



Neighborhood Gentrification across Harris County: 1990 to 2016

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Executive Summary

During the past three decades or so, many neighborhoods across Houston have experienced disinvestment and reinvestment. With an influx of high-income households, certain low- and moderate-income neighborhoods are experiencing rising housing costs. At the same time, those neighborhoods have seen greater socioeconomic change, particularly in racial composition, educational attainment, in addition to increases in rent and property taxes. This phenomenon, referred to as gentrification, changes both the social character and the built environment of a neighborhood. It often eliminates affordable housing options, deep-rooted social networks and longstanding amenities.

Although gentrification is a national issue, Houston's specific combination of socioeconomic and cultural diversity as well as sprawling residential patterns has led to a unique set of challenges. The inventory of affordable housing has been diminishing. Environmental shocks like Hurricane Harvey exacerbate housing challenges, propelling neighborhood change in unintended directions. A broad analysis of gentrification in Houston is needed to understand its processes and scales.

The purpose of this framing report is to document recent neighborhood changes indicative of gentrification and to inform the development of strategies to support equitable revitalization instead. This report uses data from the various sources including the U.S. Decennial Censuses, American Community Surveys, Neighborhood Change Database and other data to understand neighborhood change in Houston by defining gentrified neighborhoods and identifying its mechanisms across Harris County. Specifically, this report identifies which neighborhoods experienced gentrification between different time periods, showcasing a typology of gentrification across Harris County. The susceptibility index and case studies further illustrate neighborhoods at higher risk of gentrification pressures. We created a web-based data tool at www.datahouston.org/story/gentrification.



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Key Findings

- Gentrification across Houston has accelerated since 2000. Very little gentrification occurred from 1990 to 2000, while the period between 2000 and 2010 saw the greatest change. Growing gentrification patterns emerge during the time period between 2010 and 2016.
- Many gentrified neighborhoods are inside the 610 loop (73 out of 783 census tracts¹ in Harris County), but a greater number of gentrified neighborhoods are outside the 610 loop (144 census tracts).
- Regression results indicate that virtually all neighborhoods on the east side of Houston inside the 610 loop are susceptible to gentrification in the near future.
- Case studies selected by relatively high susceptibilities reveal unique housing and demographic differences among the Fifth Ward, OST/South Union and Greenspoint neighborhoods.
- Communities have utilized local land-use policies, deed restrictions, homestead exemptions, community land trusts and community engagement strategies, attempting to take control of gentrification. Neighborhoods identified as currently gentrifying may benefit the most from these strategies and from additional housing policy initiatives.

Table of Contents

4	Introduction
6	What is Gentrification
9	Gentrification Typologies
13	Gentrification Susceptibility
23	Conclusion and Discussion
25	Appendix A: Principal Component Analysis
27	Appendix B: Multivariate Logistic Regression and Susceptibility Index
29	Appendix C: Data and Methodological Limitations
31	Endnotes

Introduction

Neighborhoods across Houston are experiencing increases in housing costs due to shifts in housing and neighborhood demographics. Higher-income households are moving into predominately lower-income neighborhoods. Since 1990, low- and moderate-income urban neighborhoods have been experiencing more socioeconomic changes, particularly in racial composition and educational attainment, in addition to the change in housing stock and costs.² Although neighborhoods continuously evolve, some households benefit from considerable transformations in the social and built environment while disadvantaged households are economically challenged by rising housing costs caused by the in-migration of more affluent households and facing pressures of unwanted neighborhood changes.

Two schools of thought surround the gentrification issue.³ One argues that gentrification patterns revitalize deteriorating buildings and landscaping, increase county revenues and promote neighborhood racial and income diversity. The other contends that in the face of gentrification pressures, increased rent and property values push out existing residents and weaken any potential positive changes generated from neighborhood growth and development. The effects of gentrification arguably dismantle deep-rooted cultural traditions and deprive existing residents of local services, like health, social and education benefits that would be received from

equitably revitalized neighborhoods, but not in gentrified neighborhoods. An equitably revitalized neighborhood would provide housing preservation, new mixed-income housing and even employment opportunities that benefit existing residents.

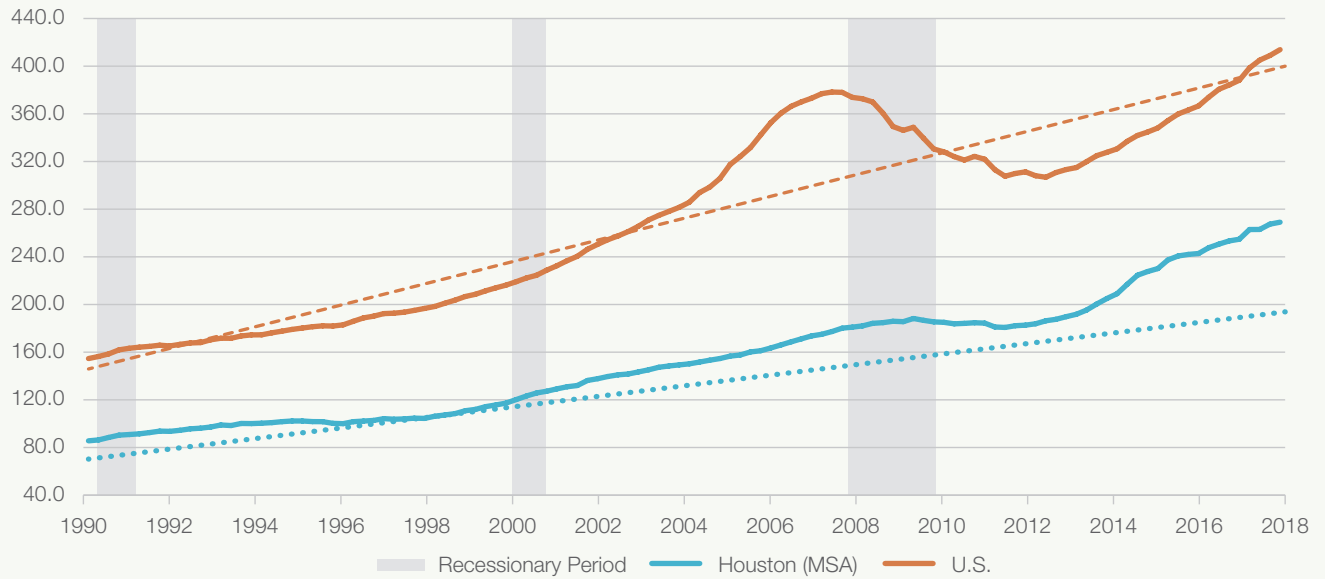


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In this report, gentrification is framed around the broader context of housing market conditions. Houston's combination of growing socioeconomic, cultural diversity and its historical residential sprawling pattern has led to unique housing market challenges. Housing prices across the country have steadily increased in the 1990s and skyrocketed in the early 2000s. Prices be-

FIGURE 1

House Price Index for U.S. and Houston MSA: 1990–2018



Source: Houston Metro area housing price index (HPI), U.S. Federal Housing Finance Agency, 1990–2018.

gan to fall in 2007 due to the latest recession, but bounced back beginning in 2012. In contrast, Houston’s housing prices show a much smoother pattern. It remained steady in the 1990s and began steadily rising during the 2000s, only dipping slightly in 2011, most likely due to a lagged effect of the recessionary period, but bounced back since 2012. The increases tend to concentrate in specific neighborhoods rather than spreading across the city as a whole.⁴ On one hand, the inventory of affordable housing has been slowly diminishing.⁵ On the other hand, anticipated growth in demand for housing in higher-demand locations drives the potential for additional gentrifying neighborhoods. Disasters like Hurricane Harvey might exacerbate housing supply problems, propelling neighborhood change in potentially unintended directions such as further gentrification.

At the same time, the median household income in Harris County has dropped since 2000.⁶ Low- and moderate-income residents struggle to afford rising housing costs. The median monthly housing costs are \$1,183 for homeowners⁷ and \$937 for renter households. Compared to the median household income, the cost burden is approximately 18 percent for homeowners and 30 percent for renters respectively. The U.S. Housing and Urban Department (HUD) defines cost-burdened families as those “who pay more than 30 percent of their income for housing.” Indeed, the average family is cost-burdened in 50 percent of Harris County census tracts. Meanwhile,

nearly a quarter of Houston renters allocate *more than 50 percent* of their income to housing, which is considered “severely cost-burdened.”

New housing development in the urban core often targets higher-income households rather than low- and moderate-income households. Furthermore, high housing costs put homeownership out of reach for many low-income households. Due to limited affordable housing options, residents have unsatisfactory choices: move to distant areas with long commutes, pay more than they can afford, bear potential overcrowding or leave the neighborhood or city altogether.

This report aims to advance the understanding of gentrification in the region. In the following sections, we first provide a definition of gentrification in Houston’s context and identify the level of neighborhood change across Harris County. Next, we identify factors highly associated with gentrified neighborhoods, and locate neighborhoods susceptible to gentrification in the near future. Finally, we discuss some possible land use policies, bringing attention to equitable development policies that practitioners and policymakers can use to accommodate the change while respecting local communities’ cultures. Additionally, we created an online interactive map at www.datahouston.org/story/gentrification to facilitate the use of data from this report.

What is Gentrification

Gentrification is a process of neighborhood change characterized by migration of middle- and upper-income groups into disinvested urban neighborhoods, resulting in a loss of affordable housing and a transformation of the social character of a neighborhood.⁸ Unlike neighborhood revitalization, the process of gentrification has adverse effects on neighborhoods and residents, not only altering the historical culture and character of urban neighborhoods, but also economically overburdening existing residents and potentially displacing them.⁹

As a social issue, gentrification is heavily shaped by housing market pressures and rooted in economic and racial inequality. It is well documented that higher income households have put pressure on and overburdened historically non-white communities.¹⁰ Although neighborhood conditions and services appear to be improving, research has shown that disadvantaged residents, including minorities and low- and moderate-income households, gained less from these improved conditions and services than other residents.¹¹ Market pressures and loss of preferred services and amenities may force existing residents to move out, thus displacing them and challenging their neighborhood's ability to retain racial and economic diversity.¹² For example, much of the Fourth Ward was once known as Freedmen's Town with predominantly African-American residents filled with single-family homes. After HUD's decision to demolish 677 of the 963 units in the Allen Parkway Village public housing project in the late 1990s,¹³ much of the original low-income housing was replaced by townhomes, mid-rise apartments and other commercial developments and the community is now commonly referred to as Midtown instead. The historical community once thrived with successful local businesses and vibrant arts and culture, but an influx of more affluent residents changed that landscape.¹⁴

The goal of this report is not to seek to resolve the negative effects of gentrification, rather to anticipate gentrification pressures at a time in which the process can still be altered and to build the social and political power needed to implement and/or expand the strategies to prevent negative impacts of gentrification. We do not argue that gentrification displaces residents, rather it may disproportionately overburden some more than others, and thus gentrification could be framed in terms of "equitable development."

