Granular Migration with Serial Correlation

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Motivation

- An individual is not infinitesimal. A finite number of people reside in each location.
  - Dingel and Tintelnot (2020) for a static model.
- Individuals' residence is serially correlated.
  - I have lived in State College for 3+ years.

Outline

- I solve individuals' optimization problem of location choice.
- I consider a finite number of individuals.
- Each of them has serially correlated location-specific productivity draws.
- No migration cost is incurred.
- I study the aggregate distribution of labor force across locations over time.

Preferences

- An individual i in j has utility

$$U_{i,0} = \sum_{t=0}^{\infty} \beta^t \log(C_{i,t}). \tag{1}$$

- If she lives in location j in period t, the budget constraint is

$$P_t^j C_{i,t} \leq w_t^j \exp\{e_{i,t}\}. \tag{2}$$

- No saving.

Location Choice

- The value of individual i in location t in period t is

$$V_{i,t}^{j} = \log\left(\frac{w_t^j \exp\{e_{i,t}\}}{P_t^j}\right) + \beta \max_k V_{i,t+1}^{k}. \tag{3}$$

- $\{e_{i,t}^{j}\}_{t=0}^{\infty}$ follows an AR(1) process

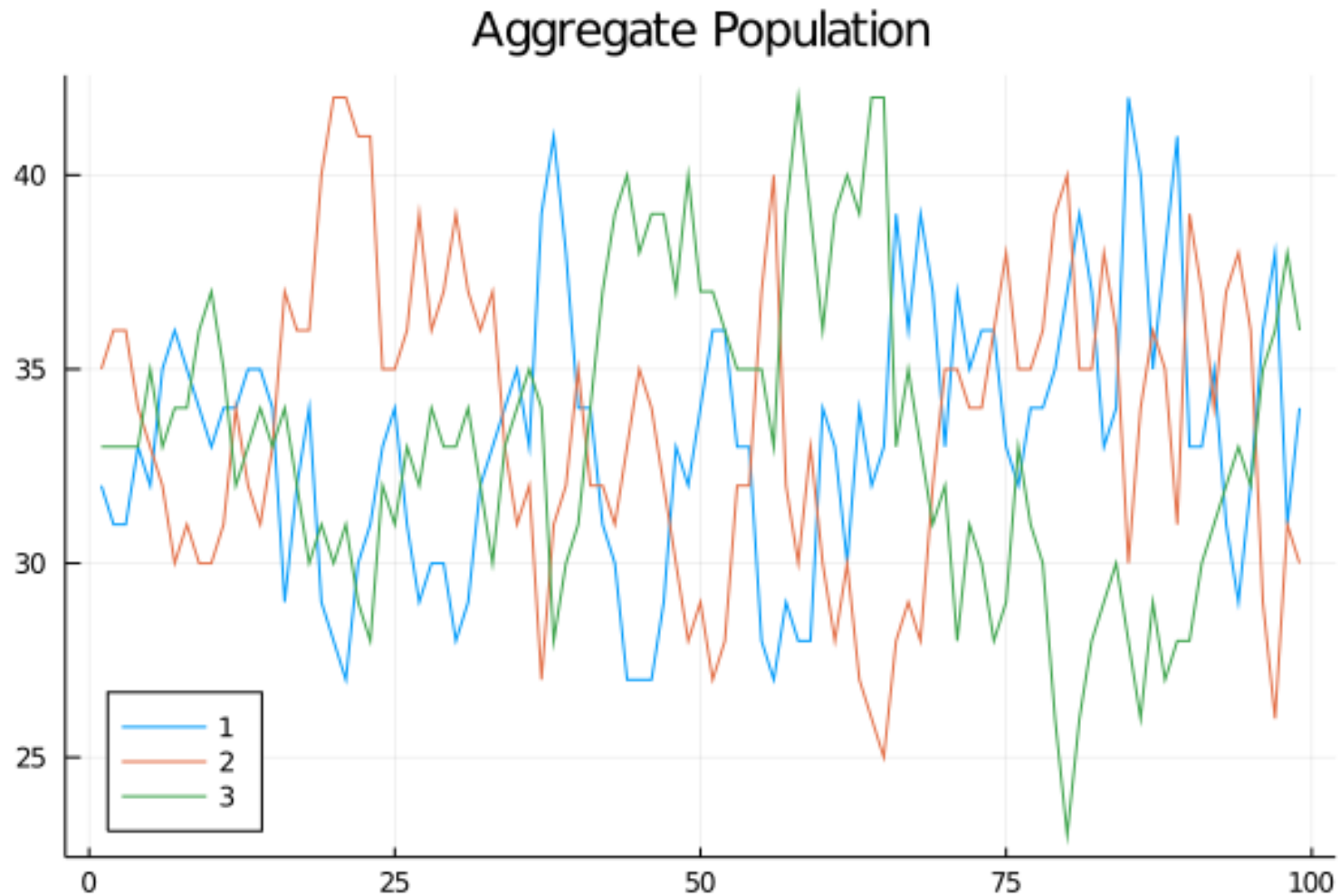
$$e_{i,t}^{j} = \rho_0 e_{i,t-1}^{j} + \rho_1 \varepsilon_{i,t}^{j}, \tag{4}$$

