Intraurban Accessibility and Employment Density: Evidence from the Twin Cities

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Urban Agglomeration Economies

Returns to urban size

Productivity effects

3 to 8 percent (Rosenthal and Strange 2004)

4 percent (Melo et al. 2009 meta)

Relationship to infrastructure

Public capital stocks as input

Attenuates congestion effects of size

Facilitates interactions among firms

Sources of Urban Scale Economies

Internal	1. Pecuniary			Being able to purchase intermediate inputs at volume discounts
	Technological		2. Static Technological	Falling average costs because of fixed costs of operating a plant
			3. Dynamic Technological	Learning to operate a plant more efficiently over time
External or Agglomeration	***Localization***	Static	4. "Shopping"	Shoppers are attracted to places where there are many sellers
			5. "Adam Smith" specialization	Outsourcing allows both the upstream input suppliers and downstream firms to profit from productivity gains because of specialization
			6. "Marshall" labor pooling	Workers with industry-specific skills are attracted to a location where there is a greater concentration
		Dynamic	7. "Marshall-Arrow-Romer" learning by doing	Reductions in costs that arise from repeated and continuous production activity over time and which spill over between firms in the same place
	Urbanization	Static	8. "Jane Jacobs" innovation	The more that different things are done locally, the more opportunity there is for observing and adapting ideas from others
			9. "Marshall" labor pooling	Workers in an industry bring innovations to firms in other industries; similar to no. 6 above, but the benefit arises from the diversity of industries in one location.
			10. "Adam Smith" division of labor	Similar to no. 5 above, the main difference being that the division of labor is made possible by the existence of many different buying industries in the same place
		Dynamic	11. "Romer" endogenous growth	The larger the market, the higher the profit; the more attractive the location to firms, the more jobs there are; the more labor pools there, the larger the market—and so on
	12. "Pure" agglomeration			Spreading fixed costs of infrastructure over more taxpayers; diseconomies arise from congestion and pollution

Source: Kilkenny (1998); World Bank (2009)

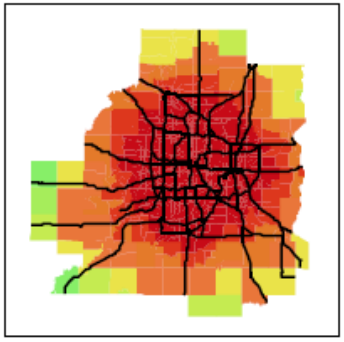
Conceptual and Measurement Issues

- Spatial variation in agglomeration with urban areas
- Transportation as a service flow, not a stock
- Allow for localization, as well as urbanization as source of agglomeration
  - *Urbanization*: access to firms in all industries, geographically widespread (external to firms and their industries)
  - *Localization*: access to firms in same industry, sharply attenuates with distance