Gentrification Process

The gentrification process can take on different forms as not all neighborhoods evolve or respond to change the same way. One study found four dominant gentrification processes in Houston: locally driven urban renewal, private sector block-busting, refurbishment of existing structures and teardowns.¹⁵ Although there is variation in the process of gentrification, key elements include the following:

- Disinvestment and reinvestment
- Loss of affordable housing
- Physical upgrading of residential neighborhood
- Upward movement of residents' socioeconomic status

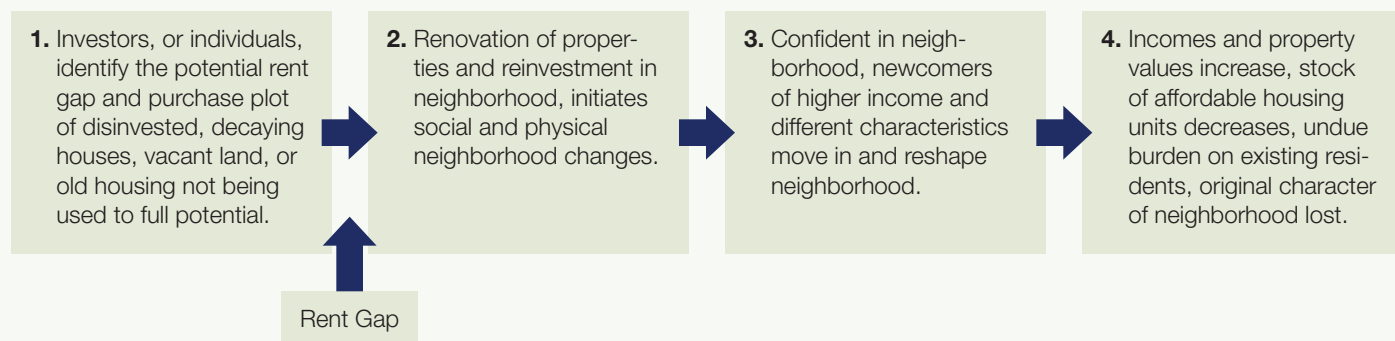
FIGURE 2 Market-Driven Process of Gentrification

Figure 2 demonstrates one example of a typical market-driven process of gentrification. A neighborhood, often older, vacant or decaying in some way experiences disinvestment, in which a rent gap emerges, that is the difference between the value of the property before renovation and after renovation. Speculators have been known to deliberately disinvest in areas that could be of high demand until the value of the property is so low that renovation and selling would yield a higher profit. The larger the rent gap, the more investment in the neighborhood and surrounding neighborhoods would be. Investors could reinvest in the area by purchasing the house or large plots of land and renovating. Once the neighborhood shows signs of resurgence, and prices or rentals of renovated properties exceed those of existing ones, newcomers of different demographics and social practices move in, further raising the overall costs of housing. Existing residents then must contend with those neighborhood changes in addition to rising rents and property taxes.

Other models of gentrification include alternative outcomes, such as waves of gentrifiers, the addition of professionals, construction of luxury condos and apartment complexes and the effects of natural disasters.¹⁶ For example, a neighborhood may go through a sudden change, such as flooding or wildfire. Residents who are unable to afford repairs may opt to sell the property to investors—a situation that may put existing residents at risk of displacement. In some cases, certain housing policies and practices may have major consequences in specific neighborhoods, such as what has happened to the Freedmen's Town.

Gentrification Criteria

Based on these processes of gentrification, our approach to determine which census tracts¹⁷(proxies for neighbor-

hoods) in Harris County have gentrified, are gentrifying or may be susceptible in the future incorporates several methods from previous studies. We made modifications to reflect the unique character of Houston.

We utilized three overall criteria to ascertain if a tract gentrified within a given time period: vulnerability, sociodemographic change and investment change. These criteria are shown in Figure 3 and described in detail below.

FIGURE 3 Gentrification Criteria

Vulnerability in Base Year (3 out of 4)

- % Low-Income Households > County Median
- % Population 25+ without Bachelor's Degree or Higher > County Median
- % Non-White population > County Median
- % Renter Households > County Median

Sociodemographic Change

- Change in % Population 25+ with Bachelor's Degree or Higher > County Change
- OR
- Change in Median Household Income > County Change
- AND
- Change in % Non-Hispanic White Population > County Change

Investment Change

- Change in Median Monthly Gross Rent > County Change
- OR
- Change in Median Home Value > County Change

Vulnerability Criteria

A tract is considered vulnerable to gentrification if it exhibits three out of the four characteristics compared to the county median¹⁸ in the base year: 1) a higher percentage of low-income households, 2) a higher percentage of individuals 25 years and older without at least a bachelor's degree, 3) a higher percentage of non-white population and/or 4) a higher percentage of renter households.

Low-income households were defined as households that had an income below 80 percent of the county median, which is the standard definition by the U.S. Department of Housing and Urban Development. Low-income neighborhoods are vulnerable because of potential rent gaps.

Educational attainment is a key indicator of socioeconomic status and highly correlated with personal income. Census tracts with fewer college-educated individuals are more vulnerable and at risk of gentrification.

Percent non-white is included in the vulnerability criteria because gentrification is linked with changes in racial composition of a neighborhood, particularly a dominant social group moving into an area with a predominantly minority population. The dominant social group, in terms of political power and socioeconomic status in Houston's context, is non-Hispanic whites.

Generally, renters have less capacity to challenge unwanted neighborhood change. Increases in property value mean higher property tax included in the rent. Thus, neighborhoods with more rental units are less stable and more susceptible to gentrification.¹⁹

Sociodemographic Change Criteria

Gentrification is predominantly described as a neighborhood's transformation over time. A socioeconomic change component is required because the process of gentrification includes an influx of relatively affluent households. Therefore, we examined whether the tract's sociodemographic change was greater than the county's change from the base year to the end of a given time period.

Both household income and education are measures of socioeconomic status. Educational attainment is relatively stable compared to median incomes.²⁰ However, college-educated individuals may not see increases in income

depending on occupation and family circumstances. Thus, we allowed the sociodemographic change component to be either change in percent population 25 and over with a bachelor's degree or higher or change in median household income higher than the county change.²¹

Furthermore, change in racial and ethnic composition is also included because gentrification has been shown to include demographic changes, particularly a dominant social group moving into an area with a predominantly non-white population.²²

Investment Change Criteria

Finally, we included a component on investment change. We used median home value and median gross rent to reflect investment in communities, including the quality of various neighborhood amenities. High rents are indicative of market demand and home values in the area, but may not occur in step with each other. Thus, we allowed the investment change component to be either change in rent or change in home value greater than the county's overall change.

Gentrification vs. Displacement

Gentrification and displacement are often entangled concepts, yet it is important to understand their differences, and why we do not measure displacement in this report. As previously defined, gentrification is a process of neighborhood change that includes socioeconomic and demographic change based on income, education, racial makeup and investment in a previously disinvested neighborhood. Residents of gentrifying neighborhoods are often non-white and lower-income. As high-income residents move into these neighborhoods, existing residents become susceptible to economic pressures, potentially forcing them to move. Displacement, then, is a possible consequence of the process of gentrification.²³ Displacement occurs when residents are unable to afford to remain in their homes because of rising rents or property taxes, and involuntarily move out of the neighborhood and settle in less desirable communities. Unfortunately, most aggregate data are unable to capture and estimate the true loss of low-income residents in a given neighborhood, in addition to their reasons for moving.²⁴ Not all moves out of a changing neighborhood count as displacement.

Gentrification Typologies

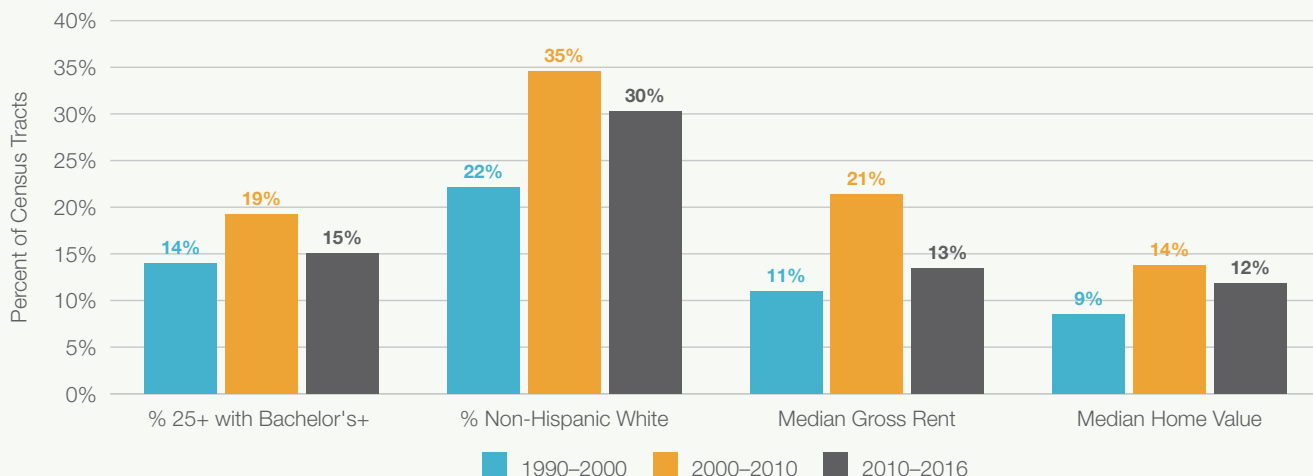
Gentrification occurs in many stages and intensities and can come in waves over time.²⁵ Cities across the U.S. saw an acceleration of gentrification during the 2000s compared to the 1990s due to a more dramatic set of economic and demographic changes.²⁶

This pattern is evident in Houston. Figure 4 shows a side-by-side comparison of the share of Harris County's census tracts that are or were vulnerable to gentrification and had a greater change than the county's overall change by attribute and time period. For example, among Harris County's 783 census tracts, more than 20 percent had experienced increases in median gross rent faster than the county average from 2000 to 2010,²⁷ compared to 11 percent from 1990 to 2000. This suggests acceleration in gentrification across Houston since 2000. Figure 4 also shows that socioeconomic and investment changes differ between the time periods, possibly indicating boom and bust periods, econom-

ic recessions, spikes in housing prices, natural disasters and recovery, etc. This indicates why it is important to look at the density of gentrified tracts by time periods.

Previous research has relied on data only available at the time, which has been the decennial census, making the change in the intervening years obsolete. We find that in the case of Houston, there was much change between 2000 and 2010, but the housing market took an upswing around 2012, indicating further change occurring that could be captured using recent data from 2012–2016 American Community Survey.

FIGURE 4 Percent of Census tracts in Harris County vulnerable to gentrification and seeing a large gain relative to county by attribute and time period



Source: Census 1990, 2000, 2010, American Community Survey 2012–2016 5-year estimates, Census Bureau.

Figure 5 and Figure 6 illustrate the typology key for defining gentrified tracts during the time period in this report. A tract first has to be considered gentrifiable or vulnerable, meaning the neighborhood must be specified as vulnerable to gentrification in the first year of the time period based on the four criteria: share of low-income households, educated individuals, renters and/or non-white individuals.

As listed in Figure 6:

- 217 census tracts (28 percent of all tracts) gentrified sometime between 1990 and 2016, including 36 in the

1990s and 2000s, 175 in the 2000s and later and six continuously since 1990.

- 165 census tracts (21 percent) were vulnerable to gentrification but did not gentrify between 1990 and 2016.
- 401 census tracts (51 percent) were not vulnerable to gentrification and did not gentrify during that time.
- Tracts meeting criteria for gentrification were broken out into three categories: “established,” “gentrifying” and “continual” tracts.

