Who Cares About the Neighborhood?

Gentrification and Educational Outcomes in Oakland Unified School District Elementary Schools

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I. Introduction

In September 2014, Dropbox employees reserved a soccer field in the Mission District of San Francisco. Historically, the field was an open community space where teams would show up and wait to play, but recently it had been privatized. As a result, when community members would not vacate the field during the Dropbox employees' reserved time, a confrontation ensued:

> **Community Member**: "You don't understand, it's not about booking a field…this field has never been booked. How long have you been in the neighborhood?"
>
> **Dropbox Employee**: "Who cares about the neighborhood?"
>
> **Community Member:** "I've been born and raised here for twenty years."
>
> **Dropbox Employee:** "We paid…for the field. Read it [shows permit]!"
>
> **Community Member:** "You think just because you have money, you can buy the field."

This confrontation is representative of how divisive the issue of gentrification is. Gentrification is a "process by which higher income households displace lower income households in a neighborhood, changing the essential character…of that neighborhood" (Barton, 2014). Gentrification has become one of the most controversial issues in contemporary American politics.

There are two main perspectives on gentrification. The first is gentrification is a negative process that displaces low-income people out of their communities. This perspective argues that displacement contributes to higher incarceration rates, poorer health outcomes, and creates social harm by dismantling communities. The second, opposing perspective understands gentrification as a beneficial process for everyone, including low-income people. This perspective argues that gentrification allows middle class values and culture to permeate and improve communities,

providing more resources for communities through additional tax dollars, and creates more jobs and affordable housing (through aforementioned increased tax revenue) for low-income people.

While no consensus has been reached on whether gentrification is a positive or negative force in communities (like most political issues, it largely depends on who you ask), the majority of literature suggests that it does have *some* effect on communities. One particular area of contention is gentrification's effect on educational outcomes for low-income students. Again, there are two predominant and opposing theories. The positive theory understands gentrification as having a beneficial effect on low-income students, arguing that mixed income schooling, through peer effects, contributes to increases in test scores (Kahlenberg, 2001). It argues that as neighborhoods obtain more resources, they are better able to support students, thus creating a culture of achievement that low-income students will benefit from (Keels et al, 2013).

The negative theory argues that gentrification either negatively or marginally affects low-income student's education achievement levels. This perspective argues that though gentrification attracts wealthy people to low-income neighborhoods, many of the gentry either do not have children or are not willing to send their children to public schools when there are higher-achieving charter and private schools available (Cucchiara, 2008; Keels et al, 2013; Lipman, 2008). This theory argues that gentrification disempowers the parents of low-income students, as public school boards attempt to compete with private and charter schools in order to attract affluent parents who are able to donate more money and resources to the school than low-income parents. This effectively repurposes public schools to focus on middle-class and affluent student needs (Lipman, 2008). Finally, they argue that the effect on low-incomes students of being exposed to more affluent peers or being inculcated with "middle-class" values is negligible, if not negative (Keels et al, 2013).

Education is one of the most important and pressing issues facing communities today. It has long been established that education is a primary indicator of future income, crime rates, and health outcomes. For example, in 2013, President Obama declared widening economic inequality (largely created by differences in education) as the "defining challenge of our time" (The White House, 2013). His primary education policy and a hallmark of his tenure, Race to the Top, is a response to American rankings in reading and mathematics paling in comparison with the rest of the developed world. In 2012, America teenagers ranked 36^{th} in the world in the Program for International Student Assessment, even three years after Race to the Top was initiated (NCES, 2012).

Now, as globalization and technological progress continue, routine production jobs, which had once provided Americans who had no higher education a place in the middle class, are vanishing. The correlation between education and earnings, and by extension, income inequality, has become much stronger. The median income for someone whose highest level of education is a high school diploma is $22,516 less per year than someone whose highest level of education is a bachelor's degree, and $50,492 less per year when comparing to someone with a professional degree (Bureau of Labor Statistics, 2015). Therefore, it is obvious that education is relevant, and that understanding how gentrification affects educational outcomes is necessary to guide future education policy.

This thesis looks to contribute to the existing literature on gentrification and educational outcomes in schools, following the spirit of the Keels et al. study on gentrification and its effects on outcomes in reading and math achievement in the Chicago Public School system (2013). I focus on the elementary level (grades 2-6 specifically), where there is especially a lack of

research. In particular, I am interested in how gentrification affects low-income students' test scores.

Specifically, this thesis examines effects of gentrification on educational outcomes for students in the Oakland Unified School District (OUSD). I look to create a gentrification proxy using changes in median household income, homeownership, and educational attainment. I use publicly available STAR test data (California's standardized test through 2013) from the California Department of Education (CDE) to measure educational achievement within each school over time. Using the American Community Survey, I supplement the STAR test data of each individual school with income, education, and homeownership data for the census tract that the school is located in. The combination of census tract data and STAR test data allows me to understand the effect of gentrification on elementary level educational outcomes.

II. Literature Review

Positive Effects of Gentrification

The debate around gentrification is polarized; though gentrification is often publicized as a negative outcome, there remain advocates of gentrification as a positive overall force (Atkinson 2002; Byrne, 2003; Freeman and Braconi, 2004). Byrne argues that gentrification should increase access to jobs for the poor, as their new and more affluent neighbors can afford more goods and services (2003). Though he acknowledges that these new employment opportunities may be low-wage positions, he understands this as a positive effect, as non-gentry with little to no higher education may need these jobs. Globalization and outsourcing have done away with the factory jobs that were a vital pathway to the middle class jobs for Americans with no higher education. America's post-industrial economy has shifted away from manual labor jobs to careers focused on critical thinking and creative problem-solving, what Robert Reich called "symbolic analyst" jobs (Reich, 1991). These "symbolic analyst" jobs, consequently, are highly dependent on obtaining higher education. As a result, there are not as many stable and well-paid employment opportunities available for those who have not attained a higher education, causing gentrification to benefit low-income communities by providing job opportunities that require no higher education. Byrne's argument implicitly assumes that the communities that relied on factory jobs are typically the same communities where gentrification brings in new, low-wage employment opportunities that require little to no higher education (e.g. restaurant or retail jobs).

Another argument in favor of gentrification is "gentrification help[s] break down barriers to real estate lending in cities, which makes it easier today for urban residents at all income levels to buy a house" (Byrne, 2003; Wyly and Hammel, 1999). This perspective argues that prior to gentrification, lenders would avoid "depressed urban neighborhoods," contributing to

redlining—the practice of purposely denying or charging more for loans in certain areas, especially those containing a large number of minorities (Byrne, 2003). Wyly and Hammel argue that when gentrification began in a neighborhood, gentrifiers found willing lenders and taught those lenders they could stand to make profit if they lent money in these gentrifying neighborhoods (1999). Thus, gentrification made loans more accessible to everyone in these communities.

