

TRANSIT ANALYSIS OF CHARLOTTE, NC

Julia Bright

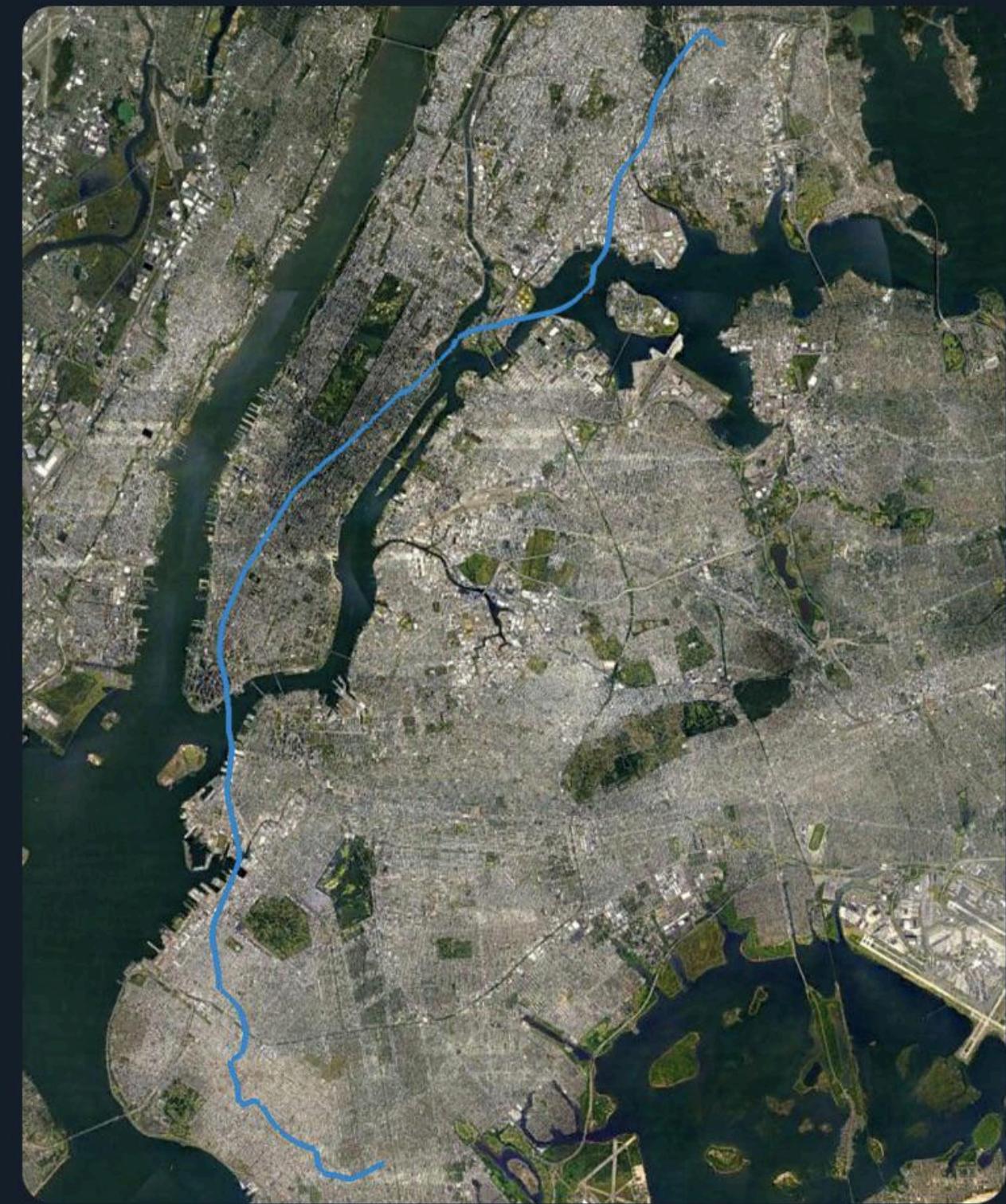


Jack
@jacktymac

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WHY CHARLOTTE?

- “Sprawl capital of the world”
- Car-dependent development
- Lackluster public transit



GOALS OF THE STUDY

- Explore possible disparities in transit frequency related to income and money spent on transportation
- Identify a route well-suited for transit expansion, with the motivation of providing public transit options to low income workers

METHODS AND DATA

Linear Regression:

Analyze two relationships

- Transit Frequency and Percent Income Spent On Transport
- Transit Frequency and Yearly Income (in thousands)

Transit Frequency calculated as combined hourly frequency of service for all transit routes per square mile during weekday afternoon peak commute period

(4:00 – 7:00 pm)

Data Sources:

EPA Smart Location Database

- Source variables from multiple US Census Bureau surveys

SimplyAnalytics

- Variables created using American Community Survey (ACS) and Consumer Expenditure Survey (CE)

