# Gentrification, Race, and Immigration in the Changing American City

# Gentrification, Race, and Immigration in the Changing American City

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**Gentrification, Race, and Immigration in the Changing American City**

## Abstract

This dissertation examines how gentrification—a class transformation—unfolds along racial and ethnic lines. Using a new conceptual framework, considering the city-level context of immigration and residential segregation, examining the pace and place of gentrification, and employing a new method, I conduct three sets of empirical analyses. I argue that racial and ethnic neighborhood characteristics, including changes brought by the growth of Asians and Latinos following immigration policy reforms in 1965, play an important role in how gentrification unfolds in neighborhoods in US cities. Nonetheless, these processes are conditional on the histories of immigration and the racial structures of each city.

The first empirical analysis uses Census and American Community Survey data over 24 years and field surveys of gentrification in low-income neighborhoods across 23 US cities to show that the presence of Asians and, in some conditions, Hispanics, following the passage of the 1965 Hart-Celler Act, contributed to early waves of gentrification. The second empirical analysis introduces a method of systematic social observation using Google Street View to detect visible cues of neighborhood change and integrates census data, police records, prior street-level observations, community surveys, proximity to amenities, foreclosure risk data, and city budget data on capital investments. The analysis demonstrates that minority composition, collective perceptions of disorder, and subprime lending rates attenuate the evolution of gentrification

across time and space in Chicago. The third analysis uses similar data in Seattle, where segregation levels are low and minority neighborhoods are rare, and shows that a racial hierarchy in gentrification is evident that runs counter to the traditional racial order that marks US society, suggesting changing racial preferences or new housing market mechanisms as Seattle diversifies. By deepening our understanding of the role of race in gentrification, this dissertation sheds light on how neighborhood inequality by race remains so persistent despite widespread neighborhood change.

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## Introduction

Large-scale economic and demographic transformations during the latter part of the mid-twentieth century left inner-city neighborhoods depopulated and in dire conditions (Wilson 1987). Beginning in the 1960s, the social and economic conditions of these neighborhoods, which had disproportionately larger shares of lower- and working-class minorities, were distinct from the past and worsened in subsequent decades as a result of macrostructural changes in the labor market, especially the decline in manufacturing, and the legacy and persistence of residential segregation (Massey and Denton 1993; Wilson 1987).

Despite legislative victories towards racial equality, progress in racial attitudes, and racial diversification over the last 50 years, residential segregation and the persistence of disadvantaged minority neighborhoods remain defining features of US cities (Rugh and Massey 2014; Sampson 2012). Among the US's 25 largest cities, 97 percent of predominantly minority (> 75 percent) census tracts in 1980 remained majority-minority (> 50 percent) over the next 30 years, and over 88 percent of census tracts in the top quartile of poverty rates remained in the top half of the poverty distribution in each city. In these census tracts with persistent poverty, over 84 percent of residents were minorities in 2010.[1] Indeed, race and class are powerfully stable in urban neighborhoods.

Yet, another dominant narrative of the trajectories of low-income neighborhoods in urban studies and popular discourse conveys widespread gentrification (Hackworth and Smith 2001; Wyly and Hammel 1999). Gentrification is the process by which low-income central city

[1] Author's calculations. Source: Brown University's Longitudinal Tract Data Base.

neighborhoods experience a socioeconomic upgrading, characterized by an influx of investment and an in-migration of middle- and upper-class residents.[2] Such changes, which counter traditional models of neighborhood succession (e.g., Park, Burgess, and McKenzie 1925) that could explain urban change for much of the twentieth century, have spurred considerable scholarly and public debate on their causes and consequences, particularly for low-income, often minority, residents of these neighborhoods.

Thus, by one account, low-income, minority neighborhoods have overwhelmingly remained poor and predominantly minority. By the other account, many low-income neighborhoods experience socioeconomic ascent, threatening the residential security of its pre-existing low-income residents. The goal of this dissertation is to explain these seemingly contradictory accounts by examining how gentrification—a class transformation—unfolds along racial and ethnic lines. Existing understandings of gentrification oversimplify and underexplore the role of race (Anderson and Sternberg 2013; Bader 2011; Lees 2000). Scholarship on early gentrification hardly addresses the intersection of race and gentrification (Lees 2000), and studies of neighborhood change that address race use basic categories that do not take into account the increasingly multiethnic nature of US cities and neighborhoods (Logan and Zhang 2010). Although scholars have aptly noted the distinction between early gentrification and the gentrification of recent decades (Hackworth and Smith 2001; Hyra 2012), few have systematically considered the changing nature of the relationship between race and gentrification across these eras. Further, although scholars agree that gentrification is temporally and spatially uneven, studies rarely examine racial variation in the rate and spread of gentrification over time.

