# Longitudinal Activity Careers in microWELT 2.0

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## Abstract

This report outlines the longitudinal modeling of activity careers in microWELT 2.0. We aim to improve the microWELT model framework by incorporating longitudinally consistent activity careers with transitions between 6 states: never entered the labor force, employed, unemployed, on maternity/parental leave, out of the labor force, and retired. So far, individual labor market status has been imputed monthly, taking into account a number of personal and family characteristics. Moving from this simple cross-sectional imputation approach to a continuous-time longitudinal model that accounts for state duration, we face data challenges because microWELT - designed as a comparative model - is based on comparative sample data that suffer from small sample sizes and sparse longitudinal depth, leading to high parameter uncertainty in estimated transition hazards compared to models based on administrative employment records, such as the Austrian microDEMS model. To overcome these limitations, we combine the approach used in microDEMS with a two-step alignment mechanism, where the first step allows for (optional) aggregate scenario targets such as an overall unemployment rate, and the second step uses cross-sectional imputation models to generate alignment targets for specific population groups by age, gender, education, health, and family characteristics. Hazards for transitions into unemployment and out of the labor force are used indirectly to select the candidates with the shortest random waiting time for the number of transitions required to meet the alignment targets within each population group.

Keywords: Dynamic microsimulation, employment, unemployment, labor force participation

## 1. Introduction

MicroWELT is a dynamic microsimulation platform developed for the comparative study of the interactions between population aging, sociodemographic change and welfare state regimes. In the Horizon Europe Sustainwell project, we aim to improve the model framework by incorporating longitudinally consistent employment histories. So far, the individual labor market status was updated monthly, taking into account a set of personal characteristics on the probability of being in the labor market, employed or unemployed. While microWELT accounts for observable differences in employment and unemployment probabilities in the cross-section over age, gender, education, health, and family characteristics, individual activity states were previously reassigned each month for a given set of personal characteristics, not accounting for the past state and state duration.

A second refinement concerns the activity states distinguished in the model, by dividing the non-activ population into three groups: those who never entered the labor market, those who are already retired and those who temporarily leave the labor market. Also, we added a state for persons on maternity/parental leave. These refinements correspond to the requirements of modeling leave benefits and pensions.

This report covers data challenges, the general modeling approach, and the specific activity transition mechanisms applied by transition type. Estimation results and parameters are placed in the Appendix.

## 2. Data challenges

Making use of EU-SILC data, we aim at adding longitudinal consistency to activity careers, by making the labor market states depend not only on a set of personal characteristics but also on the duration in the respective state.

Data on labor market transitions are rare at an internationally comparative level. While in principle the EU-LFS data contains a (limited) longitudinal dimension with repeated interviews of the same respondents over several quarters, scientific use files typically do not allow to follow individuals over time, as the longitudinal dimension is removed in the data for most countries.

While the same holds true for EU-SILC data, they offer retrospective information of individual labor market careers in the form of self-reported individual labor market states for each month of the reference year. This allows us to measure transitions between different labor market states within one calendar year even for those countries that do not publish their data in its

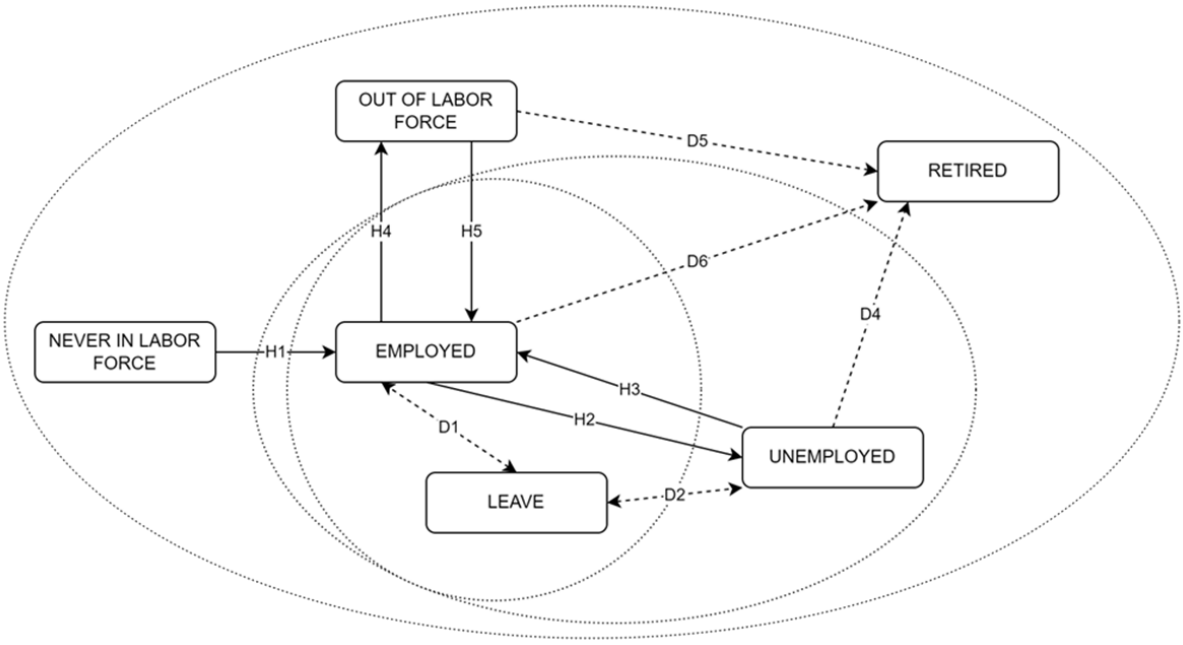
panel structure. For countries that preserve the panel structure, we can follow labor market careers for up to four years.

