Internal Migration and the Microfoundations of Gravity

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Midwest Macro
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Most people in most years do not move

Why?

(a) Moving costs?

(b) Persistent preferences?

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(b) Persistent preferences?

- Hard to distinguish (Heckman, 1981)
- Important for dynamics of regional evolutions, migratory insurance, and macro misallocation

Literature

- Quantitative dynamic spatial literature has emphasized moving costs
  - Models used for a large variety of questions
  - Artuç, Chaudhuri and McLaren (2010), Kennan and Walker (2011), Kaplan and Schulhofer-Wohl (2017), Giannone (2017), Porcher (2020), Caliendo, Dvorkin and Parro (2019), Mangum and Coate (2019), Monras (2018), Hao, Sun, Tombe and Zhu (2020), Schubert (2021), Eckert and Peters (2018), Tombe and Zhu (2019), Amior and Manning (2018), Bryan and Morten (2019), Oliveira and Pereda (2020), Allen and Donaldson (2020), Liu, Klieman and Redding (2021), Morris-Levenson and Prato (2021)
- More tractable
- Able to easily match gravity relationship
- Natural extension of the trade literature

Outline

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5. Show this model has different implications for counterfactuals and welfare than a moving cost model

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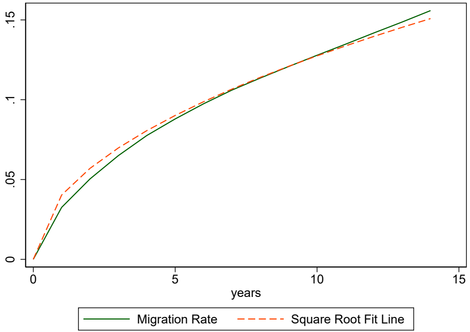
1. New fact about the dynamics of migration
2. Propose a model of persistent spatially-correlated preferences
3. Show the model can match gravity pattern of migration
4. Show the model can match dynamic moments
5. Show this model has different implications for counterfactuals and welfare than a moving cost model
    - Show this model isn't hopelessly intractable

New Fact

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



- Data from Gies Consumer Credit Panel

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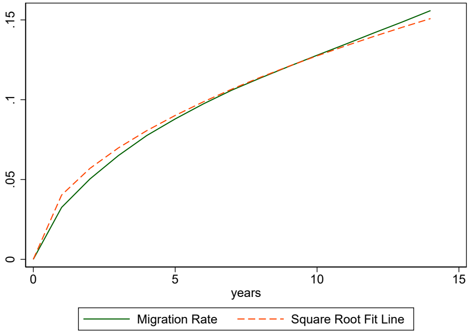

- Data from Gies Consumer Credit Panel
- Consistent with persistent preferences

Model

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

- Agents choose location that maximizes utility

$$u_{nt} = \max_i u_{int} = \max_i v_{it} + \epsilon_{int}$$

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- Personal utility is spatially-correlated

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

Covariance matrix

Why $\Sigma_{ij} = \exp(-A \text{ distance}_{ij})$?

Proposition 1

Σ is positive definite

- Proof uses Schoenberg Interpolation Theorem
- Requires $\Sigma_{ij} = f(\text{distance})$ to be completely monotone and non-constant
  - Not a trivial condition

- Having a functional form that always works means that this model can be easily extended to other settings

Parameterization

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

Gravity

$$\text{migration}_{ijt} = \frac{\text{population}_i^{\alpha}\,\text{population}_j^{\delta}}{\text{distance}_{ij}^{\beta}}$$