[2] This definition does not require that displacement or racial turnover occur, for which empirical evidence has produced mixed results (Atkinson 2004; Freeman 2005; Vigdor 2002).

Because race has had such a defining influence on residential patterns in the US (Massey and Denton 1993), deepening our understanding of the role of race in gentrification sheds light on how low-income, minority neighborhoods have remained so persistent despite widespread neighborhood change occurring in many low-income neighborhoods.

Indeed, the social processes that perpetuate the persistence of poor, minority neighborhoods do not operate in isolation from the social processes that facilitate neighborhood change. Classic urban theories pointed to the interdependence of neighborhoods that comprised the city and the forces external to neighborhoods that influence their trajectories (Logan and Molotch 1987; Park, Burgess, and McKenzie 1925). Although a rich line of research has examined the mechanisms reproducing poor, minority neighborhoods (e.g., discriminatory institutional practices, neighborhood selection, social reproduction) and its detrimental consequences on individual life chances (Massey and Denton 1993; Sampson 2012; Sharkey 2013; Wilson 1987, 1996), a coherent account of the role of race in gentrification and its linkages to durable neighborhood inequality by race remains incomplete.

In developing such an account, my project advances the study of gentrification in several ways. First, I offer a conceptual framework for understanding gentrification that moves beyond debates between production and consumption as the driving mechanisms of gentrification, which once stymied empirical research on gentrification (Zukin 1987), and builds on a rich body of sociological literature on residential selection. Gentrification, as I defined it above, is a process of reinvestment facilitated by multiple actors, including investors and developers, middle- and upper-class residents, and commercial businesses, as well as policy, such as tax-based incentives for new development or housing project demolition. Framed in this way, gentrification is a process of residential selection by both individuals and state and corporate actors, simultaneously

shaping both the supply and demand for investment into a low-income urban neighborhood. Thus, I draw upon theories of residential selection, which contribute to explanations of residential segregation, to understand the role of race in gentrification and its relationship to the persistence of low-income, minority neighborhoods.

Second, my analyses incorporate two dimensions that studies of gentrification have largely overlooked—the contexts of immigration and residential segregation. Prior understandings of the role of race in neighborhood trajectories primarily rely on theories developed from a black-and-white racial context of the mid-twentieth century (Logan and Zhang 2010). Despite the massive waves of Asian and Latino immigration since 1965, which altered economic and social conditions and racial and ethnic compositions in US cities and neighborhoods, the literature on gentrification does not systematically incorporate this new diversity.

The growth of Asian and Latino immigrants in cities following the passage of the 1965 Hart-Celler Act, which ended quotas on immigration by region, influenced the trajectory of neighborhoods in several ways. Immigrants repopulate and often revitalize declining neighborhoods and cities through small business ownership, housing demand, and local consumption, altering the social and economic conditions of neighborhoods in which they settle (Fong and Shibuya 2005; Logan and Zhang 2010; Muller 1993; Winnick 1990). New immigrant groups also concentrate in some areas and form ethnic enclaves, which serve as affordable destinations for new immigrant arrivals and often gentrification (Hum 2014; Portes 1987; Waldinger 1989; Winnick 1990). Further, given that racial and ethnic composition is an important factor in residential selection processes, the influence of new immigrants on the racial and ethnic compositions of neighborhoods likely alters their relative desirability (Charles 2003;

Logan and Zhang 2010; Smith 1996; Zukin 1987). Thus, the rise of immigration significantly influences urban housing markets, affecting how gentrification unfolds along racial and class lines. Nonetheless, the levels and timing of immigration vary across cities (Singer 2004), and, therefore, the rise of Asians and Latinos influences gentrification differently across contexts.

