Immigrants, Imports, and Welfare: Evidence from Household Purchase Data

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Immigrants, Real Wages, and Trade

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- Immigrants may affect consumption opportunities by changing:
  - the price of existing goods (Lach 2007; Cortes 2008; Zachariadis 2012)
  - the availability of new imported varieties
- But does immigrant-induced trade make native households better off?
  - If increased import expenditure simply reflects immigrant preferences, welfare effects for natives should be mediated

Overview and Results Preview

- This paper: Link household scanner data to barcode-specific origin country for >600k barcodes
  - + country of birth for ∼20k households
  - "Reduced-form" evidence for both immigrant preferences and spillover channel + structural model for counterfactual analysis

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- Counterfactual exercise 3: rise in variable trade costs
  - welfare cost 25% higher for immigrants

Literature/Contribution

Data

Household Purchase and Product Origin Data

- Nielsen Homescanner dataset
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- Merged data:
  - Covers ∼20% of consumer expenditure on tradeables
  - Construct single cross-section using pooled data from 2014-2016

Import Expenditure Shares | Stylized Fact #1 | Stylized Fact #2

General Gravity Model

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Goal: separate immigrant preferences from spillovers in the effect of immigrants on imports

- Derive estimating equation from general gravity model at household-level

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Expenditure by household h on goods from origin country o, X_{oh}:

$$X_{oh} = \alpha_o \left(\frac{X_h}{\Phi_h} \right) \phi_{oc}^{B} z_{oh}$$

- X_h: Grocery expenditure by household h
- α_o: size, cost of production, trade policy vis-a-vis origin o
- Φ_h: Household h price index
- ϕ_{oc}^{B}: trade barriers between producers in o and consumers in county c
- z_{oh}: Demand shifter for goods from o by household h

General Gravity Estimating Equation: Import Supply

Assume $\phi^B_{us,c} = 1$ and $z_{us,h} = 1$ for all households h and counties c

- Define $\tilde{x}_o = x_o / x_{us}$ for any variable x

General gravity equation can be expressed as:

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$$\tilde{X}_{oh} = \tilde{\alpha}_o \phi^B_{oc} z_{oh}$$

- Allow immigrant population share I_{oc} and distance vector d_{oc} to affect trade costs:

$$\phi^B_{oc} = \exp\left(\rho d_{oc} + \beta^b I_{oc} + \eta^b_{oc}\right)$$

General Gravity Estimating Equation: Import Demand

In paramaterizing demand shifter z_{oh}, we fully leverage household demographic information:

$$z_{oh} = \exp\left(\beta^z I_{oc}\right) \exp\left(\delta J_h + \zeta_1 \mathbf{1}[o(h) \neq o] + \zeta_2 \mathbf{1}[o(h) = o] + \eta^z_{oh}\right)$$

- β^z: average effect of immigrants on preferences $\rightarrow$ cultural diffusion channel
- J_h: vector of household characteristics (income, education, etc.) $\rightarrow$ parameter vector δ
- ζ_1: immigrant demand-shifter for all origin countries,
- ζ_2: immigrant demand-shifter for one's own origin country (homophily)
  (as in Logan & Rhode 2010 and Atkin 2016)

General Gravity Estimating Equation

Plug definitions of ϕ^B_{oc} and z_{oh} back into expenditure equation and take logarithm:

$$\ln \tilde{X}_{oh} = \ln \tilde{\alpha}_o + \rho d_{oc} + \beta I_{oc} + \delta J_h + \zeta_1 \mathbf{1}[o(h) \neq o] + \zeta_2 \mathbf{1}[o(h) = o] + \eta_{oh}$$

$$\beta = \beta^b + \beta^z \qquad \eta_{oh} = \eta^b_{oc} + \eta^z_{oh}$$

- ζ_1 and ζ_2 shape immigrant preference effect
- β captures spillover channel: immigrants affect natives' purchases of imports