All data collected at the census block group level

Relationship Maps:

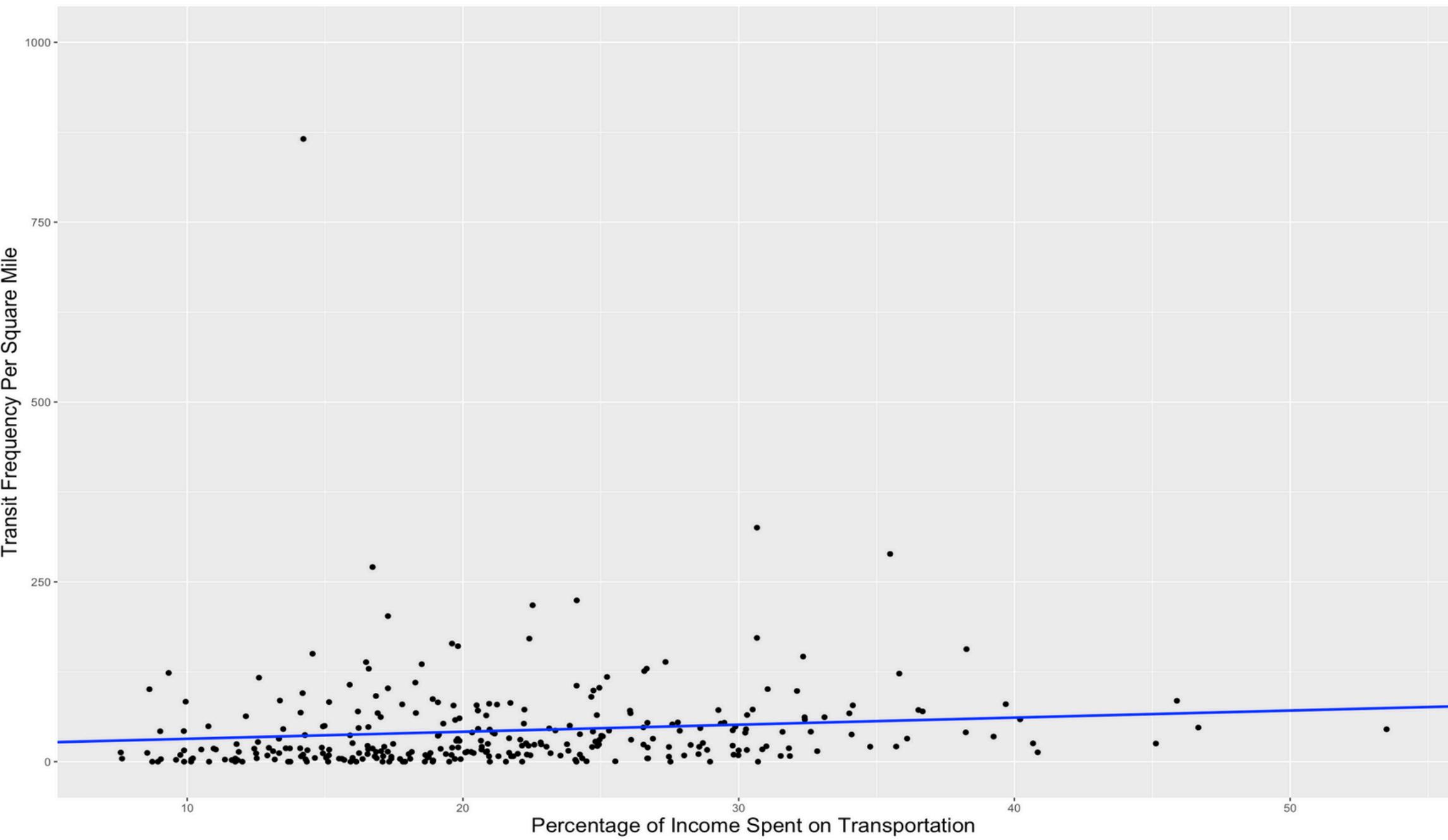
Three Bivariate Choropleth Maps

- Activity Density & Transit Frequency
- Jobs Per Acre & Low Wage Workers (workplace)
- Low Wage Workers (residence) & Transit Frequency

Low Wage Workers classified as making \$1250/month or less

Is transit service better in areas where people spend more of their income on transportation?

