

Chicago is Large, Contains Multitudes

Using spatial data visualization to resolve a paradoxical reputation

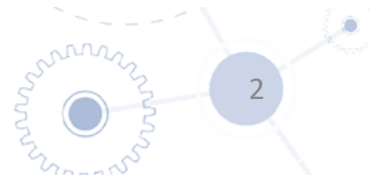
Dan Herweg

May 2019

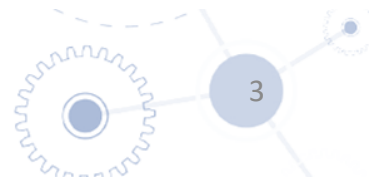


**Do I contradict myself?
Very well then I contradict myself,
(I am large, I contain multitudes.)**

- Walt Whitman, Song of Myself



**This project attempts to resolve a paradox I
have experienced for a long time...**

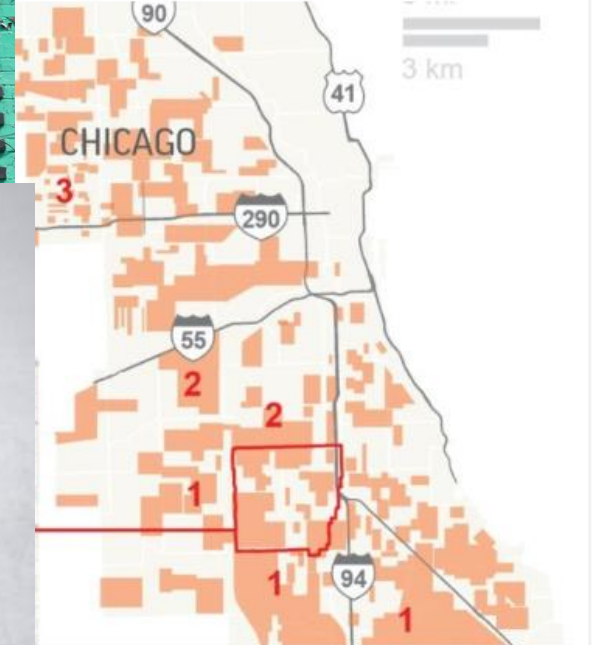




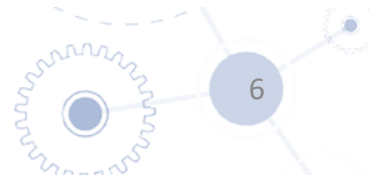
Chicago is most corrupt big city, Illinois third most corrupt state in country, study finds



'The Insane chicago way': what gangs
are fighting on your streets?

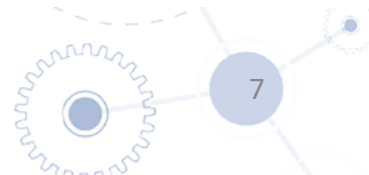


Is Chicago a vibrant, thriving city?
or is it in decline?

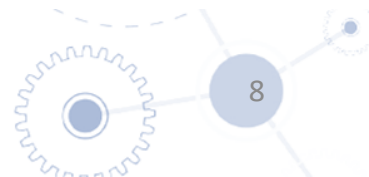
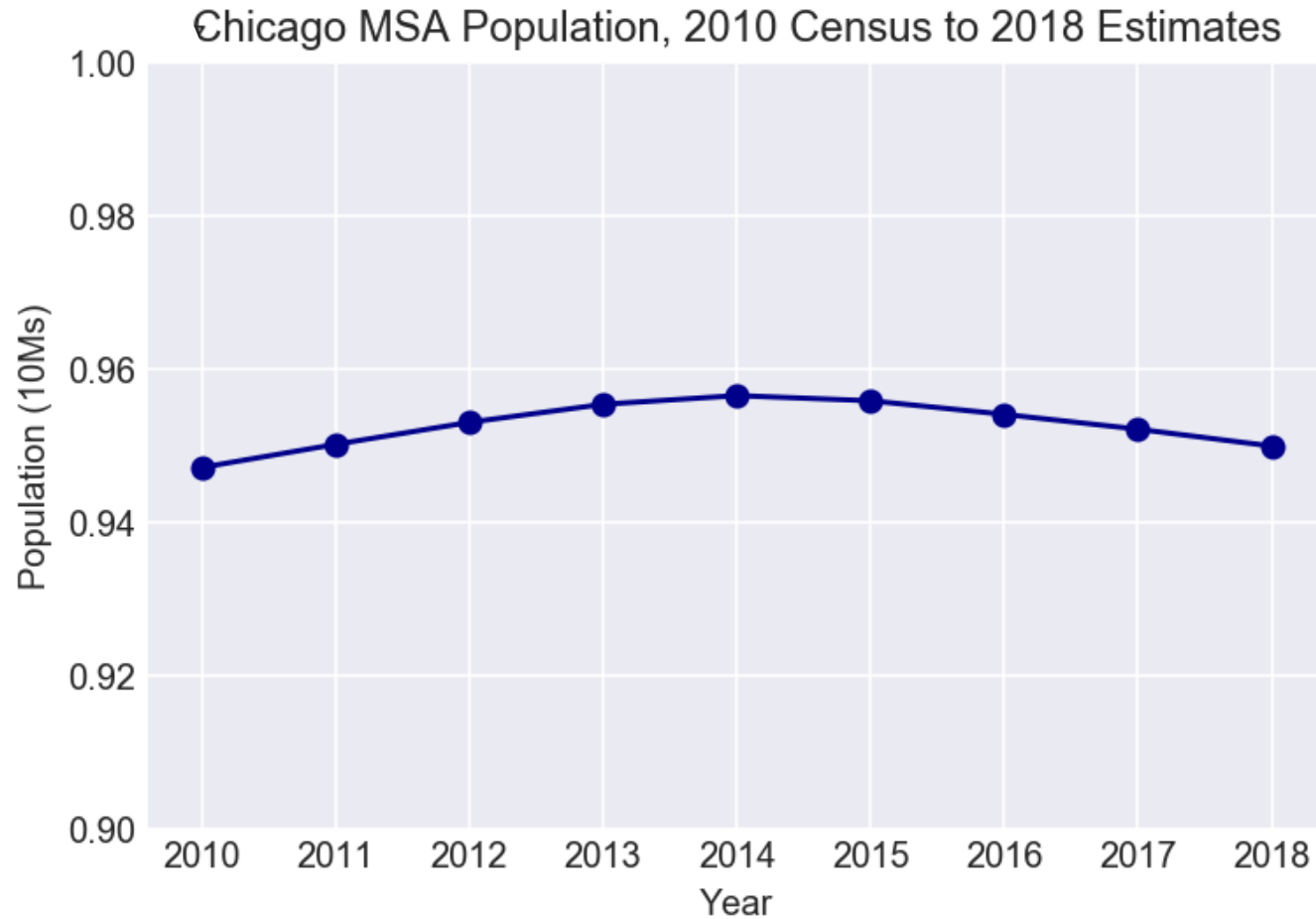


My hypothesis is that population stagnation was due to an internal bimodal distribution:

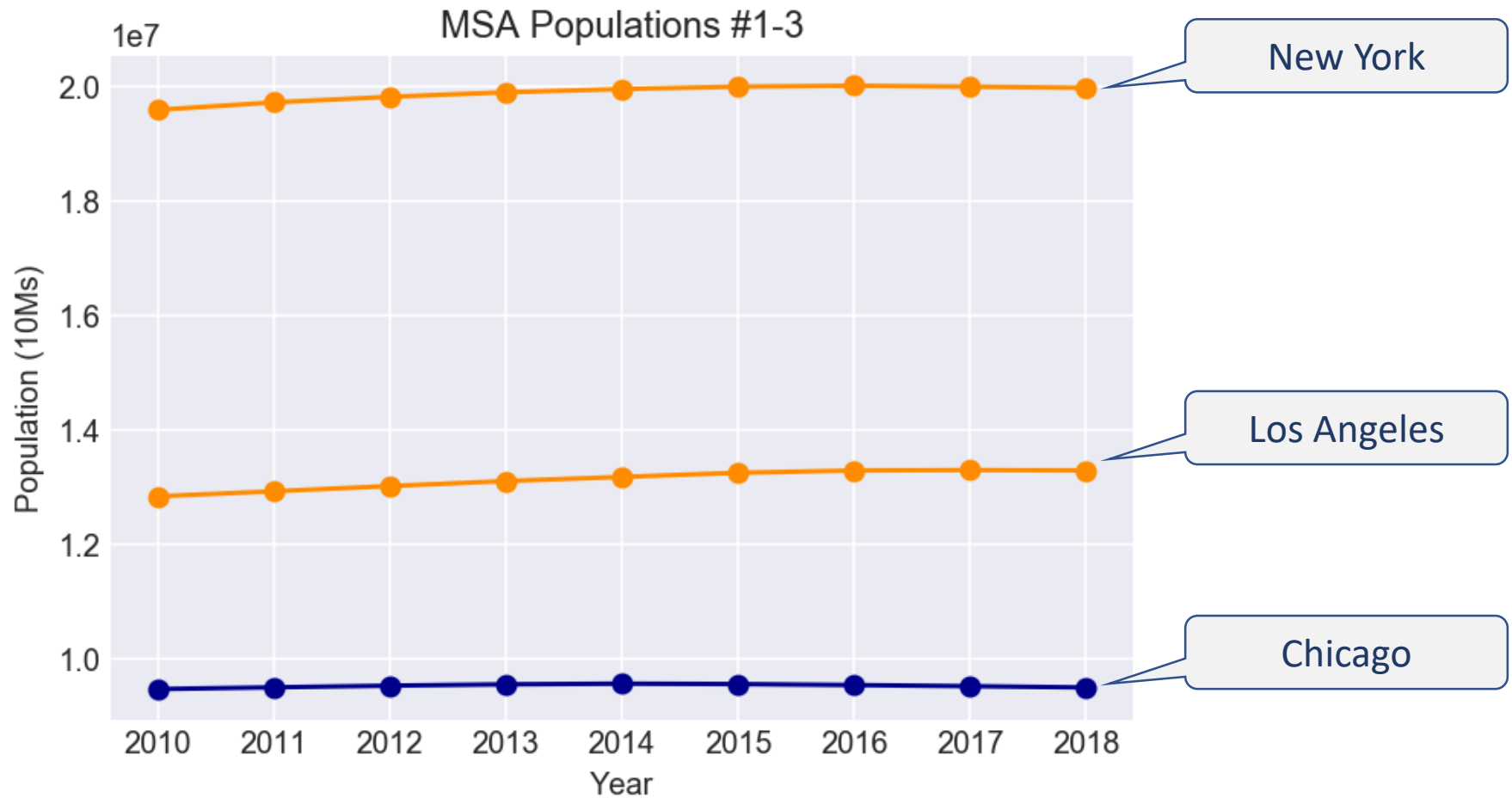
**The north side growing
while the south side declines**



