



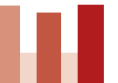
Inštitut za ekonomska raziskovanja
Institute for Economic Research

DYNAMIC MICROSIMULATION PENSION MODEL DYPENSI

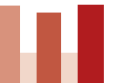
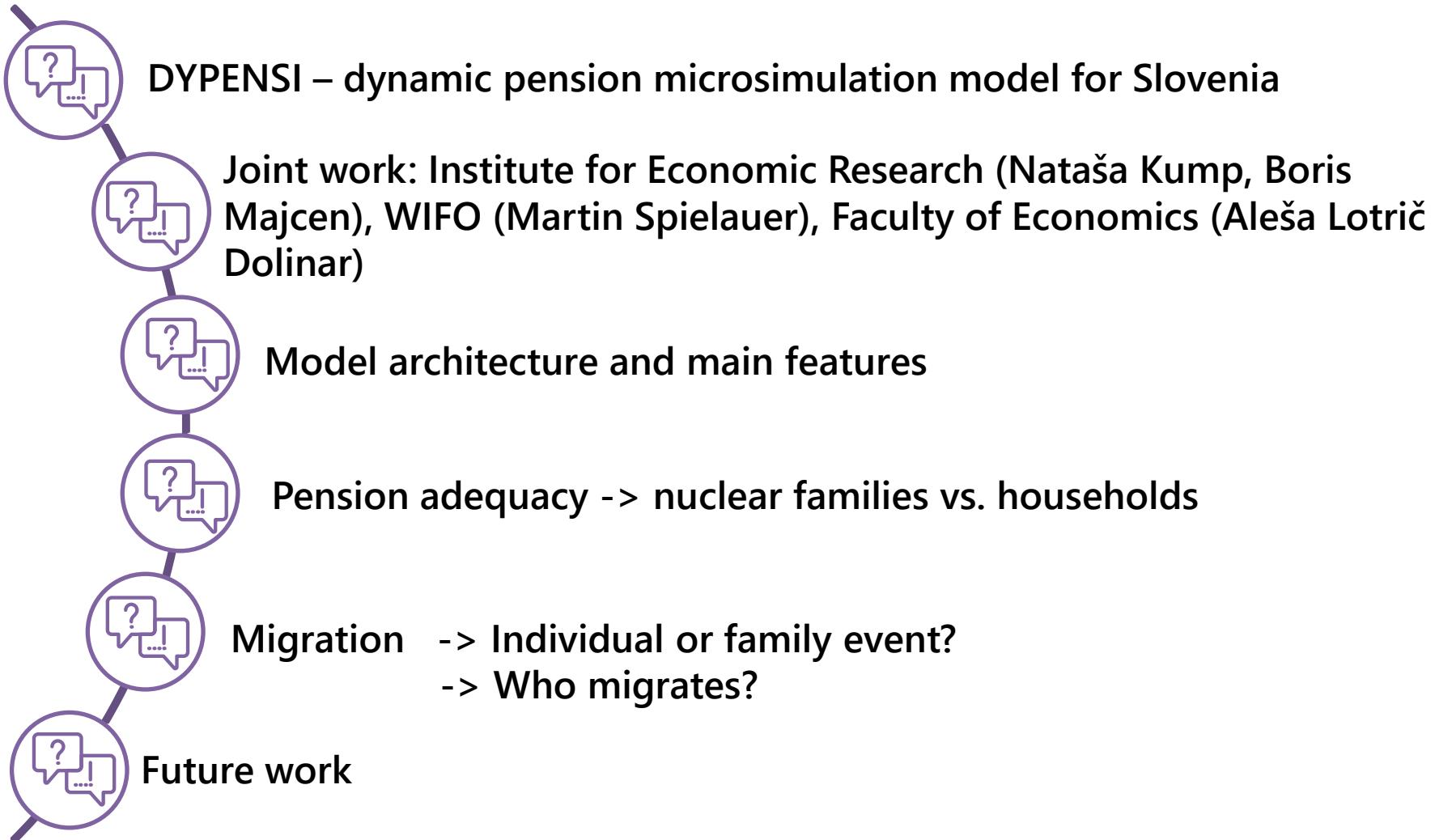
Nataša Kump, Martin Spielauer, Boris Majcen, Aleša Lotrič Dolinar

