Using Spatial Models to Reconcile Findings Connecting Migration and Income

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Background

- Associations between migration and income
- Negative effects on income
  - Boustan et al. (2008)
  - Blanchard and Katz (1992)
  - Borjas (2003, 2016)
- No significant effects on income
  - Altonji & Card (1991)
  - Cortés (2008)
  - Card (2001)
  - Monras (2020)
- Positive effects on income
  - Ottaviano and Peri (2012)
  - Peri and Sparber (2009)

Objective and Questions

- Examine associations of internal migration and income
  - Smaller geographical levels
  - Considering neighboring areas
  - More recent data

- How is internal migration associated with income?
  - Does a higher proportion of working-age and US-born internal migrants affect the income of their non-migrant counterparts in the destination area?

  - Does a higher proportion of low-educated and US-born low-educated internal migrants affect the income of their non-migrant counterparts in the destination area?

Data and Methods

Data

- 2016-2021 American Community Survey
- 2016-2021 Cost of Living Index from the Council for Community and Economic Research

Population

- PUMA level (N=2,351)
- Working-age and US-born working-age populations
- Low-educated and US-born low-educated working-age populations

**People with 16-64 years of age

**Low-educated population refers to population with up to high school degree.

Variables

Population	Dependent Variables	Independent Variables
Working-age population	• Log of average income among ○ Non-migrant working-age population ○ U.S.-born non-migrant working-age population	• Cost of living index • Proportion of internal migrants • Proportions of non-migrants ○ College degree ○ Married ○ Non-Hispanic White ○ 25–54 years of age (prime group)
Low-educated working-age population	• Log of average income of low-educated among ○ Non-migrant working-age population ○ U.S.-born non-migrant working-age population	• Cost of living index • Proportion of low-educated internal migrants • Proportions of low-educated non-migrants ○ Non-Hispanic White ○ Married ○ 25–54 years of age (prime group)

Variables	All Working-Age Population				Low-Educated Working-Age Population			
	2016		2021		2016		2021	
	Mean	Std.Dev.	Mean	Std. Dev.	Mean	Std.Dev.	Mean	Std.Dev.
Income	35,316.72	13,867.88	41,976.09	16,376.29	20,170.83	4,509.56	23,232.32	5,065.26
Cost of living	111.73	23.30	112.24	23.72	111.73	23.30	112.24	23.72
	%		%		%		%	
Internal migration	6.03	3.06	6.19	3.37	5.70	3.93	5.75	4.32
College+	27.52	14.0	30.96	14.48	—	—	—	—
NH White	61.32	25.68	57.48	25.24	56.0	28.0	51.51	26.94
Married	47.81	9.02	47.77	8.85	39.78	8.0	38.66	7.71
Prime working-age	61.33	4.38	61.35	4.44	53.64	6.32	51.88	6.57
# PUMAS		2,351		2,351		2,351		2,351

Notes: The sample size includes only non-migrant low-educated respondents between 16-64 years. All variables are expressed at the PUMA level.
Source: 2016-2021 American Community Survey and 2016-2021 Cost of Living Index.

Methods

- Spatial Durbin Error Model (SDEM)
  - Local spillovers
  - Spatial lags of the independent variables and error
  - Main specification (subject to the subset of the population*):

$$y = X\beta + W\,X\gamma + u$$

$$u = \lambda W\,u + \varepsilon$$

- Ordinary Least Squares (OLS)
  - Robust standard errors
  - Main specification (subject to the subset of the population*):

$$y = X\beta + u$$

*Subsets of the population: All / US-born working-age population/ Low-educated / Low-educated US-born working-age population

OLS and Spatial Models: All Working-age Population

Year	Dependent Variable: Log of averageincome for non-migrants				Dependent Variable: Log of average income for non-migrants (only US-born)			
	OLS	Spatial Durbin Error Model			OLS	Spatial Durbin Error Model		
		Direct	Indirect	Total		Direct	Indirect	Total
2016	-0.39***	-0.27***	-0.18	-0.45*	-0.35***	-0.23**	-0.18	-0.41
2017	-0.39***	-0.28***	-0.02	-0.30	-0.37***	-0.28***	0.08	-0.20
2018	-0.40***	-0.38***	0.04	-0.34	-0.33***	-0.33***	0.10	-0.23
2019	-0.30***	-0.26***	-0.15	-0.40*	-0.23**	-0.18**	-0.03	-0.21
2021	-0.27***	-0.31***	0.21	-0.10	-0.29***	-0.33***	0.23	-0.10

Notes: The coefficients in these table are for the key independent variable: proportion of internal migration. These model specification include all controls: cost of living, race, education, marital status, and age. ***Significant at p<0.01, **Significant at p<0.05, *Significant at p<0.1.
Source: 2016-2021 American Community Survey.

