Should They Stay or Should They Go? Immigration and Municipal Bonds

Kyle Zimmerschied

University of Missouri

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Motivating Example: Springfield, Ohio

"The arrival of Joseph, Oreus and as many as 15,000 other immigrants from Haiti over roughly the last three years has reshaped this city of 58,000, offering some promise of economic revival along with growing pains... Enrollment in Medicaid and federal food assistance and welfare programs surged...[But] "We needed a workforce"... said Amy Donahoe, director of workforce development with the Greater Springfield Partnership. "They are coming in and they are working hard and they want to make money."

— Reuters (2024)

Springfield, Ohio Population | Aging Demographics | Record Immigration

Local Impacts of Immigration?

- Immigrants place a greater strain on local public resources
  - Immigrants are more likely to receive government assistance than native residents (Borjas, 1999; Watson, 2023)
- Immigrants promote economic growth
  - Increase in labor supply and fostering new business creation (Bernstein *et al.*, 2022; Burchardi *et al.*, 2020)
  - Small adverse effects on native wages (Cortes, 2008)
- This Paper: Studies the impact of immigration on local governments' access to finance to examine this trade-off

Why the Municipal Bond Market?

- Empirical Challenge: How to measure financial impacts of immigration on local government?
  - "Investor demand for municipal bonds reflects the markets' expectations about future financial risks to local economies" (Gustafson *et al.*, 2023)
- Directional Effects:
  - Increased Demand: A decline in yields implies immigrant inflows represent a net asset to the local government
  - Reduced Demand: An increase in yields implies immigrant inflows represent a net liability to the local government
- Importance: County governments use municipal bonds to fund long-term investments
  - \$200 billion issued in 1990 $\rightarrow$ \$800 billion in 2020
  - Main uses include education, utilities, and housing

Contribution

1. Effects of immigration on the local government's access to finance
   - Complement literature on municipal access to finance and risks
     - Climate change (Painter, 2020; Goldsmith-Pinkham *et al.*, 2023)
     - Demographic factors (Butler & Yi, 2022; Gustafson *et al.*, 2023)
2. Effects of immigration on public finance
   - Complement literature on effects of immigration
     - Local labor market (Peri, 2012; Card, 2001)
     - Productivity (Bernstein *et al.*, 2022; Burchardi *et al.*, 2020; Peri, 2012; Piyapromdee, 2021)
     - Foreign investment (Cohen *et al.*, 2017; Burchardi *et al.*, 2019)

Data Sources and Sample

1. Bond Issue Level: Data on bond features at the county $\times$ issue level from Refinitiv SDC Platinum
   - 42,637 bond issues from 1985 to 2010
   - Keep the bond with the longest maturity
   - Keep bonds at five year endpoints to align with immigration data
2. County Level:
   - Decennial Census: Population, demographic, and immigration data
   - U.S. Censuses of state and local government: Income statement and balance sheet data (Pierson *et al.*, 2015)
   - Quarterly Census of Employment and Wages: Establishment, employment, and wage data
   - County Business Pattern Files: Data on employment composition (Eckert *et al.*, 2020)

Bond Sample and Census Data

Spread

	N	Mean	SD	p25	Median	p75
Panel A: Bond Characteristics						
Yield Spread (%)	42637	2.33	1.41	1.36	2.14	3.08
Issue Amount ($ M)	42637	21.22	55.58	2.21	5.90	16.00
Panel B: County Census Characteristics						
Total Immigration	6302	3.82	21.09	0.11	0.33	1.48
Non-European Immigration	6302	3.39	19.50	0.09	0.27	1.23
Total Population (000,000's)	6302	1.79	4.32	0.32	0.66	1.60
Population Change (000's)	6302	10.05	32.26	0.13	1.97	8.70
% Ages 18-65	6302	0.61	0.04	0.58	0.61	0.63
% Labor-Intensive	6302	0.71	0.08	0.66	0.72	0.77
Panel C: County Census Wages						
	N	Mean	SD	p25	Median	p75
Establishment Count (000's)	6302	4.80	12.68	0.76	1.61	4.15
Number of Employees (000's)	6302	81.14	205.81	10.58	24.59	66.92
Average Annual Pay (000's)	6302	34.74	6.96	30.07	33.46	37.93
Panel D: County Financial Characteristics ($ Millions)						
Total Revenue	6302	174.06	632.44	15.67	39.93	121.18
Total Expenses	6302	171.93	590.35	15.79	40.44	120.00
Total Debt	6302	139.75	467.55	1.95	14.63	78.41
Financial Assets	6302	354.94	1,395.68	18.15	57.16	214.31
Leverage ($\frac{Debt}{\text{Fin. Assets}}$)	6252	0.36	0.41	0.08	0.27	0.48

Empirical Concerns

$$\text{Yield Spread}_{i,c,t} = \beta_0 + \beta_1 \textit{Immigration}_{c,[t-5,t]} + \tau' \times \text{Bond Controls}_{i,t} + \rho' \times \text{County Controls}_{c,t-5} + \delta_t + \gamma_c + \epsilon_{i,c,t} \quad (1)$$

1. Immigrants *choose* where they settle based on changing time-varying conditions leading to reverse causality
2. Industry shocks bias estimates when a given county has a concentrated sector of employment and immigrant composition

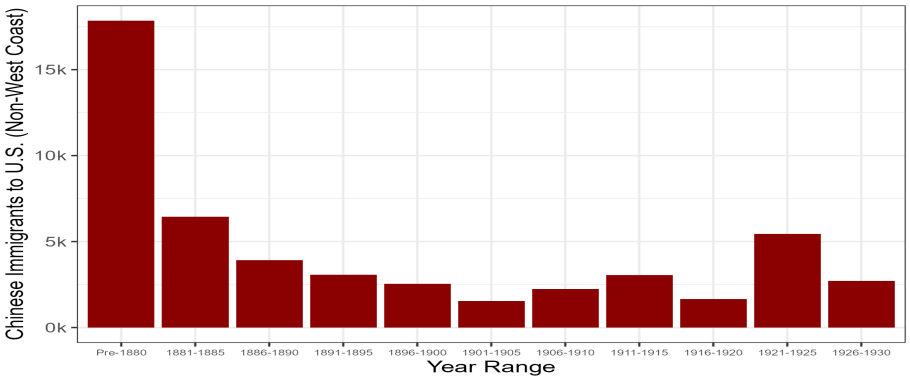
Identification Approaches

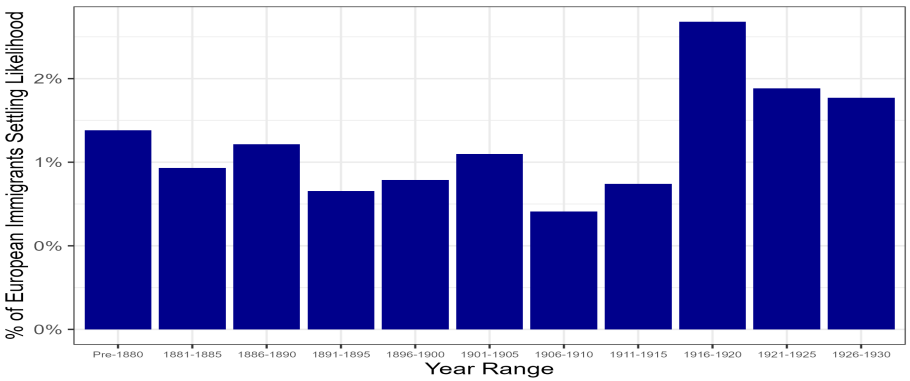
1. Instrumental Variables Approach: Use the fact that immigrants are drawn to settle where their ethnic peers have previously settled
   - Exogenous variation stems from the historical migration and settlement patterns of previous ancestors
2. Event Study Approach: Use the staggered roll-out of the Secure Communities Act
   - Significantly increased the number of deportations and deterred incoming immigrants from settling in a given county