9th World Congress of the International Microsimulation Association

Vienna, 10 January 2024

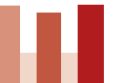


Presentation



Model development

- **DYPENSI, the first version, 2011-2014, Modgen**
- **DYPENSI update and extension, 2018-2023**
 - Extended up to 2080
 - New starting population from December 31, 2017
 - Realistic family formation and family histories
 - Updated DYPENSI will address pension adequacy besides the financial sustainability of the pension system
 - Additional features needed (social benefits and other incomes, taxes and social contributions, poverty rates estimations, retirement decisions)
- **Current uses of the model**
 - Forthcoming pension reform
 - AWG 2024 pension expenditure projections: pension expenditure dropped from 16% of GDP to 13.7% of GDP (updated labour market assumptions and contributory period assumptions)
 - Pension adequacy report 2024: estimation of poverty risk and inequality



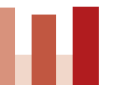
Model architecture

Time based continuous model -> interacting population

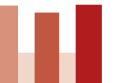
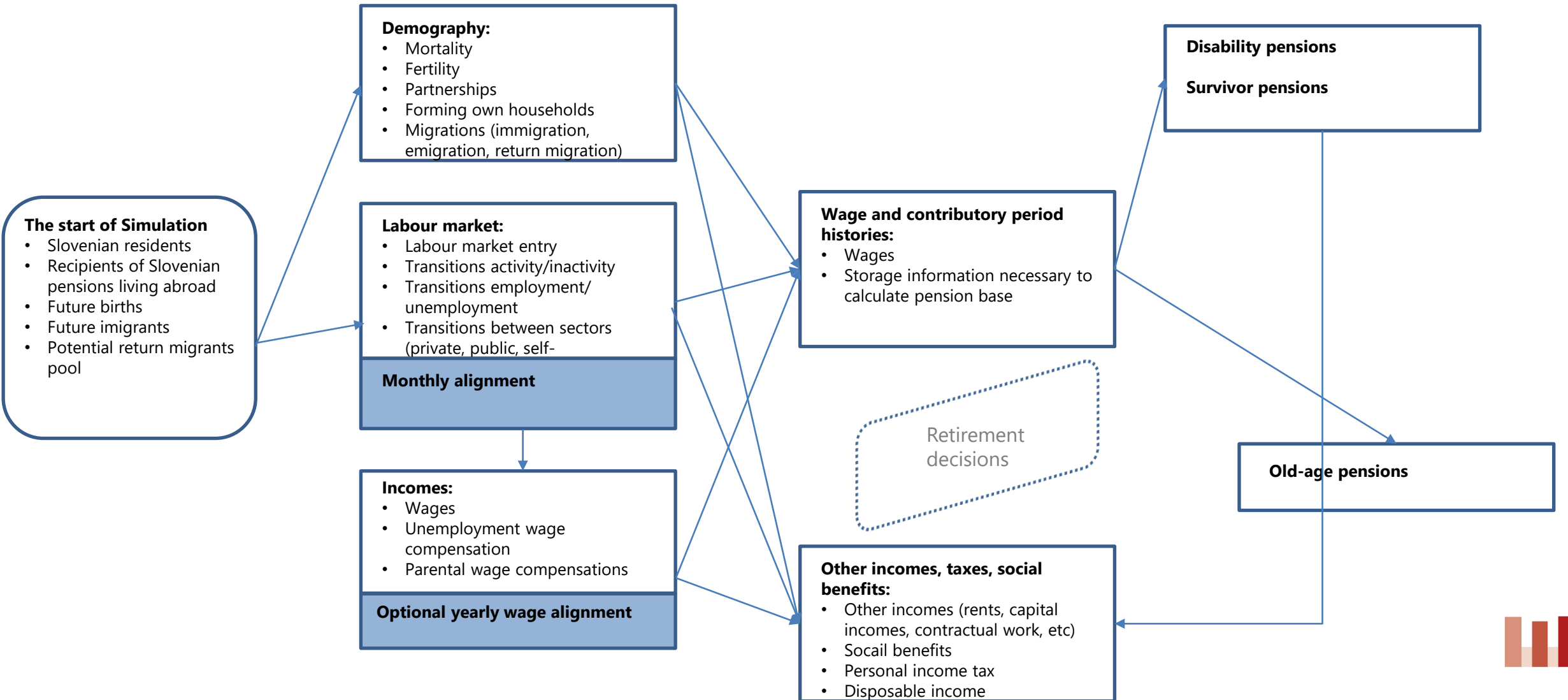
Realistic sub-annual spell durations of processes:

