The Importance of Unbiased Estimation of Life Expectancy and Heterogeneity in Life Expectancy for Financial Stability and Fair Outcomes in DC Pension Schemes

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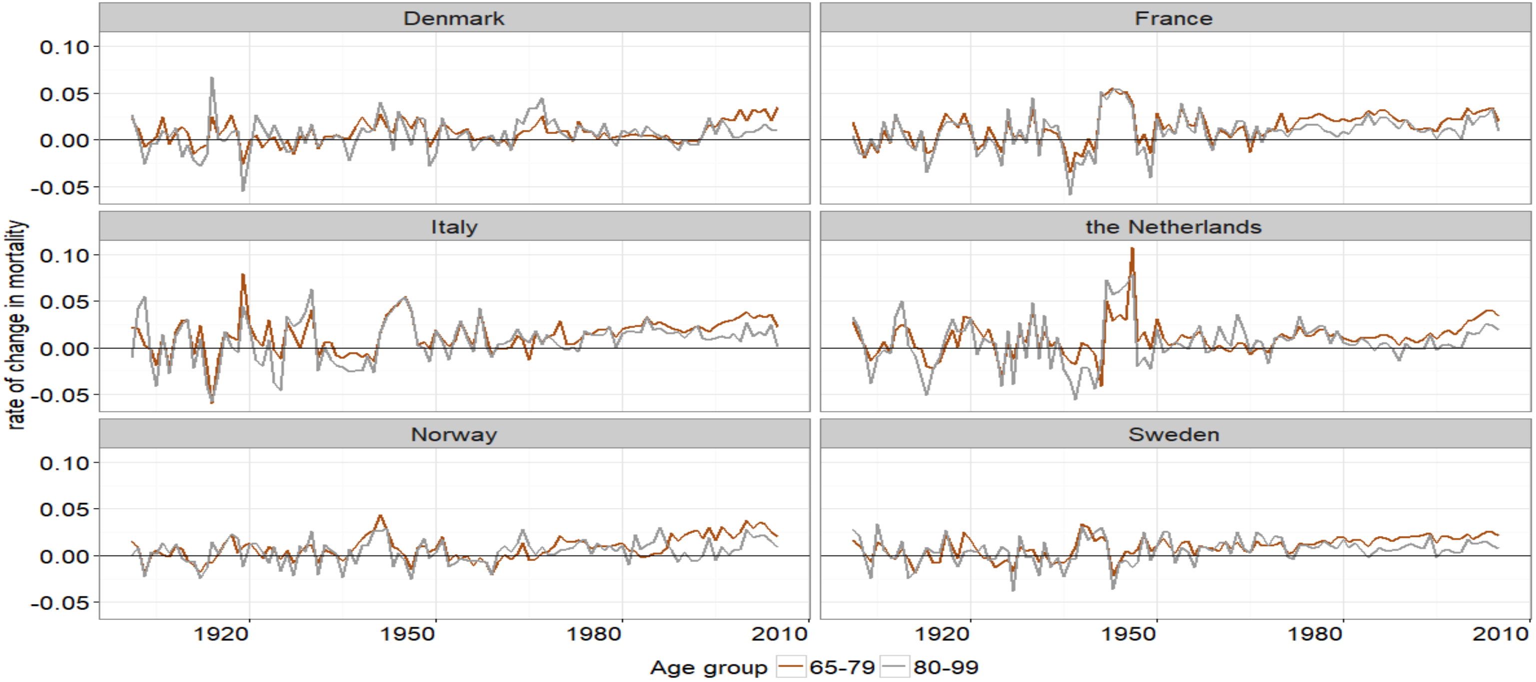
About the paper:

- Projection of life expectancy:
  - ✓ How do the current projection methods work?
  - ✓ The point of departure: longevity of older birth cohort is increasing at an accelerating rate (Alho, Bravo & Palmer, 2013)
  - ✓ What does this mean for DC pension schemes?
  - ✓ Replace period data for estimating LE with cohort data? How would this work? → Data analytic period-cohort method?
  - ✓ Variable annuities?
- Heterogeneity in life expectancy: What does it look like? What can we do about it?

