
Midterm Presentation for Intra-Regional Migration and Transportation in New York Metro Area

UP206A - Introduction to GIS and Spatial Data Science

Winter 2021

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Students:

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Zhendong Long (Jayden)

What happen during the pandemic?

...

People are leaving!



Millions of Americans moved during the pandemic – and most aren't looking back

The faces of America's cities and neighborhoods have been forever altered by the pandemic.



Buyers are fleeing the cities, seeking more affordable homes and yard space for their families, home offices for parents, and designated areas for remote learning for their children. Baptiste Virot / for NBC News

Source: NBC News

Is this just a COVID thing?

Bloomberg Wealth

Wealth

Even Before Covid 2,600 People a Week Were Leaving New York City

By [Alexandre Tanzi](#) and [Wei Lu](#)

December 5, 2020, 3:00 AM PST

-
- Los Angeles, Chicago also among cities with 100+ daily exodus
 - Phoenix, Dallas, Austin among big gainers in 2019 Census data
-

Source: Bloomberg News

•••

Nope! It's a generic out-migration trend.

So, there are some questions raised?

• • •

How many people migrate?

Where to?

Potential impacts?

What leads?

Section I.

Introduction

- Topics & Geographical Scope
- Research Questions
- Why It Matters?

Topics & Geographic Scope of Research

Migration
Demographics
Economy
Housing
Transportation
Mobility



New York City Metro Area

- Largest metro area in the U.S.-
- Supported by several busiest commuter trains-

Research Questions

What is the
MIGRATION PATTERN
regionally and nationally?

What are the
IMPACTS OF MIGRATION
on economy and housing?

Does and How
Transportation Infrastructure
affect migration and its impacts?

Why Do Them Matter?

In the context of

Personal Interests

Yushan's interest: transportation
Jayden's: economic development

In the context of

Post-COVID “Workstyle”

Intra-regional
vs.
Inter-regional migration

In the context of

Transit-Oriented Development

Transportation => More Migration?

Section II.

Methods

- Research Steps
- Data Processing Methods
- Applied datasets

Five Steps of Research

Step 1. Glance at Current Migration

Migration Trend during the pandemic

Step 2. Understand Big Picture

General migration pattern at the national scale

Step 3. Zoom in on Regional Scale

Local migration pattern in New York Metro

Transportation Network in New York Metro

Step 4. Record Migration Impacts

Local Housing and economy changes

Step 5. Look for Relationship

Migration pattern vs. Housing/Economy changes vs. Transportation Infrastructure

Three Methods of Data Processing

Method 1. Performance spatial analysis with geo-data

Mapping the study boundaries
Transportation network analysis

Method 2. Performance data analysis with census-data

Clean, sort, filter, and combine datasets for individual findings
Making charts for the findings

Method 3. Match geo-data and census-data

Map and visualize the findings spatially

Two Categories of Dataset

Category 1. Geo-Data

Base Maps (Metro and County Boundary and Location)
Transportation Network Map

Category 2. Census-Data

Migration Population Data
Economic Data (GDP, Real Income, etc.)
Housing Affordability Data (Housing Cost, etc.)

Section III.

Results

- Individual findings
- Comparative findings

Step 1.

Glance at Current Migration

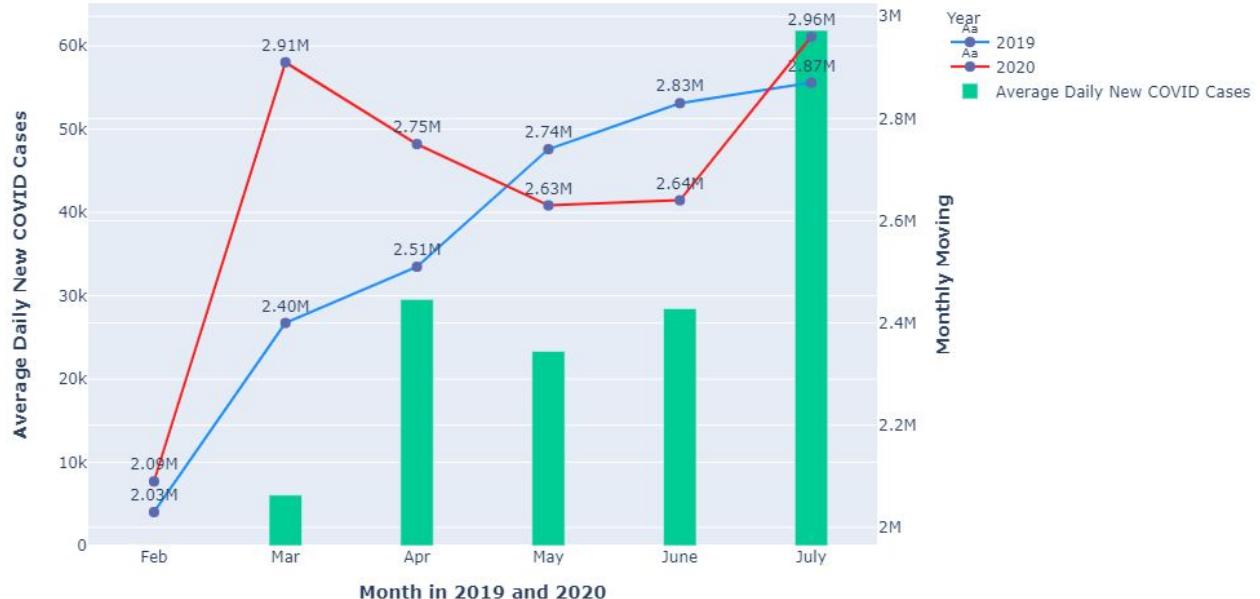
Migration Trend during the pandemic

Do we see an increasing speed of moving during COVID?

Yes and No

There was sudden increase in the number of moving in the beginning of the COVID pandemic.

But overall, there were not a dramatic difference.



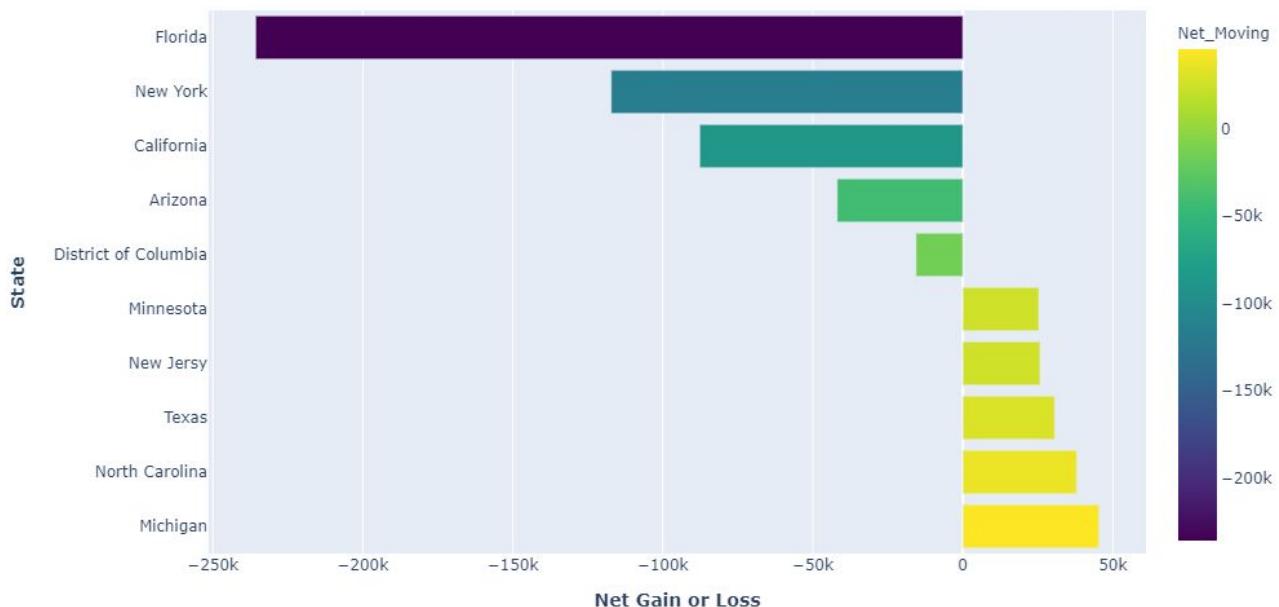
* Reproduction of data finding from <https://www.mymove.com/moving/covid-19/coronavirus-moving-trends/>

Which state gain / lost most people during COVID?

Florida
Most net loss state
With more than 200K

Michigan
Most net gain state
with almost 50K

Top 5 States for Net Gain and Top 5 States for Loss of Moving

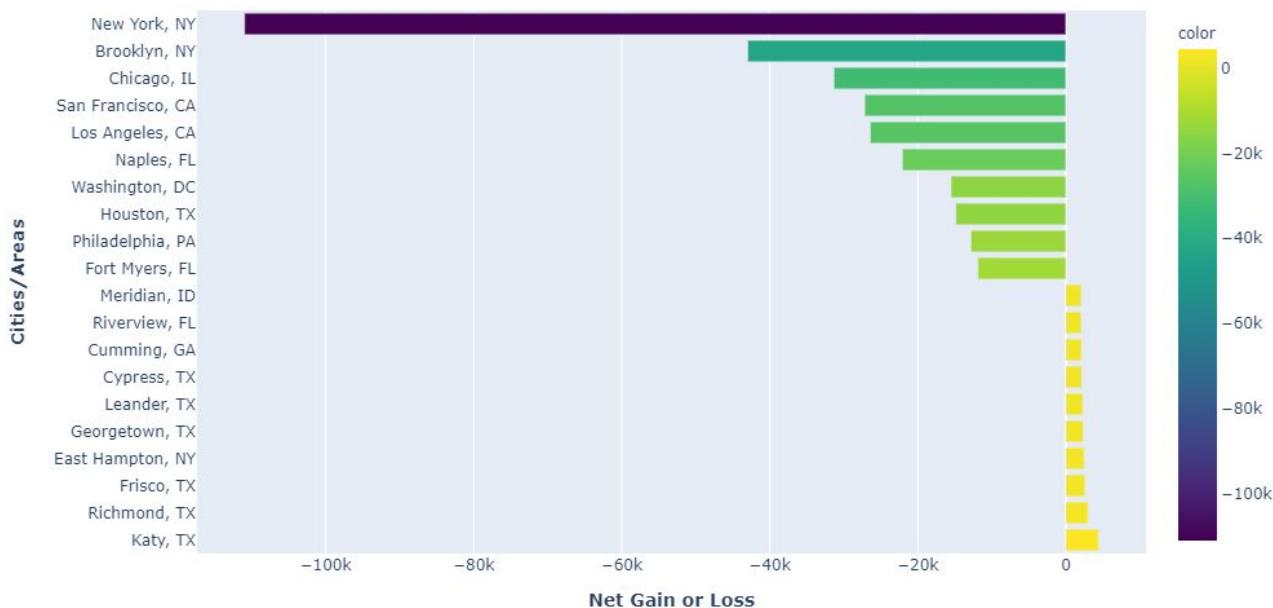


Which city gain / lost most people during COVID?