Another data challenge is related to small sample sizes, leading to high parameter uncertainty in estimated transition hazards compared to models based on administrative employment records, such as the Austrian microDEMS model. To overcome these limitations, we combine the hazard regression approach used in microDEMS with an alignment mechanism based on cross-sectional models, for generating target unemployment and labor force participation rates.

## 3. Modeling approach

The core of the activity transition model consists of a collection of piecewise-constant hazard regression models combined with decision models for retirement and parental leave take-up and duration. The approach adapts and simplifies the approach developed for microDEMS (see Appendix). We distinguish six activity states (see Figure 1)

**Figure 1: Activity states and transitions**



**S: own illustration.**

The transition models are complemented by a two-step alignment mechanism, where the first step allows for (optional) aggregate scenario targets such as an overall unemployment rate, and the second step uses cross-sectional imputation models to generate alignment targets for specific population groups by age, gender, education, health, and family characteristics. Hazards for transitions into unemployment and out of the labor force are used indirectly to select the candidates with the shortest random waiting time to be included in the number of transitions required to meet the alignment targets within each disaggregated population group.

## 3.1 First employment

The transition into first employment is modeled by age- and education specific hazard rates. Currently, we have implemented a simple test version. MicroDEMS additionally distinguishes rates by school attendance and school type, capturing dual education tracks (apprenticeships) and student work. It also distinguishes first labor force entries of immigrants. We aim to add such details to microWELT at a later stage.