Does gentrification indicate displacement? Freeman and Braconi's study of gentrification in New York in the 1990s found low mobility rates and argued that "mobility rates in gentrifying neighborhoods are inconsistent with a process dependent on the massive displacement of disadvantaged residents" (2004). The authors acknowledge that perhaps low mobility rates for low-income people are the result of low-income people being displaced out of their homes but moving within their neighborhood (which would not count as displacement). They suggest an alternative explanation—that the low mobility rates they find in gentrifying neighborhoods are indicative of gentrification's positive effects for all the residents in the city. These benefits include more retail and public services, safer streets, and more job opportunities (2004). In a similar study conducted in Boston, Vigdor finds that while units that housed low-income people at the beginning of a four-year window were unlikely to still house low-income people at the end of that period, it was due more to income mobility than displacement (2002).

Both Vigdor and Freeman and Braconi do not claim that gentrification is unequivocally positive, and that secondary displacement (from increased rents) does occur. In fact, Vigdor notes that though people may not be displaced, increases in rent without equivalent increases in income will especially hurt low-income people (2002). Byrne points out that while gentrification may cause displacement, these studies 1) argue that gentrification does not necessarily lead to

displacement, and that 2) perhaps the aforementioned positive effects of gentrification for low-income people make the extra costs of rent worth paying, resulting in lower mobility rates (2003). If this is the case then gentrification still has a net benefit to low-income people, even in cases where rent is increasing.

Additionally, Byrne articulates that due to the years of domestic policy and law supporting white flight to suburbs (and the numerous barriers for low-income people to reach the suburbs), the suburbs became concentrated pockets of wealth and resources—making the inner cities their low-income counterparts (2003). As a result, certain scholars believe gentrification brings opportunities and resources to the inner cities that low-income people, who cannot flee to the suburbs, would otherwise not have access to. In cases where gentrification does not lead to displacement, as in the Vigdor and Freeman and Braconi cases, transferring wealth and resources from the suburbs to previously low-income communities may be considered to be a positive effect of gentrification.

Others argue that gentrification increases the political capital of low-income people. Byrne articulates this idea by noting that before gentrification, low-income communities' voices did not have much political clout as these communities did not have the resources to demand attention and change on a larger scale (2003). However, gentrification brings in more affluent people who are forced to interact with their low-income neighbors in political forums and elections. This causes low-income people's priorities to become more publicized, as gentrifiers may consider low-income people's demands if they want to attain low-income people's political support and votes. As gentrifiers bring resources into the communities, low-income demands can be better met (2003).

Finally, many scholars suggest that that gentrification increases the tax base of a community, allowing the community to have more resources. As gentrification "increases municipal tax receipts" there may a greater likelihood for increases in public employment, bringing jobs to low-income people (Byrne, 2003). These tax increases are largely the result of increases in property taxes that arise from increases in property value as neighborhoods become gentrified. In many cases, property taxes go to public services, such as education, police protection, sanitation, and highway maintenance (2003). Therefore, by increasing taxes in a community, the overall quality of life for those in the gentrified community may go up.

Negative Effects of Gentrification

Through gentrification, scholars argue the political voice of non-gentry is often ignored and lost (Kennedy and Leonard, 2001). For example, in the 1999 mayoral election in San Francisco, both candidates supported anti-gentrification measures. However, no anti-gentrification policy or measure was created, reinforcing the idea non-gentry voices are only ostensibly heard, and politics are still largely driven by money (2001). In fact, Gilens and Page, after analyzing close to 2,000 policy outcomes in the last twenty years, found that influence in policy substantially increases as a group or person becomes wealthier (Gilens & Page, 2014). They find that a citizen with an average level of income has marginal, if any, effect on policy outcomes, and that the preferences of the "economic elites" are 15 times more important in predicting policy outcomes (2014). Though not every gentrifier may belong to the economic elite, on average, gentrifiers have more wealth than low-income non-gentry. Thus, the political preferences of gentry will be catered to over non-gentry.

Gentrification is also a public health issue. With rising rents, even without displacement, low-income households may have to make the tradeoffs between basic needs, such as healthy food and health care, to pay rent (CJJC, 2014). Furthermore, for homeowners, the amount of stress that comes with potential foreclosures and loss of wealth is proven to be detrimental to a person's health—potentially causing a cycle of an individual's health deteriorating, causing them to spend money they do not have to combat subsequent illnesses, which in turn further increases stress and anxiety due to increasing debt (CJJC, 2014). In fact, the "longer someone has lived in their current neighborhood, the greater their experience of stress, anxiety, and depression after a move"—clearly indicating that displacement from gentrification can cause major psychological harm (CJJC, 2014, p. 46). It is vital to acknowledge how these issues of public health affect education, and is reductive to understand how gentrification affects education without considering how it affects other fields that also affect education, such as health, culture, and politics.

Gentrification is also an issue of racial justice and equity. Between 1990 and 2010, the proportion of Black Americans making up the total population in Oakland fell by 16 percentage points (CJJC, 2014). Oakland neighborhoods in the later stages of gentrification have the largest disparity between Black and White mortality rates compared to other neighborhoods not gentrifying (CJJC, 2014). Black students in the United States, *ceteris paribus*, already perform one standard deviation worse on standardized testing than their White counterparts—equating to the difference between a 4th grader and an 8th grader (Miksic, 2014). John Jackson, the CEO of the Schott Foundation, reported that at the current rate of progress, it would take "50 years for black males to graduate at the same rate as white males" (Jackson, 2012).

Finally, Sheppard disputes the claim that gentrification yields additional resources to the community (2012). He finds that in cities with "a higher proportion [of people] who have moved within the last five years, there are significantly fewer neighborhood improvement organizations (public charities as classified by the IRS) per capita, and the organizations that are present have collectively lower expenditures per capita." (2012) This poses gentrification as a problem that both potentially causes displacement and inflicts a social cost on communities. Sheppard established that a large increase in displacement risk (two standard deviations) would be correlated with a "52 to 72 percent decrease in community benefit expenditures per capita" (2012). This may be due to gentry not needing neighborhood improvement organizations, as they most likely have enough resources to live more individual focused lives. This research implies that gentrification is not only harmful for those who it displaces, but also the poor residents who remain, as the neighborhood improvement organizations spend less per capita then before.

Positive Effects of Gentrification on Education

Gentrification may increase achievement levels in school through increases in average education levels, employment, income, resources, and peer effects (Keels et al., 2013; Leventhal and Brooks-Gunn, 2000). Consequently, schools in gentrified areas are expected to show improvement because children of gentry will enroll, bringing higher achievement levels to the schools (Keels et al., 2013). Shifts in "educational norms, increased safety, and improved childcare" may also indirectly improve educational outcomes for low-income students (Keels et al., 2013).