The rate of change in mortality is not time-invariant



Why worry about the second derivative?

- Projections of life expectancy determine the annual pension payments, i.e., the annuity payments
- *Systematic* underestimation leads to deficits that accumulate over time.

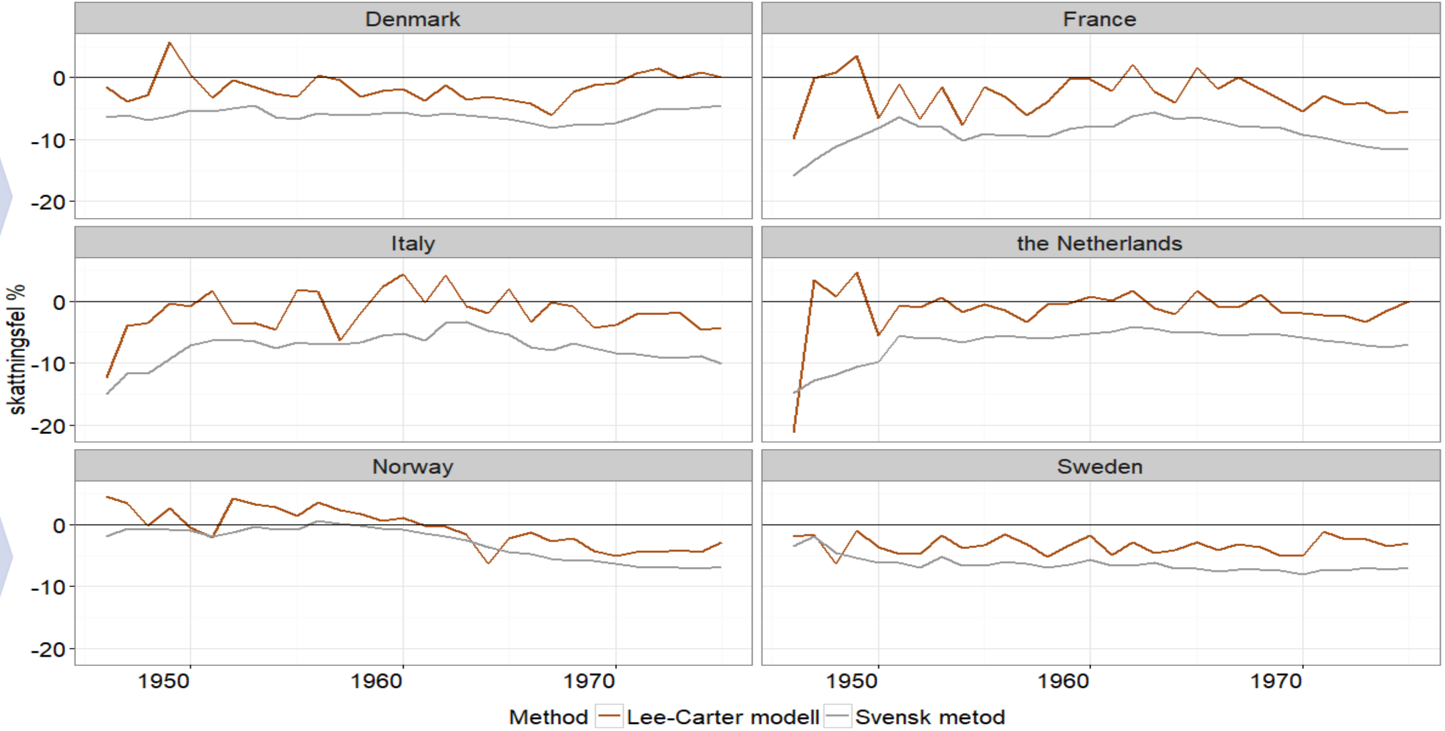
  Systematic overestimation leads to surpluses that can not be distributed post humus
- For Public NDC Schemes: Unfair inter-generational redistribution

  For Public/Private FDC Schemes: Who pays the price for uncertainty?
- Socio-economic heterogeneity? → Death is not a random event.