Variable Definition

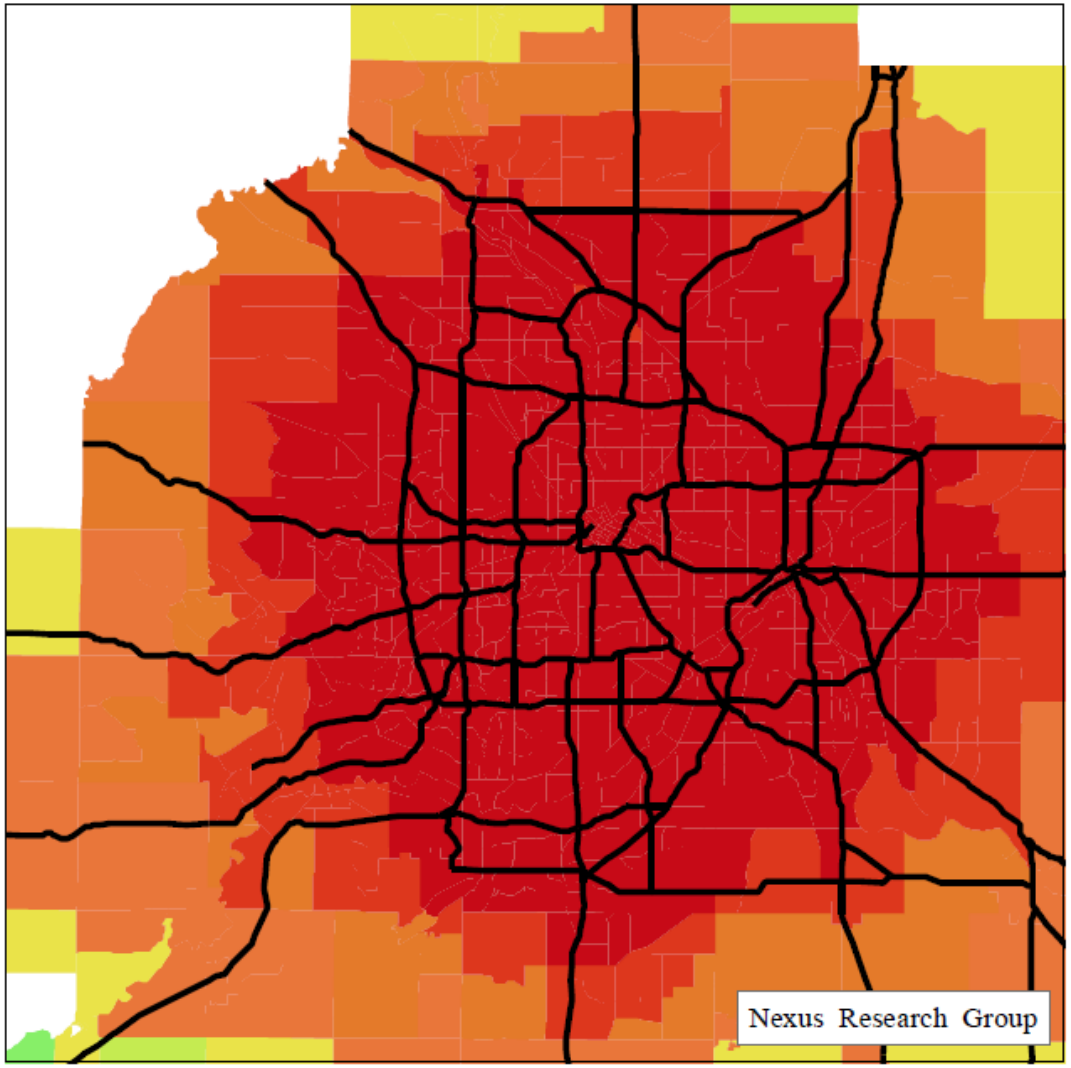
- Urbanization
  - Proxied by access to regional employment (30 min)
- Localization
  - Proxied by access to *same-sector* employment within 10 min

Access to Jobs (Urbanization)



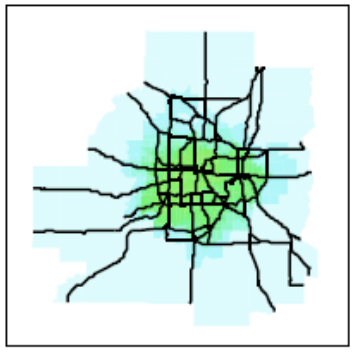
Accessibility to jobs
(total number of jobs)
within 30 minutes by cars
2010

- 0-1,000
- 1,000-2,500
- 2,500-5,000
- 5,000-7,500
- 7,500-10,000
- 10,000-25,000
- 25,000-50,000
- 50,000-75,000
- 75,000-100,000
- 100,000-250,000
- 250,000-500,000
- 500,000-750,000
- 750,000-1,000,000
- 1,000,000-
- Highways



