

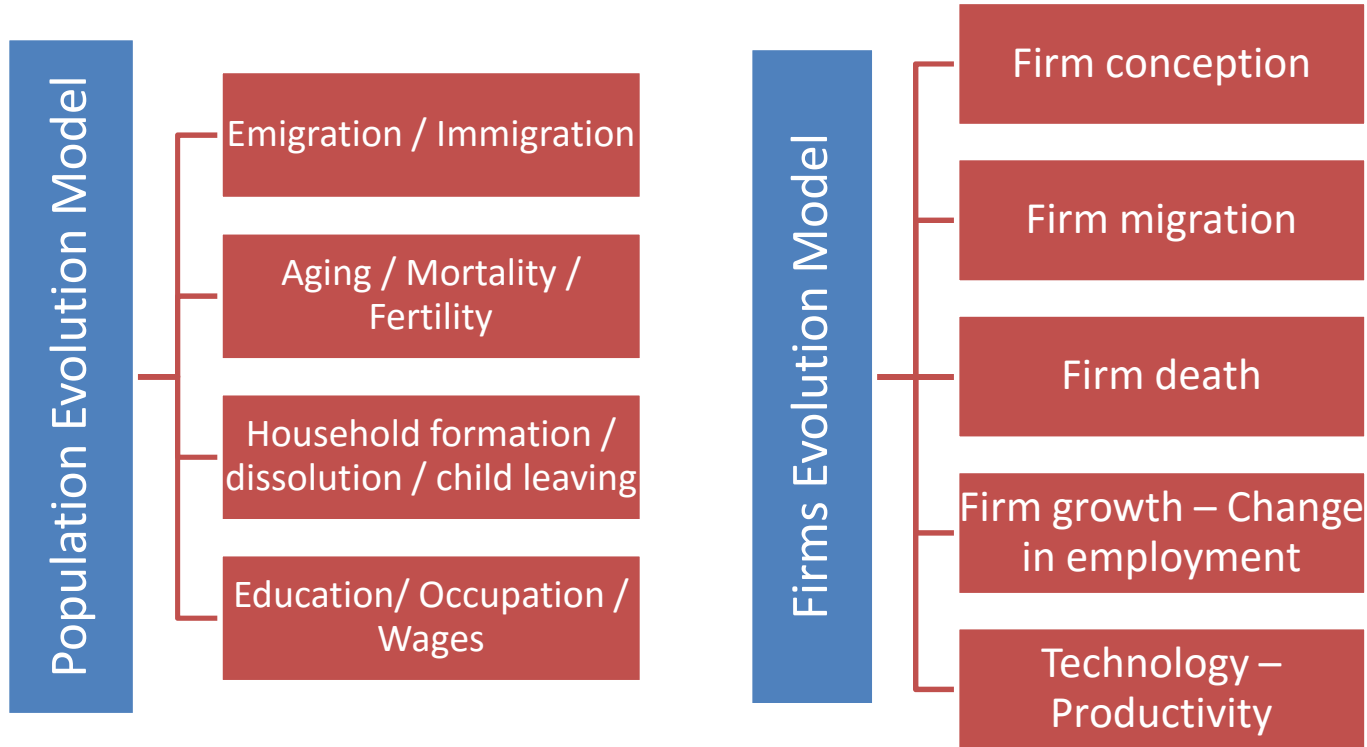
Firm Evolution

presented by
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Firm Synthesis



Firm Demography



Firm Demography

- Economy driven by individual firms
- Basic unit is a firm or a business establishment
- Firm events of formation, growth/decline, relocation and closure