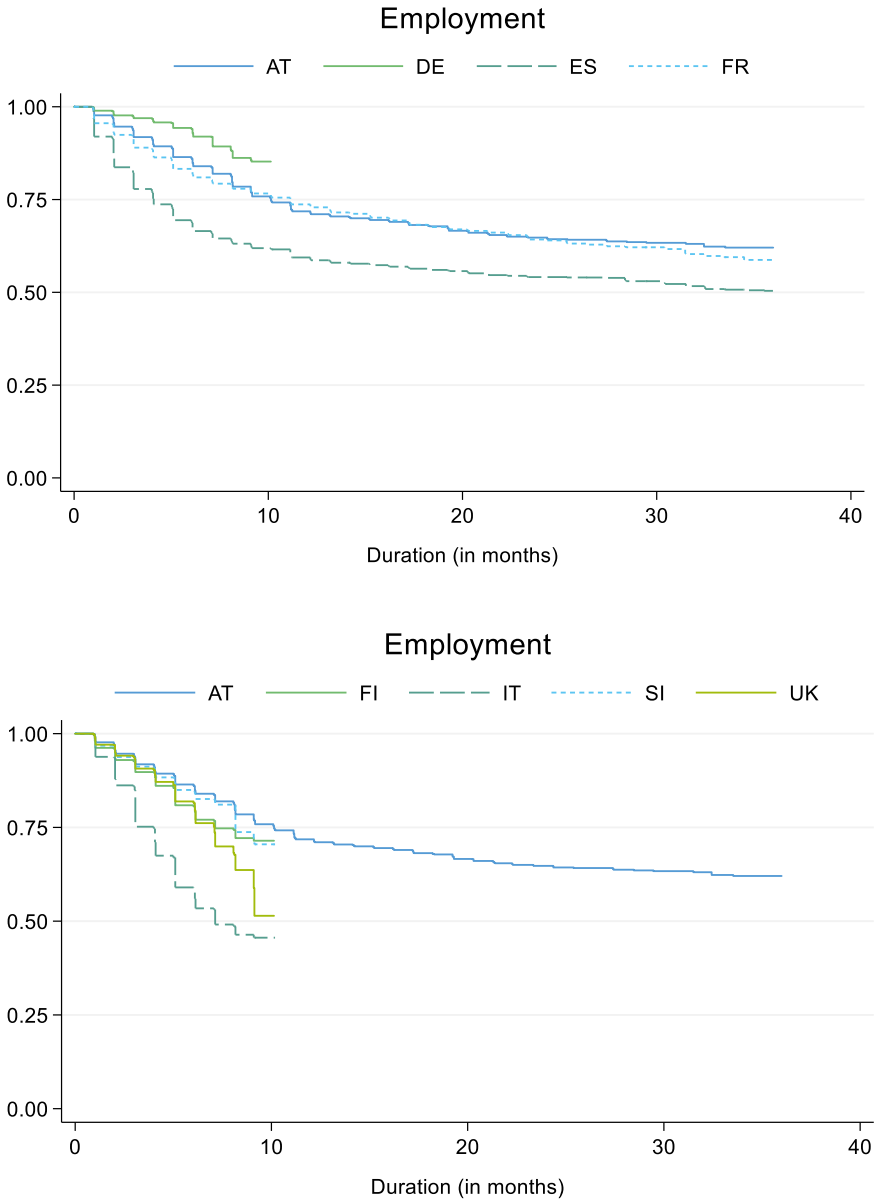
## 3.2 Employment and unemployment

Unemployment risks as well as the speed of finding new employment strongly depend on age, education, and health. Besides the obvious correlation between unemployment risks and these personal characteristics, labor markets are characterized by a large degree of path dependency. Exploiting the longitudinal activity information from EU-SILC data, we estimate transitions between labor market states, accounting for personal characteristics and the duration of the activity status.

We use EU-SILC data for the years 2014 to 2018. For Austria, Spain and France the data allow us to follow individuals over several waves, giving us information of monthly labor market states for up to 48 months. For the other countries in our sample, we end up with 12 months. As respondents are required to list their "main" labor market status for each month, we interpret a consecutive number of months with the same labor market state as an uninterrupted spell and measure the duration of this spell simply as the sum of consecutive months within the same labor market state. For our analysis, we cluster all labor market states associated with employment (employee full-time, employee part-time, self-employed full-time, self-employed part-time) into a single definition of employment. To assess the transition rates depending on the duration of the state, we focus on labor market states that start within the available observation period. Thus, we exclude all spells for which we cannot determine the time at

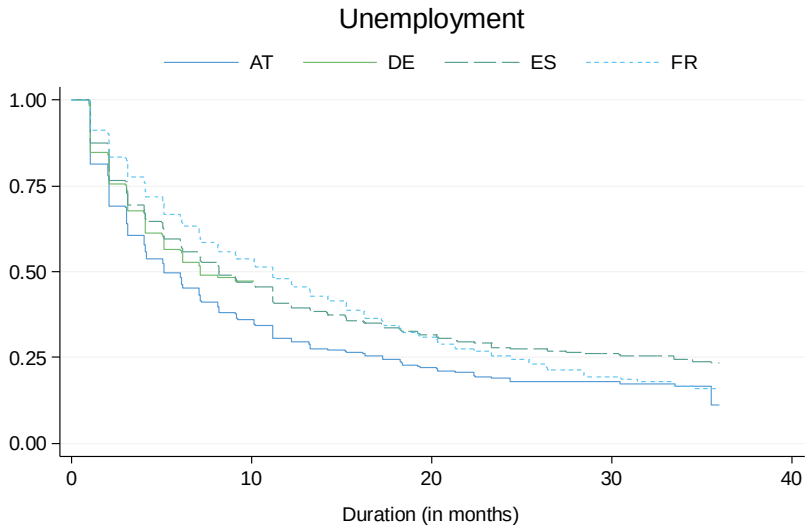
which they started in the data. The following illustrations (Figure 2 and Figure 3) of Kaplan-Meier estimates clearly show the duration dependence of transitions, with the fastest state exits observed in the first months and curves flattening with time.

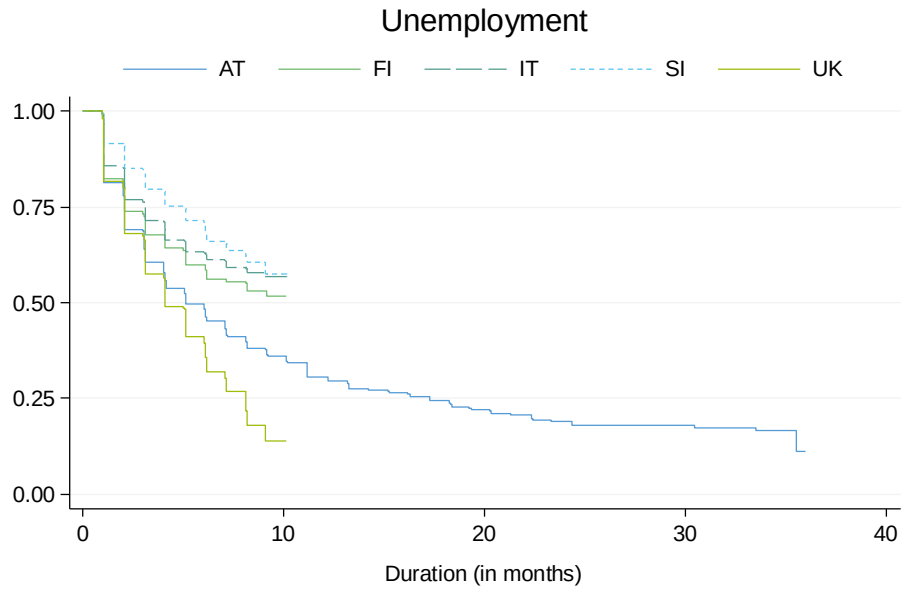
**Figure 2: Kaplan-Meier estimates of survival rates in employment before moving to unemployment**




