account the pension rules for how income during working life relates to income during retirement, and the income consequences of becoming widowed.

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Estimation results

Dependent variable: Mortality Risk

	Men		**Women**	
Covariates, parameter, Eq.(6)	*Parameter estimate*	*Standard error*	*Parameter estimate*	*Standard error*
Constant, α_0	-11.085	1.016	-10.487	0.846
Age, α_1	0.139	0.015	0.110	0.013
Single	0.000		0.000	
Married, β_1	-0.551	0.266	-0.349	0.228
Widowed, β_2	-0.325	0.096	-0.087	0.085
Ln(Individual income), β_3	-0.405	0.058	-0.454	0.072
Ln(Spouse income) x Married, β_4	-0.117	0.114	-0.129	0.074
Standard deviation random effect, σ	0.420	0.155	0.233	0.046
Log-likelihood value	-10906.5		-14824.3	
Number of parameters	23		23	
Number of observations	54617		87108	
Number of individuals	7657		11601	
Time dummy variables are included				

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Simulation results I

Pension related gross yearly salary	Baseline situation Median income	Difference from the baseline Man Median+10%	 Woman Median+10%
Man, fulltime	29500	32450	
Woman, part-time	14750		16225

Type of household	*Remaining life expectancy (in years)*	*Difference in remaining life expectancy*	*Difference in remaining life expectancy*
A single person household			
Man	12.26 (0.60)	0.21 (0.04)	
Woman	17.54 (0.85)		0.21 (0.04)
A two person household before age 65: man fulltime employed, woman not employed			
Man	15.86 (0.60)	0.26 (0.04)	
Woman	19.57 (0.78)	0.19 (0.05)	
A two person household, before age 65: man fulltime employed, woman part-time employed			
Man	16.22 (0.61)	0.25 (0.04)	0.06 (0.05)
Woman	20.64 (0.84)	0.17 (0.05)	0.20 (0.04)

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Woman	19.57 (0.78)	0.19 (0.05)	
A two person household, before age 65: man fulltime employed, woman part-time employed			
Man	16.22 (0.61)	0.25 (0.04)	0.06 (0.05)
Woman	20.64 (0.84)	0.17 (0.05)	0.20 (0.04)

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Simulation results II

	Baseline situation	**Difference from the baseline**			
Pension related gross yearly salary	**Median income**	**Man Minimum wage**	**Woman Minimum wage**	**Man 2x the median**	**Woman 2x the median**
Man, fulltime	29500	16392		59000	
Woman, part-time	14750		8196		29500
Type of household	*Remaining life expectancy (in years)*	*Difference in remaining life expectancy*	*Difference in remaining life expectancy*	*Difference in remaining life expectancy*	*Difference in remaining life expectancy*
A single person household					
Man	12.26 (0.60)	-1.20 (0.18)		1.59 (0.25)	
Woman	17.54 (0.85)		-1.06 (0.20)		1.65 (0.32)
A two person household, before age 65: man fulltime employed, woman not employed					
Man	15.86 (0.60)	-1.65 (0.24)		1.80 (0.27)	
Woman	19.57 (0.78)	-1.12 (0.29)		1.31 (0.37)	
A two person household, before age 65: man fulltime employed, woman part-time employed					
Man	16.22 (0.61)	-1.63 (0.24)	-0.36 (0.26)	1.78 (0.27)	0.49 (0.38)
Woman	20.64 (0.84)	-1.02 (0.26)	-1.07 (0.20)	1.26 (0.35)	1.60 (0.30)

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Simulation results II

	Baseline situation	Difference from the baseline			
Pension related gross yearly salary	**Median income**	**Man Minimum wage**	**Woman Minimum wage**	**Man 2x the median**	**Woman 2x the median**
Man, fulltime	29500	16392		59000	
Woman, part-time	14750		8196		29500
Type of household	*Remaining life expectancy (in years)*	*Difference in remaining life expectancy*	*Difference in remaining life expectancy*	*Difference in remaining life expectancy*	*Difference in remaining life expectancy*
A single person household					
Man	12.26 (0.60)	-1.20 (0.18)		1.59 (0.25)	
Woman	17.54 (0.85)		-1.06 (0.20)		1.65 (0.32)
A two person household, before age 65: man fulltime employed, woman not employed					
Man	15.86 (0.60)	-1.65 (0.24)		1.80 (0.27)	
Woman	19.57 (0.78)	-1.12 (0.29)		1.31 (0.37)	
A two person household, before age 65: man fulltime employed, woman part-time employed					
Man	16.22 (0.61)	-1.63 (0.24)	-0.36 (0.26)	1.78 (0.27)	0.49 (0.38)
Woman	20.64 (0.84)	-1.02 (0.26)	-1.07 (0.20)	1.26 (0.35)	1.60 (0.30)

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Simulation results II

Pension related gross yearly salary	Baseline situation Median income	Difference from the baseline Man Minimum wage	 Woman Minimum wage	 Man 2x the median	 Woman 2x the median
Man, fulltime	29500	16392		59000	
Woman, part-time	14750		8196		29500
Type of household	*Remaining life expectancy (in years)*	*Difference in remaining life expectancy*	*Difference in remaining life expectancy*	*Difference in remaining life expectancy*	*Difference in remaining life expectancy*
A single person household					
Man	12.26 (0.60)	-1.20 (0.18)		1.59 (0.25)	
Woman	17.54 (0.85)		-1.06 (0.20)		1.65 (0.32)
A two person household, before age 65: man fulltime employed, woman not employed					
Man	15.86 (0.60)	-1.65 (0.24)		1.80 (0.27)	
Woman	19.57 (0.78)	-1.12 (0.29)		1.31 (0.37)	
A two person household, before age 65: man fulltime employed, woman part-time employed					
Man	16.22 (0.61)	-1.63 (0.24)	-0.36 (0.26)	1.78 (0.27)	0.49 (0.38)
Woman	20.64 (0.84)	-1.02 (0.26)	-1.07 (0.20)	1.26 (0.35)	1.60 (0.30)

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Summary of results

- For both men and women we find that mortality risk is negatively associated with individual income. A 10% higher than median individual income is associated with a 2.5 to 3 months higher remaining life expectancy at 65 for both men and women.

- For men and women, remaining life expectancy at age 65 is about three years less for low income than for high income individuals.

- The remaining life expectancy at age 65 for women with a low income spouse is about two years less than for women with a high income spouse. For men this difference is insignificant.

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Policy implications

- Individuals' internal rate of return of a uniform priced pension plan is positively associated with income since high income individuals live, on average, longer. In other words, low income individuals receive a bad pension deal and high income individuals receive a good pension deal.

- Concerning the planned increase in the statutory retirement age from 65 to 67 in the Netherlands, the empirical results imply that the relative decrease in the expected pension benefit duration is about 20-25% larger for low than for high income individuals.

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