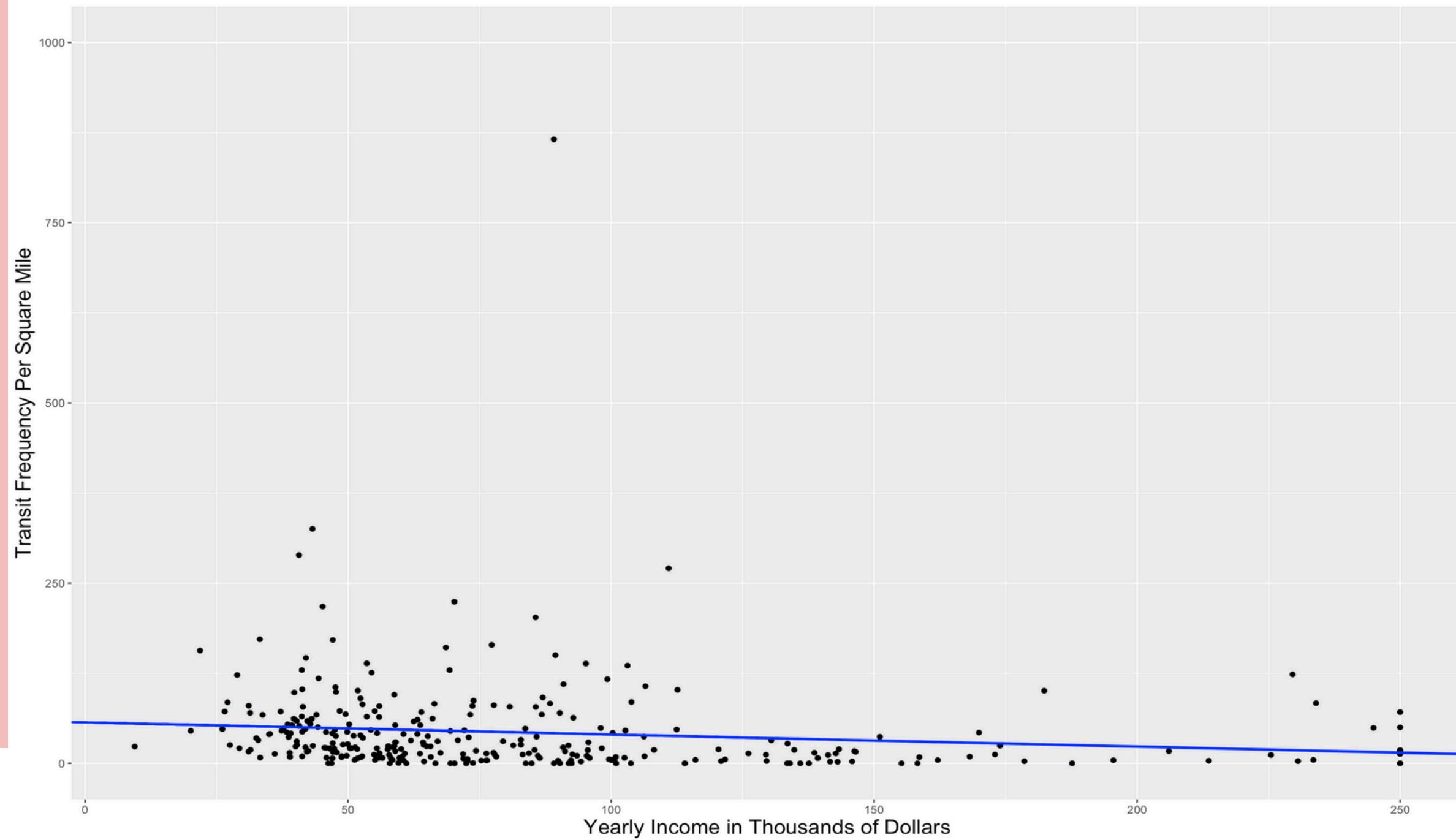
```
##  
## Call:  
## lm(formula = TransitFrequency ~ PctTransportCosts, data = data)  
##  
## Residuals:  
##    Min      1Q Median      3Q     Max  
## -52.18 -31.78 -19.96  10.52 829.71  
##  
## Coefficients:  
##                 Estimate Std. Error t value Pr(>|t|)  
## (Intercept)  21.9796   11.2612   1.952  0.0519 .  
## PctTransportCosts  0.9838    0.4944   1.990  0.0475 *  
## ---  
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1  
##  
## Residual standard error: 67.51 on 301 degrees of freedom  
## (252 observations deleted due to missingness)  
## Multiple R-squared:  0.01298,    Adjusted R-squared:  0.009706  
## F-statistic:  3.96 on 1 and 301 DF,  p-value: 0.0475
```