- Average treatment effects providing understanding of effects from inflows and outflows of immigrants

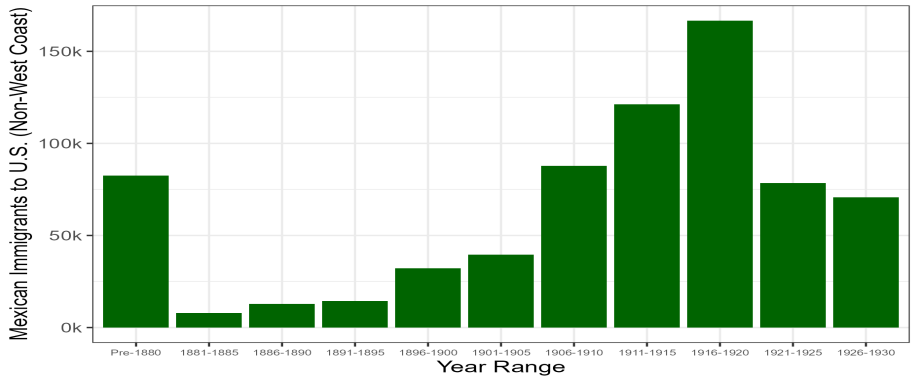
Intuition of IV: A Tale of Two Counties

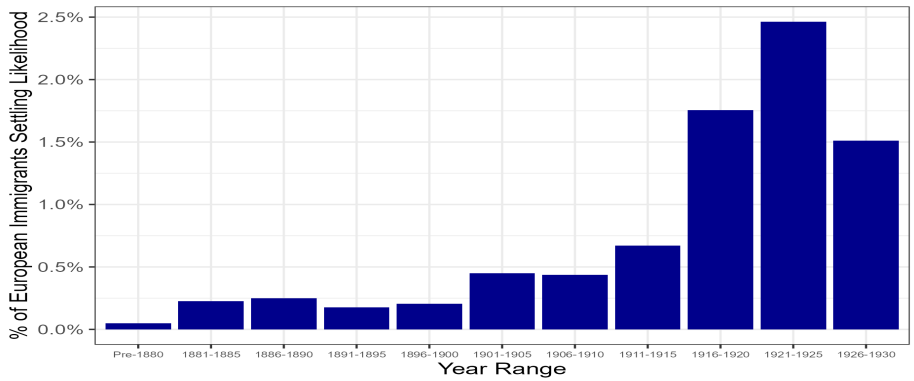
1980: San Francisco 20% Chinese Ancestry





1980: Los Angeles 30% Mexican Ancestry





- Intuition: Variation in county ancestry composition provide heterogeneous exposure to subsequent immigrant inflows

Roadmap of Instrumental Variables Identification

- Intuition of Identification: Create quasi-random variation in modern-day, county ancestry based on historical migration and settlement patterns

1. Visual example of identifying variation stemming from interaction of:
   - *Push:* Immigrants leave their home countries at varying times and magnitudes GIF
   - *Pull:* Counties vary in their desirability to immigrants over time GIF
2. Identifying assumptions Assumptions
   - Relevance condition: First-stage F-statistics above 200
   - Exclusion restriction: Use rigorous leave-out information approach
3. Design built around:
   1. Predicting quasi-random variation in ancestry in a given county Example
   2. Using predicted ancestry to proxy for exposure to subsequent immigrants Example

Instrumental Variables Equation

- First-Stage Equation:

$$\Delta Immigration_{c,[t-5,t]} = \beta_0 + \beta_1 \widehat{Immigration}_{c,[t-5,t]} + \tau' \times \text{Bond Controls}_{i,t} + \rho' \times \text{County Controls}_{c,t-5} + \delta_t + \gamma_c + \epsilon_{i,c,t} \quad (2)$$

- Second Stage Equation:

$$\text{Yield Spread}_{i,c,t} = \beta_0 + \beta_1 \widehat{Immigration}_{c,[t-5,t]} + \tau' \times \text{Bond Controls}_{i,t} + \rho' \times \text{County Controls}_{c,t-5} + \delta_t + \gamma_c + \epsilon_{i,c,t} \quad (3)$$

Immigration Lowers Municipal Bond Yields

$$\text{Yield Spread}_{i,c,t} = \beta_0 + \beta_1 \widehat{Immigration}_{c,[t-5,t]} + \tau' \times \text{Bond Controls}_{i,t} + \rho' \times \text{County Controls}_{c,t-5} + \delta_t + \gamma_c + \epsilon_{i,c,t}$$

	Yield Spread				
	(1)	(2)	(3)	(4)	(5)
Non-European Immigration	-0.090***	-0.054***	-0.140**	-0.140***	-0.288**
	[0.010]	[0.011]	[0.053]	[0.031]	[0.116]
F-Statistic	2820.04	2981.95	205.19	204.97	434.11
Observations	42636	42636	42636	42636	42396
State F.E.	Yes	Yes	Yes	Yes	No
County F.E.	No	No	No	No	Yes
Year F.E.	Yes	Yes	Yes	Yes	Yes
Bond Controls	No	Yes	No	Yes	Yes
County Controls	No	No	Yes	Yes	Yes

- A $1\sigma \uparrow$ in immigration ($\approx$ 20,000) leads to about a 6 basis point decline in an issuing county's yield spread
- Economic Magnitude: Saving in interest payments of $\approx$ \$200,000 over the lifetime of the average bond issuance

Heterogeneous County Effects

$$\text{Yield Spread}_{i,c,t} = \beta_0 + \beta_1 \widehat{Immigration}_{c,[t-5,t]} + \beta_2 \widehat{Immigration}_{c,[t-5,t]} \times CountyChar_{c,t-5} + \tau' \times \text{Bond Controls}_{i,t} + \rho' \times \text{County Controls}_{c,t-5} + \delta_t + \gamma_c + \epsilon_{i,c,t}$$

	Yield Spread			
	(1)	(2)	(3)	(4)
Immigration	-0.166***	-0.132***	-0.476***	-0.137***
	[0.046]	[0.040]	[0.097]	[0.040]
Immigration × I(Distance to Border)	-0.328***			
	[0.089]			
Immigration × I(Net Income Margin)		-0.059**		
		[0.024]		
Immigration × I(% Working Age Population)			0.328***	
			[0.063]	
Immigration × I(% Labor-Intensive Employees)				0.015
				[0.035]
F-Statistic	74.38	105.89	64.82	560.90
Observations	42637	42637	42637	42637
State & Year F.E.	Yes	Yes	Yes	Yes
County & Bond Controls	Yes	Yes	Yes	Yes