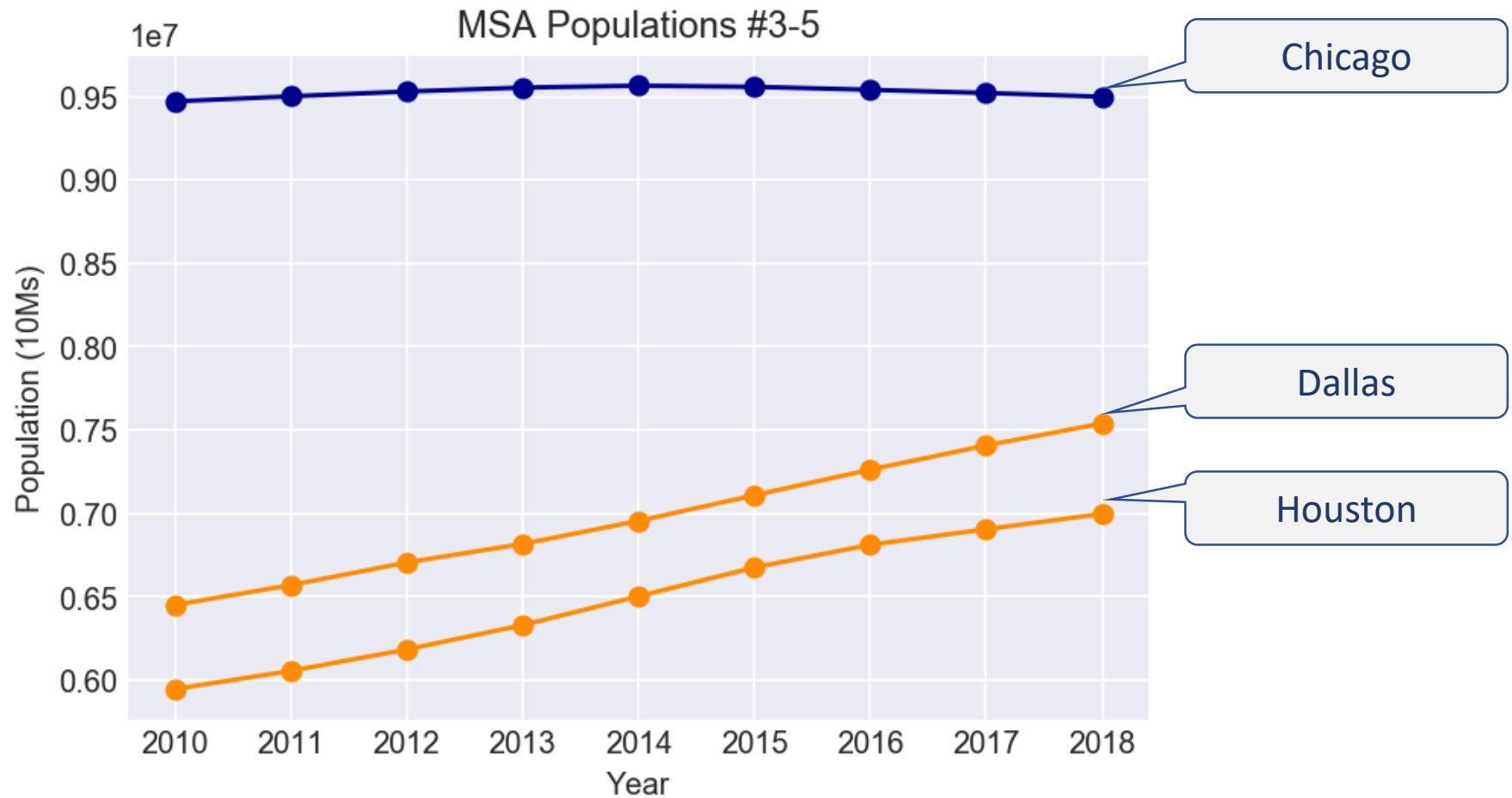
Chicago's overall population has been flat to down



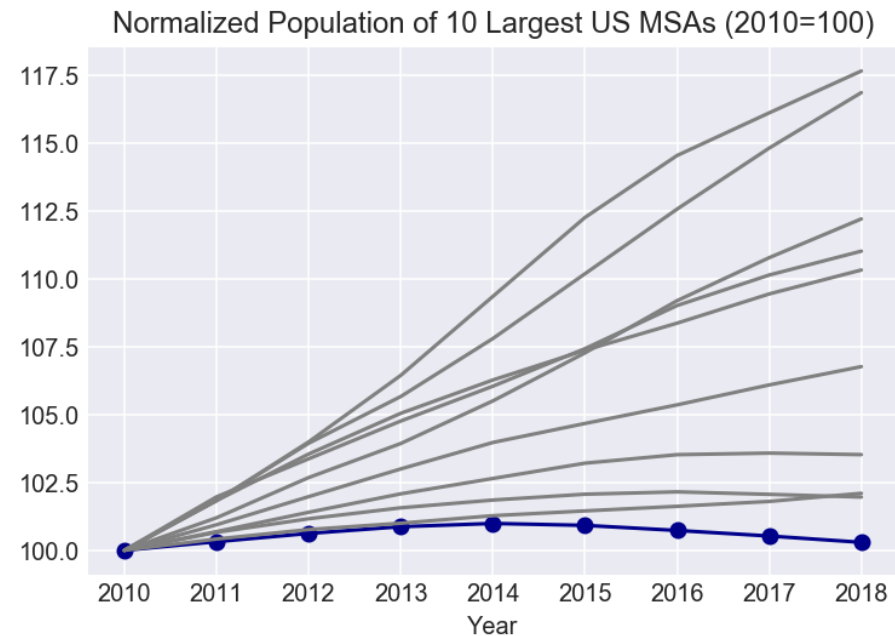
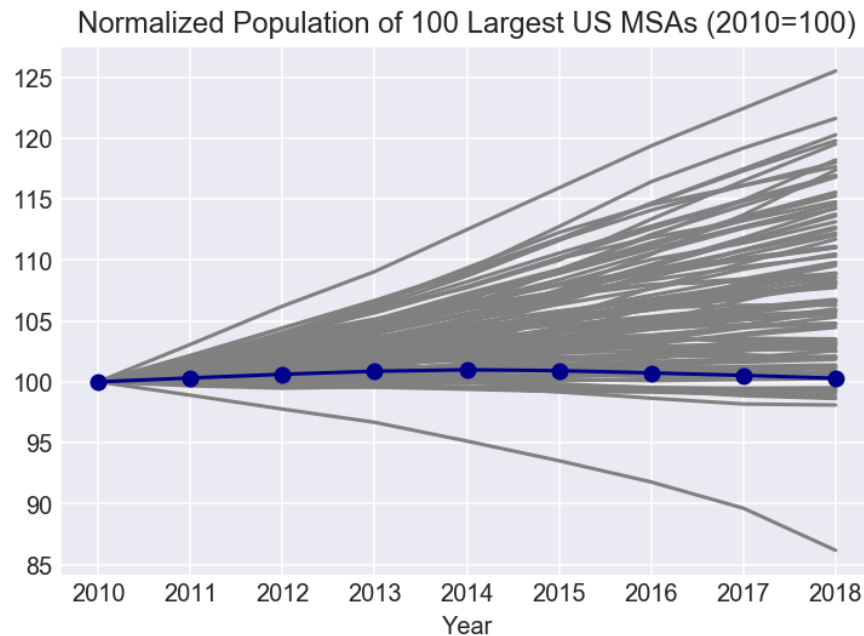
The top 3 MSAs in the US show subdued population growth



However, two growing Texas MSAs are on track to overtake Chicago's #3 spot

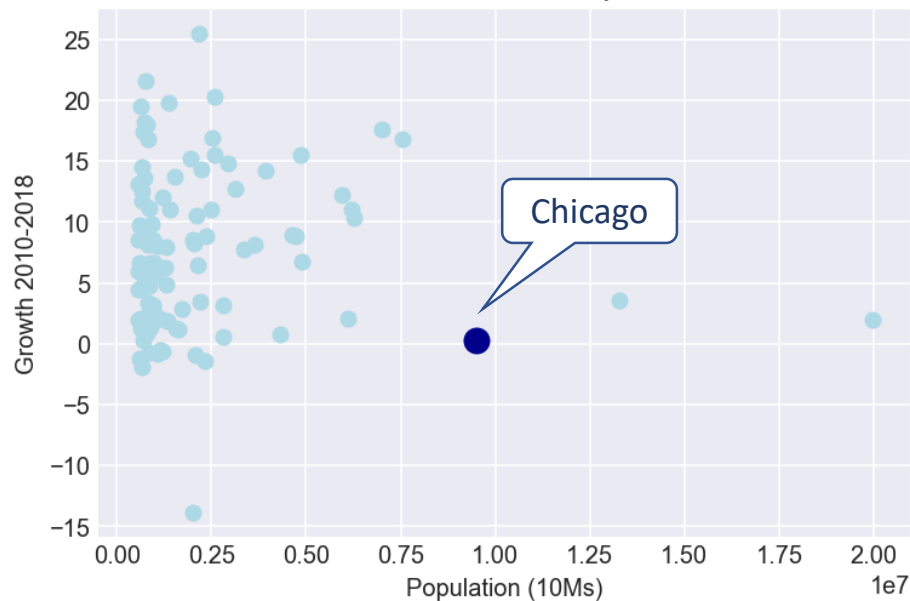


Normalizing population data, Chicago's growth is low in the US vs. top 100 and top 10 peers

