The Dynamics of Internal Migration: A New Fact and its Implications

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Internal Migratoin

- Internal migration is a primary way that local markets adjust to economic shocks
- Important for understanding the dynamics of housing rents and prices Howard and Liebersohn (2021)

Two facts about internal migration

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2. People move to nearby and populous places (gravity)

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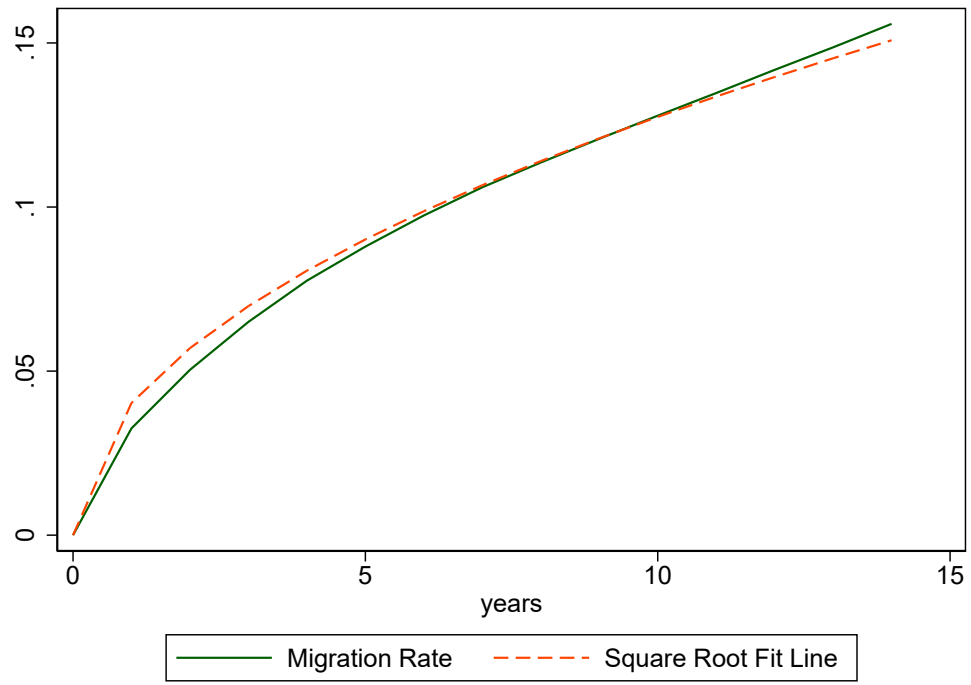
Does it matter how we understand these two facts?

- Literature has emphasized moving costs
  - Tractable
  - Easily matches both facts
  - Natural extension of the trade literature

- Persistent preferences is consistent with a new fact about the dynamics of migration:
  3. t-year migration rate is proportional to $\sqrt{t}$



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   - Idiosynchratic preferences correlated across space and time
   - Model can match new fact, while also generating rare migration and the gravity relationship
3. New Implications of the model
   - Short-run elasticities are still similar to existing models
   - Long-run elasticities are very different
   - Speed of population adjustment is very different

Contributions to the Literature

- Spatial dynamics
  - Rise and decline of regional economies
    Blanchard and Katz (1992); Caliendo, Dvorkin and Parro (2019); Allen and Donaldson (2020); Morris-Levenson and Prato (2022); Glaeser and Gyourko (2005); Kleinman, Liu and Redding (2023); Amior and Manning (2018); Davis, Fisher and Veracierto (2021)
  - Macro adaptation to local shocks
    Tombe and Zhu (2019); Hao, Sun, Tombe and Zhu (2020); Eckert and Peters (2018); Giannone (2017); Heise and Porzio (2021); Bryan and Morten (2019); Cruz and Rossi-Hansberg (2021); Oliveira and Pereda (2020); Schubert (2021)
- How to model migration
  - Modifications of the dynamic logit
    Kennan and Walker (2011); Kaplan and Schulhofer-Wohl (2017); Giannone, Li, Paixao and Pang (2020); Porcher (2020); Mangum and Coate (2019); Monras (2018); Coen-Pirani (2010); Davis et al. (2021); Zerecero (2021)
  - Persistent preferences
    Bayer and Juessen (2012)
  - Empirical evidence
    Saks and Wozniak (2011); Farrokhi and Jinkins (2021); Koşar, Ransom and Van der Klaauw (2021); Fujiwara, Morales and Porcher (2022)

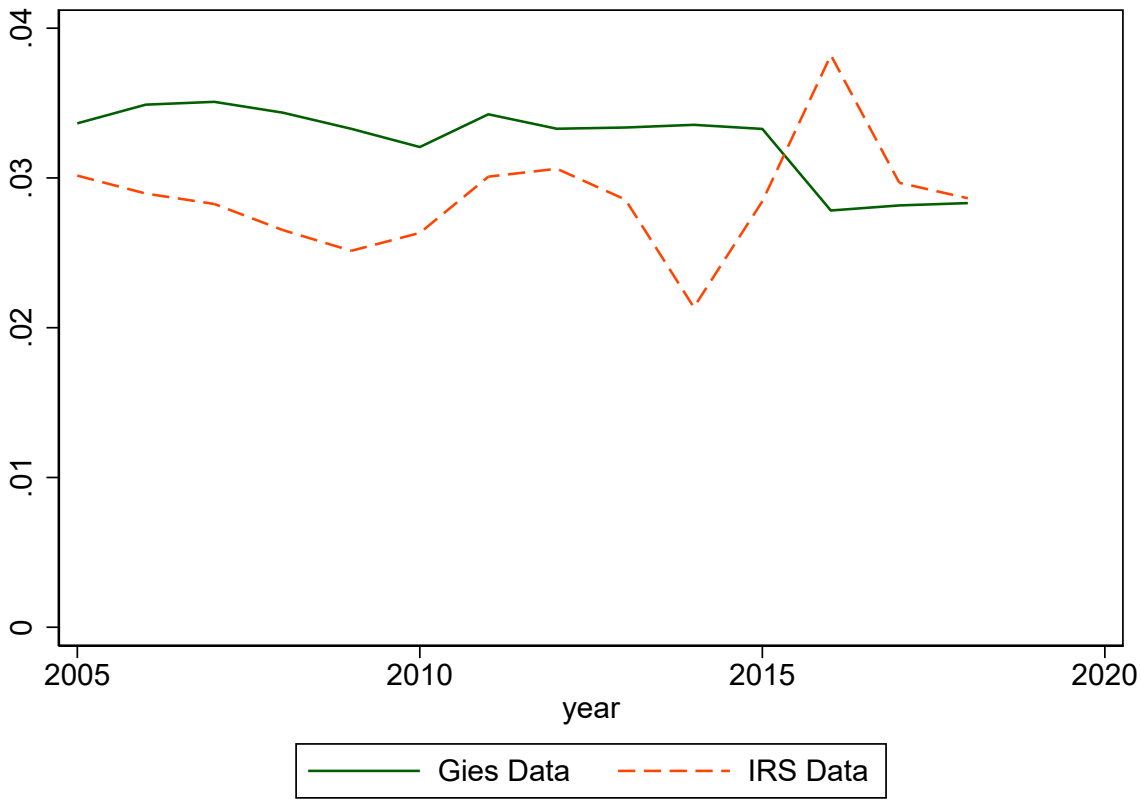
3 Facts about Internal Migration

Data

- Gies Consumer and Small Business Credit Panel (GCCP)
  - Credit data from one of the leading providers of credit reports
  - 1 percent of Americans with credit reports
  - Includes state of residence
  - Panel data, 2004-2018
- IRS Migration Data
  - Based on tax filings
  - Aggregated flows of state-to-state migration