Heterogeneous Immigrant Effects

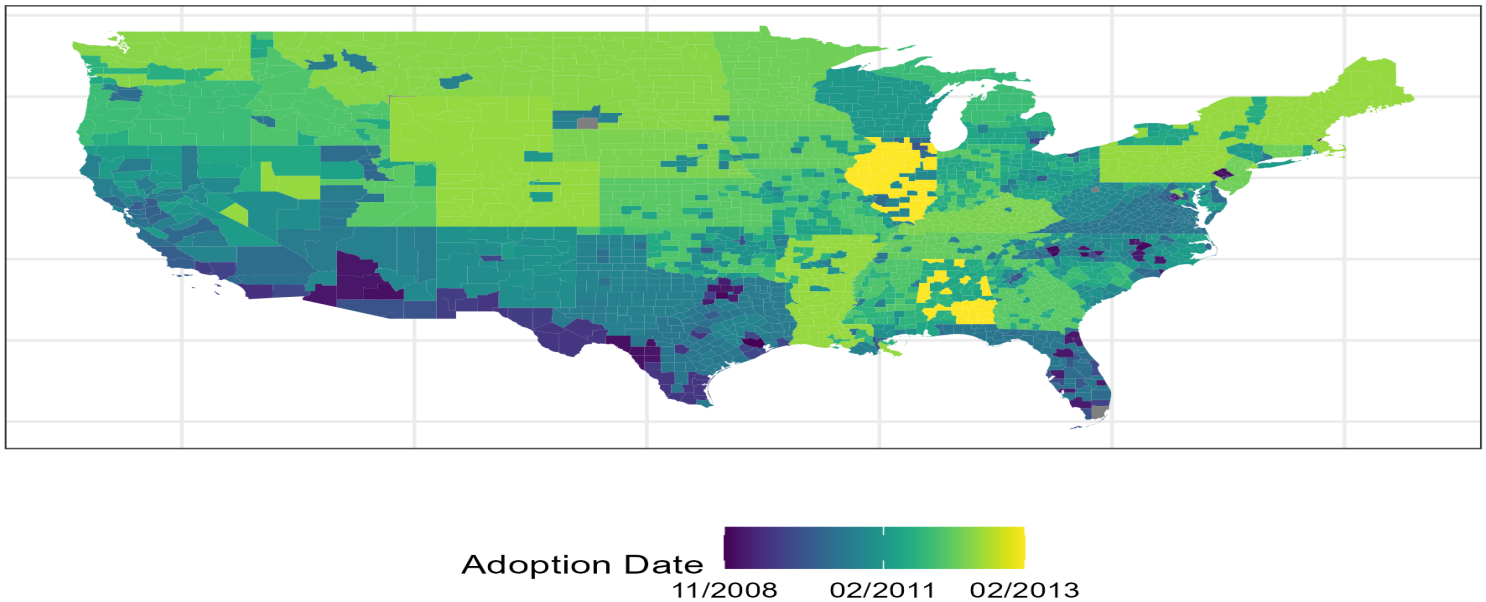
Immigrant Region

$$\text{Yield Spread}_{i,c,t} = \beta_0 + \beta_1 \widehat{Immigration}_{c,[t-5,t]} + \beta_2 \widehat{ImmigrantEduc}_{c,[t-5,t]}$$
$$+\beta_3 \widehat{Immigration}_{c,[t-5,t]} \times \widehat{ImmigrantEduc}_{c,[t-5,t]} + \tau' \times \text{Bond Controls}_{i,t}$$
$$+\rho' \times \text{County Controls}_{c,t-5} + \delta_t + \gamma_c + \epsilon_{i,c,t}$$

	Yield Spread				
	(1)	(2)	(3)	(4)	(5)
Immigrants over 25	-0.228***	-0.516***	-0.865***	-0.767***	-0.839***
	[0.069]	[0.166]	[0.250]	[0.126]	[0.261]
Immigrants over 25 × Years School			-0.284***	-0.103*	
			[0.092]	[0.059]	
Immigrants over 25 × Years College					-0.711***
					[0.244]
F-Statistic	> 200	> 200	33.83	53.62	30.35
Observations	42367	42136	42367	42136	42367
State F.E.	Yes	No	Yes	No	No
County F.E.	No	Yes	No	Yes	Yes
Year F.E.	Yes	Yes	Yes	Yes	Yes
Bond Controls	Yes	Yes	Yes	Yes	Yes
County Controls	Yes	Yes	Yes	Yes	Yes

Secure Communities Act

- Secure Communities Act created to increase immigration enforcement
- The program was rolled out from 2008 to 2013 based on a county's distance to the U.S. Mexico border and the county's hispanic population (East *et al.*, 2023)



Secure Communities Act Effect

Parallel Trends

$$\text{Yield Spread}_{i,c,t} = \beta_0 + \beta_1 SCTreat_{i,c} \times Post_t + \tau' \times \text{Bond Controls}_{i,t} + \rho' \times \text{County Controls}_{c,t} + \delta_t + \gamma_c + \epsilon_{i,c,t}$$

	Yield Spread					
	(1)	(2)	(3)	(4)	(5)	(6)
Secure Communities Act	0.074*	0.112***	0.083**	0.063*	0.086**	0.061*
	[0.039]	[0.034]	[0.033]	[0.035]	[0.035]	[0.033]
Observations	182804	182794	182794	182637	182627	182627
State F.E.	Yes	Yes	Yes	No	No	No
County F.E.	No	No	No	Yes	Yes	Yes
Month × Year F.E.	Yes	Yes	Yes	Yes	Yes	Yes
Bond Controls	No	Yes	Yes	No	Yes	Yes
County Controls	No	No	Yes	No	No	Yes
Y-mean	2.24	2.24	2.24	2.24	2.24	2.24

- Reducing the flow and stock of immigrants increases the cost of borrowing for local communities

Potential Mechanisms of Reduced Bond Yields

Migration

1. Spillovers to Local Labor Market: Immigrant inflows stimulate local labor markets and expand production capacity of local economy
2. Economies of Scale: Immigration improves a county's operating margin as revenue growth outpaces expense growth
3. Reduced Leverage: Municipalities have reduced short-term constraints which reduces the need for debt and reduces their cost of capital
4. Collateral Channel: Counties use revenues from additional immigrant inflows to fund capital expenses to take on more debt and better debt

- Use Census data on county labor markets and county government financials to provide evidence

Effects on Local Labor Market

	Log(Establishments)	Log(Employment)	Log(Total Wages)	Log($\overline{Wages}$)
	(1)	(2)	(3)	(4)
Immigration	0.169**	0.272***	0.285***	0.013
	[0.064]	[0.083]	[0.082]	[0.009]
F-Statistic	257.07	257.07	257.07	257.07
Observations	6313	6313	6313	6313
County F.E.	Yes	Yes	Yes	Yes
Year F.E.	Yes	Yes	Yes	Yes
County Controls	Yes	Yes	Yes	Yes

- A $1\sigma \uparrow$ in immigration ($\approx$ 20,000) leads to:
  1. 3 percent increase in the number of establishments
  2. 5 percent increase in employment and total wages
  3. 1 percent increase in average wages