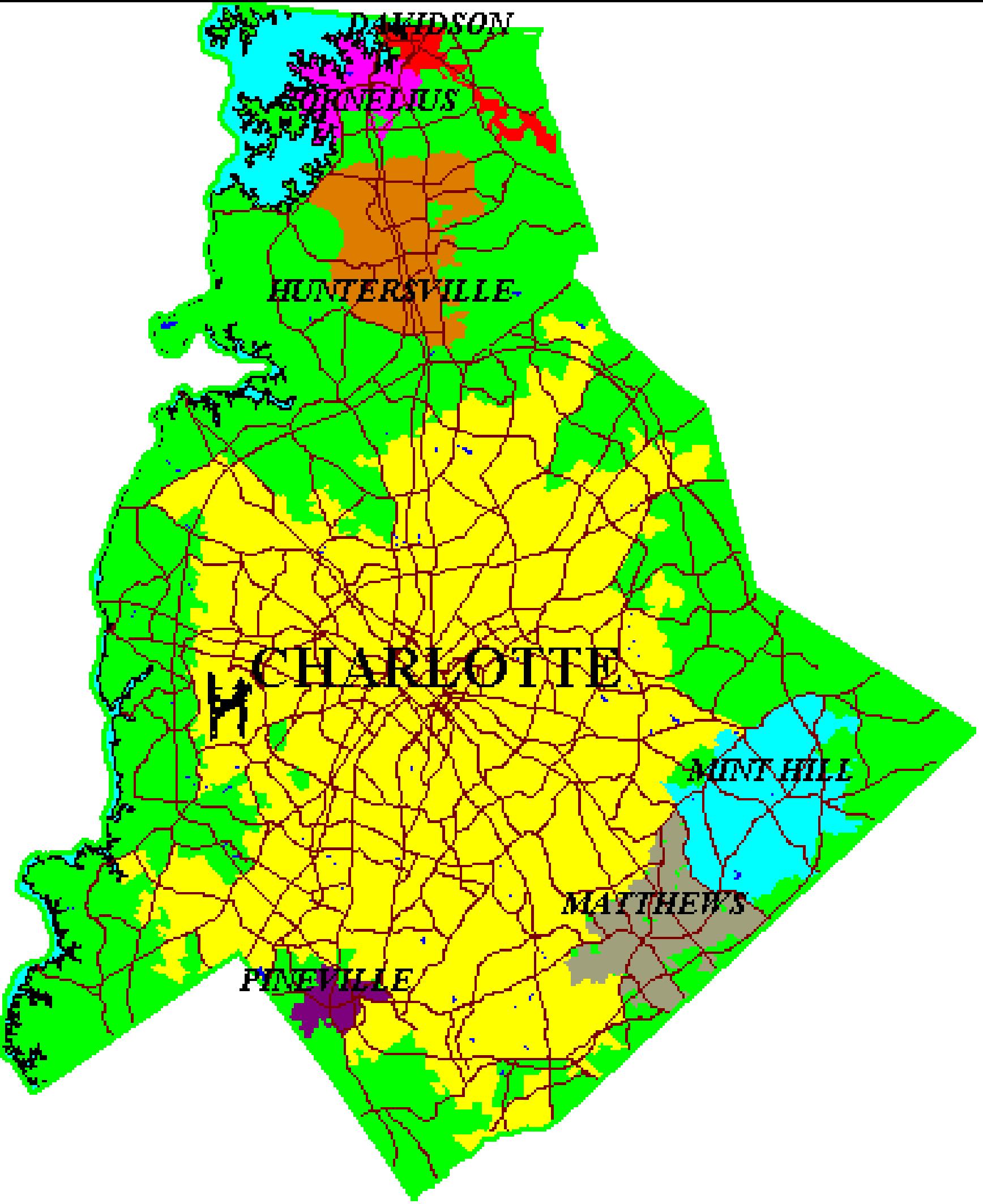
These results indicate that it is, although the statistical certainty is weak. For every 1% increase in income spent on transportation, transit frequency increases by 1 aggregate service hour.

Is transit service better in areas of higher median income? Or lower?

```
##  
## Call:  
## lm(formula = TransitFrequency ~ income_thousands, data = data)  
##  
## Residuals:  
##    Min      1Q Median      3Q     Max  
## -49.20 -32.85 -17.81   8.83 823.71  
##  
## Coefficients:  
##             Estimate Std. Error t value    Pr(>|t|)  
## (Intercept) 56.99550  7.32609  7.780 0.000000000000116 ***  
## income_thousands -0.16863  0.07478 -2.255     0.0248 *  
## ---  
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1  
##  
## Residual standard error: 67.29 on 302 degrees of freedom  
##   (251 observations deleted due to missingness)  
## Multiple R-squared:  0.01656,  Adjusted R-squared:  0.0133  
## F-statistic: 5.085 on 1 and 302 DF,  p-value: 0.02484
```