- Poisson regression

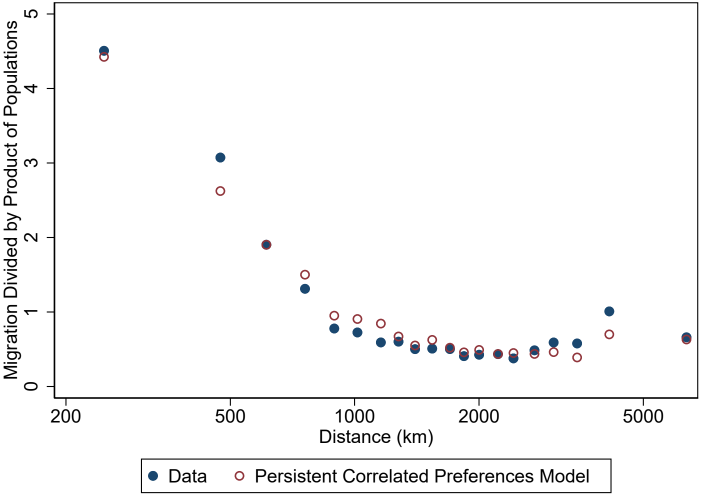
	(1) Migration (IRS)	(2) Migration (Credit)	(3) Simulated Migration	(4) Migration (Credit)	(5) Simulated Migration
Log Distance	-0.736***	-0.744***	-0.744***	-1.063***	-0.978***
	(0.0572)	(0.0515)	(0.0396)	(0.0672)	(0.0552)
Log Origin Population	0.900***	0.923***	0.892***		
	(0.0832)	(0.0797)	(0.0486)		
Log Destination Population	0.822***	0.893***	0.889***		
	(0.0976)	(0.0799)	(0.0501)		
Observations	2550	2550	2550	2550	2550
R^2					
Pseudo R^2	0.725	0.719	0.903	0.847	0.949
Origin and Destination FEs				Yes	Yes

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

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

- $\rho = .9996$
- $A = .000299\ \text{km}^{-1}$

Gravity

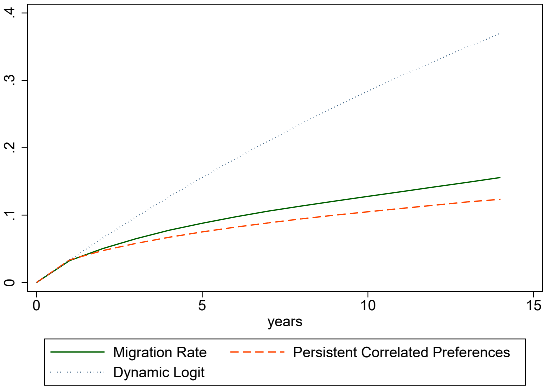


- Curvature is untargeted

Square Root Rule

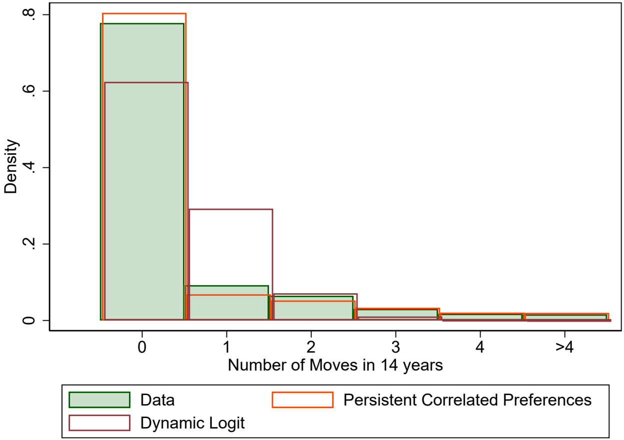
Proposition 2

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



5-year Calibration

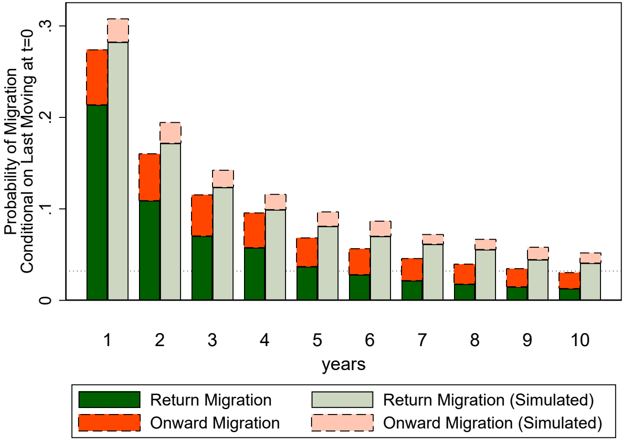
Frequency of Migration



5-year Calibration

Return Migration

- Conditional probability of moving after previous move



5-year Calibration Moving Cost Model

Implications

5 lessons:

1. Reducing moving costs may not reduce misallocation
2. Lowering information costs may not reduce return migration

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1. Reducing moving costs may not reduce misallocation
2. Lowering information costs may not reduce return migration
3. Short-run migration elasticities are decreasing in distance
4. Population cross-elasticities are roughly proportional to migration
5. Population cross-elasticities are the same in the short-run and the long-run

Short-run migration elasticities

Proposition 3

As $\rho \to 1$, the short run local semi-elasticity of migration from i to j with respect to u_i is

$$\frac{\partial m_{i \to j}}{\partial u_i} = \kappa \cdot \frac{1}{\sqrt{1 - \Sigma_{ij}}}$$

for some κ that does not depend on i or j

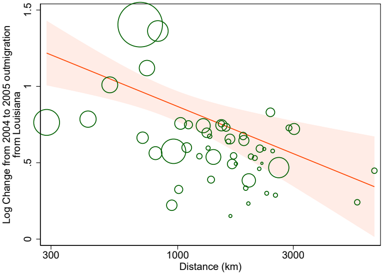
Corollary

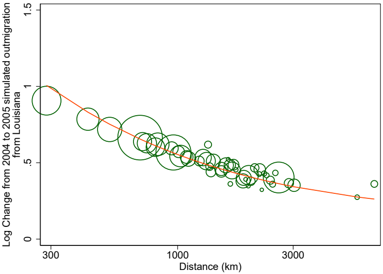
$\frac{\partial m_{i \to j}}{\partial u_i}$ is decreasing in distance

- Can arguably check this in the data

Short-run migration elasticities

- In the data, need a shock to a specific location (not spatially correlated)
    - Hurricane Katrina





Population elasticities

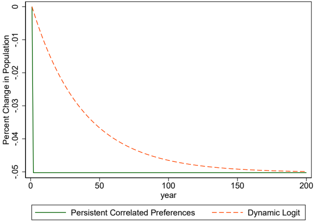
Proposition 4

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

$$\frac{\partial \log p_i}{\partial u_j} = \kappa \frac{m_{i \to j}}{p_i} \frac{1}{\sqrt{1 - \Sigma_{ij}}}$$

- Same in the short- and the long-run

Impulse response to permanent negative shock to $u_{\text{Louisiana}}$



(a) Louisiana

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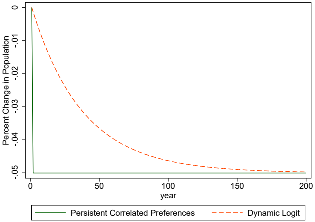
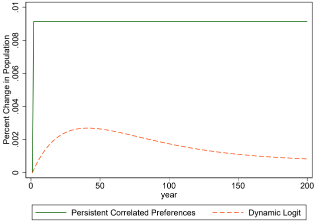
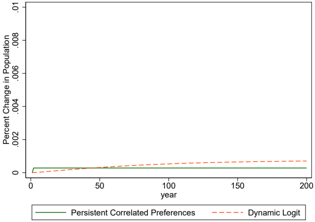


(a) Louisiana



(b) Mississippi



(c) New York

Population elasticities

- Population elasticities crucial for a variety of questions
- Examples:
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Population elasticities

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- Examples:
  - How much do people move in response to a shock?
  - Where do people move in response to a shock?
  - How long does it take them to do it?
  - Does it matter how spatially concentrated the shocks are?
    - In the paper, examine the differences if the Rust Belt shock had not been geographically concentrated

