Comparing strategies for matching mortality forecasts to the most recently observed data

What is the best trade-off between short-term accuracy and long-term robustness?

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Introduction

- Aging population -> challenges
- Pension reforms in Denmark, Finland, France, Germanym Great Brittain, Greece, Italy, the Netherlands, Norway, Spain, Sweden: retirement ages will gradually grow to 67-68 years
- Retirement age is linked to the development of life expectancy

Example – the Netherlands

From 2022 onwards (determined 5 years before):

- V = (L – 18,26) – (P – 65)
  - V: increase of the retirement age (0 or 0.25)
  - L: future (period) life expectancy on age 65
  - P: pension age in the year before

A good forecast of the future (period) life expectancy is therefore important.

Forecasting life expectancy

Objective:

- **robust** and **accurate** forecast

Problem:

- **Jump-off bias**: the estimated death rate in the last observed year does not (necessarily) equal the observed death rate

Jump-off bias

Two well-known options for the jump-off bias:

- *Lee & Carter (1992)*: 'have little impact on forecasted LE'
  -> Use model values as jump-off rates
- *Bell (1997) and Lee & Miller (2001)*: 'correction improves the forecast of LE'
  -> Use last observed values as jump-off rates

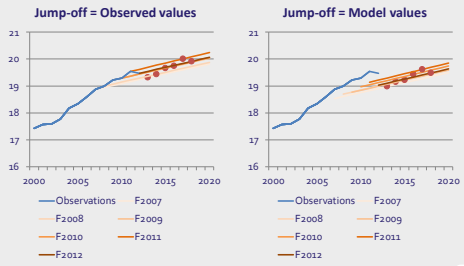
Analysis

- Data from the HMD
  - Years: 1960-2012
  - Sex: Men + women
  - Countries:
    NLD, FRATNP, BEL, ESP, FIN, GBR_NP, NOR, SWE
- Model: Lee-Carter
- Robustness (five year ahead) and accuracy (first year)

Information on the forecasting model for the Netherlands:

- Stoeldraijer, L., van Duin, C., & Janssen, F. (2013). Bevolkingsprognose 2012-2060: Model en veronderstellingen betreffende de sterfte. Bevolkingstrends, juni, 1-27. [DUTCH]
- Janssen, F., van Wissen, L. J. G., & Kunst, A. E. (2013). Including the smoking epidemic in internationally coherent mortality projections. Demography, 50(4), 1341-1362.

Life expectancy at age 65 (NLD)

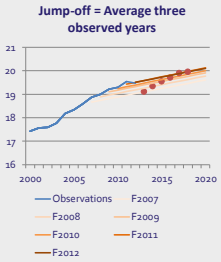


The Netherlands, men+women, Lee-Carter forecast (1960-2007:2012)

Life expectancy at age 65 (NLD)

Solution: averaging

– Less 'jumpy' five years ahead, but small jump-off bias



The Netherlands, men+women, Lee-Carter forecast (1960-2007:2012)

Measures

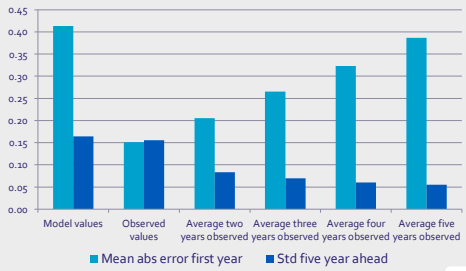
Robustness: forecast five year ahead

– Standard deviation of the increase in life expectancy five years ahead of successive forecasts (ten forecasts)

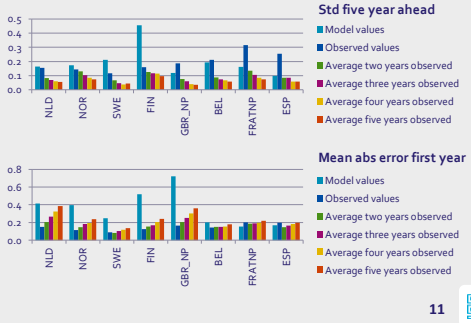
Accuracy: forecast in the first year

– Mean absolute error in the first year of the forecast

Outcome – the Netherlands



Other countries



Summary

– Focus on accuracy:
  - Model values (FRATNP, ESP)
  - Observed values (NLD, BEL, FIN, GBR_NP, NOR, SWE)

– Focus on robustness:
  - Averaging or model values (FRATNP, ESP)
  - Averaging (NLD, BEL, FIN, GBR_NP, NOR, SWE)

Summary

Focus on accuracy and robustness:

- Countries with a regular trend (FRATNP, ESP):
  -> Model values
- Other countries (NLD, BEL, FIN, GBR_NP, NOR, SWE):
  -> Averaging combined with observed values for the short term (interpolation for instance)

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Conclusion

- Choice of jump-off rates affects accuracy, but also robustness
- Recent trend important for choice of jump-off rates

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Thank you!

Questions?

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