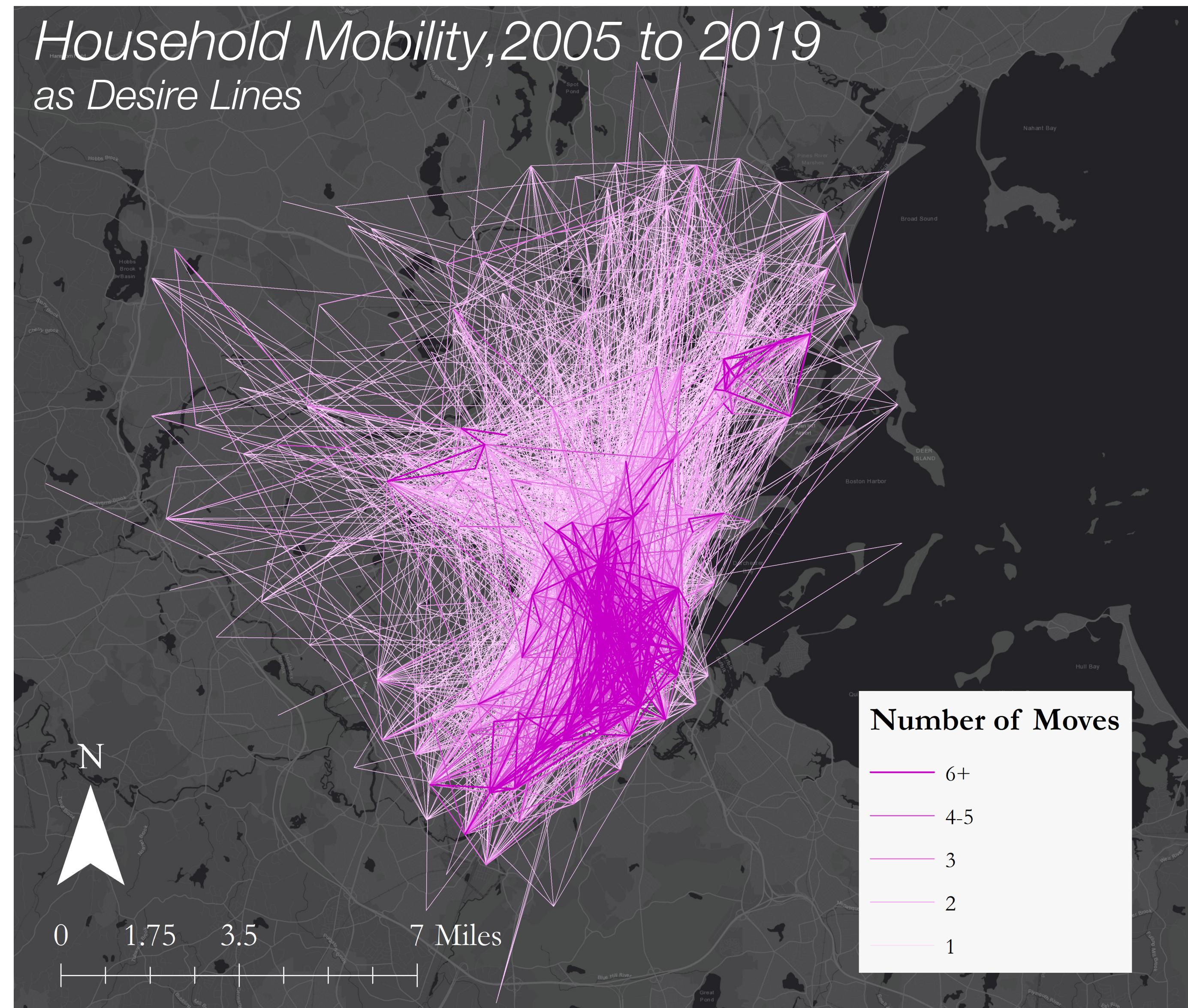


Where is home? An Examination of Urban Mobility Among Low Income Boston Residents

Household Mobility, 2005 to 2019 as Desire Lines



Introduction

The United States is currently experiencing its worst housing crisis since the Post-World War II era. Demand for housing in urban areas has increased dramatically in the past few years. Most American cities continue to experience population growth from to urbanization. While cities populations have expanded, housing stocks have not. This demand has also decreased the amount of affordable housing as prices skyrocket from this demand (Sugrue, 2014).