Another positive effect of gentrification for low-income students comes from peer effects and social mixing. Kahlenberg, a major advocate for mixed-income schooling, believes that

middle-class students have greater motivation, superior language skills, and better attitudes and behaviors than their low-income peers (Kahlenberg 2001; Lipman, 2009). Consequently, it should benefit low-income students to be in classrooms with middle and upper class students. Stillman agrees with Kahlenberg, and argues that theoretically social mixing would be beneficial for all students. However, she acknowledges that due to gentry choosing schools that low-income students are disproportionally underrepresented in, this is an idea to work towards rather than a policy that will guarantee low-income student achievement (Stillman, 2012).

Still, it is unreasonable to completely discount gentry choosing public schools as a possibility. Kimelberg and Billingham, in their study in the Boston Public School system, found that many gentry valued the diversity of the public schools as they believed it: 1) led to a less homogenous experience, 2) better reflected the real world, and that 3) diversity has a positive effect on learning (Kimelberg and Billingham, 2012). Though this was not representative of the decisions many of the parents made, as in the aggregate they chose non-public schools, it does represent the possibility that gentry will choose public schools (2012).

Negative Effects of Gentrification on Education

Keels et al. found that gentrification in Chicago had marginal effects on academic achievement in Chicago Public Schools (2013). School choice is significant for whether or not gentrification is effective in increasing school achievement. A study conducted by Kennedy and Leonard found that because many "newcomers do not have children…they bring little additional pressure to improve neighborhood schools" (2001). For gentrifiers who do come in with children, they often will select magnet, charter, and private schools rather than enrolling their children in a poorer performing public school (Keels et al, 2013; Kennedy and Leonard; 2001).

This is clear in Chicago, where ability based schools were comprised of "60 percent low income and 20 percent white…compared to about 89 percent low income and 9 percent white in neighborhood schools" (Keels et al., 2013). As gentrifiers either 1) do not yet have children, or 2) choose schools that are more segregated by socioeconomic class, the possibility of peer effects improving low-income students' achievement levels appears to be marginal.

This scenario of school choice, where gentry do not want to send their children to urban public schools, resembles a game theory situation. There is the possibility that by sending their children to these schools, through their interaction with students of various racial and socioeconomic backgrounds, that their children will benefit—but only if other gentry send their children to these schools as well, as that would increase the school's resources. However, there is also the likelihood that these schools will take time to turn around, even with continued participation from gentry. As a result, sending their children to an urban public school poses a higher risk—if other gentry do not choose to send their kids to urban public schools, and these public schools do not acquire more resources, then the gentry who do send their children to public schools end up in a worse scenario than if they chose to send their children to non-public schools. As people are generally risk averse, it follows that gentry would send their children to magnet, charter, and private schools with the assurance that the students in those schools are high achieving.

Freeman adds to the critique of gentrification, as he points out that "social ties rarely cross class and racial lines" making the positive benefits of peer effects for low-income students elusive (Freeman, 2006; Stillman, 2012). Furthermore, peer effects are very dependent on the amount of social mixing in schools. Certain studies suggest different "tipping points" where, after a certain amount of middle-income students enter a school, low-income students actually do

worse (Cucchiara, 2008; Keels et al., 2013). This may be due to schools reprioritizing their curriculum to fit the needs of children of higher socioeconomic status, who most likely come into school at a higher proficiency level than their socioeconomically disadvantaged peers.

Proponents of social mixing, such as Kahlenberg, suggest that no more than forty percent of schools be comprised of low-income student to retain the middle-income culture within the school (2001). Then, not only is there a tipping point where low-income students do worse after a certain amount of middle-income students enter the school, but there is also a threshold that requires at least sixty percent of students to be middle-class to promote the middle-class culture argued to increase low-income test scores. As these two theories exist in opposition, there is a small margin of error for a school to have the right composition of low-income and middle-income students to positively affect low-income students.

Another adverse effect of gentrification is the marginalization of low-income parents. The Center City School Initiative (CCSI), a Philadelphia based program designed to attract professionals to the Philadelphia public schools, caused low-income parents to believe that the CCSI "hoped to keep out low-income and minority children" from their schools (Cucchiara, 2008). The CCSI had to cater to affluent families and "emphasized the class-based resources parents brought to the schools." The schools thus have the potential to "re-inscribe social status, exacerbating the effects of race, class, and geography on students' educational experiences." (2008)

Lipman furthers the argument against gentrification, and specifically the deconcentration thesis of poverty, which states that moving low-income students to mixed income schools will improve their academic achievement by inculcating them with middle class values and culture (2004). She argues these ideas are rooted in an outdated moralization of poverty, which claim

that education is a meritocracy and understands minority cultures as being deficient. She argues that there are many other consequences of gentrification and closing certain "failing" schools—most notable being that students who do not go to their community's school may feel like outsiders and lose their support system. Furthermore, she denies that there are causal factors between middle class culture and school achievement, but rather a correlation grounded in the fact that middle class schools often have more resources and advantages. Lipman thus disagrees with the idea that gentrification, through bringing middle class students and values into urban, public schools, is a positive force for low-income students (2004).

Methodologies to Measure Gentrification

The methodology used to identify gentrification is essential to the results of the study. Barton found that different methodologies identified different cities and regions as gentrified, and as a result, studies may "overlook areas that experience similar changes [for] those more widely recognized as gentrified" (Barton, 2014). Therefore, it is critical to both understand what previous researchers have used to measure gentrification in order to propose an efficient and objective measure for this paper.

Many researchers of gentrification use qualitative methods to identify gentrifying neighborhoods as well as gentrification's effect on communities (Cucchiara, 2008; Lipman, 2004; Kimmelberg and Billingham; 2012). This approach is wonderful for developing nuance, interviewing community members, and understanding gentrification's effect on communities in a multidisciplinary fashion. However, because of its depth, this approach usually is not very extensive and does not draw larger conclusions about cities and regions. As a result, there is usually a lack of economic rigor as there are too few data points (schools, students, etc.)

Other scholars use a more quantitative approach, drawing upon many schools and regions to draw conclusions about gentrification and its effect on students (Bates, 2013; Bostic and Martin, 2003; Freeman, 2005; Keels et al., 2013). Many quantitative studies use a threshold method, where a neighborhood is gentrified if they experience a large enough change in certain census related variables (e.g. home ownership by race). Others are beginning to use non-census related indicators, such as number of coffee shops per capita, though these types of indicators are much harder to obtain causal inference from (Papachristos et al., 2011). The most successful studies have included qualitative methods along with their quantitative methodology, to attain a more holistic understanding of gentrification. Studies that solely rely on quantitative methodology may "identify neighborhoods that underwent naturally occurring improvements (incumbent upgrading)" as gentrifying (Barton, 2014).