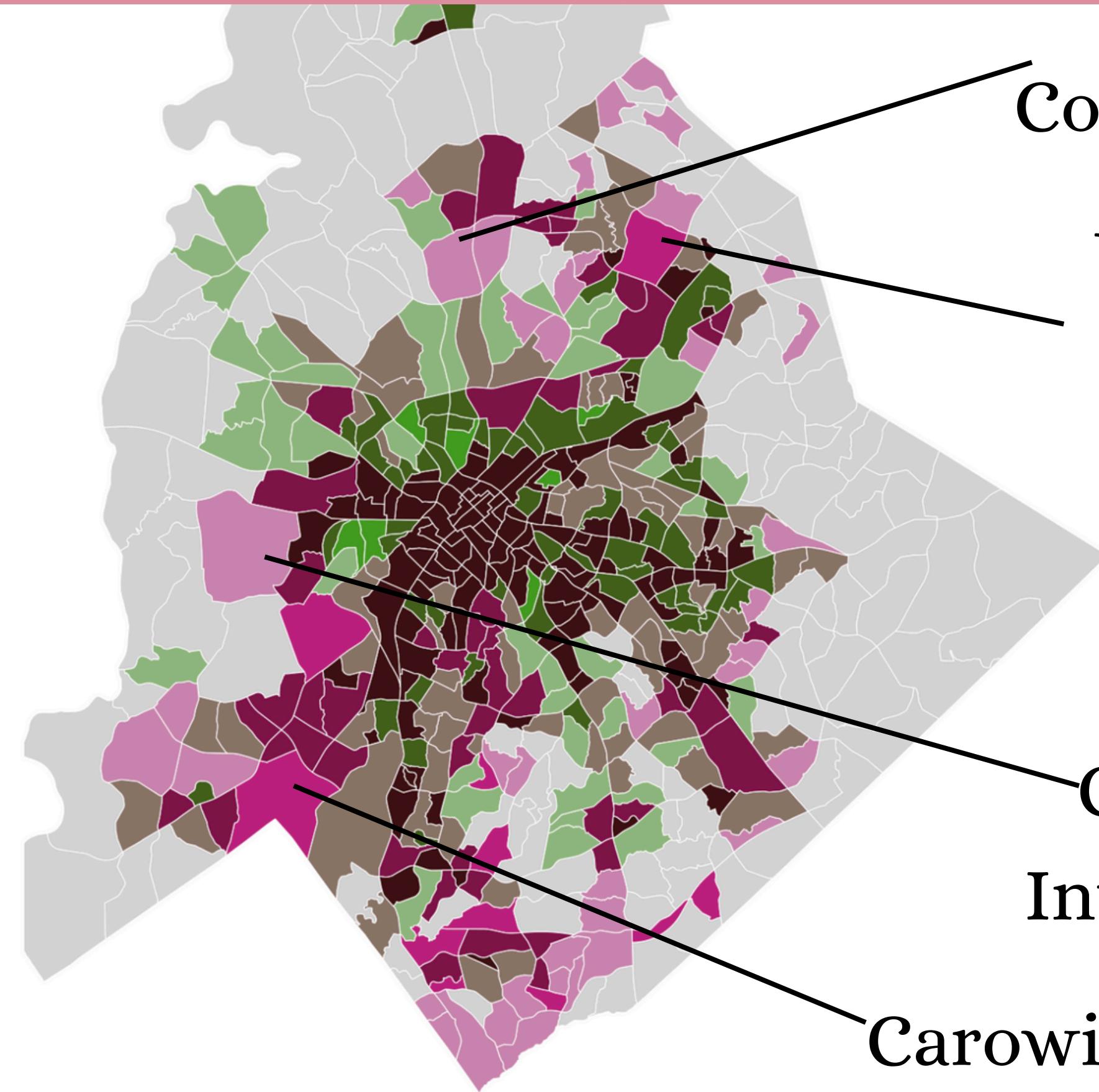
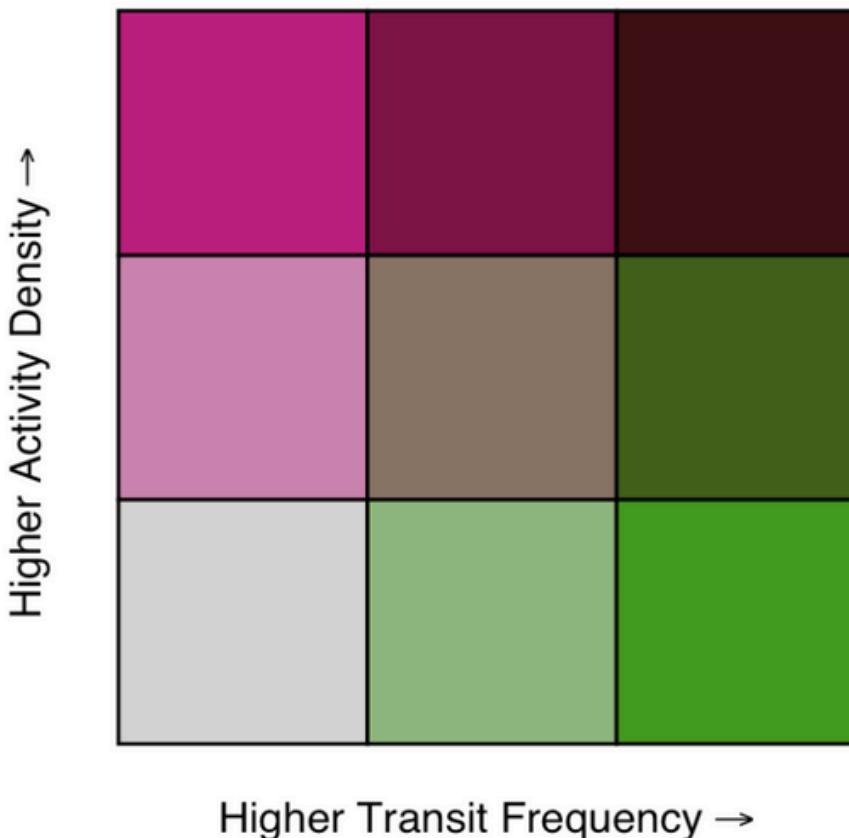