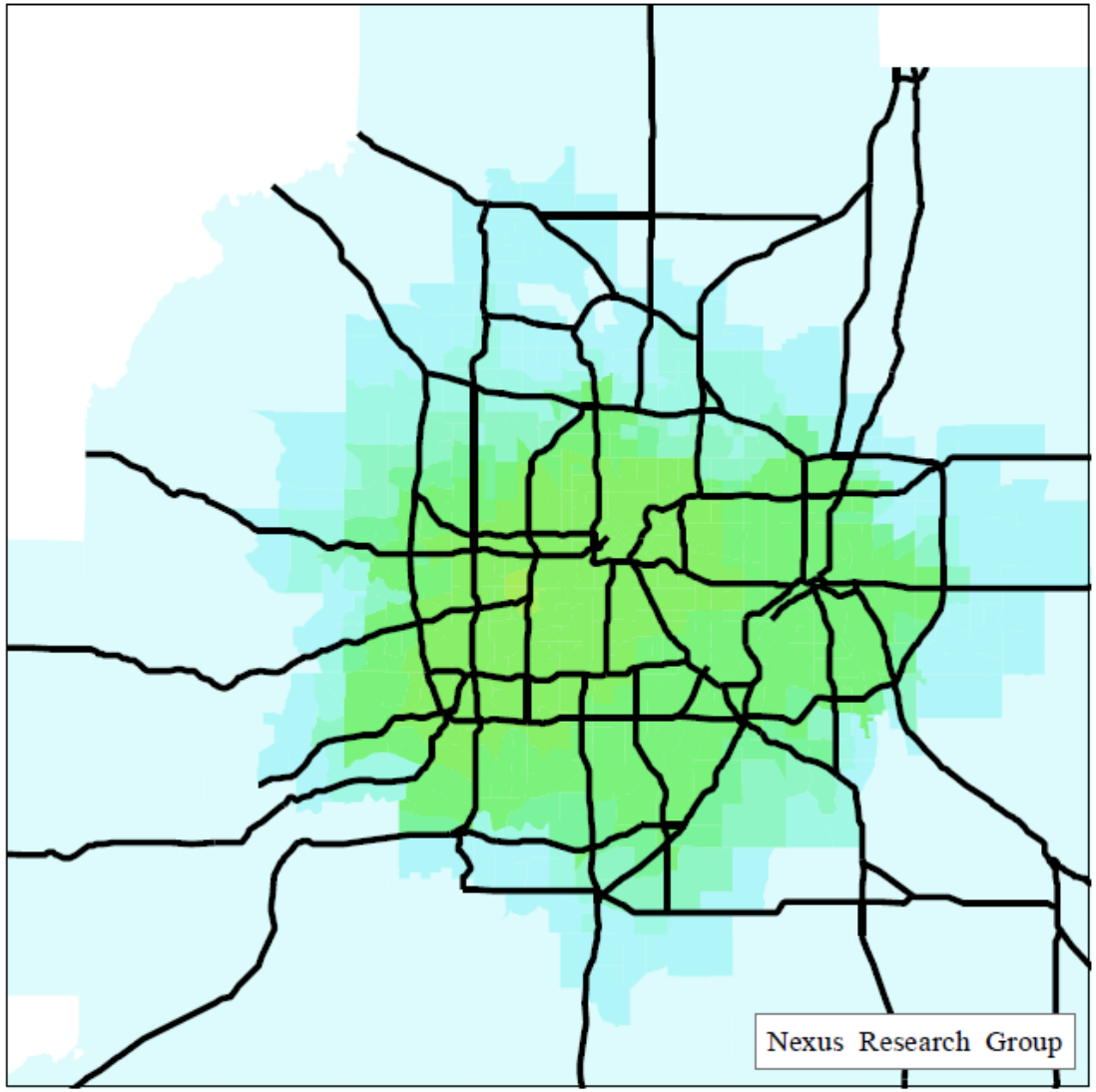
Zone Structure Displayed: Transportation Analysis Zone
Primary Data Resources: Tom Tom Speed Data, Metropolitan Council

Access to Jobs – Same Sector (Localization)



Accessibility to jobs
NAICS 52: Finance and Insurance)
within 10 minutes by car
2010

- 0-1,000
- 1,000-2,500
- 2,500-5,000
- 5,000-7,500
- 7,500-10,000
- 10,000-25,000
- 25,000-50,000
- 50,000-75,000
- 75,000-100,000
- 100,000-250,000
- 250,000-500,000
- 500,000-750,000
- 750,000-1,000,000
- 1,000,000-
- Highways