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- ζ_1 and ζ_2 shape immigrant preference effect
- β captures spillover channel: immigrants affect natives' purchases of imports
- Concern: $cov[I_{oc}, \eta_{oh}] \neq 0$
  - If immigrants sort into locations with idiosyncratically low trade costs to origin, for example, estimates of β biased upwards

  → Use Burchardi et al. (2019) push-pull IV Detail

General Gravity Estimates

	Dependent variable: Exp. share on goods from o relative to US	
	(1)	(2)
Immigrants/Pop. 2010	1.29***	1.15***
	(0.22)	(0.24)
First-stage residuals		0.18
		(0.31)
=1 if immigrant from anywhere	0.23***	0.23***
	(0.030)	(0.030)
=1 if immigrant from origin o	0.60***	0.61***
	(0.069)	(0.071)
N	1,461,130	1,461,130
Country FE	✓	✓
Household controls	✓	✓
Distance & latitude difference	✓	✓
1st-stage F-statistic		19.5

Notes: Level of observation: household-origin. Estimator: pseudo-Poisson maximum likelihood. First-stage residual is from first-stage regression of all instruments on immigrant-population share in column 2. Weights: NielsenIQ household weights. Standard errors: clustered two-ways at household and county-country levels. *, **, and ***: 10%, 5%, and 1% levels, respectively. Interpretations

Model + Counterfactual Exercises

Need for additional theory

Counterfactual Exercises

Melitz model w/ heterogeneous consumers + immigrant effects on trade costs, preferences

Detail Estimation

- Counterfactual 1: Turn immigrants into natives
  - $\uparrow$ fixed costs
  - $\downarrow$ preference-driven market size
  - $\downarrow$ preferences for imports z_{oh},
    - ⋆ Through immigrants' preferences ζ_1, ζ_2
- Counterfactual 2: Remove all immigrants (channels + expenditure)
  - All the above effects
  - $+$ $\downarrow$ county-specific expenditure market size
- Counterfactual 3: Trade cost shock
  - 10% increase in variable trade costs

Estimate Summary Headline and Extensive Margin Estimates Variable Cost Estimates

Counterfactual Outcomes: Removing Immigrant Effects

Counterfactual exercise:	(1) Change (%) import expenditure	(2) Change (%) welfare natives	(3) Change ($) welfare per native HH
Turning immigrants into natives	-7.7	-0.039	-2.9

Map

Counterfactual Outcomes: Removing Immigrant Effects

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Turning immigrants into natives	-7.7	-0.039	-2.9
Shutting down ...			
... fixed trade cost channel	-2.0	-0.035	-2.6
... market size channel	-0.3	-0.005	-0.3
... composition channel	-5.7	–	–
... homophily channel	-1.4	–	–

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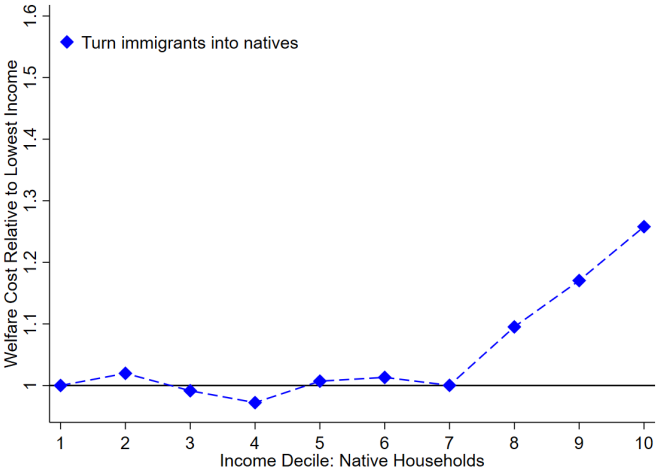
Removing all immigrants	-26	-0.932	-70

Map

Distributional Effects on Consumption of Immigrants

Immigrants benefit highest income group ∼60% more than low-to-middle income groups



