Age and Health Care Expenditure - Cross-Country Evidence

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INSTYTUT BADAŃ STRUKTURALNYCH

Research questions

1. *Does age structure of the population influence the aggregate health care expenditure?*
2. *Does time-to-death distribution of the population influence the aggregate health care expenditure?*
3. *How robust are these relationships?*

Outline

Motivation

Micro evidence

Data

Methods

Results

Why is the relationship between age and health care expenditure important?

Pressure of health care expenditure on public finance due to ageing:

- extending life-expectancy
- compression of mortality
- rising share of elderly in the population

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Conclusions from literature

- huge effects of ageing on HCE with generational accounts methodology
- consensus on the moderate influence of ageing on the health care expenditure with “red herring” and time-to-death
- income, technological progress and institutional settings are crucial, but age remains significant for the rise of health care expenditure
- hardly any evidence from macro data and/or cross country comparison, even though the age-structure variables (like 65+) often included in macro models

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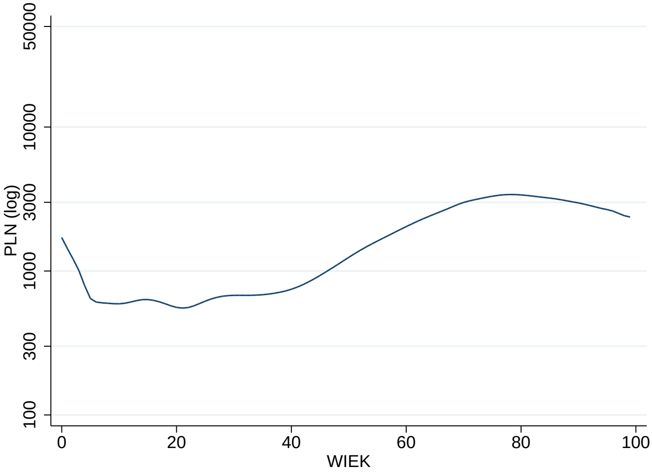
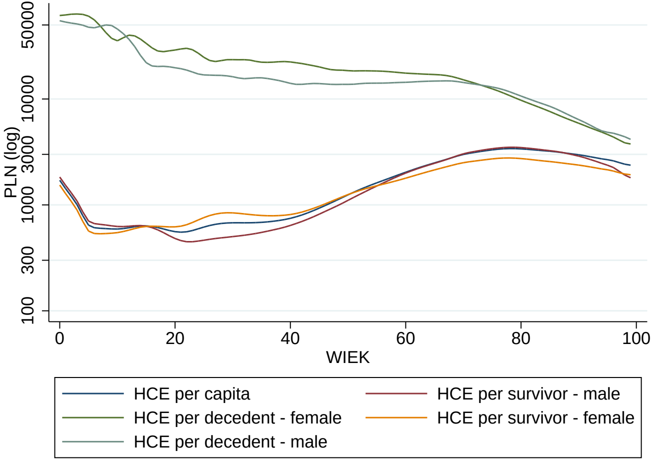
Health care expenditure rises with age



But not for decedents



The macro approach - key points

- what are the effects of including measures of age structure of population and time-to-death simultaneously?
- calculate the time-to-death for every country and every year with the use of mortality rates
- use panel data estimators
- estimate models for all reasonable variations of time-to-death, time-to-death age threshold and age structure

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Data

- Human Mortality Database
- OECD and WHO data on health and macro variables
- final sample of 30 OECD countries and mean of 31 years per country (max 49, min 10)

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Time-to-death calculation

The share of population $S_{a,i}$ at age $a \in \{0, 1, .., 110\}$ that will die in $i \in \{0, 1, .., 15\}$ years has been calculated through a transformation from unconditional to conditional death probability:

$$S_{a,i} = d_{a+i} \prod_{j=0}^{i-1} (1 - d_{a+i}) \tag{1}$$

where d_a is death rate at age a.

