Population Aging, Migration Spillovers and the Decline in Interstate Migration*

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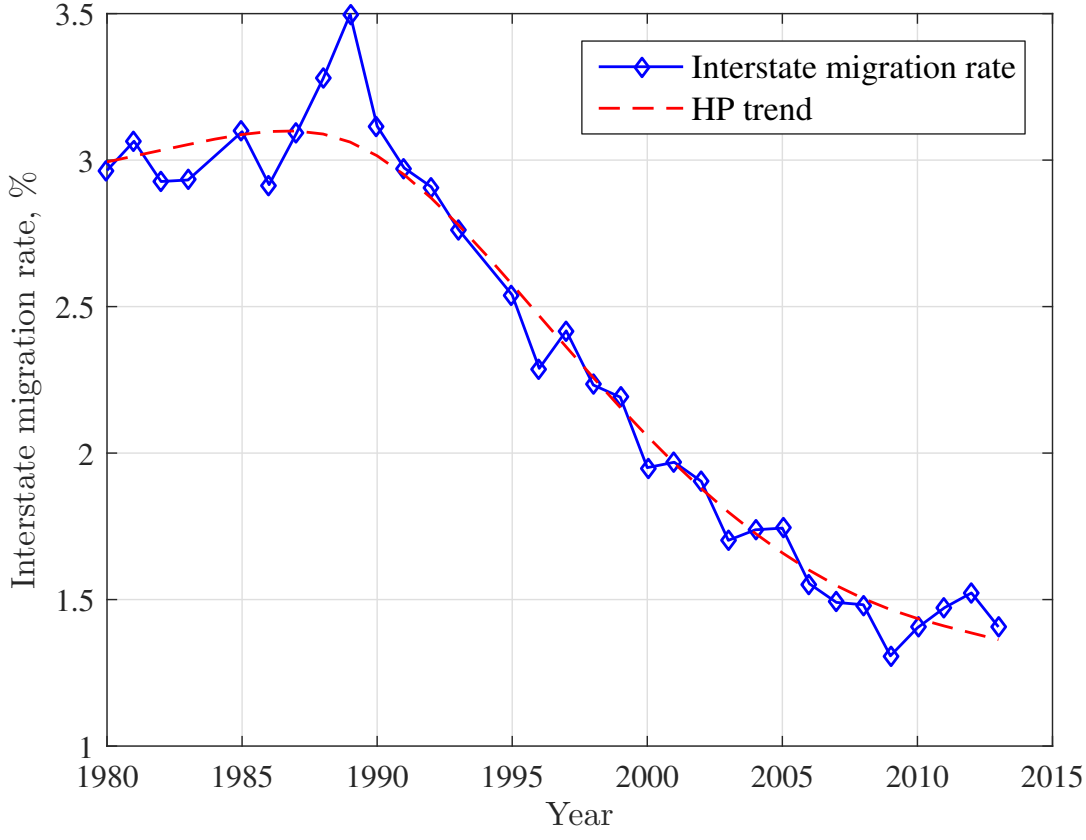
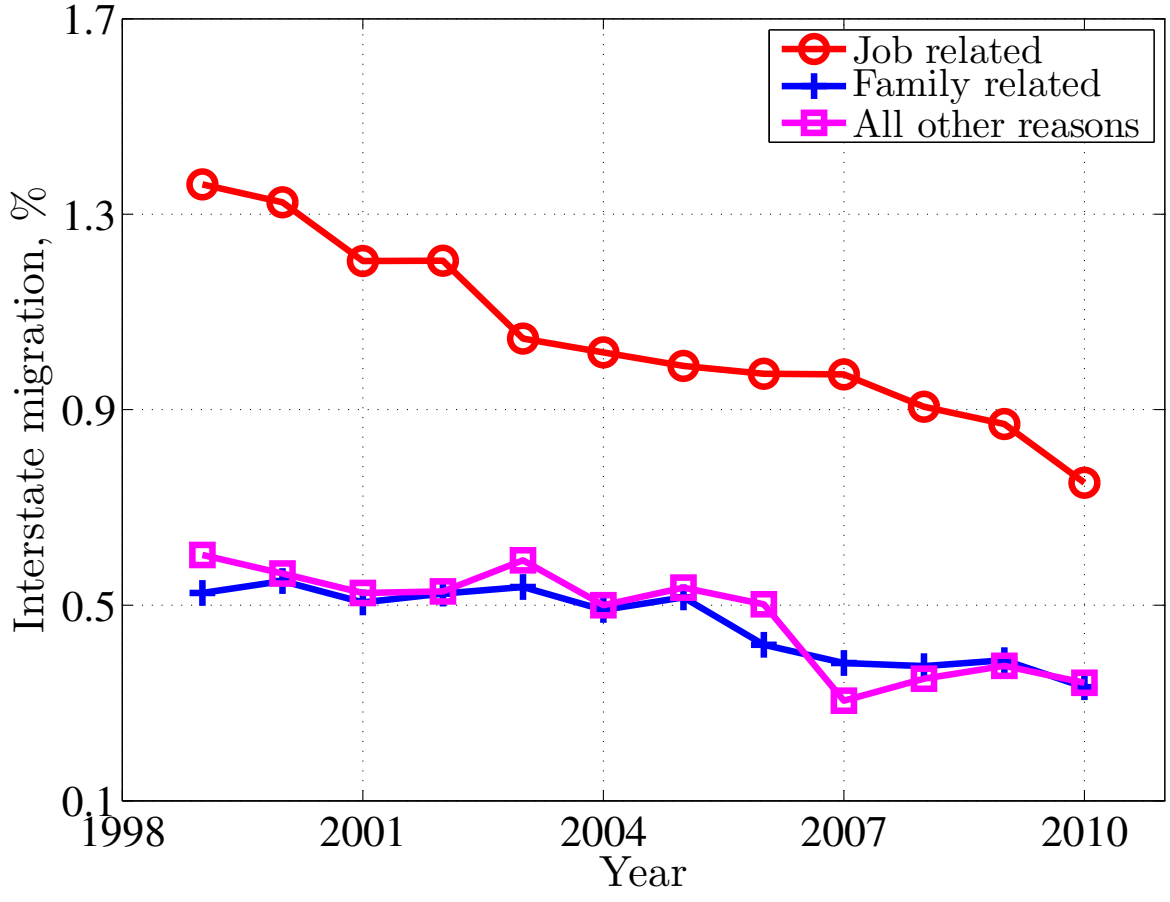
DECLINING MOBILITY ACROSS U.S. STATES

- Long-run decline in interstate migration in the U.S. over the last 30 years. SIPP