  where $\varepsilon_{i,t}$ follows iid $N(0,1)$. In simulation, $\rho_0 = \rho_1 = 0.5$.
- Individuals have perfect foresight of $\{e_{i,t}^{j}\}_{t=0,j=1}^{\infty,N}$

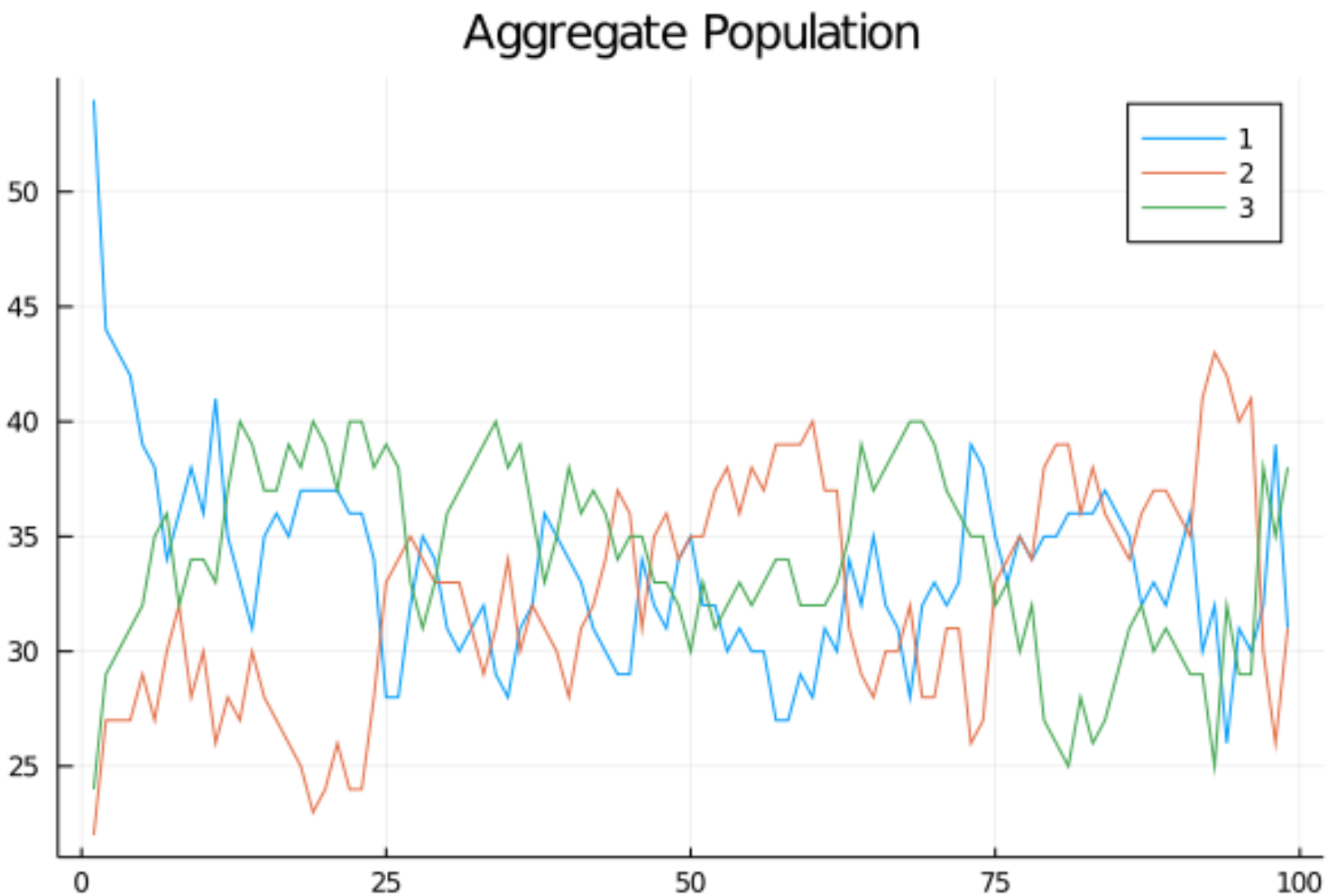
Simulation

- Focus on the location choice problem.
- Set $\frac{w_t^j}{P_t^j} = 1$ for any j and t.
- The number of locations is $N = 3$.
- The number of individuals is $L = 100$.
- Let $T = 100$. Set $V_{i,T}^j = 0$ for any i and j.
- Generate $\{e_{i,t}^j\}_{i=1,t=0,j=1}^{L,T-1,N}$.
- Solve the location choice problem backward from period $T-1$ to period 1.