S: own calculation based on EU-SILC data.

**Figure 3: Kaplan-Meier estimates of survival rates in unemployment before moving to employment**




S: own calculation based on EU-SILC data.

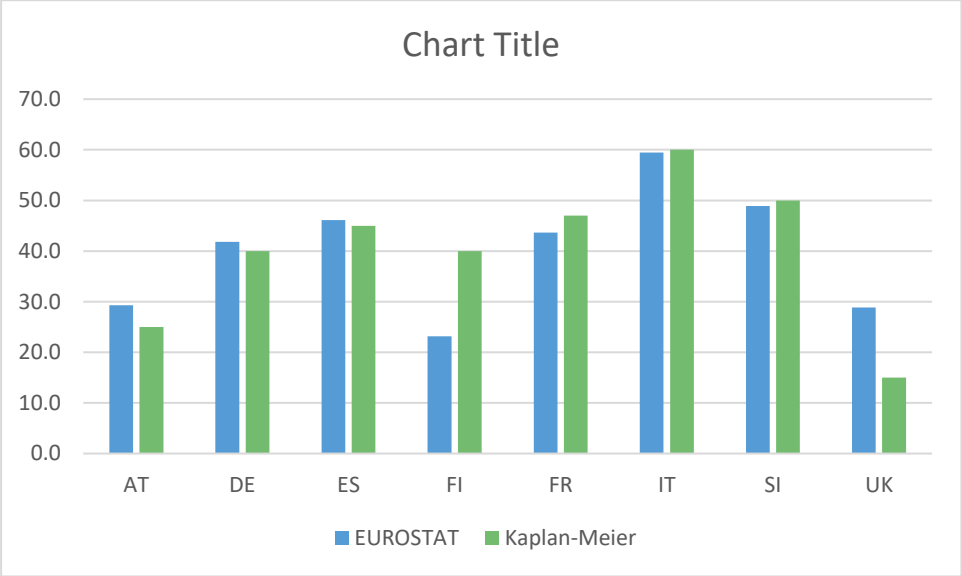
The current implementation is driven by four parameters:

- Overall targets of unemployment rates by year
- Odds ratios (estimated by logistic regression) by age group, sex, health (binary indicator), and education (4 levels)
- Unemployment hazards: Hazard regression coefficients (baseline hazards by state duration in 7 intervals, and relative risks by education and sex)
- Re-employment hazards: Hazard regression coefficients (baseline hazards by state duration in 7 intervals, and relative risks by education and sex)

While re-employment hazards are used directly to model individual level transitions, unemployment hazards are used indirectly, for ranking candidates by random waiting times. The transitions are then triggered monthly by an "observer" based on target unemployment rates for each distinguished population group (by age, sex, education, health). Target rates are determined by the logistic regression model. Optionally, the model can be aligned to external total targets. In this case, each month an alignment factor (an additional proportional factor; odds ratio) is determined (by binary search) which, when applied to the logistic regression, leads to meeting the overall target for the current population composition.

Figure 4 compares EUROSTAT long-term unemployment rates (share of unemployed with duration 12 months or longer as a share of all unemployed) to the share of unemployment spells exceeding 12 months (or 11 months for countries where we only observe 12 months) according to the above Kaplan-Meier estimates. The figure shows a good correspondence of estimates – with exception of Finland and UK.

**Figure 4: Comparison of long-term unemployment rates**




S: own calculations based on EU-LFS data and estimated based on EU-SILC

## 3.3 Maternity and parental leave

At each birth event, the mother decides on the duration of her maternity and parental leave. Leave duration is sampled from quantile means by the current activity state, allowing to accommodate the various leave regulations across countries (which might be limited to women in employment). During a leave, all activity transitions are blocked, thus a woman is not at risk of unemployment or reemployment, etc. We aim for extending the framework by allowing to share leaves with a partner according to country-specific rules.

## 3.4 Exiting and re-entering the labor force

We follow the same general modeling idea as for unemployment and re-employment, except that we allow for age-group-specific alignment targets (Step 1 alignment). The cross-sectional model for people out of the labor force includes family characteristics, such as the age of the youngest child, which is important for modeling female labor-force participation.