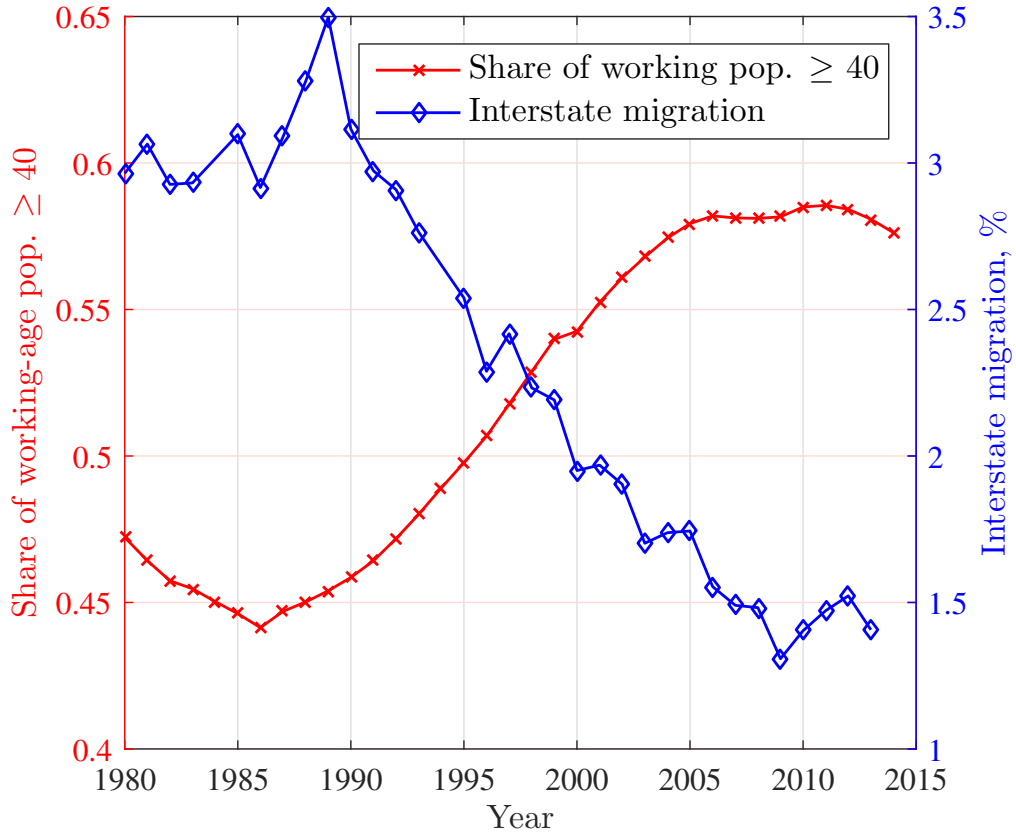
IMPLICATIONS FOR THE LABOR MARKET?

- More than a third of long-distance moves are **job-related**.
- Most of the decline is in the job-related component.



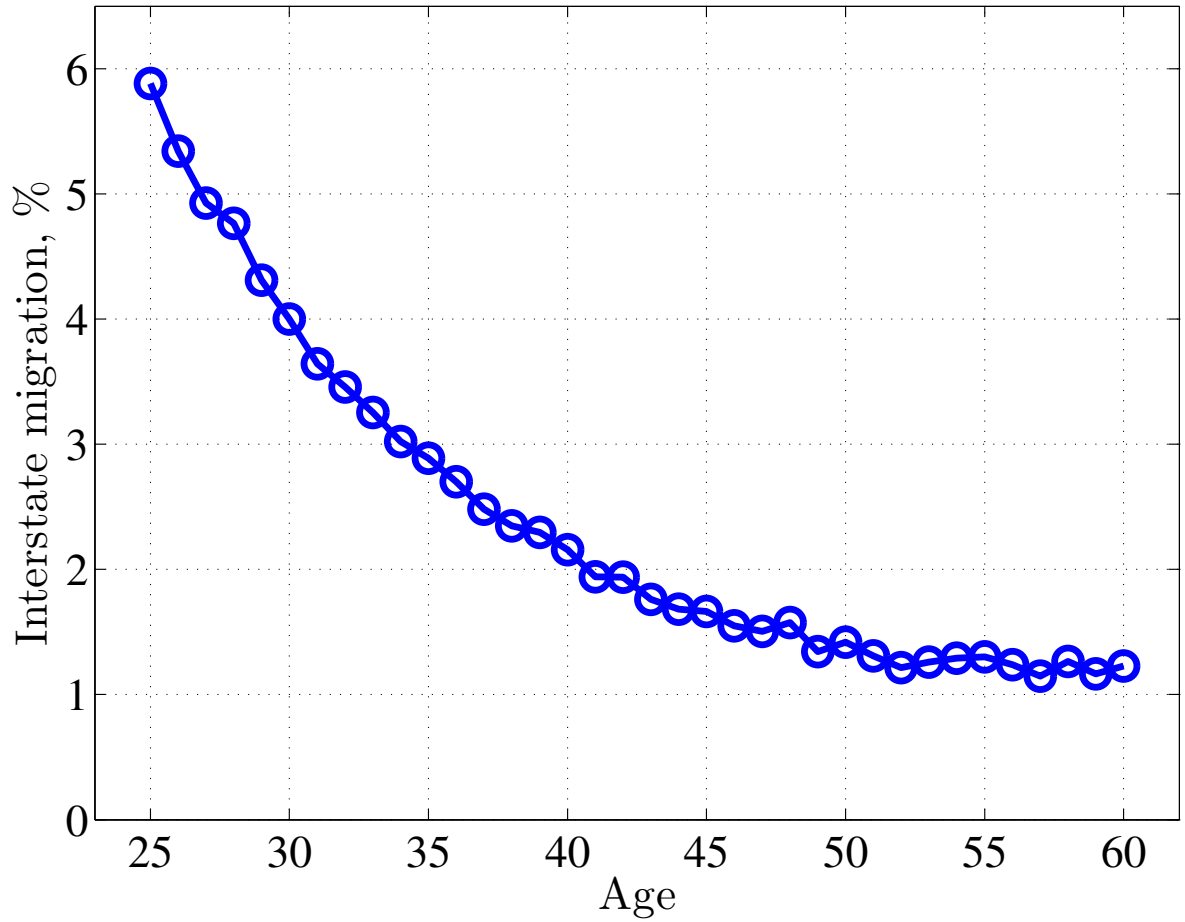
AGING OF THE U.S. WORKING-AGE POPULATION

- Share of 40-60: ~45% in 1980s –> ~60% in 2010.



AGING POPULATION IS A NATURAL CANDIDATE FOR EXPLAINING LOWER MOBILITY

- Mobility of 25-39 is twice that of 40-60.