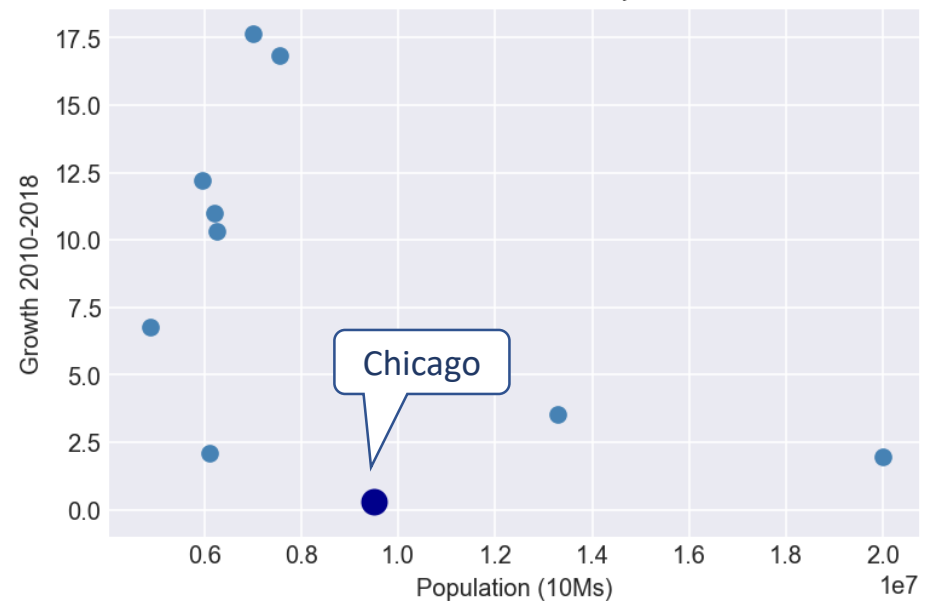


Smaller cities tended to grow faster, but Chicago still grew least among the top 10

Size vs. 2010-2018 Growth, Top 100 US Cities

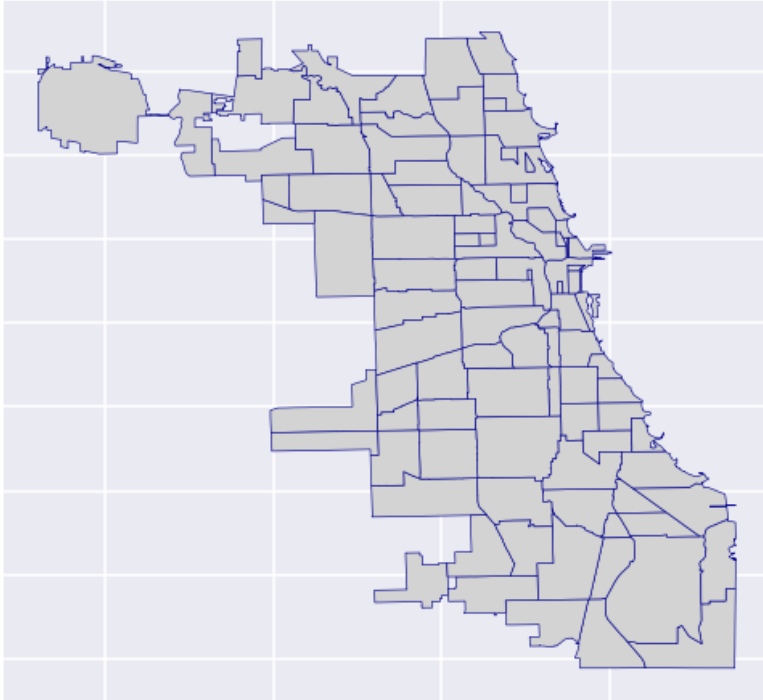


Size vs. 2010-2018 Growth, Top 10 US Cities

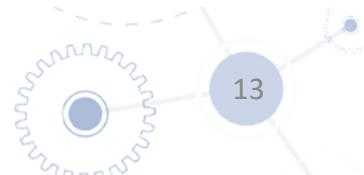
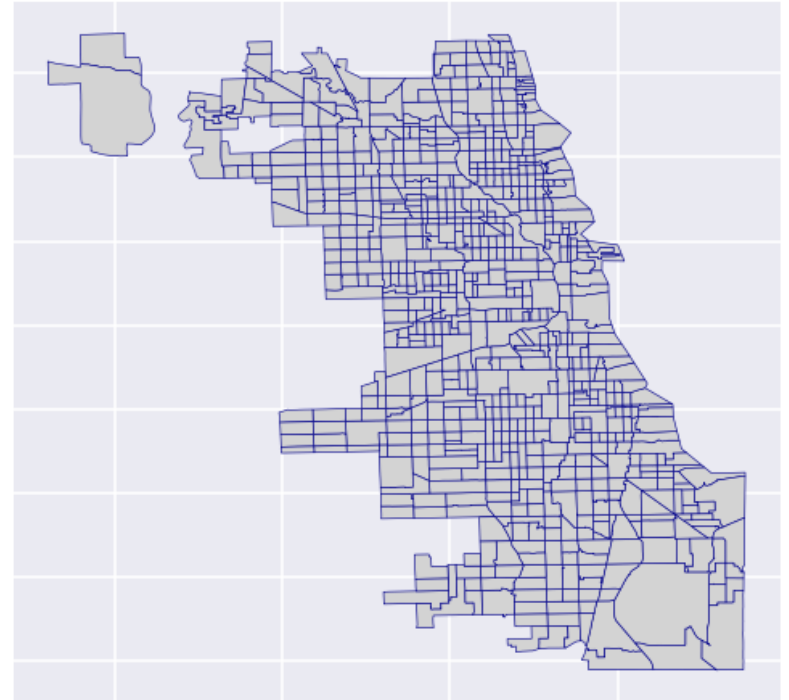


Neighborhood or census tract level data can show distributions within the aggregate

