# Quality of Consumption

A Revealed Preference Approach to Local Amenity Valuation

Benjamin Bridgman, Abe Dunn, and Mahsa Gholizadeh

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# Disclosure

The views expressed here are those of the authors and do not represent those of the U.S. Bureau of Economic Analysis or the U.S. Department of Commerce.

- Value of a location a foundational question in urban/regional economics.
- Buying a house gives access to a bundle of attributes:
  - Productivity of production (wages).
  - Natural amenities (weather, water access).
  - Produced amenities (retail outlets, public goods).
- Amenities harder to value.
  - No direct price (wages measured in dollars).
  - Measured as a residual: House price not explained by wages.
  - Housing price influenced by future capital gains, supply restrictions.
- Amenities becoming more important in location decisions [Rappaport (2008); Albouy (2016)].

# Preview

- We estimate an important amenity: quality of consumption (QOC).
- Use revealed preference on card transaction data:
  - People can travel to experience and consume in (non-home) areas.
  - Examine relative spending flows across locations.
  - Allow geographic distance and social frictions to affect flows.
- Document how geographic and social frictions shape consumption activity.
  - Findings consistent with both distance and social frictions affecting economic activity (e.g., race, education, and political affiliation).
- QOC and other measures of appeal correlated, but QOC provides independent information on amenity value:
  - Identify low natural amenity/high QOC areas.

# Why Look at Quality of Consumption?

- City growth associated with consumption amenities ("Consumer City") [Glaeser et al. (2001)].
  - Growing taste for non-traded services, e.g. restaurants [Couture and Handbury (2020)].
- People consume a lot outside their home county even for "non-traded" services [Dunn and Gholizadeh (2024) and Batch et al. (2025)].
  - 32% of expenditure outside home county.
- Indicates that people do not see outlets across locations as equivalent: they expend time/money to pass competing outlets when shopping.
- Specific to produced amenities (in scope for GDP): May be useful for Regional Price Parities.

- Use county card flows for all U.S. counties scaled to national totals across 14 industries.
- Aggregate to MSAs, non-urban state areas.
- Use gravity model to parse out the quality of the consumption from other factors (e.g., distance, racial, political, and socioeconomic factors).
- High QOC areas those with demand beyond expected demand.

- Frictions from consumption are unique. Unlike traded goods, consumers travel and experience consumption.
- Social frictions have been documented in prior work using Yelp data [Davis et al. (2019)], but this does not capture dollars transacted.
- Document how geographic and potential social frictions shape consumption activity.
  - Extracting frictions across areas is needed to measure consumption quality.
  - Findings consistent with both distance and social frictions affecting economic activity (e.g., race, education, and political affiliation).
  - First paper that we are aware of to document social frictions affecting economic activity using representative set of transactions for U.S. counties.

- Use county card flows for all U.S. counties scaled to national totals across 14 industries. [Dunn and Gholizadeh (2024)]
- Use gravity model to parse out the quality of the consumption from other factors (e.g., distance, demographic, political, and socioeconomic factors).
- Aggregate to MSAs, non-urban state areas.
- High QOC areas those with demand beyond expected demand.
- Today: Examine total 14 industries and restaurants.

- Linear gravity model

$$log(Spend_{i,j}) = Q_j + \gamma_i + t(i,j) + \beta \cdot x_{i,j} + \xi_{i,j}$$

- $\xi_{i,j}$ error term
- $Q_j$ fixed effect interpreted as the quality of consumption
- $\gamma_i$ - consumer-county specific fixed effect common across areas
- $t(i,j)$ transportation costs between $i$ and $j$
- $x_{i,j}$ other factors shaping spending (e.g., industry and other geographic and social frictions)
- Multiple industry specification:

$$log(Spend^k_{i,j}) = Q_j + \gamma_i + t^k(i,j) + \beta^k \cdot x^k_{i,j} + \xi^k_{i,j}$$

# Select Variables

- $Log(distance_{i,j})$ - distance between population centroids across origin ($i$) and destination ($j$) counties.
- Social friction variables applying "Euclidian demographic distance" function [Davis et al. (2019)].
- Difference is measured as absolute difference in shares across counties: $|Share_{origin} - Share_{destination}|$
  - Demographic difference (i.e., share white, black, Asian, Hispanic and other from Census)
  - Political difference (i.e., share voting political party [Chenoweth et al. (2020)]
  - Educational difference (i.e., share college, share high school from Census)
- Other variables interacted with distance and industry: race, mean income, education, and political index