FIGURE 5 Gentrification Index Timeline

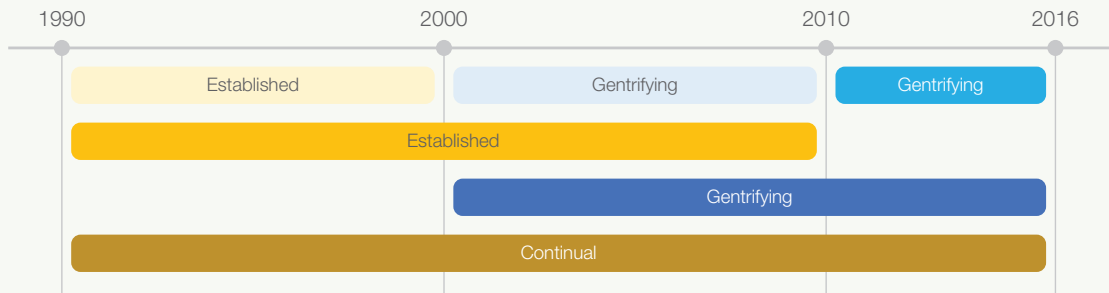
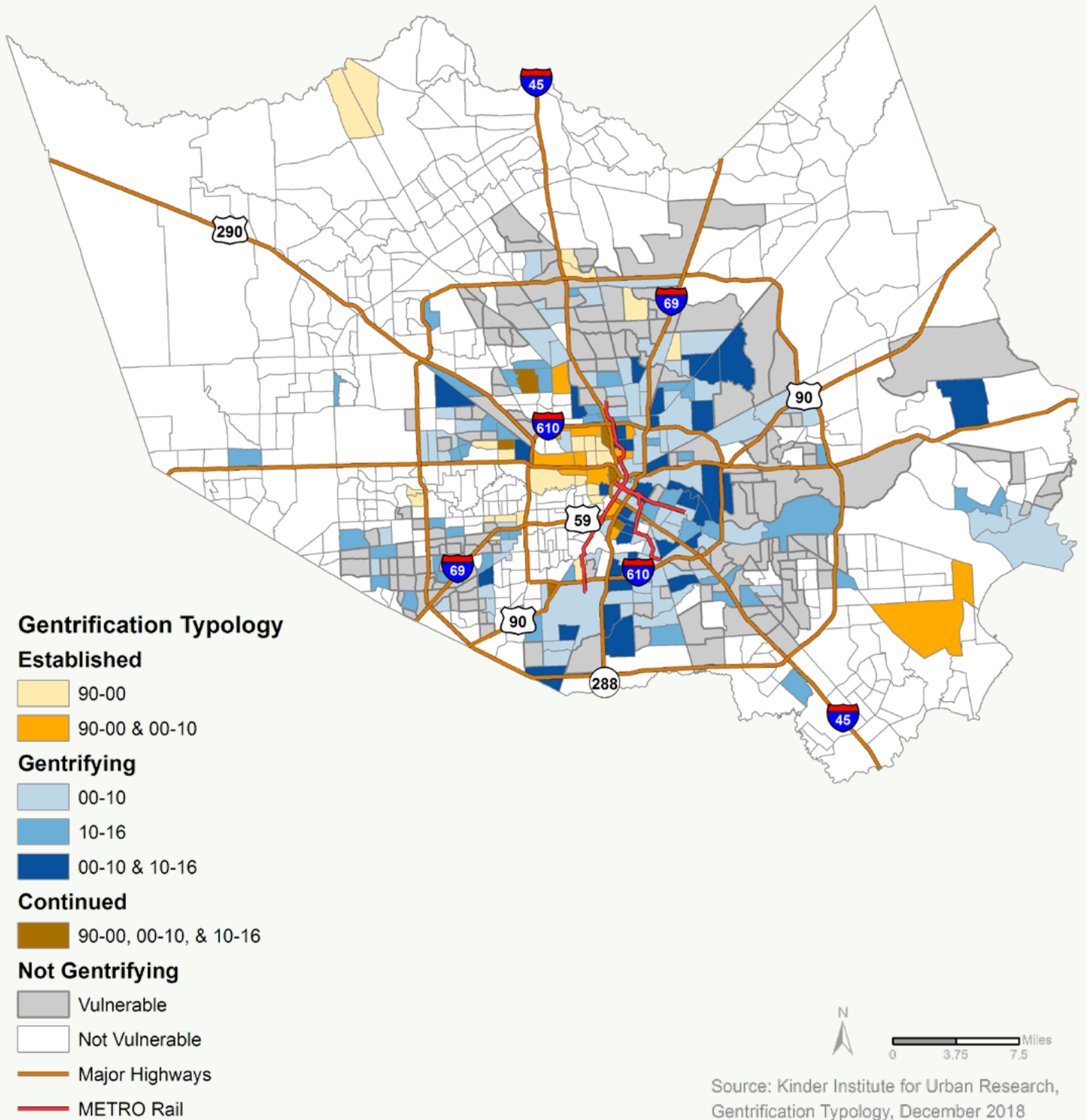


FIGURE 6 Gentrification Typology Description

Type and Time Period	Definition	# of Tracts
Established / Gentrified		
1990–2000	Vulnerable in 1990. Gentrified between 1990 and 2000, but was not gentrifying anytime between 2000 and 2016.	24
1990–2000 & 2000–2010	Vulnerable in 1990 and 2000. Gentrified from 1990 to 2000 and 2000 to 2010, but did not gentrify from 2010 to 2016.	12
Gentrifying		
2000–2010	Vulnerable in 2000. Gentrified between 2000 and 2010, but did not gentrify between 1990 and 2000 or 2010 and 2016.	87
2010–2016	Vulnerable in 2010. Gentrified between 2010 and 2016, but did not gentrify from 1990 to 2000 or 2000 to 2010.	53
2000–2010 & 2010–2016	Vulnerable in 2000 or 2010. Gentrified anytime between 2000 and 2016, but did not gentrify from 1990 to 2000.	35
Continual		
1990–2000, 2000–2010 & 2010–2016	Vulnerable in 1990, 2000, or 2010. Gentrified from 1990 to 2000, 2000 to 2010 and from 2010 to 2016.	6
Not Gentrifying		
1990–2016	Vulnerable in base year, but did not gentrify anytime between 1990 and 2016.	165
Not Vulnerable		
1990–2016	Tract was not vulnerable in base year, and did not gentrify between 1990 and 2016.	401
Total Number of Tracts Included in the Analysis: 783		

*Note: The data only include census tracts with at least 500 residents in 2010. This removes three census tracts from the dataset. Data sources include 1990 and 2000 U.S. Decennial Census and 2006–2010 (proxy for 2010) and 2012–2016 (proxy for 2016) American Community Survey 5-Year Estimates.

FIGURE 7 **Gentrification Typology**²⁸



Established Tracts

A tract is considered “established” in its gentrification if it has displayed patterns of gentrification in the past but has shown little to no signs of current or ongoing neighborhood change. Such a neighborhood exhibits a fixed neighborhood makeup with little room for reversal—at least not for several more decades. In classifying established tracts, we included tracts that gentrified in both the 1990 to 2000 and 2000 to 2010 time periods.

We found 36 established tracts (5 percent of all tracts). Of these, 24 tracts gentrified between 1990 and 2000 and 12 gentrified during both time periods. Gentrification can take place over more than a 10-year time frame so changes from both 1990 to 2000 and 2000 to 2010 may imply change at a slower rate, which is consistent with previous studies on former gentrification.²⁹

Although gentrification has traditionally been studied as a central-city phenomenon, we find several neighborhoods outside the 610 loop and even outside Beltway 8 that gentrified in the 1990s, such as the Tomball neighborhood in the northwest corner of Harris County and the La Porte area. The Washington Corridor and the Heights within the 610 loop also gentrified in the 1990s. Interestingly, the La Porte area and Washington Corridor have different demographics and residential fabrics. La Porte is highly industrial with working-class households, while Washington Corridor is more affluent. Although Washington Corridor’s socioeconomic changes were much greater than La Porte’s, both were classified as established.

Gentrifying Tracts

We classify “gentrifying” tracts as those that were gentrifying from 2000 to 2010, 2010 to 2016 or during both time periods. We found 175 such tracts altogether (22 percent of all tracts in Harris County). Of these, 87 (11 percent) gentrified between 2000 and 2010 but not afterward, 53 (7 percent) gentrified between 2010 and 2016 and 35 (5 percent) gentrified in both time periods.

Our definition of gentrifying suggests these tracts are recently or currently experiencing gentrification processes and its effects in the neighborhood. For example, Third Ward is considered a gentrifying neighborhood with gentrification patterns from both the 2000 to 2010 and 2010 to 2016 time periods. Buildings in Third Ward have been demolished at a higher rate than buildings county-wide. Vacant land, neglected properties and low housing costs make the community open to development, but what type of development and its impacts on its residents is uncertain. For these reasons, over the years, groups like the Emancipation Community Development Partnership are formed, to support the development and implementation of neighborhood revitalization strategies.³⁰

Many of the areas gentrifying are on the east side of Houston, especially east of State Hwy 288 and U.S. Route 69, such as Eastex-Jensen, Trinity, Lawndale-Wayside and Magnolia Park within or near the 610 loop. Slightly south of the 610 loop, neighborhoods like Sunnyside, South Park and South Acres are also gentrifying. Southwest of the 610 loop, pockets of Alief, Sharpstown and Gulfton are showing signs of gentrifying. As expected, however, most neighborhoods within the 610 loop are gentrifying except the tracts within “Houston’s Arrow” that houses the city’s most affluent households³¹.

Continually Gentrifying Tracts

Because of continued gentrification, six tracts (less than one percent) experienced ongoing gentrification from 1990 to 2016. We defined a “continual” tract as gentrifying during all three time periods, between 1990 and 2000, 2000 and 2010 and 2010 and 2016. Similar to gentrifying tracts, continual tracts may still be experiencing ongoing patterns of gentrification. These neighborhoods include: parts of Washington East, Acres Home, Willow Meadows, Third Ward and Spring Branch East. Continual tracts were found both inside the 610 loop and between the 610 loop and Beltway 8.

Gentrification Susceptibility

We also undertook a gentrification susceptibility analysis, which revealed that virtually all census tracts on the east side of the 610 loop are vulnerable to future gentrification.

Gentrification literature suggests several common characteristics in gentrified areas: income, race, housing stock, security in housing tenure, location, amenities and access to jobs and transportation. Principal component analysis (PCA) was performed analyzing around 30 to 50 variables between 2000 and 2016 and between 2010 and 2016.³² Our PCA results in Appendix A indicated multiple key factors driving gentrification across Harris County. These results informed the variable selection for our probability analysis.

To identify factors that make a neighborhood likely to gentrify, we applied a multivariate regression technique, specifically a logit model using forward selection and tested nearly 30 different attributes based on the PCA results. These variables fell into four categories: sociodemographic, housing, transportation and location. For example, the regression results suggest that areas with more renters paying more than 35 percent of their income on rent in 2000 have a higher probability of gentrifying in 2016. Holding all other variables constant, areas with more married families with children in 2000 are less likely to be gentrifying in 2016. More detailed specification of the regression model can be found in Appendix B.