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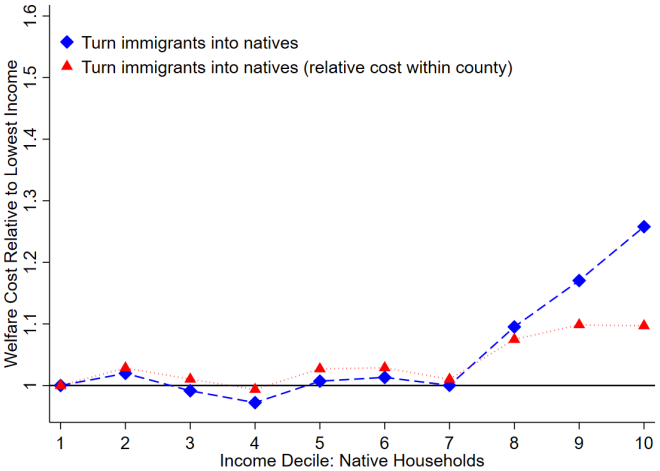

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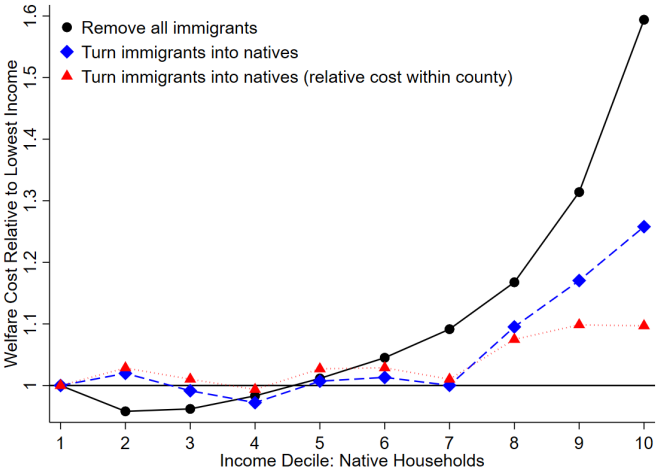
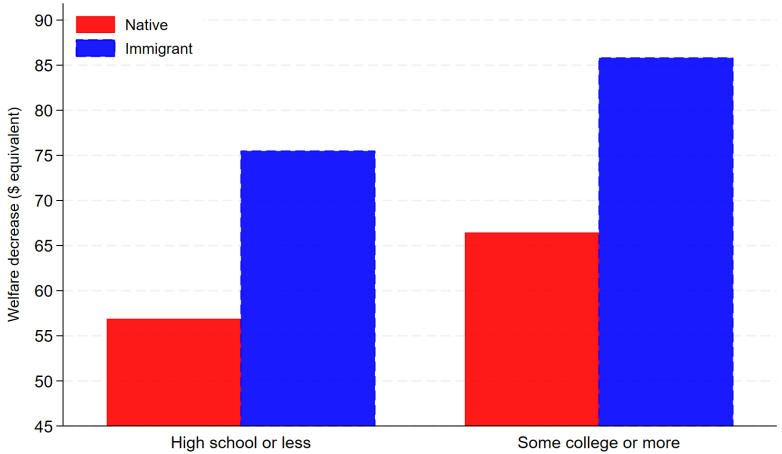


The Distributional Costs of Increased Variable Trade Costs

Figure: Relative Costs of 10%↑ in Variable Trade Costs on All Imports ($ per hh-year)



Summary and Conclusion

- First paper to provide direct evidence for local immigrant effects on non-immigrant household consumption choices
  - Link novel data on household consumption, nativity, and product origins
  - Effect due to lower fixed cost, larger market size
  - Market-size channel key for welfare effects
- Immigrant preferences important in driving trade flows
- Higher-income, urban households gain disproportionately
- Immigrants disproportionately harmed by increases in trade costs