The implementation is still under development. Complexity arises from distinguishing permanent retirement from being out of the labor-force while still at risk to re-enter. The original model structure did not make this distinction and used the (distance to) normal retirement age and pre-retirement age (set as parameters) as explanatory variables. We aim at preserving the operations of the original approach (for being used as alignment targets) as they were

successfully applied in comparative labor force projections across Europe and the US. (Böheim et.al 2023; Horvath et.al 2021; 2022)

### 3.5 Retirement

The implementation of retirement is under construction. Currently, we apply a set of simple rules for moving people from the state out of labor force to permanent retirement. In addition, we perform sensitivity analyses, using the detailed microDEMS model for Austria, which implements retirement eligibility criteria, accumulated insurance periods, and the various tracks into retirement, comparing outcomes with more stylized algorithms (Bittschi et.al 2024).

# Appendix 1: Preliminary estimation results and model parameters

## Transition models

**Table 1: Hazard ratios from unemployment to employment, men.**

| | AT | DE | ES | FI | FR | IT | SI | UK |
|---|---|---|---|---|---|---|---|---|
| **Education (Base category: ISCED2 or lower)** | | | | | | | | |
| ISCED3 | 1.31 | 1.86 | 1.17 | 1.55 | 1.24 | 0.94 | 1.98 | 1.14 |
| ISCED4 | 1.00 | 1.18 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| ISCED5 | 1.22 | 1.54 | 1.12 | 1.65 | 1.34 | 1.15 | 1.97 | 1.54 |
| **Agegroup (Base category: below 25)** | | | | | | | | |
| Age25-49 | 0.88 | 0.90 | 1.50 | 1.02 | 1.11 | 1.66 | 0.99 | 1.03 |
| Age50+ | 0.67 | 0.43 | 1.03 | 0.85 | 0.55 | 1.40 | 0.39 | 1.08 |
| **Duration (Base category: 0 - 3 months)** | | | | | | | | |
| 3-5months | 0.75 | 1.10 | 0.82 | 0.74 | 1.25 | 0.90 | 1.26 | 1.37 |
| 6-8 months | 0.52 | 0.94 | 0.71 | 0.53 | 0.88 | 0.56 | 1.44 | 2.78 |
| 9-11 months | 0.44 | - | 0.62 | - | 0.78 | - | - | - |
| >=12 months | 0.34 | - | 0.28 | - | 0.78 | - | - | - |
| **Constant** | 1.82 | 1.07 | 0.98 | 0.74 | 0.71 | 0.64 | 0.44 | 1.36 |

S: Own calculations based on EU-SILC.

**Table 2: Hazard ratios from unemployment to employment, women.**

| | AT | DE | ES | FI | FR | IT | SI | UK |
|---|---|---|---|---|---|---|---|---|
| **Education (Base category: ISCED2 or lower)** | | | | | | | | |
| ISCED3 | 1.48 | 1.10 | 1.09 | 1.31 | 1.26 | 0.85 | 1.25 | 1.07 |
| ISCED4 | 1.00 | 1.69 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| ISCED5 | 1.85 | 1.67 | 1.25 | 1.72 | 1.53 | 1.68 | 2.18 | 1.14 |
| **Agegroup (Base category: below 25)** | | | | | | | | |
| Age25-49 | 0.82 | 0.82 | 1.08 | 1.01 | 0.87 | 1.55 | 0.98 | 1.01 |
| Age50+ | 0.80 | 0.61 | 0.78 | 0.84 | 0.50 | 1.62 | 0.59 | 1.06 |
| **Duration (Base category: 0 - 3 months)** | | | | | | | | |
| 3-5months | 0.69 | 1.09 | 0.77 | 0.69 | 1.14 | 0.78 | 1.09 | 1.70 |
| 6-8 months | 0.70 | 0.78 | 0.61 | 0.30 | 0.93 | 0.34 | 1.28 | 2.51 |
| 9-11 months | 0.75 | - | 0.51 | - | 0.95 | - | - | - |
| >=12 months | 0.19 | - | 0.28 | - | 0.86 | - | - | - |
| **Constant** | 1.22 | 1.08 | 1.06 | 1.28 | 0.72 | 0.85 | 0.50 | 1.52 |

S: Own calculations based on EU-SILC.