DIRECT EFFECT OF AGING IS QUANTITATIVELY SMALL

Simple exercise:

- Fix the migration behavior of each age group at its 1981 level.
- Compute the implied migration for each year by only changing the composition over time.

$$\hat{m}_t = \sum_i s_{i,t} \times \bar{m}_{i,1981}$$

- Change in the migration rate is driven by the change in composition.

$$\Delta\hat{m} = \sum_i \Delta s_{i,t} \times \overline{m}_{i,1981}$$

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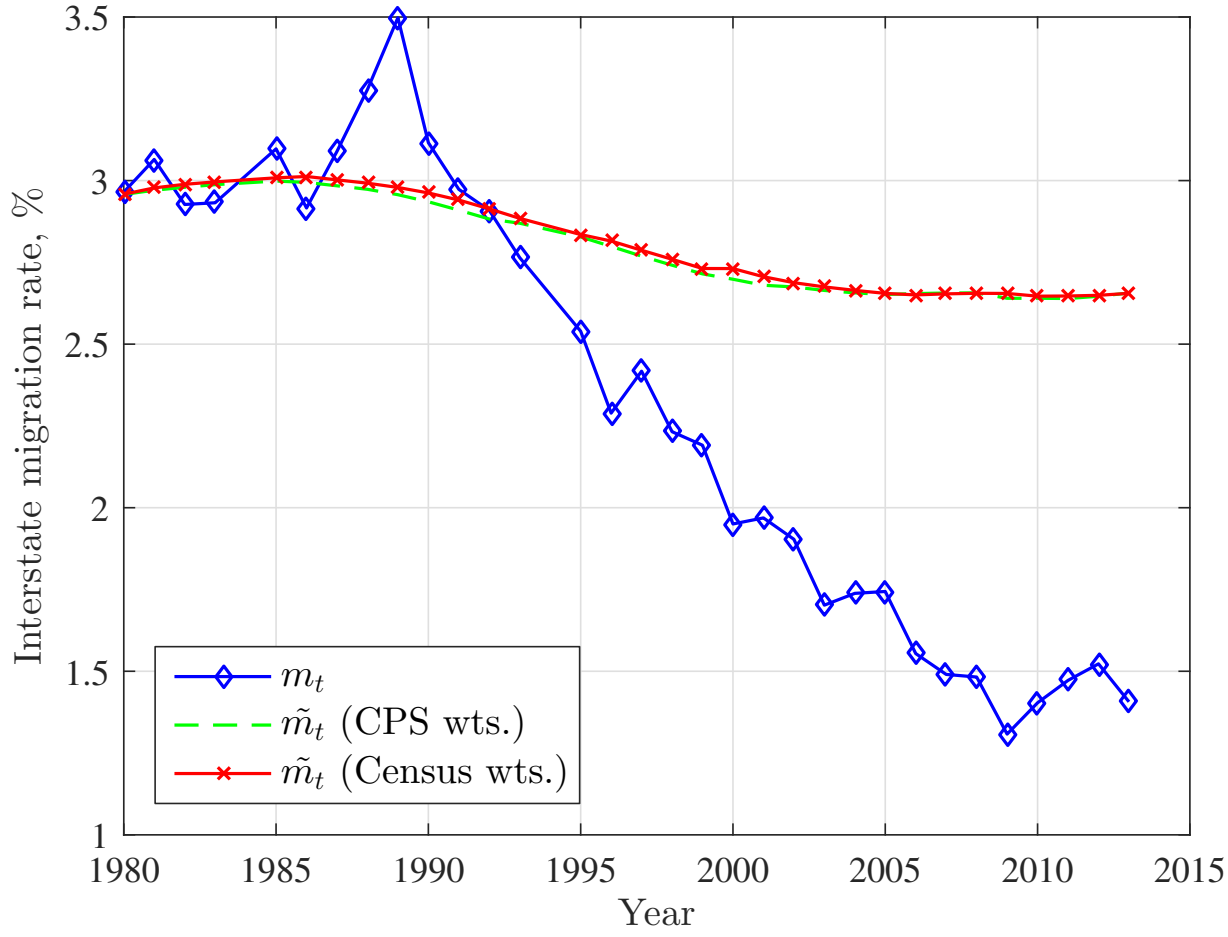
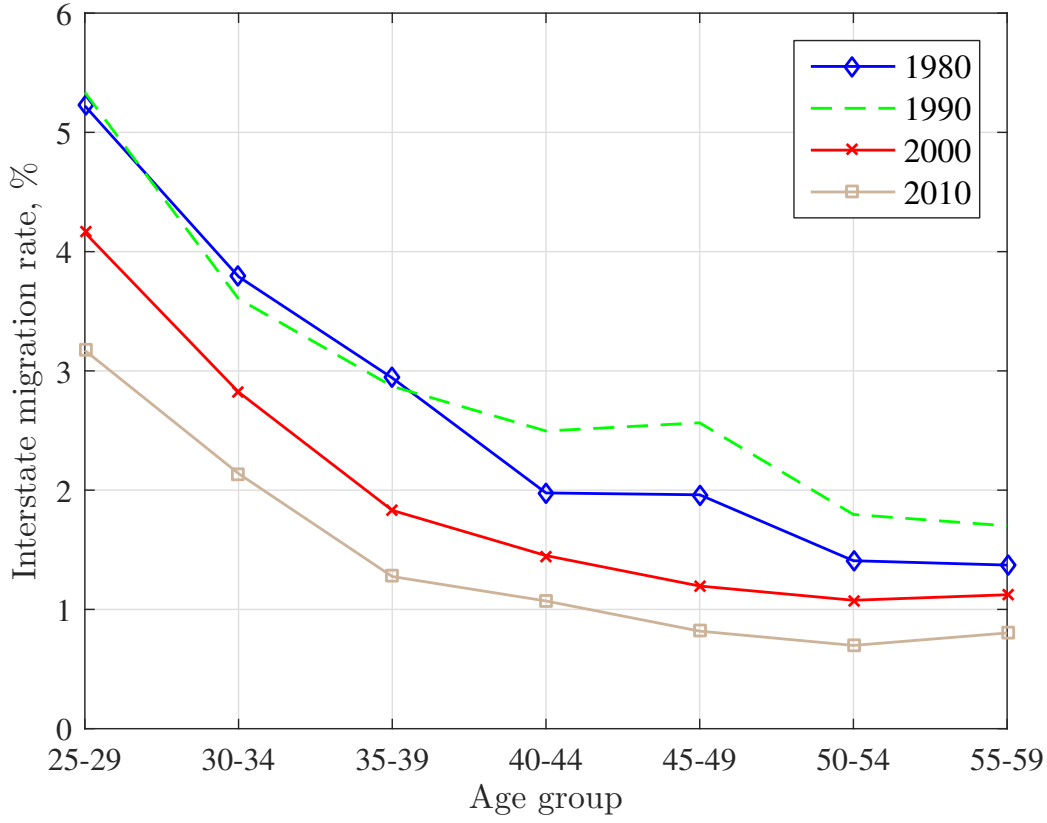


- The direct effect accounts for only 0.2 ppt of the decline.

