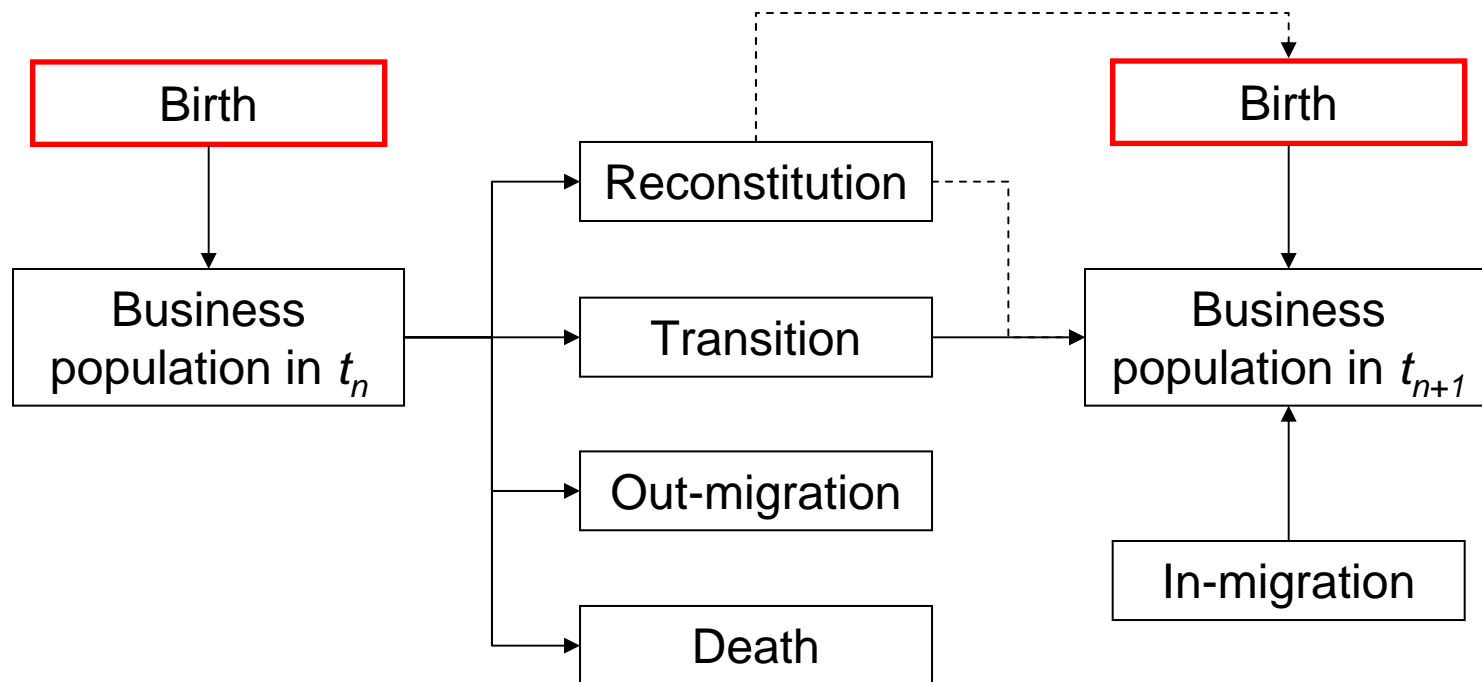Fourth Oregon Symposium on Integrating
Land Use and Transportation Models

Generating synthetic businesses

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The context

State variables

Primary attribute	Values	Definition	Events
Age	0,1,2, … years	Age at last birthday of firm plant	Birth, aging, death
Economic activity	1 Agriculture & fishery 2 Energy & mining 3 Industry 4 Construction 5 Wholesale 6 Retail 7 Cafes, restaurants, hotels 8 Transport & communication 9 Banking, insurance 10 Other servies 11 Public sector	Based on 1974 NACE definitions	None Consolidation or spin-off of firm
Size	1,2,3, … employees	Number of workers (>12 hours/week)	Changes in size
Geographic location	1, … 40 regions	Nodal regions	Relocation

Source: van Wissan, 2000

Urban modeling variables

- ILUMASS (Moeckel & Wegener)
  - Location (x,y)
  - Employees by education level
  - Job vacancies by education level
  - Customer capacity
  - Parking
  - Floor space
- Everyone else?
  - Location (point, cell, or small polygon)
  - Classification (2-digit NAICS)
  - Size (employment)
  - Age?
  - Type and quantity of space occupied

ES-202 program

- Quarterly Census of Employment and Wages (QCEW)
- Cooperative data program
- Administrative database created for tax collection
  - Does not differentiate between employment types
  - Includes workers receiving unemployment insurance
- Misses firms not covered by unemployment insurance
  - Self-employed
  - Exempt
  - Certain government workers
  - Multinational corporations (?)
- Available back to 1977
- Forms basis for County Business Pattern data

ES-202 data

Public use data

- Year and quarter
- Number of employees by county

Microdata

- Year and quarter
- Employer number
- Firm ownership
- Classification
  - SIC (1977-2001)
  - NAICS (2001-present)
- County
- Employment
- Wages
- Multi-establishment code (25/10)
- Trade name

Using ES-202 data

Method	Synthesis	Expansion	Forecasting
Sample enumeration	Use ES-202 records supplemented with missing firms	Not required	Replication or deletion
Stochastic generator	Sample from distributions of desired firm attributes	IPF using employment by industry and county	IPF using employment by industry and county

Spatial allocation

- Monte Carlo sampling
- Interpolation
- Address matching
  - Third party databases
  - Digital yellow pages
  - Business registration data

Match based on trade name

Issues

- Methodology straight-forward, but…
- Data issues
  - Timeliness of the data (obsolete snapshot)
  - Small firms and individuals problematic
  - Spin-offs and consolidations
  - Multi-establishment firms
- Changing dynamics
  - Labor productivity
  - Automation + technology
  - Global back offices

Selected bibliography

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