Bates, in her gentrification and displacement study in Portland, Oregon uses changes in the housing market, economic statistics, and demographic changes in the neighborhood to measure gentrification (2013). She identifies census tracts within Portland and categorizes them by stages of neighborhood change. She borrows from Freeman's methodology, and identifies neighborhoods as gentrified if they exhibit a greater than average increase in educational attainment and house prices (from a starting point of below average), and a change in racial composition due to an increase in white homeowners, measured by the Home Mortgage Disclosure Act (HMDA) (Bates, 2013). Bates' research is useful in understanding how to effectively measure gentrification using educational achievement. However, this is more nuanced than the methodology I choose to use, and mapping tracts by stage of gentrification is beyond the scope of this research.

Sheppard's measure of displacement risk and its relation to community benefit expenditures uses a linear regression model where expenditures and organizations are outcome variables (in two different regressions), and percent of people who moved, average income, percent of people who rent, and percent of poverty were independent variables. This study does not include other independent variables such as home ownership by race, or education related variables, that I understand as essential in understanding gentrification. Furthermore, the use of average income instead of median income is uncommon, as average income is most likely to be skewed right.

Barton combines qualitative and quantitative research by conducting a content analysis of the *New York Times* as well as using census-based practices to identify gentrifying neighborhoods and highlight the importance of using different methods to identify gentrification (2014). Barton follows Bostic and Martin's strategy of identifying census tracts as susceptible to gentrification if their median income was below 50 percent of their metropolitan statistical areas (MSA). Barton then used proportions of people with college degrees, people aged 30-44, people with managerial and administrative jobs, and how much the percent of poverty and Black residents decreased (2014). Barton finds that there is a great amount of discrepancy between tracts that the New York Times identified as gentrified, and what Bostic and Martin's methodology identifies as gentrified. Though difficult, it is all the more important for future research to bridge the gap between qualitative and quantitative research to better understand how gentrification is affecting communities.

Keels et al. use Chicago Public School data for students in elementary schools and employs a one-mile radius around the school to determine the school's neighborhood. The researchers chose to use a one-mile (also tested a half mile which yielded the same results) radius

around a school's catchment area to avoid ad hoc changes to the catchment area during the year (2013). Their dependent variables are test scores in math and reading, and they use independent variables comprised of changes in education, income, and race/ethnicity between 1990 and 2000. To measure a student's socioeconomic background they use the proxy "free or reduced lunch," which, while rough, is the best available proxy as specific income data is confidential. This is the study that is most similar to my research, as it is one of the first research projects to examine more than one school. As such, it is the study I most try to emulate in my research on OUSD schools and gentrification's effect on low-income students.

Data & Empirical Methodology

I use data from both the California Department of Education and the American Community Survey. I use Standardized Testing and Reporting (STAR) data from 2002 to 2013 as a measure of student academic performance. Within STAR testing, I use the California Standard Testing assessment because it is the assessment the majority of students take. Specifically, I use the CST subject tests in English and Mathematics, the only tests that all elementary students (besides first grade) take every year. This allows me to compare tests results over time. I only use data on students in second through sixth grade. Mean test scores range from 150 to 600, and scale scores are used to equate scores from year to year (to account for changes in difficulty levels).

This dataset includes, for a particular group of students: the school, the type of school, the grade level, the mean scaled score by test subject, and how many students were tested. I was only able to use data on subgroups of students that contained at least ten students, as the state is not authorized to release the scores of a group of students that numbers less than ten. This may

reduce the nuance of the study as perhaps certain student subgroups within "economically disadvantaged" are affected by gentrification differently, but do not have enough students in their subgroup to have reported test scores.

I supplement the test data with the American Community Survey, obtaining data on census variables by individual census tracts from both 2000 and 2010. I merged the data on census tract, so any given school would be assigned the census data in the census tract where it was located. A school's demographic is not necessarily indicative of its surrounding census tract demographic, due to some students coming in from other areas or students within the census tract of the school opting to attend school elsewhere. However, matching census tracts with schools has been successful in other studies—Keels et al. used a similar strategy to avoid ad hoc changes in a school's catchment area during the year (2013).

I created variables to measure changes in the proportion of the population of each race, percent changes in homeownership, household income, education, and poverty levels by race, and percent changes in welfare recipients and median income. An obvious limitation using census data is that I am only capturing these changes in two snapshots (2000 and 2010). If these changes were not completely linear, then my results may be skewed. However, it is the data most publicly accessible, and so I assumed linear trends in these variables.

I then created a binary gentrification proxy and assigned it a value of one if the census tract satisfied two of the following three rules: 1) an increase of at least ten percentage points (75^{th} percentile of all census tracts) of the total population who had at least a bachelor's degree from 2000 to 2010, 2) an increase of 54 percentage points in median household income from 2000 to 2010 (75^{th} percentile of all census tracts), and 3) either a decrease in Hispanic homeownership of at least 13 percentage points or a decrease in Black homeownership of at least

17 percentage points (75th percentile of all census tracts). Next, I broke up the gentrification proxy into two different proxies, "gent high" and "gent low" to distinguish between census tracts that were already well off and became even more well off (belonging to "gent high") and census tracts that were originally poorer areas and became better off ("gent low"). To elaborate, census tracts belonging to "gent high" had, on average, a median household income of $93,543 in 2010. Census tracts belonging to "gent low" had, on average, a median household income of $30,931 in 2010. About 25 percent of census tracts (11 out of the 43 census tracts) belonged to either "gent high" (2 census tracts) or "gent low" (9 census tracts). I also created a visual representation of these proxies by mapping them on all of the Oakland census tracts (Figure 6).

To measure the effect of gentrification on the difference in test scores between 2003 and 2010 for low-income students, I conducted a variety of regressions by type of test (English versus Math). I conducted six regressions, two reported for low-income students by test type, two reported for non low-income students by test type, and two reported for all students by test type. I include controls for whether or not the census tract is low income and dummies to control for differences in scores by grades. These regressions let me understand the effect that gentrification has on low-income student test scores in gentrifying census tracts versus non-gentrifying census tracts. The general regression is:

$$\boldsymbol{Difference\ in\ Mean\ Test\ Score}$$

$$= \beta_0 + \beta_1 genthigh + \beta_2 gentlow + \beta_3 LowIncome + + \beta_4 GradeDum2$$

$$+ \beta_5 GradeDum3 + \beta_6 GradeDum4 + \beta_7 GradeDum5 + \varepsilon$$

III. Discussion

For low-income students in low-income census tracts, gentrification had a negative effect on the change in test scores from 2003 to 2010 (Table 5). I found that low-income students in gentrifying census tracts, had, on average, a 16.12 point lesser improvement on the English Star Test over time compared to low-income students in non-gentrifying census tracts (significant at the one percent level). Additionally, low-income students in gentrifying census tracts had, on average, an 18.24 point lesser improvement on the Math Star Test over time than did low-income students in non-gentrifying census tracts (significant at the five percent level). These effects are substantial, with the differences in both English and Math scores equating to roughly one half of a standard deviation (Table 3 & 4).