Chicago Neighborhoods

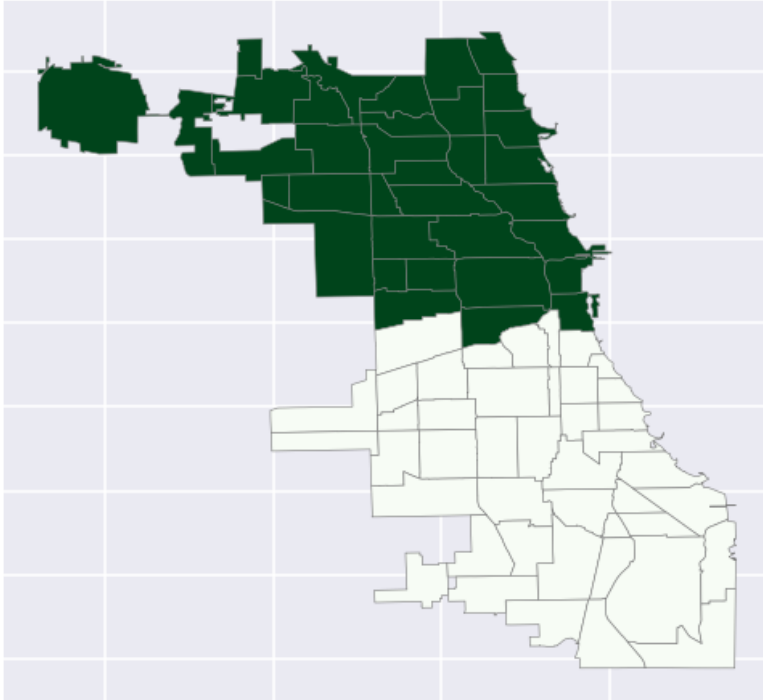


Chicago Census Tracts

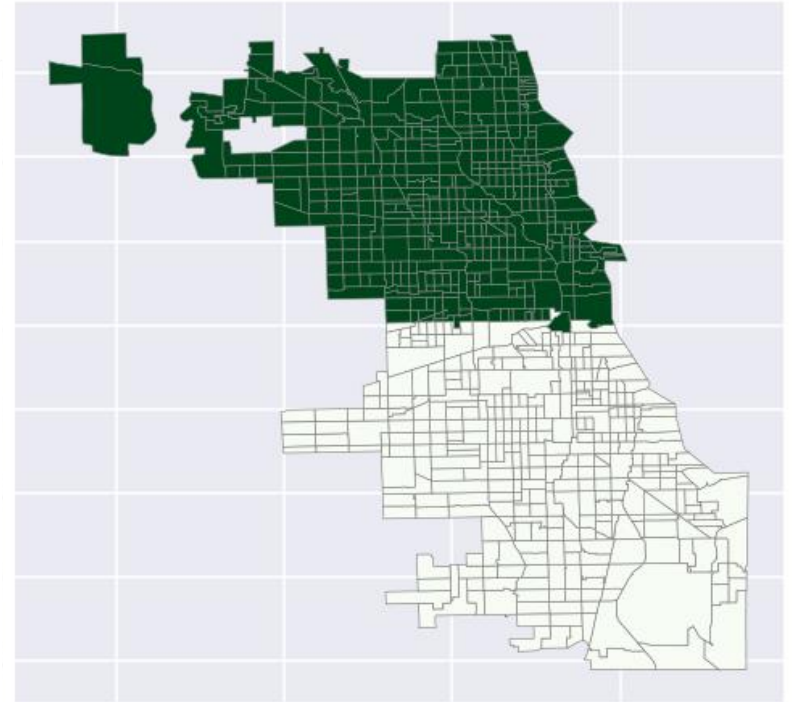


These smaller pieces can be classified as Northside and Southside

Northside/Southside Neighborhoods

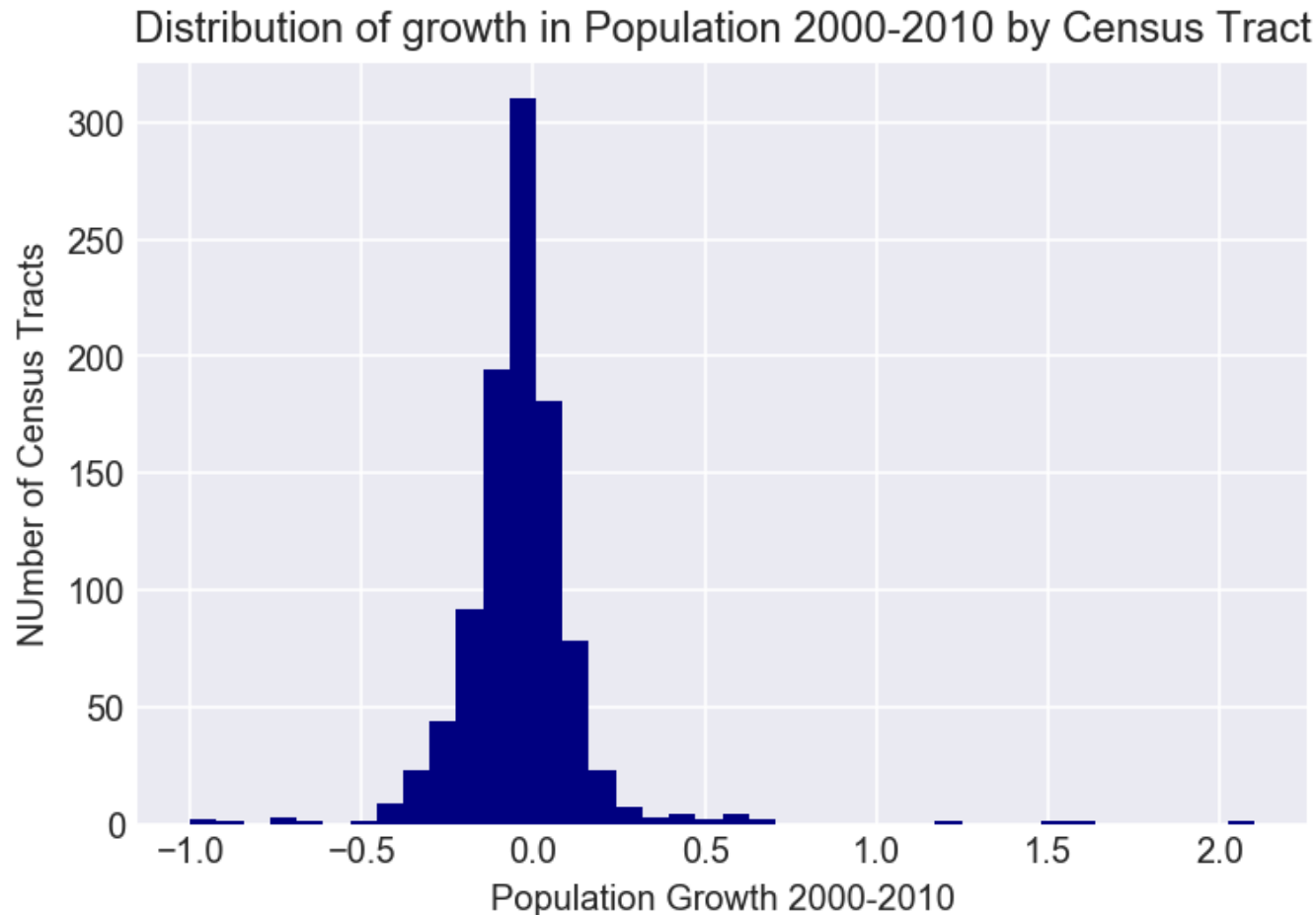


Northside/Southside Census Tracts

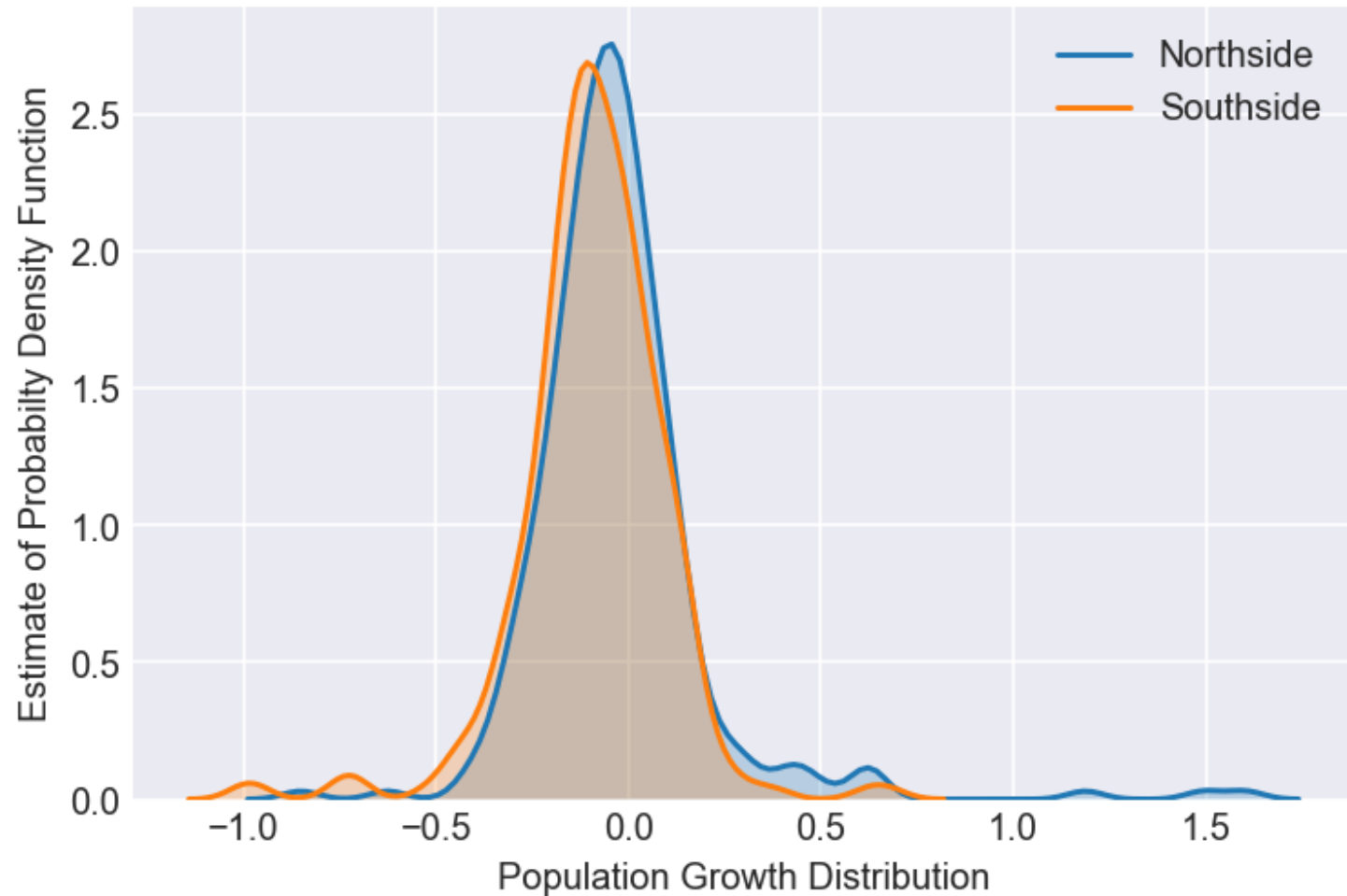


These classifications were done by unscientifically choosing a y-coordinate that made sense to me and separating the polygons using their centroids

Census tract level population growth does not look strongly bimodal overall

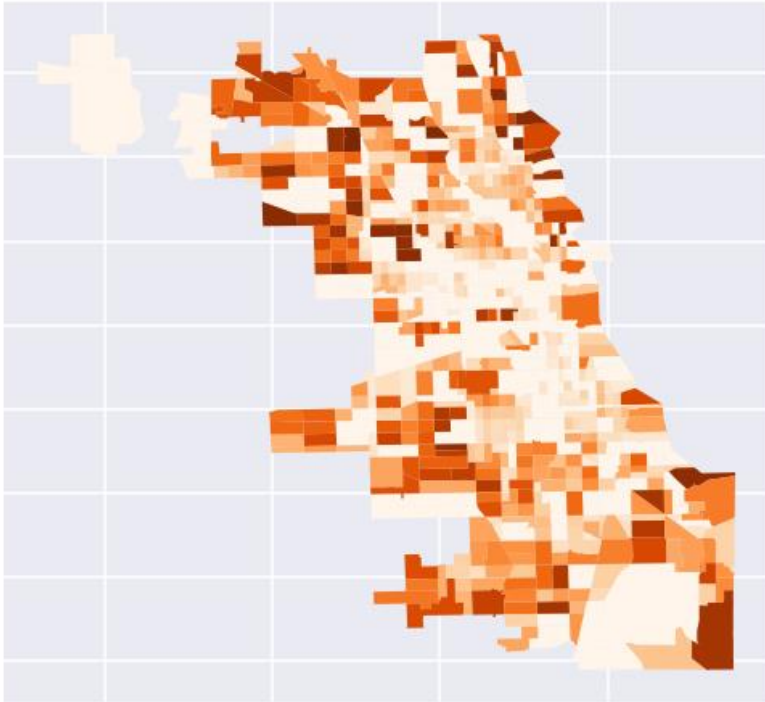


Using the north/south tag, some evidence of spatially differential growth rates is seen

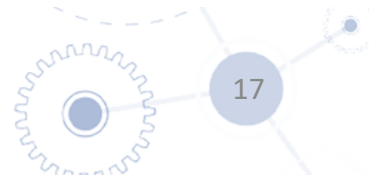
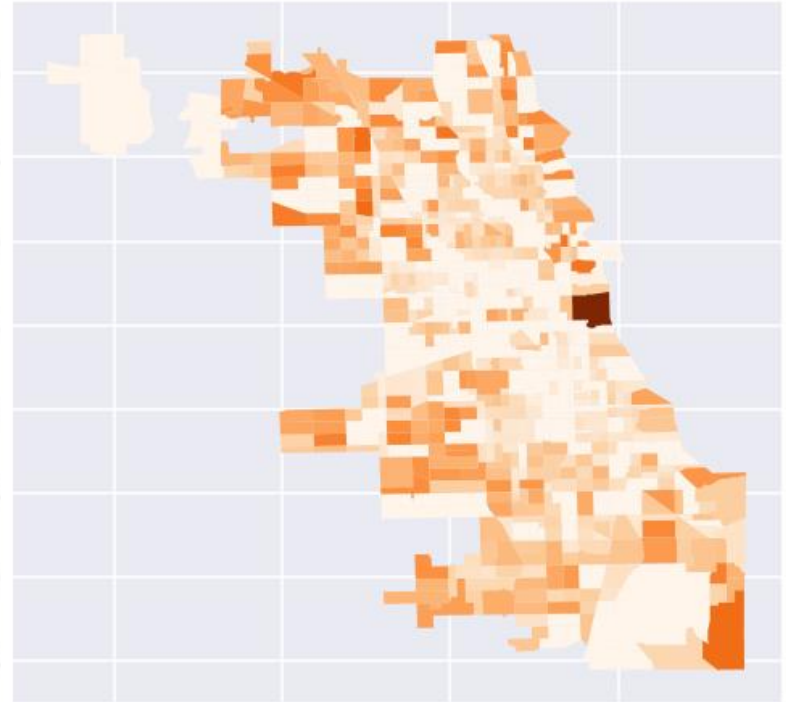