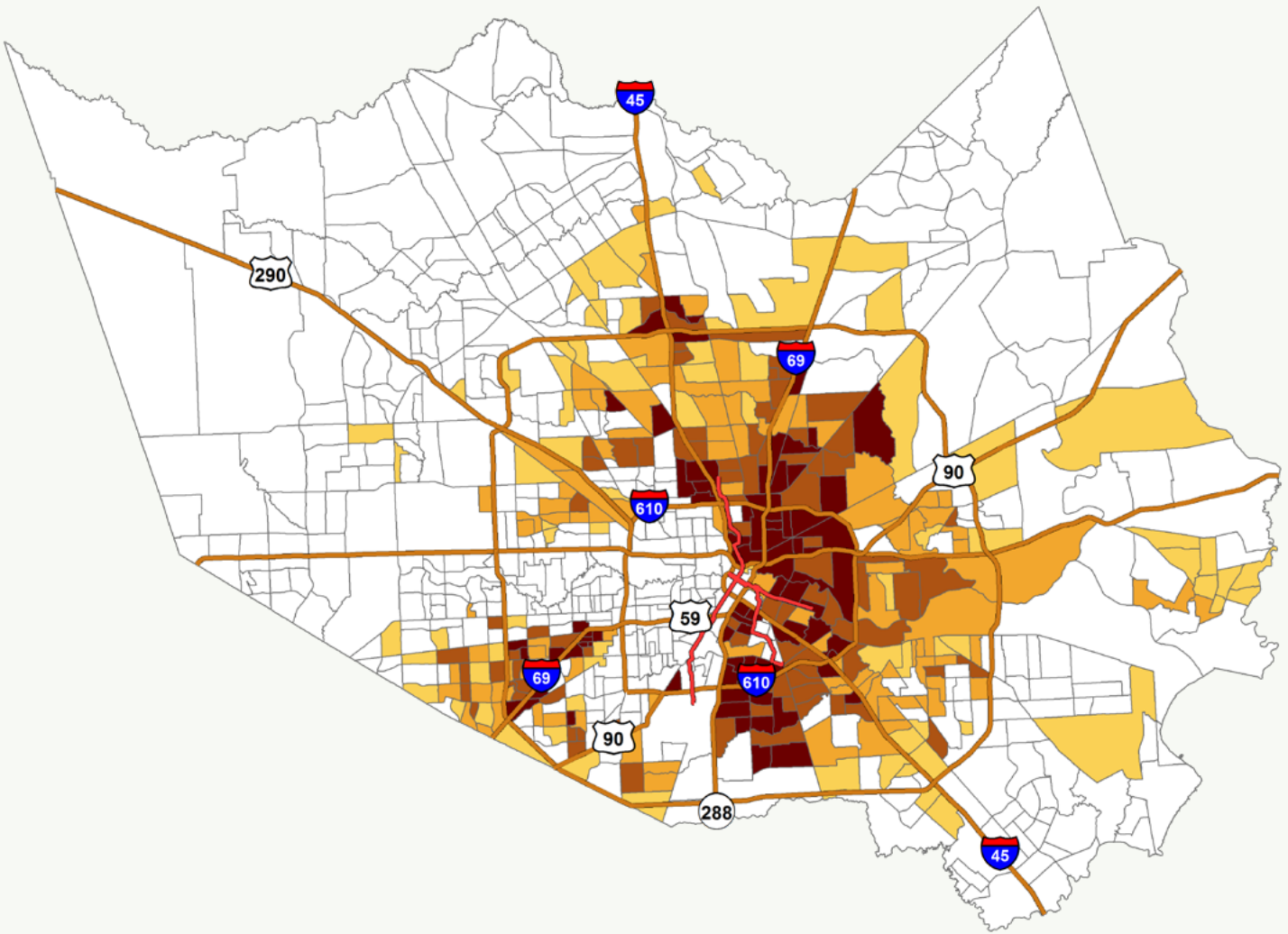
Adopting results from the regression model, we were able to predict the likelihood of neighborhoods gentrifying in the near future. The coefficients from the model were used in determining the probability of tracts gentrifying in the future based on values from 2016 data. Each tract yielded a probability in the form of a percentage, indicating the likelihood of gentrifying, referred to as susceptibility index. A tract with a higher susceptibility index has a higher

probability that it will gentrify post-2016. Tracts susceptible to gentrification post-2016 are mapped in Figure 8.








Results indicated many of the tracts that have or are currently experiencing gentrification have a high likelihood of continuing to gentrify. Several tracts near neighborhoods of Sharpstown, Westwood, Alief and Gulfton appear to have a higher likelihood of gentrifying in the future. Many tracts just south of the 610 loop and east of the SH 288, appear to show a high likelihood of gentrifying, with an index of 75 percent or more. Neighborhoods like Sunnyside, the east side of South Acres/Crestmont Park and all of South Park exhibit steep probabilities of gentrifying. Similarly, most of Northeast Houston appears to be at risk for gentrification, though at different levels. Other neighborhoods in North Central Houston indicated at risk include Independence Heights, Greenspoint, parts of Klein Far South and Acres Home. In Houston Southeast, neighborhoods such as Pecan Park, Magnolia Park and Lawndale/Wayside are also at risk of gentrification. Those with less risk include neighborhoods on the outskirts of Harris County on the east side and several tracts in Pasadena and Edgebrook in southeast Harris County.

The two tracts with the highest probability of gentrifying (98 percent) are both within Third Ward. At a susceptibility probability of 97 percent, several tracts are various neighborhoods in Denver Harbor, Kashmere Gardens, Sunnyside and Midwest. Neighborhoods with at least a 90 percent chance of gentrifying include Fifth Ward, Gulfton, Trinity/Houston Gardens, OST/South Union, Second Ward, Acres Home, Near Northside, South Park, Pecan Park and South Acres/Crestmont Park.

FIGURE 8 **Gentrification Susceptibility**



Susceptibility Index

-  Not Vulnerable
-  0.01 - 25%
-  25.01 - 50%
-  50.01 - 75%
-  75.01 - 100%
-  Major Highways
-  METRO Rail



Source: Kinder Institute for Urban Research, Gentrification Susceptibility Index, December 2018

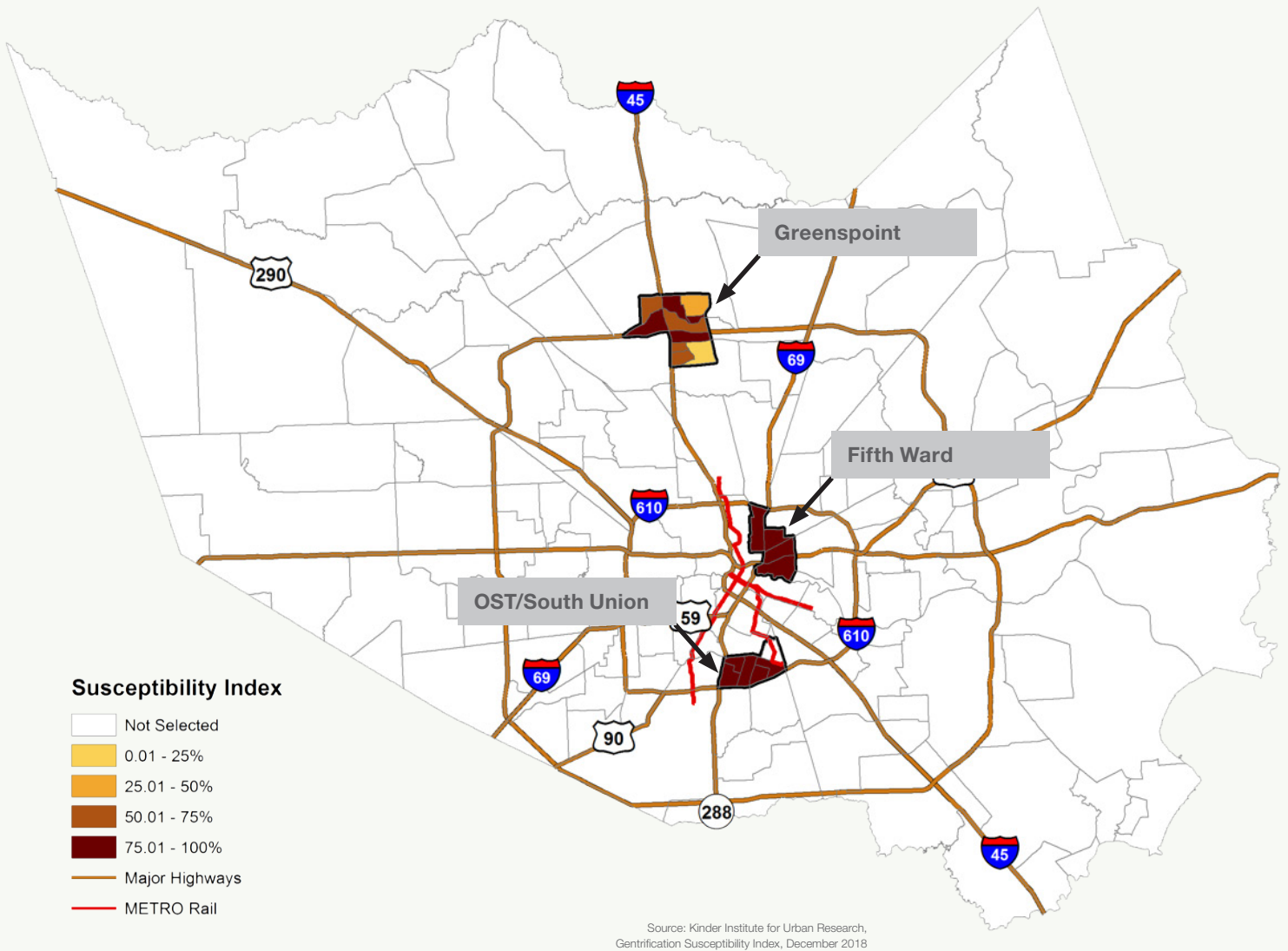
Susceptible Neighborhoods: Case Studies

This susceptibility index presents a depiction of where Houston may see the most change that could negatively impact existing residents. We have selected three communities for an in-depth analysis of neighborhood changes in the past two decades and what efforts are currently being undertaken to avoid undue hardships on existing residents. We selected the three community tabulation areas³³ based on two criteria:

- The area is gentrifying or vulnerable to gentrification from 2000 to 2016; and
- The area has a higher probability of gentrifying post-2016.

The three neighborhoods included in the case studies are **OST/South Union, Fifth Ward and Greenspoint**. We drill down the factors used to identify whether the neighborhood will be gentrifying in the near future. These factors can be strategized around in order to implement equitable inclusive development strategies.

FIGURE 9 Selected Neighborhoods



	Gentrification Typologies	Susceptibility Index Range
OST/South Union (6 tracts)	Gentrifying 00–10, 10–16	81.6–92.3 ⁵⁴
Fifth Ward (4 tracts)	Gentrifying 00–10, 10–16	78.5–94.8
Greenspoint (10 tracts)	Vulnerable, 90–00, 00–10, 10–16	19.44–88.16

OST/South Union

The OST/South Union neighborhood area is located in south-central Houston inside the 610 loop. As defined by the Kinder Institute's Community Tabulation Areas (CTAs), it is bound by Old Spanish Trail on the north, State Highway 288 on the west and Interstate 610 on the south, with a land area of approximately 4.5 square miles. It is west of the University of Houston, south of Texas Southern University and east of the Medical Center and NRG Arena. The Old Spanish Trail corridor is home to the final destination of the purple Metro rail line and the Palm Center transit center. The location's proximity to major job centers, the area's easy access to major highways and public transit, its volume of older housing and its relatively high share of vacant units and lots make it highly susceptible to gentrification.

Figure 10 shows the spatial patterns of housing in the OST/South Union neighborhood area. More than 65 percent of the housing is comprised of single-family units. Most of the ranch-style homes were built post-1945. Specifically, 16.8 percent of the housing units were built in the 1940s, 32.3 percent in 1950s and 15.7 percent in the 1960s.³⁴ These older homes are located along Martin

Luther King Boulevard and Old Spanish Trail adjacent to the newer commercial development.