Similarly, gentrification had a negative effect on test scores for all students in low median household income census tracts. All students in census tracts with low median household income that gentrified had, on average, a 15.55 point lesser improvement on the English Star Test over time (significant at the one percent level) and a 15.81 point lesser improvement on the Math Star Test over time (significant at the five percent level), compared to all students in non-gentrifying census tracts over time.

Additionally, all low-income census tracts experienced a greater improvement in both low-income students' and all students' test scores from 2003 to 2010. Low-income students in low median household income census tracts had, on average, a 13.26 point greater improvement in test scores for English and a 20.19 point greater improvement in test scores for Math (both significant at the one percent level) than did low-income students in medium or high median household income census tracts. For all students this holds true as well: all students in low median household income census tracts had, on average, a 13.11 point greater improvement in

English scores and a 15.69 point greater improvement in Math Scores, compared to all students in medium or high median household income census tracts.

On the other hand, gentrification had no effect on the change in test scores for non-low income students. Likewise, gentrification, in census tracts that already had high median household income in 2000, had no effect on test scores for any group of students.

Interestingly, scores for low-income students in low-income gentrifying tracts were roughly the same as scores for low-income students in low-income tracts that did not gentrify (Tables 3 & 4). This is significant because in a straight comparison of scores between low-income students in low-income tracts that did gentrify, and low-income students in low-income tracts that did not gentrify, the effect of gentrification is lost. Though both of the low-income student groups started and finished with similar test scores, had gentrification not occurred in the low-income census tracts that it did, those low-income student test scores would have been significantly higher. It is not enough to compare the final scores of both groups of low-income students, but instead an analysis must include the trajectory of scores and how gentrification affected the change in test scores over time.

Intuitively, it is perhaps strange that the control for census tracts with low median household income would yield a positive beta on the change in test scores over time. However, this is most likely due to test scores in poorer census tracts being much worse than test scores in better off tracts in 2003, rather than it being an advantage for students to be in a poorer census tract (Tables 1 & 2). As the changes in test scores were larger for low-income census tracts than non low-income census tracts, it follows that the control for low median household income is positive. The difference in the level of improvement could be due to many different things such as: increased funding to schools in low-income tracts (where every additional dollar may yield

more marginal benefit to a poorer school than a wealthier school), the OUSD small school initiative that refocused OUSD on supporting low-income students, or it may more difficult to increase test scores when they are already high to begin with. Furthermore, changes in education policy, such as the implementation of No Child Left Behind (NCLB), may have caused the control for census tracts with low-median household income to be positive. To elaborate, NCLB largely focused on reducing the achievement gap between low-income students and high-income students, and so the fact that low-income students saw a larger gain in test scores than high-income students may be attributed to NCLB.

Unfortunately, with school-level rather than individual-level data, I cannot definitively report the underlying cause of gentrification's negative effect on test scores for low-income students in low-income census tracts that gentrified. I cannot account for the displacement of students, so whether or not the results are due to individual students performing worse or gentrification causing displacement is unclear. If many low-income students are being displaced, then these results describe the effect of gentrification on low-income students who are not displaced out of their school. There may be other characteristics of the group of low-income students who were not displaced that may have distorted gentrification's true effect.

To better understand how displacement affected my results, I created graphs highlighting the change in the percent of low-income students. I broke low-income students down into low-income students who were in gentrified tracts with low median household income and low-income students who were not in gentrified tracts (Figures 4 & 5). Notably, the percent of low-income students in tracts that gentrified decreased from around 90 percent between 2004-2007 to 70 percent by 2010. The percent of low-income students in non-gentrifying tracts decreased in a similar fashion, though by a slightly smaller margin. Therefore, perhaps the decrease in the

percentage of low-income students may not be due to displacement but rather individual students performing worse on the tests. However, this is still speculation, as I do not have micro data on the individual students who took the tests.

There are other clear limitations of these results. First, working with census data only allowed me to know demographic information for two years, 2000 and 2010. If demographic trends are not linear, which they very well may not be, then the census data is not entirely accurate. Furthermore, my proxy for gentrification was a binary based off of changes in education and homeownership by race, and median household income between 2000 and 2010 (again, assuming linearity). Gentrification, as discussed in the literature review, is not an easily observable phenomenon, and often occurs slowly over time. These tracts are most likely gentrified to different degrees, and as a result, using a binary interpretation of gentrification is reductive (though within the constraints of this paper, necessary).

In addition, it is improbable that the demographic data of a school entirely matches the census tract that it is geographically located in. Students may bus in from different census tracts or go to private and charter schools, ensuring that student demographics are not equivalent to census demographics. However, I extrapolated census demographics to reflect school demographics because of both my own research constraints and because other studies successfully used this strategy.

Finally, because I do not use qualitative research, I may run the risk of identifying neighborhoods that underwent naturally occurring upgrades as gentrifying. I use an arbitrary threshold for gentrification that, without qualitative research, may decontextualize my results and mispredict which tracts are gentrifying. Future research would combine both qualitative and

quantitative research to gain a more nuanced understanding of gentrification and its effect on low-income students in OUSD.

IV. Conclusion

In summary, I find that gentrification negatively affected low-income students' test scores over time in Oakland census tracts that were originally low-income. The effect is substantial, as gentrification prevented approximately a one-half standard deviation improvement in test scores between 2003 and 2010. As previously mentioned, the use of school level data prevents any definitive claim that these results are due to displacement rather than individual students performing worse.

If further research does find that gentrification negatively affects low-income students in Oakland due to displacement, then there are several policy implications. The argument that gentrification will raise the test scores of low-income students may be refuted. As other scholars have articulated, perhaps it is not middle class values that will raise test scores but rather the funding that goes into middle class schools (Lipman, 2009). Additionally, if low-income students are being displaced due to gentrification then only low-income students who remain can experience any potential benefit.

Furthermore, these results may indicate that gentrification indeed causes public schools to repurpose themselves to cater to the needs of more affluent students and the desires of affluent parents. As a result, low-income students and parents may be marginalized by public schools, and education policy in areas that are being gentrified should recognize this possibility and work towards providing more support for low-income students and families.