**Table 3: Hazard ratios from unemployment to out of labor force, men.**

| | AT | DE | ES | FI | FR | IT | SI | UK |
|---|---|---|---|---|---|---|---|---|
| **Education (Base category: ISCED2 or lower)** | | | | | | | | |
| ISCED3 | 6.66 | 0.75 | 1.09 | 0.65 | 1.39 | 3.04 | 0.69 | 1.46 |
| ISCED4 | 1.00 | 2.59 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| ISCED5 | 7.86 | 0.74 | 1.15 | 0.52 | 1.37 | 5.04 | 0.46 | 0.52 |
| **Agegroup (Base category: below 25)** | | | | | | | | |
| Age25-49 | 0.25 | 0.61 | 0.39 | 0.30 | 0.24 | 1.16 | 1.11 | 0.08 |
| Age50+ | 0.54 | 0.30 | 0.65 | 0.08 | 0.65 | 2.17 | 0.97 | 0.31 |
| **Duration (Base category: 0 - 3 months)** | | | | | | | | |
| 3-5months | 1.04 | 1.91 | 0.66 | 0.61 | 9.00 | 0.13 | 0.17 | 1.13 |
| 6-8 months | 0.49 | 0.79 | 0.83 | 0.40 | 3.66 | 1.00 | 0.26 | 0.00 |
| 9-11 months | 1.35 | - | 3.90 | - | 4.85 | - | - | - |
| >=12 months | 0.71 | - | 0.67 | - | 5.23 | - | - | - |
| **Constant** | 0.06 | 0.29 | 0.09 | 1.51 | 0.02 | 0.01 | 0.41 | 0.51 |

S: Own calculations based on EU-SILC.

**Table 4: Hazard ratios from unemployment to out of labor force, women.**

| | AT | DE | ES | FI | FR | IT | SI | UK |
|---|---|---|---|---|---|---|---|---|
| **Education (Base category: ISCED2 or lower)** | | | | | | | | |
| ISCED3 | 0.98 | 1.36 | 0.79 | 0.58 | 2.07 | 1.64 | 0.52 | 1.10 |
| ISCED4 | 1.00 | 2.37 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| ISCED5 | 1.39 | 1.63 | 0.86 | 0.41 | 1.28 | 1.78 | 0.24 | 0.98 |
| **Agegroup (Base category: below 25)** | | | | | | | | |
| Age25-49 | 0.87 | 0.27 | 0.67 | 0.42 | 0.56 | 0.45 | 1.09 | 0.12 |
| Age50+ | 0.83 | 0.48 | 0.65 | 0.09 | 0.71 | 0.79 | 1.04 | 0.54 |
| **Duration (Base category: 0 - 3 months)** | | | | | | | | |
| 3-5months | 0.70 | 1.88 | 0.90 | 1.04 | 1.42 | 2.35 | 0.43 | 1.84 |
| 6-8 months | 0.66 | 2.63 | 0.40 | 0.61 | 1.05 | 0.62 | 0.21 | 2.30 |
| 9-11 months | 1.80 | - | 8.87 | - | 1.89 | - | - | - |
| >=12 months | 0.50 | - | 0.94 | - | 1.11 | - | - | - |
| **Constant** | 0.33 | 0.25 | 0.12 | 1.54 | 0.07 | 0.05 | 0.66 | 0.35 |

S: Own calculations based on EU-SILC.

**Table 5: Hazard ratios from employment to unemployment, men.**

| | AT | DE | ES | FI | FR | IT | SI | UK |
|---|---|---|---|---|---|---|---|---|
| **Education (Base category: ISCED2 or lower)** | | | | | | | | |
| ISCED3 | 0.90 | 0.89 | 0.66 | 0.98 | 0.85 | 0.65 | 0.77 | 1.11 |
| ISCED4 | 1.00 | 0.48 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| ISCED5 | 0.47 | 0.51 | 0.55 | 0.52 | 0.50 | 0.37 | 0.51 | 0.83 |
| **Agegroup (Base category: below 25)** | | | | | | | | |
| Age25-49 | 1.57 | 1.33 | 1.11 | 1.70 | 0.99 | 0.90 | 1.33 | 1.37 |
| Age50+ | 1.79 | 2.04 | 1.03 | 3.36 | 0.68 | 0.95 | 1.39 | 0.78 |
| **Duration (Base category: 0 - 3 months)** | | | | | | | | |
| 3-5months | 1.25 | 1.46 | 0.94 | 1.78 | 1.04 | 2.45 | 1.42 | 2.02 |
| 6-8 months | 2.15 | 4.20 | 0.48 | 2.21 | 0.81 | 2.05 | 2.33 | 4.43 |
| 9-11months | 1.70 | - | 0.28 | - | 0.43 | - | - | - |
| 12-14 months | 0.28 | - | 0.11 | - | 0.39 | - | - | - |
| 15-17 months | 0.36 | - | 0.12 | - | 0.43 | - | - | - |
| 18-23 months | 0.52 | - | 0.10 | - | 0.24 | - | - | - |
| >=24 months | 0.10 | - | 0.09 | - | 0.18 | - | - | - |
| **Constant** | 0.25 | 0.11 | 0.97 | 0.24 | 0.56 | 0.99 | 0.34 | 0.36 |

S: Own calculations based on EU-SILC.

