Local Concentration, National Concentration, and the Spatial Correlations of Markups

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Motivation

- **Increasing** national and local production concentration

  Autor *et al.* (2020) and Autor *et al.* (2023)

- With endogenously variable markups this might be concerning

  Edmond, Midrigan, and Xu (2023)

- But, evidence of **divergence** of national and local sales concentration

  Rossi-Hansberg and Hsieh (2023) and Benkard *et al.* (2023)

- **This paper:** Spatial model $\Rightarrow$ local sales HHI $\Rightarrow$ markups in space

This Paper

- General equilibrium model of intra-national trade with
  - Heterogenous **multi-unit** manufacturing firms **shipping** across markets
  - Oligopolistic competition in each destination market
- Calibrate model to match
  - **National concentration** of 6-digit NAICS industries
  - Operation of **multi-unit** firms across Economic Areas
  - **Gravity effects** at the 3-digit industry level from Commodity Flow Survey

Outline

- Model Environment
- Quantification
- Quantitative Exercises
  - Spatial Correlations
  - Geography Matters
  - Trade Cost Reduction

The Environment

- J locations indexed at $j, k = 1, \ldots, J$ [*origin* $= j$, *destination* $= k$]
- Continuum of sectors $s \in (0, 1)$
- There are $n(s)$ firms i in each sector s [*oligopolistic competition*]
  - Firms can have multiple establishments
  - Firm-location productivity $z_{ij}(s) = \bar{z}_i(s)\, \hat{z}_{ij}(s)$
- Sector-specific iceberg trade cost $\tau_{jk}(s) = \text{distance}_{jk}^{\delta(s)}$
- Labor L_j at location j; supply e_j efficiency units [*immobile in benchmark*]

Demand & Production

- *Demand:* in destination k the non-tradable final good is produced as

$$C_k = \left(\int C_k(s)^{\frac{\theta-1}{\theta}} ds \right)^{\frac{\theta}{\theta-1}} \text{ with } \theta > 1 \quad \text{and} \quad C_k(s) = \left(\sum_{i=1}^{n(s)} c_{ik}(s)^{\frac{\gamma-1}{\gamma}} \right)^{\frac{\gamma}{\gamma-1}} \text{ with } \gamma > \theta$$

- Firm i's shipment to k is itself a CES aggregate over different establishments

$$c_{ik}(s) = \left(\sum_{j=1}^{J} c_{ijk}(s)^{\frac{\lambda-1}{\lambda}} \right)^{\frac{\lambda}{\lambda-1}}$$

- *Production:* firm i in origin j for destination k produces

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Profit Maximization: Destination-by-Destination

- *Within-firm allocation:* cost minimization $\Rightarrow$ origin-independent markup

$$p_{ijk}(s) = \mu_{ik}(s)\,\frac{w_j}{z_{ij}(s)} \quad \rightsquigarrow \quad P_{ik}(s) = \mu_{ik}(s)\,\underbrace{\left(\sum_{j=1}^{J}\left(\frac{\tau_{jk}(s)\,w_j}{z_{ij}(s)}\right)^{1-\lambda}\right)^{\frac{1}{1-\lambda}}}_{\text{unit-cost } \boldsymbol{\phi_{ik}(s)} \text{ of } c_{ik}(s)}$$

- *Local Competition:* Cournot competition at each destination k

$$\max_{c_{ik}(s)}\left\{ c_{ik}(s)\Big(P_{ik}(s) - \boldsymbol{\phi_{ik}(s)}\Big) \,\middle|\, c_{ik}(s) = \left(\frac{P_{ik}(s)}{P_k(s)}\right)^{-\gamma}\left(\frac{P_k(s)}{P_k}\right)^{-\theta} C_k \right\}$$

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$$\mu_{ik}(s) = \frac{\epsilon_{ik}(s)}{\epsilon_{ik}(s) - 1} \qquad \text{with} \qquad \epsilon_{ik}(s) = \left[\omega_{ik}(s)\,\frac{1}{\theta} + \big(1 - \omega_{ik}(s)\big)\,\frac{1}{\gamma}\right]^{-1}$$

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Parameterization

- *Locations:* 170 BEA **Economic Areas**; firm locations from **NETS**

ID	Economic Area	Employment Share
1	Los Angeles-Riverside-Orange County, CA	14.6%
2	New York-Newark-Long Island, NY-NJ	7.2%
3	Chicago-Gary-Kenosha, IL-IN-WI	6.9%
⋮		
170	Scottsbluff, NE-WY	0.0012%

- *Sectors:* 363 **NAICS 6-digit manufacturing**

  Ready-Mix Concrete (327320), Breakfast Cereal (311230), Computer Storage Device (334112), etc.