Finally, if gentrification is negatively affecting low-income student test scores due to displacement, these results support the idea that the moralization of poverty, which claims that education is a meritocracy and understands minority cultures as deficient, is both unfounded and dangerous. Future policy should focus on providing resources and opportunities for low-income students rather than relying on middle class values as a solution to disparities in education.

In conclusion, future research should continue investigating gentrification in Oakland using individual-level data in conjunction with qualitative data. It is necessary to understand how gentrification affects low-income students educational outcomes, as education is such an important indicator of future income, health, crime rates, and life expectancy. As gentrification continues to affect Oakland and the Bay Area, policy needs to focus not only on supporting low-income students, but also their communities. Understanding the link between gentrification and educational outcomes will be crucial in crafting the most sustainable, equitable, and effective education policy, and should be pursued with the utmost urgency.

V. Thesis Figures

Table 1: Summary Statistics for English Mean Scale Score, 2003

Student Subgroup	Mean	Std. Dev.	Min	Max	25th percentile	75th percentile
All	330.47	33.96	257.6	429.9	304.2	354.4
Low-Income in Gentrifying Tract	313.9	25.58	259.1	395.1	300.4	326.8
Low-Income in Non Gentrifying Tract	315.79	22.77	259.4	380.4	299.6	330.3
Non Low-Income	337.96	35.18	253.4	431.8	308.9	367.55

Table 2: Summary Statistics for Math Mean Scale Score, 2003

Student Subgroup	Mean	Std. Dev.	Min	Max	25th percentile	75th percentile
All	339.07	42.96	260.7	445.2	308.6	366.1
Low-Income in Gentrifying Tract	330.17	39.53	265.3	447.3	307.65	343.7
Low-Income in Non Gentrifying Tract	321.09	31.5	263.1	429.7	295.9	345.5
Non Low-Income	346.35	45.75	260.7	459.7	309.45	379.1

Table 3: Summary Statistics for English Mean Scale Score, 2010

Student Subgroup	Mean	Std. Dev.	Min	Max	25th percentile	75th percentile
All	353.38	35.97	269.1	424.2	325.2	378.1
Low-Income in Gentrifying Tract	338.3	29.73	293.3	414.7	314.3	353.1
Low-Income in Non Gentrifying Tract	340.71	25.71	259.5	403	322.2	357.55
Non Low-Income	368.12	40.71	289.8	450	336.1	405.8

Table 4: Summary Statistics for Math Mean Scale Score, 2010

Student Subgroup	Mean	Std. Dev.	Min	Max	25th percentile	75th percentile
All	353.38	35.97	269.1	424.2	325.2	378.1
Low-Income in Gentrifying Tract	378.43	46.48	290.8	492.7	347.5	394.05
Low-Income in Non Gentrifying Tract	369.33	35.29	282.7	431.6	350	389.55
Non Low-Income	405.11	51.26	289.3	494.3	368.1	447.3

Table 5: Effect of Gentrification on the Change in Math and English Test Scores from 2003 to 2010

Census Tracts	Low Income English	Low-Income Math Scores	Non Low-Income English	Non Low-Income Math	All English	All Math
Gentrifying with High Median Household Income	-7.46 (0.54)	4.170 (0.24)	-1.925 (-0.24)	1.928 (0.13)	0.78 (0.10)	3.45 (0.29)
Gentrifying with Low Median Household Income	-16.12** (-2.97)	-18.24* (-2.38)	-7.754 (-1.15)	-12.55 (-1.05)	-15.55** (-3.18)	-15.81* (-2.10)
Low Median Household Income	13.26** (2.63)	20.19** (2.03)	9.518 (1.68)	19.89 (1.95)	13.11** (3.26)	15.69* (2.54)
Number of Observations	121	121	109	110	156	156

* p<0.05; ** p<0.01; *** p<0.001

Note: Controls for grade are included in the regression, but not reported.