Firmographics

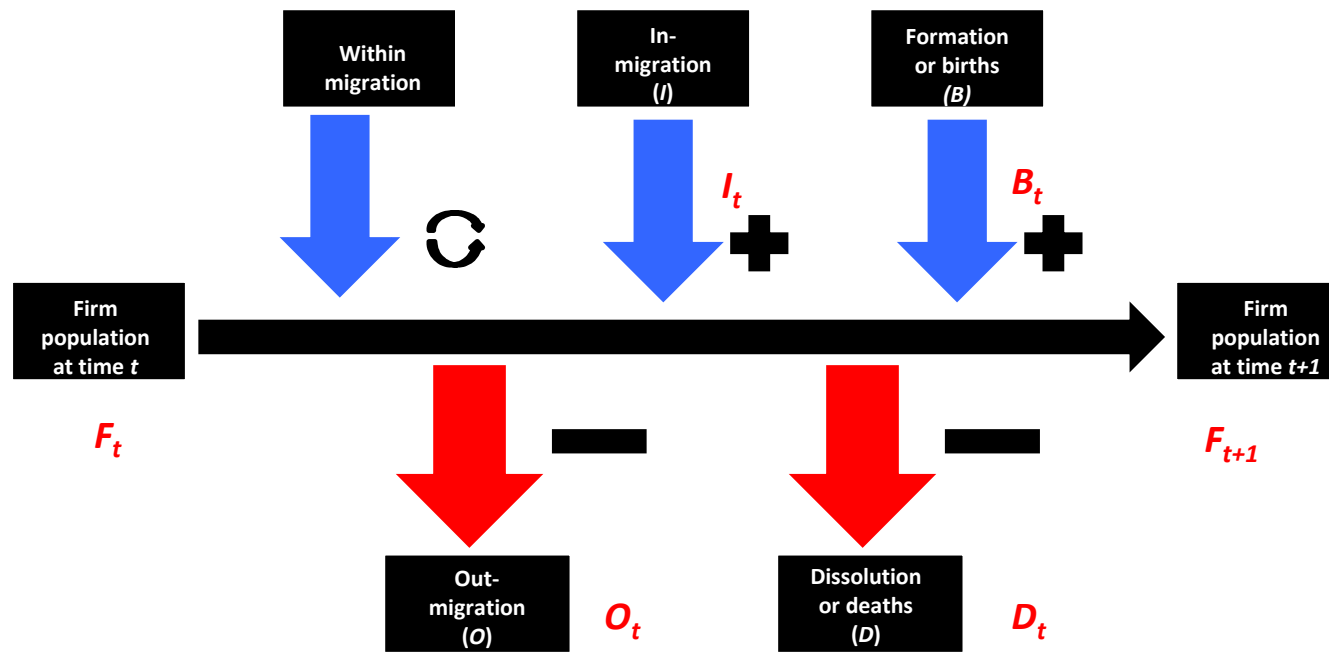
- Firm-level microsimulation-based approaches
- Micro-representation of spatial economy
- Ideal approach for integrated models
- Better assess ramifications of regional planning policies

Evolution of Firm Population



Accurately describes evolution of firm population in space and time

$$[F_{t+1} = F_t + B_t - D_t + I_t - O_t]$$



Factors that Impact Firms



Firm internal

- Employment size
- Sales
- Age
- Standalone/headquarters

Agglomeration economies

- Localization – number of employees within same industry type.
- Urbanization – number of employees from other types.

Market Area

- Population
- Average household income
- Student enrollment by school and university

Regional indicators and transport access

- Miles of roadway by facility type (e.g. freeway, arterial and minor roads).
- Flags for major hubs in the region (e.g. Theme Parks, Airports, Ports).