Results indicate that as income increases,
transit frequency decreases.
Smaller relationship than previous model, but
higher statistical certainty.



Activity Density (jobs + housing) and Transit Frequency

Looking for pink
block groups: high
density, low
transit frequency



Compact Suburbs

University City

Research Park

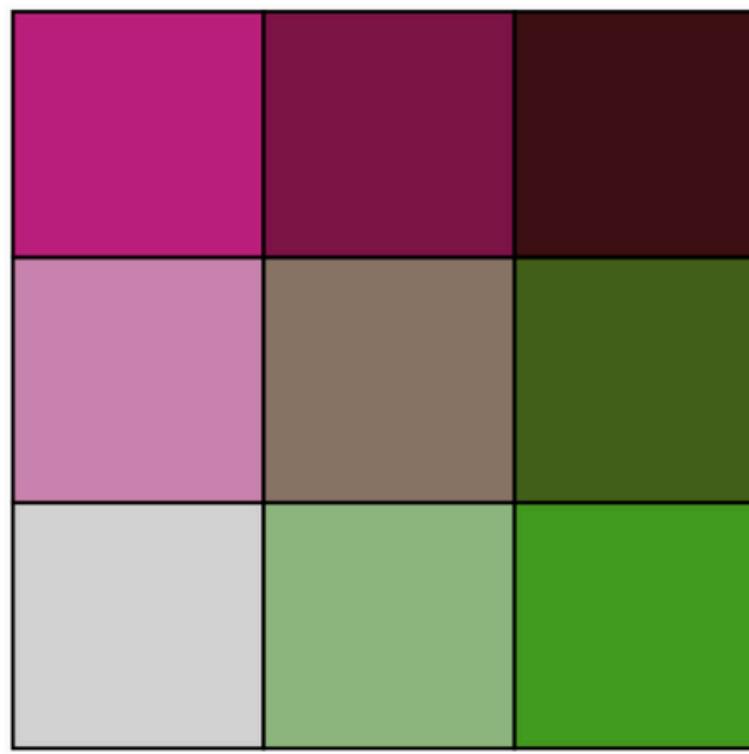
Charlotte Douglas
International Airport

Carowinds

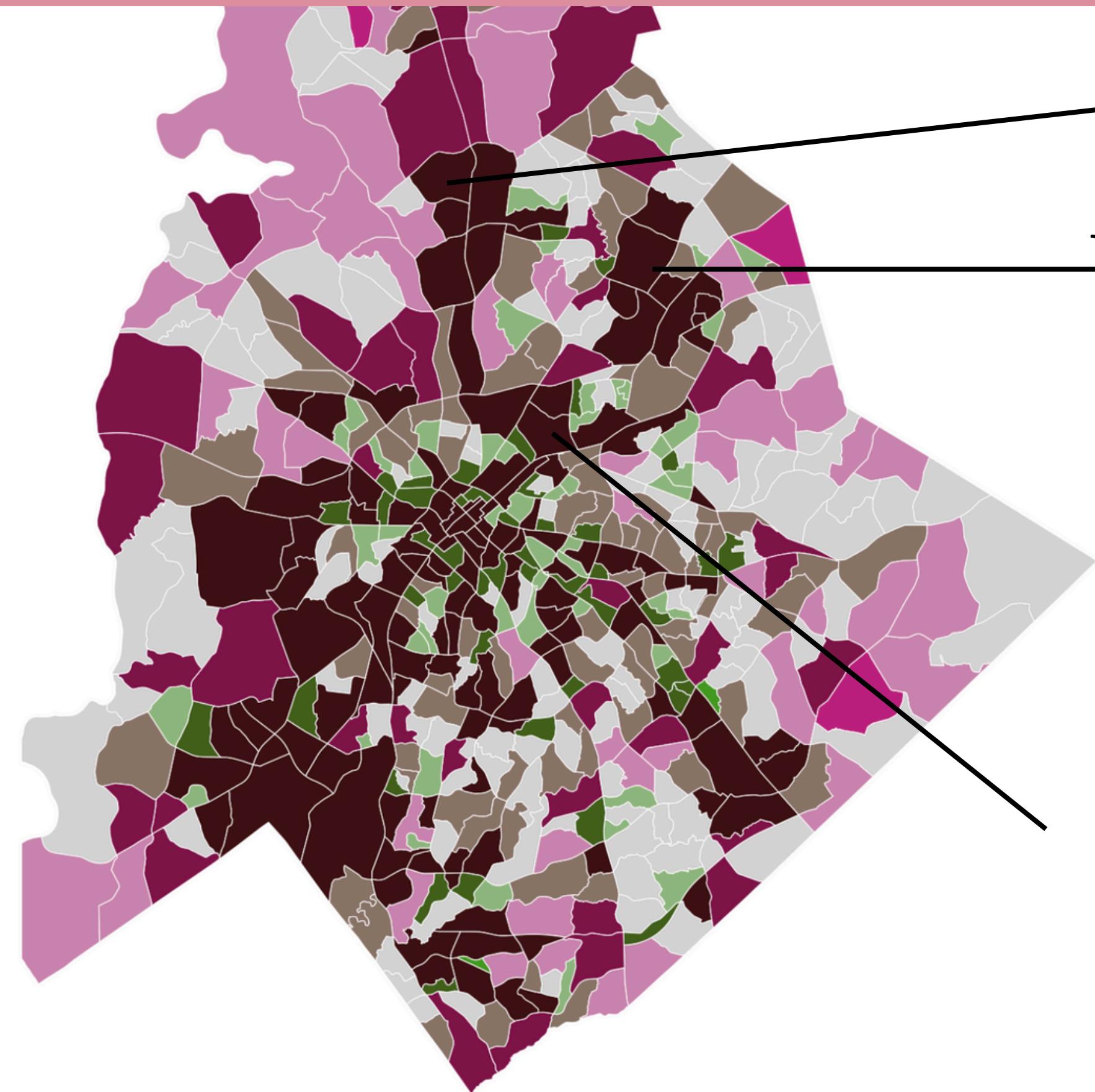
Employment Density (jobs per acre) and Low Wage Workers (workplace location)

