Transit Oriented Displacement: Has the Twin Cities' Green Line Propagated Gentrification?

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This report covers the work done by Brian in the broader project "Impact of Transit Development on Urban Environments: A Multifaceted Approach". An overview of our joint project can be found in the README file, while Gugo's work can be found in his own report.

Research Question and Project Background: Has the Twin Cities' Green Line light rail line contributed to gentrification of the surrounding areas? I seek to answer this question using change in four primary indicators between 2013 and 2019, mean property value, median household income, poverty, and percentage white population. I also explore changes in public transit usage to further contextualize the impact of the line. This question arose as a result of my own interest in transit and exploring social science issues through data. The Metro Green Line is a light rail line opened in 2014 as a way to connect an area known as the Central Corridor, which refers to the area between the downtowns of St. Paul and Minneapolis that follows University Ave through the University of Minnesota. This is a part of a broader development plan, of which Allianz Field is also a part of.

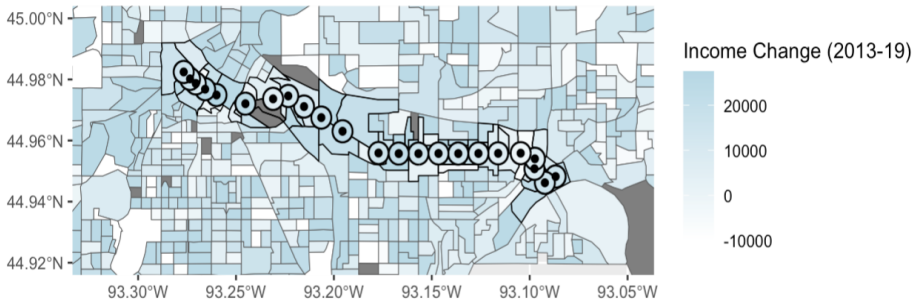
As a geography major, I have become familiar with the surrounding environment and have become attuned to noticed changes in urban structure. I've begun to notice outcrops of newly constructed apartment complexes particularly along University Ave, along the length of the Green Line tracks in St. Paul and Minneapolis. These are often tell tale signs of gentrification, a concept described by the University of Minnesota's Institute on Metropolitan Opportunity (2016) as "the displacement of lower-income households by higher-income residents, replacement and/or rehabilitation of housing stock, and displacement of racial minorities by higher-income white residents". This is a process which occurs at a rapid pace, as the product of socio-economic forces pushing against residents. Some of these typical visual representations can be found in the traditionally lower-income neighborhoods of Prospect Park and Frogtown. Prospect Park was formerly home to a large manufacturing sector, while Frogtown is composed of a large migrant population, so it can be said that development might impact these neighborhoods in different ways. Regardless, it is important to understand if

purposeful development is negatively impacting the pre-existing community, especially if it is resulting in displacement.

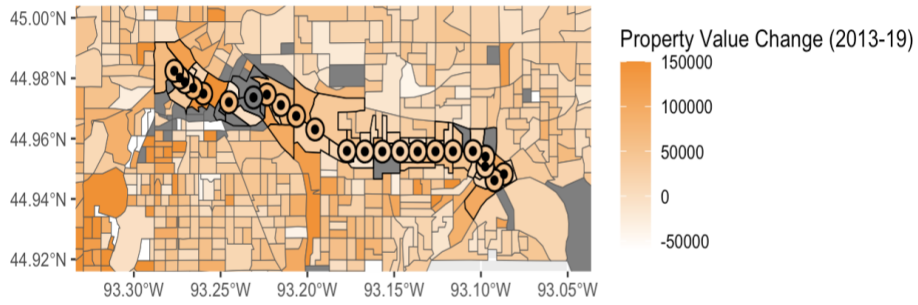
Data and Analysis: To quantify the selected variables, I used data from the American Community Survey (ACS). The ACS is a yearly demographic survey sent out by the U.S. government intended to supplement the decennial census, getting into more detailed social and economic information. I chose this as its annual nature allowed me to obtain more specific data relating to the opening of the line, connecting to the rapid nature of gentrification in our definition. I chose to compare 2013, the year prior to the Green Line's opening and 2019, the most recent year before the 2020 redistricting. I accessed this data through the Census API via the tidycensus package, which allows for queries to be made through the R statistical programming language. I analyzed variables relating to median household income, mean property value, percentage white population, percent under the poverty line, and the percentage of the population that uses public transit to go to work on a daily basis. This data was collected at the block group aggregation, which I selected to provide highly localized data to each station. I queried data from both Ramsey and Hennepin counties, though to complete analysis I created an additional data set of block groups that intersected with a 400m radius of any Green Line station. This number was chosen as many stations lay 800m apart along University Ave. All joins completed were along spatial lines, thinking about census data's relationship to location rather than other datasets.

