Commuting, Migration, and Local Employment Elasticities by F.Monte, S.Redding, E.Rossi-Hansberg (AER 2018)

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Motivation

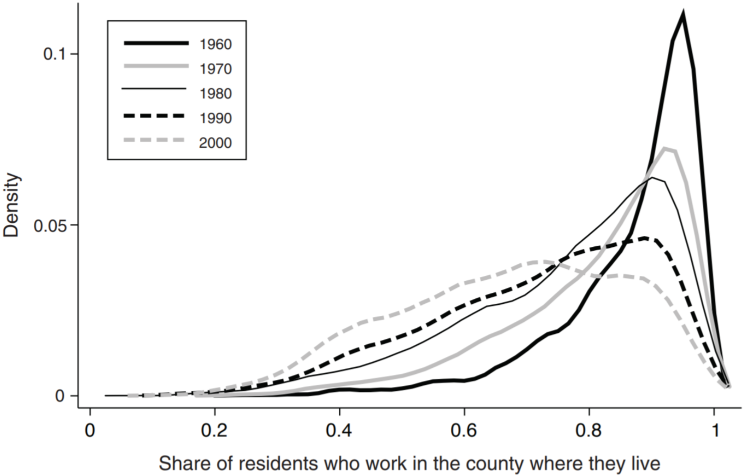

FIGURE 1. KERNEL DENSITIES OF THE SHARE OF RESIDENTS WHO WORK IN THE COUNTY WHERE THEY LIVE

Spatial general equilibrium model:

- locations are linked through
  - good market (trade)
  - factor markets (migration and commuting)

Consumer preferences: Cobb-Douglas

$$U_{ni\omega} = \frac{b_{ni\omega}}{\kappa_{ni}} \left(\frac{C_{n\omega}}{\alpha}\right)^{\alpha} \left(\frac{H_{n\omega}}{1-\alpha}\right)^{1-\alpha}$$

$$G_{ni}(b) = e^{-B_{ni} b^{-\epsilon}}, \quad B_{ni} > 0, \epsilon > 1$$

Good consumption: CES

$$C_n = \left[\sum_{i \in N} \int_0^{M_i} c_{ni}(j)^{\rho} dj\right]^{\frac{1}{\rho}}, \quad \sigma = \frac{1}{1-\rho} > 1$$

General equilibrium model with spacial linkages 2/4

Land price:

$$Q_n = (1-\alpha)\frac{\bar{v}_n R_n}{H_n}$$

Goods price:

$$p_{ni}(j) = \left(\frac{\sigma}{\sigma-1}\right)\frac{d_{ni} w_i}{A_i}$$

Share of goods consumed:

$$\pi_{ni} = \frac{M_i p_{ni}^{1-\sigma}}{\sum_{k\in N} M_k p_{nk}^{1-\sigma}} = \frac{L_i \left(d_{ni} w_i / A_i\right)^{1-\sigma}}{\sum_{k\in N} L_k \left(d_{nk} w_k / A_k\right)^{1-\sigma}}.$$

Workplace income:

$$w_i L_i = \sum_{n\in N} \pi_{ni} \bar{v}_n R_n$$

General equilibrium model with spacial linkages 3/4

Probability a worker chooses to live in *n* and work in *i*

$$\lambda_{ni} = \frac{B_{ni}\left(\kappa_{ni} P_n^{\alpha} Q_n^{1-\alpha}\right)^{-\epsilon} w_i^{\epsilon}}{\sum_{r \in N}\sum_{s \in N} B_{rs}\left(\kappa_{rs} P_r^{\alpha} Q_r^{1-\alpha}\right)^{-\epsilon} w_s^{\epsilon}} \equiv \frac{\Phi_{ni}}{\Phi}$$

Overall probabilities:

$$\lambda_n^R = \frac{R_n}{\bar{L}} = \sum_{i \in N} \lambda_{ni} = \sum_{i \in N} \frac{\Phi_{ni}}{\Phi}, \quad \lambda_i^L = \frac{L_n}{\bar{L}} = \sum_{n \in N} \lambda_{ni} = \sum_{n \in N} \frac{\Phi_{ni}}{\Phi}$$