# Gravity Model

| | Log(Consumption) | Log(Consumption) |
|---|---|---|
| Log(Distance+1) | -3.603*** | |
| | (0.0858) | |
| Demographic Difference | -0.518*** | -0.726*** |
| | (0.104) | (0.0927) |
| Educational Difference | -2.830*** | -2.160*** |
| | (0.0812) | (0.0869) |
| Political Difference | -2.404*** | -2.025*** |
| | (0.135) | (0.126) |
| Observations | 24391986 | 23974165 |
| Adjusted $R^2$ | 0.727 | 0.739 |
| Additional Variables | | |
| Industry Cat. * Log(Dist) | Y | Y |
| Poly. Dist and Ind. | N | Y |
| Demog/Educ * Log(Dist) | N | Y |
| Additional interactions | N | Y |

Standard errors in parentheses

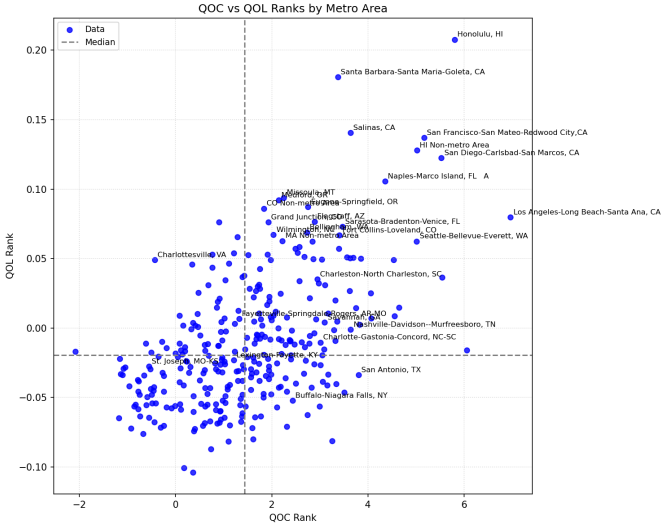
All estimates include county fixed effects.

* p<0.10, ** p<0.05, *** p<0.01

# Quality of Consumption Ranking

| MSA | Rank QOC | Rank QOC Restaurants | Rank QOL |
|---|---|---|---|
| Los Angeles-Long Beach-Santa Ana, CA | 1 | 2 | 15 |
| Las Vegas-Paradise, NV | 2 | 1 | 151 |
| Honolulu, HI | 3 | 3 | 1 |
| Phoenix-Mesa-Scottsdale, AZ | 4 | 7 | 79 |
| Miami-Miami Beach-Kendall, FL | 5 | 4 | 51 |
| San Diego-Carlsbad-San Marcos, CA | 6 | 5 | 8 |
| San Francisco-San Mateo-Redwood City,CA | 7 | 6 | 4 |
| West Palm Beach-Boca Raton-Boynton FL | 8 | 11 | 73 |
| Seattle-Bellevue-Everett, WA | 9 | 8 | 25 |
| HI Non-metro Area | 10 | 9 | 6 |
| Orlando, FL | 11 | 10 | 88 |
| New York-Wayne-White Plains, NY-NJ | 12 | 12 | 59 |
| Dallas-Plano-Irving, TX | 13 | 17 | 233 |
| Cape Coral-Fort Myers, FL | 14 | 14 | 42 |
| Chicago-Naperville-Joliet, IL | 15 | 13 | 91 |
| Salt Lake City, UT | 16 | 20 | 66 |
| Houston-Baytown-Sugar Land, TX | 17 | 15 | 311 |
| Naples-Marco Island, FL A | 18 | 16 | 10 |
| Tampa-St. Petersburg-Clearwater, FL | 19 | 18 | 103 |
| San Antonio, TX | 20 | 22 | 215 |
| Tucson, AZ | 21 | 26 | 37 |
| Myrtle Beach-Conway-North Myrtle Beach, | 22 | 19 | 38 |
| Salinas, CA | 23 | 21 | 3 |
| Provo-Orem, UT | 24 | 74 | 80 |
| Sarasota-Bradenton-Venice, FL | 25 | 24 | 19 |

# Quality of Life and Quality of Consumption



- Both physical distance and social frictions shape consumption patterns.
- Correlation between QOC and other measures of appeal: Housing cost, wages, Albouy (2016) QOL.
- QOC provides independent information on amenity value:
  - Not just recovering QOL.
- Disagreement between QOC/QOL may reflect natural amenities:
  - Texas cities lack coastal Calif. natural amenities, but deliver similar QOC.