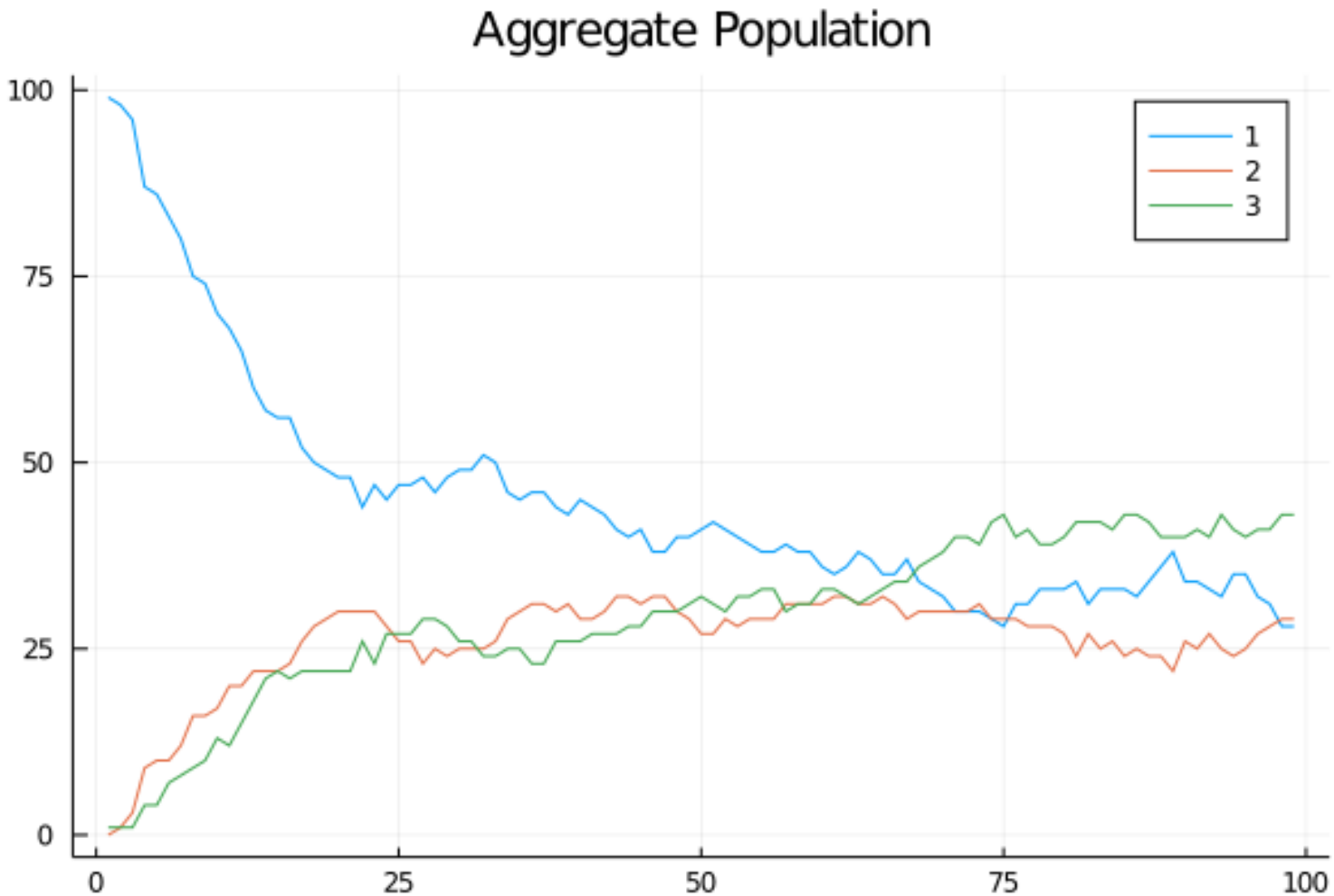
- Start with a random draw for e_0 from iid $N(0,1)$.



- Start with $e^1_{i,1} = 1$ and $e^k_{i,1} = 0$ for locations $k = 2, 3$ and any individual i.



- The same setting as the previous page, except that now $\rho_0 = 0.9$.



- The same setting as the previous page, except that now $L = 1000$.