Fact #1

Migration is rare



Comparison of interstate migration rates in IRS and GCCP

Fact #2

Migration follows a gravity pattern

Poisson regression:

$$\log m_{i \to j} = \beta \log \text{distance}_{ij} + \alpha \log p_i + \gamma \log p_j + \epsilon_{ij}$$

	(1) Migration (IRS)	(2) Migration (Credit)
Log Distance	-0.736***	-0.744***
	(0.0572)	(0.0515)
Log Origin Population	0.900***	0.923***
	(0.0832)	(0.0797)
Log Destination Population	0.822***	0.893***
	(0.0976)	(0.0799)
Observations	2550	2550

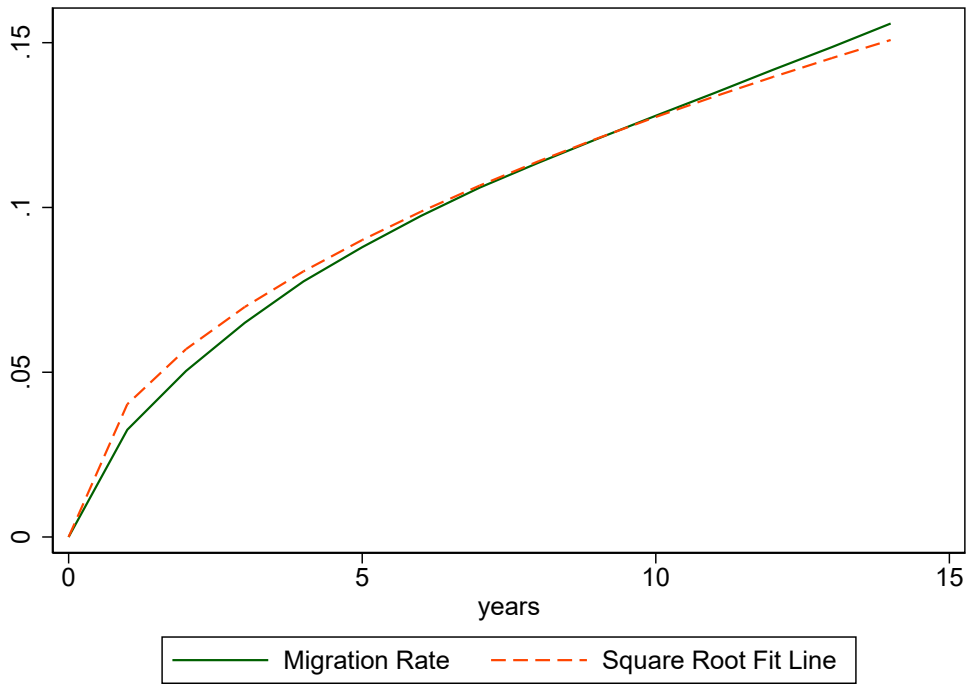
Standard Errors are two-way clustered by origin and destination states

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

- Define t-year interstate migration rate as the share of people who live in a different state than they did t years ago

Fact #3 (New)

t-year interstate migration rate is proportional to $\sqrt{t}$



- Implies a high rate of return or onward migration
- Suggestive of persistent preferences PSID

Standard Dynamic Logit

I locations indexed by i, N individuals indexed by n, and discrete time indexed by t:

- Agents choose location that maximizes utility

$$V_{nt}(i) = \max_j v_{jt} - \delta_{ij} + \epsilon_{jnt} + \mathbb{E}[V_{nt+1}(j)]$$

- ϵ_{jnt} is i.i.d. and has an extreme value distribution

Comparison to Standard Model

- In standard model, migration is Markov
  - State variable is current location
  - When migration is rare, t-year migration proportional to t
- Can be reconciled...
  - ...with flexible tenure-dependent moving costs
  - ...or with location attachment
  - ...but requires many fine-tuned parameters

The SPACE Model

Model

I locations indexed by i, continuum of individuals indexed by n, and discrete time indexed by t:

- Agents choose location that maximizes utility

$$V_{nt}(\vec{\epsilon}_{nt}) = \max_i \{v_{it} + \epsilon_{int}\} + \beta \mathbb{E}[V_{nt+1}(\vec{\epsilon}_{nt+1})|\vec{\epsilon}_{nt}]$$

  - No moving costs
  - State variable is match-specific idiosyncratic preference for every location

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$$\epsilon_{int} = \rho \epsilon_{in,t-1} + \left(\sqrt{1-\rho^2}\right) \eta_{int}$$

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- Personal utility is spatially-correlated

$$\vec{\eta}_{nt} \sim N(0, \Sigma), \qquad \Sigma_{ij} = \exp(-A \text{ distance}_{ij})$$

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- Square root fact

Proposition 2

As $\rho \to 1$, the t-year migration rate is proportional to $\sqrt{t}$

Parameterization

- Two parameters: persistence ρ, and spatial correlation A
- Target: 1-year migration rate, gravity equation
- Simulate 10 million people for two periods, fifty U.S. states and D.C.
  - v_i matches population

Matching the Facts Quantitatively

- Persistence: $\rho = .9996$,
- Spatial correlation: $A = .000299$ km^{-1}
- Targets (and hits) 3.34 percent migration rate

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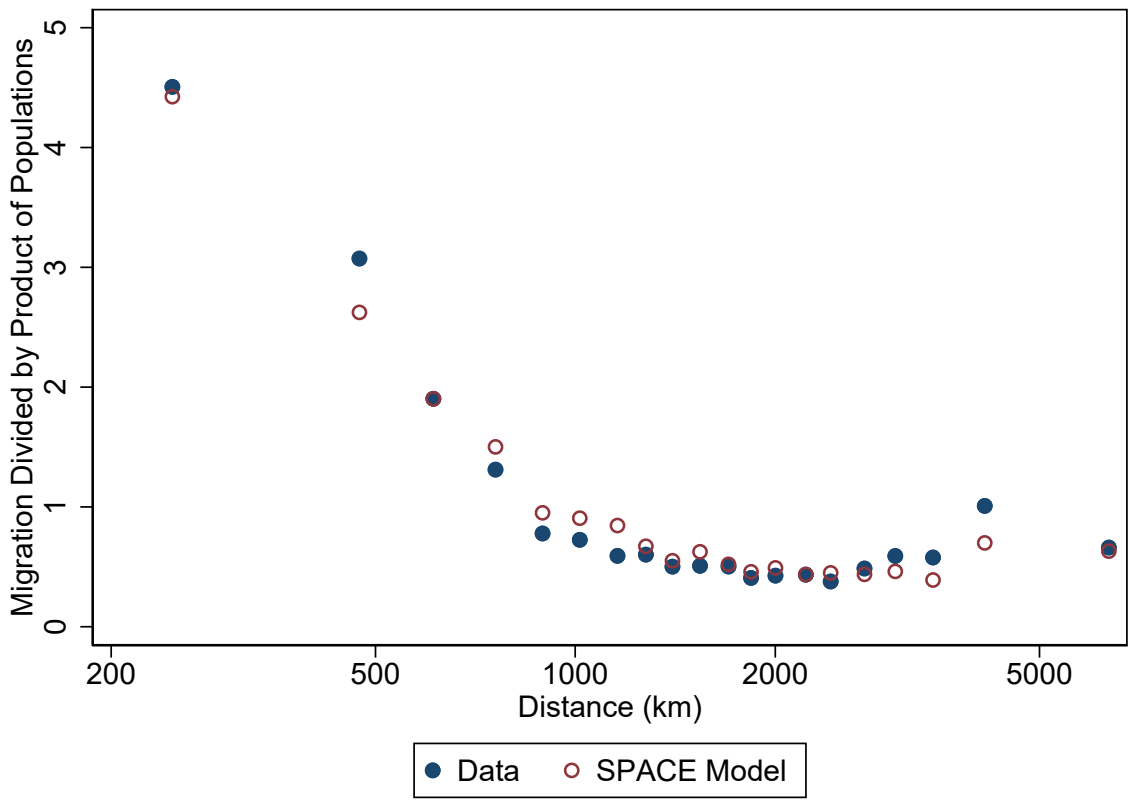
Gravity