Generic model

$$h_{k,l} = \beta^i S_{i,a,k,l} + \alpha^a A_{g,k,l} + \theta_j X_{j,k,l} + \epsilon_{k,l} \tag{2}$$

or

$$h_{k,l} = \varphi h_{k,l-1} + \beta^i S_{i,a,k,l} + \alpha^a A_{g,k,l} + \theta_j X_{j,k,l} + \epsilon_{k,l} \tag{3}$$

where:

$h_{k,l}$ - the per capita health care expenditure in logarithm, at country k in year l

$S^{i,a}_{k,l}$ - share of population at country k in year l that will die in i years and is younger than a

$A^g_{k,l}$ - share of population younger than g at country k in year l

$X_{k,l}$ - GDP per capita (logarithm) at country k in year l

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Model space

- estimation with the different combinations of
  - age-share: 5,10,..,95
  - time-to-death: 0,1,..,15
  - age threshold for time-to-death: 20,25,..,95
- various panel data estimators:
  - first difference OLS with robust standard errors
  - fixed effects with time dummies and robust standard errors
  - dynamic panel model Bond-Bover (system) estimator
- totally 12 960 models estimated, 270 for every time-to-death and every model

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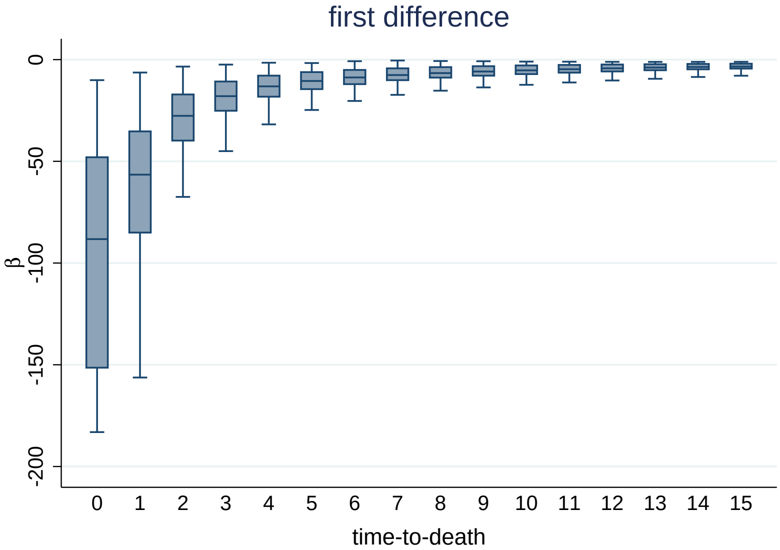

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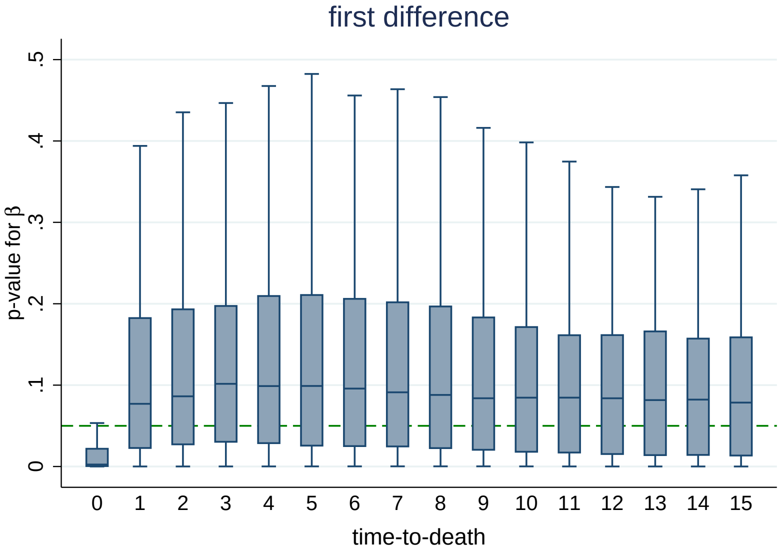