**Table 6: Hazard ratios from employment to unemployment, women.**

| | AT | DE | ES | FI | FR | IT | SI | UK |
|---|---|---|---|---|---|---|---|---|
| **Education (Base category: ISCED2 or lower)** | | | | | | | | |
| ISCED3 | 1.16 | 0.70 | 0.62 | 1.04 | 0.93 | 0.81 | 0.83 | 1.30 |
| ISCED4 | 1.00 | 0.37 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| ISCED5 | 0.62 | 0.35 | 0.48 | 0.54 | 0.54 | 0.57 | 0.66 | 1.10 |
| **Agegroup (Base category: below 25)** | | | | | | | | |
| Age25-49 | 1.13 | 1.81 | 1.19 | 1.30 | 0.98 | 1.25 | 1.26 | 0.66 |
| Age50+ | 1.46 | 5.28 | 1.05 | 2.71 | 1.07 | 1.18 | 1.50 | 0.72 |
| **Duration (Base category: 0 - 3 months)** | | | | | | | | |
| 3-5months | 1.46 | 1.32 | 1.03 | 1.71 | 1.44 | 2.68 | 1.50 | 2.27 |
| 6-8 months | 1.10 | 3.73 | 0.56 | 0.88 | 0.84 | 2.26 | 1.24 | 5.81 |
| 9-11months | 0.74 | - | 0.35 | - | 0.90 | - | - | - |
| 12-14 months | 0.44 | - | 0.11 | - | 0.37 | - | - | - |
| 15-17 months | 0.48 | - | 0.17 | - | 0.58 | - | - | - |
| 18-23 months | 0.28 | - | 0.12 | - | 0.47 | - | - | - |
| >=24 months | 0.30 | - | 0.10 | - | 0.38 | - | - | - |
| **Constant** | 0.21 | 0.10 | 0.92 | 0.26 | 0.37 | 0.61 | 0.27 | 0.21 |

S: Own calculations based on EU-SILC.

**Table 7: Hazard ratios from employment to out of labor force, men.**

| | AT | DE | ES | FI | FR | IT | SI | UK |
|---|---|---|---|---|---|---|---|---|
| **Education (Base category: ISCED2 or lower)** | | | | | | | | |
| ISCED3 | 1.43 | 1.62 | 2.17 | 0.68 | 0.79 | 1.48 | 0.58 | 0.96 |
| ISCED4 | 1.00 | 2.13 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| ISCED5 | 2.59 | 2.01 | 1.05 | 0.59 | 0.81 | 2.12 | 0.19 | 1.12 |
| **Agegroup (Base category: below 25)** | | | | | | | | |
| Age25-49 | 0.23 | 0.50 | 0.14 | 0.15 | 0.49 | 0.55 | 0.41 | 0.33 |
| Age50+ | 0.50 | 0.51 | 0.29 | 0.09 | 0.65 | 0.90 | 0.61 | 0.67 |
| **Duration (Base category: 0 - 3 months)** | | | | | | | | |
| 3-5months | 0.70 | 0.77 | 0.49 | 1.11 | 0.77 | 0.76 | 0.87 | 1.39 |
| 6-8 months | 0.36 | 0.56 | 0.24 | 0.11 | 0.44 | 0.97 | 0.54 | 2.95 |
| 9-11months | 0.33 | - | 0.36 | - | 0.50 | - | - | - |
| 12-14 months | 0.06 | - | 0.09 | - | 0.39 | - | - | - |
| 15-17 months | 0.15 | - | 0.03 | - | 0.03 | - | - | - |
| 18-23 months | 0.12 | - | 0.13 | - | 0.46 | - | - | - |
| >=24 months | 0.15 | - | 0.06 | - | 0.17 | - | - | - |
| **Constant** | 0.29 | 0.21 | 0.24 | 3.02 | 0.13 | 0.15 | 0.11 | 0.81 |

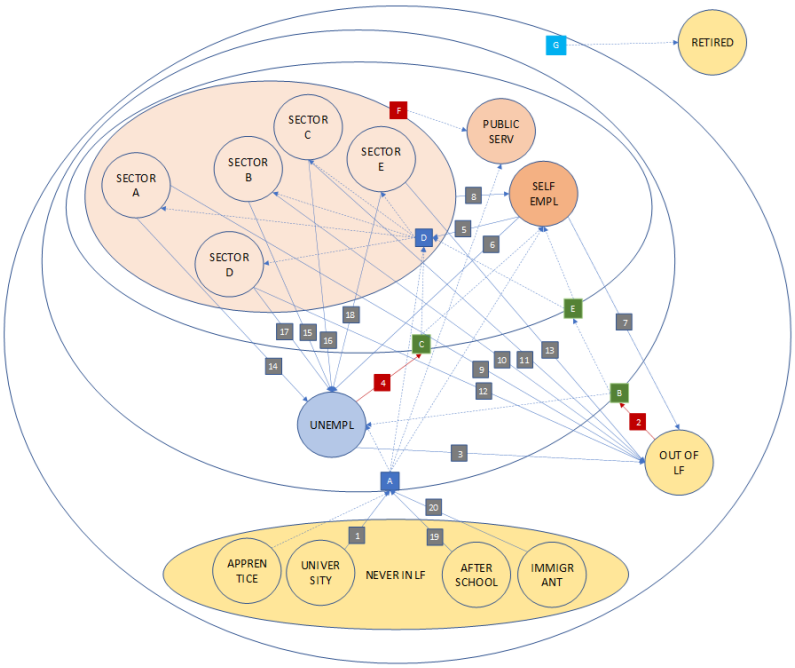
S: Own calculations based on EU-SILC.

