# Lecture on “Simulating Life Histories with the R Package MicSim”

Sabine Zinn

[szinn@diw.de](mailto:szinn@diw.de)

**Outline**

This lecture illustrates how synthetic life-courses can be simulated by the use of continuous-time microsimulation. To perform a microsimulation we use the MicSim package of the open source software environment R.

This lecture will be structured as follows: first, I introduce the basic concepts of a continuous-time microsimulation approach. In a continuous-time microsimulation, life-courses are determined by state transitions (i.e., events) and waiting times between transitions. Stochastic models of individual behaviour are used to specify life-course dynamics, that is, they determine whether and when individuals will experience events.

In a second step, I will show how to conduct continuous-time microsimulation using the MicSim package. To illustrate the functionality of the package I will use two examples: first, we study living arrangement pathways to first birth. Second, we study a more complex application on individual behaviour concerning changes in marital status, educational attainment, and fertility status. For the first application on living arrangement pathways to first birth we use empirical rates derived from the Dutch SHARELIFE survey and for the second application we use with hypothetical transition rates resembling real behaviour in Western societies. In the course of presenting how to derive a feasible microsimulation model, I will also address the following issues: how to create newborns during simulation, the realization of deterministic events (such as enrolment to elementary school at a specific date in the year a child becomes six years old), and how MicSim handles immigration and emigration.

I will conclude this session with some remarks on how to build feasible computer experiments via simulation. That is, I will shortly present the key idea of a pseudo random number generator, seed setting, and the necessity to repeat simulation runs. Finally, I will illustrate MicSim’s abilities to shorten run times by conducting multi-core simulations.