SHIFT IN THE LIFECYCLE PROFILE OF MIGRATION



- The decline in migration is **common across all age groups**.
- Evidence **against compositional explanations** (Kaplan and Schulhofer-Wohl 2013; Molloy, Smith and Wozniak 2013)

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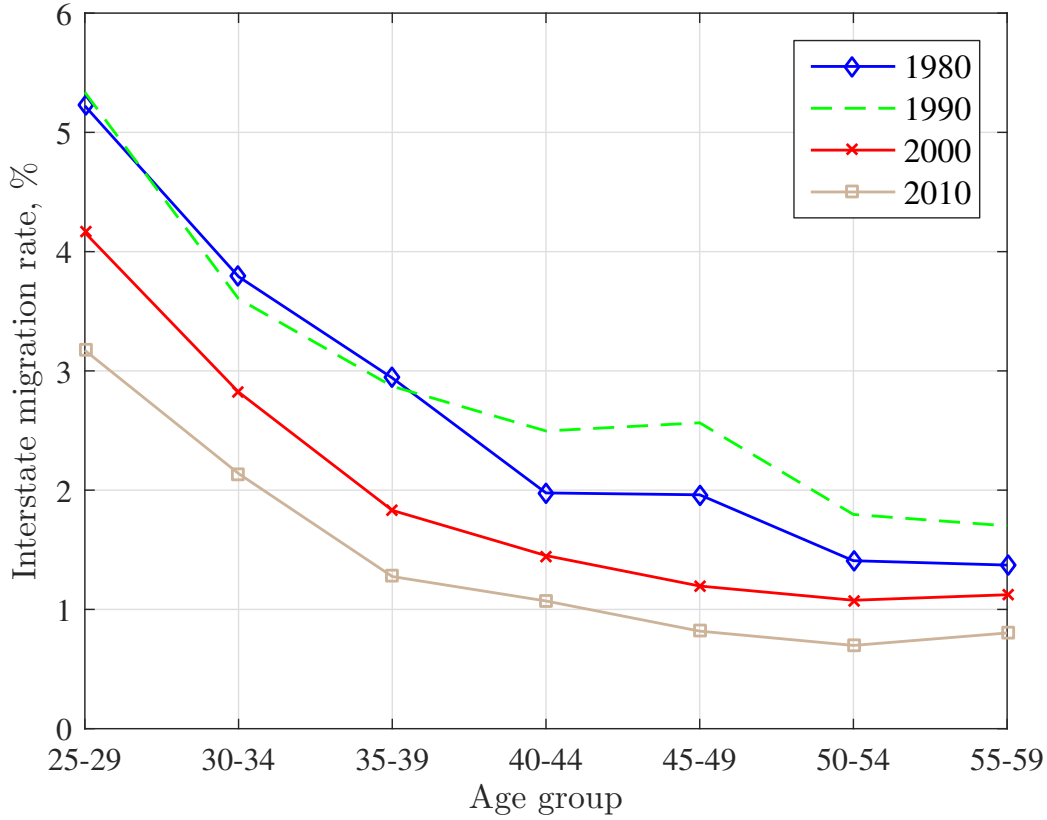

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KEY HYPOTHESIS

Population aging is more than shifting shares!

WHAT WE DO

1. Argue that **equilibrium effects** matter.
   - Behavior is not invariant to composition:

$$m = \sum_i s_{i,t} \times m_{i,t}(s_t)$$

2. Empirical analysis using geographic variation.
   - An individual that lives in an "older" location is less likely to move (regardless of age).

3. Provide a theory and a quantitative exploration.
   - When the population ages, an equilibrium effect causes lower mobility for **all** workers (**migration spillovers**).
   - Test the mechanism in the data.

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MIGRATION SPILLOVERS

- Firms can fill vacancies **locally** (directed to local workers) or **globally** (directed to all workers).
- Older workers have a positive composition externality on local recruiting.
  - Firms prefer hiring them as they have a lower outside option and tend to stay longer with the firm.
  - An increase in their share makes advertising jobs locally more profitable.
  - Local job finding rate increases, which lowers the migration of **all** workers.

ROAD MAP

1. **Empirical investigation of aging and migration**

2. **Equilibrium model of migration**

3. **Conclusions and future work**

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CROSS-SECTIONAL RELATIONSHIP BETWEEN AGING AND MOBILITY

- Composition may have an indirect effect by changing age-specific migration rates:

$$m_{ist} = \alpha_s + \beta_t + \delta X_{it} + \gamma \ln share > 40_{st} + \varepsilon_{st},$$

m_{ist} : dummy for out-migration of individual i, in state s, during year t
α_s and β_t : state and year fixed effects
$share > 40_{st}$: share of 40-60 among working-age population (25-60).
X_{it}: worker controls including a full set of age dummies, college, gender and race dummies,

- Instrument $share > 40$ with lagged cumulative birth rates (Shimer 2001; QJE).
  - Exclusion restriction: Cdtl. on state and time effects, any economic conditions that shifted fertility rates in the past do not directly affect current migration decisions.

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First stage

	Share 40-59	Residual	In logs	In logs, resid.
Lagged birthrate	-0.05^{***}		-0.35^{***}	
	(0.003)		(0.018)	
Lagged BR (resid.)		-0.05^{***}		-0.35^{***}
		(0.003)		(0.018)
State dummies	Yes	No	Yes	No
Year dummies	Yes	No	Yes	No
Observations	1372	1372	1372	1372
R^2	0.955	0.143	0.963	0.218

IV ESTIMATES

	Baseline	Controls	Linear	Het. trends
Share 40-60	-2.22^{**}	-2.41^{**}	-0.21^{*}	-0.07^{*}
	(0.97)	(1.13)	(0.11)	(0.04)
College	0.23^{***}	0.22^{***}	0.01^{***}	0.01^{***}
	(0.02)	(0.02)	(0.002)	(0.001)
White	-0.001	0.003	0.00	0.00
	(0.02)	(0.02)	(0.002)	(0.001)
Female	-0.01^{***}	-0.08^{***}	-0.001^{***}	-0.01^{***}
	(0.003)	(0.006)	(0.000)	(0.003)
N	2,003,386	1,506,234	2,003,386	2,003,386
Effect on migration	-1.3	-1.3	-2.5	-0.8
Elasticity	-3.1	-3.4	-5.9	-2.3

Instrumenting for the age composition with lagged cumulative birth rates. Standard errors are clustered around state.

HETEROGENEOUS EFFECTS BY AGE

	Young vs. Middle-Age	Seniors (65+)
Share 40-60	-1.91^{**}	0.43
	(0.95)	(2.26)
Middle-age	-0.63^{***}	
	(0.14)	
N	2,003,386	623,991
Effect on migration	-1.3	0.1
Elasticity	-3.1	0.7

Instrumenting for the age composition with lagged cumulative birth rates. Standard errors are clustered around state.

- Effect slightly stronger for middle-age and not present for seniors.

ALTERNATIVE DATA SOURCES

- Similar results in
  - IRS data (cannot do by age).
  - Census data (not using year-to-year variation in composition).
  - American Community Survey (ACS): more disaggregated analysis (PUMA-level).

ACS ANALYSIS

- Mobility can be measured at a more granular geographical level than U.S. states.
  - "Migration PUMAs" are constructed from one or multiple (P)ublic (U)se (M)icrodata (A)reas.
  - PUMAs typically consist of single or multiple counties.
  - Advantage: closer to a local labor market
  - Disadvantage: instrument is potentially weaker.
- Use Census crosswalks to aggregate county-level birthrate and demographic variables to MigPUMA.
- ACS introduced 2010-based PUMAs in 2012 for which no crosswalk exists.
- Use data from 2005-2012 to analyze the relationship between demographics and migration behavior.

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Constructing MIGPUMA-level age composition and birthrates

- Census provides a crosswalk between counties and PUMAs.
- Some counties are PUMAs.
- Some PUMAs are entirely contained in a single county.
  - Assume aggregates are uniform within a county.
- Some PUMAs span more than county, but we know how much of its population is in each county.
  - Obtain aggregates using population shares as weights.