New York City
Most net loss city
With more than 100K

Many TX cities
Top 3 net gain cities

Top 5 Cities/Areas for Net Gain and Top 5 Cities/Areas for Net Loss of Moving

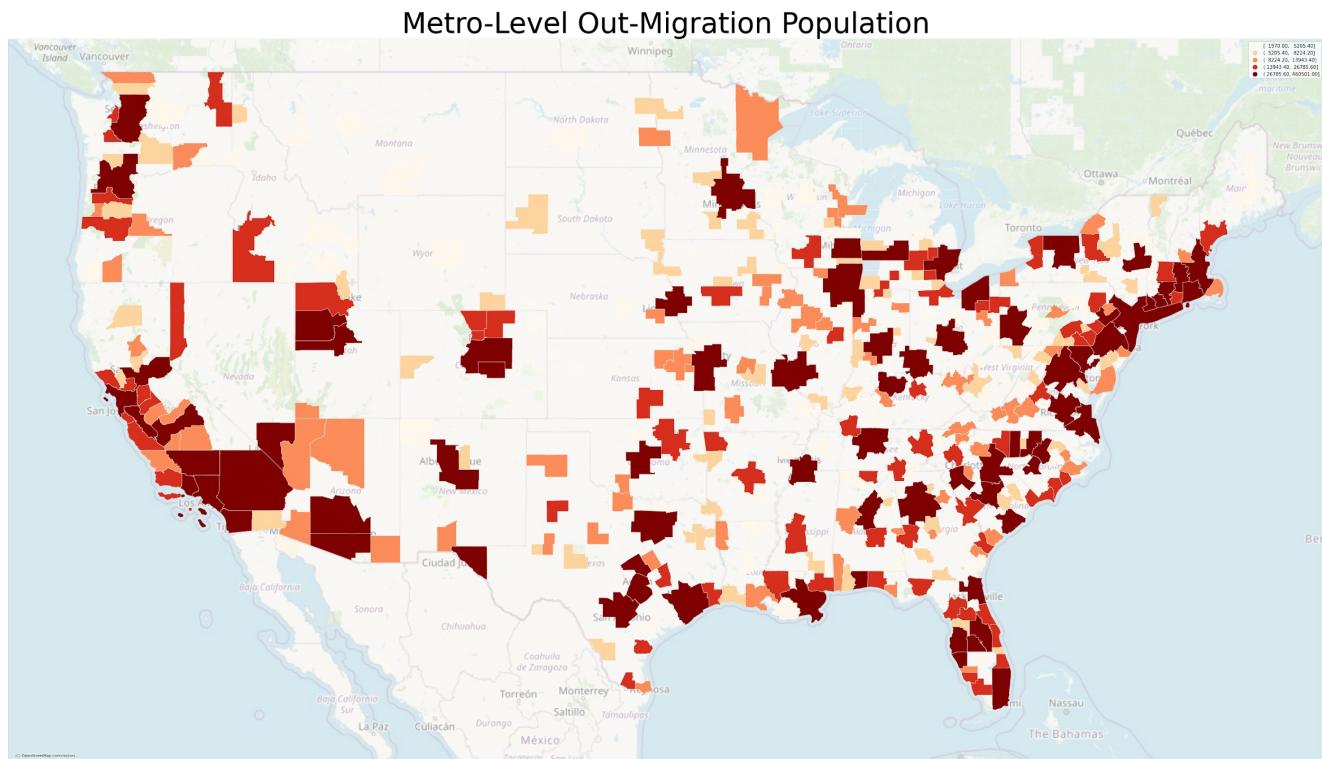


Step 2. Understand Big Picture

General migration pattern at the national scale

Where do people leave from?

Concentrate around
mega-cities

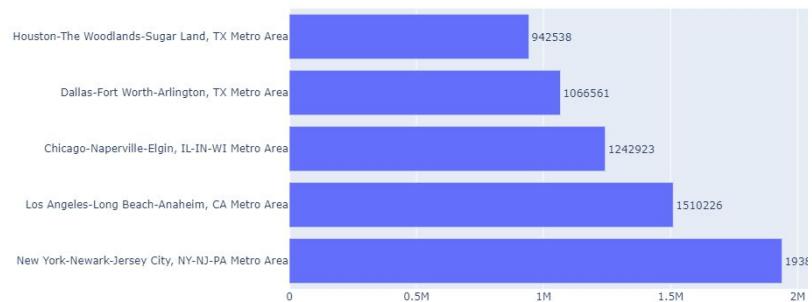


Where do people leave from?

NY Metro is No.1 in terms of migration population

Majority of migrants move within the same metro

Top 5 Metro Area for Out-Migration



Top 5 Metro Area for Out-Migration



Step 3.

Zoom in on Regional Scale

Local migration pattern in New York Metro

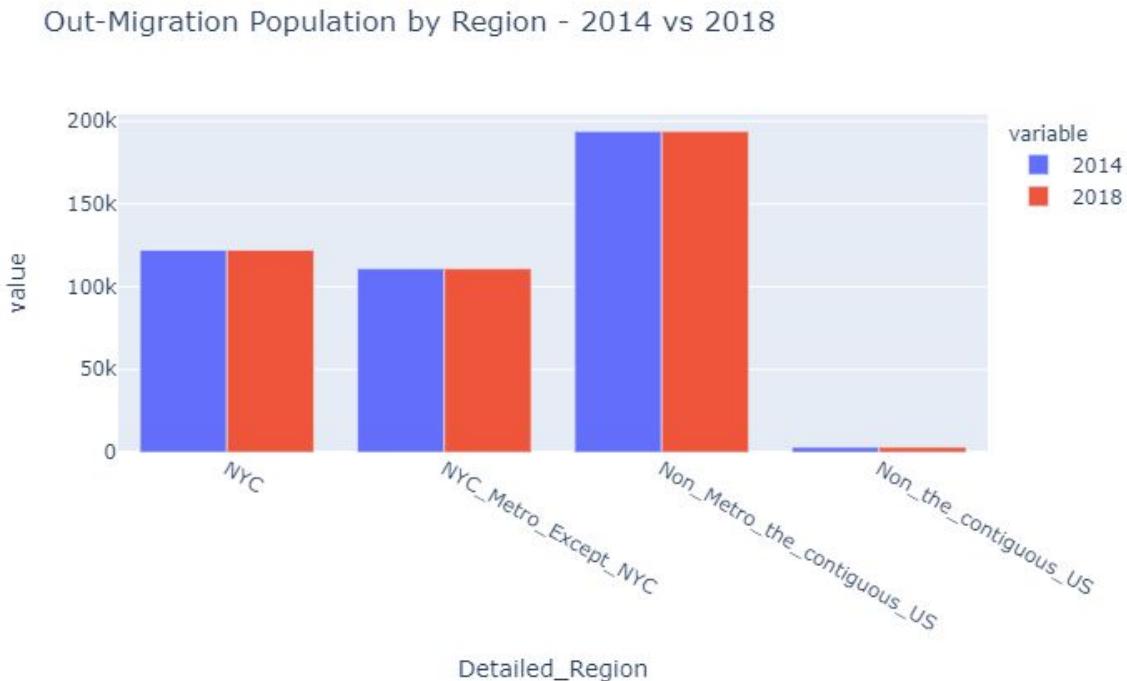
Transportation Network in New York Metro

Which region do New Yorker migrate to?

Migration remains similar in 2014 vs 18

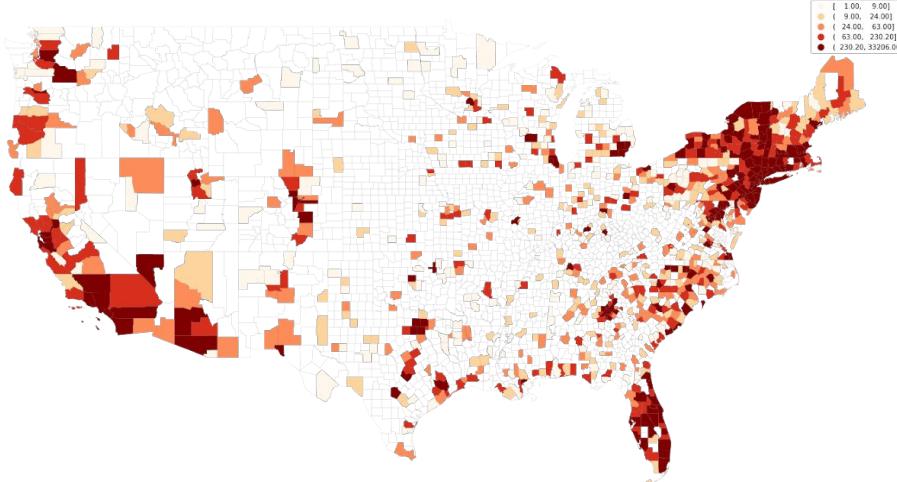
Most of people move within NY Metro Region (200K+)

Half within NYC (100K+); the other half is to the surrounding counties (100K+)

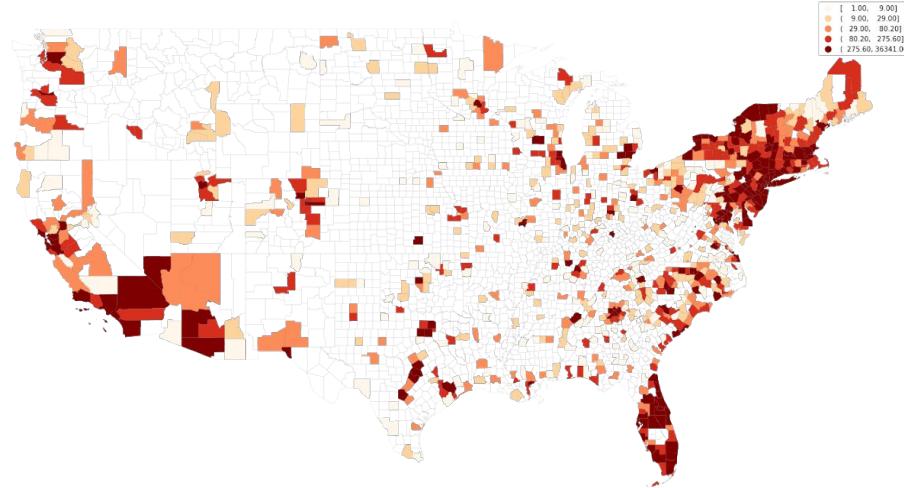


Which county do New Yorkers migrate to?

