Pension microsimulation models in Estonia, Finland, Hungary, the Netherlands and Poland

A partial update of the PENMICRO project

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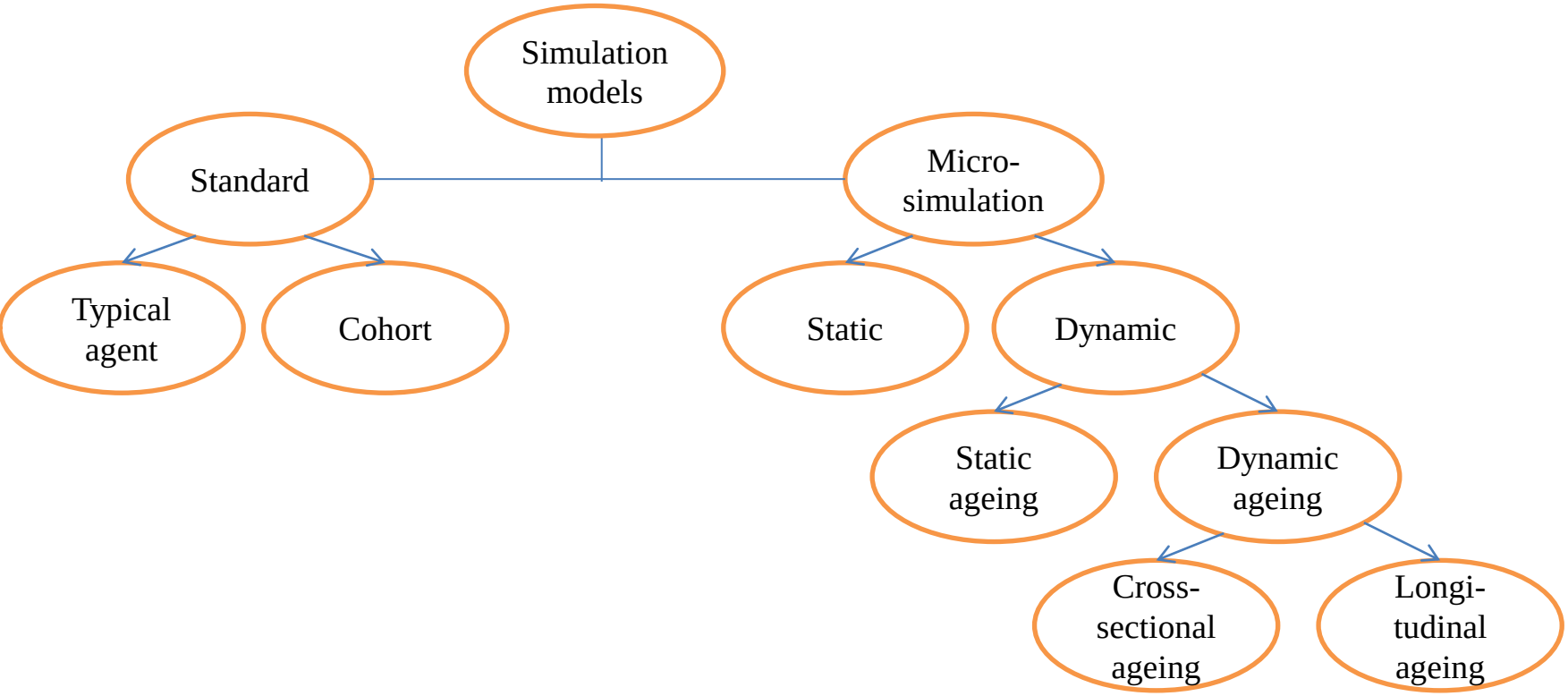
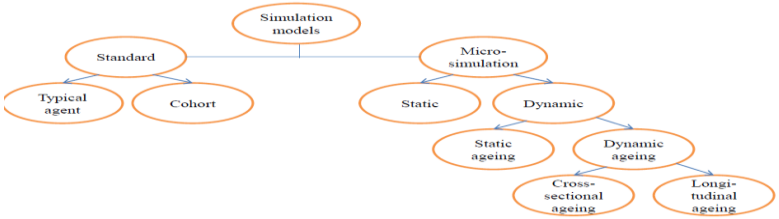


A taxonomy of simulation models

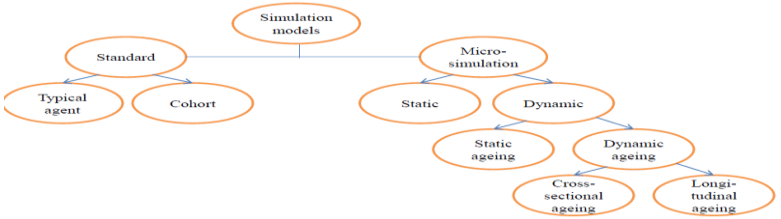
Based on Zaidi and Rake (2001), O'Donoghue (2001), Dekkers és Belloni (2005), Li and O'Donoghue (2013).