First stage

	Share 40-59	Residual	In logs	In logs, resid.
Lagged birthrate	-0.03^{***}		-0.03^{***}	
	(0.005)		(0.002)	
Lagged BR (resid.)		-0.03^{***}		-0.03^{***}
		(0.005)		(0.003)
State dummies	Yes	No	Yes	No
Year dummies	Yes	No	Yes	No
Observations	6,575	6,575	6,575	6,575
R^2	0.975	0.006	0.976	0.028

ACS RESULTS

	IV Probit	Linear (2SLS)
Share 40-60	-6.945^{*}	-0.782^{*}
	(4.016)	(0.471)
College	0.077^{***}	0.009^{***}
	(0.006)	(0.001)
White	-0.024^{**}	-0.002^{*}
	(0.012)	(0.001)
Female	0.096^{***}	0.010^{***}
	(0.006)	(0.000)
N	8,759,910	8,759,910
Elasticity	-7.3	-6.4

Instrumenting for the age composition with lagged cumulative birth rates. Standard errors are clustered around MigPUMAs.

ROAD MAP

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ENVIRONMENT

- Time is continuous. N locations indexed by i.
- Measure 1 of workers that can be of J types. Shares given by w^j. Types differ in
  - Moving cost distribution (i.i.d.) $G^j(c)$
  - (exogenous) job destruction, δ^j
  - Location preference ε_i^j.
- Ex-ante identical firms decide on vacancy creation.

LABOR MARKET

- Firms can advertise positions in two ways.
  - Locally (directed to local workers only).
  - Globally (online postings, visible to all workers).
- Workers may search for jobs both in the local market and in the global market.
  - Random search in both markets.
  - May run into a local firm in the global market.
- Wages are set according to Nash bargaining.

VALUE FUNCTIONS

$$
\begin{aligned}
rU_i^j &= b + \varepsilon_i^j + \overbrace{\left(p_{il} + \frac{v_{ig}}{v_g} p_g\right)\left(W_i^j - U_i^j\right)}^{\text{find a job in own location}} \\
&\qquad + \overbrace{p_g \sum_{k \neq i} \frac{v_{kg}}{v_g} \mathbb{E} \max\left\{0, W_k^j - U_i^j - c\right\}}^{\text{find a job in some other location}} \\
rW_i^j &= w + \varepsilon_i^j + \delta^j \left(U_i^j - W_i^j\right) \\
rJ_i^j &= y - w - \delta^j J_i^j,
\end{aligned}
$$

p_{il} : job finding rate in the local market of location i.

p_g : job finding rate in the global market

FREE ENTRY OF FIRMS

- Local market:

$$\kappa = (1-\eta)\, q_{il} \sum_{j=1}^{J} s_i^j S_i^j$$

s_i^j : share of unemployed in i that are of type j.

S_i^j : surplus of a firm in i that meets with a worker j in the same location (***higher*** for older workers).

- Global market:

$$\kappa = (1-\eta)\, q_g \left\{ \overbrace{\sum_{j=1}^{J} s_i^j S_i^j}^{\text{local worker}} + \overbrace{\sum_{k \neq i} \sum_{j=1}^{J} s_i^j \mathbb{E} \max S_{ki}^j}^{\text{distant worker}} \right\}$$

S_{ki}^j : surplus of a firm in i that meets with a worker j that resides in k (***lower*** for older workers).

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CALIBRATION

- $N = 50$ locations.
- $J = 7$ age groups between 25–60.
- Calibrate to 1980s

- Strategy
  1. Some parameters set outside the model.
  2. Choose the remaining parameters via the SMM.
- **Do not directly target**
  - the decline in the interstate migration rate.
  - the cross-sectional correlations.

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PARAMETERS CALIBRATED OUTSIDE THE MODEL

Parameter	Value
Time discount rate, ρ	0.0033
Value of leisure, b	0.71
# locations, N	50
Matching function elasticity, γ	0.25
Matching efficiency, ν	0.77
Workers' bargaining power, η	0.50

PARAMETERS CALIBRATED OUTSIDE THE MODEL

Parameter		Value
Population share by age group, %	25-29	16.11
	30-34	14.88
	35-39	11.61
	40-44	9.58
	45-49	9.15
	50-54	9.36
	55-60	11.08
Separation rate by age group	25-29	0.0425
	30-34	0.0310
	35-39	0.0250
	40-44	0.0210
	45-49	0.0192
	50-54	0.0176
	55-60	0.0158

PARAMETERS CALIBRATED INSIDE THE MODEL

Parameter		Value
Vacancy posting cost, κ		0.4419
Mean of the moving cost distribution by age group	25–29	0.4363
	30–34	0.5215
	35–39	0.6261
	40–44	1.0565
	45–49	1.0838
	50–54	1.4252
	55–60	1.4458

MATCHING CALIBRATION TARGETS

Moment		Data	Model
Average job finding rate		0.416	0.416
Annual migration rate by age group	25-29	5.26%	5.26%
	30-34	3.82%	3.82%
	35-39	2.96%	2.96%
	40-44	1.99%	1.99%
	45-49	1.98%	1.98%
	50-54	1.42%	1.42%
	55-60	1.38%	1.38%

TESTING THE MODEL: CROSS-SECTIONAL CORRELATION OF MIGRATION AND AGE COMPOSITION.

- What does the model imply for the cross-state migration elasticities?
- Use the preference parameters to generate heterogeneity across locations.
- Compute the model counterpart of the cross-state migration elasticity

	Aggregate	25–39	40–59
Model	-1.36	-1.00	-1.54
Data (IV)	-3.09	-2.65	-3.95
95% CI	[-7.70,-0.29]	[-7.03,-0.04]	[-6.98,-0.05]

TESTING THE MODEL: SHARE OF LOCAL HIRES

- Firms in "older" states recruit more through local means as opposed to global search.
  - A larger share of hires from the local market should be local.
- We test this using data from SIPP and compare to cross-state elasticities from the model.

	Data	Model
Elasticity of the share of local hires	0.38	0.11
w.r.t. share of population > 40	(0.23)	

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w.r.t. share of population > 40	(0.23)	