This community was originally home to working-class non-Hispanic whites. In the late 1960s, middle-class African-Americans moved into the area, and the neighborhood became majority black during the 1970s due to white flight.³⁵ In the 1980s, Palm Center and the neighboring area fell into decline as many tenants such as Oshman's Sporting Goods left the shopping center due to neighborhood changes. The city tried to redevelop the shopping center but failed due to a dispute with the federal government over funds used in the project.³⁶ Currently OST/South Union is home to almost 20,000 residents, most of whom are African-American. Our analysis of neighborhood changes happening between 2000 and 2016 shows that this community started gentrifying in the year 2000 and has continued to do so since. The share of African-Americans decreased from 84 percent in 2000 to 77 percent in 2016. At the same time, more Hispanics moved into the neighborhood, growing from 13 percent of the population in 2000 to 18 percent in 2016. Overall the neighborhood saw a greater increase in its share of non-Hispanic white residents than the county as a whole. Although this community is characterized by a high poverty rate and a high

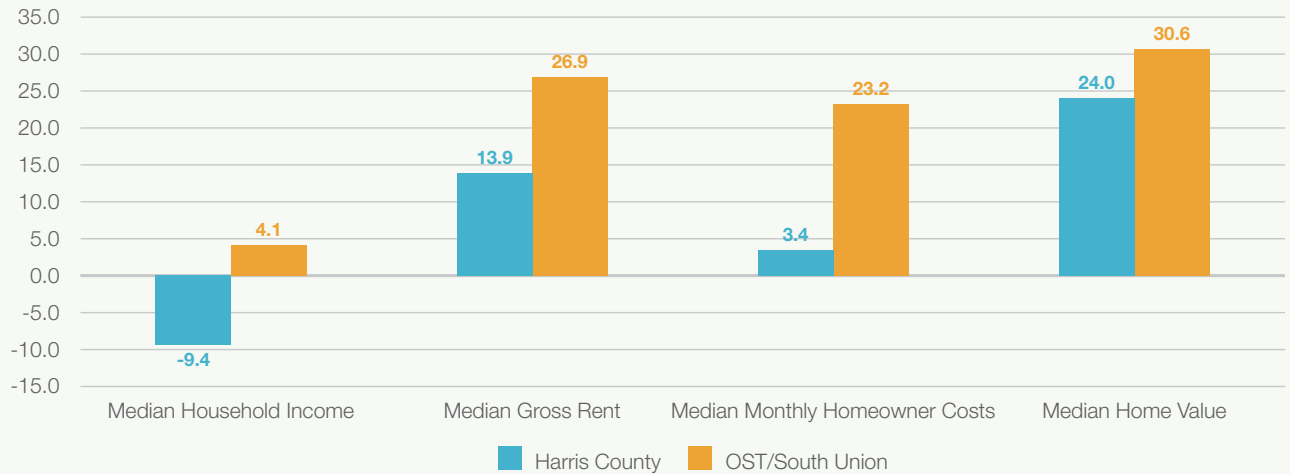
FIGURE 10 Housing Types in OST/South Union



Source: Data from Harris County Appraisal District, 2017.

FIGURE 11a

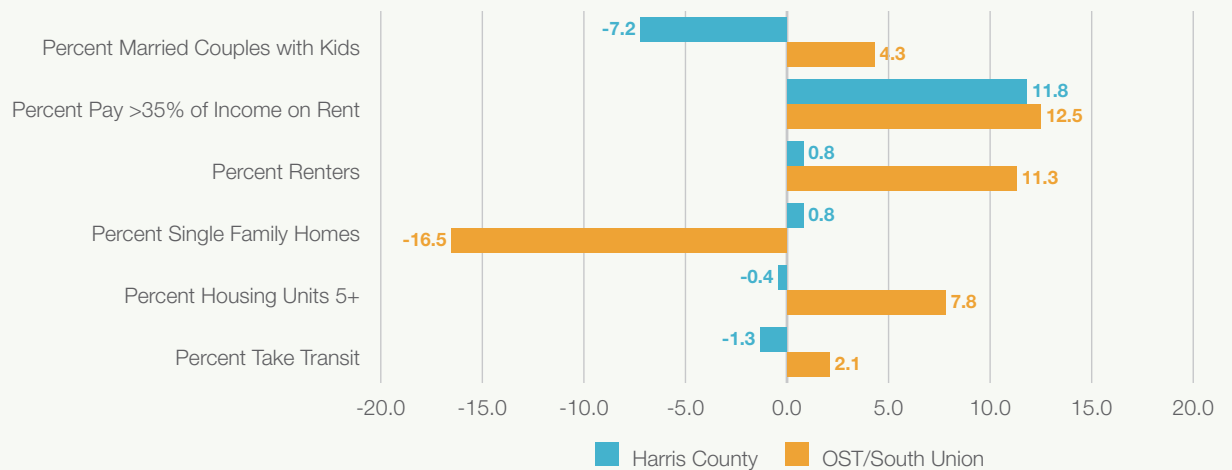
Percent Change in Median Household Income and Housing Costs (2000–16)



Source: Census 1990, 2000, 2010, American Community Survey 2012–2016 5-year estimates, Census Bureau.

FIGURE 11b

Harris County and OST/South Union Housing and Demographic Changes (2000–16)



Source: Census 1990, 2000, 2010, American Community Survey 2012–2016 5-year estimates, Census Bureau.

unemployment rate, the share of college degree residents increased in recent years more than the county change.

Our analysis also suggests that this area will likely continue to gentrify in the near future, based on some key factors. Compared to the percentage change in housing and demographic characteristics in Harris County between 2000 and 2016, the OST/South Union has a greater increase in its share of renter households and that of multifamily housing units with five or more units, and a larger decline in its share of single-family homes. There has been an increase in the share of married couple families with children (by 4.32 percentage points), but an even greater increase in its share of non-families (by 10.8 percentage points) in this community.

Although the median household income increased by approximately 4 percent, from \$28,377 to \$29,531, median monthly gross rent increased by 27 percent, from \$605 in 2000 to \$768 in 2016, and median home value went up by 31 percent, from \$52,833 in 2000 to \$68,981 in 2016.³⁷ The share of renters paying more than 35 percent of their incomes went up by 12.5 percentage points. The median monthly owner costs for mortgaged homes also went up by 23 percent, from \$825 to \$1,017, indicating that the housing affordability issue is getting worse in this community.

As a historic community, OST/South Union is also characterized by strong civic leadership. Neighborhood Recovery CDC has served the community since 1992. As a result of the National Endowment for the Arts Our Town

project in 2011, the Southeast Houston Transformation Alliance (SEHTA) was founded to make positive transformation in the neighborhood through community-based placemaking.³⁸ In 2013, the OST/South Union was selected by Local Initiatives Support Corporation (LISC) Greater Houston to become a Great Opportunities (GO) Neighborhood partner, with a vision to transform this neighborhood into a healthy, vibrant, safe and economically stable community. A total of 29 strategies in eight opportunity areas were developed to support this vision. Besides leveraging resources across different sectors such as economic development, environment, education and health, the community is also prepared to use the comprehensive plan as a tool to guide potential development projects while preserving their culture and histories.

In order to create and maintain affordable housing and preserve social ties, community-based organizations like Agape Development Ministries plan to support existing residents by providing access to homeownership. Agape has purchased a plot of land and is currently designing a development with input from the families who will be buying these homes. The leadership at Agape explained that the goal of their recent purchase is to preserve affordability without concentrating poverty and to create mixed-income housing. To expand the number of homeowners in the community, Agape provides career and financial education from youth to adulthood and gives renters a voice in a powerless housing structure. Similarly, the LISC GO team has conducted workshops to educate residents on protesting taxes and managing tax exemptions.

At the same time, the OST/South Union community has a large share of vacant units and land. Inevitably private

real estate developers identify the potential rent gaps and make investments, putting families at risk of increased rent and tax burdens. With limited resources and capacity, community-based organizations cannot fully implement the tools and strategies to help the community grow while protecting it from undesirable private development.

Fifth Ward

The Fifth Ward, one of Houston's original six historical political districts, is located about 2 miles northeast of Downtown Houston. When it was originally settled back in the 1860s, half the population was white and half was African-American. By the mid-1880s, it was filled with black working-class people who worked at the Ship Channel and in industrial areas on the east side of the town. After some growth and decline, the Fifth Ward became predominantly black in the 1920s. It served as a major economic center for African-Americans from the 1940s to the 1960s. However, desegregation and recessions led residents to move out of the Fifth Ward into the suburbs in the 1970s and 1980s. The community became socially fragmented and economically unstable. It was also characterized by high crime and high poverty.

The Fifth Ward's close proximity to Downtown Houston and easy access to major freeways make it highly vulnerable to gentrification. New commercial developments and multifamily complexes have been gradually replacing sub-standard housing since the 1990s. According to our analysis and the gentrification typology, the Fifth Ward was gentrifying between 2000 and 2010. One census tract just north of I-10 continued to gentrify between 2010 and 2016. The Fifth Ward saw a slight loss of population

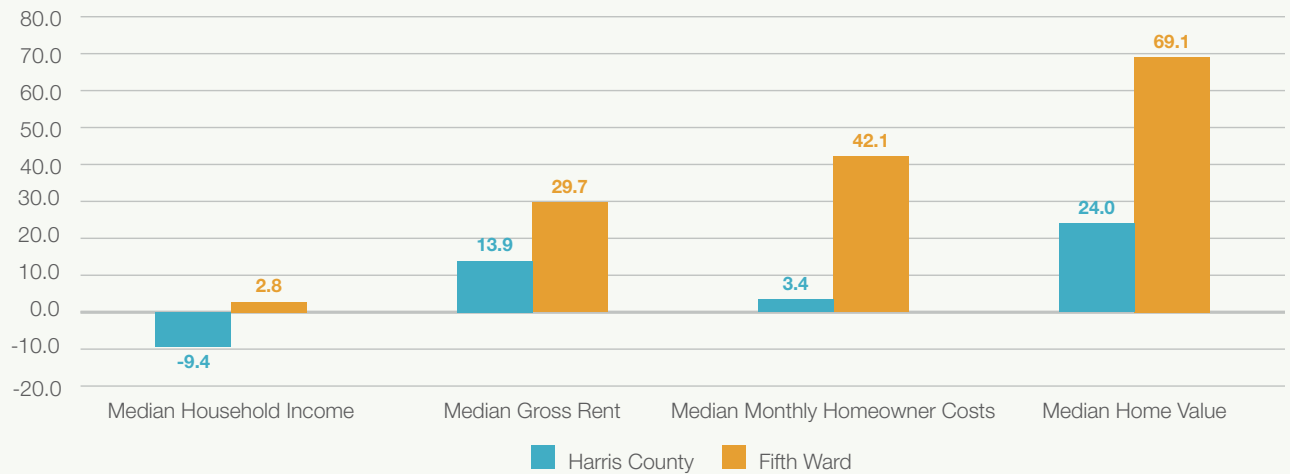
between 2000 and 2016. The share of African-American population in the entire community decreased from 63 percent in 2000 to 51 percent in 2016, while the proportion of Hispanic population and non-Hispanic white population increased by 10 percentage points and 3 percentage points respectively. The share of college educated residents increased by 7 percentage points between 2000 and 2016. The percent of low-income population and percent in poverty both decreased by 4 percentage points. However, this community still has a poverty rate of over 43 percent.



Fifth Ward Community Redevelopment Corporation

FIGURE 12a

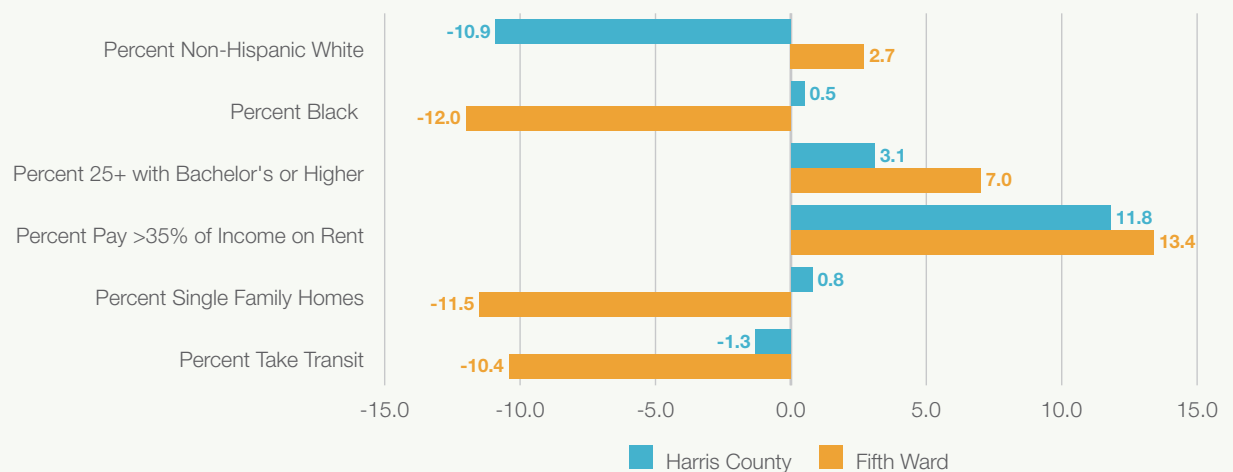
Percent Change in Median Household Income and Housing Costs (2000–16)



Source: Census 1990, 2000, 2010, American Community Survey 2012–2016 5-year estimates, Census Bureau.