I thought about change along the Green Line in two different scales; the line as a whole and the surroundings of individual stations. To make determinations on if gentrification was actually occurring, I performed significance tests for the mean value of the intersected block groups versus the entire counties. I also list these numbers in my results when doing a direct comparison. I also calculated the means for individual stations, which I display visually. This allows me to notice visual patterns in where hyper local trends might differ from the overall conclusion.

Results: For each variable, I created a visualization that shows the relationship between change surrounding the Green Line and the greater Twin Cities area. All intersected block groups are outlined, while an additional layer of the change for each station is layed on top of the block groups. The gradient scale does not always represent the full scope of change, as some outliers skew the ability to recognize meaningful changes in the data. Each variable also has a corresponding p-value and raw value comparison.

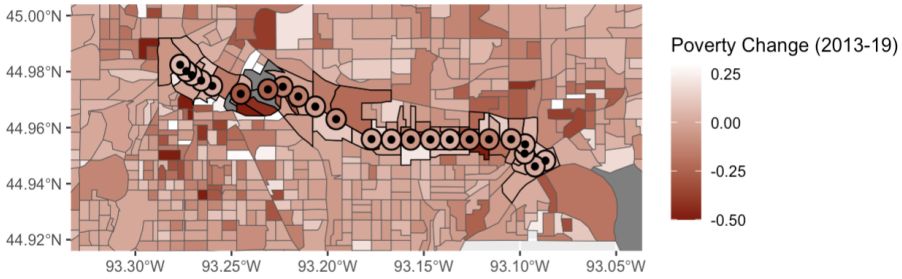


For our first variable, change in median household income, we see a change of +$14,064 in intersected block groups versus +14,926 in the greater Twin Cities. This corresponds with a p-value of 0.69, which gives us complete certainty that we cannot conclude any meaningful difference. There are outcrops of slightly larger than average income change, surrounding areas such as Snelling Ave, Prospect Park and downtown Minneapolis.

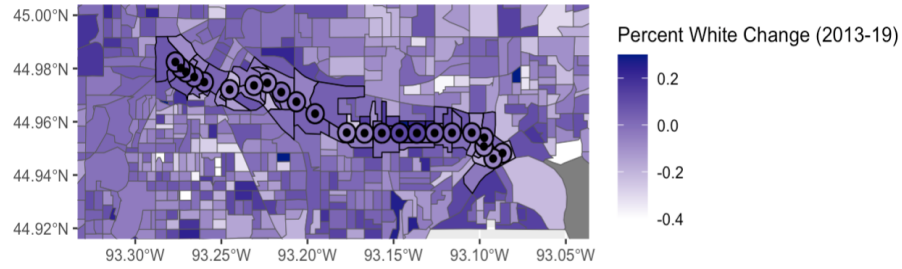


For mean property value, we see a change of +$42,556 in intersected block groups and +$41,371 in the greater Twin Cities. This corresponds with a p value of merely 0.87, an incredibly large value that gives us utmost confidence that there is no difference. Visually, it is hard to determine any location which appears to have had a greater than average change in property value. This is interesting, as one might expect a rapid change in housing stock to

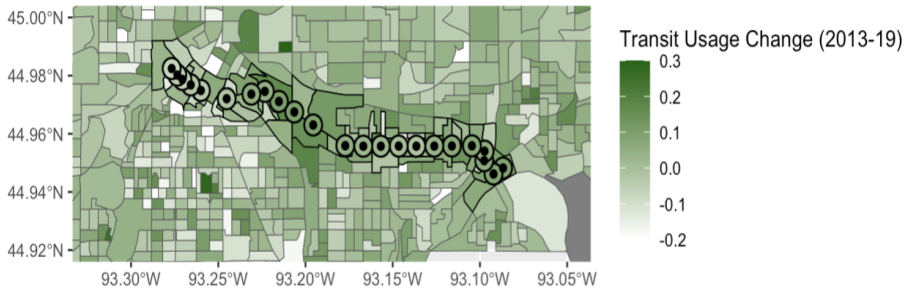
manifest higher prices, a telltale sign of gentrification and the primary cause of displacement. We can be confident in saying that this isn't happening at a large scale along the Green Line.