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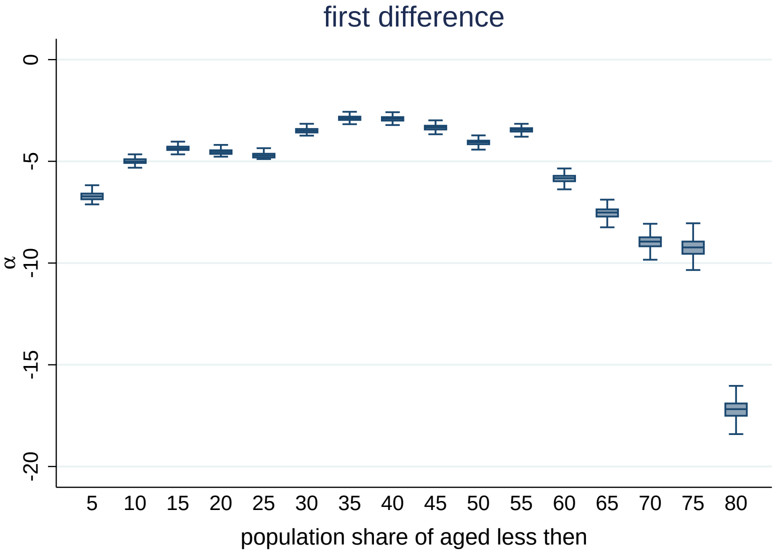

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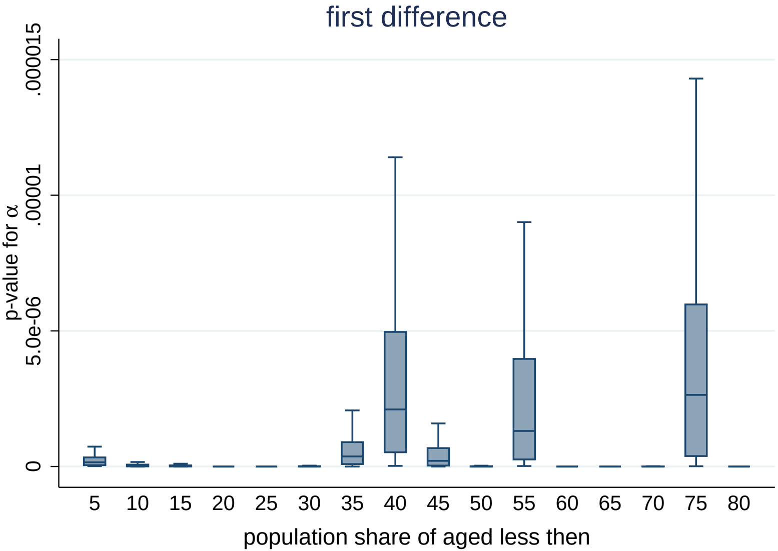

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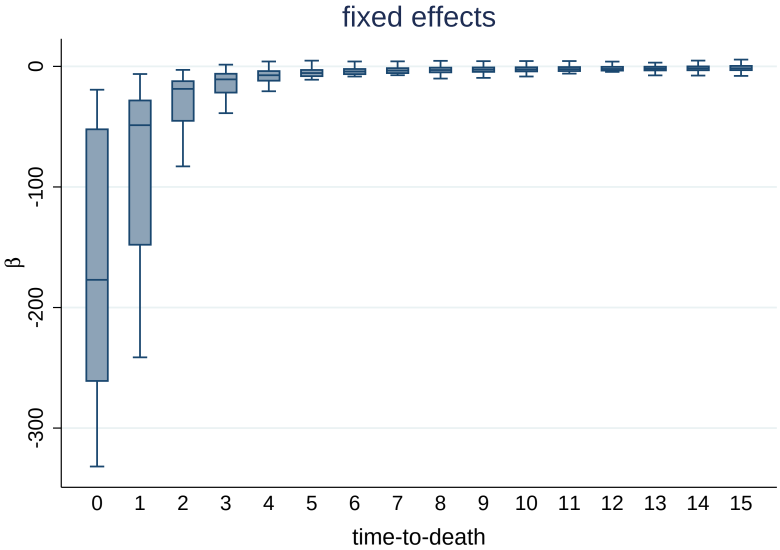