The degree of residential segregation also varies across cities, producing distinct local contexts of racial and ethnic relations in which processes of residential selection and neighborhood change take place. Studies on the role of race in gentrification have primarily focused on highly segregated cities, and national sample analyses have not considered variation by city-level factors. Explanations of residential segregation argue that the relative size of minority groups in a city or metropolitan area leads the dominant group to avoid living in areas with minority groups but also decreases the overall segregation level of blacks (Blalock 1967; Rugh and Massey 2014; White and Glick 1999). Further, highly segregated contexts maintain higher quality neighborhoods that are predominantly white, thereby limiting residential choices (Charles 2003). Different levels of residential segregation thus foster distinct processes of residential selection that influence the role of race in how gentrification unfolds.

Third, this project accounts for the temporal and spatial unevenness of gentrification itself. Most prior studies on the "uneven development" (Smith 1984) of gentrification examine the factors associated with where gentrification takes place in general. While this approach was sufficient for examining the early wave of gentrification, which was slow and sporadic and often facilitated by individual households and businesses and small developers (Hackworth and Smith 2001), it does not capture the various dimensions of unevenness in contemporary gentrification. Scholars consider gentrification in recent decades to be widespread and rapid, featuring an increased role of state and corporate actors, occurring frequently in economically risky

neighborhoods, and expanding upon the gentrification that had occurred in earlier decades (Hackworth 2007; Hackworth and Smith 2001). Surprisingly few studies consider variation across neighborhoods in their rate of gentrification or variation in the types of areas to which gentrification spreads, but attention to this dimension of gentrification sheds light on its relationship to persistently poor, minority neighborhoods.

Finally, this project introduces an innovative methodological approach for analyzing gentrification. Most quantitative scholars measuring gentrification use conveniently available census and administrative data, but several studies have demonstrated the shortcomings of this strategy (e.g., Barton 2014; Owens 2012; Wyly and Hammel 1999). Because gentrification is a complex process facilitated by multiple forces beyond individual residents and often embody physical, cultural, social, and economic transformations, traditional data do not consistently identify these changes. The qualitative character of gentrification is distinctly visible from the streetscape but often difficult to capture with census and administrative data (Krase 2012; Papachristos et al. 2011). I take advantage of Google Street View—a recent technological advancement that simulates walking along nearly any given street block from a computer. This technology is publicly accessible and free, allowing researchers to assess neighborhood environments at a relatively low cost. Using systematic methods, I develop a measure to capture the degree of gentrification in a neighborhood.

**Chapter Outline: Race and Gentrification, from Past to Present**

By using a new conceptual framework, considering the city-level context of immigration and residential segregation, examining the pace and place of gentrification, and employing a new method, my approach to studying gentrification uncovers new findings that advance our

understanding of its relationship with neighborhood inequality by race. I argue that racial and ethnic neighborhood characteristics, including changes brought by the growth of Asians and Latinos following immigration policy reforms in 1965, play an important role in how gentrification unfolds in neighborhoods in US cities. Nonetheless, these processes are conditional on the histories of immigration and racial structures of each city. Using original data on gentrification and a variety of additional data sources, I conduct three sets of empirical analyses to support this argument.

In the first empirical chapter, I examine the role of the rise of immigration, following the passage of the 1965 Hart-Celler Act, in early waves of gentrification. Many new immigrants, who were primarily Asian and Latino, moved to central city neighborhoods, sometimes concentrating in low-cost neighborhoods that became ethnic enclaves and also settling into other affordable neighborhoods that were declining in the wake of deindustrialization and suburbanization. I argue that the rise of immigration brought pioneers to many low-income neighborhoods, spurring neighborhood gentrification by providing economic and social stability and racial and ethnic diversity in depopulated neighborhoods that attracted gentrification. Nonetheless, the effects that these groups had on early waves of gentrification are conditional on the intensity of immigration in each city. Using prior field surveys of gentrification conducted from 1994 to 2001 in 23 US cities and the decennial US Census beginning in 1970, I demonstrate that an early presence of Asians was positively associated with gentrification. In addition, the early presence of Hispanics positively predicts neighborhood gentrification in cities with low immigration levels and in neighborhoods with a substantial share of blacks. Low-income predominantly black neighborhoods and neighborhoods with large Hispanic population gains, often becoming ethnic enclaves, remained ungentrified despite the growth of gentrification

during the late twentieth century.