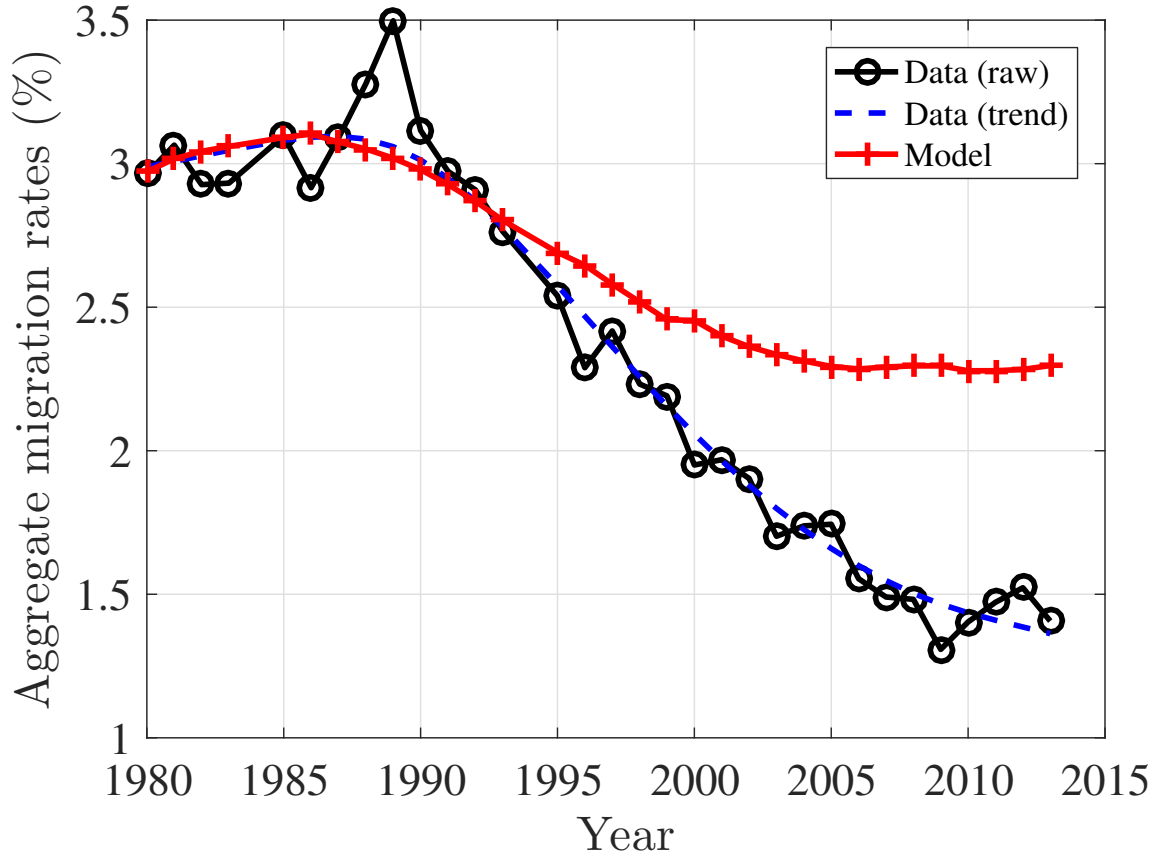
HETEROGENEOUS EFFECTS

	Occupation categories
Share 40-60 (manual-routine)	-0.20^{*}
	(0.12)
Cognitive-nonroutine	-0.038^{***}
	(0.014)
Manual-nonroutine	-0.032^{***}
	(0.012)
Cognitive-routine	-0.029^{***}
	(0.013)
N	1,506,234

Instrumenting for the age composition with lagged cumulative birth rates.
Standard errors are clustered around state.

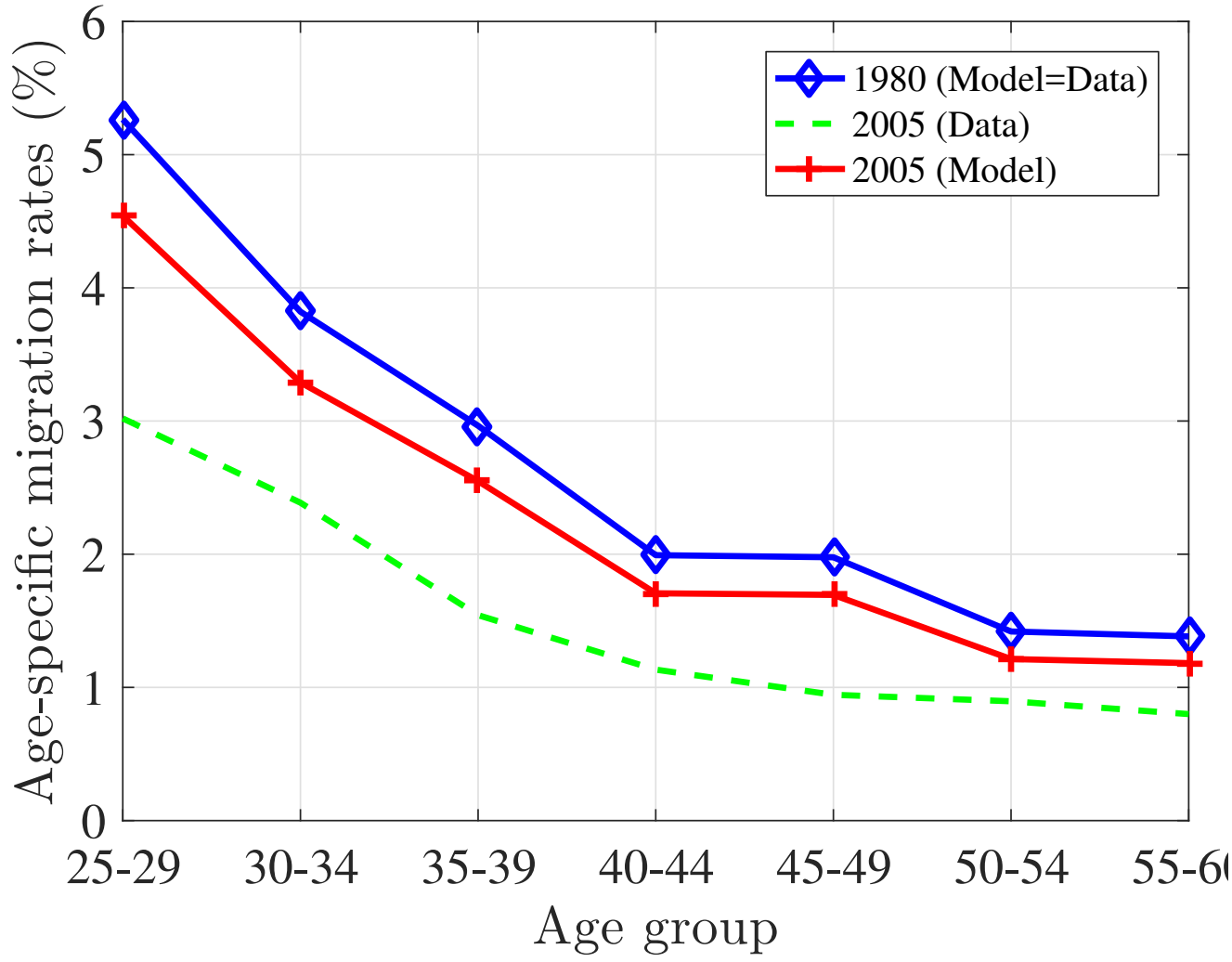
- Stronger effects for cognitive occupations as well as nonroutine.