Effects on Financial Margins & Leverage

	Log(Total Revenues)	Log(Total Expenses)	Net Margin	Log(Total Debt)	Log(Fin. Assets)	Debt/ Fin. Assets
	(1)	(2)	(3)	(4)	(5)	(6)
Immigration	0.200*** [0.068]	0.248*** [0.095]	-0.046 [0.036]	0.443*** [0.160]	0.215* [0.126]	0.129 [0.092]
F-Statistic	257.88	257.88	257.88	265.09	258.03	258.03
Observations	6302	6302	6302	5347	6237	6237
County F.E.	Yes	Yes	Yes	Yes	Yes	Yes
Year F.E.	Yes	Yes	Yes	Yes	Yes	Yes
County Controls	Yes	Yes	Yes	Yes	Yes	Yes

- A $1\sigma \uparrow$ in immigration ($\approx$ 20,000) leads to:
  1. 3.9 percent increase in total revenues
  2. 4.8 percent increase in expenses
  3. 8.9 percent increase in debt
  4. 4.3 percent increase in financial assets

Decomposing Effects on Revenues

	Log(Taxes)			Log(General)	Log(Intergov. Transfers)			
	Total	Property	Sales & Rec	General	Total	Fed	State	Local
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Immigration	0.230*	0.264*	0.085	0.275**	0.261***	0.613***	0.150*	0.496**
	[0.133]	[0.153]	[0.145]	[0.129]	[0.070]	[0.176]	[0.078]	[0.232]
F-Statistic	258.07	258.14	312.00	258.08	258.06	280.66	258.06	277.70
Observations	6280	6272	4136	6258	6265	4592	6263	4314
County F.E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year F.E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
County Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

- Revenue growth driven by an increase in property taxes and intergovernmental transfers

Decomposing Effects on Expenses

	Panel B: IV: Effect of Immigration on Expenses						
	Log(Infrastructure)		Log(Public Goods Expenses)				
	Capital	Roads	Parks	Judicial	Health	Police	Welfare
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Immigration	0.593*	0.294**	0.115	0.313***	0.118	0.218**	0.283
	[0.300]	[0.138]	[0.192]	[0.115]	[0.120]	[0.097]	[0.172]
F-Statistic	259.82	262.59	270.32	258.12	261.09	259.23	290.61
Observations	5946	5831	4631	6186	5998	6194	5438
County & Year F.E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes
County Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes

- Expense growth driven by an increase in physical infrastructure spending
- Smaller sensitivity on public goods expenses

Conclusion

- This Paper: Studies effects on local communities access to finance
- Increasing immigration benefits local communities through reduced borrowing costs and increased access to credit
- Stronger effects for communities:
  1. Further away from the border
  2. Counties with financial slack
  3. Higher likelihood of labor shortages
- Mechanism: Effects driven by:
  1. Increased business establishment and business growth
  2. Increased collateral to take on more debt and better debt

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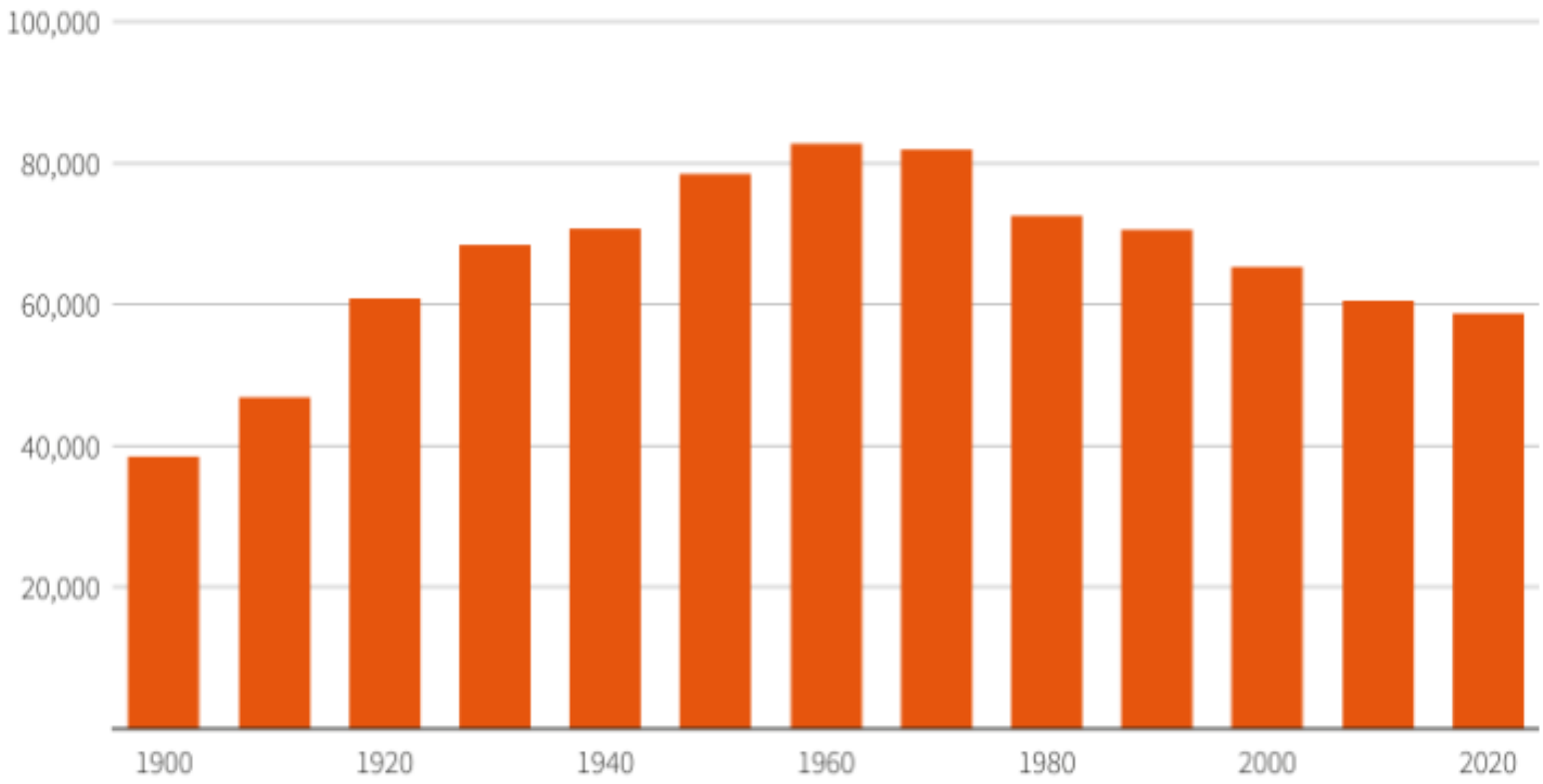
Springfield, Ohio Population