Appendix

Contribution to the Literature

- Quantify import, variety welfare effect of immigrants across households
  - Research on trade-immigrant link uses data aggregated to region/industry level
    Gould 1994; Head & Ries 1998; Rauch & Trindade 2002; Combes et al. 2005; Peri & Requena-Silvente 2010; Parsons & Vezina 2018; Burchardi et al. 2019
  - When using disaggregated data, often no distributional effects
    Iranzo and Peri 2009; Di Giovanni et al. 2015; Aubry et al. 2016; Bonadio 2024
- Estimate household-level effect of immigrants on price index
  - Prior work looks at aggregate/sectoral price changes
    Lach 2007; Cortes 2008; Zachariadis 2012
  - Distributional effects primarily focus on labor market
    e.g., Dustmann et al. 2013, Llull 2018
- New dimension of heterogeneity in import demand: immigrant status
  - Literature has focused on income/geography
    Fajgelbaum & Khandelwal 2016, Borusyak & Jaravel 2021, Auer et al. 2023; Jaccard 2024
  - Key result: immigrant preferences are persistent
    Bronnenberg et al. 2012, Atkin 2016

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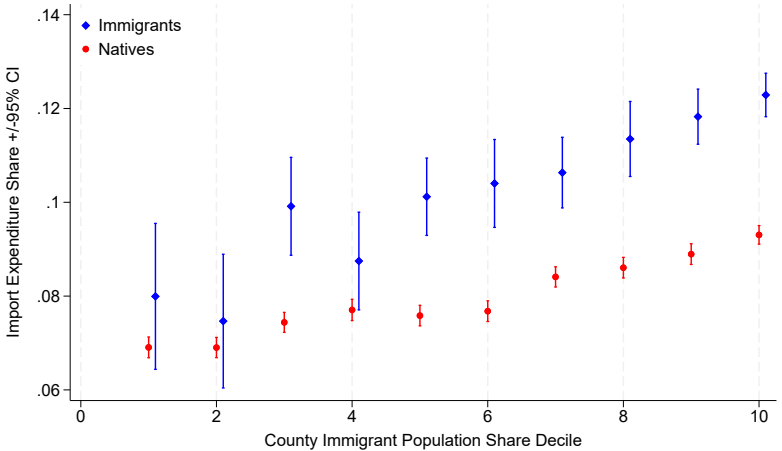
Immigrants Spend 34% More on Imported Goods than Natives

Stylized Fact 1



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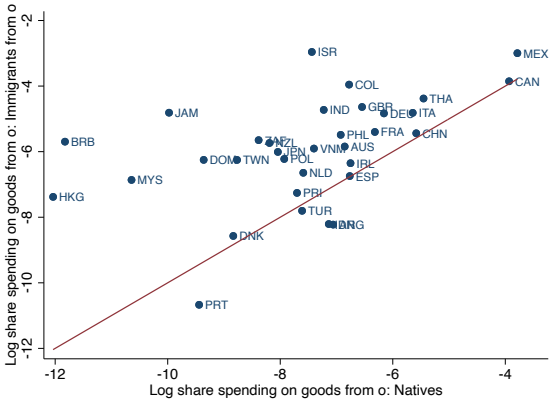
Immigrants Spend 2.2 Times More on Origin Imports

Stylized Fact 2

Figure: Consumption Homophily



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Estimating β^f and β^z using Deflated $\tilde{X}_{oh}$ and Deflated Extensive Margin

	$\tilde{X}_{oh}/\mathcal{Z}_{oh}$		$\tilde{N}_{oh}/\mathcal{Z}_{oh}$	
	(1)	(2)	(3)	(4)
Immigrants/Pop. 2010	1.50***	1.36***	1.29***	1.30***
	(0.22)	(0.29)	(0.12)	(0.16)
First-stage residuals		0.18		-0.0089
		(0.38)		(0.23)
N	1,461,130	1,461,130	1,461,130	1,461,130
Country FE	✓	✓	✓	✓
Distance & latitude difference	✓	✓	✓	✓
1st-stage F-statistic		20.2		20.2