- Curvature is untargeted

Square Root Fact

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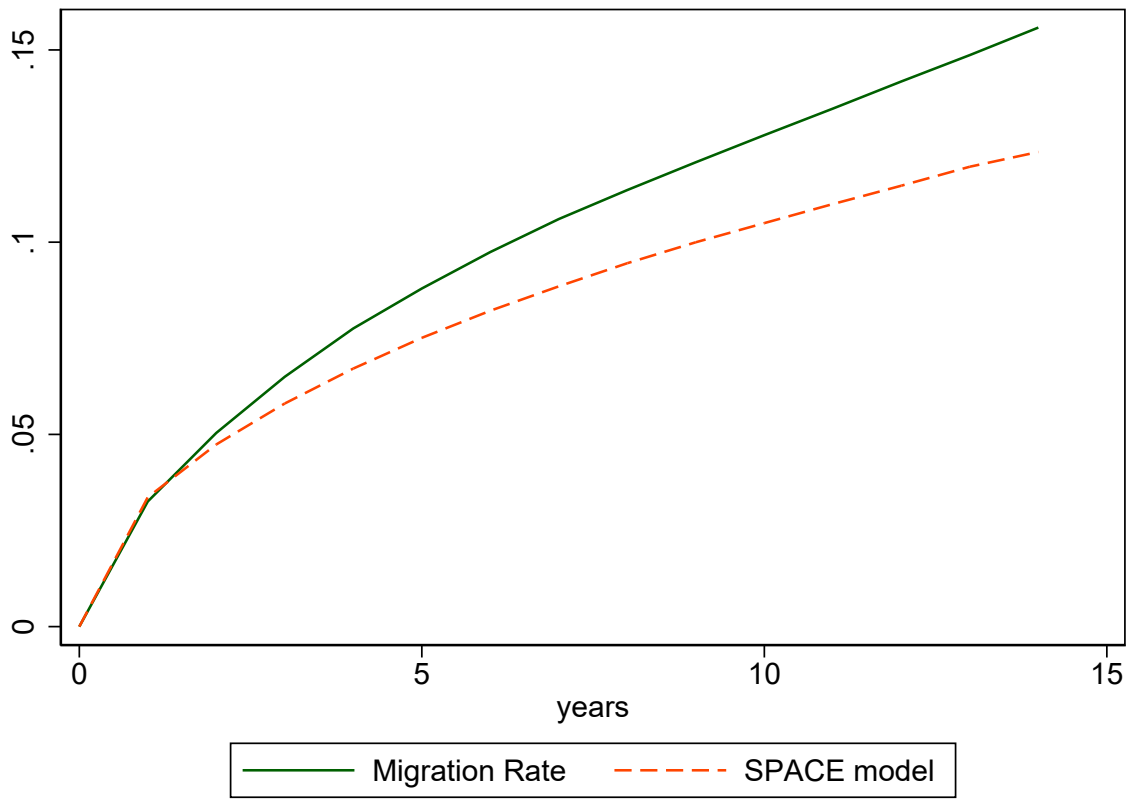
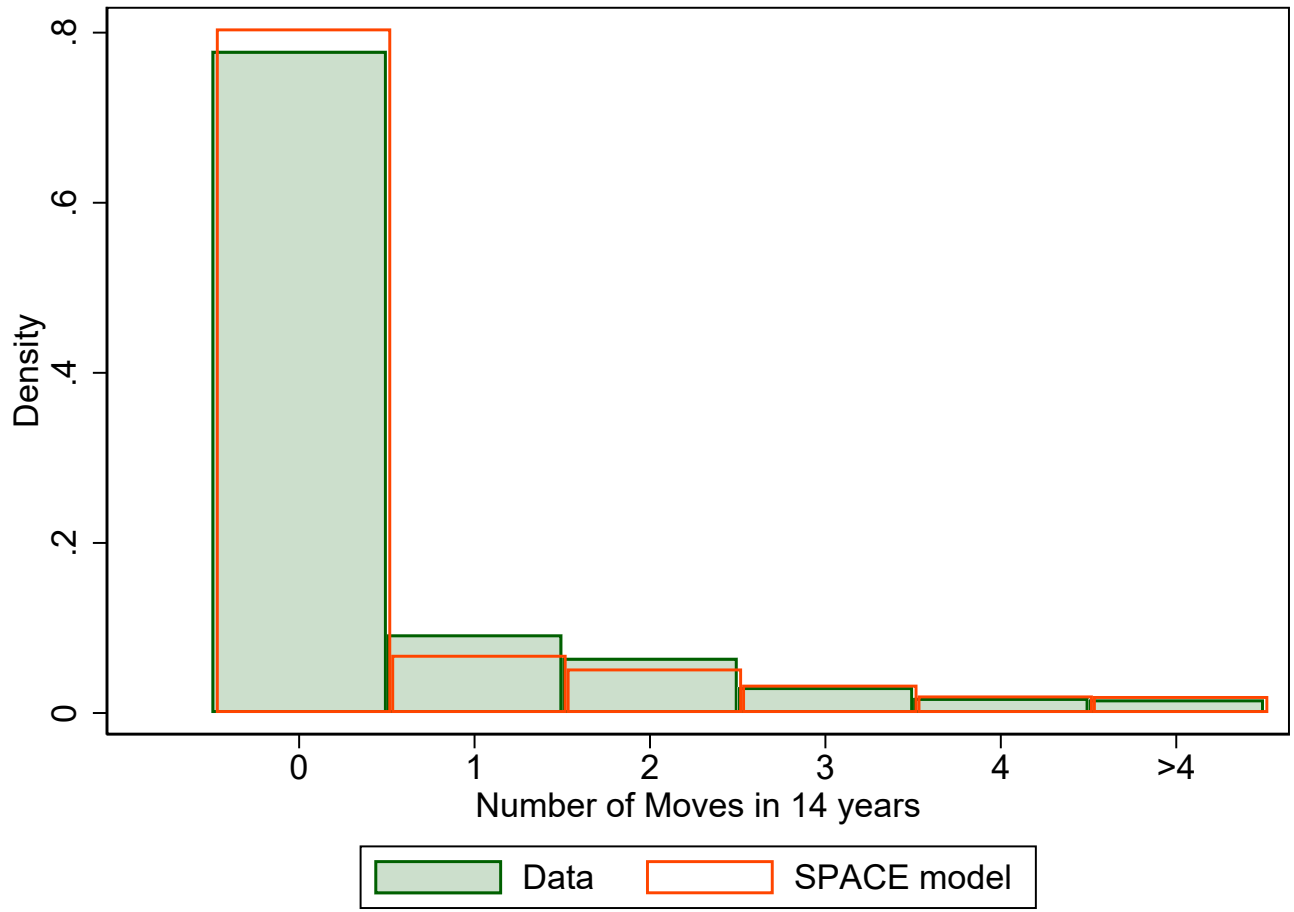