Out-Migration Population from New York City - 2014



Out-Migration Population from New York City - 2014



- The destination for out-migration from NYC remains similar for both 2014 and 2018, concentrating on the major metro regions in the U.S.
- However, New York State has a concentration cluster for both year, indicating moving in-state is a popular choice for New Yorkers

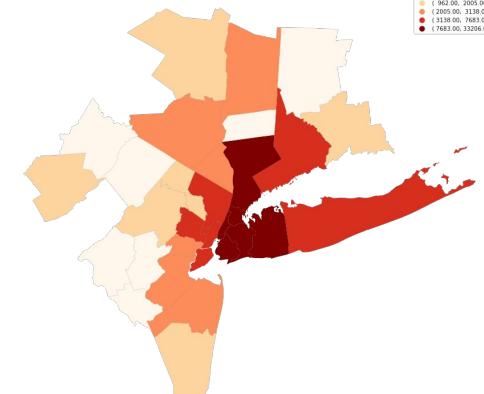
Which county do New Yorkers migrate to?

Top 10 Migration Destination in New York Metro Area for New York City

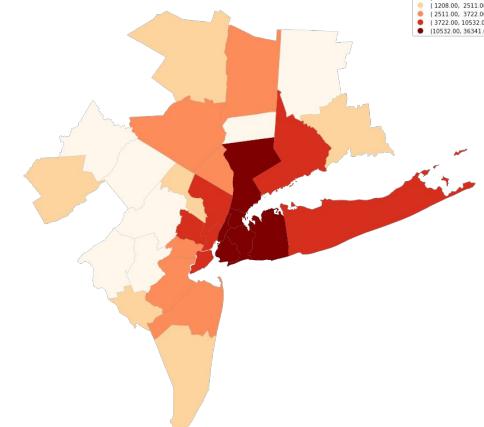


The immediate surrounding counties, along with the five NYC counties, are where most New Yorkers migrate to.

Out-Migration Pattern - 2014

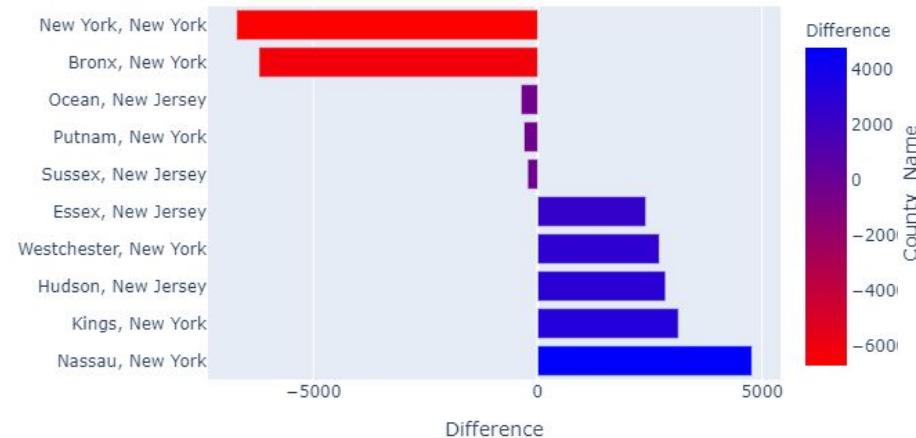


Out-Migration Pattern - 2018

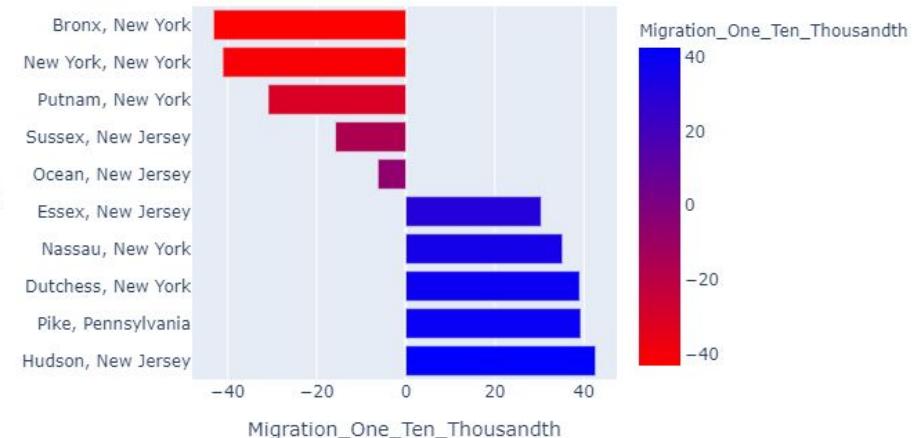


If a county sees more or less outflow migration from NYC?

Top 5 and Bottom 5 of Out-Migration Population Change in New York Metro



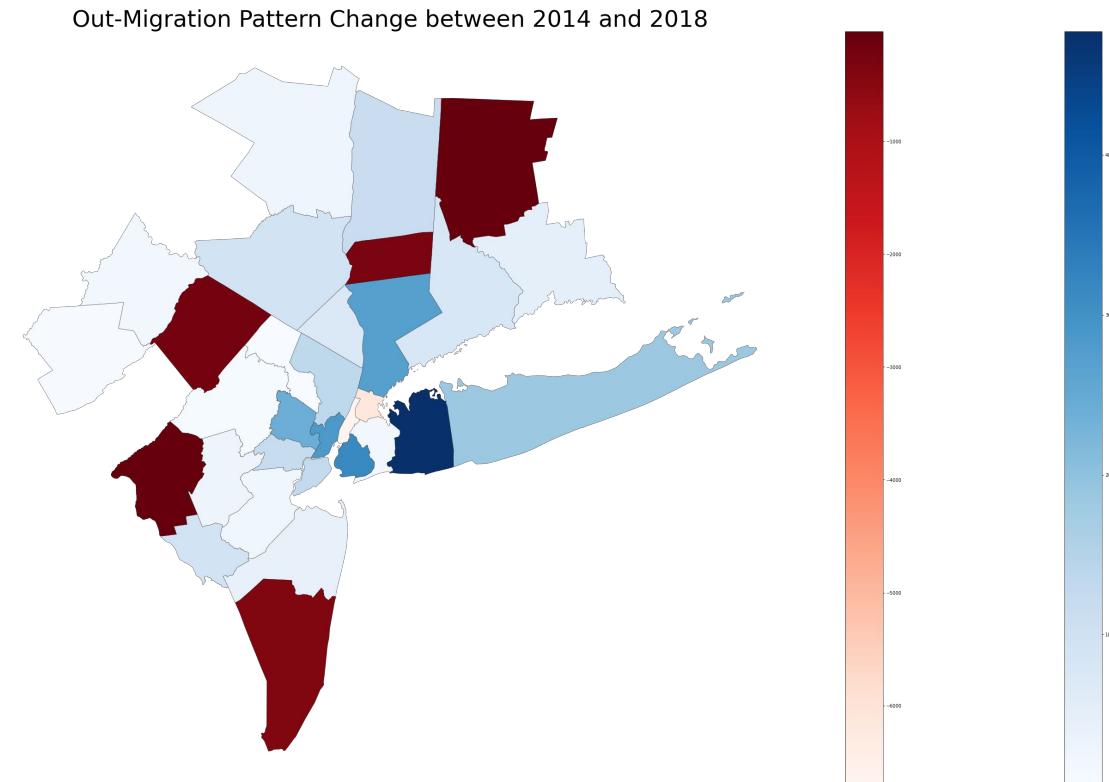
Top 5 and Bottom 5 of Out-Migration Population Percentage Change in New York Metro



- Manhattan (New York County) and Bronx see much less out-migration population between 2014 and 2018, indicating New Yorkers have less interests in those areas.
- Brooklyn (Kings County) and Long Island (Nassau County) see much more inflow people during the same period
- Pike County, PA and Hudson, NJ (including all major cities in NJ across from Manhattan) see a growing portion of migration in their population base

If a county sees more or less outflow migration from NYC?