Another explanation is that population density moved downtown

Population Distribution in 2000

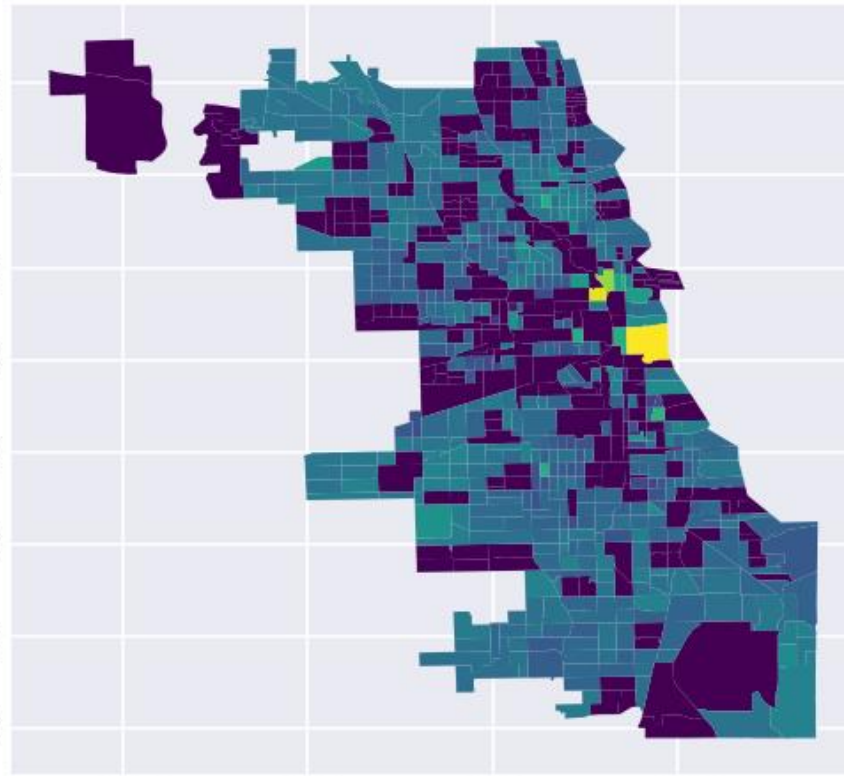


Population Distribution in 2010

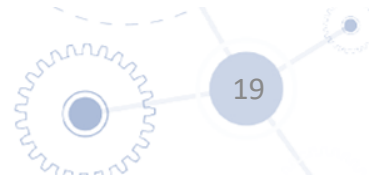


Population growth rates reflect this movement

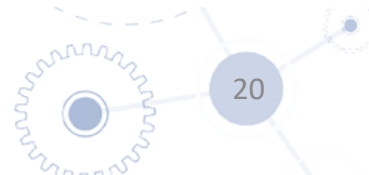
Distribution of Population Growth Rates from 2000-2010 by Census Tract



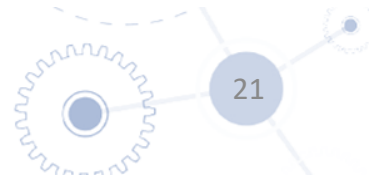
Data fit a center/periphery distinction as more important than my north/south hypothesis



However, my priors were based on other evidence of north/south divides

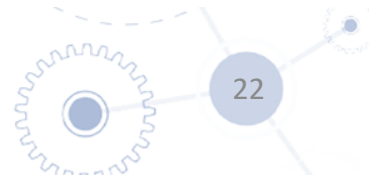


Race

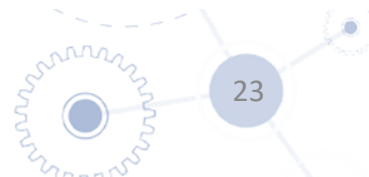


Race

(we have seen this map in several classes already)