For change in those living under the poverty line, intersected block groups have a change of -5.7% and the greater Twin Cities has a change of -2.6%. This gives us a p value of 0.25, still above the typically used baseline of 0.05 to determine significance. It appears that surrounding the University of Minnesota, there has been a significant decrease in poverty over a short time. Though given the additional factors of the college, it is hard to say that this change is solely related to the Green Line.



For change in percentage White population, intersected block groups have a change of -0.2% while the greater Twin Cities has a change of -3.0%. This variable gives us our lowest p value yet, 0.07, which some may interpret to be small enough to conclude significance. There appears to be a sizable increase in the white population around the Frogtown area, a neighborhood which we've identified as being vulnerable to gentrification. Though, given the previously low White population here a small change would likely result in a large percentage value, potentially skewing our results.



Finally, we take a look at the change in daily transit usage to add another interesting layer to our analysis. We see that intersected block groups have a change of +1.7% while the greater Twin Cities has a change of -0.1%. This provides us with a p value of 0.10, again near the realm of significance but not convincingly. This conclusion would be particularly interesting if we had seen meaningful changes in other categories, as we could theoretically hypothesize that the Green Line would be perpetuating gentrification without negating car dependence, the typical primary goal of public transport development.

Conclusions: Given that none of our p values are below 0.05, we cannot conclude that given our parameters, the Green Line has caused gentrification. There may be individual neighborhoods where aspects of gentrification are occurring, but when taking a large-scale approach this is something we cannot conclude. This is actually in line with what experts on the Twin Cities' situation have said. The Institute on Metropolitan Opportunity's report concluded that while St. Paul and Minneapolis have been engaging in consistent new housing and apartment construction, they cannot say that it has proven to cause any displacement. I also met with Rachel Dungca, a data scientist at the Metropolitan Council, the governing body which is in charge of all transit operations in the Twin Cities. She shared that they have come to a similar conclusion.

There are a few reasons why this could be the case. Firstly, the Green Line spans a variety of land uses. While there are some areas for living, there are more areas for commercial use. The construction of new strip malls over old ones would not displace anyone from their living situations and would be hard to measure using demographic data. The line also passes through two major downtown areas and a world class university, who likely assert a greater influence on their surroundings than a light rail line. Also in the United States, in most cities

public transit is used more out of necessity than choice. In such a car dependent society, most individuals who would have the income to change the situation along the Green Line would likely be car owners and not regularly use transit. We observed this in the only ~2% increase in transit usage along the line. The Twin Cities are impacted by severe winter conditions, which made transit undesirable for daily usage for a good portion of the year. Also, University Avenue itself is not very pedestrian friendly, so access to stations can be dangerous at times. As a whole, it might not be surprising to see that the Green Line hasn't caused gentrification, as the greater situation of the Twin Cities doesn't provide a platform for livelihood shifting, transit oriented changes to be made.

Further Research: Upon the completion of this project, I've determined two further steps that could be taken to gain greater insight into this question. Firstly, I believe that individual analysis of certain neighborhoods would be more likely to uncover patterns of gentrification than generalizations of the whole line. This is clear both when noticing patterns in my visualizations, with areas such as Frogtown and Prospect Park more likely to display characteristics of gentrification than others, and simply by driving along the length of the line. Outcrops of new apartments are certainly present, though very localized, and it is not unlikely that the other surroundings have counterbalanced ongoing gentrification in these neighborhoods. Additionally, non-publicly available information exists about changes in where people live, which would provide much greater accuracy in determining if displacement is occurring. Unfortunately, both of these steps are out of the scope of this project.

Work Cited

Institute on Metropolitan Opportunity, Are Minneapolis and St. Paul Gentrifying? (2016).