- The map visualize the previous chart
 - Increasing interests in the surrounding counties
 - Decreasing interests in the centers and remote counties

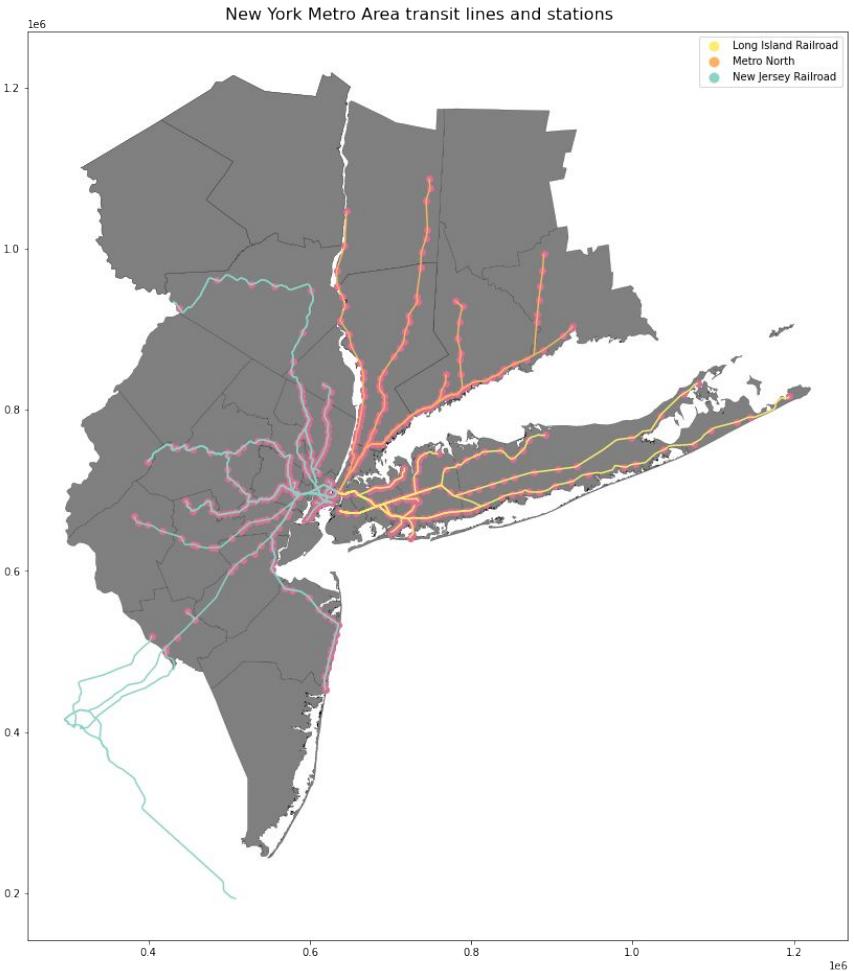


Transit system analysis

Combined Three transit systems:

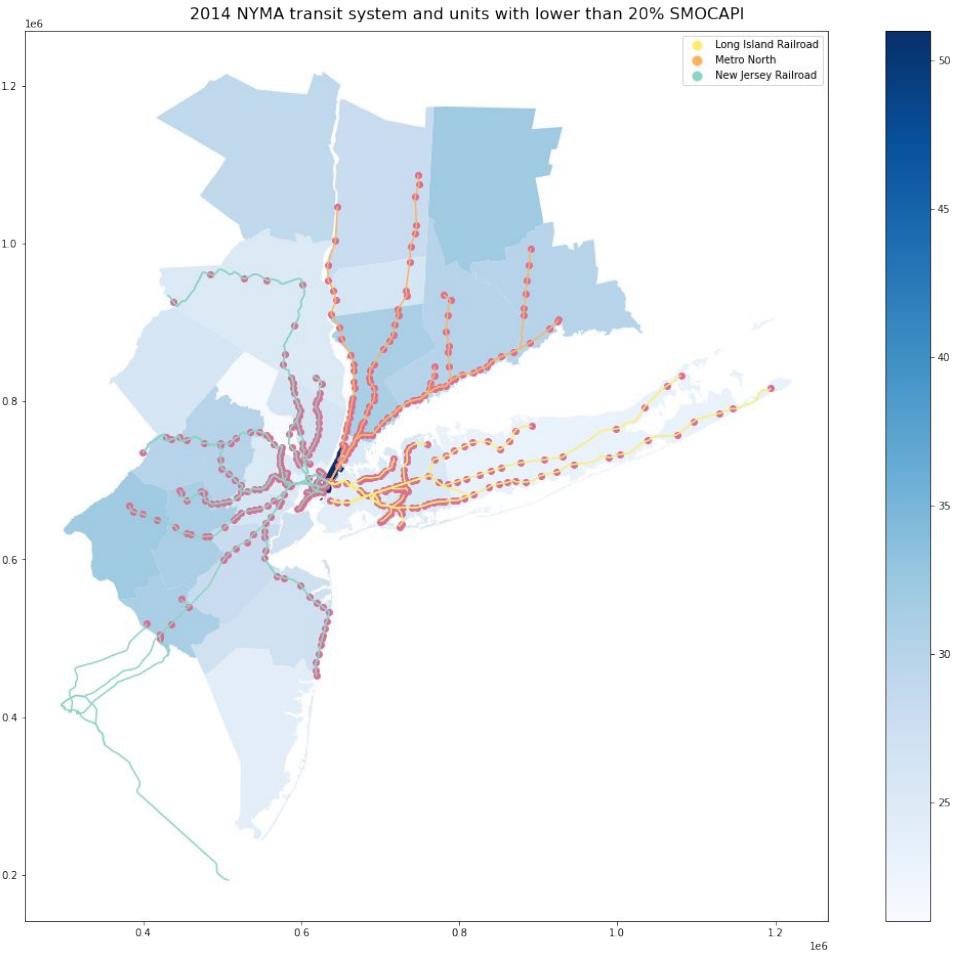
- New Jersey Transit Rail System
- Long Island Railroad
- Metro North Railroad

Interactive map of the transit system



Transit system analysis

Further analysis: transit concentration
on county level



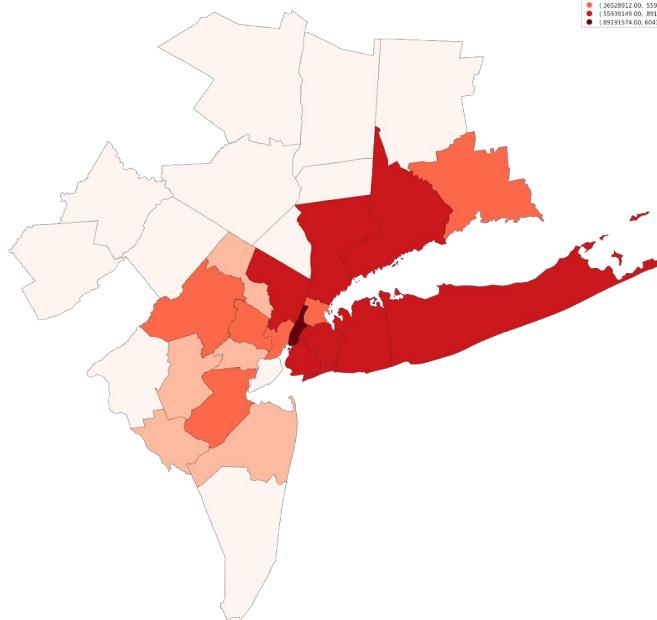
Step 4.

Record Migration Impacts

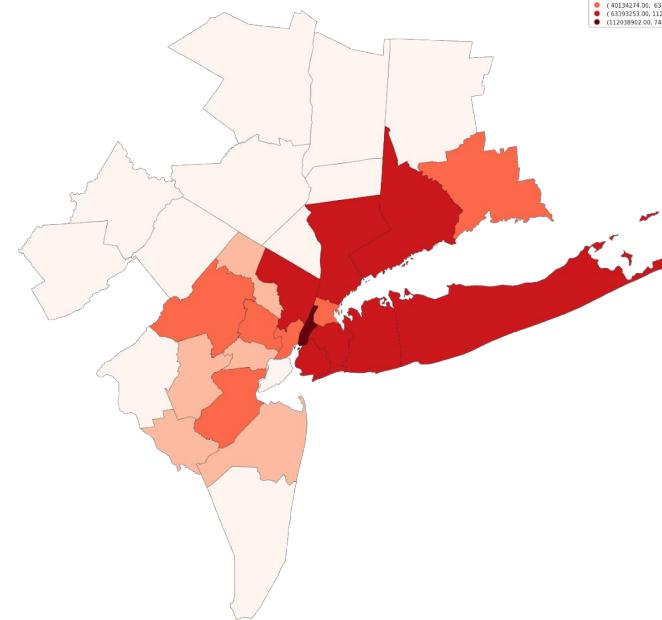
Local Housing and economy changes

How each county performs in GDP?

GDP Level - 2014



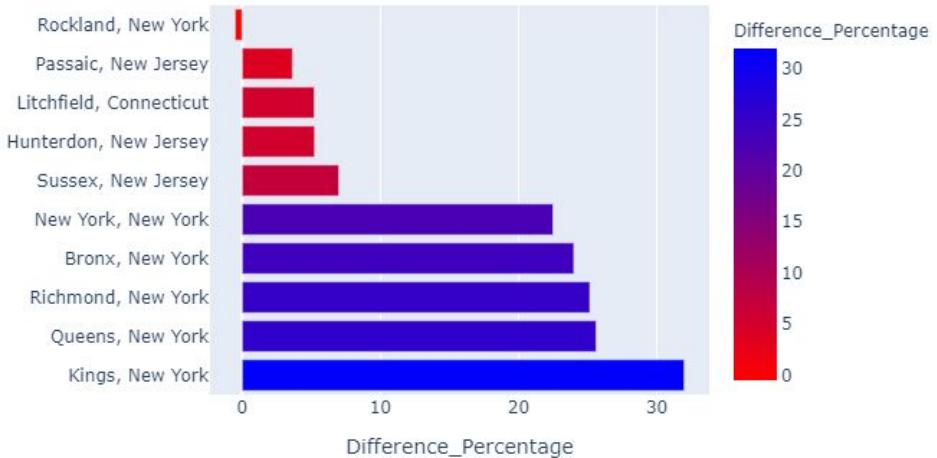
GDP Level - 2018



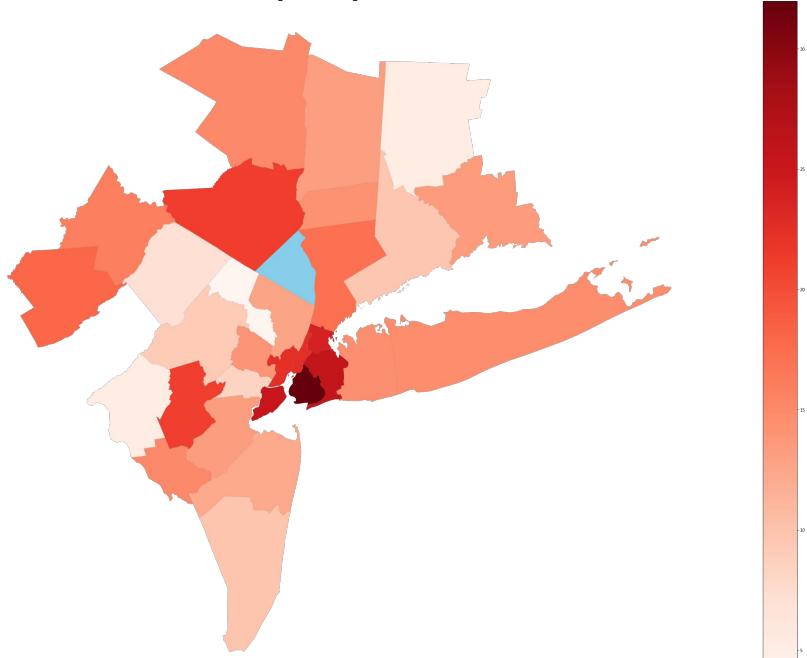
- The further a county is, the lower GDP level it sees
- Long Island has a cluster of GDP

What GDP change in each county?