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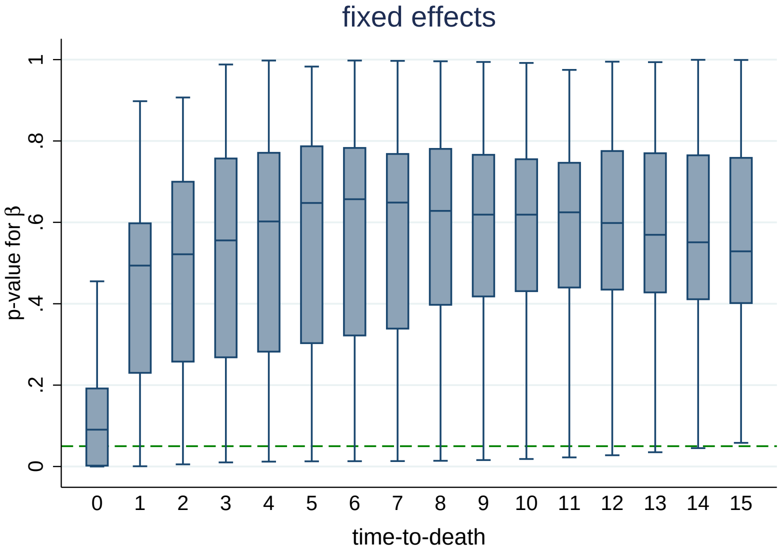

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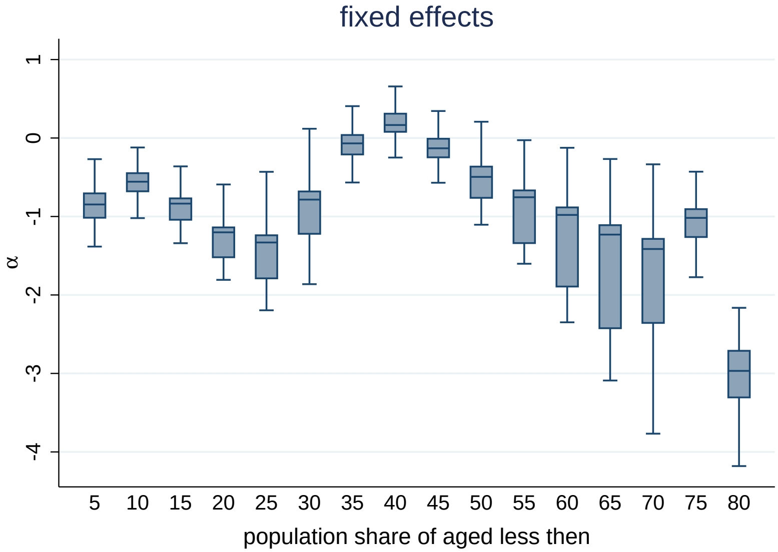

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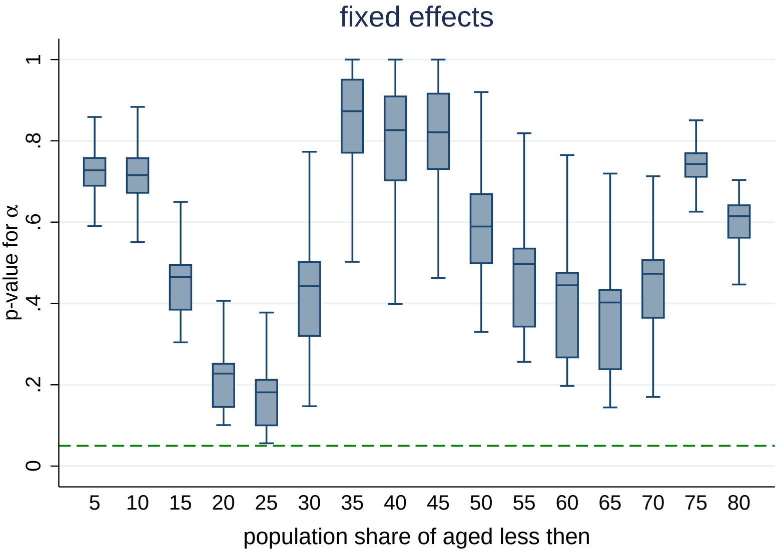