Source: U.S. Census Bureau

Reuters Graphics

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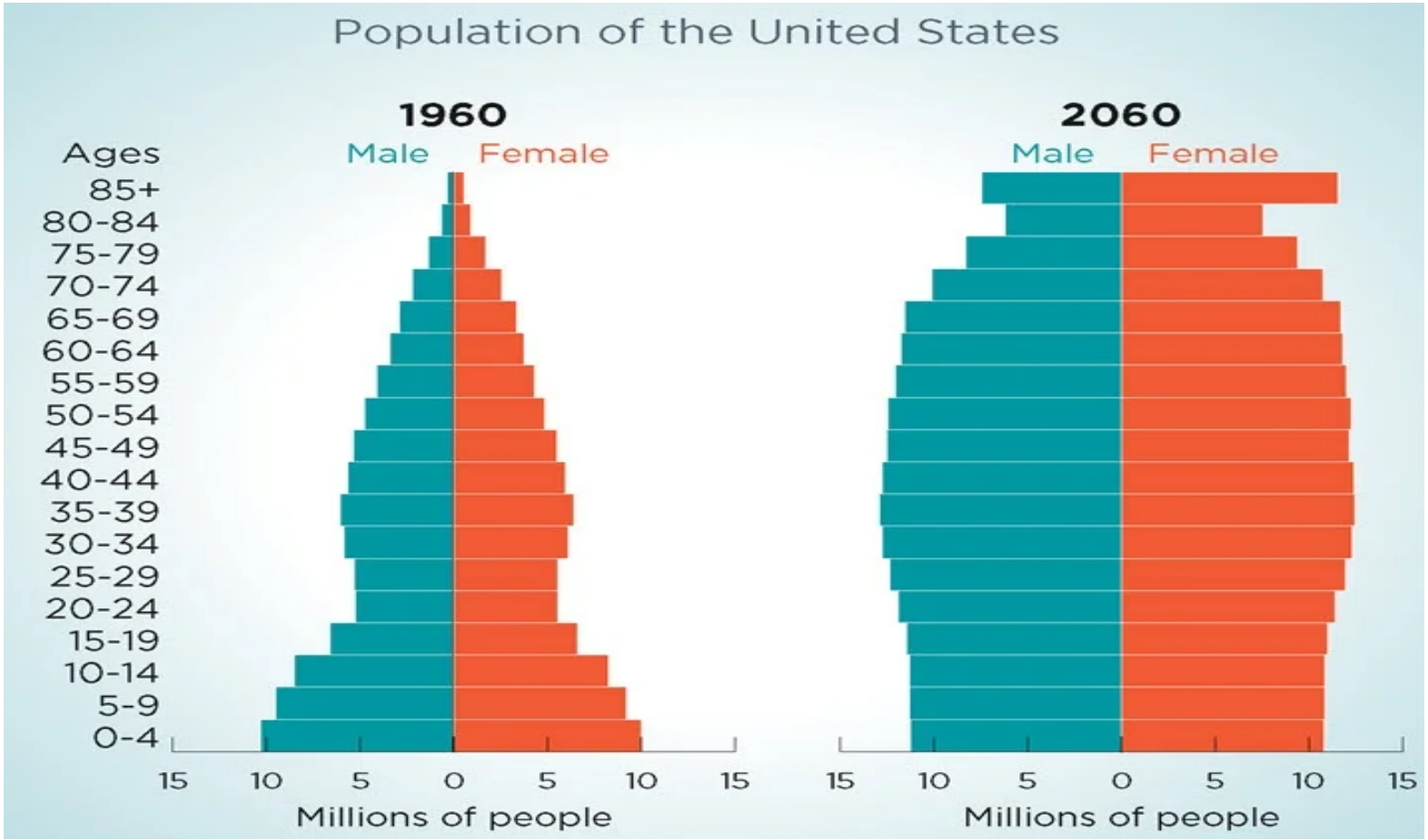
Aging U.S. Demographics



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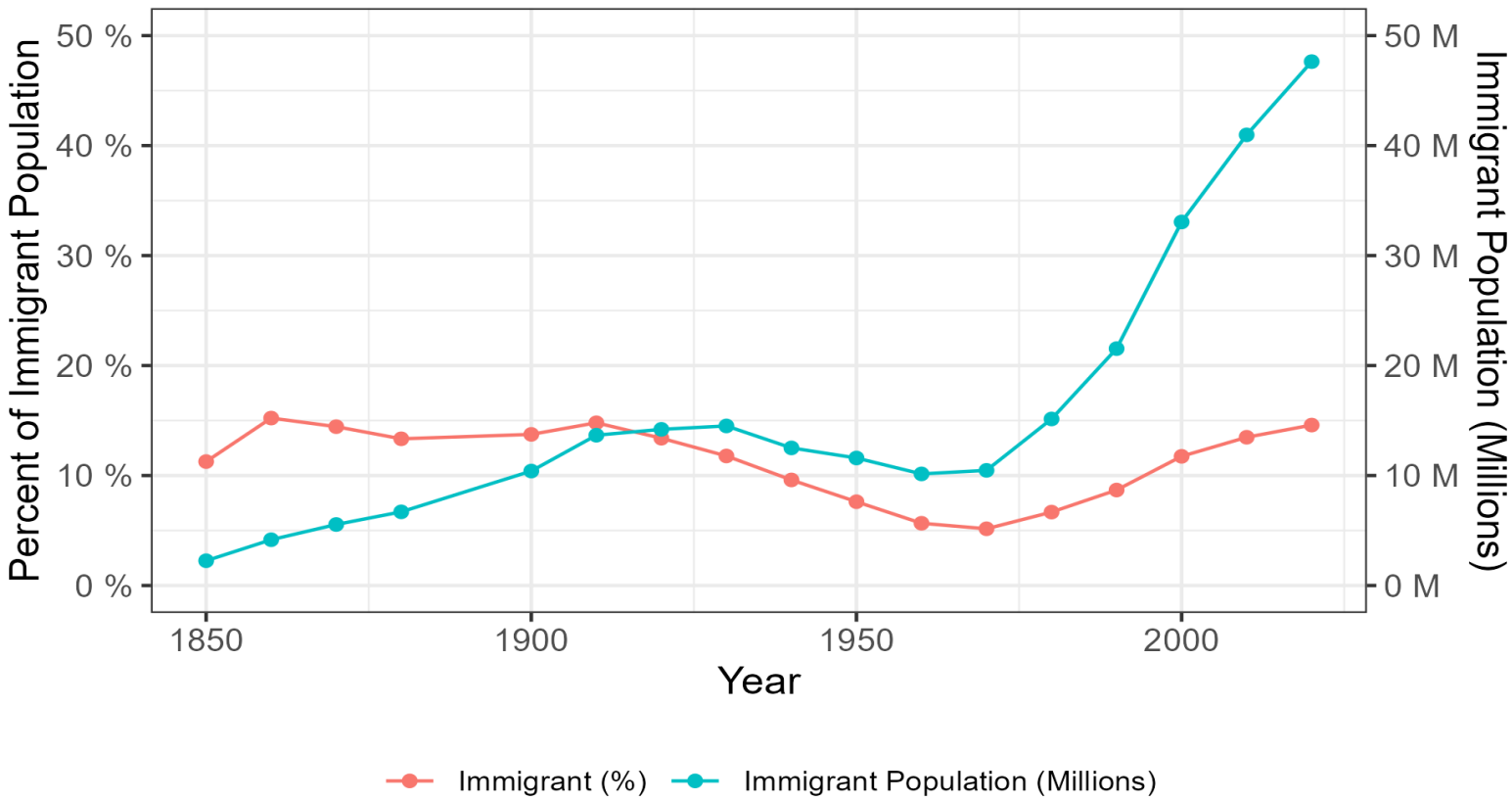
Increasing U.S. Immigration



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Creating Bond Yield Spread

$$\text{Yield Spread}_{i,c,t} = \frac{Yield_{i,c,t}}{(1-\tau_{c,t})} - r^{f}_{m,t} \tag{4}$$

- i: bond issue; c: county; t: year
- $\tau_{c,t} = \tau_t^{Federal} + \tau_{c,t}^{State} \times 1[Exemption^{State}]_{c,t}$: tax-exemption
- $r^{f}_{m,t}$: yield of maturity-matched treasury