Top 5 and Bottom 5 of GDP Change - 2014 vs 2018



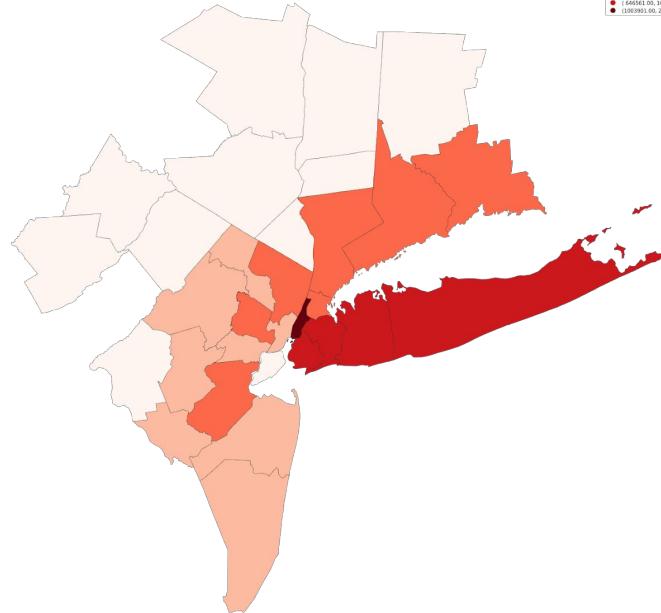
GDP Change Percentage - 2014 vs 2018



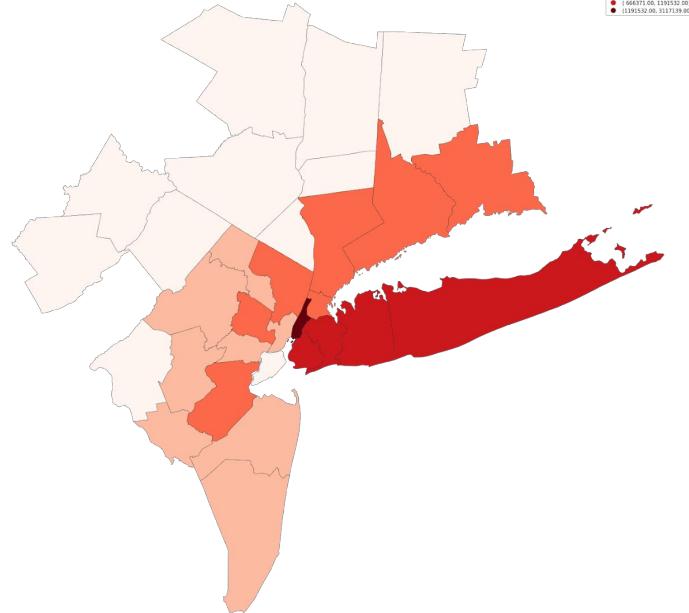
- Not surprisingly, five NYC counties the largest GDP growth
- Generally, the further a county is, the less GDP growth it sees

How many jobs each county has?

Number of Employment - 2014

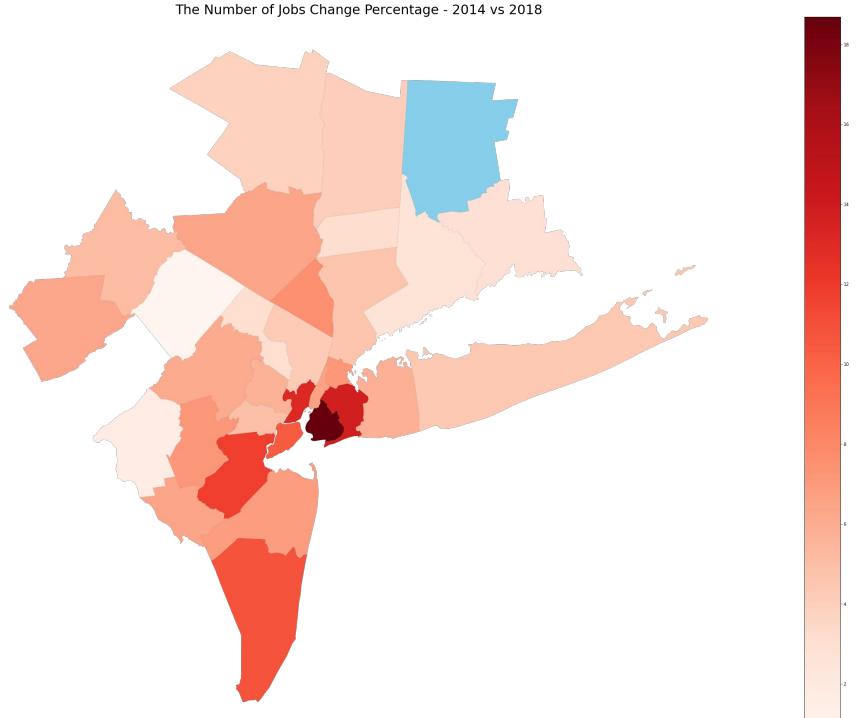
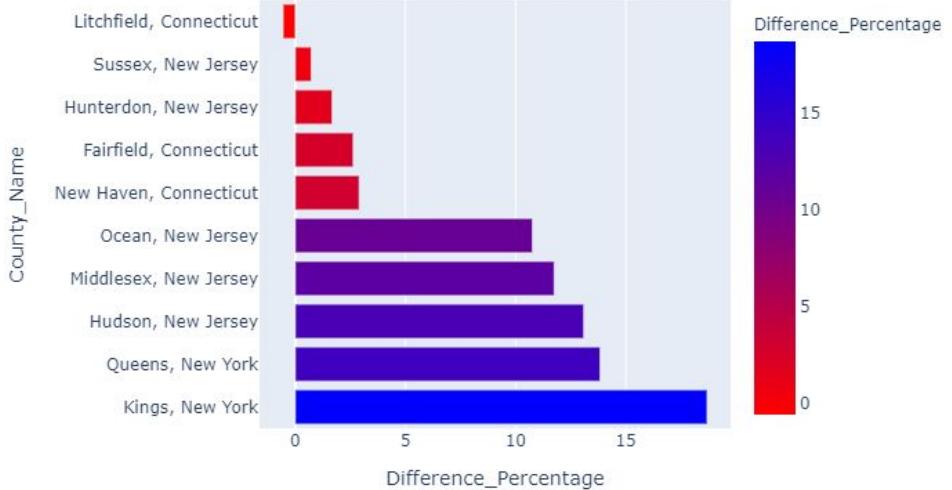


Number of Employment - 2018



- Manhattan is for sure having most jobs
- The jobs also concentrate in the Long Island region

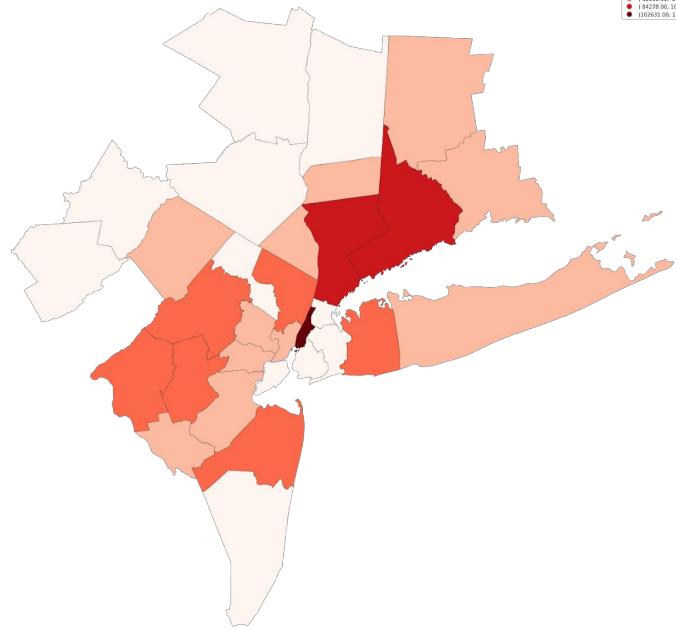
What job number change in each county?



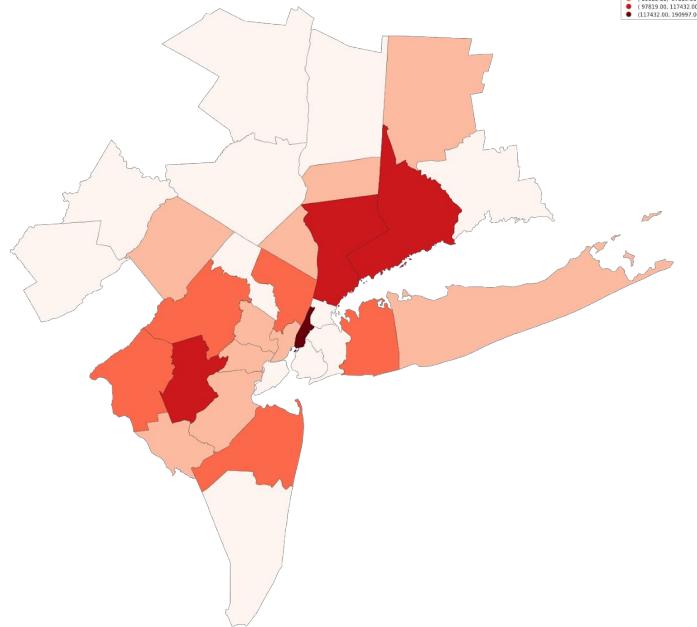
- Most job growths are in surrounding counties, not in Manhattan

What is income level for each county?