5-year Calibration

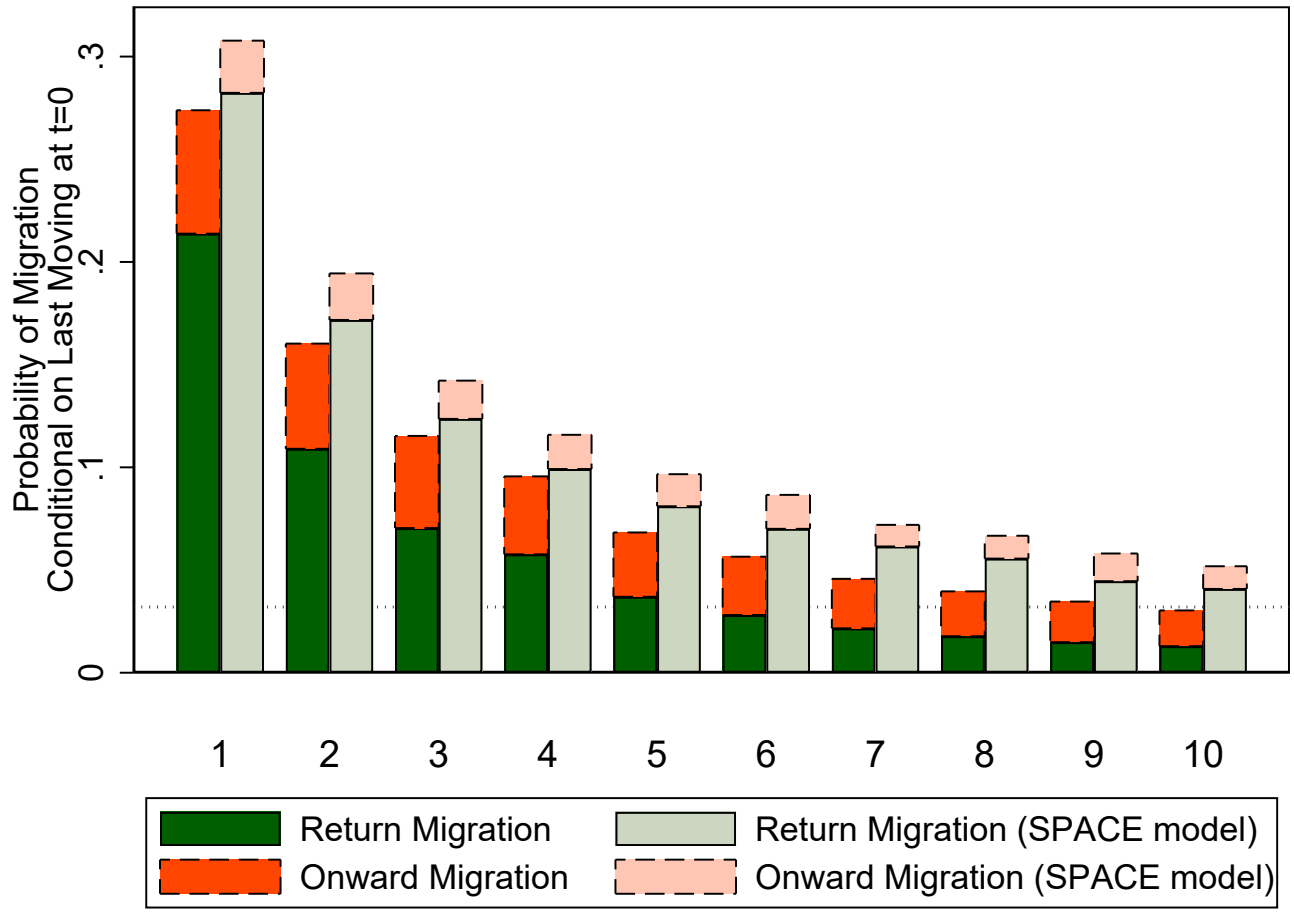
Frequency of Migration



5-year Calibration

Return Migration

- Conditional probability of moving after previous move



5-year Calibration

Implications of the Model

1. Population elasticities
2. Population dynamics
3. Moving Costs

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- Need to be able to calculate population elasticities
- One reason for skepticism: multinomial probits do not have a closed-form solution for these elasticities as a function of parameters

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Proposition 3

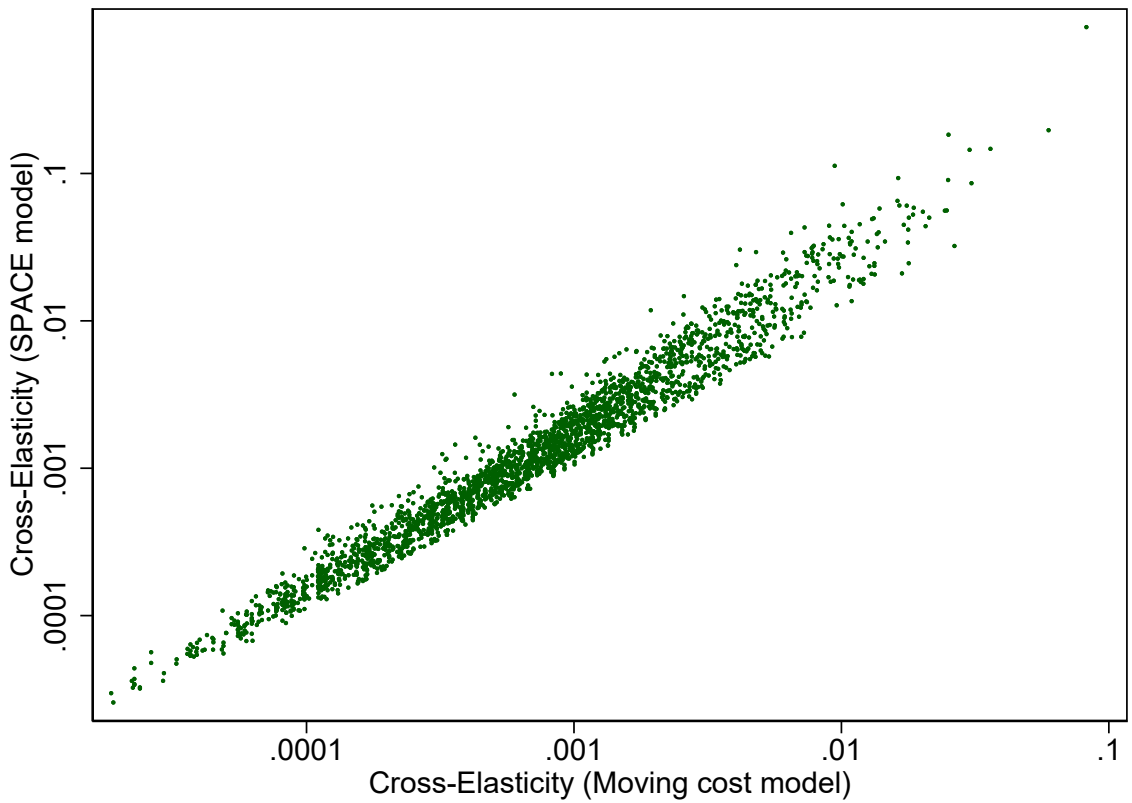
As $\rho \to 1$, the semi-elasticity of the population in i with respect to u_j is

$$\frac{\partial \log p_i}{\partial v_j} = -\lim_{\rho \to 1} \frac{m_{i \to j}}{p_i} \frac{1}{\sqrt{1 - \Sigma_{ij}}} \sqrt{\frac{\pi}{1 - \rho^2}}$$