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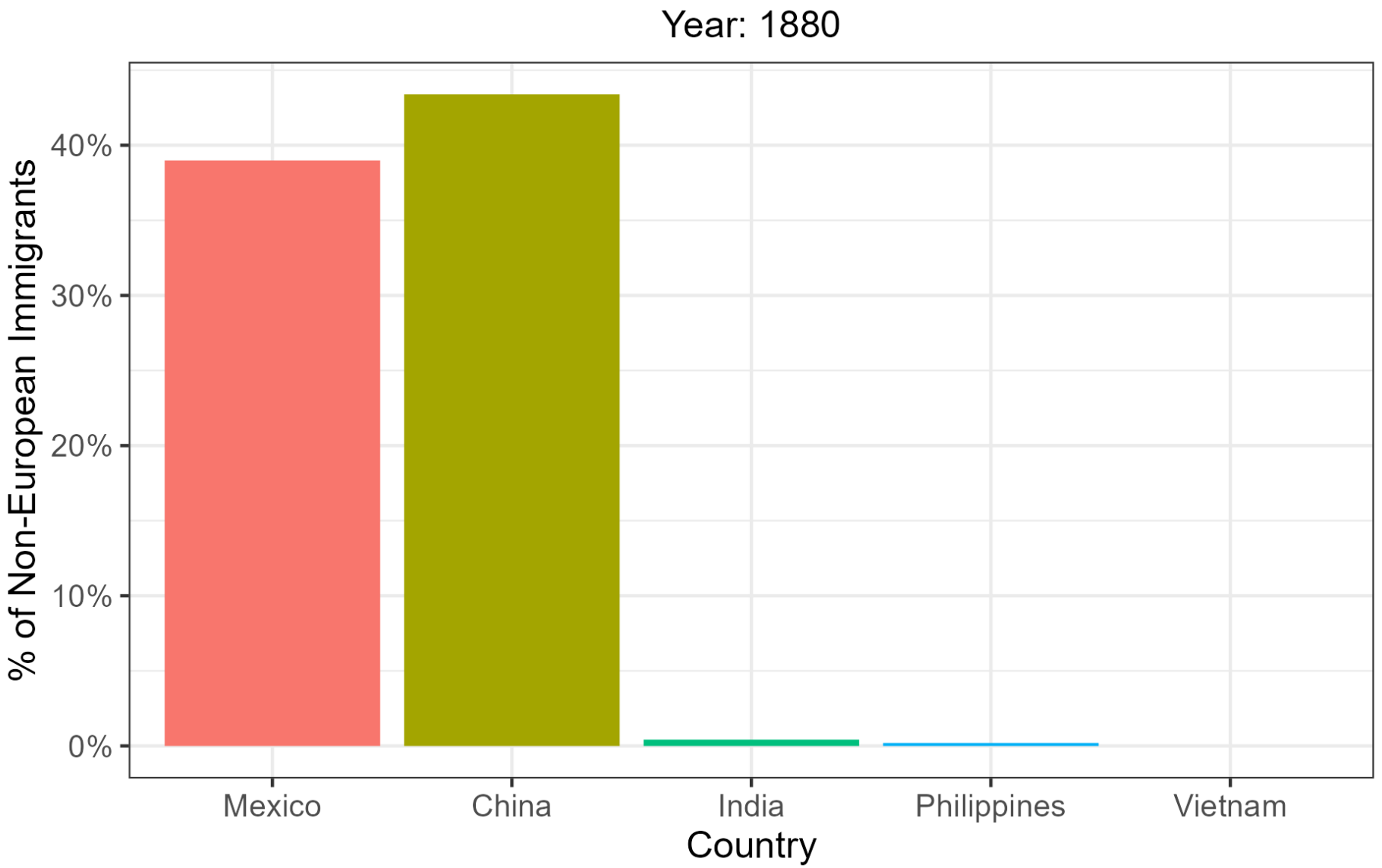
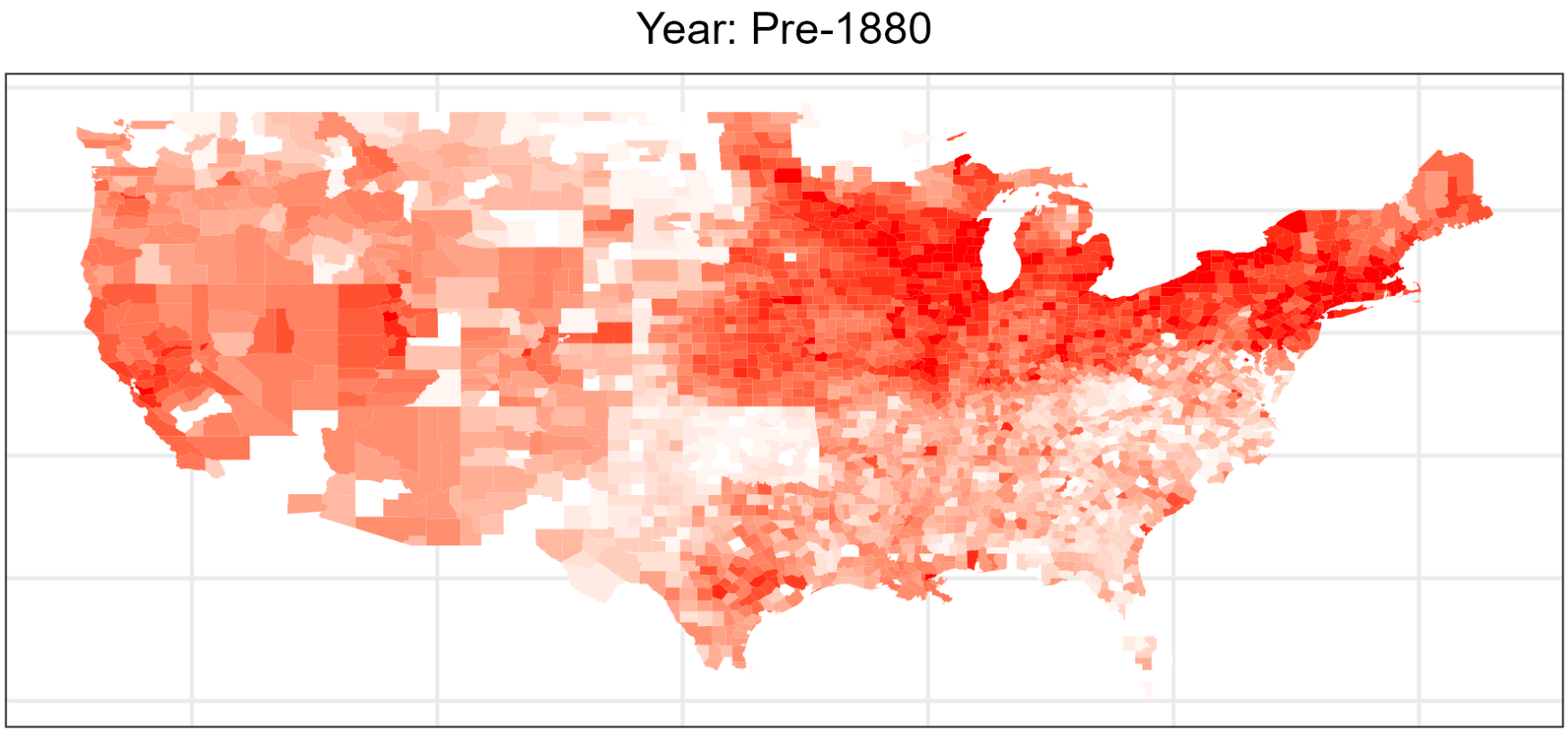
Variation from Emigrating Countries: *Push Factor*