In the second chapter, I examine the rate and spread of gentrification in Chicago over the last 20 years. Building on research with Robert Sampson, I argue that similar patterns of race-based residential selection that shape residential segregation are also at work in how gentrification unfolds in Chicago. While gentrifiers may prefer some level of racial diversity, we argued in a paper published in the *American Sociological Review* in 2014 that this preferred level of diversity demonstrates a limit and racial order that reflect similar hierarchies shaping residential stratification in the US more broadly. We introduce the method of systematic social observation using Google Street View described above to detect visible cues of neighborhood change and measure the degree of gentrification in a neighborhood. These measures used images taken between 2007 and 2009, and we integrated them with prior field survey data on gentrification conducted in 1995 in Chicago, census data, police records, neighborhood surveys, prior street-level observations of disorder, spatial measures of proximity, and city budget data to assess the relationship between racial and ethnic composition and the trajectories of gentrification in Chicago neighborhoods. We found that, among neighborhoods that showed signs of gentrification in 1995 or were adjacent to them, neighborhoods with higher shares of black and Latinos and higher levels of collective perceptions of disorder gentrified less. In particular, gentrification is unlikely when the share of blacks is over 40 percent—demonstrating a limit to gentrifiers' preferences for diversity.

Extending these findings, I incorporate new measures of gentrification using Google Street View images taken in 2011 and indicators of change from 2007 to 2014 to demonstrate that the housing crisis disproportionately depressed the trajectory of neighborhoods with greater shares of blacks among neighborhoods that had shown signs of gentrification in 1995 or were

adjacent to them. The recent housing crisis negatively impacted development and the housing market in Chicago, but, consistent with past studies on its disproportionate effects in minority neighborhoods (Been, Ellen, and Madar 2009; Hwang, Hankinson, and Brown 2015; Immergluck 2008; Rugh, Albright, and Massey 2015), the results reveal unequal trajectories for minority neighborhoods, even in the context of gentrification.

The third chapter interrogates the role of residential segregation in producing racialized patterns of gentrification, which I find in Chicago in the second chapter and other existing research also finds, by examining the role of racial and ethnic compositions in the pace and place of gentrification in Seattle. I chose this city for its low levels of residential segregation and relatively high rates of immigration, primarily from Asia, in the last few decades. I argue that new housing market mechanisms or changing race-based residential preferences resulting from the dynamics of immigration and diversification influence the uneven development of gentrification by race in Seattle. I integrate field surveys of gentrification conducted in 1998, original data on gentrification based on images from 2012 using Google Street View, census data, police records, spatial measures of proximity, and neighborhood surveys and demonstrate that low-cost neighborhoods with small but substantial shares of Asians, which tend to have many housing and socioeconomic characteristics conducive to gentrification, are least likely to gentrify in both early and recent waves of gentrification. Moreover, neighborhoods with greater shares of blacks were less likely to gentrify in the early wave of gentrification, though to a lesser degree than Asians, but were more likely to gentrify in recent decades. The findings demonstrate one way in which the context of immigration and racial structures of cities condition the relationship between neighborhood racial inequality and gentrification.

The final chapter summarizes the theoretical arguments and findings from each chapter.

Then, I tie these findings together to outline the overall argument and contribution of this work. I also suggest new directions for the next generation of research and policy on gentrification.

# 1

# Pioneers of Gentrification:

# Transformation in Global Neighborhoods in the Late Twentieth Century


## Abstract

Few studies have considered the role of immigration in the rise of gentrification in the late twentieth century. Analysis of Census and American Community Survey data over 24 years and field surveys of gentrification in low-income neighborhoods across 23 US cities reveal that most gentrifying neighborhoods were "global" in the 1970s or became so over time. An early presence of Asians was positively associated with gentrification, and an early presence of Hispanics was positively associated with gentrification in neighborhoods with substantial shares of blacks and in cities with low levels of immigration, where ethnic enclaves were less likely to form. Low-income predominantly black neighborhoods and neighborhoods with large Hispanic population growth remained ungentrified despite the growth of gentrification during the late twentieth century. The findings suggest that the rise of immigration after 1965 brought pioneers to many low-income neighborhoods, spurring neighborhood gentrification in some areas and forming ethnic enclaves in others.



**Keywords:** gentrification, immigration, race and ethnicity, multiethnic neighborhoods

## Introduction

Although several studies have examined the causes of gentrification, few have considered the role of immigration in the early wave of gentrification that took place in the last quarter of the twentieth century. Gentrification is a process by which low-income central city neighborhoods experience investment and renewal accompanied by an in-migration of middle- and upper middle-class residents (Smith 1998:198).[1] Thus, gentrification is broadly a process of neighborhood selection, not only by relatively well-off individual households, but also by developers, businesses, and institutions, that results in the physical, demographic, and cultural transformation of a low-income area into a higher-value, middle- or upper-class neighborhood.