- If you know migration, distance, and the parameters, sufficient to calculate these elasticities

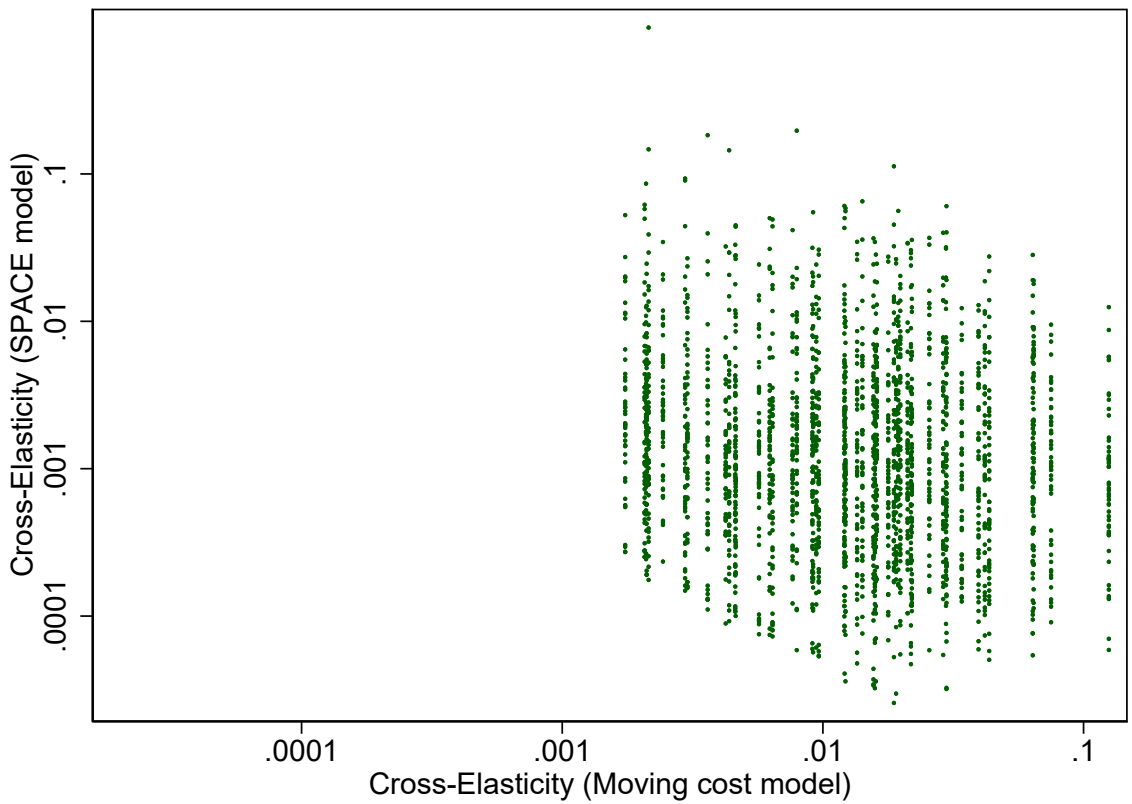
Short-run Population Cross-elasticity

- In the short-run, elasticities from moving cost model and SPACE model are quite similar
- Both primarily depend on gross migration

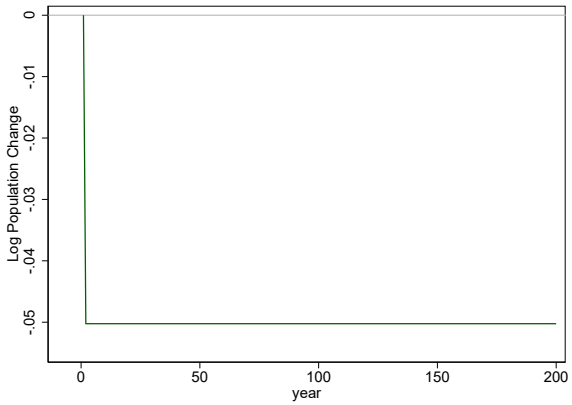


Long-run Population Cross-elasticity

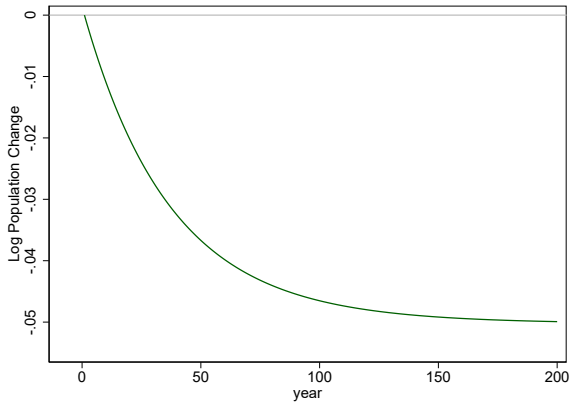
- In the long-run, very different
- Dynamic logit converges to static logit
  - Cross-elasticities proportional to population of shocked state



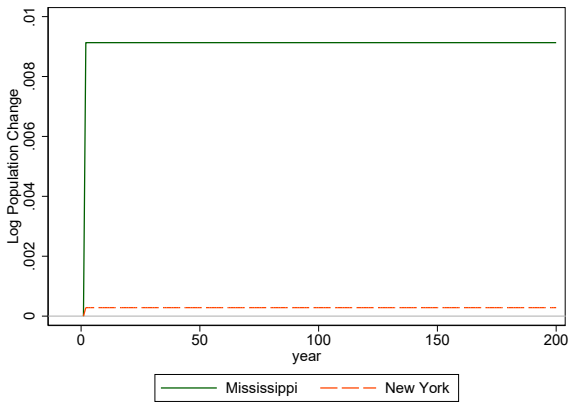
Population dynamics after a one-time permanent change in $v_{\text{Louisiana}}$