- *Employment:* L_j from US Census **County Business Patterns**

- *Efficiency units:* e_j to match wage bill $w_j L_j$ from CBP

Firms and Establishments

- *Firms:* have two characteristics
  1. $\bar{z}_i(s)$ firm-level productivity fixed effect (continuous)
  2. $n_i(s)$ number of locations where they have establishments (discrete)

- Productivity distribution: $F_Z(z) := \text{Prob}(\bar{z}_i(s) \leq z) = \textbf{Pareto}(\xi)$

- Unit-count distribution: $F_N(n) := \text{Prob}(n_i(s) \leq n) = \textbf{Empirical CDF}$

- Joint distribution (more productive $\Rightarrow$ more establishments):

$$H(z, n) = \mathcal{C}(F_Z(z), F_N(n)) \quad \text{where} \quad \mathcal{C}(u, u') = \textbf{Gumbel Copula}(\rho)$$

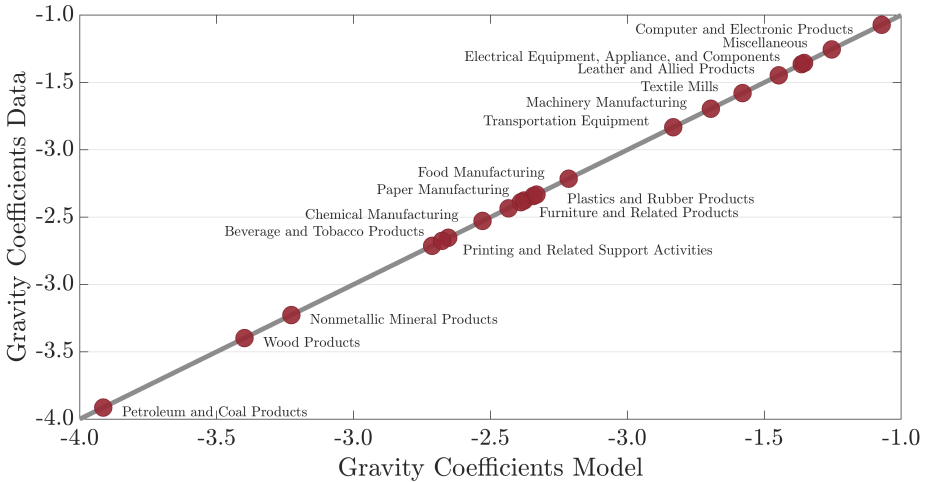
Parameter Values

Parameter		Value	Target
Assigned Values			
Substitution across sectors	θ	1.25	Edmond, Midrigan, Xu (2023)
Substitution within sectors	$\gamma = \lambda$	10	Edmond, Midrigan, Xu (2023)
Method of Moments			
Pareto tail firm productivity	ξ	10.35	National concentration
Gumbel rank correlation	ρ	0.81	Employment share multi-unit firms
Trade cost	$\delta(s)$		Gravity 3-digit NAICS

Model Fit

Moments [targeted]	Data	Model
National Concentration		
Top 4 sales share	**0.42**	**0.44**
Top 20 sales share	0.73	0.65
HHI sales	**0.10**	**0.10**
Local Concentration		
HHI production	0.36	0.37
Multi-Establishment Firms		
Fraction multi-establishment firms	0.03	0.03
Employment share of multi-establishment firms	**0.54**	**0.53**
Sales share of multi-establishment firms	0.62	0.55