FIGURE 12b

Harris County and Fifth Ward Housing and Demographic Changes (2000–16)



Source: Census 1990, 2000, 2010, American Community Survey 2012–2016 5-year estimates, Census Bureau.

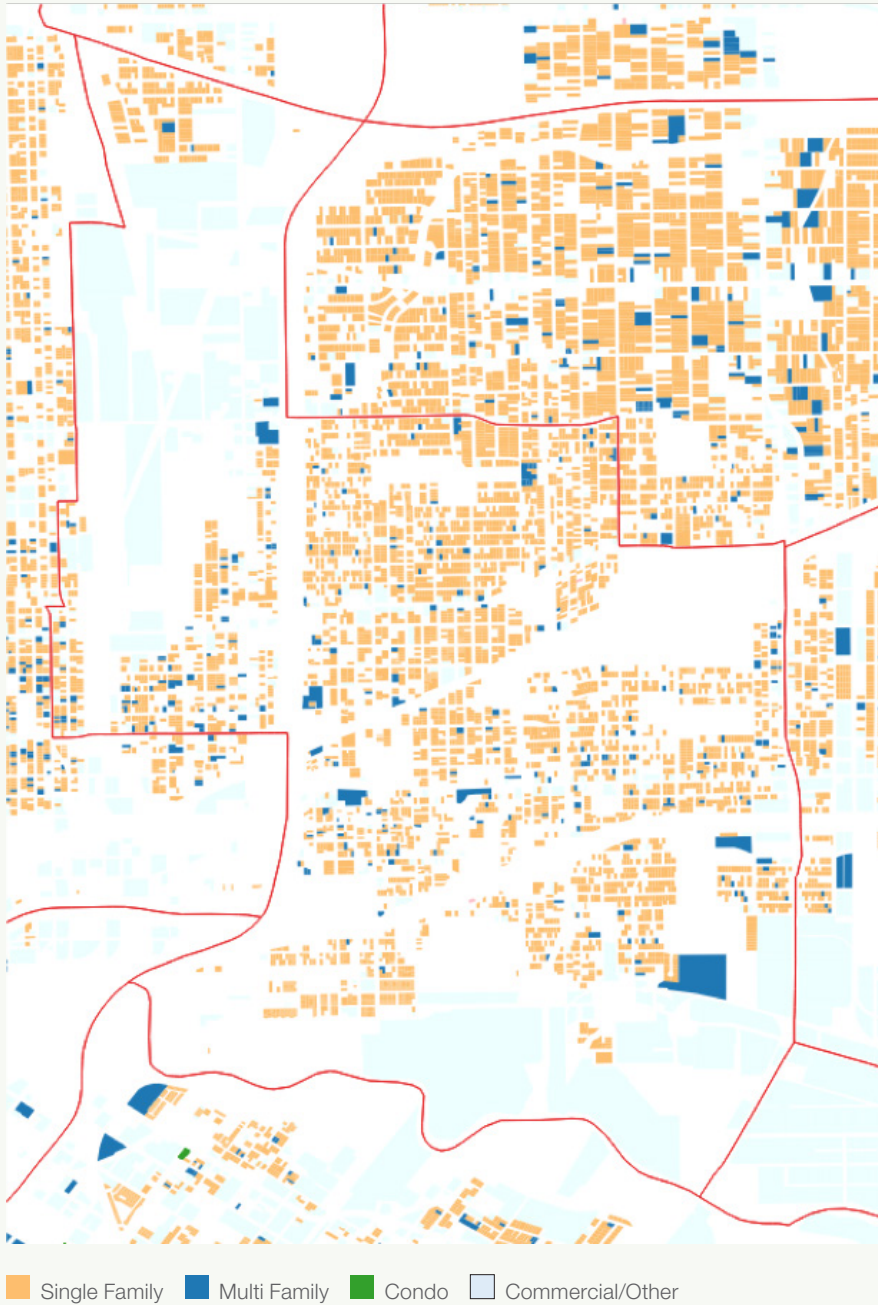
The results of the regression model suggest the entire community has a high probability of gentrifying in the future. Sociodemographic factors coupled with housing factors exacerbate the likelihood of gentrification. For example, median household income across the Fifth Ward increased from 2000 to 2016, up from \$21,295 to \$21,892 with inflation adjusted. Median gross rent also increased from \$478 to \$620, and median monthly homeowner costs increased from \$742 to \$1,054.³⁹ Figure 12a shows the percentage change in median household income, median gross rent, median monthly homeowner costs and median home value in the Fifth Ward between 2000 and 2016, in comparison of those in Harris County. The percentage of renters paying more than 35 percent of their income increased 13 percentage points. In addition, the share of

single-family homes dropped by 12 percentage points from 2000 to 2016. Almost 13 percent of all the housing stock in the Fifth Ward was built during that time.

As shown in the map in Figure 13, 73 percent of the housing units in the Fifth Ward are single-family and 27 percent are multi-family. The census tract on the east side of I-69 and the tract on the south side of the East Freeway contain a lot of commercial and industrial areas. According to the regression model, the census tract between the East Freeway and the Southern Pacific Railroad has the highest probability of being gentrified among the four tracts in this neighborhood area.

In 1989, The Fifth Ward Community Development Corporation (FWCRC) was created to support the re-

FIGURE 13 Housing Types in the Fifth Ward



Source: Data from Harris County Appraisal District, 2017.

vitalization of the neighborhood. Known as a model of nonprofit-private partnership, the organization has been working on increasing new home construction and community investment. In July 2018, the Fifth Ward became a GO Neighborhood and is eligible to receive funding at a comprehensive level of investment. In addition, several public housing properties are operated by the Houston Housing Authority in the Fifth Ward, such as Kelly Village at 3118 Green with 333 housing units and the recently redeveloped Kennedy Place at 3100 Gillespie

with 108 units. However, the Fifth Ward is still facing high probability of gentrifying and losing affordable housing stock.

Natural disasters such as Hurricane Harvey could potentially amplify the risk of gentrification. Some areas in the Fifth Ward were hit hard by Hurricane Harvey, and as such the neighborhood may have experienced a loss of “naturally occurring” (privately held and not subsidized) affordable housing. Many families were displaced by the disaster and forced to sell to speculators.⁴⁰ Other families have few tools to protect themselves from future disasters or from rapid gentrification which can be fueled by natural disasters and recovery efforts. Residents worry that they have no special mechanisms to address the unbearable costs of recovery and rebuilding.

After Hurricane Harvey, many residents were forced to sell their homes for a fraction of what it was originally worth. Two issues emerge: 1) a net loss for the homeowner who might not be able to replace the existing home with a new one in the same area and 2) the presence of out of town speculators who made the purchase but actually operate from as far away as New York and San Francisco. It is difficult for community organizations such as FWCRC to engage property owners who reside and operate outside the community.

Furthermore, new and existing residents may identify different needs for new business, services and job development opportunities in the neighborhood. Many new businesses moving into the area tend to cater to the new residents with higher incomes rather than old, such as coffee shops that charge up to \$4 for a cup of coffee. Generally, new tenants are less engaged with the existing community. They may raise issues with funding mixed-income housing projects such as the St. Elizabeth Project⁴¹ that is inclusive to all types of residents.

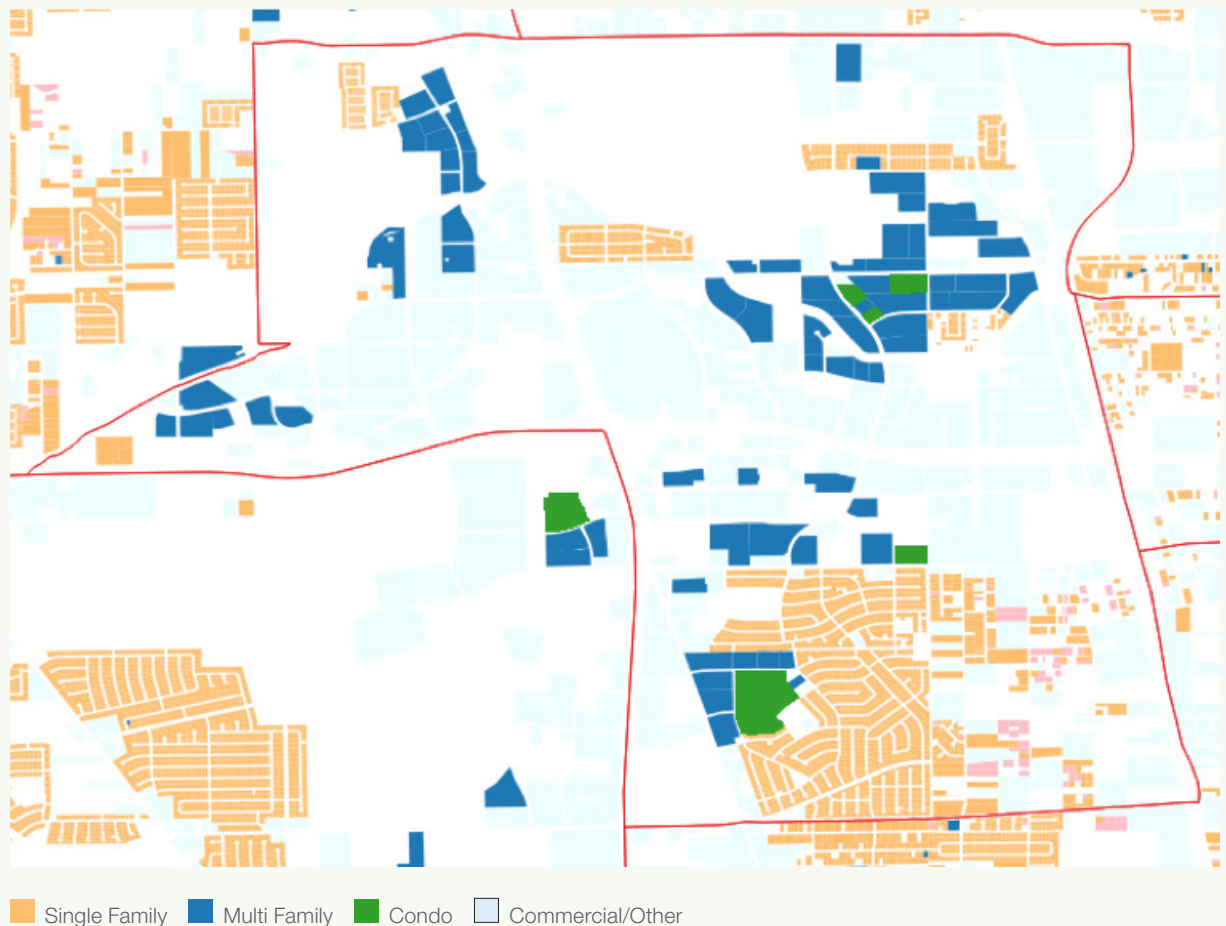
Greenspoint

Greenspoint lies near the intersection of I-45 and Beltway 8 and is very close to major job centers, including the George Bush Intercontinental Airport. The original neighborhood was developed to meet the needs of working-class families who sought moderately priced homes close to the North Freeway (I-45) and centered around the Greenspoint Mall and nearby office development in the 1970s and 1980s. Since the late 1980s, lower-income families have occupied the area's many apartment complexes. Its economy suffered since the withdrawal of ExxonMobil during the mid-2010s. Today, half of its residents make less than \$26,000 a year. Only 16 percent of the housing units are single-family homes, and 85 percent of the residents in Greenspoint rent. About 15 percent of the households do not own a car. Additionally, three-quarters of Greenspoint's multi-family housing is located within a floodplain, suffering from several flooding events from Tropical Storm Allison in 2001, the Tax Day floods in April 2016 and most recently Hurricane Harvey.