There are several reasons that the influx of immigrants following the passage of the 1965 Hart-Celler Act, which eased immigration restrictions, may have influenced the development of gentrification. First, the subsequent rise of the predominantly Asian and Hispanic immigrants to urban areas beginning in 1968, when the new immigration laws became effective, precedes the surge of gentrification in US cities that occurred in the late 1970s and 1980s (Hackworth and Smith 2001:467).[2] Ethnographic accounts of neighborhoods that began gentrifying during this time indicate the presence of Hispanic and Asian immigrant groups prior to the influx of middle-class residents. These include well-known examples of gentrified neighborhoods, such as Brooklyn's Williamsburg (Susser 1982), Manhattan's Lower East Side (Mele 2000), and Chicago's Wicker Park (Lloyd 2006).

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[1] For the purposes of this study, I employ this working definition and conceptualize gentrification as a phenomenon that occurs at the neighborhood-level within central urban areas. See Brown-Saracino (2010) for alternative definitions.

[2] Evidence of gentrification in US cities dates back to the 1950s, but this period of gentrification was slow and sporadic and generally isolated to a few neighborhoods in northeastern cities (Hackworth and Smith 2001).

New immigrants repopulated areas that lost populations as a result of deindustrialization and suburbanization and established commercial businesses in affordable and vacant storefronts (Lin 1998; Muller 1993; Wilson 1987; Winnick 1990). Many of these neighborhoods became established ethnic enclaves, which have only begun to face gentrification pressures in recent decades, when gentrification became rapid and widespread (Hackworth and Smith 2001; Hum 2014; Wilson and Grammenos 2005); neighborhoods to which most of these immigrants arrived were not traditional ethnic enclaves, even in traditional immigrant destination cities (Waldinger 1989). Many settled in affordable areas that were previously white and middle-class, and others settled in affordable areas that were predominantly black and low-income (Bogen 1987; Oliver and Johnson 1984; Waldinger 1989). Through this demographic renewal, new immigrants revitalized declining areas by increasing housing demand in emptying neighborhoods and populating previously vacant residences and commercial storefronts (Winnick 1990), thereby creating more desirable economic and social neighborhood conditions that could attract gentrification.

The influx of primarily Asian and Hispanic immigrants also altered the racial and ethnic composition of these neighborhoods in ways that are consistent with evidence on the race-based residential preferences of gentrifiers during this period. Accounts of the early wave of gentrification describe gentrifiers' aversion to living in predominantly minority, particularly black, neighborhoods (Laska and Spain 1980; Smith 1996; Smith and Williams 1986), and others depict gentrifiers' affinity toward racial and ethnic diversity and distaste for the homogeneous character of the suburbs (Brown-Saracino 2009; Lloyd 2006; Zukin 1987). Thus, the racial and ethnic compositional changes that the influx of Asian and Hispanic immigrants brought to neighborhoods were more likely to satisfy gentrifiers' residential preferences. Although these

observations suggest that the increased diversification of neighborhoods from post-1965 immigration is associated with gentrification, studies of early waves of gentrification across multiple neighborhoods and cities—like most past studies on racial and ethnic change—use basic race categories, such as predominantly white, predominantly minority, or racially mixed, and rarely consider race groups beyond blacks and whites (Logan and Zhang 2010).

The goal of this article is to document the relationship between the rise of immigrants in the period following 1965 and the subsequent early wave of gentrification. In the following section, I bridge research on gentrification with literature on immigration, multiethnic neighborhoods, and segregation to develop hypotheses for examining this relationship.

**How Immigration Influences Early Gentrification**

In the wake of large population declines in US cities, both gentrifiers and new immigrants settled in low-income, affordable neighborhoods during the 1970s and 1980s, yet analyses of these two processes together is rare (Waldinger 1989). While new immigrants concentrated near central business districts, sometimes revitalizing ethnic enclaves in traditional immigrant gateways or forming new ones, they also settled in a diversity of other low-cost areas—the suburbs, central city areas that whites had fled, and low-income predominantly black neighborhoods (Bogen 1987; Oliver and Johnson 1984; Waldinger 1989). Early gentrification also concentrated in and around central business districts, but it exhibited significant variation within these areas due to gentrifiers' tastes for particular building characteristics and social and ethnic diversity, investment calculations, and the availability of low-cost housing (Zukin 1987). Although studies have not systematically examined the relationship between immigration and the development of early gentrification, the literatures on immigration during this period and residential selection

processes in gentrification provide insight into how the early influx of immigrants to low-cost central city neighborhoods influenced gentrification.

