



Sustainwell WP3 Activities and planned outputs

[Overview – 2024-03-10](#)

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The overview lists activities at WIFO and contributions of IER (indicated in the text)

Update 2024-04-15: shortened

1. Activities

1.1 Re-basing microWELT and extension to 8 countries

The microWELT microsimulation model was re-based and extended to 8 countries. The starting year of microWELT was moved to 2018, and all parameters of the core were updated. This involved the review and adaptation of the analysis scripts for parameter generation. Analysis scripts are documented and allow to reproduce the generation of the starting population and of all model parameters of the base version.

1.2 OpenM++ transition

OpenM++ is the platform-independent open-source successor of Modgen, the programming language used to implement microWELT and microDEMS. While openM++ is a re-implementation of the Modgen language, some code adaptations are required to meet modern (and stricter/safer) programming standards. OpenM++ supports a parallel installation with Modgen, which, following a set of standards of code organization and folder structure, allows to compile the same code both in openM++ and Modgen.

We currently have two versions, the Modgen version, and an X-compatible version which we still build up. Alongside the openM++ transition, we have decided to re-implement the model core from scratch creating microWELT 2.0, which consolidates existing code and code versions and adapts to new requirements of the JPI MYBL / Horizon Europe WellCARE and SustainWELL projects. We aim at merging the versions over the coming months.

1.3 Ongoing improvements of the model core

The existing model core is continuously improved, many improvements being driven by the demands of Sustainwell, but also benefiting other projects. Recent examples are:

- Adaptations Family Links: microWELT distinguishes three types of linkages between family members: links between spouses, links between children and “biological” parents (both mother and - if known - father), and links between dependent children and “social parents”. For dependent children living at home, the latter can be both “biological” parents and stepparents. In previous versions, these links were dissolved reaching economic independence. In microWELT 2.0 we maintain these links (as they are useful for the modeling of care networks, inter-vivo transfers and bequests of wealth) and adapt the code to distinguish if children still live together with their social parents.
- Partnership formation and dissolution: Improvements of the modelling of partnership status, especially at higher ages.
- Distribution of family sizes: microWELT simultaneously reproduces official population projections (age-specific fertility) and accounts for differences in childlessness and the distribution of age at first birth by education. microWELT 2.0 expands on this approach, additionally accounting for differences in second births by education, leading to a realistic distribution of family sizes (no children, one child, two and more children) by cohort and education.

1.4 Technical documentation

Modgen/openM++ support self-documentation of code, i.e., documentations and labels within the code are used for the creation of a help-file available to the model user. We therefore aim at keeping most technical documentation within the model code, avoiding multiple copies and versions.

We have built a mechanism, to create module documentations also in a way which can be instantaneously published on the web. This builds on previous projects; We have started updating and reorganizing the microWELT.eu website, and full model and code documentations including downloads will be provided and maintained.

After completing the openM++ transition and the re-construction of the updated model core, we plan to document this work also in a research paper in the International Journal of Microsimulation.

1.5 Earning equations

Alongside the Sustainwell project, we added earnings implemented by Mincer-Wage Equations. Based on EU-SILC data, daily wages are calculated based on yearly gross wages (SILC variable py010g) and time spent in employment (SILC variables pl073, pl074, pl075, and pl076). For men we estimate wage equation for each education group. For women we additionally control of the age of the youngest child in the family in one of four age categories (0-2, 3-4, 5-9, 10-14, 15 and older). Heterogeneity in wages is implemented by the standard error from the log-wage Mincer Equations. Everyone in the simulation is assigned a random place in the wage distribution. The current version is documented online but is subject to revisions and improvements.

1.6 Longitudinal modeling of activity careers

We currently improve the model framework of microWELT by incorporating longitudinal consistent employment careers modelled in continuous time. So far, the individual labour market status is updated monthly, accounting for a set of personal characteristics on the probability of being in the labour market, in employment or unemployment. While microWELT accounts for observational differences in employment and unemployment probabilities depending on age, gender, education and other personal characteristics in the cross-section, individual employment states for a given set of personal characteristics are randomly reallocated each month.

We aim at improving longitudinal consistency in labour market careers, by letting transitions between labour market states depend not only on a set of personal characteristics but also on the duration of the respective state. We have identified a feasible way based on EU-SILC data, based on the retrospective assessment of individual labour market careers for each month of the reference year.

This work is documented in a research note. We aim at validating the approach for Austria by comparison to the microDEMS model. Eventually, this work should lead to a research paper.