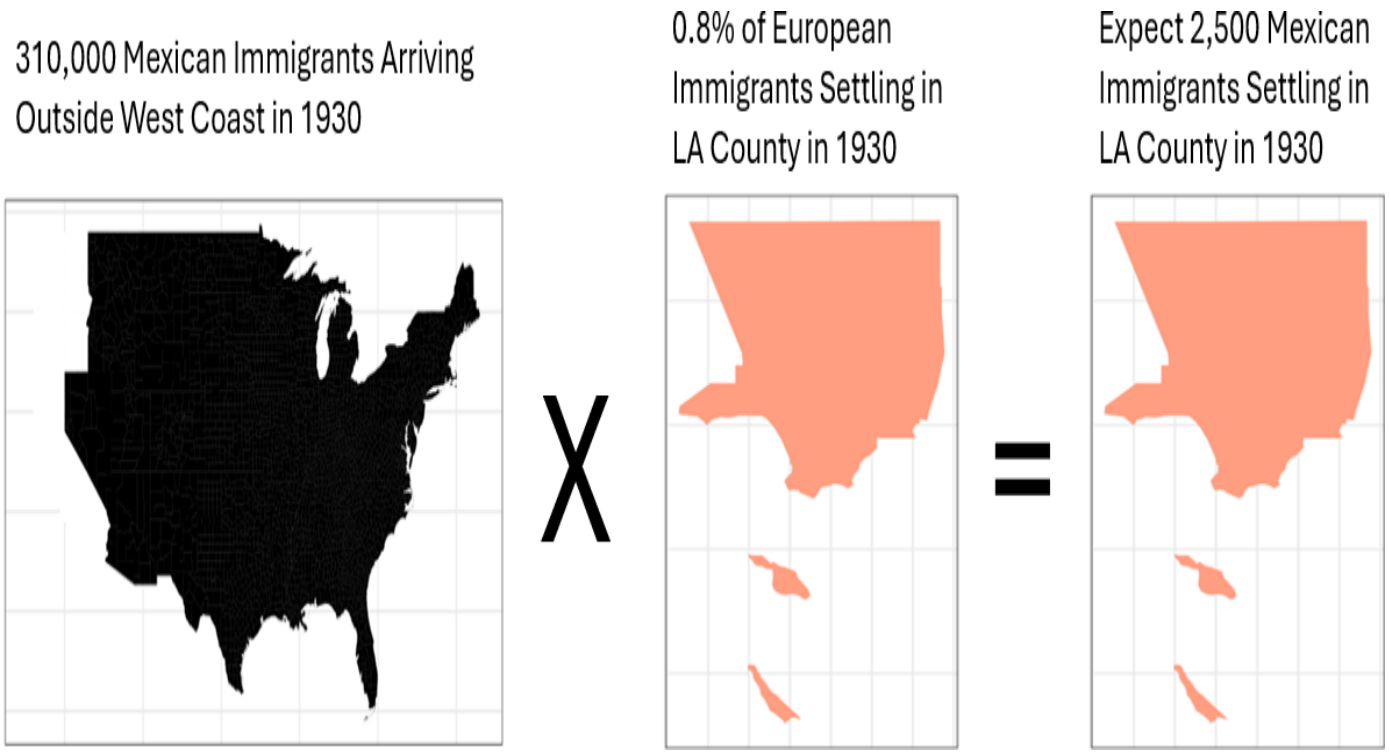


Variation from County Desirability: *Pull Factor*



Interact Push & Pull Factors to Instrument for Ancestry

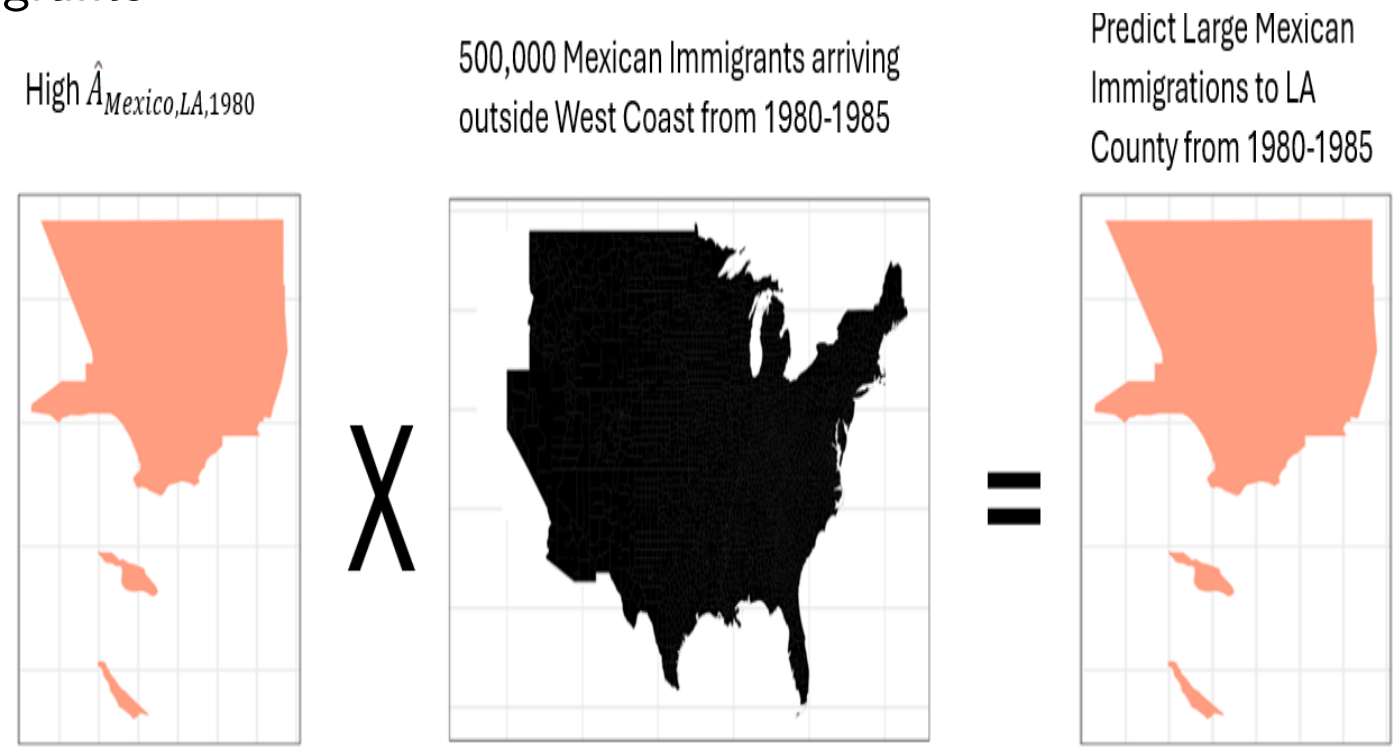
- Predict quasi-random variation in Los Angeles' 1.3 million people of Mexican ancestry in 1980 based on interaction of historic migration and settlement patterns



$$\hat{A_{o,c,t}} = \sum_{\tau=1880}^{t} \hat{a}_{r(c),\tau} \underbrace{I_{o,-r(c),\tau}}_{\text{Push}} \underbrace{\frac{I_{Europe,.,c,\tau}}{I_{Europe,\tau}}}_{\text{Pull}} + \delta_{o,r(c)} + \delta_{c(o),c} + X'_{o,c}\varsigma + \nu_{o,c,t} \quad (5)$$