Data Needs



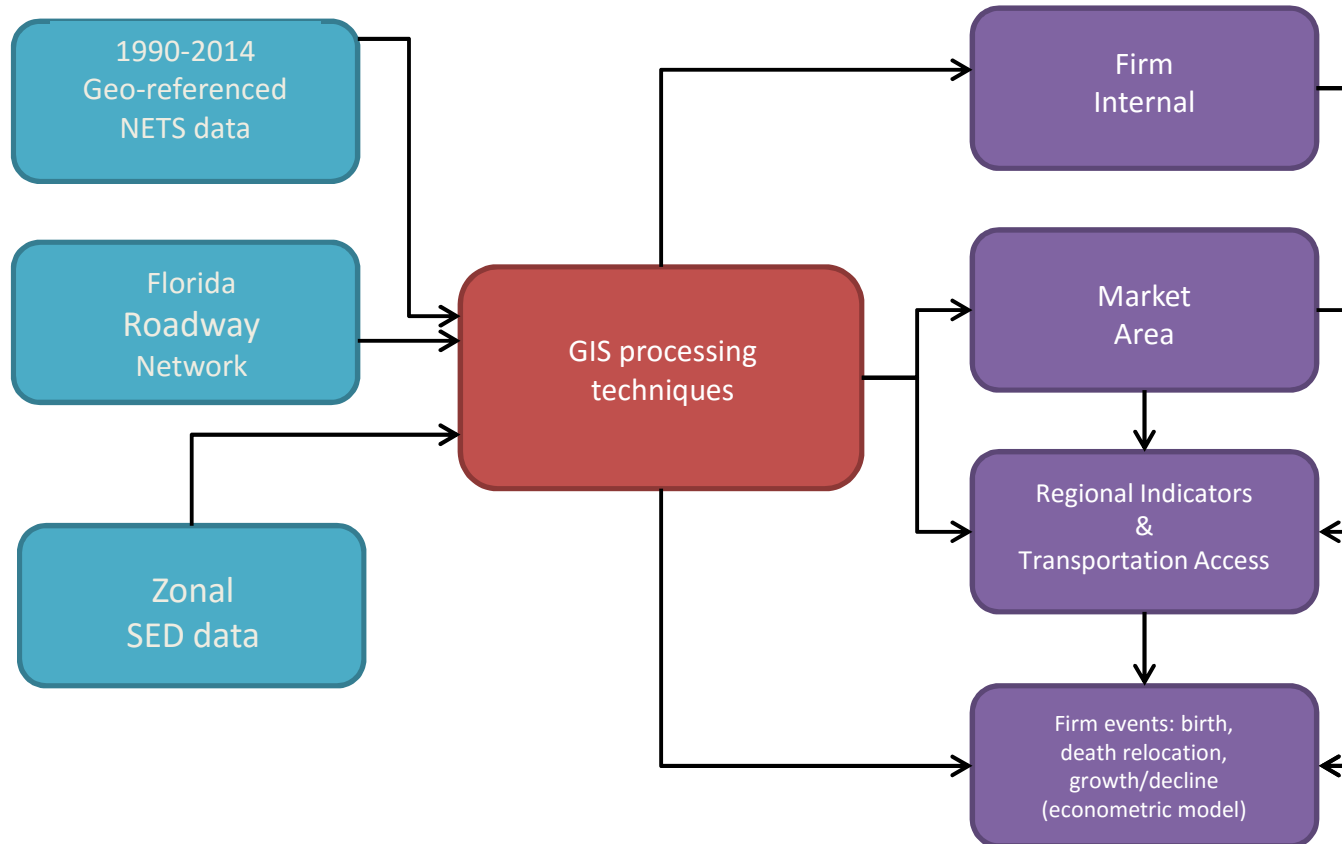
Longitudinal Data

- Unit of observation is firm or business establishment with XY coordinates
- Record events on birth, death, size, growth / decline and mobility

National Establishment Time Series (NETS)

- Information on firms in Florida from 1990 to 2014
- Provides employment information
- Shows when firms were formed, moved into, and out of regions

Data Processing



Firm Evolution



NETS Database 1990 to 2012

$$F = S + B - D + I - O$$

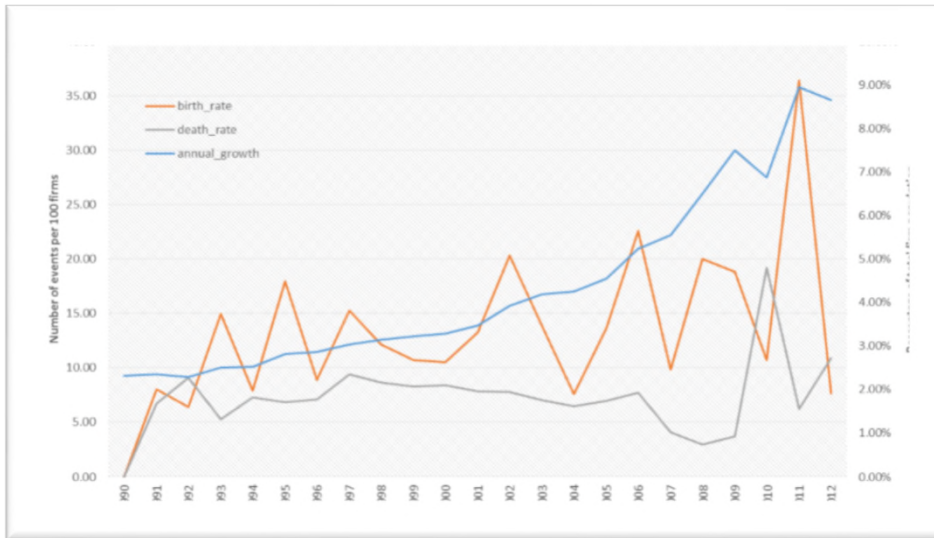
Year	Births (B)	Deaths (D)	Move-in (I)	Move-out (O)	Survivors (S)	Total (F)
1990	0	0	0	0	130,884	130,884
1991	10,488	8,800	285	164	130,884	132,693
1992	8,531	12,076	207	116	132,693	129,239
1993	19,346	6,796	294	156	129,239	141,927
1994	11,196	10,338	333	139	141,927	142,979
1995	25,669	9,800	293	119	142,979	159,022
1996	14,134	11,234	289	149	159,022	162,062
1997	24,705	15,231	229	143	162,062	171,622
1998	20,836	14,846	204	176	171,622	177,640
1999	19,072	14,718	283	144	177,640	182,133
2000	19,103	15,319	454	210	182,133	186,161
2001	24,712	14,598	755	349	186,161	196,681
2002	39,978	15,327	763	360	196,681	221,735
2003	30,618	15,531	1,108	466	221,735	237,464
2004	18,047	15,337	1,405	616	237,464	240,963
2005	32,943	16,762	1,102	441	240,963	257,805
2006	58,158	19,806	879	485	257,805	296,551
2007	29,239	12,156	779	465	296,551	313,948
2008	62,895	9,262	1,232	676	313,948	368,137
2009	69,350	13,576	1,309	950	368,137	424,270
2010	45,332	81,365	1,399	1,026	424,270	388,610
2011	141,577	24,142	1,330	967	388,610	506,408