The new rise of immigrants during the 1970s provided a "demographic renewal" to older, inner-city neighborhoods that had fallen out of favor and undergone population declines (Muller 1993; Winnick 1990). Many of these neighborhoods were marked by low residential and commercial rents and high vacancy rates, which provided opportunities for affordable housing and entrepreneurship (Lin 1998; Winnick 1990). Consequently, they stabilized and spurred local economic growth by creating demand for local services, establishing their own enterprises, and replenishing demand in local housing markets (Lin 1998; Muller 1993; Vigdor 2014). The revitalization by immigrants described here is distinct from the gentrification, as defined above, but by stabilizing low-income neighborhoods through filling vacancies and stimulating the local economy and housing market, the influx of immigrants to relatively low-cost, declining neighborhoods improved the social and economic conditions of these areas.

The influx of immigrants to central city neighborhoods also altered the racial and ethnic compositions of these neighborhoods. Although gentrification today is often associated with its location in previously minority neighborhoods, early gentrification primarily did not take place in predominantly black neighborhoods, even though they had similar building and price characteristics to other areas that gentrified (Laska and Spain 1980; Smith 1996; Smith and Williams 1986; for an exception, see Gale 1979). Some accounts characterize gentrifiers as having distinct tastes for diversity and racial integration, in opposition to the homogeneous suburbs, and document how real estate actors and other stakeholders marketed such diversity to attract gentrifiers (Brown-Saracino 2009; Lloyd 2006; Mele 2000; Zukin 1987). Survey results, however, reveal that racial mix is not necessarily the driver of whites' preferences to move to

redeveloped neighborhoods (Bader 2011; Gale 1979), and other studies suggest that the share of minorities that gentrification favors for such diversity is limited (Berrey 2005; Hwang and Sampson 2014).

While the evidence on the extent of racial diversity that gentrification favors is mixed, it does not discount the possibility that racial and ethnic changes brought by the growth of new immigrants to low-cost neighborhoods enhanced their desirability to gentrifiers. Survey evidence on residential preferences more broadly finds that people generally prefer integrated neighborhoods but favor white neighbors the most, black neighbors the least, and Asian over Hispanic neighbors in the middle (Charles 2003). Although gentrifiers may not favor homogenously white neighborhoods, they may indeed favor Asian and Hispanic neighbors over blacks. Further, when gentrifiers are white, which is most often (Ellen and O'Regan 2011; Freeman 2005; Gale 1979), this pattern is also consistent with a buffering process described by Farley and Frey (1994), in which whites are willing to live in the same neighborhoods with blacks after Asians and/or Hispanics are present, providing relief to black-white racial tensions.

Taken together, the evidence points to the following hypothesis:

- *Hypothesis 1:* Neighborhoods with more Asians and/or Hispanics are more likely to gentrify.

Given that accounts of early gentrification argue that predominantly black and predominantly white neighborhoods were less desirable, I also expect the following:

- *Hypothesis 2:* Gentrification in predominantly black neighborhoods is more likely when more Asians and/or Hispanics are present.
- *Hypothesis 3:* Gentrification in predominantly white neighborhoods is more likely when more Asians and/or Hispanics are present.

Alternatively, if there are limits to gentrifiers' preferred share of blacks in a neighborhood, as some studies show, I expect the following hypothesis:

- *Hypothesis 4:* Gentrification in neighborhoods with greater shares of blacks is more likely when more Asians and/or Hispanics are present.

In addition to being favored over Hispanics in surveys on race-based residential preferences, Asians were generally able to garner more economic and social capital relative to Hispanics among this new wave of immigrants. Asians had disproportionately higher levels of self-employment, as many were highly-educated but faced difficulty entering the labor market and could rely on alternative sources of capital (Godfrey 1988; Lee 2002; Light 1972). This leads to the following hypothesis:

- *Hypothesis 5:* The positive effect on the likelihood of gentrification is greater for Asians than for Hispanics.