- continuous-time events
- monthly events (mid month or end month)
- yearly events (mid year or end year)

Alignment routines (optional): it enables us to reproduce external scenarios; baseline scenario is aligned with EUROPOP2023 and AWG assumptions.



Model structure



Demographic modules

Fertility

- Births by sex until 2080.
- Fertility rate by age, education and birth order.

Migration

- Immigration
- Emigration

Education

- Transitions between levels
- Impact of parents' education

Disability

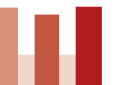
Probability by age and sex for receiving the disability pension

Partnerships

- Probability that a woman is in partnership by education and the age of the youngest child.
- Distribution of partnerships by education.

Mortality

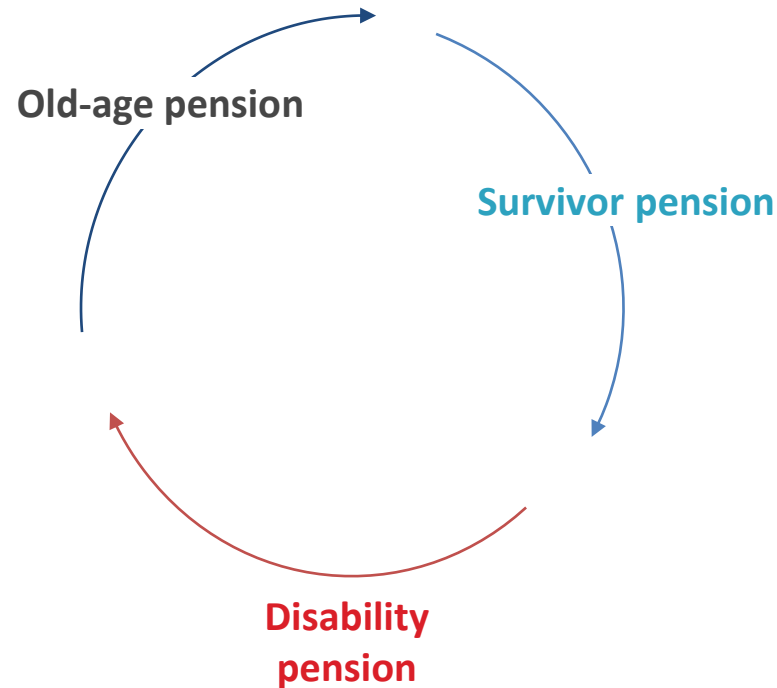
- Mortality rates by age and sex.
- Differences in mortality by education and disability.



Pension calculation

Old-age pension

Fulfilment of pension requirements
Retirement decision – work longer?
Pension base calculation
Accrual rate
Old age pension calculation
Pension valorisation every year



Survivor pension

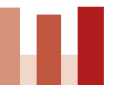
At the death event, the model checks if linked persons (partner and children) are eligible for the following:

- full survivor pension
- survivor pension supplement
- pension swap

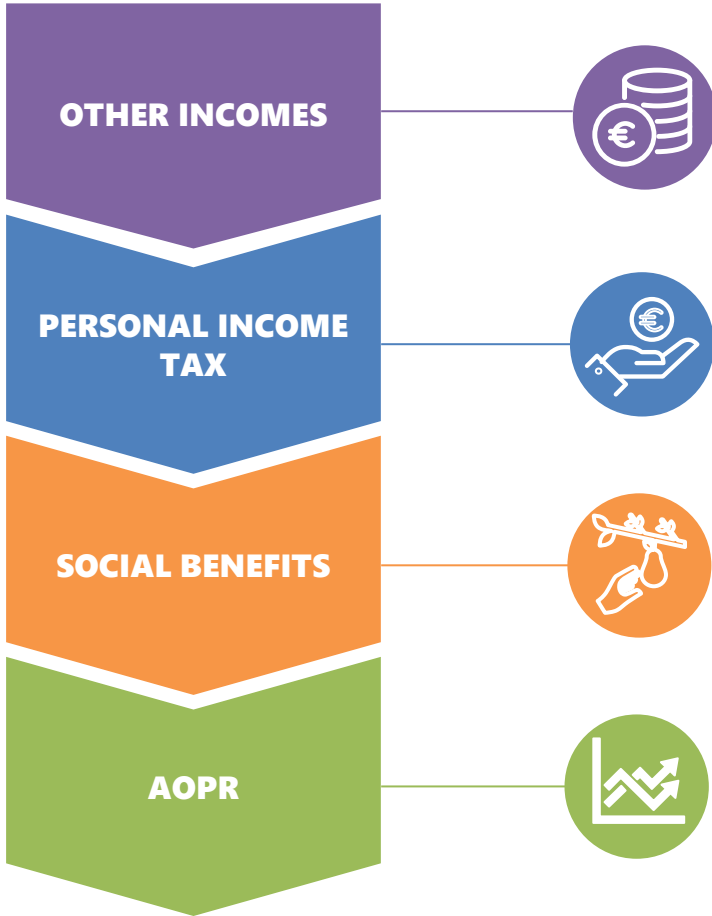
Monthly check for eligibility.
Pension valorisation every year

Disability pension

Choosing the persons for disability by age and sex
Pension base calculation
Calculation of added years
Pension calculation
Pension valorisation every year



Pension adequacy: poverty risk and inequality

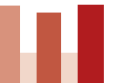


At the end of the year, some individuals get capital income, contractual work income, student work income, rent, and royalties.

It is calculated at the end of the year.

According to the net (family) income, eligibility for child benefits, social assistance and income support are assessed. It's continuously updated during the year.

Merging families into households, disposable income calculation, poverty line calculation, and at-risk-of-poverty-rate calculation.



Nuclear families vs. households

EU-SILC

- Poverty line calculated using **household** equivalent income.
- App. 80% of households are nuclear families.
- App. 22% of the elderly lives in extended households.

Households in DYPENSI

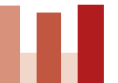
- DYPENSI models nuclear families and not households.
- Treating nuclear family as household has huge impact on equivalised household/family income and poverty line.