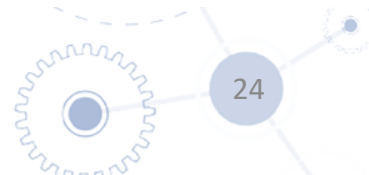


AirBnb Prices



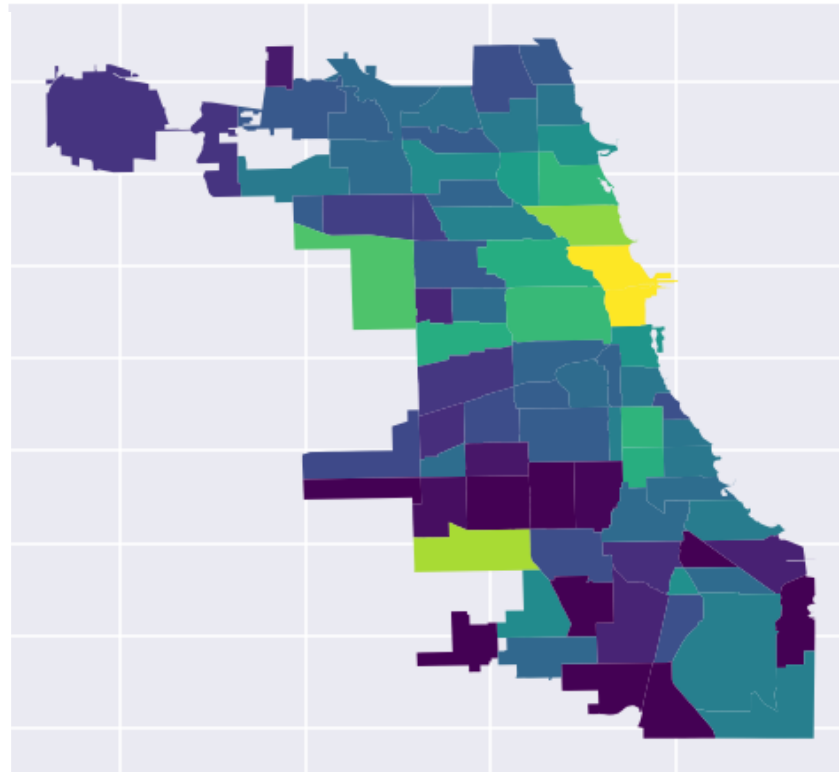
AirBnb Prices

Crime

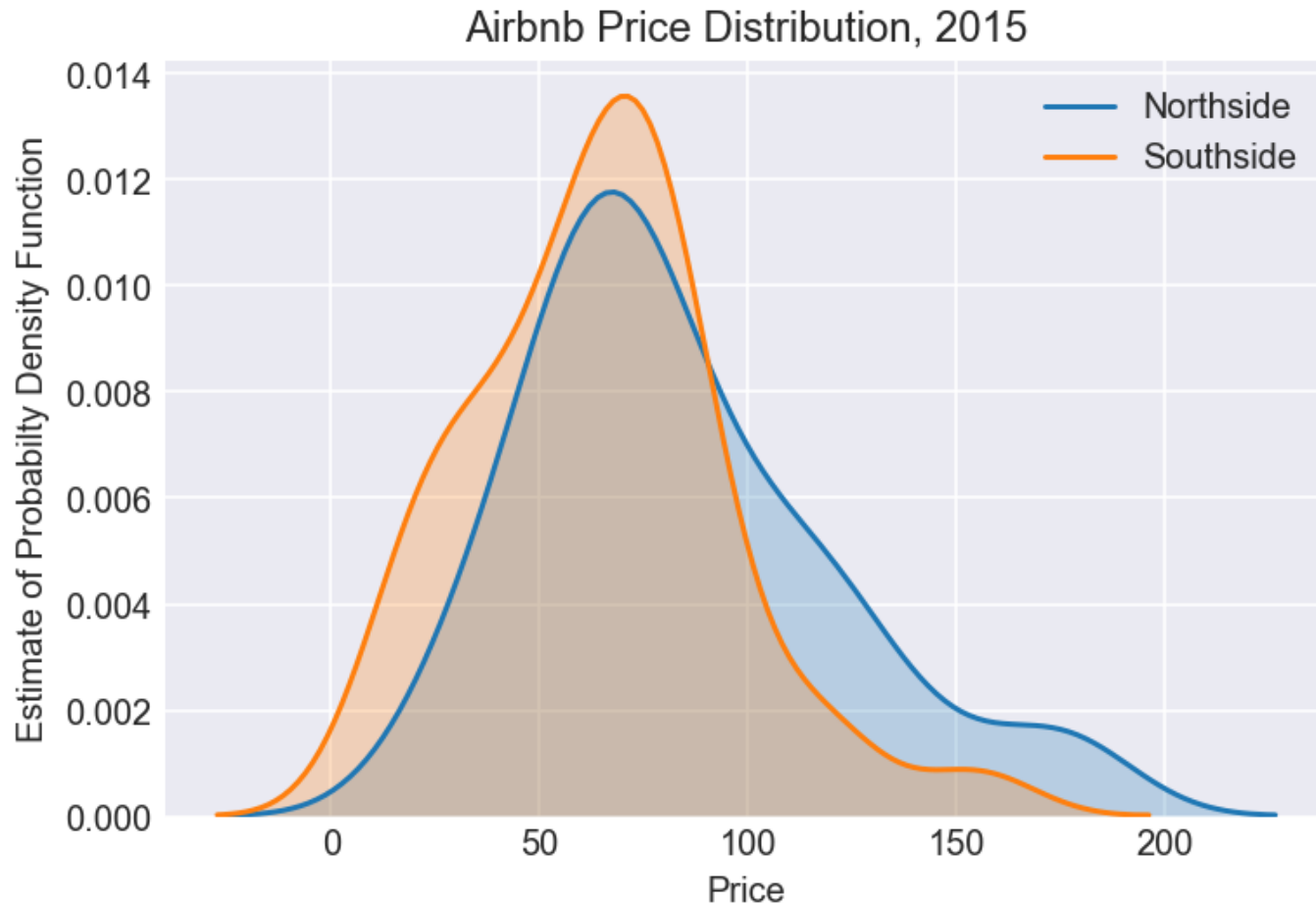


Spatial AirBnB visualization shows the center/periphery effect of downtown

AirBnb Prices in Chicago, 2015



While a distribution view illustrates north/south differences

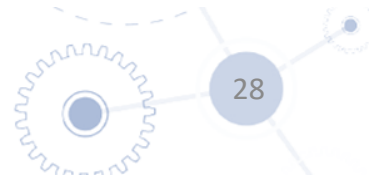


Crime



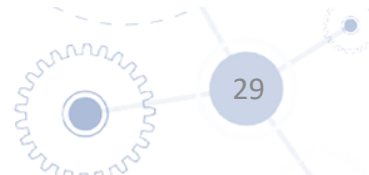
Crime

- Theft



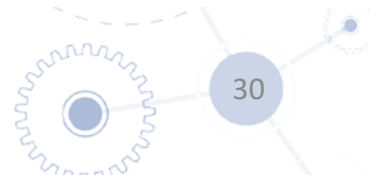
Crime

- Theft
- Narcotics



Crime

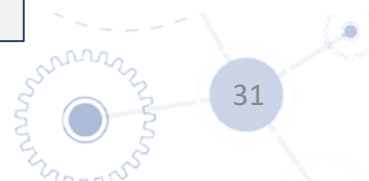
- Theft
- Narcotics
- Homicide/Weapons Violations



Crime

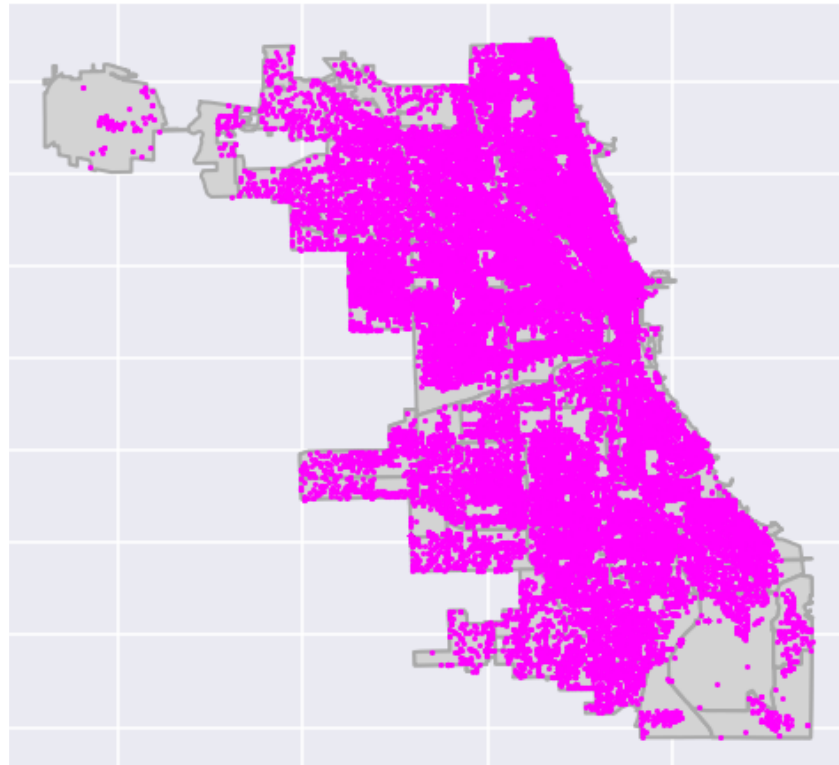
- Theft
- Narcotics
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Neighborhood maps and distributions were made using a random sample of 5% of the crimes in the last year. Crimes were assigned to the neighborhood based on distance to the neighborhood's centroid



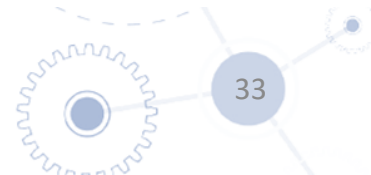
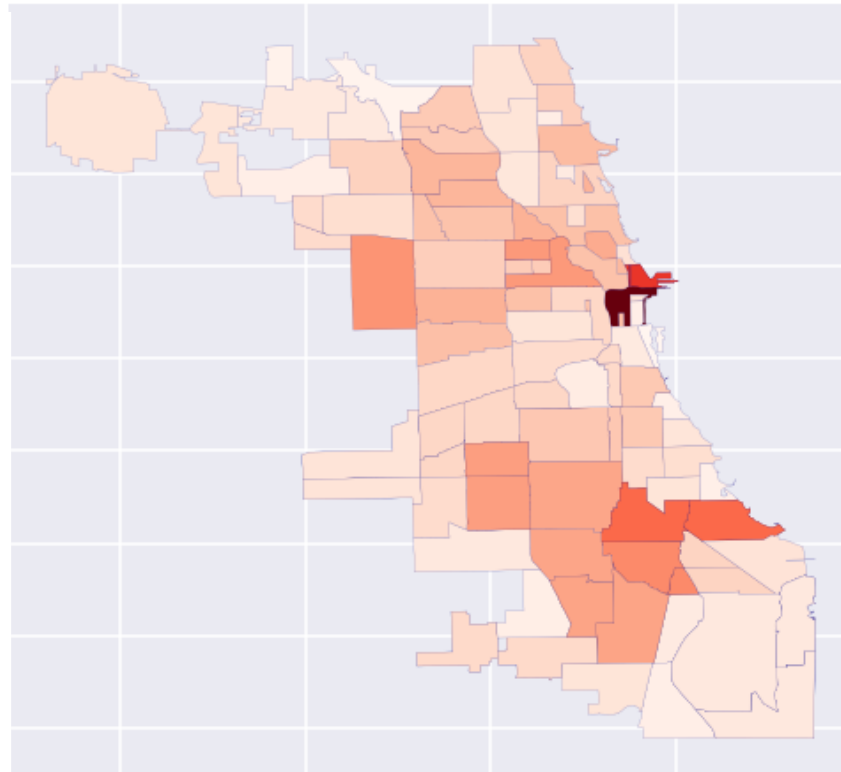
Thefts are very common and occur everywhere

Thefts in Chicago, May 2018 - May 2019

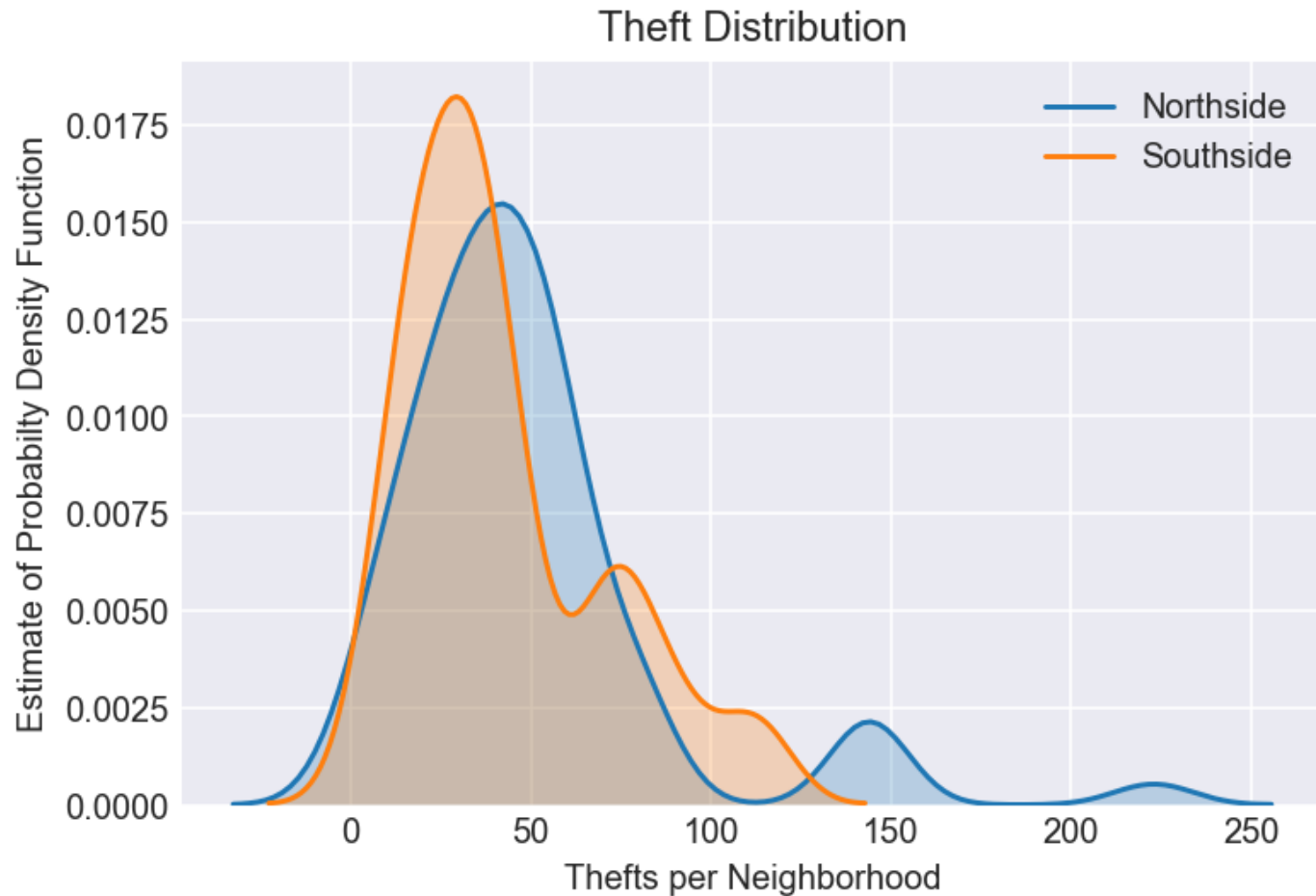


Sampling the data and aggregating spatially shows us theft is concentrated downtown

