Developing long-term pensioner microsimulation modelling in Great Britain

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Current projections show more older people and fewer children by 2073

Great Britain Principal Population Projections by age and sex:
Line = 2023; Grey bars = 2073.

Source: Office for National Statistics
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Develop existing model or do something new?

- Long term dynamic micro simulation – Pensim3
  - 20+ years old
  - Survey data based
  - Needs development to deliver what we need
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• Why do something new?
  – Scope to tackle new functionality
  – Admin data focus
  – Using new tools and techniques
Base data (or model starting point)

- 1% sample of NINOs (All National Insurance records (L2))
- 10 years of Employment and Self-Employment earnings (RAPID)
- 20 years of benefit history

NINO matching
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Family Resources Survey, 19/20

Wealth and Asset Survey, 18-20

Annual Survey of Hours and Earnings, 19/20

NINO matching

All via Data Fusion – i.e. matching “like” people

Some NINO matching plus imputation
## Data Fusion

<table>
<thead>
<tr>
<th>Information</th>
<th>Rows (adults)</th>
</tr>
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<tbody>
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### Family Resources Survey, 19/20
- 31,000 rows (adults)
### Data Fusion

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**Family Resources Survey, 19/20**

31,000 rows (adults)

1. Design and select “Critical Subsets”

2. Resample the survey data so that
   a) Identical numbers of individuals in each critical subset
   b) Resampling is at a household level
   c) Survey weights are preserved (as close as possible)

3. Match survey records to closest admin data neighbour
Order of Decreasing Difference Methodology

- Administrative Data
- Survey Data
Order of Decreasing Difference Methodology

- Two-dimensional example...
  - Find the admin data person furthest away from the origin.
Order of Decreasing Difference Methodology

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- Two-dimensional example...
  - Find the admin data person furthest away from the origin.
  - Find the closest survey respondent to that person.
Order of Decreasing Difference Methodology

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Order of Decreasing Difference Methodology

- Two-dimensional example...
  - Find the admin data person furthest away from the origin.
  - Find the closest survey respondent to that person.
  - Pair them
Order of Decreasing Difference Methodology

- Two-dimensional example...
  - Find the admin data person furthest away from the origin.
  - Find the closest survey respondent to that person.
  - Pair them
  - Remove and repeat!
Using AnyLogic
Development Road Map

Base data

Deaths → Births → Migration → Households → User Interface

Including geography from the start
Development Road Map

Base data

Deaths → Births → Migration → Households → User Interface

Including geography from the start

Health & Education → Employment → Pension (contributing) → Benefits

Pension (claiming) → Social Care → Housing → Inheritance
And how will we use it?

Customer discussion
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Customer discussion

Assumptions: stochastic / scenario pack

Horizon scanning

External assumptions (ONS, OBR)
And how will we use it?

- Customer discussion
- Assumptions: stochastic / scenario pack
- Horizon scanning
- External assumptions (ONS, OBR)
- Long-Term Micro Simulation Model
- Simple, aggregate long-term models
- Other existing models
And how will we use it?

- Long-Term Micro Simulation Model
  - Assumptions: stochastic / scenario pack
  - External assumptions (ONS, OBR)
  - Customer discussion
  - Horizon scanning

- Simple, aggregate long-term models
  - Outputs under various scenarios
  - Distributional analysis
  - Customer discussion
  - Refinement and re-modelling
  - Other existing models

Customer discussion
Contact details

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