Creating households

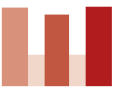
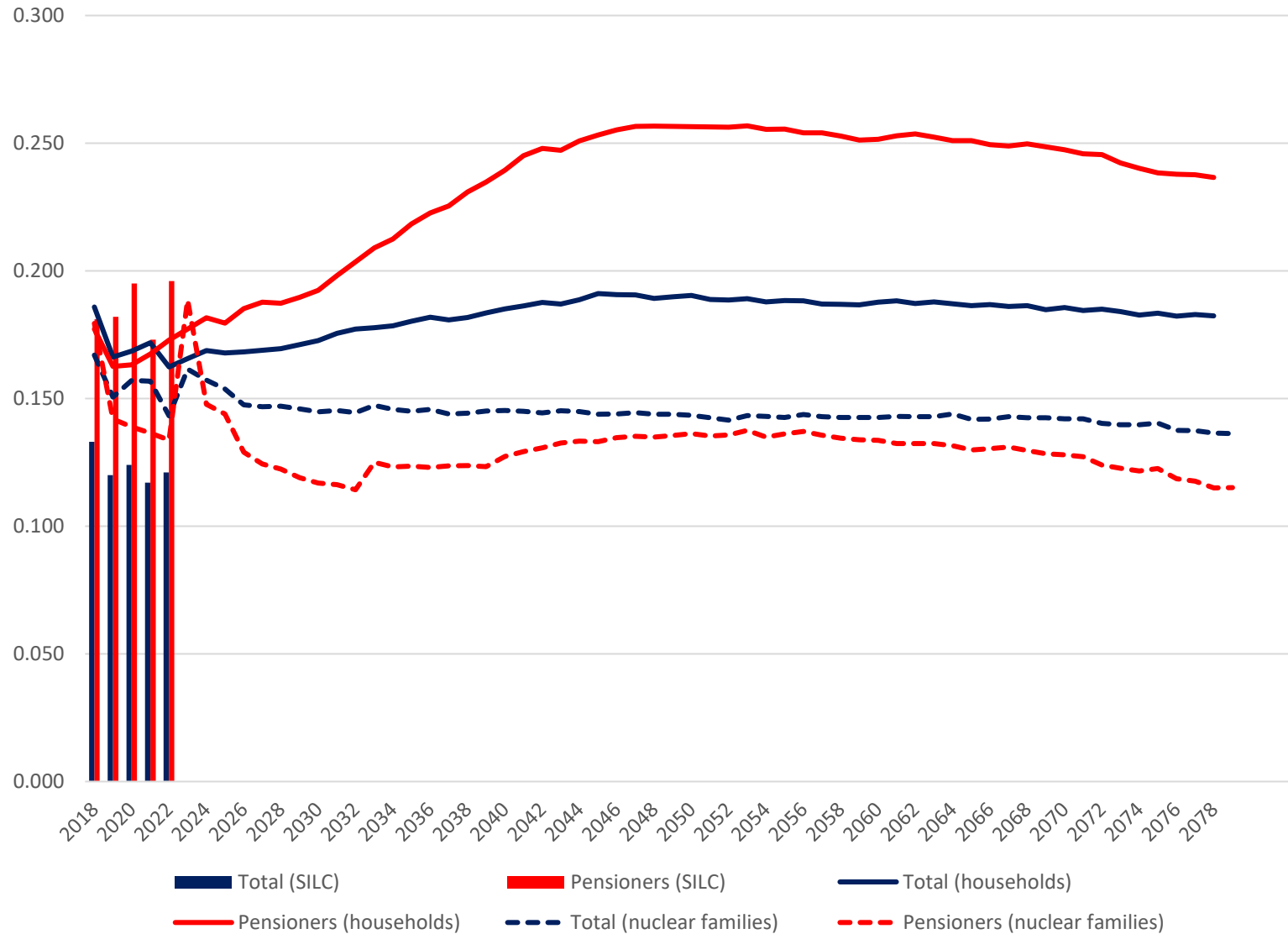
- At the end of each year we merge nuclear families into households.
- Likelihood of living with the parents of the family head or the parents of the spouse, distinguishing various family types, age groups, and education
- Cross-sectional approach; no longitudinal consistency.

Calculation

- Equivalized household income
- Poverty line
- Number of poor
- Inequality measures (the Gini index, S80/S20, P90/P10, etc).



At-risk-of-poverty rates, DYPENSI results



Immigration

Number of immigrants per age, sex and year

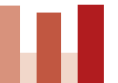
- Europop2023 assumptions.
- New immigrants are modelled from scratch at the start of simulation.
- We sample all their characteristics (sex, year of birth and education); if possible, donors with the same education among immigrants are selected; otherwise, we search donors by age and sex or among non-migrants.

Return immigration

- A pool of potential return migrants at the start of the simulation (ghosts).
- Parameter: share of return immigrants among all immigrants by sex and age group.
- Individuals moving out of Slovenia might return.

Family or individual event?