Although many of the neighborhoods to which post-1965 immigrants settled were neither established ethnic enclaves nor did they become them, some enclaves formed as subsequent immigrants continued to concentrate in these areas (Bean, Tienda, and Massey 1987; Waldinger 1989). Although the formation of ethnic enclaves revitalized the social and economic conditions of neighborhoods, ethnic enclaves rarely gentrified during the early gentrification of the late 1970s and 1980s (D. Wilson and Grammenos 2005).[3] Evidence from New York City suggests that Hispanic neighborhoods had strong organizational capacity that was able to maintain affordable housing (Winnick 1990), preventing gentrification in neighborhoods with high levels of Hispanic growth, and the continued rapid growth of immigrants into these neighborhoods

[3] In some cases, these neighborhoods attracted middle-class Asians and Hispanics (e.g., Portes 1987), but the changes did not necessarily reflect the transformations associated with gentrification.

limited the points of entry for gentrifiers as low-cost vacancies quickly disappeared. This literature offers the following hypothesis:

- *Hypothesis 6:* Gentrification is less likely in neighborhoods that serve as Asian and/or Hispanic enclaves.

**City-Level Immigration and Segregation**

Immigration flows, however, were unevenly spread between cities. Through the latter half of the twentieth century, immigration was largely concentrated in a handful of cities and expanded to a larger set of cities in later decades (Singer 2004). Hispanic enclaves generally only arose during the 1970s in cities with large post-1965 growth in Hispanics, and the growth of Hispanic enclaves was far more prevalent relative to Asian enclaves, given the relatively low presence of Asians in the US at the time (Massey and Denton 1987). New Asian immigrants often settled in affordable urban neighborhoods instead (Massey and Denton 1987). Thus, the effect of Asians and/or Hispanics may vary by city-level immigration flows:

- *Hypothesis 7:* Gentrification is less likely in neighborhoods with more Asians and/or Hispanics in cities with high levels of Asian and/or Hispanic post-1965 growth.

Finally, cities also have varying levels of residential segregation that are dependent on the overall minority share and shape patterns of residential mobility and neighborhood change (Blalock 1967; Crowder, Pais, and South 2012). Thus, the extent to which the influx of immigrants makes neighborhood racial and ethnic compositions more conducive to gentrification may be conditional on the existence of predominantly black neighborhoods as the main alternative low-cost residential option (Charles 2003; Smith 1996). In cities with high levels of segregation, predominantly black neighborhoods during this period had markedly poor economic

and social conditions (Massey and Denton 1993; Wilson 1987). Thus, the influx of immigrants to low-cost neighborhoods in these cities likely had greater influence on the relative desirability of the neighborhoods they entered:

- *Hypothesis 8:* Gentrification is more likely in neighborhoods with more Asians and/or Hispanics in cities with large shares of blacks.

In assessing these hypotheses, I improve upon prior research in three ways. First, I offer the first systematic test of the relationship between early gentrification and post-1965 immigration, incorporating a key dimension missing from studies on gentrification. Second, I enhance understandings of this relationship by considering multiple racial and ethnic categories. Third, I take into account the racial and immigrant context of the cities in which neighborhoods gentrify.

**Data and Methods**

To measure gentrification, I use data from an influential large-scale neighborhood field survey conducted once in each of 23 US cities by geographers Daniel Hammel and Elvin Wyly (hereafter HW) (1996; Wyly and Hammel 1998, 1999, 2004) from 1994-2001. The cities (Atlanta, Baltimore, Boston, Cincinnati, Chicago, Dallas, Denver, Detroit, Fort Worth, Indianapolis, Kansas City, Milwaukee, Minneapolis-St. Paul, New Orleans, Oakland, Philadelphia, Phoenix, Saint Louis, San Diego, San Francisco, San Jose, Seattle, and Washington, DC) span a range of immigrant and racial compositions and degrees of gentrification. Given that gentrification requires preexisting economic disadvantage, HW considered census tracts to be "gentrifiable" if they were below the citywide median income level in 1960 for cities in the Northeast and Midwest and in 1970 for cities in the South and

West.[4] The different baseline years capture regional differences in the timing of urban decline and suburban expansion. They documented visible evidence of gentrification based on structural improvements and new construction among the gentrifiable tracts. They considered tracts to be gentrifying if they had a minimum of one improved structure on a majority of blocks and at least one block in the tract with at least one-third of its structures improved. They considered all other tracts to be ungentrified. Across the 23 cities, they coded 359 tracts as gentrifying and 1,737 tracts as not gentrifying; 2,968 were not gentrifiable.