Typical agent models:

pros:
- strong longitudinal element (detailed institutional settings with all non-linearities, ceilings etc.)
- well suited to assess incentives (such as to work longer) and estimate replacement rates

cons:
- ad hoc cross-sectional view (transitions across the subgroups are usually not accounted for)
- unfit for fiscal projection (weighing agents to reflect composition of society)
unfit for the analysis of distributional effects

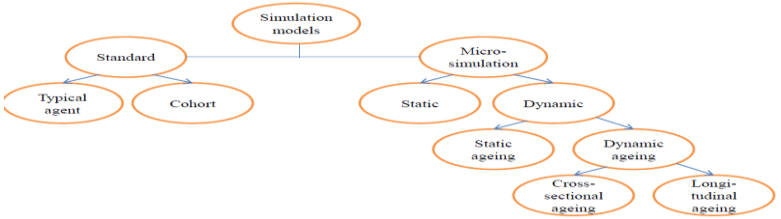


Cohort models:

main features:
- parameters of projections reweigh the group-averages
- alignment
- internal consistency
- frequently disaggregated by gender, marital status and other variables

pros:
-more easily give to aggregate conclusions (future revenues or expenditures)

cons:
- exposed to inconsistencies among the careers of cohorts and the aggregates resulting from the projections



Time in microsimulation

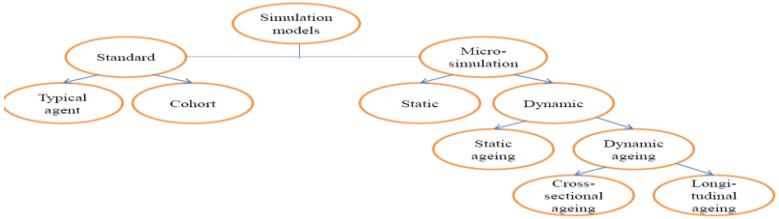
Static microsimulation

Does not include time: compares two states of the world, or two different institutional settings; simulates “overnight effects”

Dynamic microsimulation

Includes time and explicitly models life paths of individual units as they age

Models behavioural responses to changing policy environment



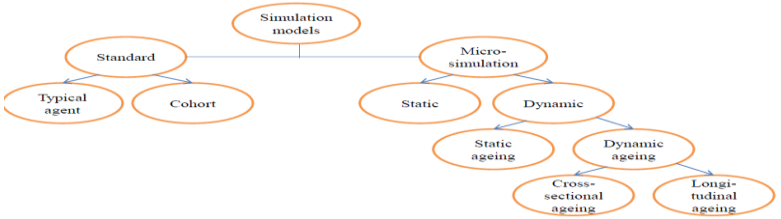
Age in dynamic microsimulation

Static ageing

Cross-section characteristics are updated by exogenous future aggregate data: time is traced as a series of world states.

In practice: reweighing-updating process

- reweigh the individual cases in order to adjust the sample to projected demographic and labour market developments
- resulting aggregates are adjusted by some exogenous developments, such as economic growth



Dynamic ageing

Complete life histories of each individual in the dataset are built up

Cross-sectional models: update all variables for all individuals before moving to the next period of time.
This allows interactions between individuals, such as marriage or widowhood

Cohort/longitudinal models: update all variables for an individual in all points of time before moving to the next individual
This allows the introduction of forward-looking elements to individual behaviour

Data issues

Survey or process-produced data (tax authorities, social security administrations)

Matching various datasets

Cross-sectional (individuals appear in the sample only once) or panel (individuals are followed over a period of time)

Data on individual or on other household members

A brief summary of the MOPACT wp4 models

4 cohort models (EE Finance Ministry, Bank of Estonia, PRAXIS; Polish Social Security Administration)

4 dynamic models with dynamic ageing (NL, FI, HU, PL),

NL:

Administrative data matched with income survey (panel)

Information on households (number and age of members, combined income) is available

Matching is based on admin ID

Models labour market (working hours and wages) and retirement but no household dynamics

Taxes and social assistance are included

Main aim: effect of reform scenarios on the adequacy of retirement savings (replacement rates and poverty measures)

EE:

Various cohort models by administration and private research firm

Main goal is budget forcast (overall expenditures and revenues in terms of GDP; assets in funded pillar; number of future contributors and beneficiaries)

Income distribution and adequacy are secondary of importance

FI:

A new dynamic model by the Finnish Centre for pensions

Developed and maintained in-house

Uses register data (contributory history, benefit take-up) and imputes level of education

Applies transition probabilities between states but no behavioural equations

Unlike other models surveyed here it applies a longitudinal ageing process

PL:

An annually updated cohort model (FUS) and a recently developed dynamic microsimulation model (ZUS MS) – both ran by the social security administration

A special feature of FUS: it applies group-specific mortality rates

ZUS MS covers the whole range of social security not just old age pensions

It applies process-produced data; admin data of various social security agencies are matched by a statistical procedure

HU:

A dynamic model still under development; will become operational in 2015; imported from FPB (Belgium) and adapted to Hungarian conditions

Based on register data of pension authorities; potential to match with public health data by admin IDs and statistical matching with survey data

It models demography, labour market (employment and wages), household formation and retirement

Transitions are modelled by logits