Use Predicted Ancestry to Proxy Subsequent Immigrant Exposure

- I interact these predicted ancestry exposures with contemporaneous immigration from that origin to get the predicted number of entering immigrants



$$\hat{I_{o,c,t}} = b_t \times [\underbrace{\hat{A_{o,c,t-1}}}_{\text{Pred. Anc}} \times \underbrace{\tilde{I}_{o,-r(c),t}}_{\text{Flow}}] + \delta_{o,r(c)} + \delta_{c(o),c} + \delta_t + X'_{o,c}\theta + u_{o,c,t} \quad (6)$$

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Identifying Assumptions

1. Relevance Condition: First stage F-statistics exceeding 200 suggest historical migration and settlement patterns are informative of subsequent immigrant settlement patterns
2. Exclusion Restriction: $\rho(\epsilon_{c,t},\ I_{o,-r(c)} \times \frac{I_{Europe,c,\tau}}{I_{Europe,\tau}}) = 0$
3. Any confounding factors that drive temporary increases in a given county's financial situation post-1985 ($\epsilon_{c,t}$) do not systematically correlate with:
   - pre-1985 immigration from a given origin to other regions with the United States ($I_{o,-r(c)}$) interacted with the simultaneous settlement of European migrants in that US destination ($\frac{I_{Europe,c,\tau}}{I_{Europe,\tau}}$)

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Effects by Immigrant Region of Origin

	Yield Spread					
	(1)	(2)	(3)	(4)	(5)	(6)
Central American Immigrants	-0.216***	-0.453**				
	[0.073]	[0.183]				
Asian Immigrants			-0.563***	-1.327***		
			[0.123]	[0.482]		
Other Immigrants					-3.120*	-8.395***
					[1.571]	[1.867]
F-Statistic	> 200	> 200	> 200	> 200	> 200	> 200
State F.E.	Yes	No	Yes	No	Yes	No
County F.E.	No	Yes	No	Yes	No	Yes
Year F.E.	Yes	Yes	Yes	Yes	Yes	Yes
Bond Controls	Yes	Yes	Yes	Yes	Yes	Yes
County Controls	Yes	Yes	Yes	Yes	Yes	Yes
Y-mean	2.33	2.33	2.33	2.33	2.33	2.33

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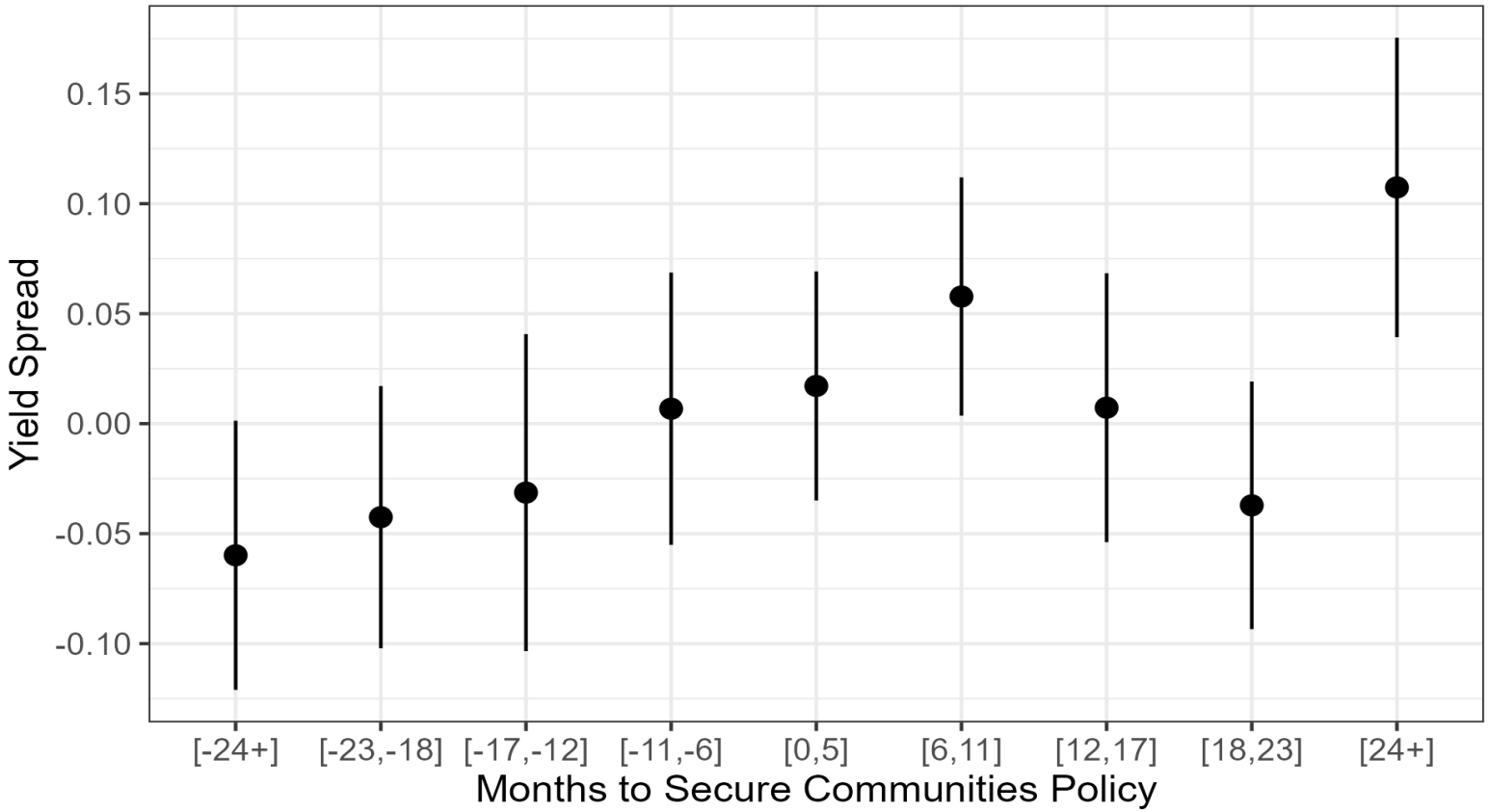
Secure Communities Parallel Trends



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Effects on Internal Migration and Population

	% Stayers	% Joiners	% Net Flow	Log(Population)
	(1)	(2)	(3)	(4)
Immigration	0.010***	-0.015***	-0.005	0.365***
	[0.003]	[0.005]	[0.005]	[0.106]
F-Statistic	97.38	97.38	97.38	246.02
Observations	6073	6073	6073	6302
State F.E.	No	No	No	No
County F.E.	Yes	Yes	Yes	Yes
Year F.E.	Yes	Yes	Yes	Yes
County Controls	Yes	Yes	Yes	Yes
Y-mean	0.94	0.06	0.01	11.22

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