Notes: The table presents regression results at the household-country level. We estimate each specification using pseudo-Poisson maximum likelihood estimation. The first-stage residual term is taken from a first-stage regression of all the instruments on the immigrant-population share in column 2. Observations are weighted using NielsenIQ household weights. Standard errors clustered two-ways at the household and origin-by-destination levels. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

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Estimating β^{τ} using Marginal Cost Expression

	Dependent variable: Log Average Barcode Price			
	(1)	(2)	(3)	(4)
Immigrants/Pop. 2010	-0.041***	-0.017	-0.058***	-0.040
	(0.013)	(0.031)	(0.016)	(0.044)
N	2,261,777	2,261,777	1,601,674	1,601,674
Barcode FE	✓	✓	✓	✓
County FE	✓	✓	✓	✓
Distance & latitude difference	✓	✓	✓	✓
1st-stage F-statistic		17.3		17.5
Sample	All	All	¿100 Counties	¿100 Counties

Notes: The table presents two-stage least square regression results at the barcode-county level. The instrumental variables strategy is described in Section **??**. Standard errors are clustered at the barcode and country level. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

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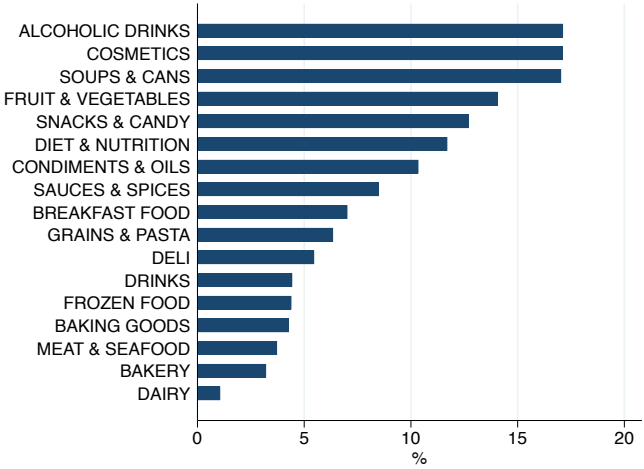
Variation in Share of Expenditures on Imported Varieties Across Products



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County-Level Immigrant-Import Semi-Elasticity

Plugging functional form assumptions back into $\tilde{X}_{oh}$ and aggregating to county-level $\tilde{X}_{oc}$:

$$\begin{aligned}\frac{\partial \ln \tilde{X}_{oc}}{\partial I_{oc}} &= \frac{\partial \ln \phi^{B}_{oc}}{\partial I_{oc}} + \frac{\partial \ln \phi^{Z}_{oc}}{\partial I_{oc}} \\ &= \underbrace{\left[\beta^{\tau} + \beta^{f}\right]}_{\substack{\text{Trade cost} \\ \text{channel}}} + \underbrace{\left[\frac{\theta}{\sigma - 1} - 1\right]\left(\beta^{z} + \frac{\partial \ln \bar{z}_{oc}}{\partial I_{oc}}\right)}_{\text{Market size channel}} + \underbrace{\beta^{z}}_{\substack{\text{Cultural} \\ \text{diffusion} \\ \text{channel}}} + \underbrace{\frac{\partial \ln \bar{z}_{oc}}{\partial I_{oc}}}_{\substack{\text{Composition} \\ \text{channel}}}\end{aligned}$$

- Two keys:
  - Only first two channels are welfare-relevant for native households
  - Data contains empirical moments needed to estimate each channel separately

Model Primitives: Heterogeneous Firms with Heterogeneous Consumers

Preferences: CES w/ $\sigma > 1$ and z_{oh} demand shifter identical as in general gravity.

Production: Variable trade costs $\tau_{o,c(h)}$ and fixed costs $f_{o,c(h)}$; productivity drawn from Pareto distribution with shape parameter $\theta > \sigma - 1$.