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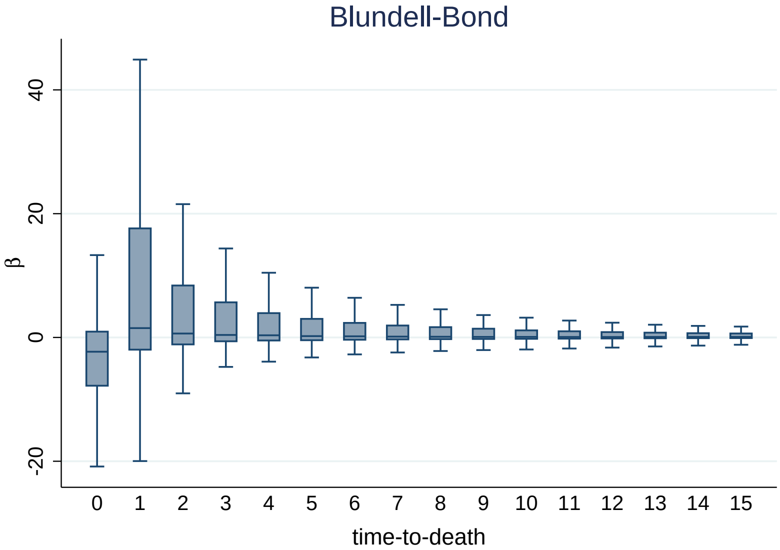

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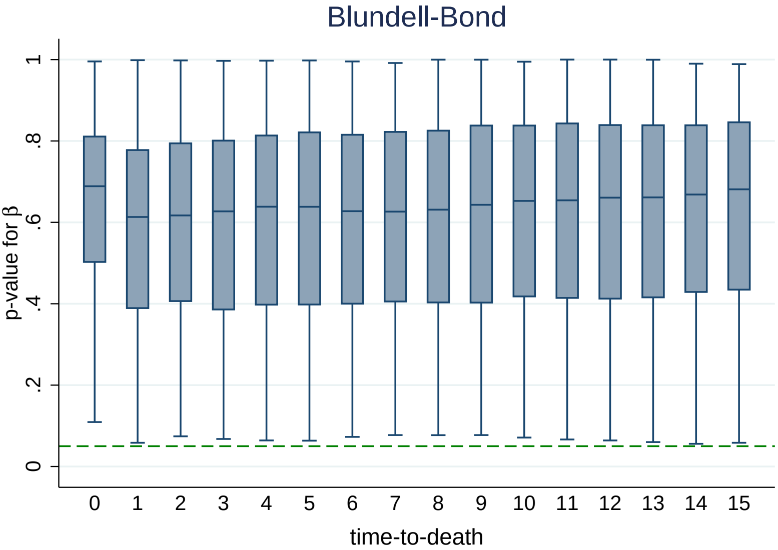

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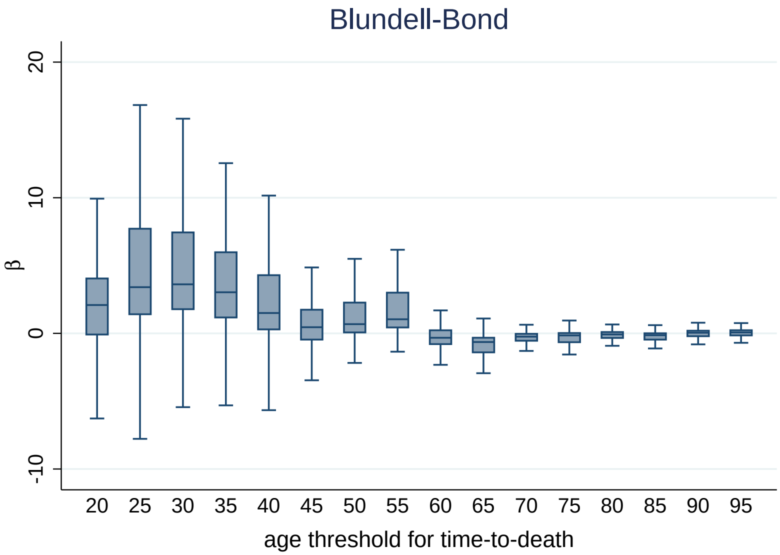

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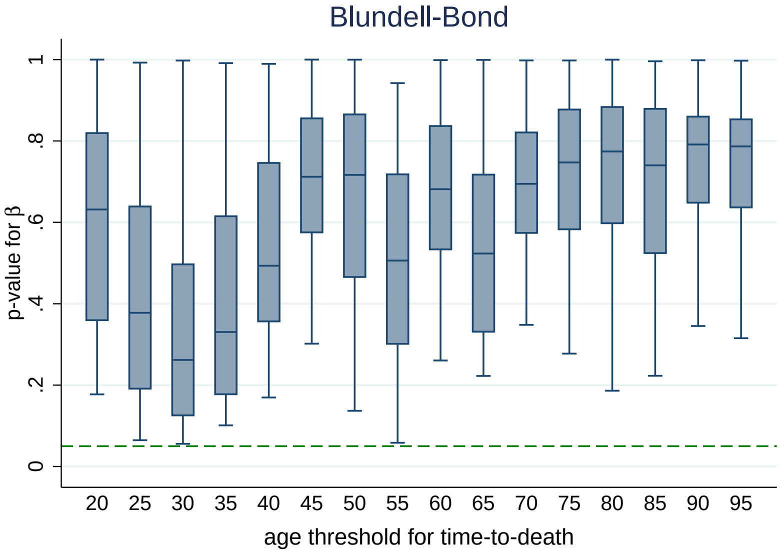