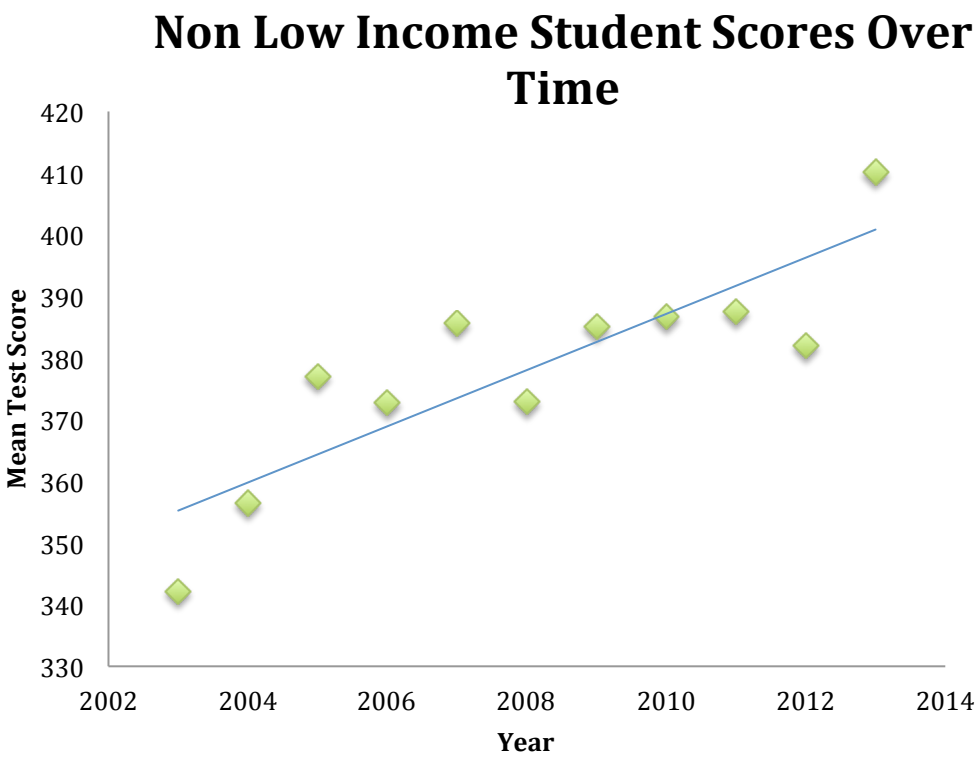

Figure 1: Non Low Income Students Mean Test Scores over Time

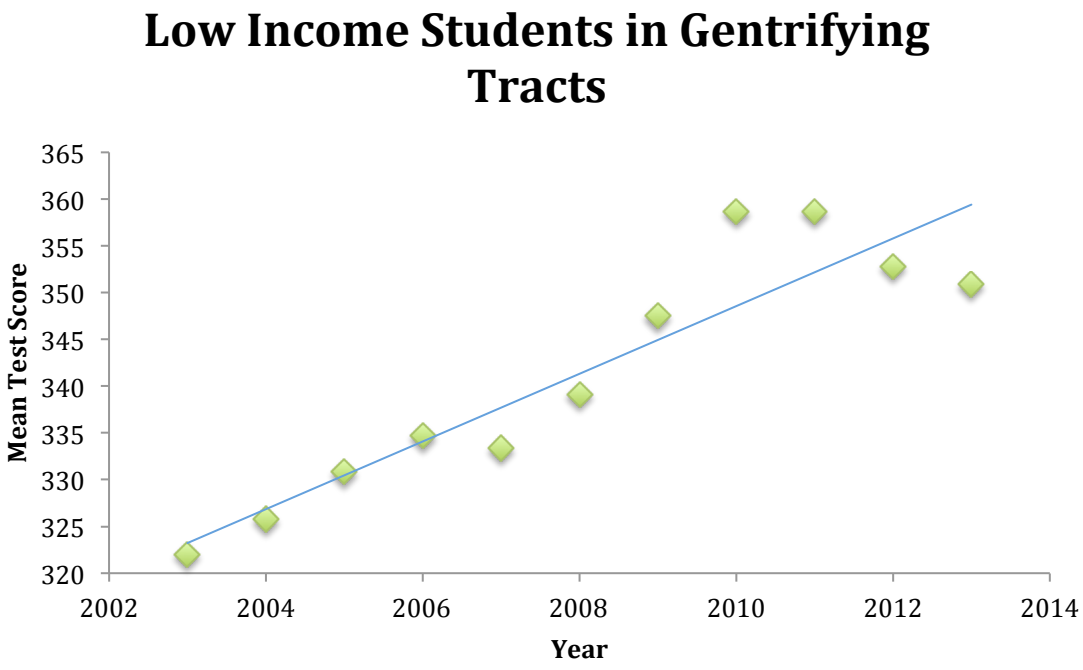

Figure 2: Mean Test Scores for Low Income Students in Gentrifying Tracts Over Time

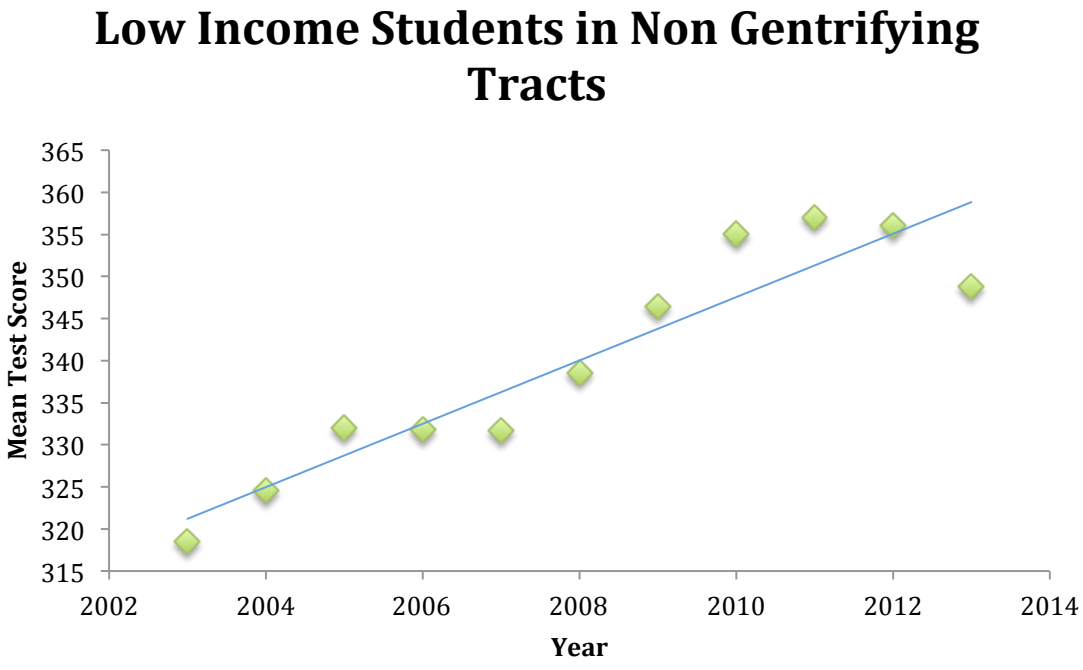

Figure 3: Low Income Students Mean Test Scores in Non Gentrifying Tracts Over Time