- **Additional Assumptions:** (1) monopolistic competition; (2) potential entrants proportional to country size

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- **Additional Assumptions:** (1) monopolistic competition; (2) potential entrants proportional to country size
- Equilibrium expenditure:

$$\tilde{X}_{oh} = \underbrace{\tilde{Y}_o \tilde{w}_o^{-\theta}}_{\tilde{\alpha}_o} \underbrace{\left(\tilde{\tau}_{o,c(h)}\right)^{-\theta} \left(\tilde{f}_{o,c(h)}\right)^{-\left[\frac{\theta}{\sigma-1}-1\right]} \left(z_{o,c(h)}\right)^{\left[\frac{\theta}{\sigma-1}-1\right]}}_{\phi^B_{oc}} \underbrace{z_{oh}}_{\phi^Z_{oh}}$$

- $z_{o,c(h)}$: Average demand shifter of all households in county c

Greater Detail Channels Back

Estimating Model Components: Overview

1. Collect all origin-county terms into ψ_{oc} fixed effect and estimate δ, ζ_1, and ζ_2:

$$\ln \tilde{X}_{oh} = \psi_{oc} + \delta J_h + \zeta_1 + \zeta_2 + \eta^z_{oh}$$

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3. Deflate expenditure by $\mathcal{Z}_{oh}$ and estimate β using same IV as general gravity model

$$\ln \frac{\tilde{X}_{oh}}{\mathcal{Z}_{oh}} = \alpha_o + \rho d_{o,c(h)} + \beta I_{o,c(h)} + \eta_{o,c(h)} + \eta^z_{oh}$$

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4. Separately identify components of β:
   - β^τ: Elasticity of barcode-level price to immigration population
   - β^f and β^z: Extensive margin elasticity versus total elasticity

Full Estimating Equation Back

Parameter Estimate Summary

- Preference parameters:
  - $\hat{\zeta}_1 = 0.23$ (0.03); $\hat{\zeta}_2 = 0.64$ (0.07)
  - $\hat{\delta}$: import preference generally increasing in income and education
- Spillover parameters: $\hat{\beta} = 1.36^{***}$:
  - $\hat{\beta}^{\tau} \rightarrow$ indistinguishable from zero
  - $\hat{\beta}^{f} = 1.28$
  - $\hat{\beta}^{z} = 0.06$
- Extensive margin effect dominates $\implies$ fixed cost reduction channel is vast majority of aggregate spillover effect
  - Note that this channel is welfare-relevant

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Instrumental Variables for Immigrant Population Share $I_{o,c}$

We make use of IV strategy from Burchardi, Chaney, and Hassan (2019, REStud)

- Predict immigrant stock using vector of historic inflows
  - Use interaction between origin-specific immigrant flows to US by decade and attractiveness of counties to all immigrants by decade, for decades 1880–2000
  - Leave-out all countries in continent of origin o and all counties in Census region of c

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  - Use interaction between origin-specific immigrant flows to US by decade and attractiveness of counties to all immigrants by decade, for decades 1880–2000
  - Leave-out all countries in continent of origin o and all counties in Census region of c
- For each decade D, county c, and origin o, construct following instrument:

$$\widetilde{IV}^{D}_{o,c} = I^{D}_{o,-r(c)} \times \frac{I^{D}_{-C(o),c}}{I^{D}_{-C(o)}}$$

- One IV for each decade-origin-county triplet, so 12 IV's for each origin-county pair
  - Implement control function approach with PPML (Atalay et al. 2019)

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Estimating Equation at Household-Origin Level

$$\ln \tilde{X}_{oh} = \alpha_o + \rho d_{o,c(h)} + \beta l_{o,c(h)} + \ln \bar{z}_{o,c(h)}^{\frac{\theta}{\sigma-1}-1} + \delta J_h + \zeta_1 \mathbf{1}\left[o(h) \neq US\right] + \zeta_2 \mathbf{1}\left[o(h) = o\right] + \eta_{o,c(h)} + \eta^z_{oh}$$

$$\beta = \beta^f + \beta^\tau + (\frac{\theta}{\sigma-1})\beta^z$$

$$\rho = \rho^\tau + \rho^f \qquad \eta_{o,c(h)} = \eta^\tau_{o,c(h)} + \eta^f_{o,c(h)}$$

$$\bar{z}_{o,c(h)} = \sum_{h \in \Lambda_c} \kappa_h e^{[\delta J_h + \zeta_1 \mathbf{1}[o(h) \neq US] + \zeta_2 \mathbf{1}[o(h)=o] + \eta^z_{oh}]}$$