Deteriorating old apartment buildings and repeated flooding have kept the housing value relatively low, which provides the rent gap that attracts investors. Our analysis shows that the area north of Beltway 8 and east of I-45, which has a lot of multifamily housing built after 1980, gentrified during 1990 and 2000, while the area south of Beltway 8 and east of I-45, has gentrified since 2000. The one tract that was gentrifying between 2010 and 2016 has a high concentration of single-family houses built before 1980, and it has a probability of continued gentrification that is higher than 50 percent.

As shown in Figure 15a, neither rent nor home costs have changed much over the past 16 years. However, median household income of Greenspoint's residents has declined significantly. Since 2000, Greenspoint experienced a big increase in its share of Hispanic population, renter households, low-income households and housing with five units or more. At the same time, the neighborhood saw a decrease in its share of college degree residents, share of non-Hispanic white as well as black population and

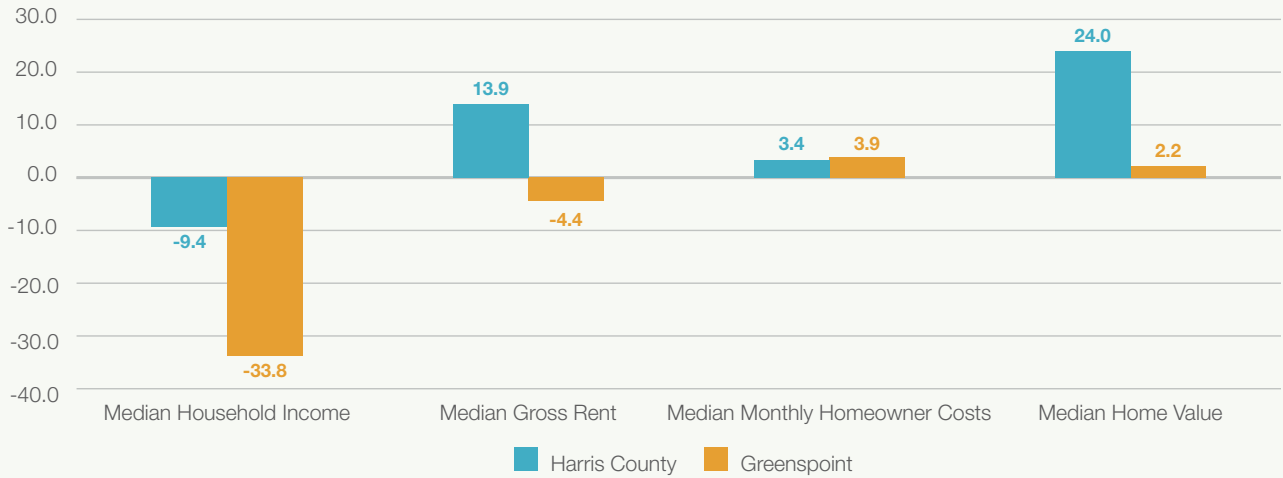
FIGURE 14 Housing Types in Greenspoint



Source: Data from Harris County Appraisal District, 2017.

FIGURE 15a

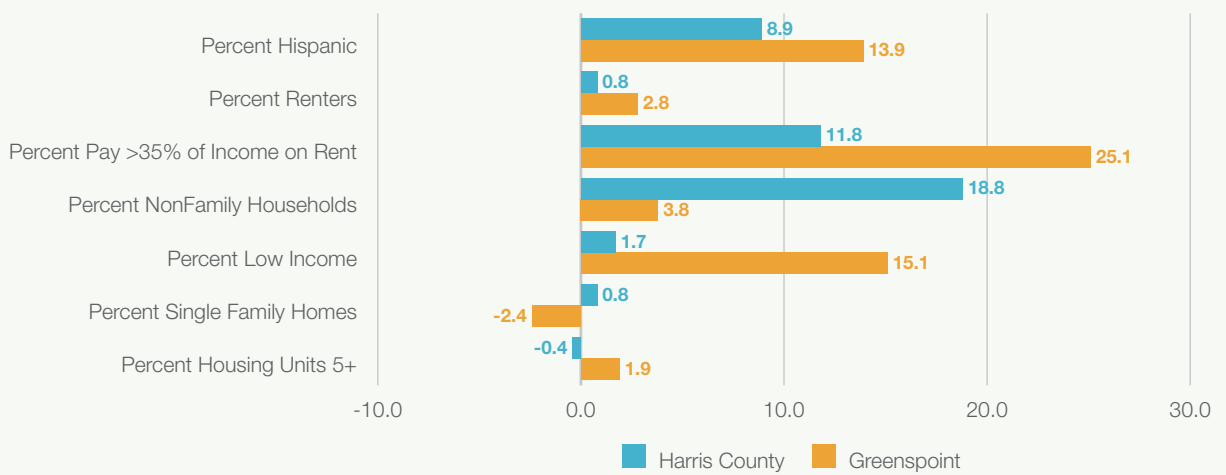
Percent Change in Median Household Income and Housing Costs (2000-16)



Source: Census 1990, 2000, 2010, American Community Survey 2012-2016 5-year estimates, Census Bureau.

FIGURE 15b

Harris County and Greenspoint Housing and Demographic Changes (2000-16)



Source: Census 1990, 2000, 2010, American Community Survey 2012-2016 5-year estimates, Census Bureau.

a loss of single-family homes. Between 2000 and 2016, the percent of low-income residents increased at a pace much faster than the county as a whole. Similarly, the proportion of renters who spend more than 35 percent of income on rent grew significantly, compared to the county as a whole. Compared to the other two neighborhoods discussed in this report, Greenspoint has an overall lower probability of gentrifying in the future.

As discussed earlier, different types of gentrification processes are shaped by the existing housing stock, the ethnic composition of the neighborhood as well as neighborhood conditions. Gentrification in OST/South Union is mostly based on private sector block-busting. Vacant lots in the neighborhood are poorly maintained, which made the remaining residents more likely to sell or rent their

properties. Gentrification in the Fifth Ward involves a low-income minority neighborhood with a strong community identity and rich cultural heritage. Due to the physical and social fabric of this community, the gentrification may require large-scale redevelopment, similar to what has happened to Freedmen’s Town. In comparison, the neighborhood changes in Greenspoint are more likely to be about displacing low-income renters if large affordable apartment complexes with deteriorating conditions are torn down, making room for new development.

Conclusion and Discussion

Gentrification is an evolving phenomenon in urban neighborhoods in the late 20th century. It affects a significant share of Houston neighborhoods, both in the city core and beyond it. As shown, gentrification is a process by which lower-income neighborhoods undergo reinvestment through the influx of relatively higher-income households, resulting in economic overburden for lower- and moderate-income households, often non-white.

This report defines gentrified (established) and gentrifying neighborhoods across Harris County and identifies factors that make neighborhoods susceptible to gentrification. Our analyses find that gentrification is distributed unevenly across Harris County neighborhoods. Scarce affordable housing in higher-demand locations creates a tight housing market, exacerbating effects of gentrification. Socioeconomic, housing, transportation and location factors impact areas' susceptibility to gentrification. We also found that some neighborhoods susceptible to gentrification are also in flooded areas. Natural disasters and flooding could potentially amplify the risk of gentrification.

The case studies in the report examine the factors we used to identify whether they will be gentrifying in the future and highlight the differences in the process as well as community responses to gentrification pressures.

Although this report identifies gentrified, gentrifying and susceptible neighborhoods, further research is needed to explore the relationship between the identified factors and their effects on gentrifying neighborhoods. A series of reports will be released by

the Kinder Institute in the next few months, examining the link between transportation and gentrification and detailing the housing stock changes in selected gentrifying neighborhoods.

Given the prevalence of gentrification and its effects, how can cities and communities enable low-income homeowners and renters to remain in their neighborhoods? How can they help maintain affordable housing stock to ensure gentrifying neighborhoods remain diverse and inclusive? Public housing, housing choice voucher programs and



Roy Luck/flickr



Fifth Ward Community Redevelopment Corporation

the Low-Income Housing Tax Credit (LIHTC) can offer tools to preserve housing affordability in gentrifying neighborhoods. Without citywide zoning, communities have also been utilizing various local land-use tools such as minimum lot size protections, minimum building lines and Chapter 42—the city’s land development ordinance⁴²—to preserve its community and prevent real estate developers from subdividing the plats and replacing old homes with townhomes. Though disputed, implementation of historic district status may also curb unwelcome neighborhood changes.

In addition to the ordinances mentioned above, private agreements such as deed restrictions and homeowner associations can also provide some kind of protection. Furthermore, homestead exemptions, community land trusts^{43,44} and other property tax relief tools could help relieve the burden of rising property taxes, especially for lower-income homeowners living in the most rapidly appreciating neighborhoods.

Though the success of those place-based strategies is inconclusive, neighborhoods with clear strategies and vision, strong leadership and community engagement tend to elicit more equitable development by including community members in the process while attempting to stabilize neighborhoods at risk of gentrification. Further policy analysis is needed to fully assess the effectiveness of those tools and to identify the best way to apply those strategies for various types of gentrifying neighborhoods.

Appendix A: Principal Component Analysis

Gentrification literature suggests several common characteristics in gentrified areas: income, race, housing stock, security in housing tenure, location, amenities and access to jobs and transportation. Our theoretical concept and data selection followed the criteria and selection of recent and pioneering gentrification scholars and practitioners.⁴⁵

Principal component analysis was performed analyzing around 30 to 50 variables between 2000 and 2016 and be-

tween 2010 and 2016.⁴⁶ Our principal component analysis results indicated multiple key factors driving gentrification across Harris County: sociodemographic, housing, housing insecurity, transportation, location, growth and investment, amenities, jobs and crime. These results informed the variable selection for our probability analysis.