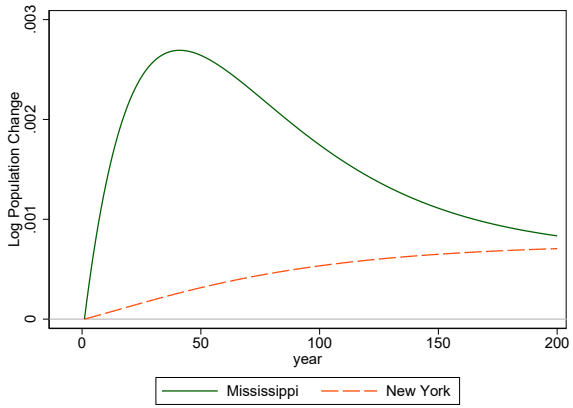
(a) Louisiana, SPACE model



(b) Louisiana, Dynamic Logit model



(c) Mississippi and New York, SPACE model



(d) Mississippi and New York, Dynamic Logit model

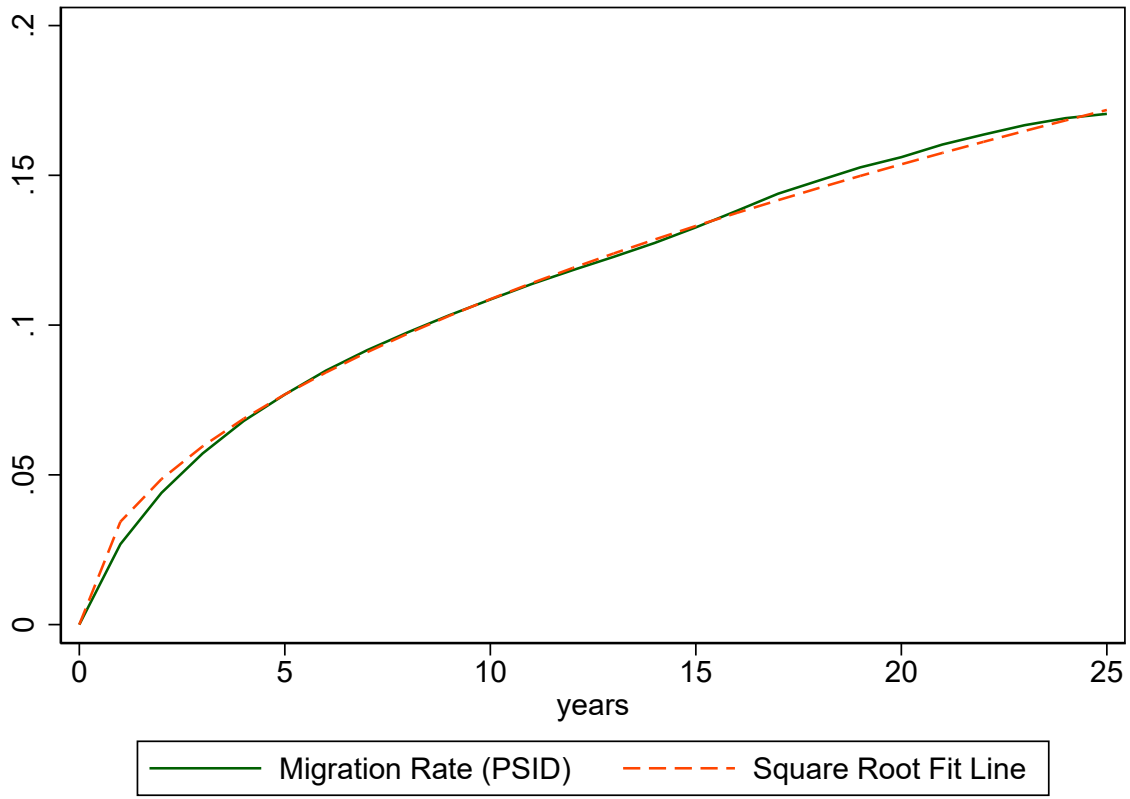
Moving Costs Need Not Be Large

- Kennan and Walker (2011): average moving cost is $312,146 (in 2010 USD)
  - $0 in SPACE model
- Common counterfactual is to change moving costs in some way

Takeaways

1. New fact: t-year internal migration rates are proportional to $\sqrt{t}$
2. Persistent preferences match dynamic moments of migration *and* gravity
3. Persistent preferences has different implications for long-run adjustments, population dynamics, and estimates of moving costs

Square Root Rule, PSID



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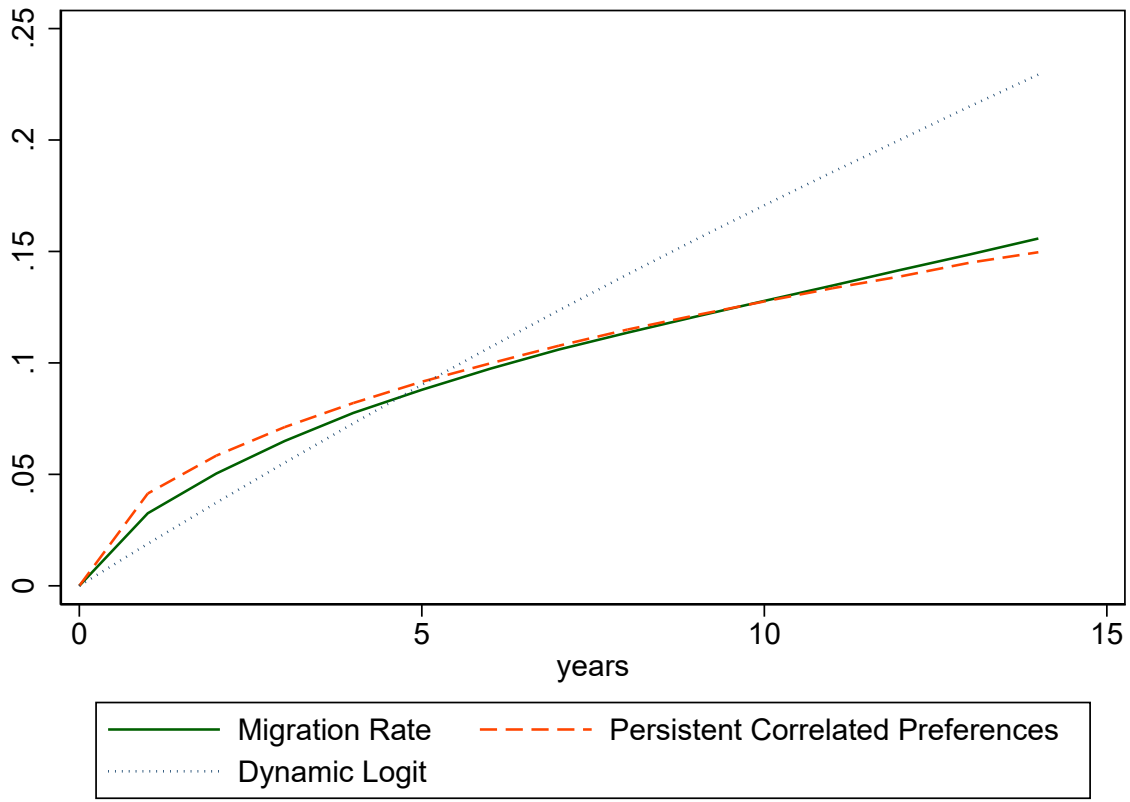