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General Gravity Estimation Summary

- $\hat{\beta} = 1.15$:
  - 1 ppt increase in $I_{oc} \uparrow$ expenditure on imports from o by 1.15% for all households
  - Aggregate immigrant population share $\sim$15% in US
- $\hat{\zeta}_1 = 0.23$:
  - Immigrants have stronger preferences for all imported varieties, regardless of origin
  - 26% higher expenditure on all import origins than otherwise identical native household
- $\hat{\zeta}_2 = 0.61$:
  - Immigrants have stronger preference for imports specifically from their origin country
  - 132% higher expenditure on imports from specific origin

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Model Primitives

Preferences: utility of consumer h in us county c

$$U_h = (q_{0,h})^{\mu_0} \left[\sum_{o \in \mathcal{O}} z_{oh}^{\frac{1}{\sigma}} \int_{\omega \in \Omega_{o,c(h)}} (q_{oh}(\omega))^{\frac{\sigma-1}{\sigma}} d\omega \right]^{\frac{\sigma}{\sigma-1}(1-\mu_0)}$$

- Expenditure on groceries: $X_h = (1 - \mu_0) Y_h$ on groceries
- Heterogeneous preferences z_{oh} s.t. $z_{us,h} = 1$ for all $\omega \in \Omega_{US,c(h)}$

Production: cost of providing q units to consumers in c for producer in country o with productivity ϕ

$$c_{oc}(q) = \frac{w_o \tau_{oc}}{\phi} q + f_{oc}$$

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Need for Additional Theory

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  - Regressing origin-specific expenditure on origin-specific population misses level effect of immigrants increasing import expenditure from all origins

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- Rest of talk: modify heterogeneous firms model of trade to identify separate channels and run counterfactual exercises

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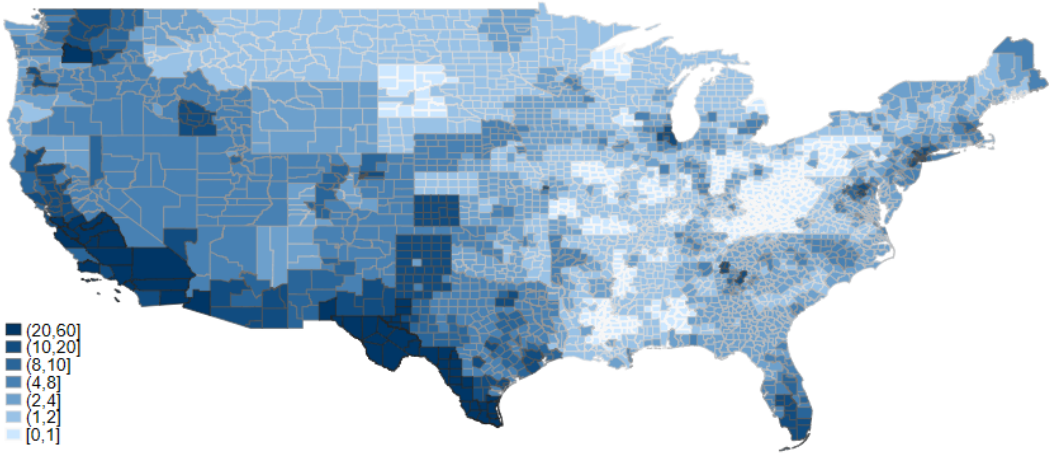
The Trade-Creating Effect of Immigrants

Magnitude of Percentage Decrease in Import Expenditure of Removing Immigrant Effects



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