Cities and product variety: evidence from restaurants

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Quality of Life in Cities

Classic models argue a trade-off: higher productivity (wages), lower quality of life through congestion (traffic, crime, pollution)

Later models added city amenities: weather, architecture, natural beauty, availability of consumer goods

Glaeser, Kolko, and Saiz, “Consumer city,” (JoEG 2001): high amenity cities have faster population growth

Critical amenity: “first, and most obviously, is the presence of a rich variety of services and consumer goods”

But, can we show that variety is higher in cities? And if so, why?
Cities and Product Variety

This paper:
Investigates these ideas with a new dataset on 127,000 restaurants in 726 US cities
Uses restaurants as a measure of city’s consumption variety; local, non-tradable, easily categorized, important
Provides evidence that bigger, denser cities do indeed have greater variety
Shows interesting patterns in distribution of variety across cities
Argues for causal link between city structure and variety: population and population density directly increase product variety
Simple sketch of theory

Cities concentrate demand, providing a sufficient market for less-preferred varieties

Specifically, for industries characterized by significant transportation costs, heterogeneous tastes, and a fixed cost of production, the ability of cities to aggregate niche groups of consumers in a small space will lead to greater variety.

Two basic forces:

• Scale: greater populations support greater variety
• Transportation cost: dispersed consumers lower demand for any firm

Both population, and population density *separately*, affect demand
Main argument: illustrative figure

Population=\(N\), 3 Firm Types

Population=\(N/2\), 1 Firm Type

Population=\(N\), 3 Firm Types

Population=\(N\), 1 Firm Type
Main argument: Phoenix vs Philly

**Phoenix, AZ**
- Pop: 1.3m
- Land: 475 sq mi
- Income: $41k
- % Coll Educ: 32%
- Ethnic HHI: .67
- Count Restaurants: 1,865
- Count Cuisines: 49

**Philadelphia, PA**
- Pop: 1.5m
- Land: 135 sq mi
- Income: $31k
- % Coll Educ: 24%
- Ethnic HHI: .83
- Count Restaurants: 2,555
- Count Cuisines: 59
Entry frontier in land-population space

Minimum Population

$4N^*$

$3N^*$

$2N^*$

$N^*$

Full Coverage

Partial Coverage

Land Area

$L^*/2$

$L^*$

$3L^*/2$

$2L^*$
Multiple types in land-population space

Minimum Population

- $N_{\min}(L; n=1, \delta=.1)$
- $N_{\min}(L; n=1, \delta=.2)$
- $N_{\min}(L; n=1, \delta=.5)$

Points A and B represent specific values in the land-population space.
Testable implications of model

1. Holding land constant, more populous markets will have more types
2. Holding population constant, smaller geographic markets will have more types
3. There will be a hierarchical relationship between the number of types and the composition of those types
4. This hierarchy will be associated with thresholds in population and land; rarer types will be found in bigger, denser markets
Description of data

Collected data from website citysearch.com using software and custom programming in Spring 2007 and Summer 2008

- Restaurants collected for metro areas of 88 of 100 largest US cities, over 300,000 restaurants
- Each restaurant assigned a unique cuisine type (ex: restaurant cannot be pizza and Italian)
- Detailed address information allowed precise placement on map, assigned every restaurant to Census Place
- Matched count of restaurants in every Census Place to count from Economic Census 2007. Kept Census Places with $0.7 < \text{match ratio} < 1.1$, leaving 726 places
Population, number of restaurants, number cuisines

Restaurant Count (log) vs Pop 2007-8 (logs)
- Fitted values with slope 1.01, Rsq = 0.86, results for 726 Census Places

Cuisine Count (log) vs Pop 2007-8 (logs)
- Fitted values with slope 0.49, Rsq = 0.67, results for 726 Census Places
Hierarchy Diagram (MNS 2008)

Data for 726 places, cuisine measure 1
Data for 727 places, cuisine measure 1
Outline of empirical work

Model predictions:
- Population increases # cuisines, land decreases # cuisines
- Hierarchy related to thresholds in population and land

Testing
1. Run cross-city regressions of number of cuisines on population and land area
2. Include many controls for city demographics: ethnicity, income, education, family size, age distribution
3. Omitted variable bias: “instrument” for key variables using historical measures
4. Also run regressions at cuisine level—likelihood of having a cuisine
5. Robustness checks on role of ethnicity and spatially clustered ethnic populations
Variety, Population, Population Density

Number of Cuisines vs Population and Population Density, Top 25 US Cities

- New York: 82 cuisines, population 8103,000
- Los Angeles: 69 cuisines, population 3915,000
- Chicago: 69 cuisines, population 2981,000
- San Francisco: 74 cuisines, population 13360,000
- Houston: 62 cuisines, population 2008,000
- Detroit: 68 cuisines, population 1808,000
- San Antonio: 63 cuisines, population 1097,000
- Phoenix: 49 cuisines, population 666,000
- San Diego: 63 cuisines, population 403,000
- Charlotte: 42 cuisines, population 326,000
- Fort Worth: 40 cuisines, population 298,000
- Minneapolis: 40 cuisines, population 279,000
- Indianapolis: 40 cuisines, population 279,000
- Nashville: 48 cuisines, population 232,000
- El Paso: 32 cuisines, population 136,000
- Jacksonville: 38 cuisines, population 102,000

- Seattle: 65 cuisines, population 129,000
- Boston: 56 cuisines, population 109,000
- Austin: 56 cuisines, population 79,000
- Baltimore: 45 cuisines, population 58,000
- Miami: 44 cuisines, population 51,000
- Philadelphia: 59 cuisines, population 30,000
- Dallas: 58 cuisines, population 25,000
- Minneapolis-St. Paul: 58 cuisines, population 23,000
- Charlotte: 63 cuisines, population 20,000
- Fort Worth: 40 cuisines, population 20,000
- Atlanta: 46 cuisines, population 20,000
- Indianapolis: 40 cuisines, population 20,000
- Nashville: 48 cuisines, population 20,000
- El Paso: 32 cuisines, population 20,000
- Jacksonville: 38 cuisines, population 20,000

Population Density (pop per sq km, log scale)

- Population (log scale)

- Number of Cuisines

- Variety, Population, Population Density
Summary of Results

1. A 1% increase in city population leads to a 0.35% to 0.49% increase in cuisine count
2. A 1% decrease in city land area (density increase) leads to an additional 0.16% to 0.21% increase in cuisine count
3. Bigger, denser cities also have rarer cuisines—not just more cuisines
4. Likelihood of having a specific cuisine is increasing in population and density, controlling for ethnicity
5. Spatial concentration of ethnic groups increases likelihood city has corresponding cuisine
Concluding Remarks

Bigger, denser cities have greater restaurant variety

Patterns are not consistent with mechanical explanations (ex: cities have more restaurants, cuisines randomly assigned to restaurants)

Fairly regular pattern to cuisines across cities: bigger, denser cities have rarer cuisines, increases overall count

These results are consistent with model of demand aggregation

Suggests that cities have greater variety through larger populations and greater density

Urban policies (ex: zoning) encouraging density may lead to greater variety and provision of varieties appealing to minority tastes
End of slides

Thank you!
Differences in average spatial concentration and average ethnic percentage of cities with a cuisine versus without the cuisine. Shown for 55 cuisines.