- New immigrants up to a given age (a parameter) search for an appropriate mother at birth who is fated to immigrate in the same year.
- Return immigration, people flagged as "wants to move" are given priority: these are people whose family head has moved to Slovenia.

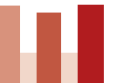
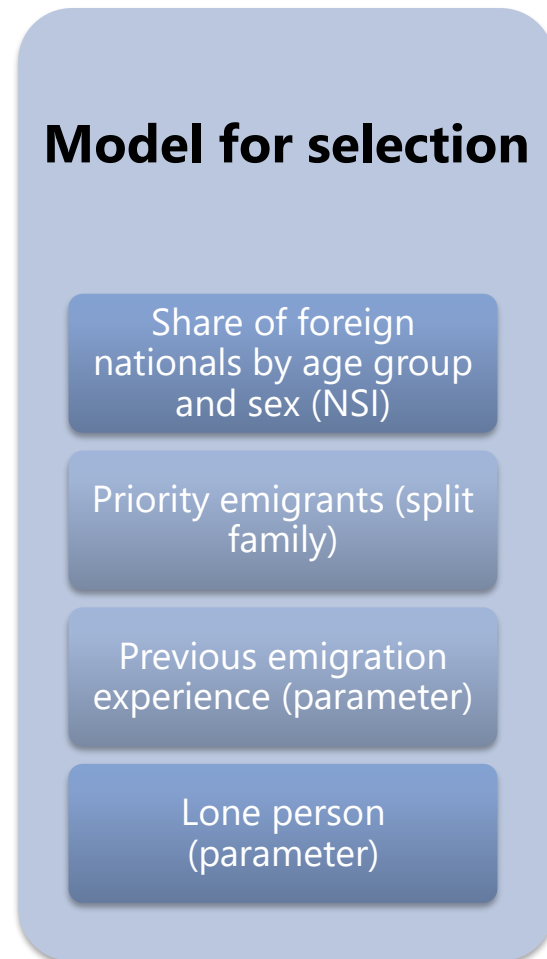


Emigration



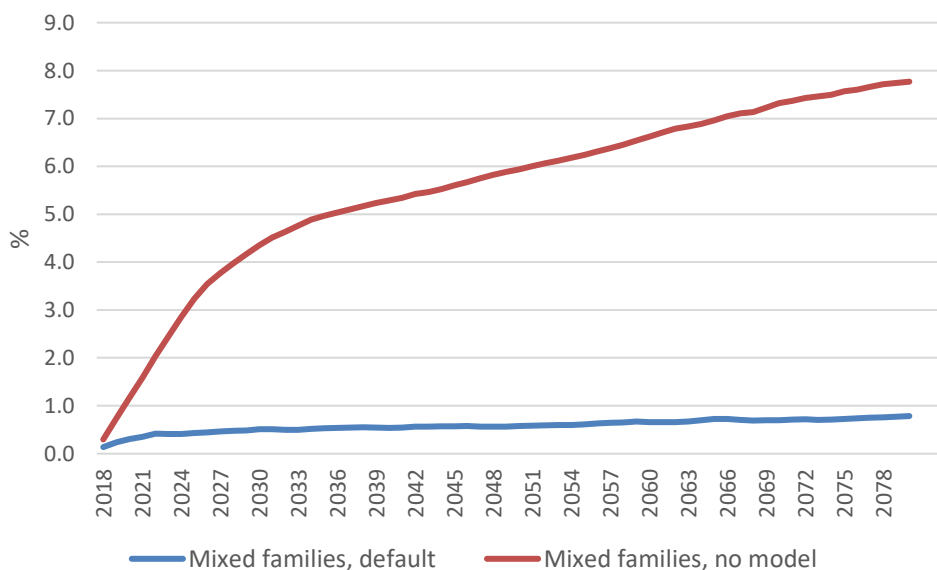
To many individuals in population move

Who?