Per Capita Personal Income Change - 2014



Per Capita Personal Income Change - 2018

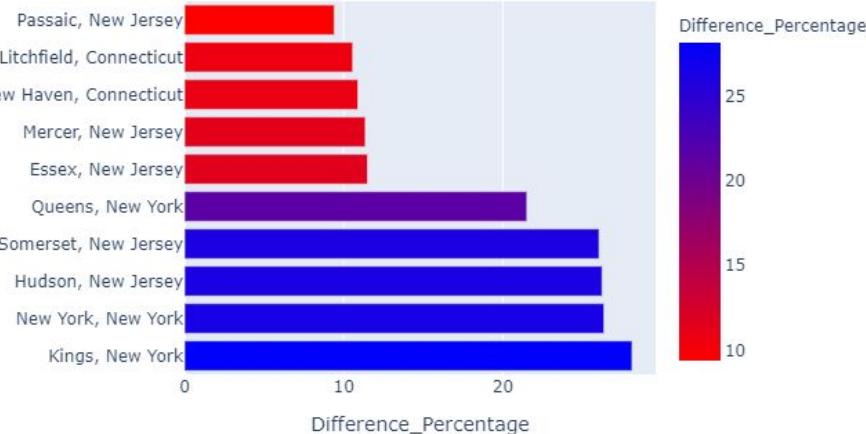


- Manhattan and the northern counties have some clusters of higher Income people

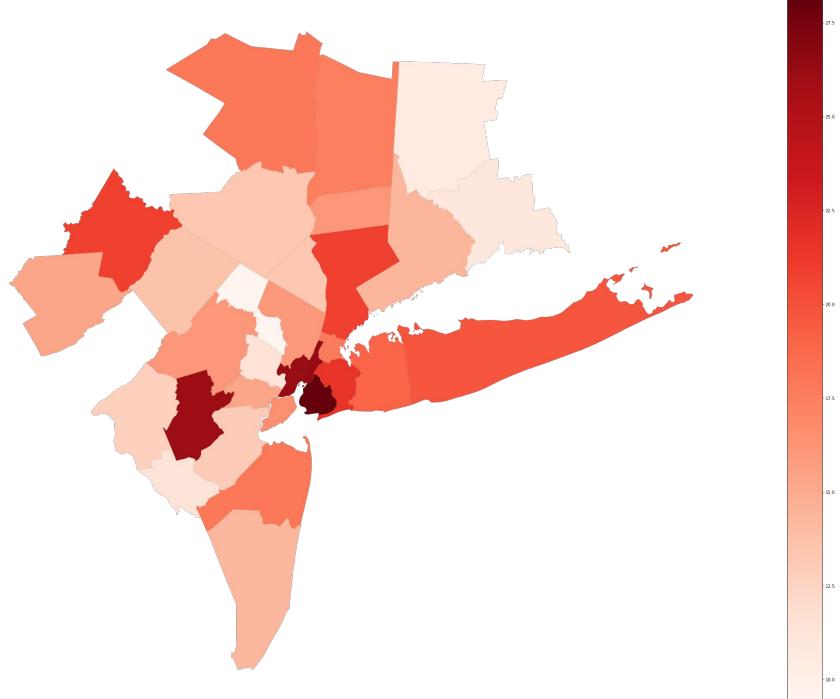
What is income change in each county?

Top 5 and Bottom 5 of Per Capita Income Change - 2014 vs 2018

County_Name

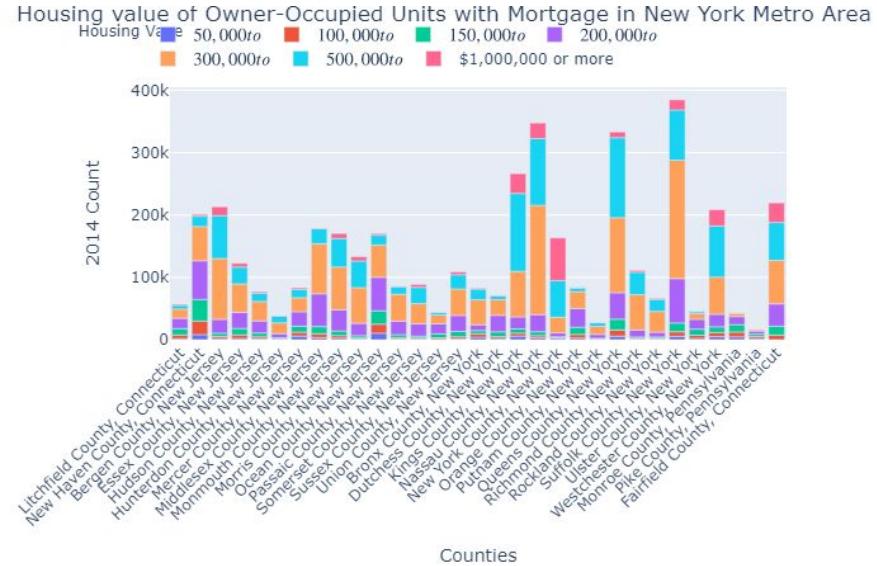
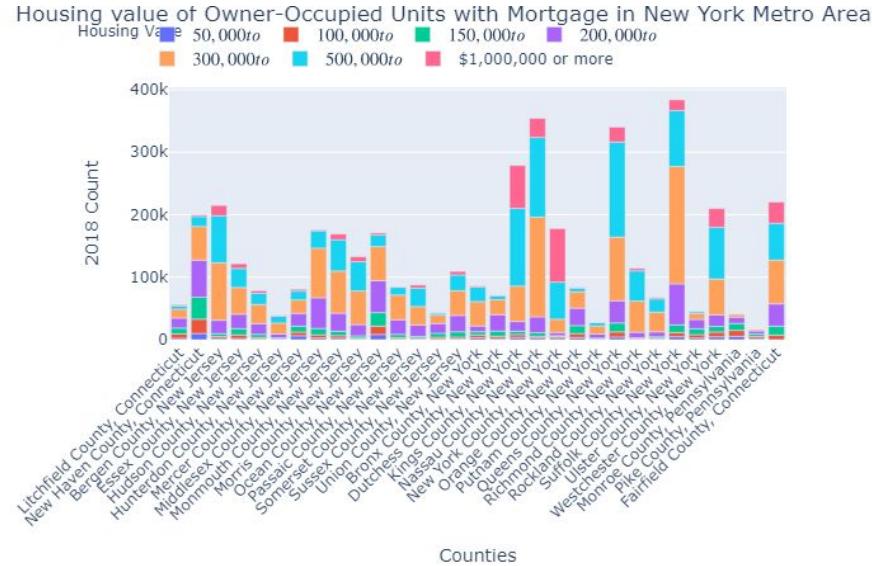


The Income Change Percentage - 2014 vs 2018

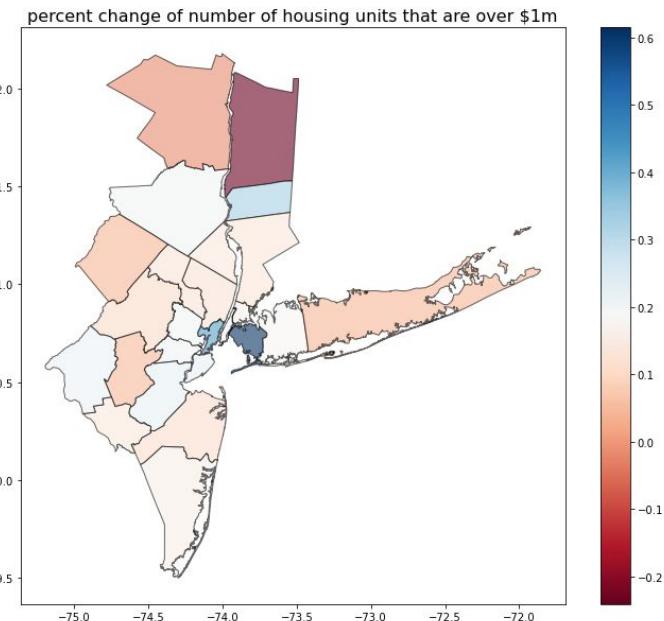


- Many non-NYC counties see great change in income level

Housing Value of owner-occupied units with mortgage

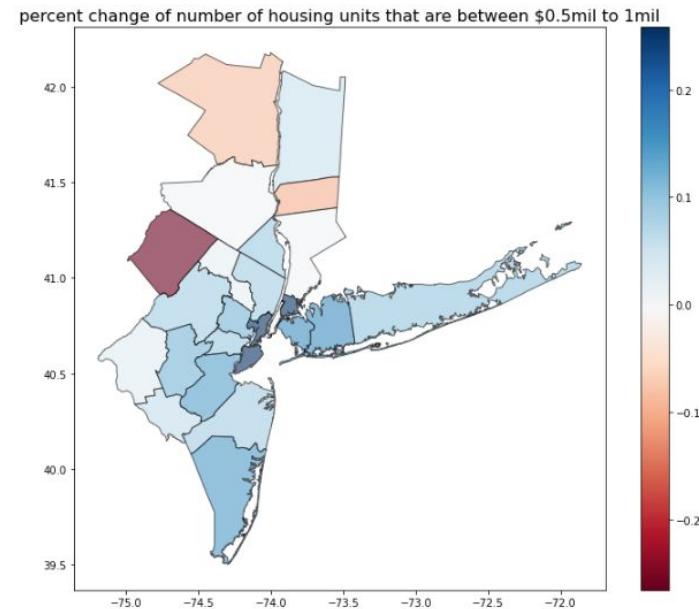


Change for housing units more than \$1 million



- Queens, Kings (Brooklyn), Hudson (across from Manhattan) experienced most growth for housing units more than \$1million;
- Growth in counties near New York City;
- Decline in distant counties.