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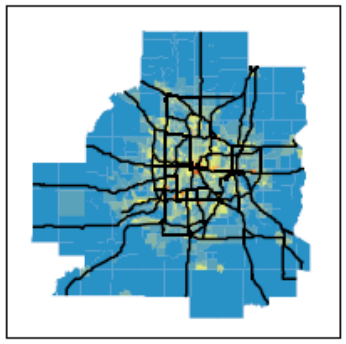
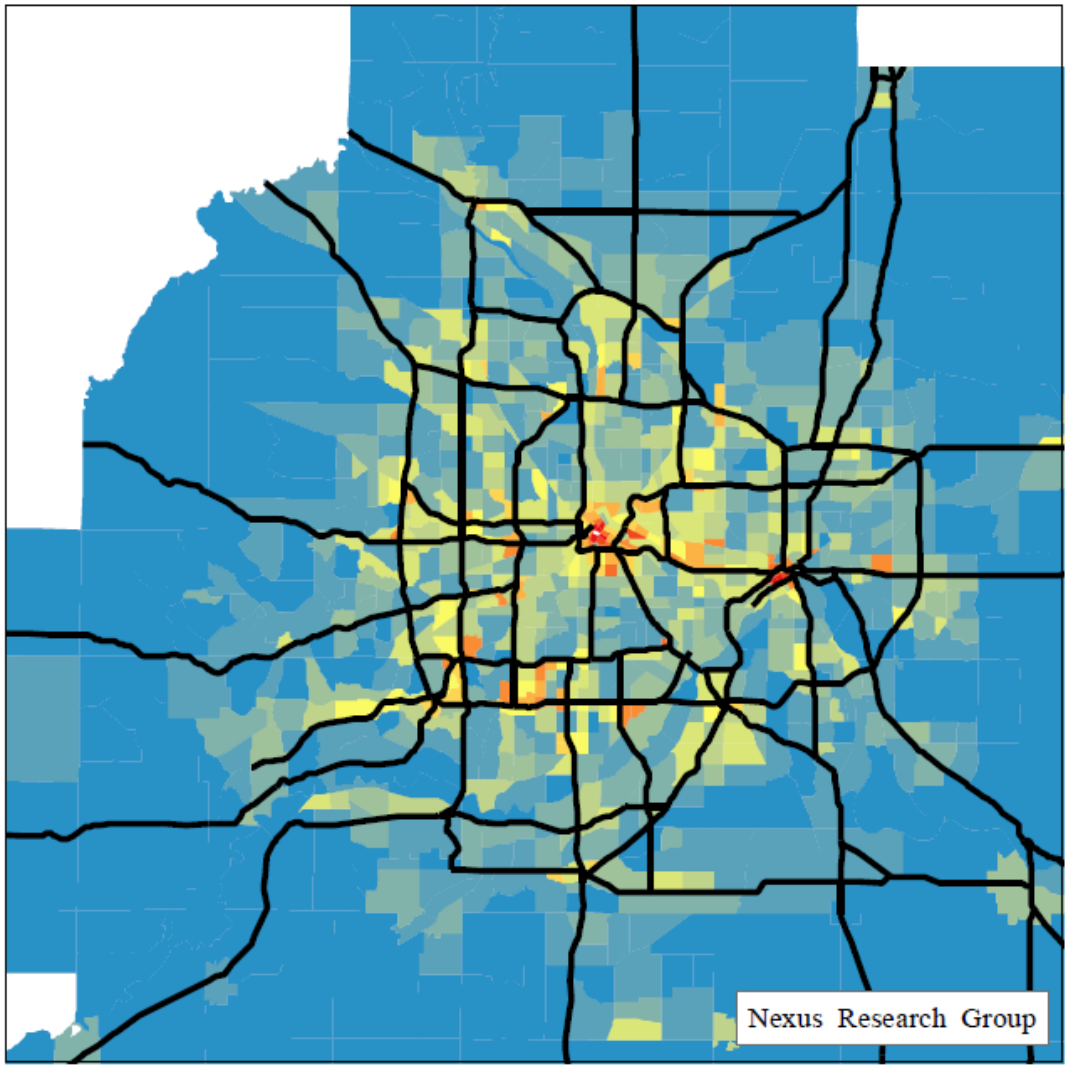
Regional Employment Density (2010)



Employment density
2010
(Number of jobs per square mile)