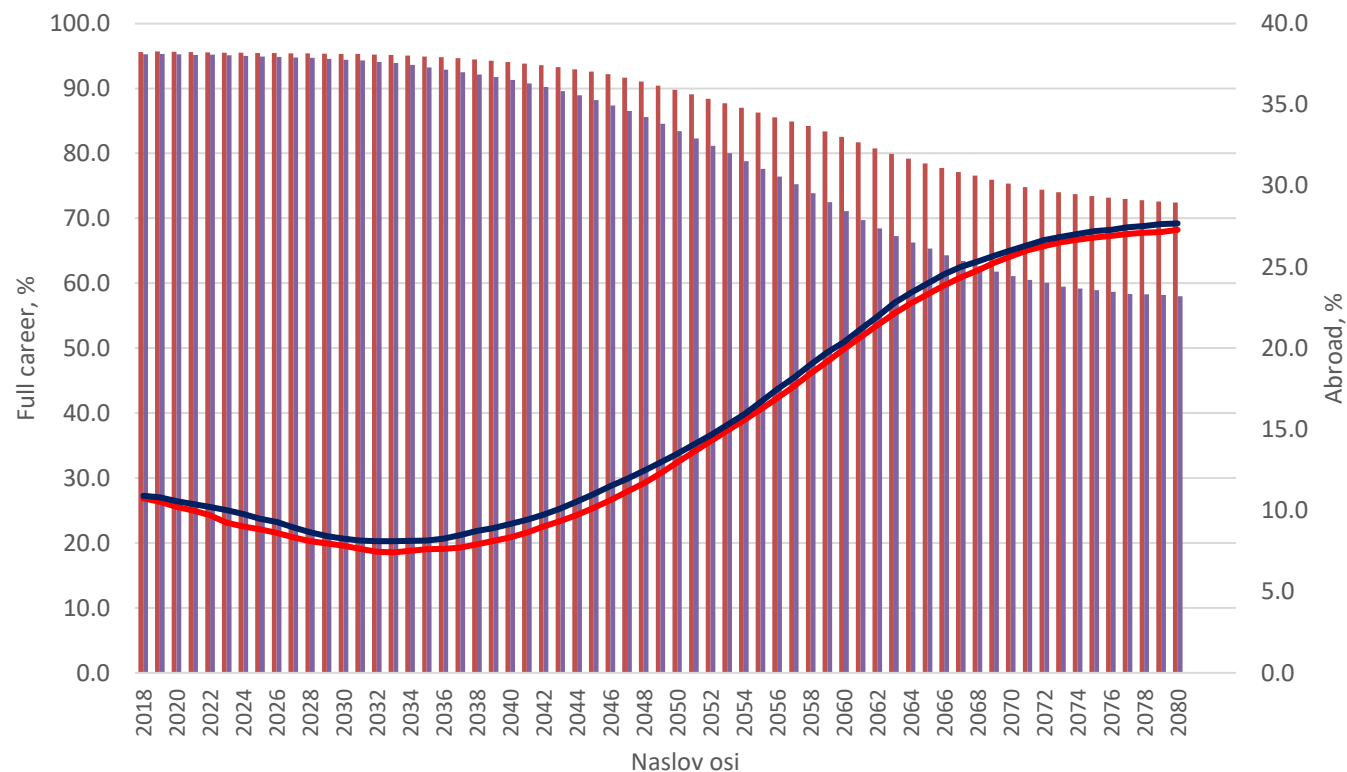


The effect of the emigration modelling

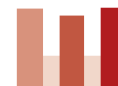
Share of split families



Share of resident pensioners with full career in Slovenia



- Share of old-age pensioners with full career in SI, default
- Share of old-age pensioners with full career in SI, no model
- Share of old-age pensioners living abroad, default
- Share of old-age pensioners living abroad, nomodel



Future work

- 1 MODEL USE**
Estimates for EC
Support for forthcoming pension reform
- 2 DATA UPDATE**
Starting population from 2022
Parameters estimated on more recent data
- 3 MODEL ADJUSTMENTS**
New scenarios – changes in the code
Current prices (constant prices now)?
De-bugging
- 4 NEW FEATURES**
Second pillar
New areas of interest (education, long term care)