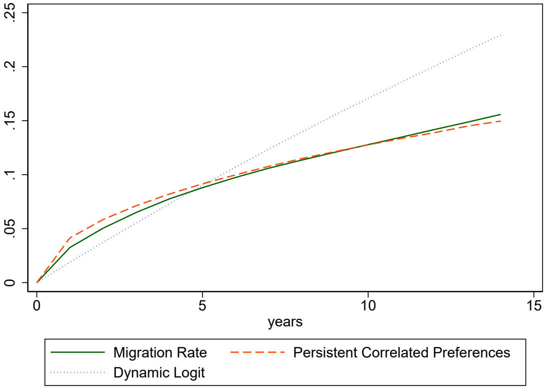
Conclusion

- Persistent preferences help to match dynamic moments of migration *and* gravity
- Important differences for the counterfactuals and welfare compared to standard moving cost model

Square Root Rule, 5-year calibration

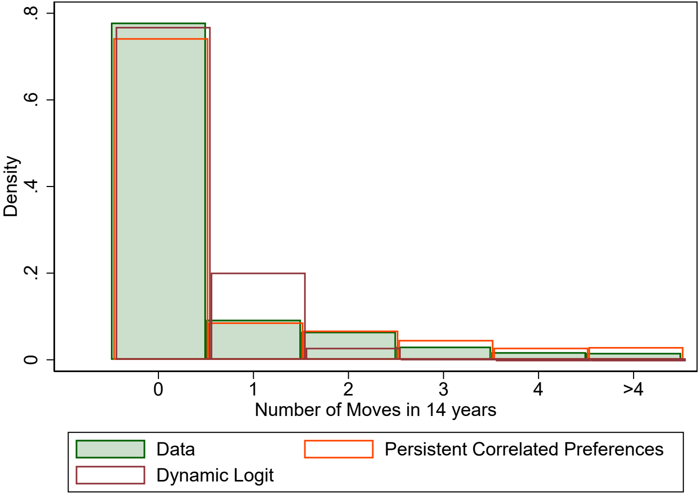
Proposition 2

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



Return

Frequency of Migration, 5-year calibration



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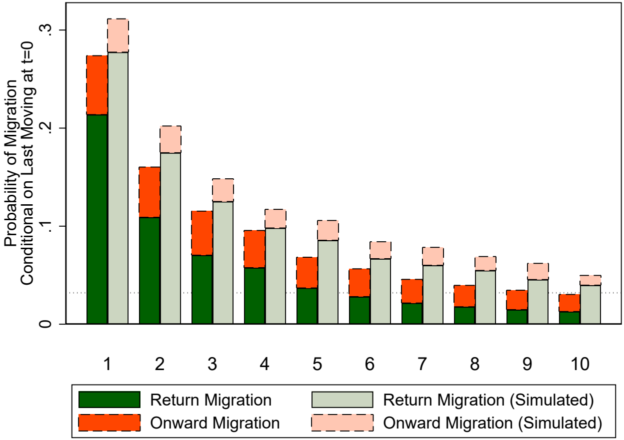
Return Migration, 5-year calibration

- Conditional probability of moving after previous move



Return

Return Migration, Dynamic Logit Model

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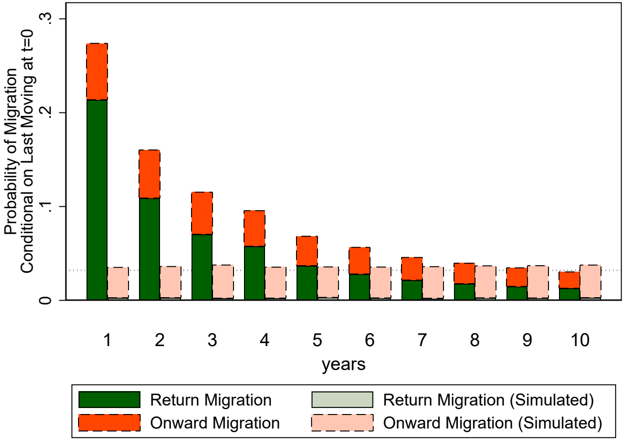

Return

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