- 0-100
- 100-500
- 500-1,000
- 1,000-1,500
- 1,500-2,500
- 2,500-5,000
- 5,000-7,500
- 7,500-10,000
- 10,000-15,000
- 15,000-25,000
- 25,000-50,000
- 50,000-75,000
- 75,000-
- Highways



Zone Structure Displayed: Transportation Analysis Zone
Primary Data Resources: LEHD, U.S. Census Bureau

Empirical Implementation

- Employment density as a proxy for productivity
- Relationship to accessibility (by sector)
  - Localization vs urbanization effects
- Regressions for 20 NAICS 2-digit sectors
  - Estimates for 2000 and 2010
  - TAZs as units of analysis (N = 1,200)
- Negative binomial specification
  - Count data
  - Accounts for large number of zones with zero employment

Data Sources

- Employment density
  - LEHD (LODES) workplace-based at block level
  - Aggregated up to TAZ level
- Accessibility/Travel Time
  - Met Council regional forecasting model
  - TomTom

Data Compatibility

Accessibility measured at TAZ level, employment at block level

- Employment aggregated to TAZs
- LEHD available since 2002
- Matched to 2000 accessibility data

Accessibility for 2000 and 2010 measured differently

- Modeled flows vs. link-based measurements (TomTom)

Urbanization/Localization Elasticities and Ranks

	2010				2000		
	Urbanization	Rank	Localization	Rank	Urbanization	Rank	Localization	Rank
Agriculture, Forestry, Fishing and Hunting	-0.064	20	0.704	11	-0.228	19	0.759	8
Mining, Quarrying, and Oil and Gas Extraction	0.399	16	0.571	12	0.611	14	0.420	14
Utilities	0.592	14	1.863	1	1.156	8	0.691	10
Construction	0.029	19	1.449	3	-0.252	20	1.525	1
Manufacturing	0.137	17	1.227	5	0.286	18	1.165	2
Wholesale Trade	0.062	18	1.822	2	0.803	11	0.920	5
Retail Trade	0.419	15	1.292	4	0.515	15	1.108	3
Transportation and Warehousing	0.742	13	0.772	8	0.676	12	0.528	13
Information	3.006	4	0.045	16	2.023	3	0.281	16
Finance and Insurance	3.644	2	-0.157	18	3.188	1	-0.266	20
Real Estate and Rental and Leasing	4.019	1	-0.549	20	0.808	10	0.767	7
Professional, Scientific, and Technical Services	3.339	3	-0.230	19	2.561	2	-0.114	19
Management of Companies and Enterprises	2.223	5	1.010	6	1.452	7	0.814	6
Administrative and Support and Waste Management and Remediation Services	2.159	6	0.292	14	1.813	4	0.310	15
Educational Services	0.798	12	0.569	13	0.501	16	0.557	11
Health Care and Social Assistance	1.131	10	0.769	9	0.835	9	0.710	9
Arts, Entertainment, and Recreation	1.419	9	0.960	7	0.468	17	0.934	4
Accommodation and Food Services	1.941	8	0.114	15	1.641	6	0.167	17
Other Services [except Public Administration]	2.143	7	-0.054	17	1.800	5	0.069	18
Public Administration	1.032	11	0.738	10	0.664	13	0.532	12

Notes: The indicator of localization economy includes industry-specific jobs in the observed zones. The numbers in the shaded cells are insignificant at the $p < 0.05$ level.

Key Findings

Urbanization effects tend to dominate localization effects

Consistent with other findings at higher levels of geographic aggregation (e.g. counties)

Localization elasticities tend to be smaller, confined to a few sectors (mfg., wholesale, retail)

Service-based sectors tend to have highest density elasticities

Key Findings (continued)

FIRE, Information, Arts/Entertainment, Mgmt of Companies

Traditional CBD-based industries

Significant variation in elasticities *across sectors*

Elasticities for 2010 generally larger than 2000

Network performance? Differences in firm/sector behavior? Measurement differences?

Study Limitations

Does not provide direct estimates of productivity effects

Lack of comparability of travel time sources

Limits ability to pool of difference data from other years

Delineation of localization economies

Future Directions

Allow degree of localization to vary by industry
Firm-level data
Production or cost function
Look at particular sources of agglomeration (e.g. labor pooling, specialization)

Acknowledgments

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