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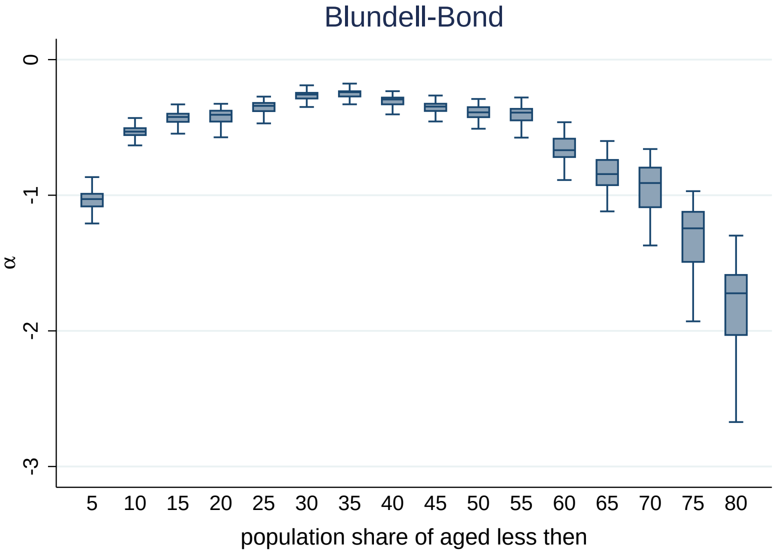

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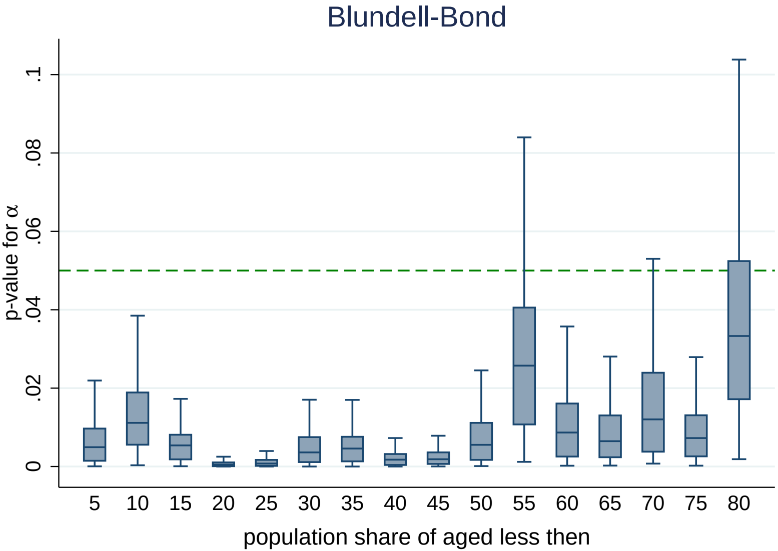

Blundell-Bond - significant and positive *beta*-s (time-to-death as endogenous variable)

- age-share: 90-95
- time-to-death threshold: 50, 55, 95
- time-to-death: 1-5, 14-15 (not 0)
- 0.2% of all models
- no significant models with negative *beta*

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Conclusions

- Age-share more robustly than time-to-death related to health care expenditure, however age-share remains insignificant in fixed effects model.
- Age-share surprisingly not robust, the exact decision of the age threshold 55, 60 or 75 might significantly influence the results.
- Time-to-death most often negative and insignificant.
- The reverse causality seems to be dominant - death rates are negatively related to health care expenditure, as higher health care expenditure reduces the mortality.
- The Blundell-Bond estimator is able to deal with the endogeneity of time-to-death.

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