AGING POPULATION AND THE DECLINE IN MIGRATION: DATA VS. MODEL



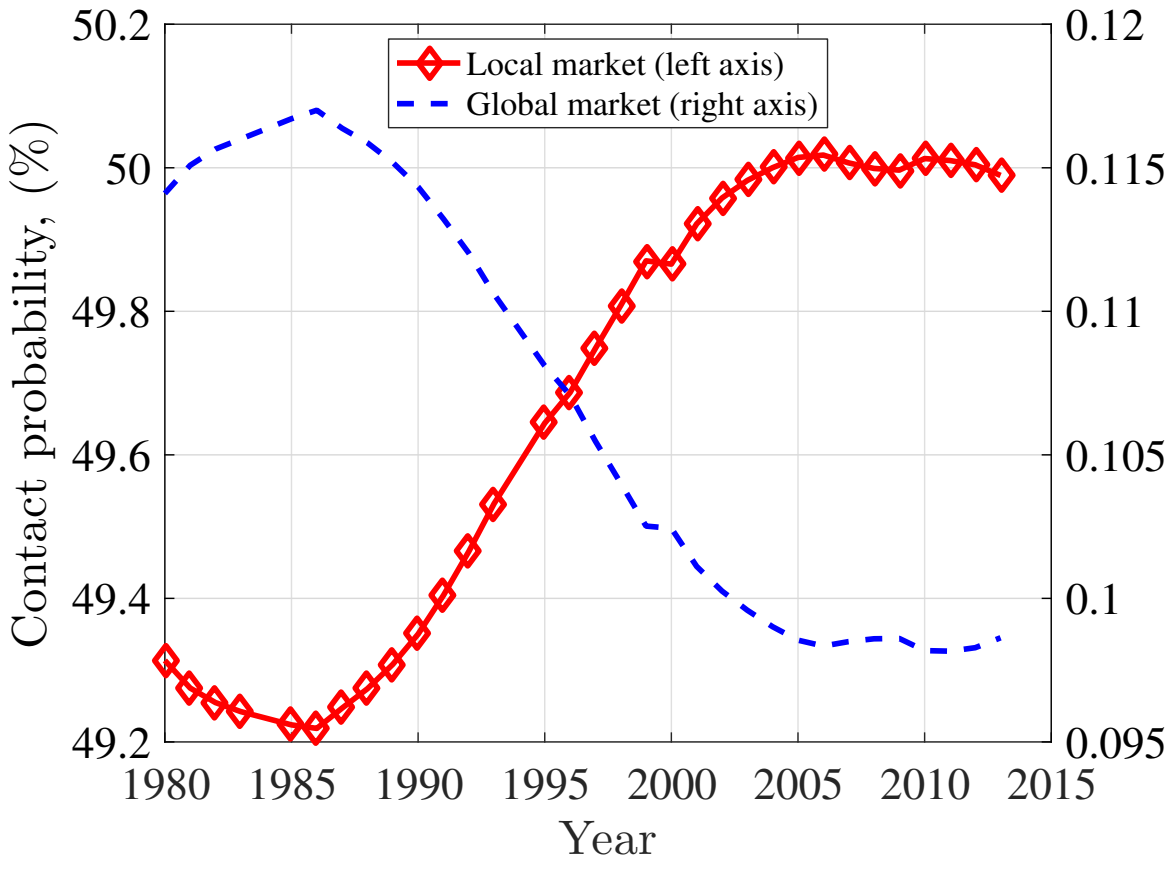
- Model explains most of the decline until early 2000s.

IMPORTANCE OF SPILLOVERS IN EXPLAINING THE FALL IN MIGRATION



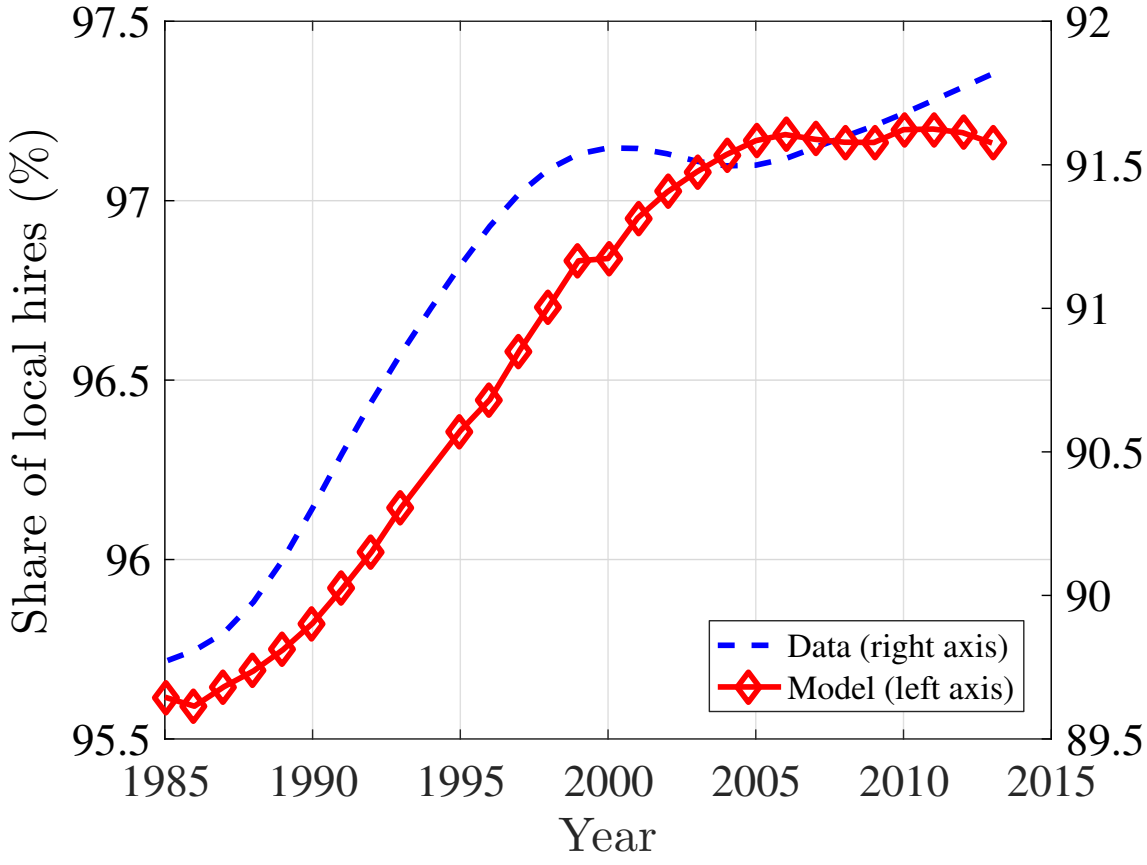
- Model explains about 30% of the within-group decline.