Looking for brown
block groups:
many jobs, many
low wage workers

Number of Low Wage Workers →



Jobs Per Acre →



Northlake Mall

University City

Research Park

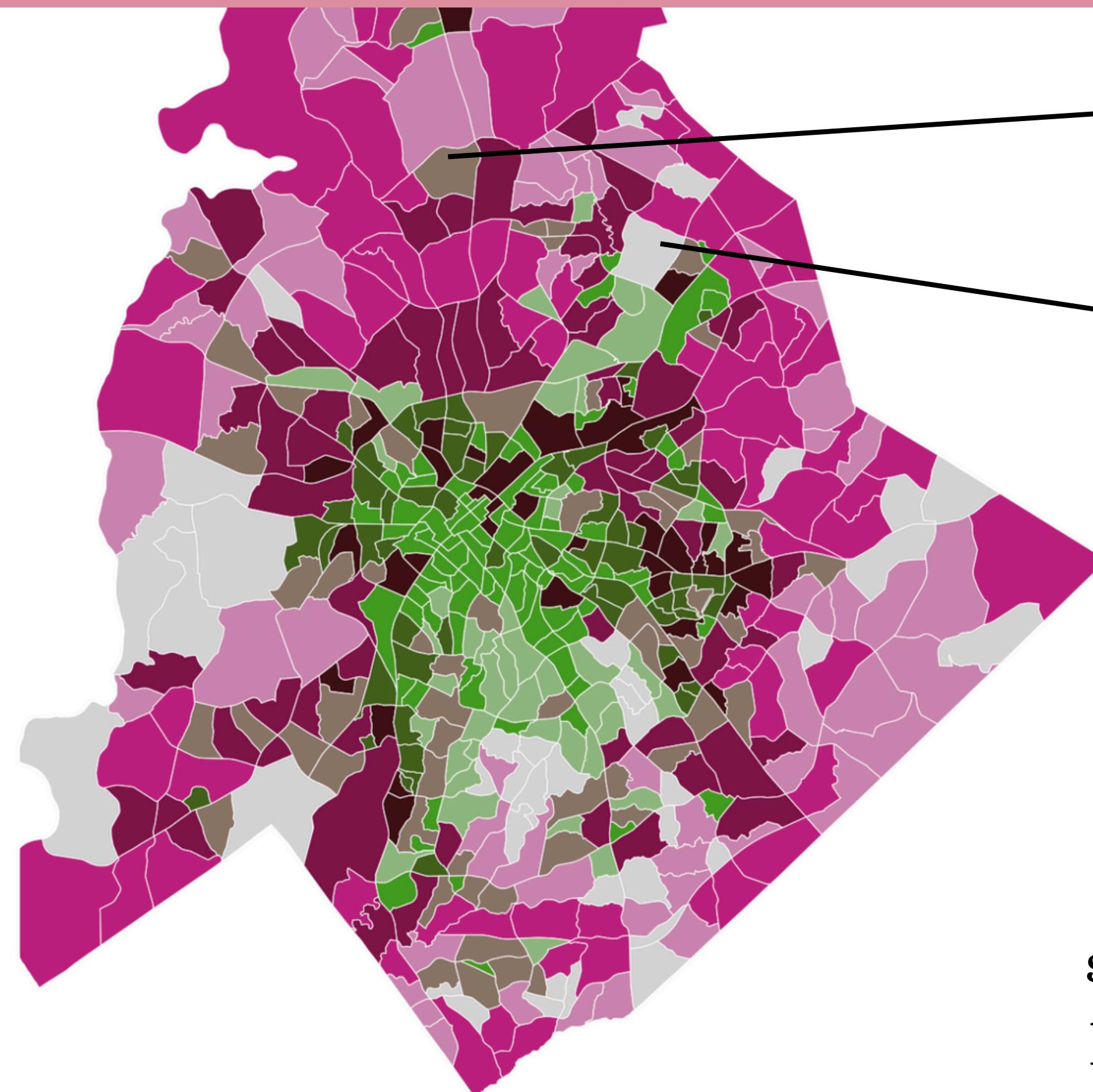
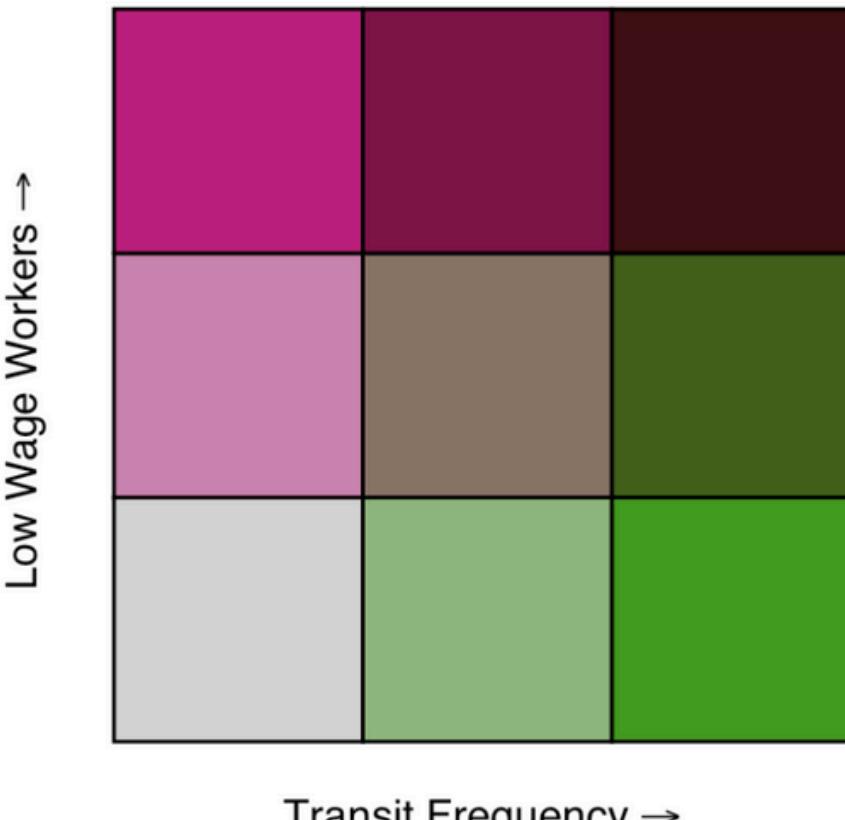
Sugar Creek,

Tryon Hills,

NODA

Transit Frequency and Low Wage Workers (home location)

Looking for pink
block groups: many
low wage worker
homes, poor transit
service



Northlake Mall
University City
Research Park

These two locations are
employment dense,
employ many low wage
workers, and are
surrounded by low wage
homes with poor transit
service frequency

LIMITATIONS

- Income variable capped at \$250,001, 555 entries as such
- Lack of transportation network analysis, specifics of existing bus lines
- Rudimentary spatial analysis
- Old transit data, 2012-2014

CONCLUSIONS

- Regression shows greater transit frequency where people spend more on transportation
- Commerce hubs surrounded by low wage residential areas are very car dependent and lacking transit
- Transit outside the city center primarily operates on stroads, leaving residential neighborhoods with poor access to bus routes

POLICY SUGGESTION



Nov 2024 See more dates

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