Source: Cambridge Systematics – SHRP2 C20 Implementation for MAG

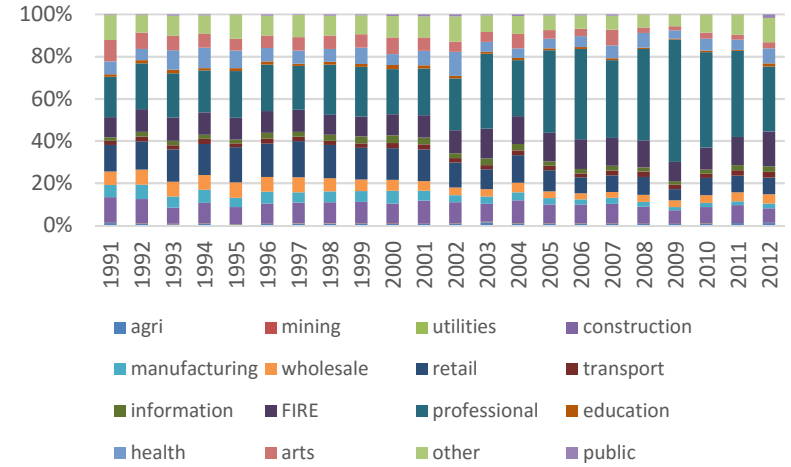
Firm Evolution



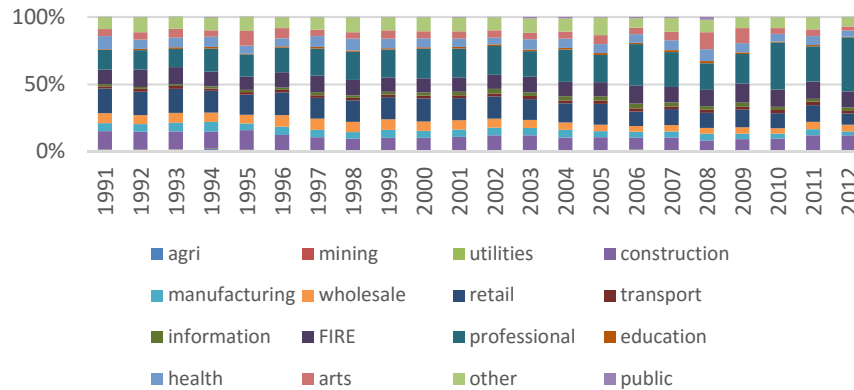
Formation and Dissolution Rates



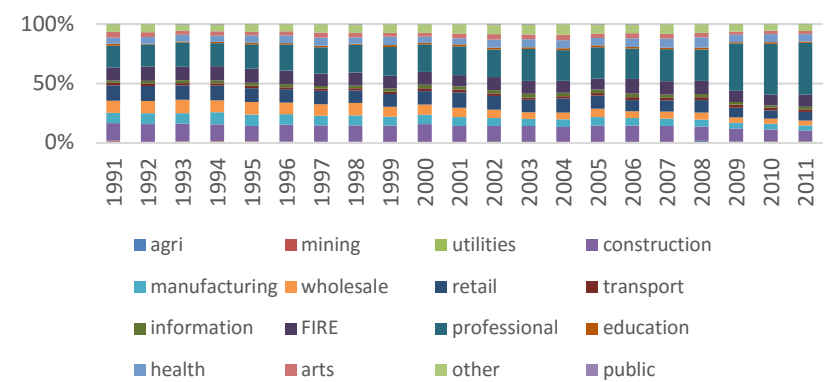
Formation



Dissolution



Relocation



Source: Cambridge Systematics – SHRP2 C20 Implementation for MAG

Model Structures



Firm Birth

Poisson distribution is fitted to the data, for sampling new born

Attributes of employment size and type are sampled at random from population

Firm Death

Binary choice model – firm is the unit of analysis determining the probability of death.