LOCAL AND GLOBAL CONTACT RATES



SHARE OF HIRES FROM OTHER LOCATION

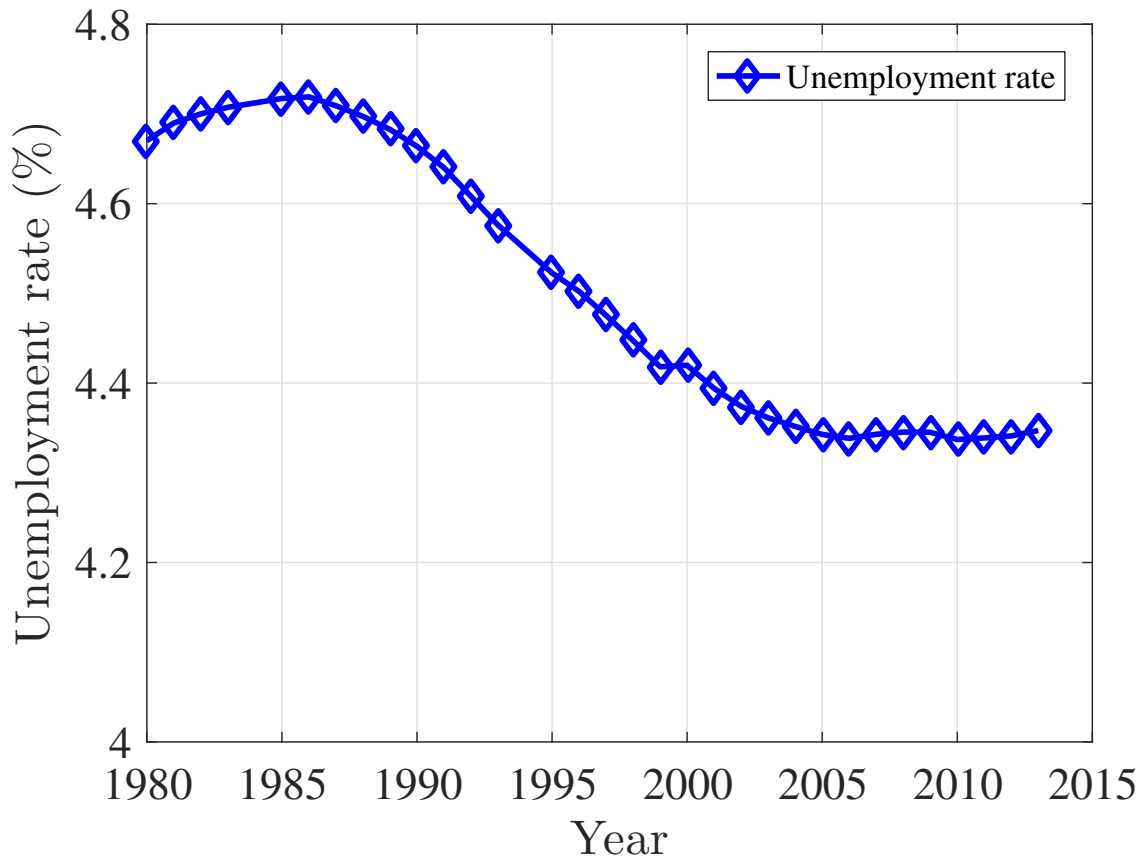
- Theory also predicts that share of distant hires should decline with population aging.
  - Qualitatively consistent until early 2000s.



LOWER MOBILITY AND UNEMPLOYMENT

- What does the model imply about the aggregate unemployment rate?
- Aggregate unemployment is essentially unchanged.
- Lower mobility is a reflection of
  1. Workers finding local jobs at a faster pace.
  2. Workers finding global jobs at a lower pace.

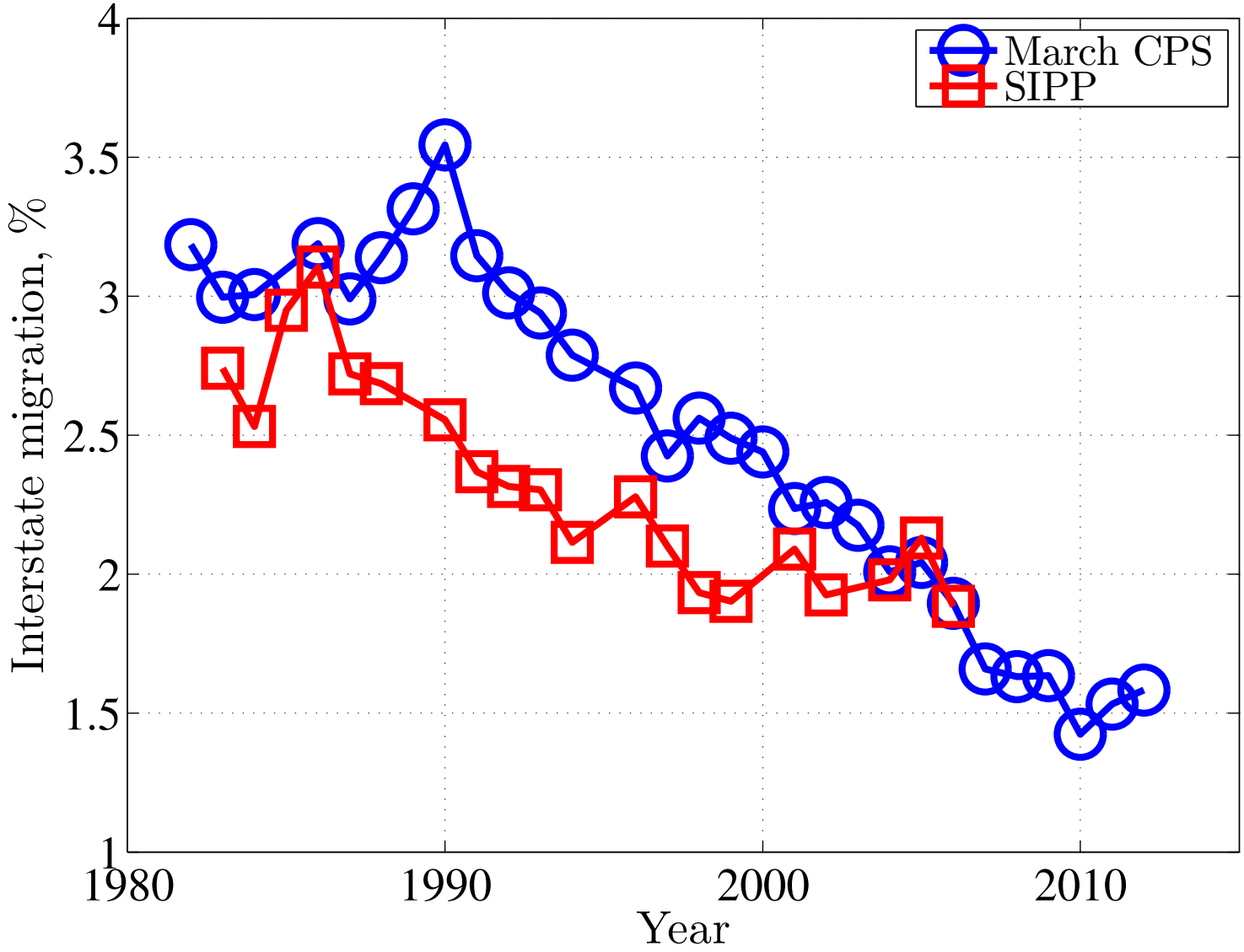
AGGREGATE UNEMPLOYMENT



CONCLUSIONS

- We have studied the effects of population aging on interstate migration.
  - Accounting for equilibrium effects is important.
  - Despite a large fall in migration, unemployment does not move.
- The mechanism has potential applications for other questions regarding migration.
  - Homeownership-related frictions may affect renters' migration.

Migration in SIPP data



Back