1.7 Retirement decisions

Incorporation of longitudinal consistency requires the modelling of a definite retirement event. Retirement is the subject of an Austrian case study (part of Sustainwell) comparing the results of the highly stylized microWELT approach with the detailed Austrian model microDEMS. Work currently focused on microDEMS, which is currently being used to assess the labour force consequences of the current Austrian pension reform - a gradual increase in the retirement

age for women from 60 to 65 (the age for men). This provides a test case for the case study. Currently, we work on a research paper on the labour supply effects of the Austrian pension reform; a working paper version is available.

1.8 Unemployment benefits

Longitudinal work careers implemented in MicroWELT distinguish spells of employment, unemployment, out of labor force, and permanent retirement. Unemployment risks and transitions out of unemployment are – besides other characteristics such as age, education, number, and age of children – duration dependent and modeled in continuous time. The risks of entering as well as of leaving unemployment are typically highest in the first few months of the according spell.

The modelling of unemployment benefits is based on estimated replacement rates using the OECD tax benefit calculator. This work was performed by IER providing parameters for replacement rates and min-max bands of unemployment benefits by month of unemployment, contribution period, and the presence and number of children (accounting for child supplements).

Documentation is available in the research note on tax-Benefit modelling and accounting.

1.9 Maternity and parental leave spells and benefits

The modelling of maternity and parental leave requires model adaptations for explicitly identifying leave periods following births. This work is on our current to-do list.

Modelling of benefits has started at IER and is discussed in the research note on tax-Benefit modelling and accounting. The general approach is like for unemployment benefits, with the difference that Euromod and the hypothetical household tool are used (instead of OECD calculators).

1.10 Pensions

On the to-do list for next steps. The general idea is to estimate replacement rates for different career lengths and income levels using available estimates (Pension Adequacy Report, OECD database) and available microdata. This work will be mainly based at IER.

1.11 Tax-benefit modelling based on synthetic database imputation.

While earnings, public pensions, maternity and parental leave and unemployment benefits are modelled in microWELT, taxes and (other) benefits are simulated by database imputation, following a modified approach outlined in Van de Ven et.al. (2022).

The tax-benefit calculation follows a synthetic database imputation approach based on Euromod. This approach supports the comparative nature of the model, i.e. its applicability to many countries without the need to code tax-transfer systems in detail. Using the Euromod hypothetical household tool, we produce a synthetic database of ~250k families across five dimensions covering population heterogeneity by income and family characteristics and composition. In the simulation, families identify a matching database record, which is used to retrieve tax and social contribution rates, as well as a set of benefits.

The work with Euromod and the hypothetical budget tool constructing synthetic databases is being carried out at the IER. At WIFO, we currently implement this approach. Documentation is available in the research note on tax-Benefit modelling and accounting. At some point soon a discussion or workshop for clarifying outstanding issues would be a good next step. Ultimately, the work would probably be suitable for a research paper in the International Journal of Microsimulation.

1.12 Implementation of tax-benefit accounting

The continuous-time framework of microWELT is reflected in the implementation of the accounting system which instantaneously updates whenever relevant characteristics such as employment status, income, or family compositions changes.

Accounts are implemented as a separate actor type (like persons); accounts are linked to a specific person and an observer actor (which is handling totals, alignments, etc.) At the end of each calendar year, or at death, a “tax return” is filed; at this point, adjustments can be made (allowing for alignments, revisions, amendments, etc.) and results are finalized and stored.

Implementation of the tax-benefit accounting system is underway; we are currently implementing a prototype based on sandbox data. Documentation is available in the research note on tax-Benefit modelling and accounting. Ultimately, the work would probably be suitable for a research paper in the International Journal of Microsimulation.

1.13 MicroDEMS

MicroDEMS is a refined Austrian version built on the microWELT platform but based on detailed longitudinal administrative records. Like microWELT, the model was re-based for incorporating the most recent population projections.

In the Sustainwell project, it will be used for country case studies (on migration and pensions). Work on pension modelling was mentioned above; work on migration will start in summer with Peter Huber becoming available for the project.

We have finalized a working paper “Lifecourse heterogeneity and the future labour force – a dynamic microsimulation analysis for Austria” which provides a general introduction to microDEMS. (plan submission to VYPR)

1.14 What is missing

1.14.1 Assets and assets incomes

- Stocks
 - Definition of asset types
 - Initial endowments
- Flows
 - Returns, interest
 - Value growth
 - NTA asset income
- Transfers
 - In-vivo transfers / gifts
 - Inheritance
 - Union dissolution
- Taxes
 - Taxes on asset income
 - Inheritance and gift taxation

1.14.2 Saving and consumption

- Decision
 - Private consumption
 - Public consumption

- Assignment to family members
 - Who consumes how much
 - Who saves; who's stocks are changed
- Consumption taxes