Conditional probability:

$$\lambda_{ni|n}^R \equiv \frac{\lambda_{ni}}{\lambda_n^R} = \frac{B_{ni}\left(w_i/\kappa_{ni}\right)^{\epsilon}}{\sum_{s \in N} B_{ns}\left(w_s/\kappa_{ns}\right)^{\epsilon}}$$

Expected worker income:

$$\bar{v}_n = \sum_{i \in N} \lambda_{ni|n}^R w_i$$

General equilibrium:

- A vector $\{w_n, \bar{v}_n, Q_n, L_n, R_n, P_n\}_{n=1}^{N}$ that maximizes worker's utility and solves previously given equations.

Data (2006-2010):

- Commodity Flow Survey, American Community Survey, US Census, Bureau of Economic Analysis, GIS data

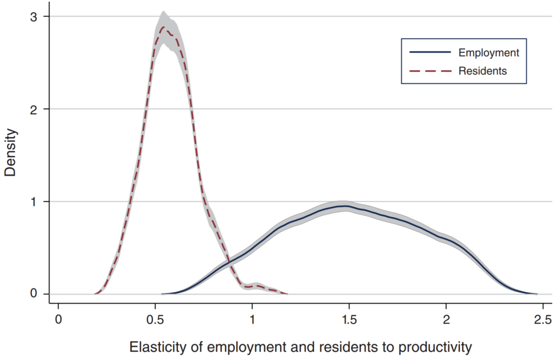

FIGURE 2. KERNEL DENSITY FOR THE DISTRIBUTION OF EMPLOYMENT AND RESIDENTS ELASTICITIES IN RESPONSE TO A PRODUCTIVITY SHOCK ACROSS COUNTIES

Heterogeneity of the local employment elasticity

Table 2—Explaining the General Equilibrium Local Employment Elasticities to a 5 Percent Productivity Shock

	Elasticity of employment								
	1	2	3	4	5	6	7	8	9
$\log L_i$		−0.003	0.009	−0.054				0.037	0.033
		(0.014)	(0.012)	(0.006)				(0.004)	(0.004)
$\log w_i$			−0.201	−0.158				−0.257	−0.263
			(0.059)	(0.039)				(0.016)	(0.016)
$\log H_i$			−0.288	−0.172				0.003	0.009
			(0.021)	(0.015)				(0.009)	(0.009)
$\log L_{-i}$				0.118				−0.027	−0.027
				(0.017)				(0.009)	(0.009)
$\log \bar{w}_{-i}$				0.204				0.163	0.207
				(0.083)				(0.037)	(0.038)
$\lambda^{R}_{ii\mid i}$					−2.047				
					(0.042)				
$\sum_{n \in N}(1-\lambda_{Rni})\vartheta_{ni}$						2.784		2.559	
						(0.192)		(0.178)	
$\vartheta_{ii}\left(\frac{\lambda_{ii}}{\lambda_{Ri}} - \lambda_{Li}\right)$						0.915		0.605	
						(0.210)		(0.175)	
$\frac{\partial w_i}{\partial A_i}\frac{A_i}{w_i}$						−1.009		−0.825	
						(0.123)		(0.150)	
$\frac{\partial w_i}{\partial A_i}\frac{A_i}{w_i} \cdot \sum_{r \in N}(1-\lambda_{rn\mid r})\vartheta_{rn}$							1.038		1.100
							(0.090)		(0.091)
$\frac{\partial w_i}{\partial A_i}\frac{A_i}{w_i} \cdot \vartheta_{ii}\left(\frac{\lambda_{ii}}{\lambda_{Ri}} - \lambda_{Li}\right)$							−0.818		−0.849
							(0.098)		(0.092)
Constant	1.515	1.545	5.683	1.245	2.976	0.840	1.553	1.861	2.064
	(0.034)	(0.158)	(0.632)	(0.797)	(0.022)	(0.201)	(0.087)	(0.404)	(0.352)
R^2	0.00	0.00	0.40	0.51	0.89	0.93	0.93	0.95	0.95
Observations	3,111	3,111	3,111	3,081	3,111	3,111	3,111	3,081	3,081