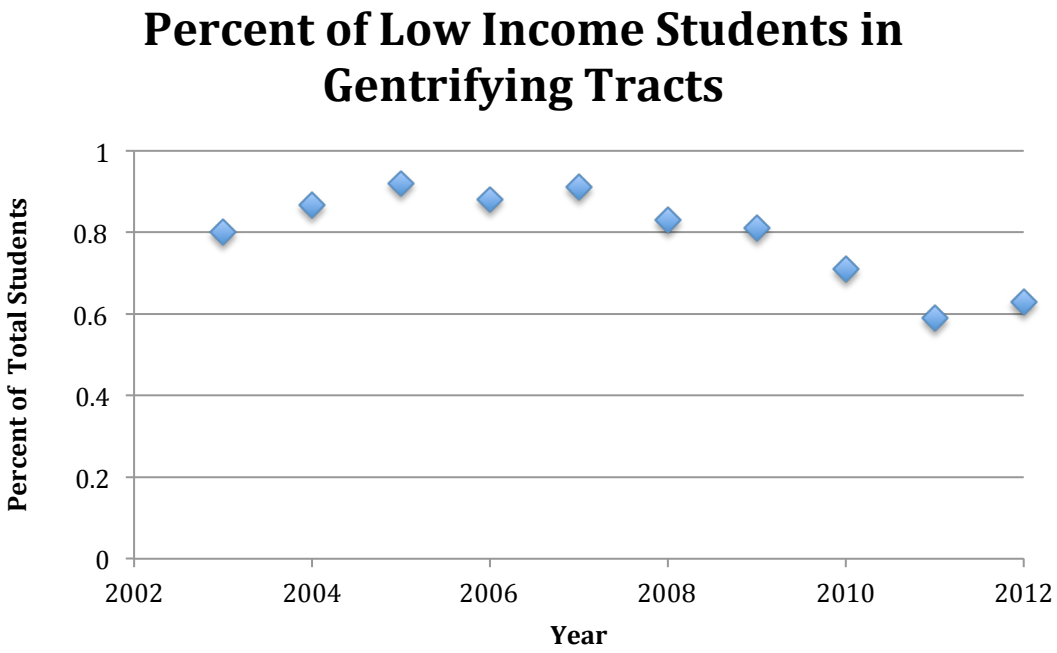

Figure 4: Percent of Low Income Students in Gentrifying Tracts Over Time

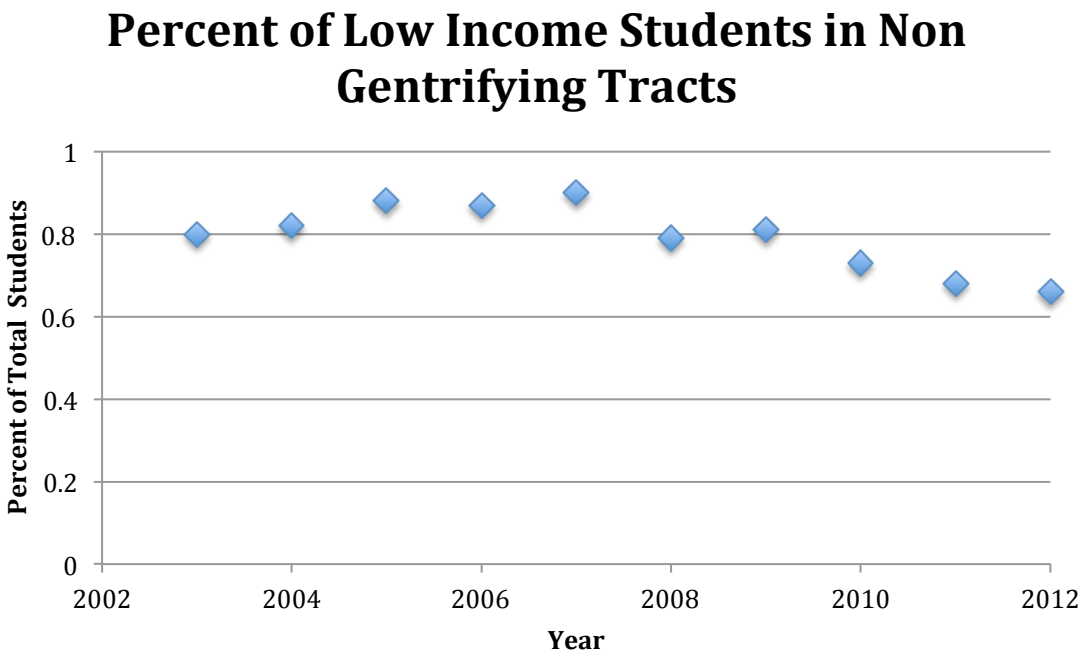

Figure 5: Percent of Low Income Students in Non Gentrifying Tracts Over Time

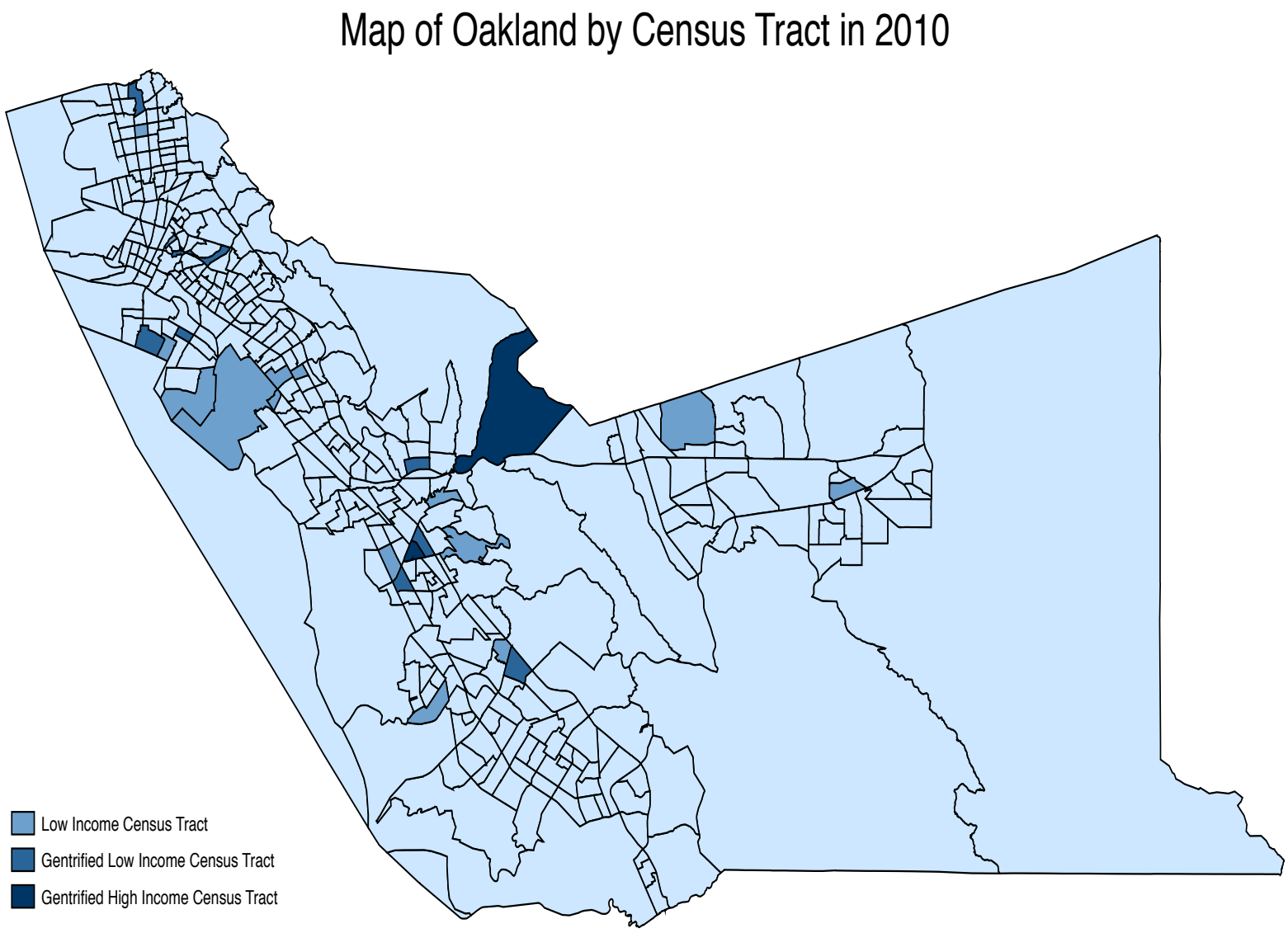

Figure 6: Oakland Census Tract Map

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