

Paper delivered at the 10<sup>th</sup> Biennial Conference of the  
*Australian Population Association*  
POPULATION AND GLOBALISATION:  
AUSTRALIA IN THE 21<sup>ST</sup> CENTURY  
Melbourne 28<sup>th</sup> November to 1<sup>st</sup> December 2000  
Melbourne Australia

## Dynamic spatial microsimulation: Another tool for the demographic modeller

John O'Leary

Victorian Department of Infrastructure

### **Abstract**

Microsimulation is the modelling of large and complex systems by simulating the behaviour of individual actors or micro-units within the system. The characteristic that distinguishes microsimulation from other modelling strategies is that each micro-unit in the defined population is separately represented and modelled. In dynamic microsimulation models trajectories are generated for the state of each micro-unit in a representative sample of the population being considered using Monte Carlo techniques based on some underlying understanding of the relevant processes. The structure of the whole population and its dynamics are then inferred from the representative samples generated in the simulation. Because microsimulation operates at level of the micro-unit, it can produce very detailed information, such as spatial distributions.

Although the application of microsimulation techniques to socio-economic modelling was pioneered during the 1950s, it is only in more recent years with the greater availability of data at the micro scale and developments in computing (especially faster speed, increased internal memory size and increased hard disk capacity) has the use of microsimulation as a tool in socio-economic modelling become more common.

The aim of this paper is to provide an introduction to the other papers that are to be given in the same session of the Australian Population Association Conference, by explaining what microsimulation is, its strengths and weaknesses.

In particular, the paper will look at the creation of the underlying initial data base (the microdata set)

used in running the model and various techniques used to create spatial microdata sets. In the paper it will be argued that the way to proceed is by using iterative proportional fitting techniques to chain tables from the Census basic community profiles and other data sources, rather than using the confidentialised unit record file (or household sample file) from the Census as the basis of the microdata set. The paper to be given by Richard Cumpston in the same session will in part focus on his attempts to build a microdata set using Australian data.

The paper will also review the literature, focussing on a number of applications where spatial dynamic microsimulation models have been used. It will be argued that the Dutch demographers (in particular Oskamp, Hooimeijer and Mulder, all from Utrecht University) have provided a theoretical backing for microsimulation by using life course analysis as a theoretical underpinning for the relationships in a dynamic microsimulation model. Pieter Hooimeijer will be able to elaborate further on this work in the paper that he will give in the same session.