**Table 8: Hazard ratios from employment to out of labor force, women.**

| | AT | DE | ES | FI | FR | IT | SI | UK |
|---|---|---|---|---|---|---|---|---|
| **Education (Base category: ISCED2 or lower)** | | | | | | | | |
| ISCED3 | 1.24 | 1.31 | 1.15 | 0.73 | 0.83 | 0.89 | 1.56 | 1.16 |
| ISCED4 | 1.00 | 0.88 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| ISCED5 | 1.44 | 0.64 | 0.61 | 0.50 | 0.63 | 0.70 | 0.79 | 1.05 |
| **Agegroup (Base category: below 25)** | | | | | | | | |
| Age25-49 | 0.47 | 0.50 | 0.23 | 0.24 | 0.60 | 0.63 | 0.26 | 0.93 |
| Age50+ | 0.70 | 0.67 | 0.30 | 0.09 | 0.58 | 0.76 | 0.38 | 0.78 |
| **Duration (Base category: 0 - 3 months)** | | | | | | | | |
| 3-5months | 0.53 | 1.57 | 0.53 | 0.95 | 0.99 | 1.62 | 0.98 | 2.17 |
| 6-8 months | 0.52 | 1.14 | 0.18 | 0.27 | 0.62 | 0.73 | 1.03 | 2.79 |
| 9-11months | 0.45 | - | 0.85 | - | 0.72 | - | - | - |
| 12-14 months | 0.17 | - | 0.28 | - | 0.55 | - | - | - |
| 15-17 months | 0.10 | - | 0.09 | - | 0.80 | - | - | - |
| 18-23 months | 0.23 | - | 0.12 | - | 0.38 | - | - | - |
| >=24 months | 0.14 | - | 0.03 | - | 0.56 | - | - | - |
| **Constant** | 0.44 | 0.31 | 0.51 | 3.29 | 0.16 | 0.25 | 0.06 | 0.76 |

S: Own calculations based on EU-SILC.

## Appendix 2: Activity transitions in microDEMS




**Hazard models**

| | | | |
|---|---|---|---|
| 1 | Never in LF: University Student | -> Laborforce | A |
| 19 | Never in LF: After School | -> Laborforce | A |
| 20 | Never in LF: Immigrant | -> Laborforce | A |
| 2 | Out of LF | -> Laborforce | B E |
| 3 | Unemployed | -> Out of LF | |
| 4 | Unemployed | -> Employed | C |
| 5 | Selfemployed | -> Employee | D |
| 6 | Selfemployed | -> Unemployed | |
| 7 | Selfemployed | -> Out of LF | |
| 8 | Employee (any sector) | -> Selfemployed | |
| 9 | Employee sector A | -> Out of LF | |
| 10 | Employee sector B | -> Out of LF | |
| 11 | Employee sector C | -> Out of LF | |
| 12 | Employee sector D | -> Out of LF | |
| 13 | Employee sector E | -> Out of LF | |
| 14 | Employee sector A | -> Unemployed | |
| 15 | Employee sector B | -> Unemployed | |
| 16 | Employee sector C | -> Unemployed | |
| 17 | Employee sector D | -> Unemployed | |
| 18 | Employee sector E | -> Unemployed | |

**Decision models**

A Placement at first laborforce entry
B Decision employed versus unemployed at laborforce reeintry
C Decision selfemployed versus worker at re-employment after unemployment
D Placement into sectors
E Decision selfemployed versus worker at re-employment after Out of lf
F Entry into public sector at a specific age
G Retiremnt decisions

**Modules**

| | |
|---|---|
| ActivityFirstEntry | 1, A |
| ActivityOutLaborForce | 3, 7, 9-13 |
| ActivityRetirement | G |
| ActivitySelfEmployed | 8 |
| ActivityUnemployed | 6, 14-18 |
| ActivityBackLaborforce | 2, B, E |
| ActivityEmployed | 5 |
| ActivityPublic | F |
| ActivityBackEmployment | 4, C |
| ActivitySectors | D |

## References

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