One model specified by controlling for industry type

Within-migration

Binary choice – firm is the unit that determines probability of relocation.

One model specified by controlling for industry type

In-migrate

Determine a fixed rate of in-migration from data

Out-migrate

Determine a fixed rate of out-migration from data

Employment Growth/Decline

Log-linear specification of employment size

Control for previous year employment to determine future

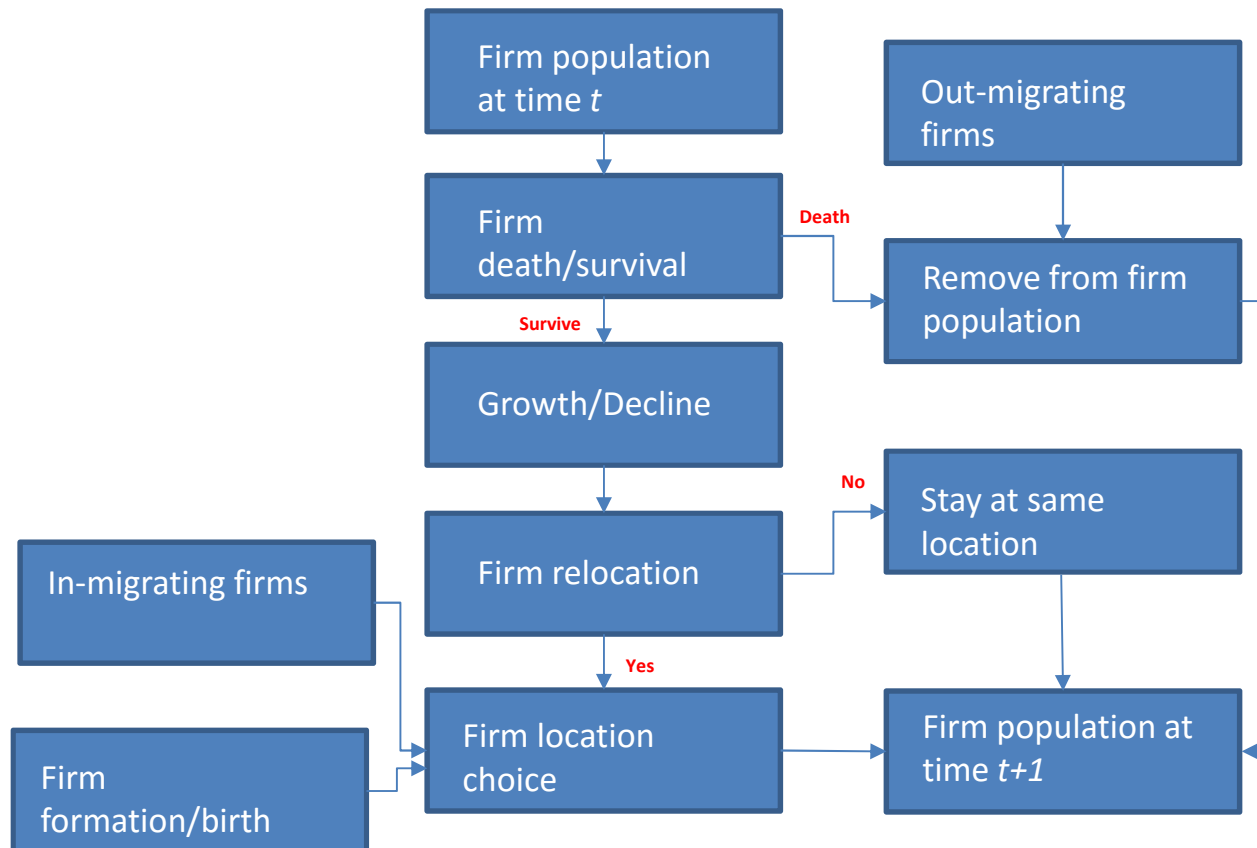
Location choice

MNL specification with universal utility function

Control for industry type in model specification

Applied to – birth, within-migration and in-migration firms

Simulation Framework



Questions?



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