How well do current projection methods work?
--- Systematic underestimation!

Lee-Carter model

Swedish method



A new “data analytic period-cohort method” Palmer-Alho-de Gosson (PAD) model

To make a projection for cohort X, we perform the following procedure:

Step I

- Create a *synthetic database* with a weighted average of the rates of change in mortality of those immediately preceding cohorts

Step II

- Extrapolate the rate of change in mortality of the projection cohorts

Step III

- Calculate motality for cohort X

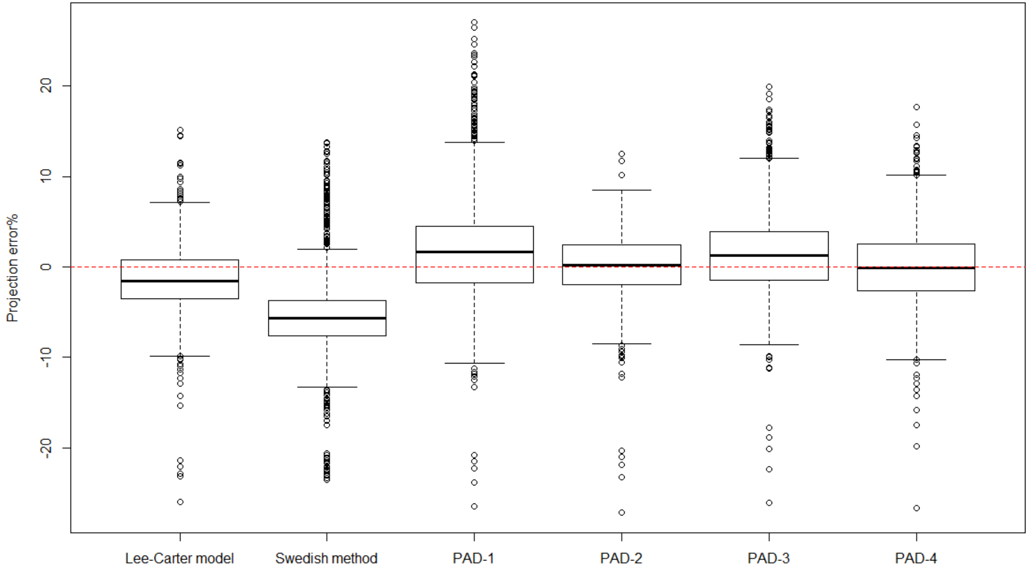
How to best extrapolate the *rate of change in mortality* for the projection cohort?

We test four methods:

1. Rate of change in mortality = the latest empirical rate
2. Rate of change in mortality = the latest 20 empirical rates
3. Rate of change in mortality = the latest 5 empirical rates
4. Rate of change in mortality = the forecasts of an ARMA model