Model Fit: Gravity



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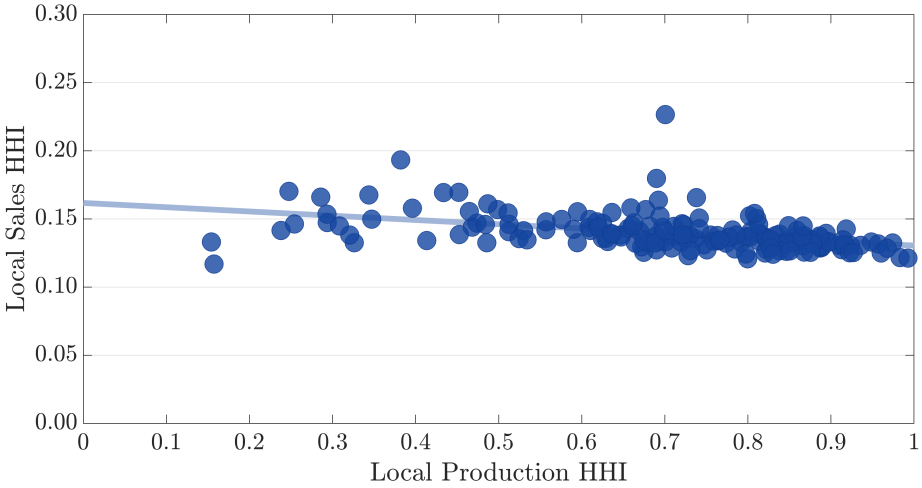
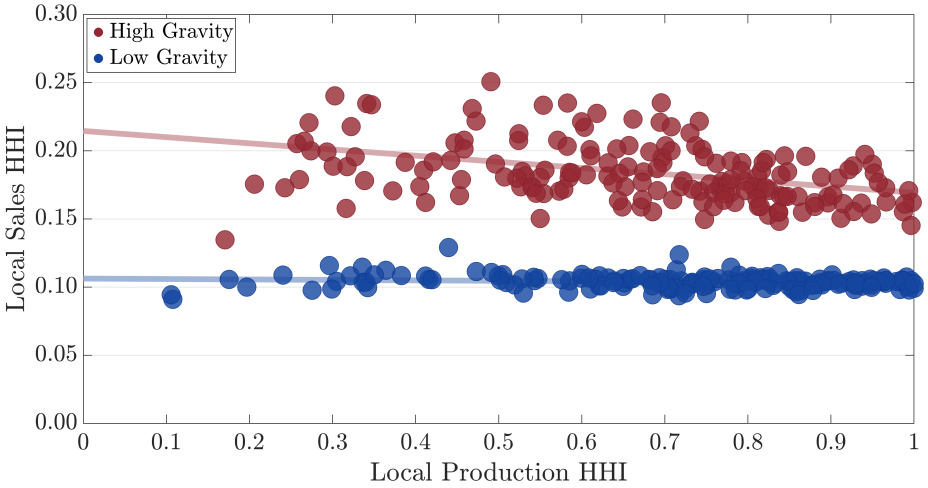
Spatial Correlation of Concentration Measures



The Role of Gravity



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Geography Matters: Markup Distribution

Percentile	Benchmark Model	No Geography
p01	1.13	1.12
p10	**1.15**	**1.14**
p25	1.18	1.15
p50	1.23	1.17
p75	1.30	1.20
p90	**1.41**	**1.25**
p99	1.62	1.40
Aggregate Markup	**1.26**	**1.18**

- Geography matters for **both the level and dispersion** of sectoral markups
- Geography matters for **the level** of the aggregate markup

Consumption Gains From Eliminating Markups

Percentile	Benchmark Model
p01	0.9%
p10	**3.6%**
p25	3.9 %
p50	5.6%
p75	6.9 %
p90	**9.1%**
p99	14.5%
Overall	**5.8%**

- Geography matters for cost of markups: **5.8%** versus **3.7%** with no geography
- Percentage consumption gains are **large** and **unevenly** distributed across EAs

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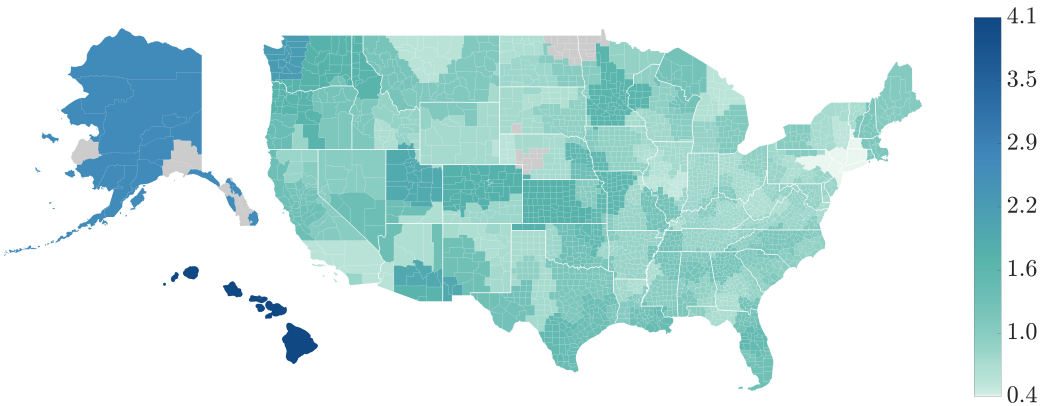
Trade Cost Reduction

	20% Increase	Benchmark	20% Decrease	Free Trade
Increasing National Sales Concentration ⇑				
Top 4 share	0.43	0.44	0.45	0.49
HHI sales	0.10	0.10	0.10	0.11
Increasing Local Production Concentration ⇑				
HHI production	0.36	0.37	0.38	0.40
Decreasing Local Sales Concentration ⇓				
Top 4 share	0.61	0.58	0.56	0.49
HHI sales	0.16	0.15	0.13	0.11

Markup Decrease from 20% Reduction in Trade Cost



Consumption Gains from 20% Reduction in Trade Cost