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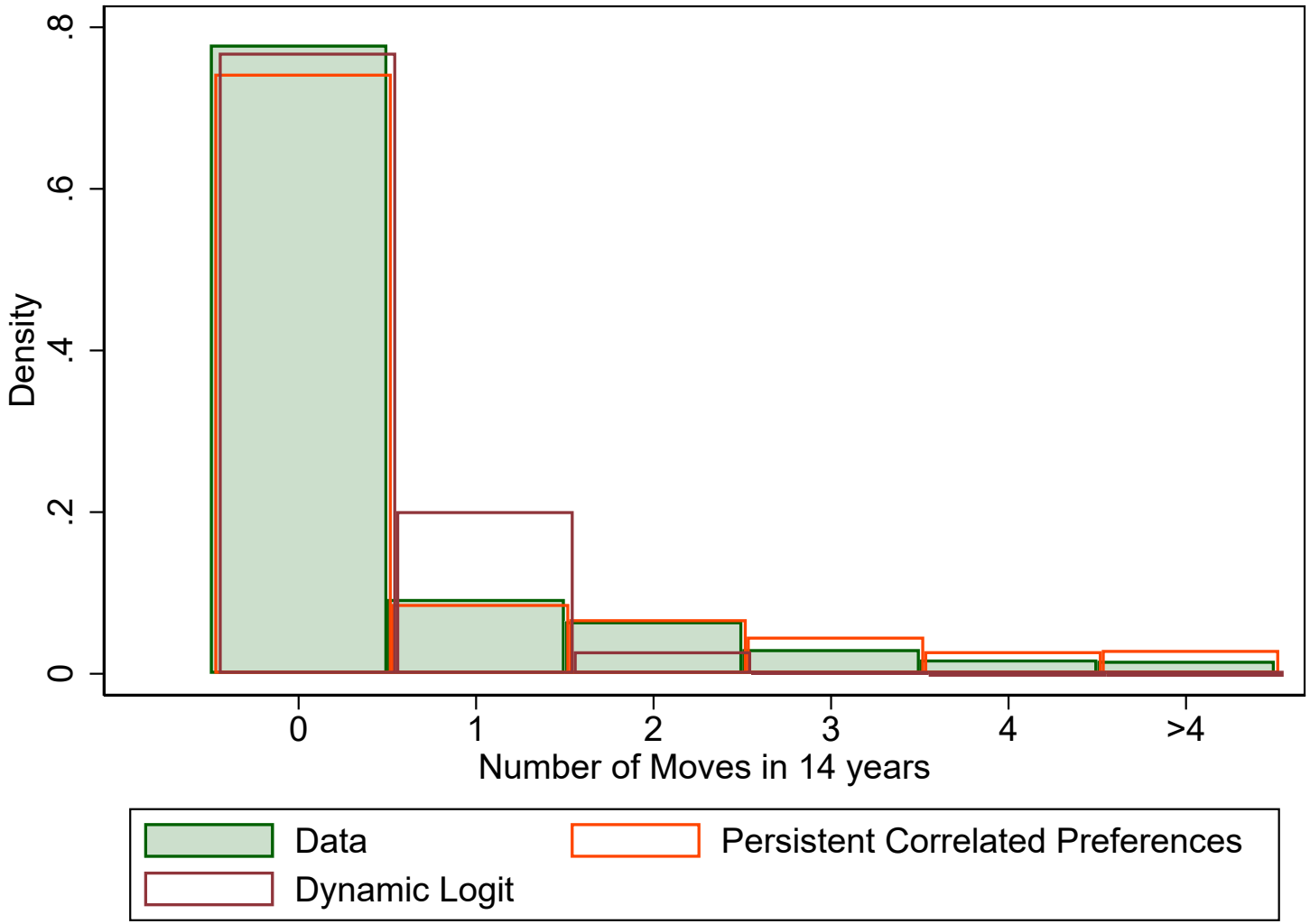
Frequency of Migration, 5-year calibration



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Return Migration, 5-year calibration

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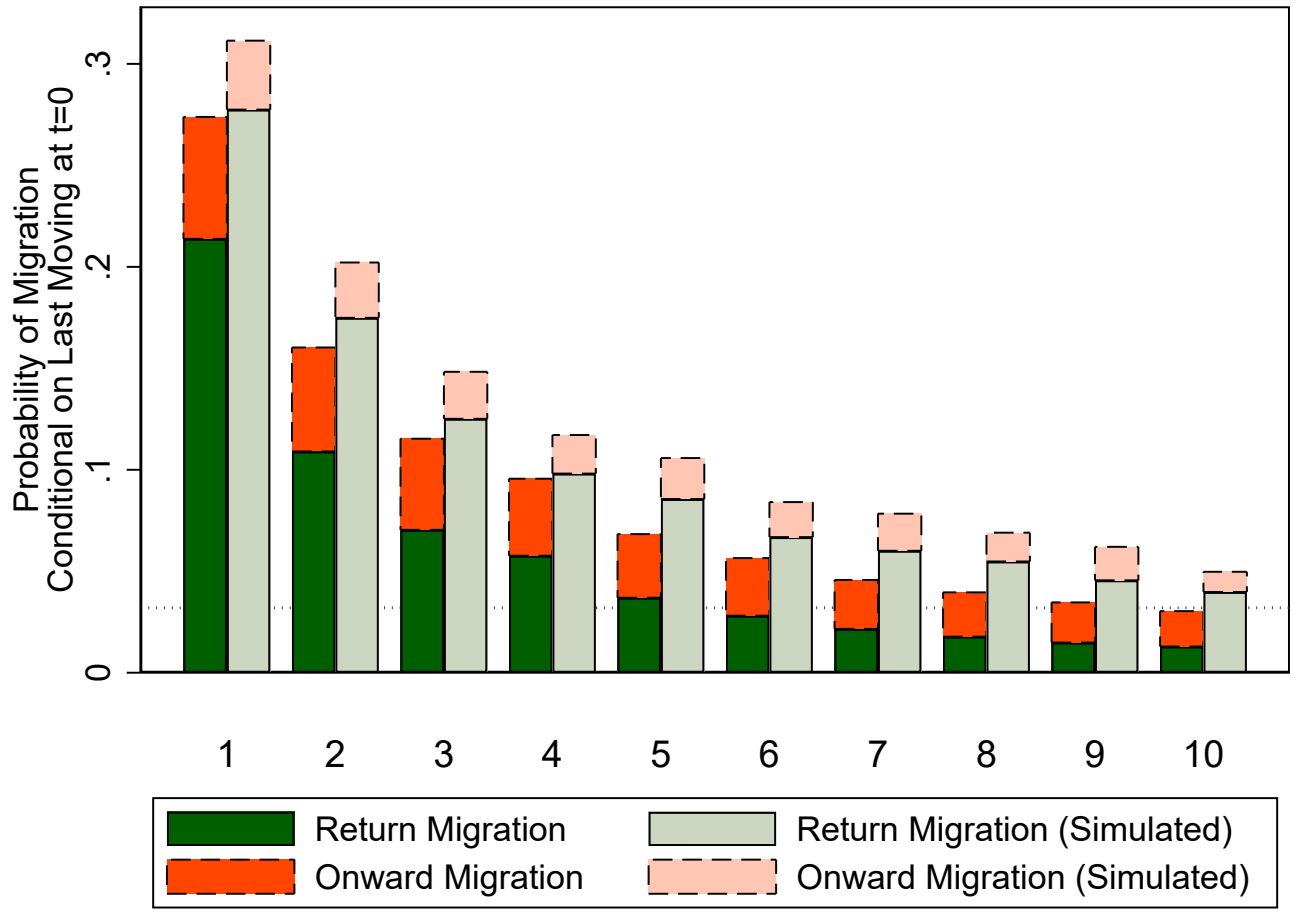