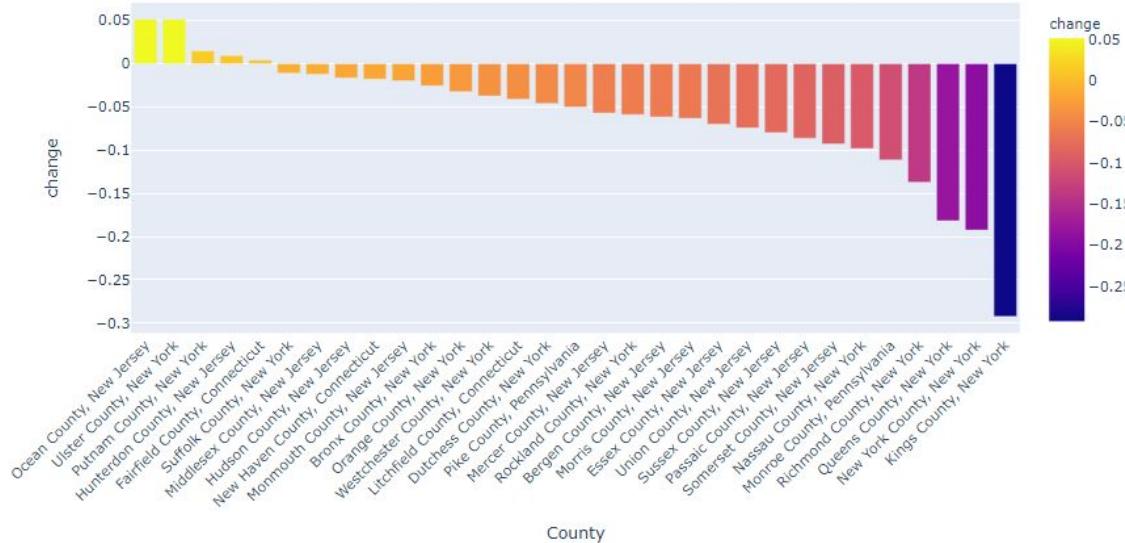
Change for housing units between \$500,000 and \$999,999



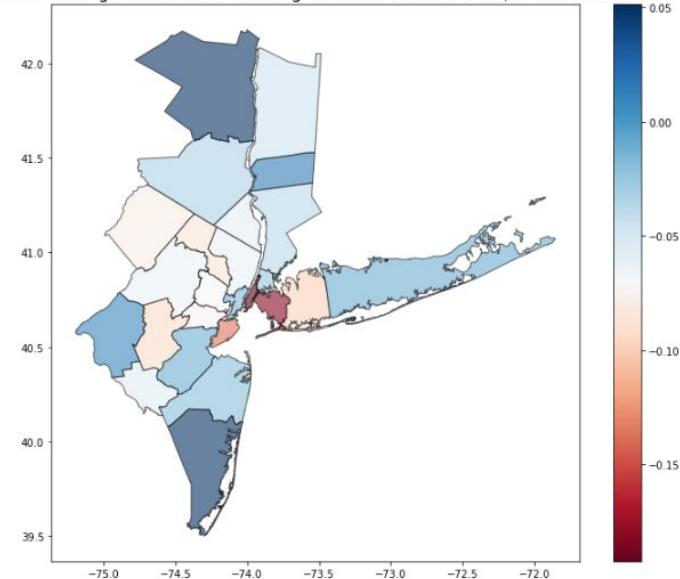
- Hudson (across from NYC), Richmond (Staten Island) and Bronx (above NYC) experienced most growth;
- Growth in counties near New York City;
- Decline in distant counties.

Change for housing units between \$300,000 and \$499,999

Percent change for housing units (\$0.3mil to 0.5mil)



percent change of number of housing units that are between \$0.3mil to 0.5mil



- Ocean, Ulster and Putnam experienced most growth;
- Growth in distant counties New York City;
- Decline in nearby counties.

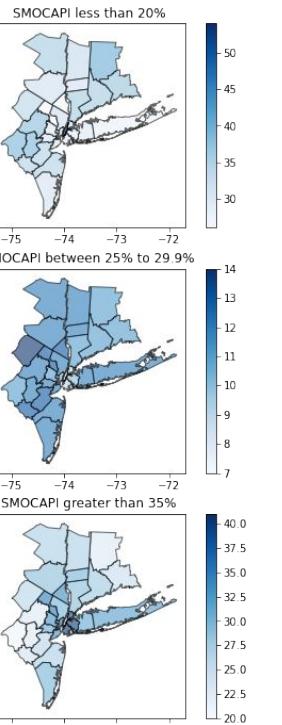
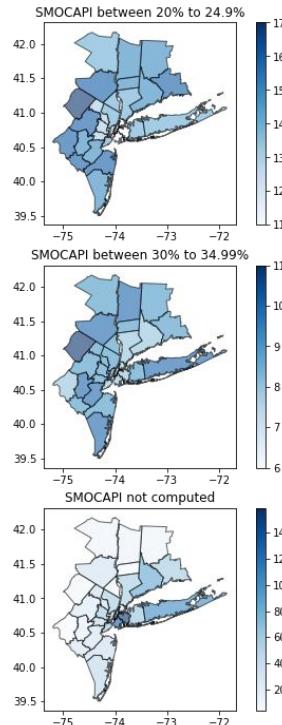
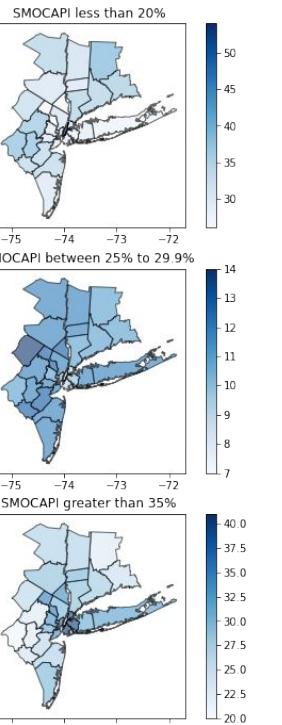
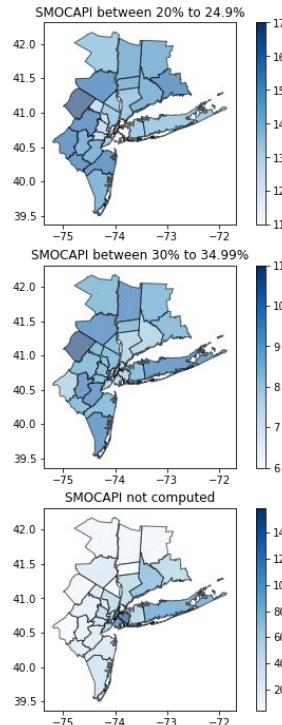
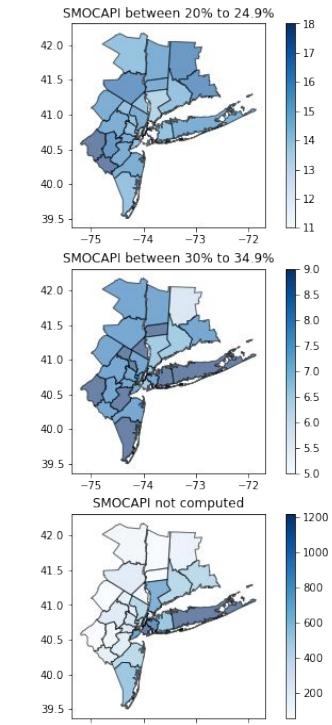
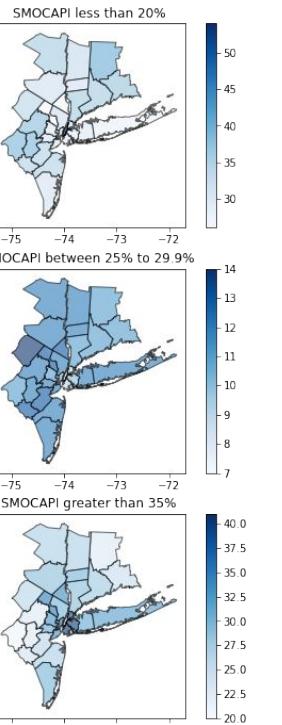
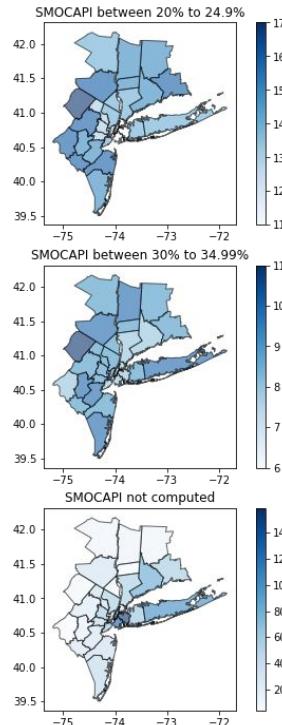
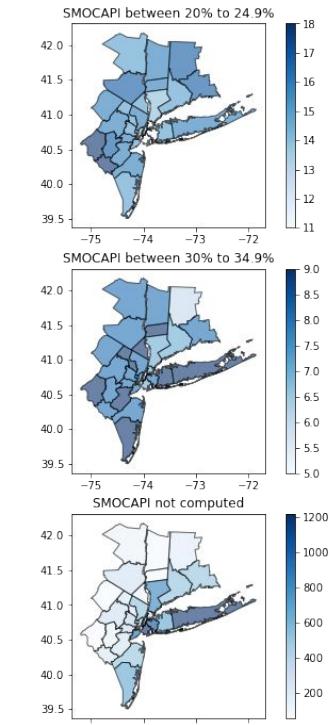
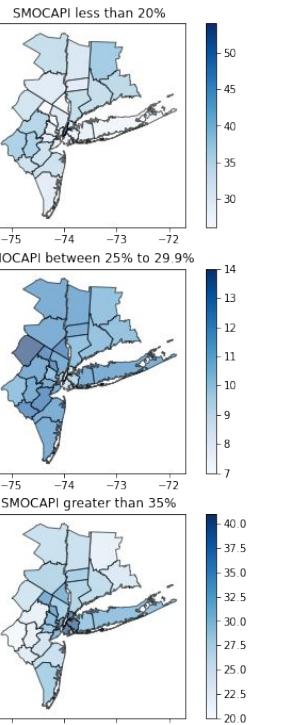
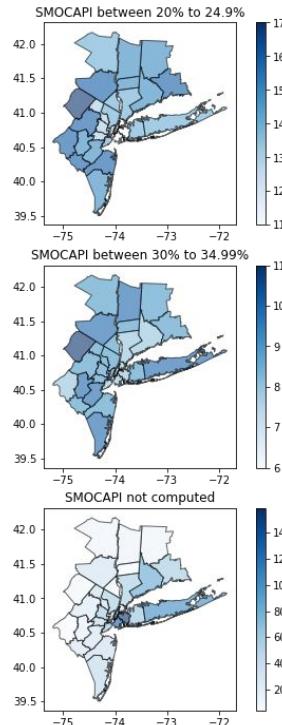
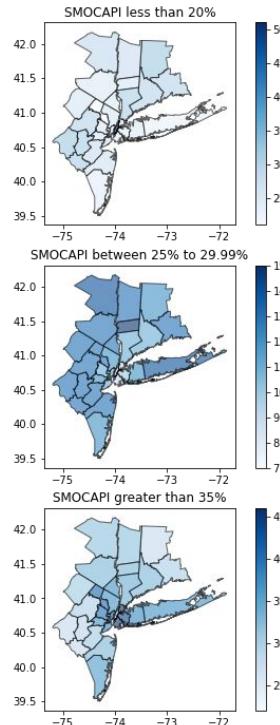
Housing affordability for owner-occupied units with mortgage