TABLE 1 PCA Results

HARRIS COUNTY FACTORS	PCA Components	Variables	Correlation / Direction
2000–2016			
Socioeconomic Status	Socioeconomic Status	Percent Bachelor's or Higher (2000)	0.925
		Median Household Income (2000)	0.894
		Percent Nonwhite (2000)	-0.837
		Median Home Value (2000)	0.823
		Percent Low Income Households (2000)	-0.820
		Median Gross Rent (2000)	0.760
		Percent Poverty Status (2000)	-0.739
		Unemployment Rate (2000)	-0.701
	Socioeconomic Change	Change in Percent Bachelor's or Higher (00–16)	0.893
		Change in Median Household Income (00–16)	0.851
Change in Percent Non-Hispanic White (00–16)		0.586	

TABLE 1 PCA Results

HARRIS COUNTY FACTORS	PCA Components	Variables	Correlation / Direction
Housing Market Demands	Rental Housing Market	Percent Housing Units: 5+ (2000)	0.919
		Percent Residing in Different House 5 Years Ago (2000)	0.874
		Percent Renter Occupied (2000)	0.851
		Percent Nonfamily Households (2000)	0.721
		Percent Single Family Units (2000)	-0.659
	Percent Vacant (2000)	0.555	
Single-Family Housing Market	Change in Percent Single Family Units (00–16)	0.927	
	Change in Percent Renter Occupied (00–16)	-0.875	
	Change in Percent Nonfamily Households (00–16)	-0.327	
Transportation	Transit	Percent Workers Taking Transit (2000)	0.794
Growth and Revitalization	Downtown Revitalization	Population Density (2000)	0.757
		Percent Units Built from 2000–2016 (2016)	-0.745
		Distance in Miles to Downtown	-0.528
	Population and Housing Growth	Change in Housing Density (00–16)	0.947
Change in Population Density (00–16)		0.945	
Housing Security	Housing Affordability	Percent Renters Pay More than 35% of Income (2000)	0.984
		Change in Median Home Value (00–16)	0.777
	Eviction/Housing Security	Change in Eviction Rate (00–16)	-0.725
2010–2016			
Amenities and Jobs	Amenities and Jobs	Recreational Facilities per 1000 Population (2010)	0.861
		Number of Jobs per 1000 Population (2010)	0.840
		Youth Facilities per 1000 Population (2010)	0.726
		Small Parks per 1000 Population (2013)	0.407
		Number of Transit Stops per 1000 Population (2010)	0.818
Crime	Crime Rate per Thousand	Population Growth Rate (10–16)	0.847
		Change in Crime Rate per 1000 Population (10–16)	-0.643
Housing Security	Subsidized Housing	Population Growth Rate (10–16)	0.738
		Change in Total Available Subsidized Housing per 1000 (12–16)	-0.628
		Median Home Value (2010)	0.702

Appendix B: Multivariate Logistic Regression and Susceptibility Index

The main methods we followed were derived from the national analysis by Lance Freeman,⁴⁷ the work done for the Institute of Urban And Regional Development in the Bay Area of California by Karen Chapple⁴⁸ and the University of California, Berkeley by Karen Chapple et al.,⁴⁹ the Houston analysis by Francisca Winston and Chris Walker from Local Initiatives Support Corporation⁵⁰ and the Philadelphia research by Lei Ding et al.⁵¹

To identify factors that make a neighborhood likely to gentrify, we used a multivariate regression technique. Based on the PCA results, we tested nearly 50 different attributes in the model, ranging from demographic factors, such as family type and income-to-rent burden; transportation factors, such as whether more individuals take transit to their jobs or number of vehicles owned; housing factors, like rent and home value, age of housing, vacancies and type of housing structure; locational factors, such

as distance to downtown and amenity factors, such as parks, recreational facilities and youth facilities.

We applied a multivariate regression technique, specifically a logit model using forward selection. This method tests each variable independently against the outcome variable (if tract gentrified or not). The variable with the strongest relationship is added to the model, and then each remaining variable is tested and added to the model based on significance level. We determined eight attributes from the year 2000 had the strongest relationship with whether a tract gentrified in the year 2016.⁵² These variables fell into four categories that we previously identified in the PCA analysis: socioeconomic, housing, transportation and location. Table 2 shows attributes that strongly associated with whether a tract gentrified.

Note that estimated coefficients are presented in the regression table instead of odds ratios. The coefficient indi-

TABLE 2 Factors in 2000 Impacting Neighborhoods' Likelihood of Gentrifying in 2016

Factors	Variables	Coefficient	SE	Significance
Socioeconomic	% Married Couples With Children	-.03932	.01585	**
	% Renters Paying > 35% of Income	.03111	.01747	*
Housing	Median Gross Rent	-.00432	.00104	***
	Median Home Value	-.00001	.00000	***
	% Units Built Before 1960	.01254	.00626	**
	% Housing 1-Unit Attached	.05496	.02728	**
Transportation	% Take Transit	.09503	.04246	**
Location	Distance to Downtown	-.08247	.03847	**
Intercept		3.85038		***

*p<.10. **p<.05. ***p<.001. N = 773, Pseudo R² = 0.4772, Likelihood Ratio = 372.31***

cates the direction of each variable's effect, either negative or positive, on the probability or likelihood of gentrifying. For example, "Percent Renters Paying >35% of Income" has a positive coefficient thus areas with more renters paying more than 35 percent of their income on rent in 2000 have a higher probability of gentrifying in 2016.

Although we are identifying the factors that contribute to gentrification, not all attributes make gentrification more likely. A negative coefficient indicates the attribute may prevent gentrification from occurring in a neighborhood. For example, "Percent of married couples with children" has a negative effect on the likelihood to gentrify, meaning holding all other variables constant, areas with more married families with children in 2000 are less likely to be gentrifying in 2016.

Median rent and home value have negative coefficients, indicating tracts with more households with higher rents or higher home values in 2000 are less likely to gentrify in 2016. This speaks to a neighborhoods vulnerability to gentrification. It makes more sense to interpret as tracts with lower rents and home values as more likely to gentrify, as more vulnerable. Although median gross rent and home value are included as predictors in the likelihood of gentrifying, their coefficients are very small, suggesting a weak influence on that likelihood.

If we use this model to predict gentrification post-2016, classification tests (a statistical post-estimation procedure) suggest that 83.62 percent of our positive predictions will be correct and 90.87 percent of our negative predictions will be correct. In fact, our overall rate of correct classification is estimated to be 89.78 percent. Therefore, we applied our model results to predict gentrification post-2016. To determine probabilities of gentrification, we used the coefficients from the model in addition to data from 2016 to solve for the probability of gentrification for every tract:

Logit (probability of gentrification) = 3.85038
 -0.03932*Percent of Married Couples with Children in 2016
 +0.03111*Percent of Renters Paying More than 35% of income in 2016
 -0.00432*Median Gross Rent in 2016
 -0.00001*Median Home Value in 2016
 +0.01254*Percent Units Built Before 1980 in 2016
 +0.05496*Percent Housing 1-Unit Attached in 2016
 +0.09503*Percent Taking Transit in 2016
 -0.08247*Distance to Downtown

Solving for the equation, each tract yielded a probability in the form of a percentage, indicating the likelihood of gentrifying. A tract with a higher percentage has a higher probability that it will gentrify post-2016. A tract with a lower percentage has a lower probability that it will gentrify post-2016.

In addition to the 2000 to 2016 multivariate analysis, we modeled the 2010 to 2016 data with the same multivariate analysis. We found similar results to the 2000 results. Crime rate, eviction rate, job density, jobs per 1,000 population, parks per 1,000 population and most amenities per 1,000 population in 2010 showed no significant relationship to whether a tract gentrified in 2016. There were two amenities in 2010 with a significant relationship to the likelihood of a tract gentrifying in 2016: health facilities per 1,000 population and youth facilities per 1,000 population. Health facilities played a preventative role in the likelihood of gentrifying, while more youth facilities increased the likelihood of a tract gentrifying. The 2010 to 2016 results are not shown here.

Appendix C: Data and Methodological Limitations

Data Source

The Neighborhood Change Database (NCDB) was used for tract values in 1990 and 2000. The NCDB reconciles changing census tract boundaries to 2010 tract boundaries in order to make comparison across time. The NCDB was developed by the Urban Institute in partnership with GeoLytics. GeoLytics applied proprietary weighting tables to normalize data to 2010 boundaries. For 2010 tract-level data, the U.S. Census Bureau's ACS 2006–2010 5-year estimates were utilized and for 2016 tract-level data, the ACS 2012–2016 5-year estimates were utilized. To maintain consistency of comparisons, county-level values in 1990 and 2000 were pulled from the Decennial Censuses from the U.S. Census Bureau. County-level data for 2010 came from the ACS 2006–2010 5-year estimates and the 2016 county-level data was pulled from the ACS 2012–2016 5-year estimates.

Our analysis included census tracts with at least 500 residents in the year 2010, or 783 tracts out of 786 in Harris County. Monetary data including home value, rent and income was adjusted to match the value in 2016 before comparisons were made.

For the PCA, we utilized multiple other data sources. Data on recreational facilities and youth facilities was obtained from InfoGroup Business USA, a private data provider. Number of jobs came from the Longitudinal Employer-Household Dynamics from the Center for Economic Studies at the U.S. Census Bureau. Small parks data was obtained from the Houston-Galveston Area Council and the number of transit stops was provided by Houston METRO. Crime data came from the Houston Police Department. Subsidized housing data came from the U.S. Housing and Urban Development data portal. Distance in miles to Downtown calculated from ArcGIS. Eviction rate came from Evictions Lab at Princeton University.

Data Limitations

We used the Neighborhood Change Database for 1990 and 2000 decennial data which reconciles tract boundaries to match 2010 tract boundaries. Though geographic boundaries were normalized, the comparison between Decennial Censuses and ACS 5-year estimates have limitations. Not only do we use ACS multiyear estimates for 2010 and 2016 tracts, we also use them for the county because the Margin of Errors are smaller with 5-year estimates than the 1-year estimates. Also, the 5-year estimates provide more recent tract-level information.

Although we utilize data with matching boundaries, the measurement of certain variables, specifically median gross rent and median home value, differed across the years. The 1990 and 2000 Censuses did not release total renter-occupied units, rather “specified renter-occupied housing units,” and the Neighborhood Change Database only included “Median value of specified owner-occupied housing units” while for the 2010 and 2016 ACS universe included “total renter-occupied” and “total owner-occupied” housing units. Therefore, the year-over-year change in median gross rent and median home value may underestimate or overestimate the actual change.

Methodological Limitations

Stepwise regression has some limitation. For example, the technique is sensitive to the presence of collinearity and smaller values, it may yield falsely narrow predicted values, and its automatic algorithms may detract from the substantive theory.⁵³ To account for these limitations, we performed logistic regression without the addition of stepwise, adding and removing variables as necessary to create the best model based on theory. If a variable did not theoretically apply even if significant, it was removed from both the logit model and the logit stepwise model, removing false predictors. Collinearity, however, is one

limitation difficult to navigate around considering our definition was comprised of so many elements that are naturally collinear with the covariates. Each covariate was individually analyzed against each other and was removed if over a moderate threshold of collinearity.

Predictive Power

Although we classify every tract as having some susceptibility, no susceptibility or no eligibility for gentrification, this does not mean that a tract designated by our maps will not gentrify in the future or that a tract will gentrify in the future. Without zoning or change in land use policies, new or updated housing can appear wherever a developer may be willing to take the risk. New recreational facilities or retail may draw homeowners into an area. Certain areas may be used for industrial uses, which may repel homeowners. New transit development may change the neighborhood dynamics. Employment centers could shift, the impact of Hurricane Harvey may become visible faster or slower than expected or other exogenous shocks could alter the state of the housing market. In such a rapidly developing city, there are unforeseen factors to take into account which were not included in our model.

Endnotes

- 1 A census tract is often used in research as a proxy for a neighborhood boundary. The Census defines a census tract as a “small, relatively permanent statistical subdivision of a county or equivalent.” Census tracts typically follow visible and identifiable features, with a population between 1,200 and 8,000 people, optimally 4,000 people. Retrieved from U.S. Census Bureau website at https://www.census.gov/geo/reference/gtc/gtc_ct.html.
- 2 Ellen, Ingrid Gould and Lei Ding. 2016. “Guest Editors’ Introduction: Advancing Our Understanding of Gentrification.” *Cityscape* 18(3):3–8.
- 3 These two ideologies are pervasive throughout gentrification studies. See examples:

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The Kinder Institute for Urban Research builds better cities and improves people's lives by bringing together data, research, engagement and action.