This has created and interesting trends in housing mobility, with low- and high-income households being the most mobile and middle-income households being the most stagnant (Desmond et al. 2015). High income households can afford to chase trends and move to “up and coming neighborhoods” while low income households are more likely to be displaced through a variety of formal and non-formal means. Middle income households tend to be stuck between these two extremes, being affluent enough to avoid displacement but not to chase trends.

Using tax returns from the Boston Tax Help Coalition (BTHC), a free tax preparation service for low income households, this project attempts to examine geographic patterns of household mobility in the Boston metro area between the 2005 and 2019.

Methods

The tax data from the BTHC provided an unbalanced panel-dataset from 25,774 households covering 2005 to 2019. The addresses of these households were geocoding using the Google Maps API and the ggmap package in R and then converted into an Origin Destination data set. In total there were 12,718 moves from 9,420 households in the data set.

To protect individuals’ privacy the data were aggregated for each analysis. The origin destination analysis was aggregated to the centroid of each census tract through a spatial join and the spacetime cubes were aggregated to a 500 ft grid with a 1-year time step. The origin destination analysis was conducted through the stplanr package in R. This package created desire lines, grouped by quantiles, that represent the flow of people from one census tract to another, grouped into Quantiles. The spatiotemporal analysis was conducted using ArcMap 10.7 and used the emerging hot spot analysis tool. The neighborhood search distance was set at 0.2 miles and time neighborhood time step was set to three years.

The addresses in the dataset covered a wide range of locations, from California to Ireland, to ease in visualization this analysis clip down the data to the municipalities defined as the Inner Core of Metro Boston by the Metropolitan Area Planning Council.

Sources

Data From:
Mass GIS, Boston Tax Help Coalition, ESRI, Open Street Map, and HERE.
Tools:
D. Kahle and H. Wickham. ggmap: Spatial Visualization with ggplot2. The R Journal, 5(1), 144-161. URL <http://journal.r-project.org/archive/2013-1/kahle-wickham.pdf>
Lovelace, R and Ellison, R., 2017. stplanr: A Package for Transport Planning. The R Journal. <https://doi.org/10.32614/RJ-2018-053>
Academic:
Desmond, M., Gershenson, C., & Kiviat, B. (2015). Forced Relocation and Residential Instability among Urban Renters. Social Service Review, 89(2), 227–262. <https://doi.org/10.1086/681091>
Sugrue, T. (2014). The Origins of the Urban Crisis. Retrieved from <https://press.princeton.edu/books/paperback/9780691162553/the-origins-of-the-urban-crisis>

Data Summary

Total Households	25,774
Households with Moves	9420
Total Moves	23,718
Inter Tract Moves	11,121

Results

Of the 12,718 moves most, roughly 87%, were between census tracts. The desire lines indicate a general clustering of moves in Boston proper, especially in the neighborhoods of East Boston, Dorchester, Mattapan, Hyde Park, and Roxbury. This clustering was assessed with a Moran’s I test, which found statistically significant clustering. The clustering of both origins and destinations was also found to be significant.

Moran's I Results

Desire Lines	I = 0.449	Z = 52.72	p = 0.000
Origins	I = 0.292	Z = 50.93	p = 0.000
Destinations	I = 0.303	Z = 52.56	p = 0.000

The spatiotemporal analysis showed that the areas where householder are moving from are significantly more clustered than areas where they are moving to, which the Moran’s I results corroborate. Both origin and destination clustering occurred exclusively in Boston proper. The clustering of destinations appears to be spreading, based on the 116 new and 2 intensifying hot spots that occur in the data set.