SMOCAPI: Selected Monthly Owner Cost as a Percentage of Household Income;
“is used to measure housing affordability and excessive shelter costs”

--U.S. Census Bureau

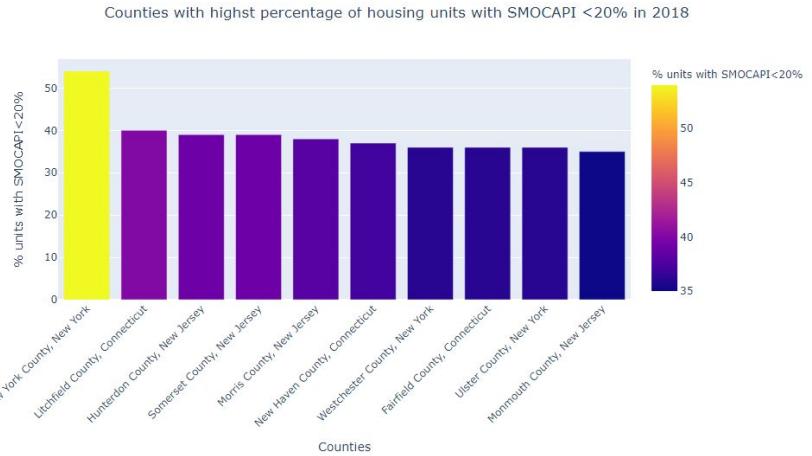
Housing affordability for owner-occupied units with mortgage

2014: Selected Monthly Owner Costs as A Percentage of Household Income-housing units with mortgage



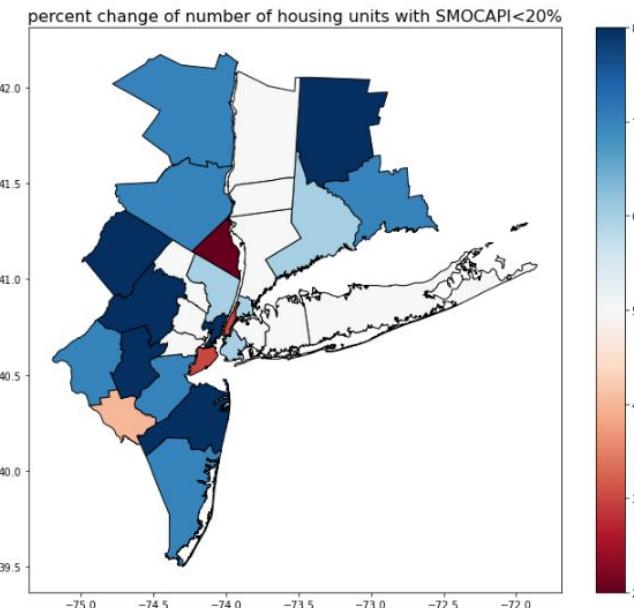
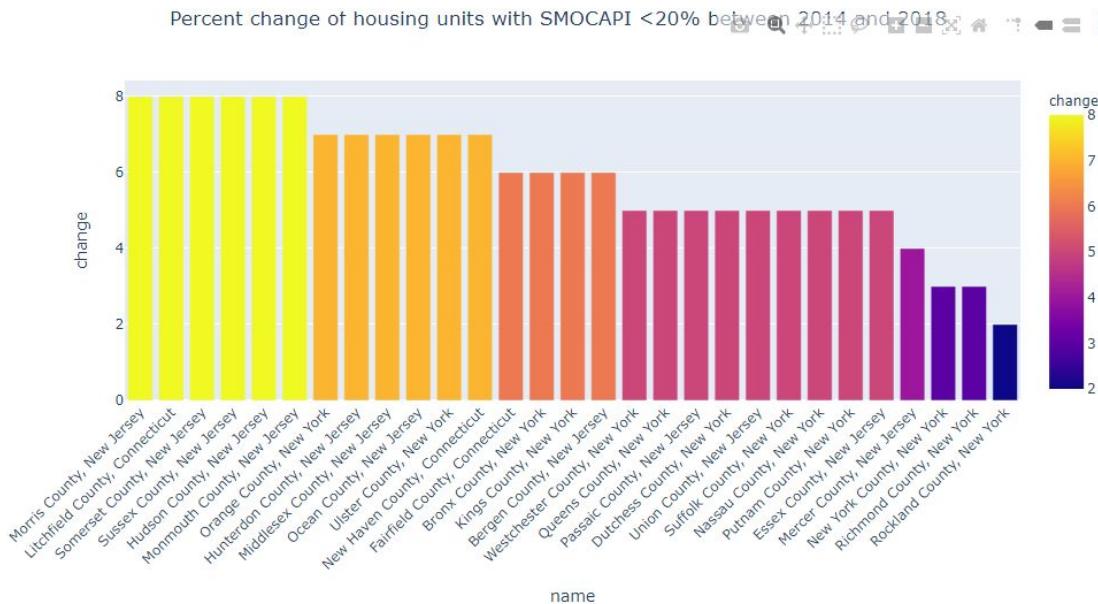
Increase in overall housing affordability in NYMA

% of housing units with SMOCAPI<20% in 2014 and 2018 by county



- New York County remained the county with most housing units with <20% SMOCAPI in NYMA, even it has slower growth than other counties (4%);
- Mercer County experienced slower growth than other counties (4%);
- Monmouth County experienced fast growth than other counties.

In NYMA...general increase in housing affordability



- All counties in NYMA experience a growth of housing units with SMOCAPI<20%, meaning housing units are becoming more affordable in NYMA.
- Counties experienced top growth of housing affordability are in distant and surrounding counties, include Morris, NJ, Litchfield, CT, Somerset, NJ, Sussex, NJ, Hudson, NJ, and Monmouth NJ.

Step V.

Looking for Relationships

Migration

- vs. transit system
- vs. housing value and affordability
- vs. economic factors

Index

Migration



In the U.S.:

- Top destinations are major metro regions
- Cluster in New York State for 2014 and 2018

In New York Metro Area:

- Moving into counties close to NYC rather than counties that are further away;
- Not much interest in the center of the NYMA (New York County and Bronx County)

Housing



Increase in **housing price** in counties near NYC;

- >\$1,000,000?
- \$500,000 to \$999,999?
- <\$500,000?

Overall increase in **housing affordability** in NYMA, but higher increase in counties further away from NYC

Economic change

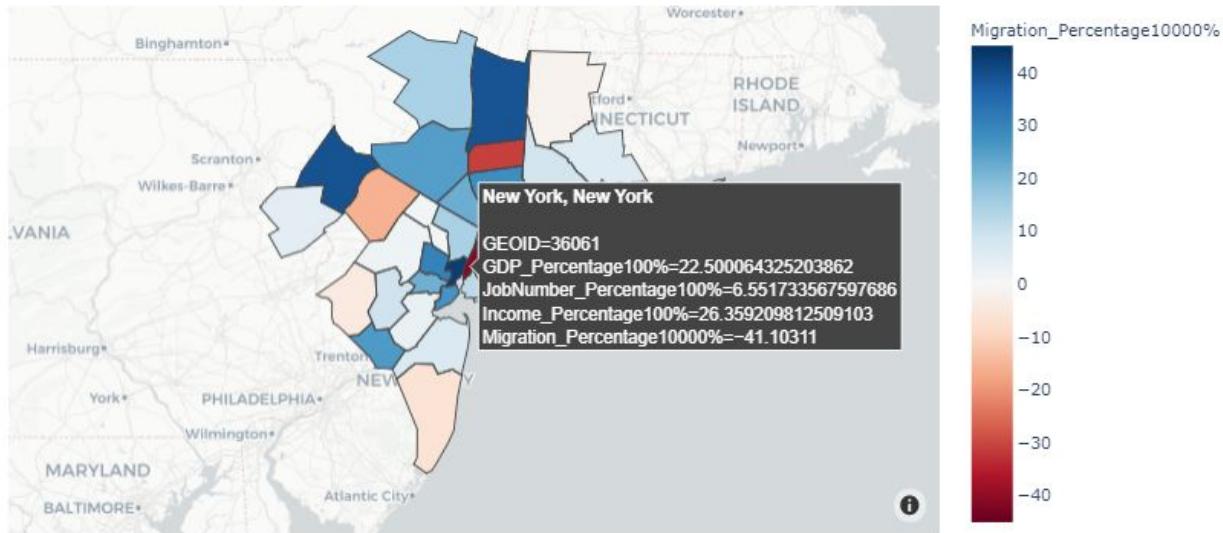


Overall **increase in GDP**, but high increase in nearby counties;

One county experienced job loss, high increase in jobs in nearby counties of NYC

Index

- Geographic relationship between migration, transit system and economic factors in the New York Metro Area
- Next step: Explore different ways to summarize and visually represent the findings of migration, transit system, economic factors and housing



Section IV.

Reflection

- Group collaboration
- Next-step plans

Team Collaboration & Next-Step Plans

- Collaboration Workflow: Divide the project by content
 - Each of us is responsible for data collection, processing, code-writing, and presentation for one aspect
 - Then work together to do comprehensive analysis
- Next steps for subject of analysis
 - Make presentation coherent (e.g. chart, maps, etc.)
 - Time frame selection (5yr vs. 10yrs?)
 - Creating the index to present the relationship between individual findings
 - Calculate transit density of the county level and generate scatter plot on map
 - Analyze relationships between migration, housing, economy, and transit density

Thank you!

“Intra-Regional Migration and Transportation
in New York Metro Area”

Yushan Tong & Zhendong Long (Jayden)