Theft Sample Distribution

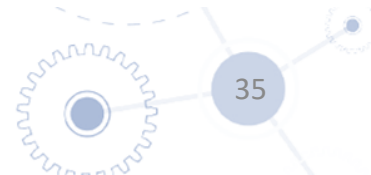
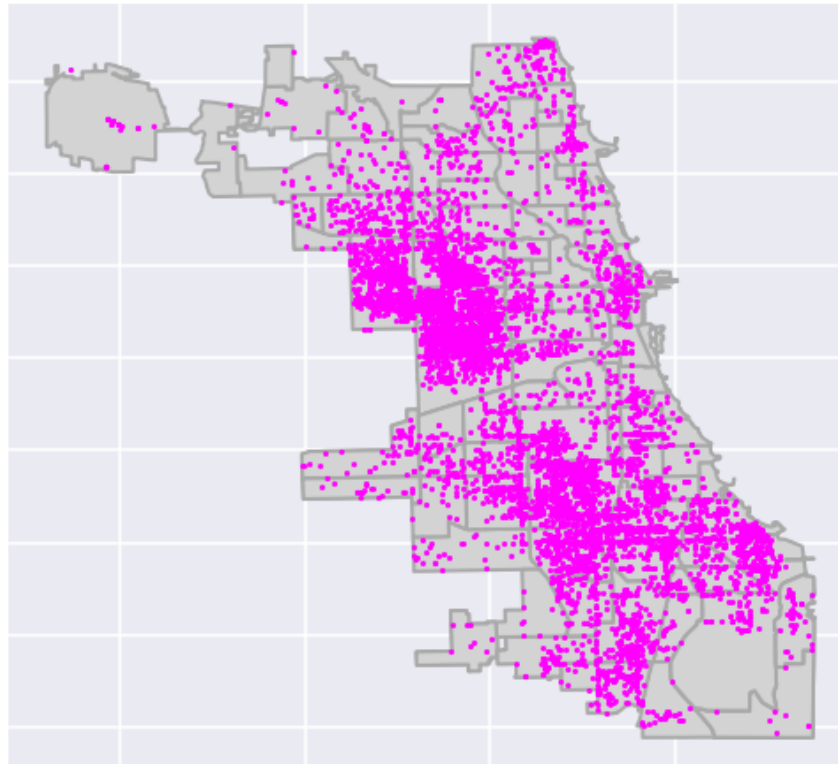


Tagging neighborhoods in the sample shows the distribution of theft on a north/south axis



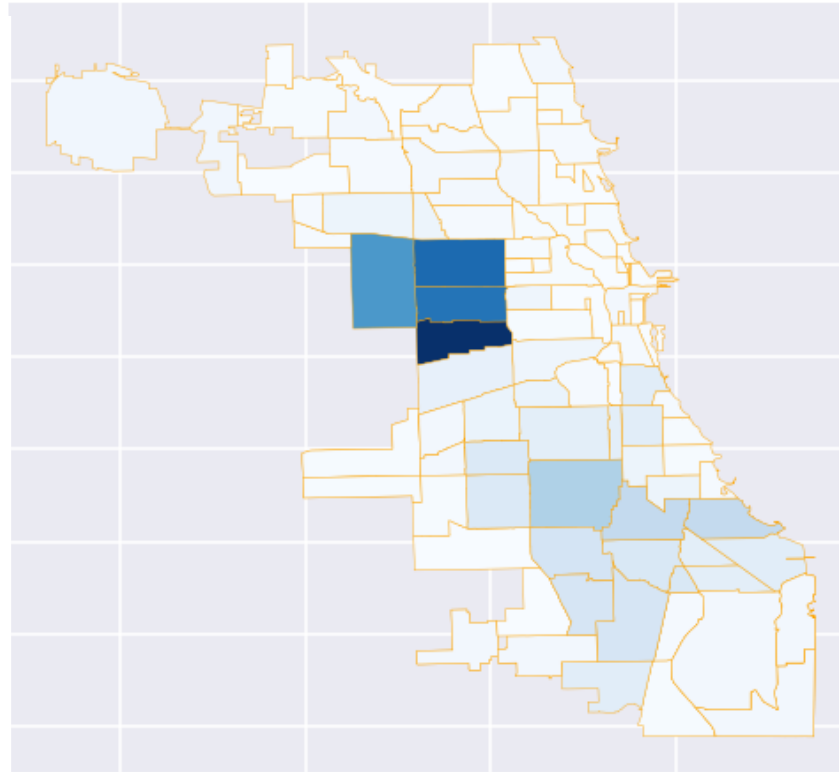
Narcotics crimes occur in all areas as well

Narcotics in Chicago, May 2018 - May 2019

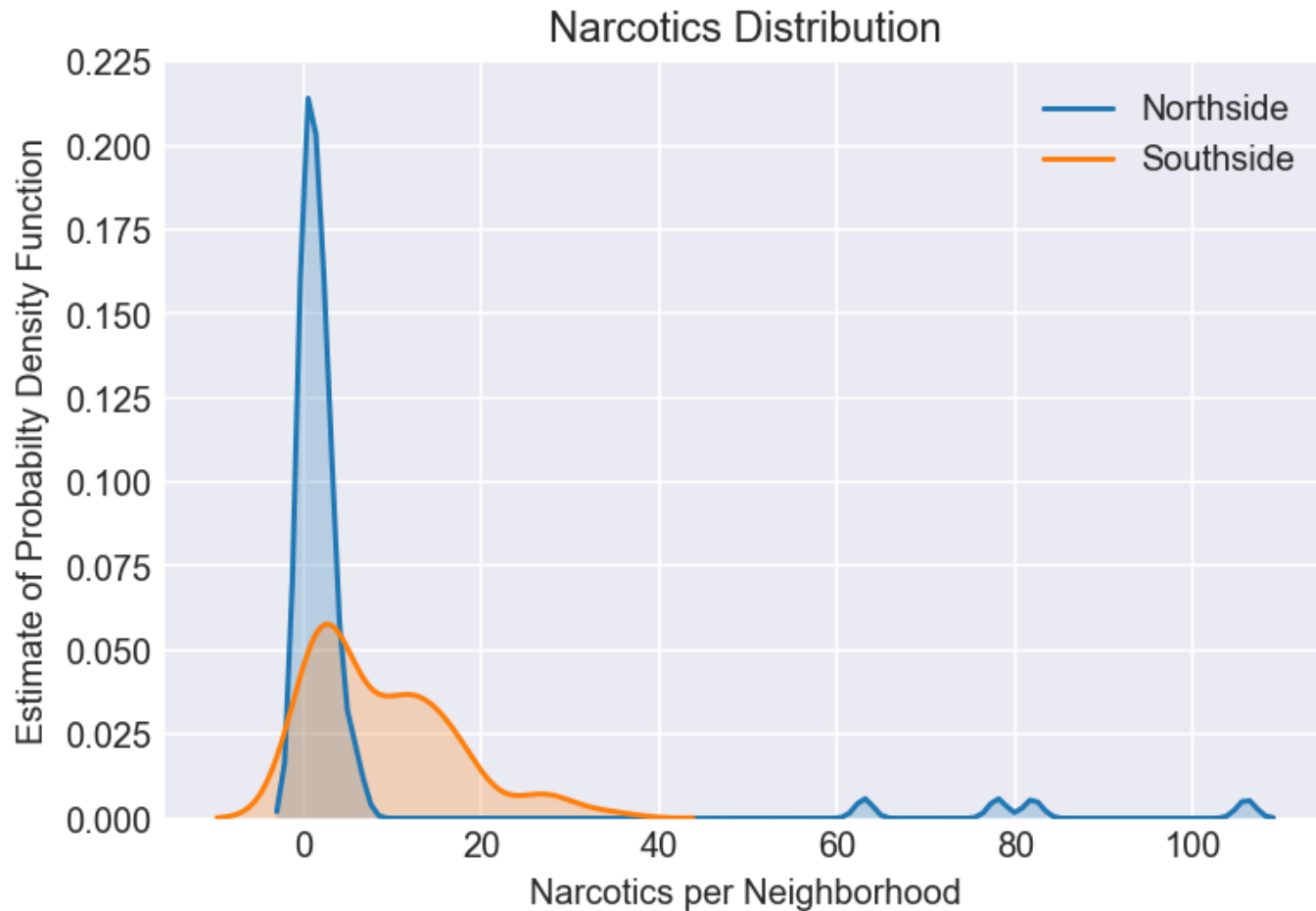


However they are concentrated in the west and south, coincident with gang activity

Narcotics Sample Distribution

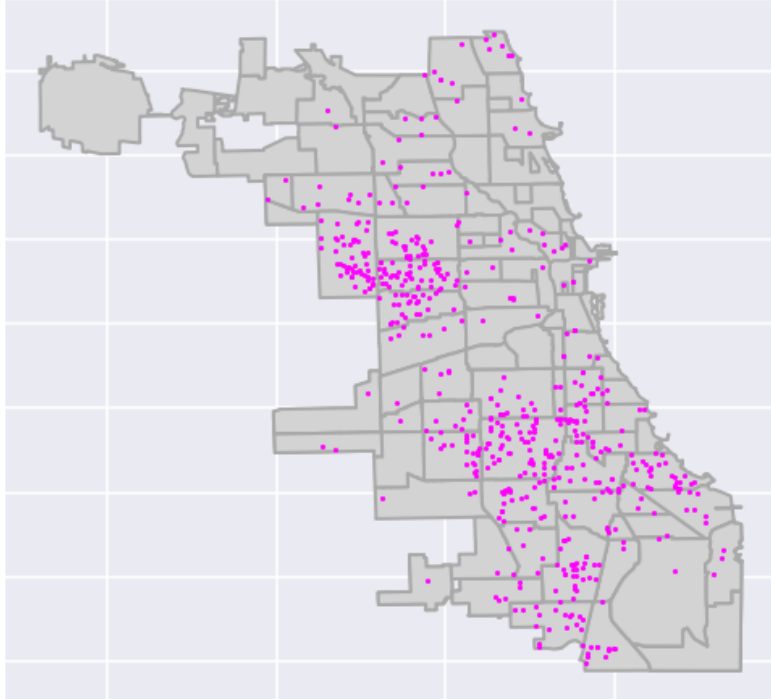


Northside outliers have the most narcotics incidents. The Southside has more on average

