

# The microWELT Dynamic Microsimulation Model

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DEMOGRAPHIC CHANGE AND INTRA AND INTERGENERATIONAL  
DISTRIBUTION: MODELLING THE IMPACT OF DIFFERENT WELFARE  
MODELS.

# Organization

- Goals
- Key Features
- Development strategy
- Modules
- Outlook

# Goals

## **Tool for comparing welfare transfers in 4 welfare state regimes in the context of ageing**

- Liberal: UK
  - Universalistic: FI
  - Conservative: AT
  - Mediterranean: ES
- Integration of National Transfer Account (NTA) Approach, disaggregated by sex, education, family type
  - Modular platform for policy analysis
  - Answer research questions which require longitudinal accounting

# Key Features

## Content

- Demographic behaviors, education, key features of welfare state regimes.
- Aims at capturing elements of the 'essence' of welfare state regimes
- Integrates (refined) NTAs
- Longitudinal accounting
- Heavily based on SILC data: Euromod integration

## Technical features

- Modeling platform: refinable, extendable, adaptable..
- Implemented in Modgen (Statistics Canada)
- Build step-by-step each step documented
- Graphical User Interface (GUI)
- Runs under Windows on a standard PC

# Development Strategy

## 3 phases, the first 2 part of Weltransim

### Step 1: Core socio-demographic NTA

- Fertility, mortality, partner, education
- Education: transmission, patterns
- Alignment mechanisms
- NTA variables and accounting
- Longitudinal accounting of transfer flows between population groups

### Step 2: Modeling Platform

- LFP, employment, earnings distribution
- Key Policy systems
- Euromod 'integration'

### Step 3: Extensions

- openly available for research
- documented, modular, extendable
- can be developed in many directions

# Starting Population

**The starting population of microWELT 1.0 is based on SILC data. Currently very few variables**

**MicroWELT automatically converts weighted observations into identical weight simulation actors**

**The simulation size is a parameter**

## **Required variables in Phase 1 model**

- Family ID (nuclear family)
- Role in family: (head, spouse, child)
- Weight
- Time of birth
- Sex
- Education level
- Current school attendance

# Mortality

**Mortality is implemented in 3 ways in order to allow reproducing available aggregate projections (Eurostat; as in Ageing Report) but also to study the effect of mortality differentials by education. Users can select between the three modeling options.**

- **Base:** life table of period mortality rates by age and sex, no educational differentials.
- **Calibrated:** period life expectancies at age 30 and age 65 by education used to calibrate mortality for meeting targets by education.
- **Aligned:** rates are aligned to produce the same aggregate mortality as in the base model, but keeping the relative mortality risks by education

# Fertility

The goal is simultaneously reproducing births by age (as Eurostat) while having a realistic model of the timing at first births and childlessness by education.

- Focus on childlessness as key component of concentration of reproduction by education.
- We get some realism in the timing differences of first births by education
- The model is still / refinable

## Modules:

- **Base:** age-specific period fertility rates (Eurostat; as in Ageing Report).
- **First birth by education:** first births are modeled using cohort first birth rates by education. The base model is still used to decide the number of births by age, but babies are distributed to be consistent with first births.



# Female Partnership Status

**We try to capture part of the 'essence' of welfare state regimes by a 'foto approach' of partnership status by education, motherhood and age of youngest child**

- modeled on the female side
- alignment on a yearly basis
- no alignment age 80+
- micro level events are death of partner and 'status swap'

## Parameters:

- Children: Proportion in a partnership by education, age group at last birth and age group of youngest child
- No Children: Proportion in a partnership by education and age
- A mobility parameter for modeling of changes in status not required for alignment ('status swap between people').

# Male Family Status and Partner Matching

**Partners are matched by education and age, we also model male childlessness ('never living with children'). Men fated with childlessness are treated differently in the spouse market**

## **Male Childlessness Module:**

- By year of birth and education
- Some imputations in starting population
- Status assigned in early life

## **Partner Matching Module:**

- Male partners are searched by women 'when needed'
- Distribution by age and education
- Some rules for always childless men
- No full longitudinal consistency except childlessness

# Education Fate

**Two goals: We try to capture (1) intergenerational transmission patterns typical for welfare state regime while (2) being able to reproduce aggregate education projections.**

- **Education levels:** low, medium, high.
- **Fate model:** projection scenarios of aggregate education outcomes by sex and year of birth.
- **Transmission model:** Highest education by parents highest education
- **Fate alignment mechanisms:** Adjusting the transmission model to reproduce fate model on aggregate.

# Enrolment patterns

**Two goals: We (1) aim at modeling realistic individual education careers while (2) being able to meet aggregated scenarios of school attendance by age (e.g. form Ageing Report)**

- **Pattern sampling:** for given outcome a career path is sampled. Enrollment pattern and school type
- **Imputation mechanism:** for people in starting population careers should match observations
- **Enrollment alignment mechanism:** Additional enrollment (dropouts, higher/additional studies which do not affect highest outcome.

# NTA Groups

## Groups:

- Children 0-16: age, parents education
- Students 17-25: age, parents educ
- Non-students 17-25: age, sex, own education, family type A
- Adults 26-59: age, sex, own education, family type A
- Adults 60+: age, sex, own education, family type B

## Family types:

- **A:** 6 types by union status and living with children (>/< 3)
- **B:** 4 types by union status and childlessness

# NTA Variables

- Private Consumption Educ (CFE), Health (CFH), Other (CFX)
- Public Consumption Educ (CGE), Health (CGH), Other (CGX)
- Public Transfers Inflows: Pensions (TGSOAI), Other Cash (TGXCI), Other In-Kind (TGXII), Educn (TGEI), Health (TGHI)
- Public Transfers Outflows (TGO)
- Net Interhousehold Transfers (TFB)
- Net Intrahousehold Transfers (TFW)
- Private Saving (SF)
- Public Saving (SG)
- Labor Income (LY)
- Private Asset Income (YAF)
- Public Asset Income (YAG)

# NTA Indicators

Literature has proposed a series of indicators which, based on current NTA data and population projections aim at measuring the effect of population ageing on the economy.

MicroWELT allows (1) reproducing existing research for FI, UK, ES, AT as base for comparative welfare state studies, and (2) studying the effect of introducing education and family on the projections.

## Currently considered papers:

- Lee (2017) Some Economic Impacts of Changing Population Age Distributions – Capital, Labor and Transfers (WP)
- Lee, et.al. (2017) Full Generational Accounts: What Do We Give to the Next Generation? (PDR)
- Lee & Mason (2014) Is low fertility really a problem? Population aging, dependency, and consumption (Science)

# Already Implemented: Lee 2017

- Simple Cobb Douglas economy without innovation
- Capital estimated from NTA flows assuming one interest rate
- Fixed capital stock and saving rates by age as today
- Two versions: open economy, closed economy

## Indices:

- Support Ratio:  $L/N$  Labor / Effective Consumers
- Impact Index:  $C/N$  Consumption / Effective Consumers



# Thank you!

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