Conclusions

- Develop a general equilibrium model that incorporates spatial linkages
- Document substantial heterogeneity across counties in the elasticity of local employment
- Show that this heterogeneity is hard to explain with usual empirical controls, but is well explained by measures of linkages in commuting networks (i.e. share of residents that work locally)
- Provide additional empirical evidence using Millior dollar plants
- Show that commuting matters on the aggregate level – decrease in commuting costs is associated with an increase in welfare

Thank you

Appendix

More empirical evidence: Million Dollar Plants 1/2

Data:

- location decisions of million dollar plants (MDP)
- source: corporate real estate journal *Site Selection*
- sample: 166 counties 1972-2003

(Greenstone, Hornbeck, and Moretti 2010)

Augment Diff-in-diff with a measure of openness of the labour market to commuting (*residence own commuting share*):

$$\ln L_{it} = \kappa I_{j\tau} + \theta\left(I_{j\tau} \times W_i\right) + \beta\left(I_{j\tau} \times \lambda^R_{ii|i}\right)$$

$$+ \gamma\left(I_{j\tau} \times W_i \times \lambda^R_{ii|i}\right) + \alpha_i + \eta_j + \mu_t + \varepsilon_{it}$$

More empirical evidence: Million Dollar Plants 2/2

TABLE 3—ESTIMATED MDP TREATMENT AND COMMUTING OPENNESS

Variable	Coefficient	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$I_{j\tau} \times W_i$	θ	0.057	0.250	0.191	0.244	0.260	0.223	0.177	0.182
		(0.018)	(0.078)	(0.065)	(0.068)	(0.078)	(0.078)	(0.066)	(0.063)
$I_{j\tau} \times W_i \times \lambda^{R}_{ii\vert i}$	γ		−0.242				−0.219	−0.190	−0.195
			(0.078)				(0.096)	(0.077)	(0.073)
$I_{j\tau} \times W_i \times \lambda^{L}_{ii\vert i}$	γ			−0.177					
				(0.087)					
$I_{j\tau} \times W_i \times \lambda^{ARL}_{ii\vert i}$	γ				−0.241				
					(0.088)				
$I_{j\tau} \times W_i \times \lambda^{MRL}_{ii\vert i}$	γ					−0.281			
						(0.110)			
$I_{j\tau} \times \lambda^{R}_{ii\vert i}$	β		0.012				−0.048	−0.203	−0.213
			(0.135)				(0.108)	(0.075)	(0.082)
$I_{j\tau} \times \lambda^{L}_{ii\vert i}$	β			0.243					
				(0.129)					
$I_{j\tau} \times \lambda^{ARL}_{ii\vert i}$	β				0.124				
					(0.160)				
$I_{j\tau} \times \lambda^{MRL}_{ii\vert i}$	β					0.133			
						(0.145)			
$I_{j\tau}$	κ	−0.015	−0.024	−0.200	−0.113	−0.113	0.021	0.160	0.159
		(0.008)	(0.096)	(0.096)	(0.125)	(0.106)	(0.086)	(0.060)	(0.066)
County fixed effects		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Case fixed effects		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects		Yes	Yes	Yes	Yes	Yes			
Industry-year fixed effects							Yes		
Census-region-year fixed effects								Yes	
State-year fixed effects									Yes
Observations		4,431	4,431	4,431	4,431	4,431	4,431	4,430	4,186
R^2		0.991	0.991	0.991	0.991	0.991	0.992	0.994	0.996

6 Counterfactual estimations: Welfare

TABLE 5—WELFARE IMPACTS FOR DIFFERENT CHANGES IN COMMUTING COSTS

	Decrease by p75	Decrease by p50	Decrease by p25	Increase by 1/p50
Implied $\hat{\hat{\mathcal{B}}}_{ni}$	0.79	0.88	0.96	1.13
Welfare change (%)	6.89	3.26	0.89	−2.33