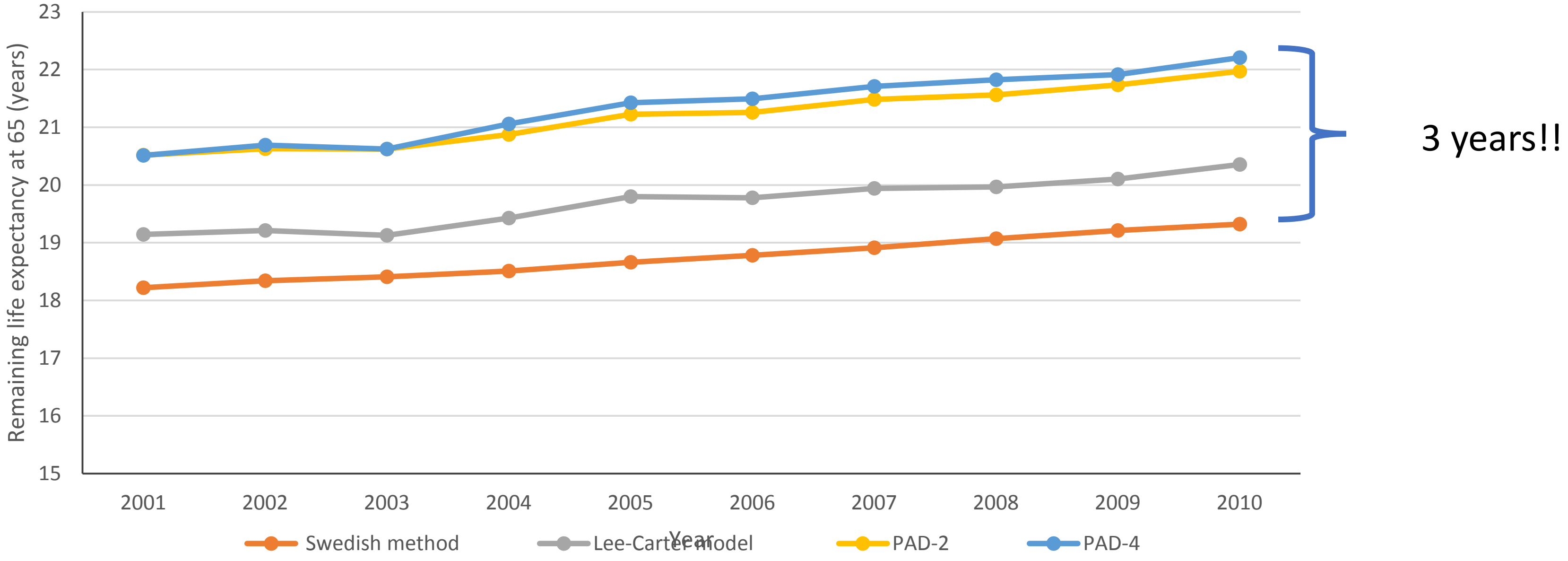
Using the synthetic PAD database these 4 models are tested both *ex post* and *ex ante* on data from 8 countries

Results from the evaluation of expired cohorts: The projection errors of PAD – 2 och 4 are randomly distributed with zero expected value



Ex ante evaluation of still-living cohorts: PAD-models yield much higher estimation values of life expectancy for the current retirees

This is how it looks for Sweden:



The Swedish Fixed Annuity Model gives deficits of 5 – 9 percent when the annuity value is set at age 65.

What do we gain by adjusting annuity regularly using new projections after retirement?

- Reduce the uncertainty in projection of mortality and life expectancy;
- Reduce the risk of financial deficits;
- Redistribution within cohort annuity pools.

	Fixed annuity with PAD-2	Fixed annuity with PAD-4	Variable annuity with PAD-2	Variable annuity with PAD-4
Sweden	3,69%	1,98%	2,47%	0,67%
Denmark	3,64%	1,42%	1,97%	0,91%
Norway	1,60%	2,66%	1,28%	0,95%
France	1,84%	4,36%	0,77%	0,50%
Italy	1,78%	5,65%	1,49%	1,69%
The Netherlands	3,14%	4,35%	1,87%	0,49%
UK	1,44%	5,91%	1,24%	1,38%
USA	2,51%	10,33%	3,41%	0,98%

Table: Average size of financial deficits with new projections at five-year intervals up to age 85.

Heterogeniety in Life Expectancy
Social gaps in life expectancy are well documented

Shorter life expectancy for:

- Men (5 → 4 years →2 in Sweden)
- Lowest income deciles
  Note: Income = f(education, health, preferences for work vs. Leisure)
- Occupation
- Genetics
- Living style, diet …

- Peter Diamond: If people are well-informed, rational decision makers, they will take knowledge of these factors into acccount in determining the age at which they retire.

Is heterogeneity in life expectancy a big problem for the (N)DC and (F)DC schemes?

- Create sub-pools?
- Estimated relative risks can change quickly over time.
- Mobility between groups.
- What about individuals' conscious influence on their health health?
  E.g. persons who consume too much alcohol? Smoke? Exercise far too little? Don't play a musical instrument? Etc.

Thanks!