Discussion

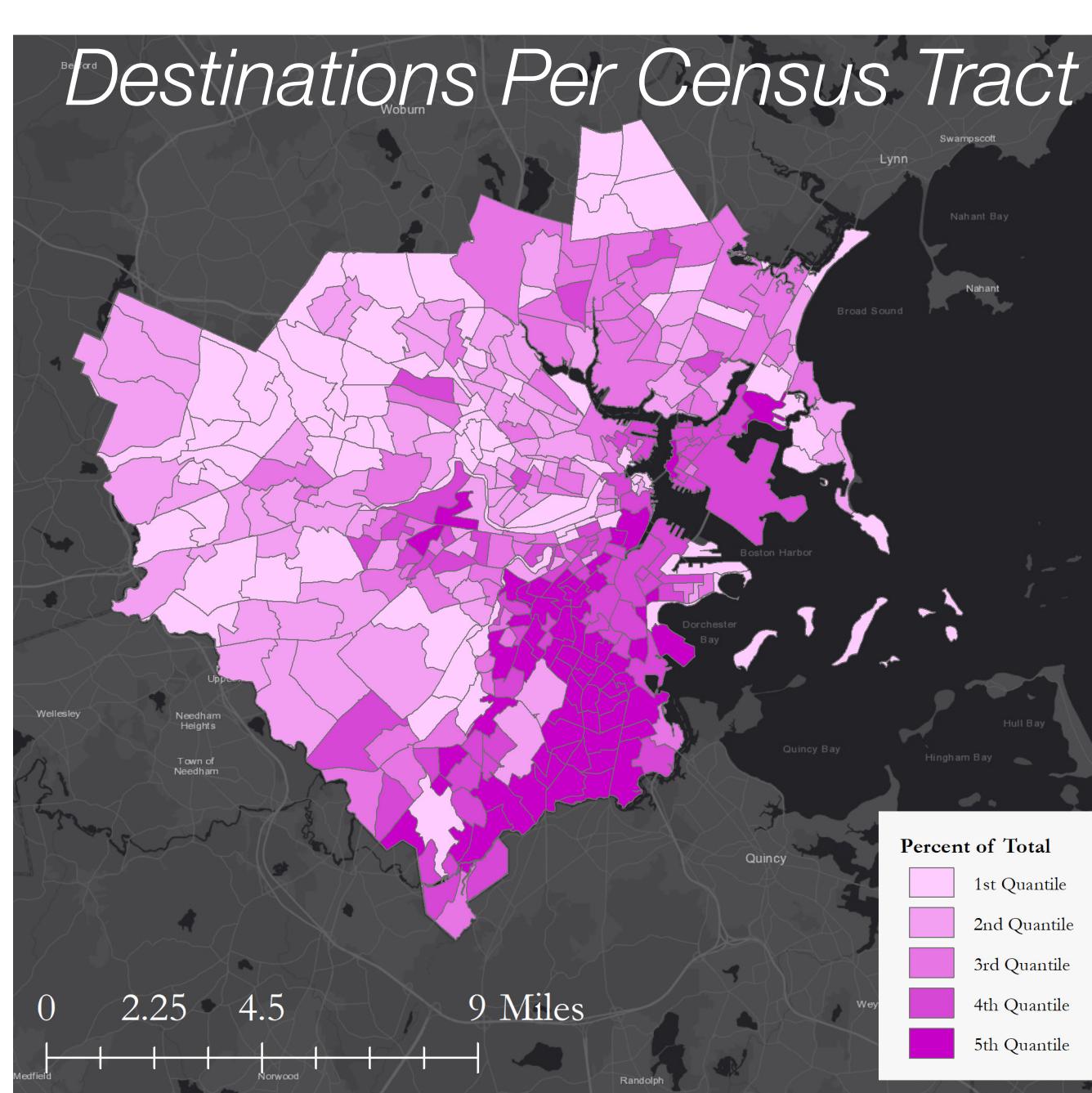
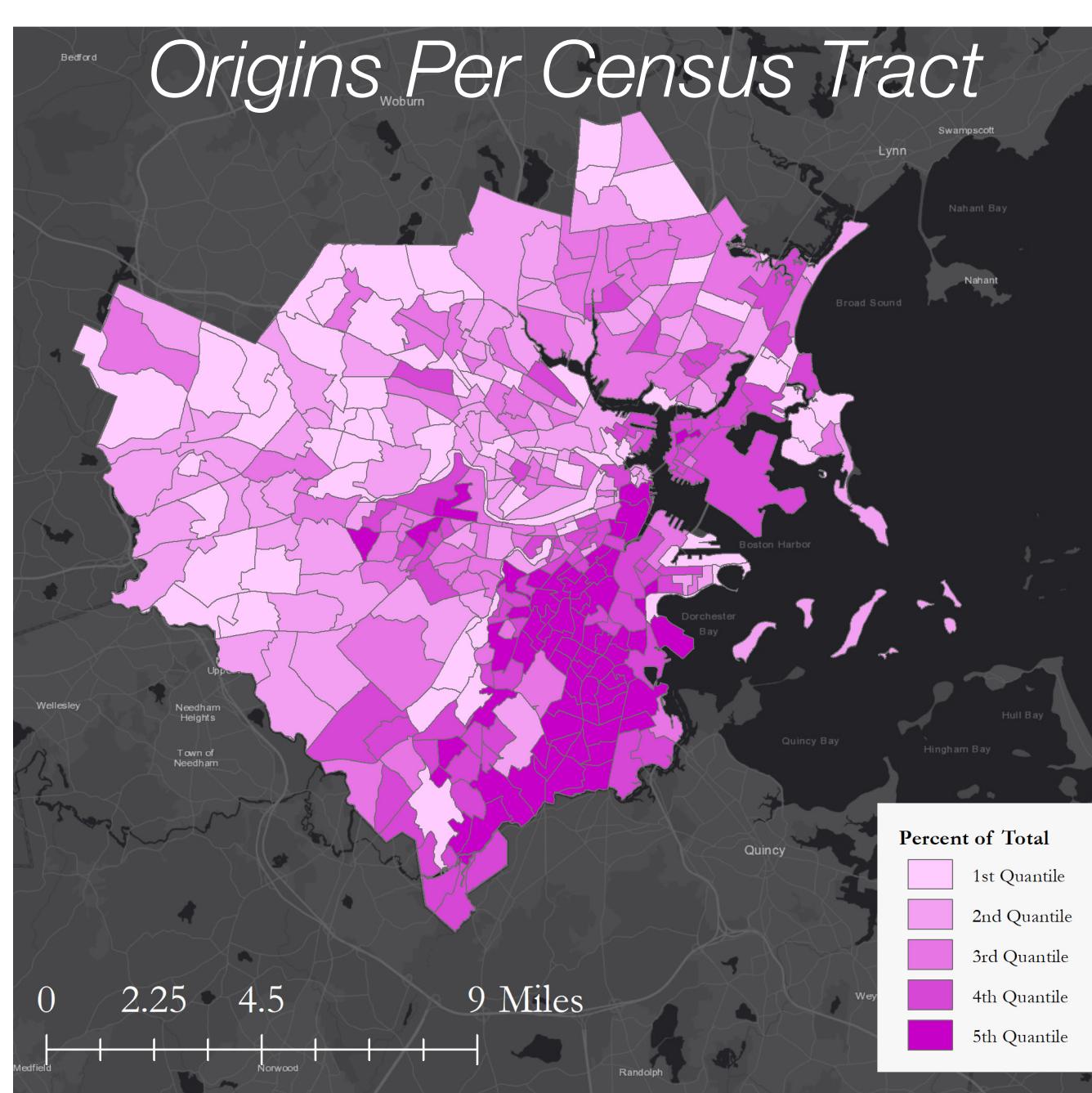
These results appear to indicate that low income households appear to be both leaving from and moving to relatively clustered areas, mostly in Boston proper. However, a not insignificant portion of mobility is occurring outside of Suffolk County, roughly 8%. The presence of significantly more clustered origins than destinations could indicate that the drivers of household mobility have a significant geographic component.

Further research should examine drivers of household mobility at both the individual level, income, age, race, and number of children, as well as the neighborhood level, including variables like gentrification and eviction rates. These neighborhood factors could explain the strong geographic clustering of origins as compared to destinations.

There are two major limitations with this project. The first is that the aggregation of households to census tracts and a 500ft grid could be hiding significant relationships. However, aggregation is essential to protect individuals’ privacy, but the impacts are important to consider for future research.

The second is the data collection process. Since this data set was pulled from tax records collected by the BTHC, which predominantly operates in Boston, it’s likely that many people who were displaced further than the suburbs of Boston. Municipalities such as Brockton, Worcester, and Lowell chose not to travel to Boston to have their taxes prepared. Attrition bias is common in convenience sampling like this. Future research on housing mobility in Boston should focus on creating a sample like the MARS instrument developed by Matthew Desmond.

This research is preliminary in nature and is an attempt to mine patterns in this data set. Future research will develop discrete hazard models and binomial regressions to understand what drives urban mobility among low income households. These models will include the households removed for this projects and also account for individual and neighborhood factors. By focusing on individuals these models will minimize the impacts from the MAUP.



Hot Spot Analysis