# Quality of Life [Albouy (2016)] Regressed on QOC and Amenities

| | Quality of Life | Quality of Life | Quality of Life |
|---|---|---|---|
| Quality of Consumption | 0.566*** | | 0.476*** |
| | (0.0704) | | (0.102) |
| Log(Population) | | -0.0844* | -0.392*** |
| | | (0.0468) | (0.0801) |
| Perc. of pop. with college degree | | 0.422*** | 0.457*** |
| | | (0.0918) | (0.0553) |
| Standardized values of wrluri | | 0.0643 | 0.0239 |
| | | (0.0693) | (0.0636) |
| Heating degree days | | 0.481*** | 0.398** |
| | | (0.181) | (0.156) |
| Cooling degree days | | 0.501*** | 0.614*** |
| | | (0.112) | (0.1000) |
| Annual sunshine | | 0.371*** | 0.249*** |
| | | (0.0628) | (0.0591) |
| Distance to coast | | 0.369*** | 0.321*** |
| | | (0.0590) | (0.0566) |
| Slope of land | | 0.370*** | 0.183*** |
| | | (0.0816) | (0.0704) |
| Latitude | | 0.0237 | -0.0530 |
| | | (0.176) | (0.151) |
| Observations | 274 | 273 | 273 |
| Adjusted $R^2$ | 0.378 | 0.747 | 0.798 |

Standard errors in parentheses

* p<0.10, ** p<0.05, *** p<0.01

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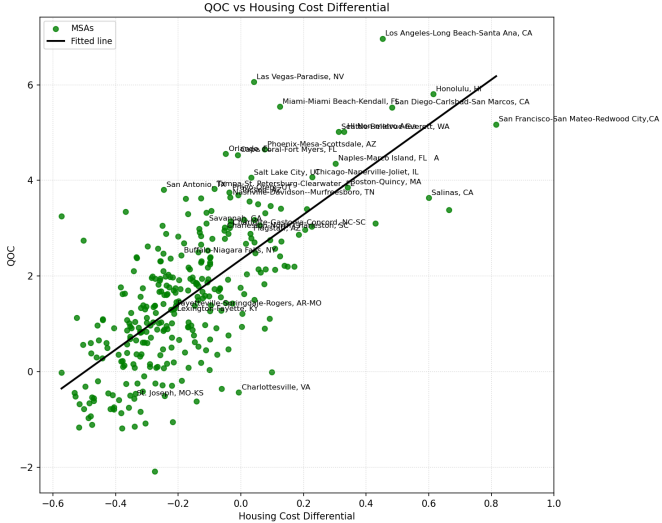
- Use random utility model.

$$U_{ilj}(t(l,j),Q_j)) = Q_j + \gamma_i + t(i,j) + \beta \cdot x_{i,j} + +\epsilon_{ilj}$$

- $\epsilon_{ilj}$: type 1 extreme value distribution.
- Value of this outside good normalized to zero.
- Price is contained in F.E.
- Probability that a location $l$ consumer buys a product in location $j$ is conditional-logit.

$$\Pr(U_{ilj} > U_{ilk} \forall k \in L) = \frac{\exp(t(l,j) + \beta_i \cdot x_j + \alpha \cdot p_j + Q_j + \xi_{l,j})}{1 + \sum_{\forall k \in L} \exp(t(l,k) + \beta_i \cdot x_k + \alpha \cdot p_k + Q_k + \xi_{l,k})}$$


QOC vs Housing Cost Differential
MSAs
Fitted line
Los Angeles-Long Beach-Santa Ana, CA
Las Vegas-Paradise, NV
Honolulu, HI
Miami-Miami Beach-Kendall, FL
San Diego-Carlsbad-San Marcos, CA
San Francisco-San Mateo-Redwood City,CA
Phoenix-Mesa-Scottsdale, AZ
Naples-Marco Island, FL
Salt Lake City, UT
Chicago-Naperville-Joliet, IL
San Antonio
Boston-Quincy, MA
Salinas, CA
Buffalo-Niagara Falls, NY
Springfield, MO
Lexington-Fayette, KY
Charlottesville, VA
St Joseph, MO-KS
QOC
Housing Cost Differential
6
4
2
0
−2
−0.6
−0.4
−0.2
0.0
0.2
0.4
0.6
0.8
1.0

# Quality of Consumption and Wage Differential