OLS and Spatial Models: Low-educated Working-age Population

	DV: Log of income for non-migrant low-educated				DV: Log of income for low-educated (only US-born non-migrant)			
		Spatial Durbin Error Model				Spatial Durbin Error Model		
Year	OLS	Direct	Indirect	Total	OLS	Direct	Indirect	Total
2016	-0.48***	-0.32***	0.42	0.10	-0.48***	-0.34**	0.53*	0.19
2017	-0.35***	-0.15	0.07	-0.08	-0.22*	-0.09	0.24	0.15
2018	-0.44***	-0.31***	0.36	0.05	-0.33**	-0.25**	0.49*	0.25
2019	-0.31***	-0.16*	0.49**	0.33	-0.26*	-0.18*	0.53**	0.36
2021	-0.15	-0.11	0.65***	0.54**	-0.11	-0.09	0.64***	0.54*

Notes: The coefficients in these table are for the key independent variable: proportion of internal migration. These model specification include all controls: cost of living, race, marital status, and age. ***Significant at p<0.01, **Significant at p<0.05, *Significant at p<0.1.
Source: 2016-2021 American Community Survey

Accuracy of model predictability

Independent variable	All working-age population		Low-educated working-age population	
	Pearson's *r*	Coefficient of determination (r^2)	Pearson's *r*	Coefficient of determination (r^2)
Predicted income (OLS)	0.9300***	0.8649	0.5147***	0.2649
Predicted income (SDEM)	0.9322***	0.8689	0.5335***	0.2846
Predicted income, US-born only (OLS)	0.9297***	0.8643	0.4960***	0.2460
Predicted income, US-born only (SDEM)	0.9314***	0.8675	0.5114***	0.2615

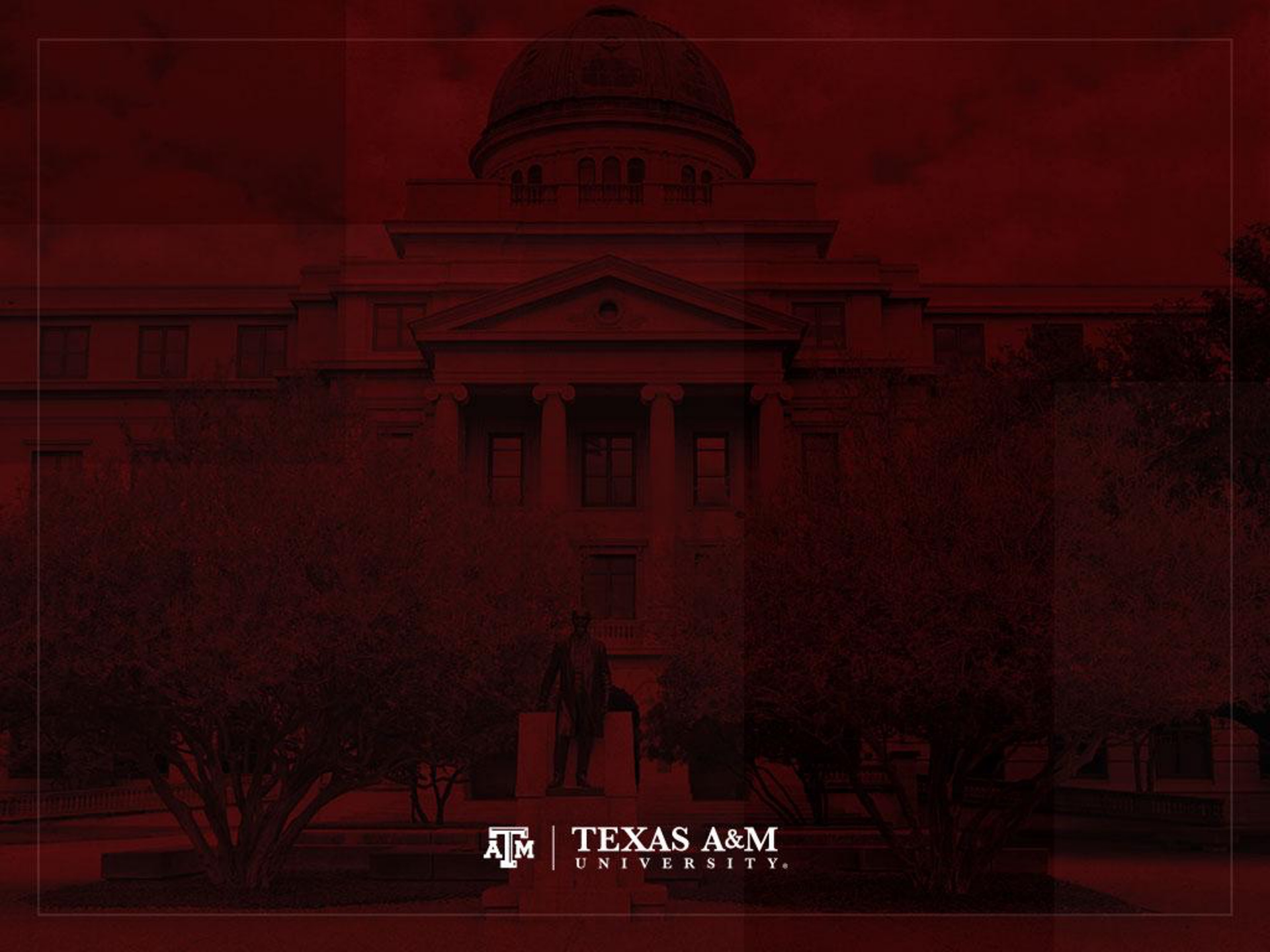
Source: 2021 American Community Survey

Final considerations

- Associations of internal migration with income: reconcilation of two different frameworks
  - **Negative** direct associations
  - **Positive** indirect associations
  - More pronounced among low-educated population
- Importance of methodology
  - The comparison between OLS and spatial models highlights the complexity of the relationship between internal migration and income
  - Space is an essential component of the association between internal migration and income

Next Steps

- Expand analysis to county level with restricted data
- Explore associations of income/employment and migration for other population subsets and specific areas
  - Highly-educated migrants
  - Hispanics in new destinations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