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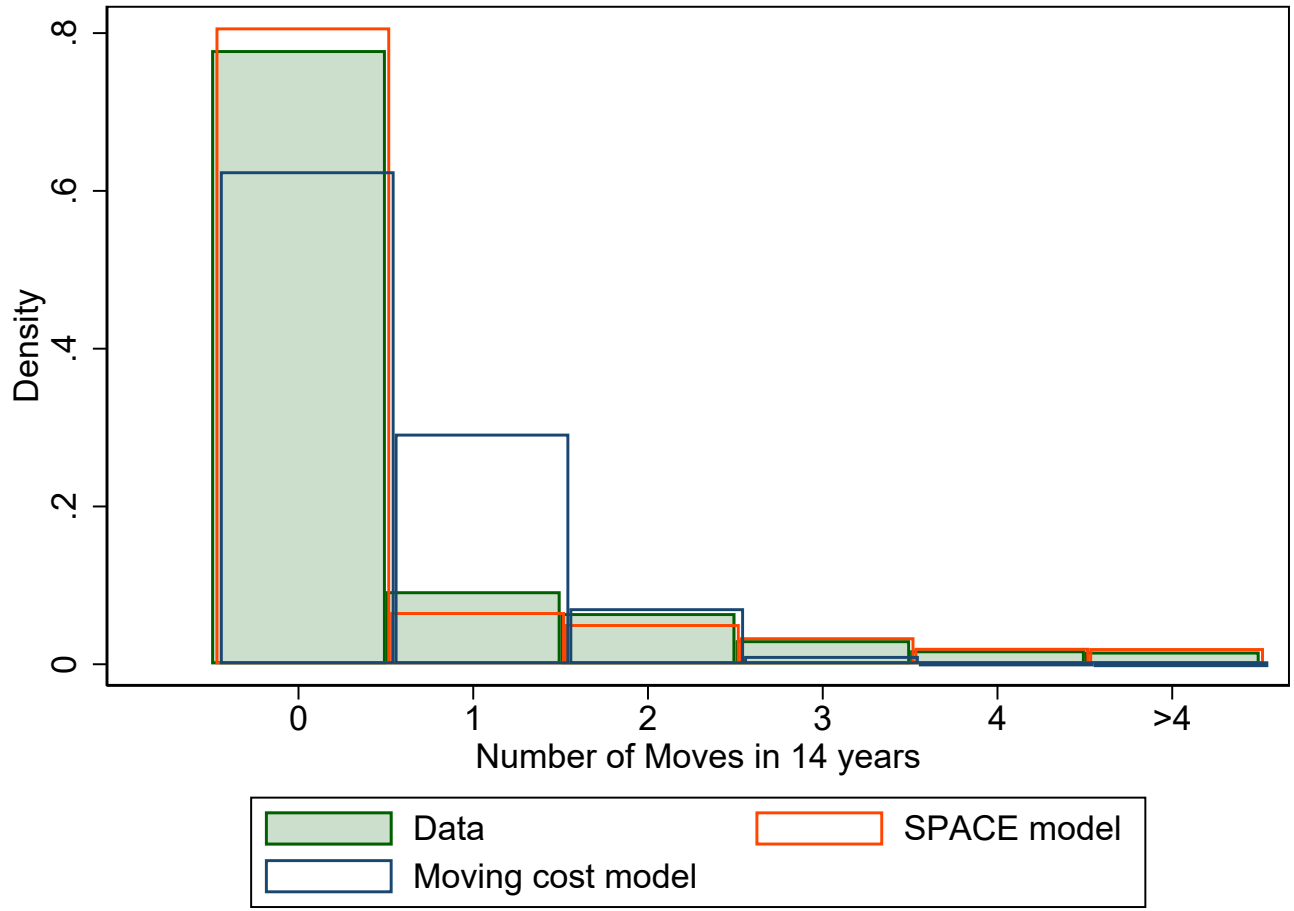
Frequency of Moves, Dynamic Logit Model



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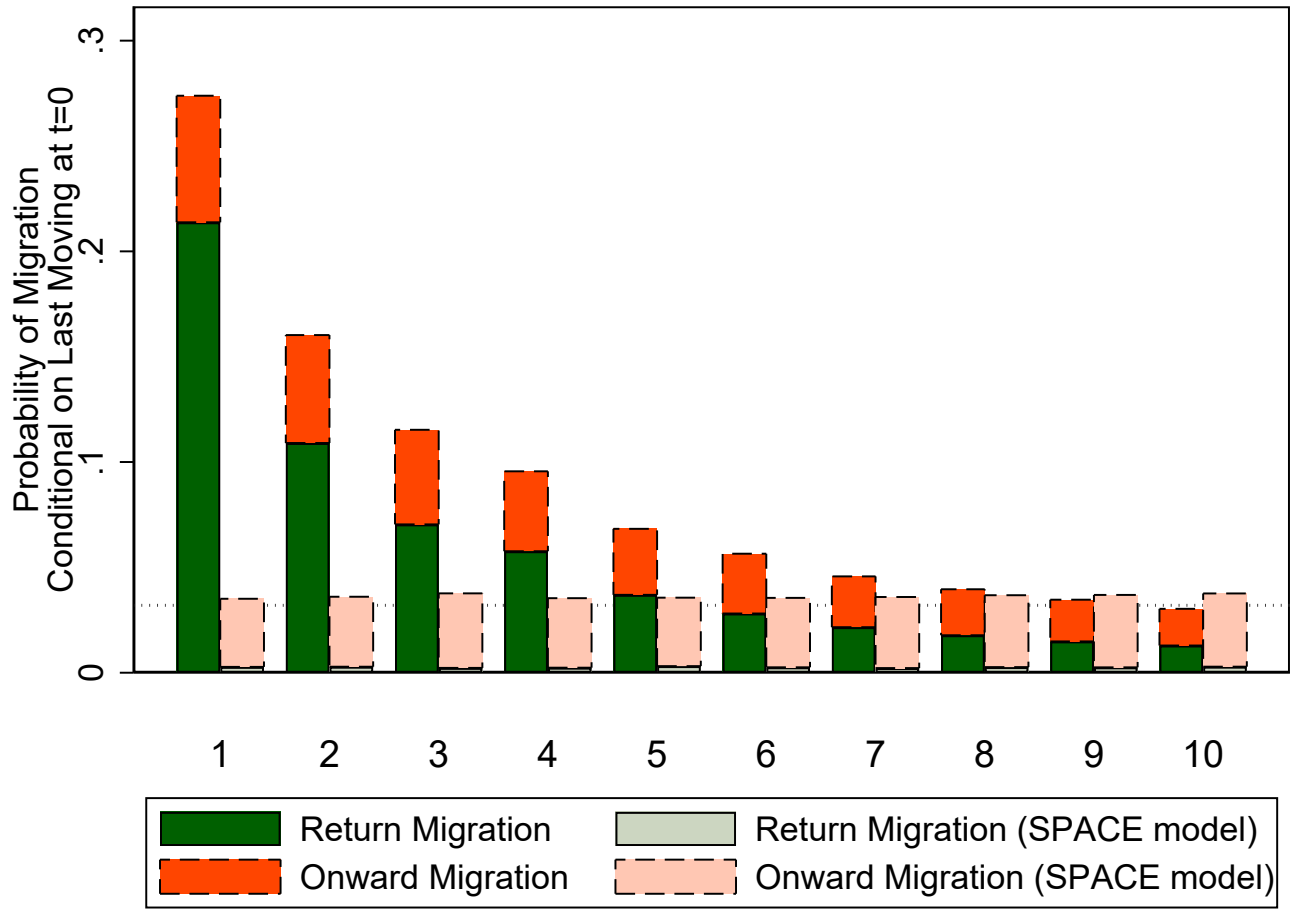

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