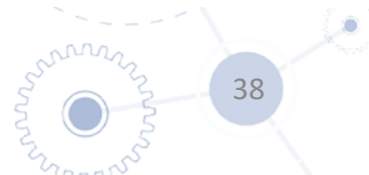
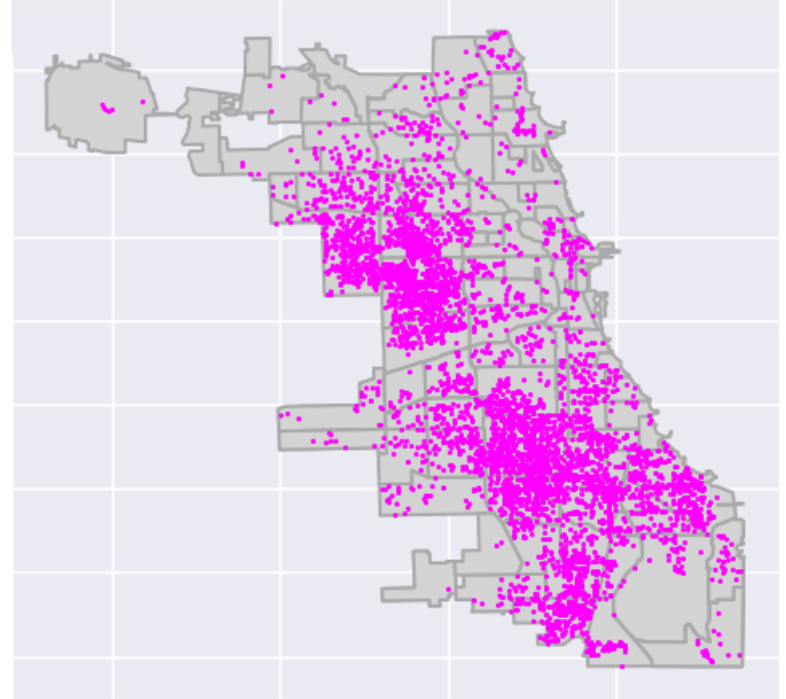


Homicides and Weapons Violations are also concentrated in the west and south

Homicides in Chicago, May 2018 - May 2019

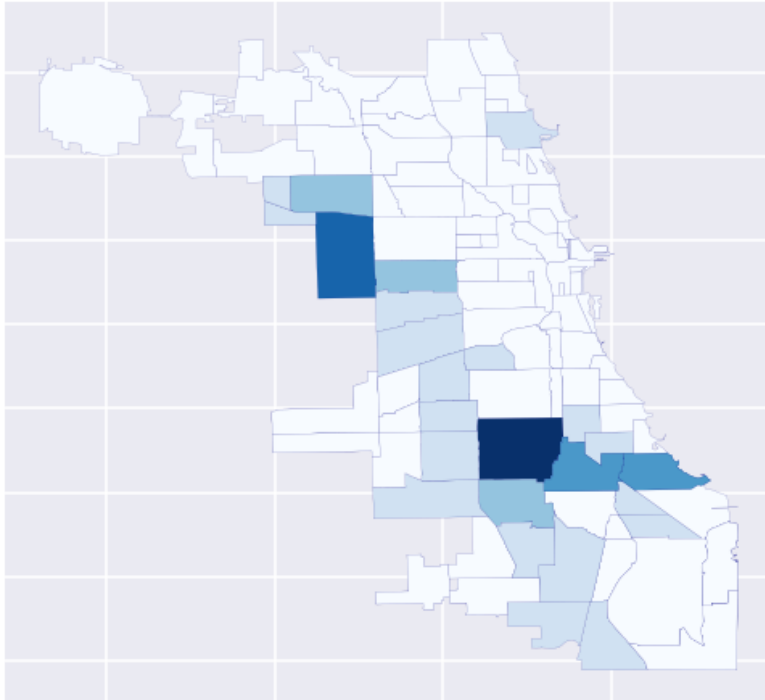


Weapons Violations in Chicago, May 2018 - May 2019

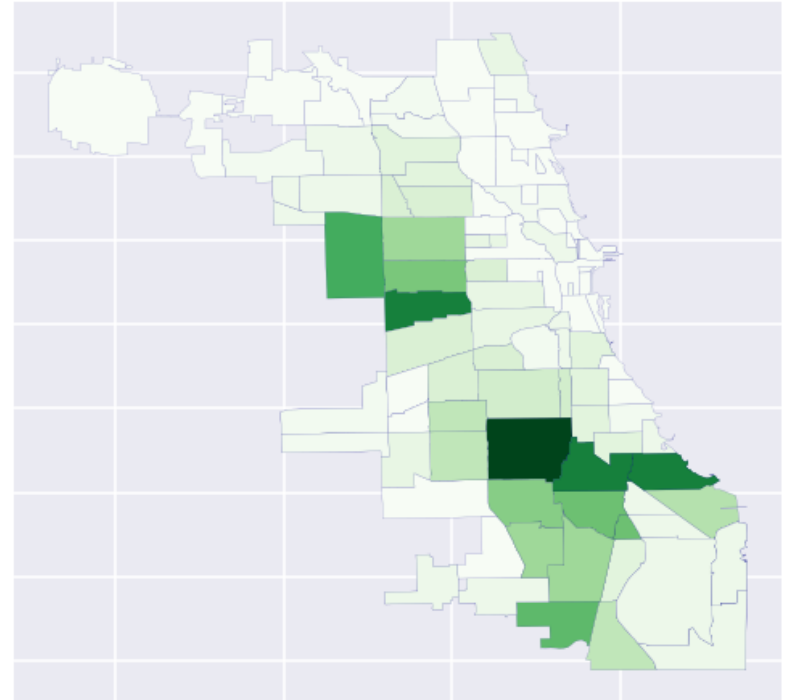


Homicides and Weapons Violations are also concentrated in the west and south

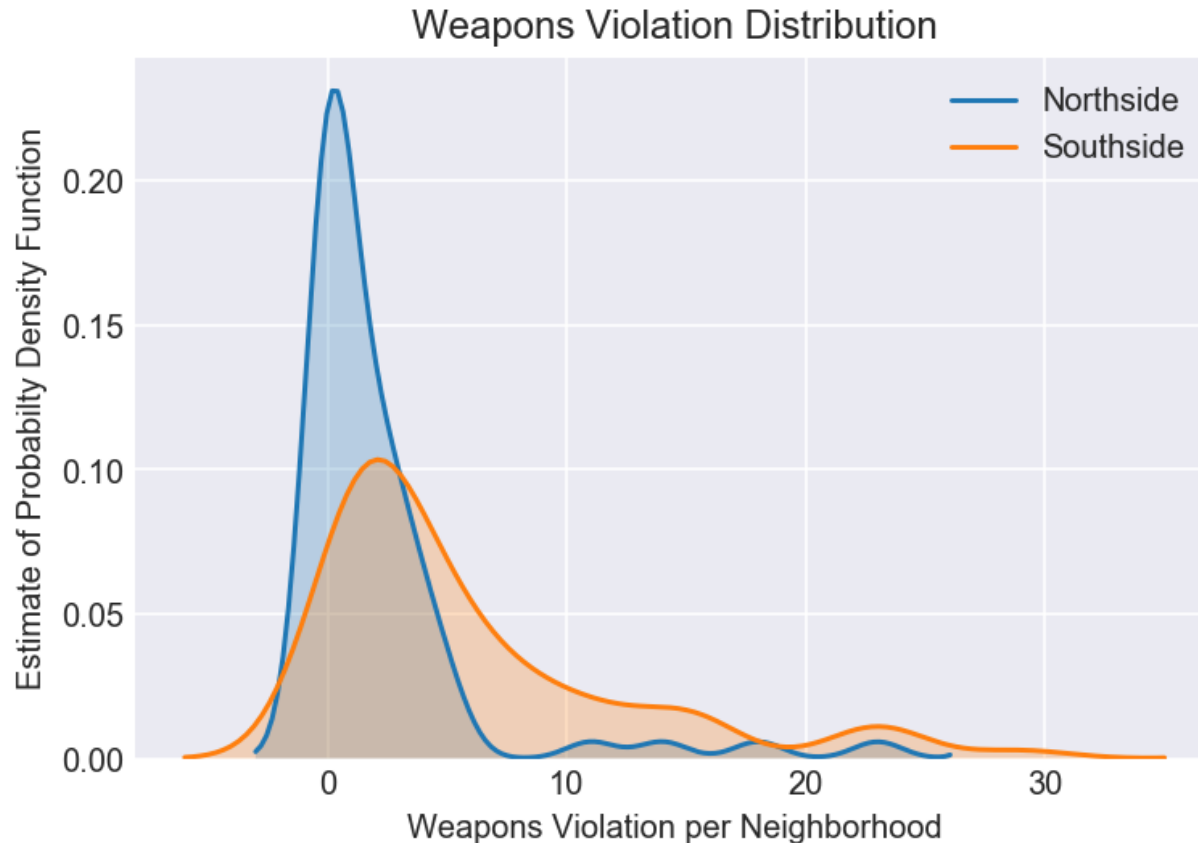
Homicide Sample Distribution



Weapons Violation Sample Distribution



Weapons Violations are skewed right on the Southside



Conclusions

- Aggregate data can ignore important information about underlying distributions
- Tagging spatial relationships with a north/south dimension is interesting, but clearly an oversimplification of social processes
 - Even the spatial element is a minimum of 2D!
- Chicago has spatially-related differentials that reflect disparate social and economic processes in close proximity

Resources



<https://data.cityofchicago.org/>
<http://tomslee.net/category/airbnb-data>
<https://www.census.gov/data.html>

MADAS

MASTER in DATA SCIENCE for COMPLEX ECONOMIC SYSTEMS