Although these surveys were conducted in 1994-2001, the gentrification that they identified primarily captures the early gentrification of the late 1970s and 1980s, not its expansion during the late 1990s. The tracts that were gentrifying according to the survey had median household incomes increases, poverty rate declines, and stalled white population decline beginning in the late 1970s and early 1980s (see Appendix B). Moreover, using Bostic and Martin's (2003) census-based measure for identifying gentrification, only 8% of gentrifying tracts identified by HW were gentrifying from 1990-2000 and not in 1970-1990, and the main results are similar if I exclude these tracts from the analysis.[5]

Although the surveys are limited to a single observation in time, 23 US cities, and tracts

[4] A limitation of the data is that only tracts below the citywide median were observed, which excludes many working-class neighborhoods in cities that experienced widespread economic decline. About 25% of tracts below the national 1970 median income are not considered to be gentrifiable. Supplementary analysis using census-based gentrification measures (see footnote 5) for tracts that are below the national 1970 median income yield similar results and are presented in Appendix B.

[5] Bostic and Martin's measure is based upon discriminatory analysis by Wyly and Hammel (1999) comparing their survey results to census variables. The measure considers tracts with the highest average rank for the following factors as gentrifying: % college-educated at the end of the period ($t_1$); % with some college education ($t_1$); average household income ratio in $t_1$ to the beginning of the period ($t_0$); homeownership rate ($t_1$); % professionals ($t_1$); change in % ages 30-44 from $t_0$ to $t_1$; and % above poverty ($t_1$). They also included % black and % white non-family households, but I do not include these measures to remove assumptions of racial change.

that were below citywide median income levels in 1960 or 1970, these measures are preferable to alternative strategies for large sample studies, such as census- or administratively-based variables. Owens (2012) finds that socioeconomic ascent based on commonly-used census-based indicators of gentrification captures various forms of neighborhood change, many of which are not inherent to the direct indicators of neighborhood upgrading associated with gentrification. Moreover, Barton (2014) demonstrates that Bostic and Martin's (2003) and Freeman's (2005) census-based strategies identify gentrification in distinct areas from both each other and well-known gentrifying areas identified in newspaper content. Wyly and Hammel (1999) also found that tracts that they identified as gentrifying correlated with expected socioeconomic census variables, but around 10% of tracts were also incorrectly classified as gentrifying when using only the same census variables to identify gentrification. Given that census data do not directly consider new construction and renovation or aesthetic and commercial changes that are better observed with the visible streetscape, it is not surprising that census variables misidentify gentrification.

Recognizing these issues, recent studies have used alternative data, such as filed building permits, home loans, coffee shop counts, visible housing and neighborhood characteristics observed using Google Street View, and newspaper content (Barton 2014; Helms 2003; Hwang and Sampson 2014; Kreager, Lyons, and Hays 2011; Papachristos et al. 2011), but these measures capture narrow aspects of gentrification, require time-intensive data collection efforts that limit cross-city comparisons, or rely on data that are not available for the time period of interest. Thus, the gentrification surveys provide the largest and most reliable existing dataset of early gentrification.

In addition, I use tract-level Census data from 1970-2000 from the Geolytics'

Neighborhood Change Database, harmonized to 2000 census tract boundaries to allow for comparisons across time for the same geographic areas. I also use American Community Survey five-year estimates from 2005-2009, which use identical boundaries.[6] Only tracts with non-zero populations for all census years are included in the analysis to assess racial and ethnic transitions over time. Publicly available tract-level census data do not distinguish the foreign-born population by their race and ethnicity prior to 2000. Most of the immigrants arriving after 1965 were Asian and Hispanic. Although Puerto Ricans are not included in the foreign-born population, percent foreign-born and the combined percentage of Hispanics and Asians in the sample have correlations of .63, .75, .87, and .92 for 1970, 1980, 1990, and 2000, respectively.[7] Therefore, I present results examining racial and ethnic compositions, and I do not include a separate variable for nativity since these variables are highly collinear during this period. Appendix B presents results examining nativity composition instead of racial and ethnic composition, which are consistent with results for Hispanics, reflecting their relatively larger presence among the foreign-born population at the time.

Because the gentrification surveys took place in various years, I constructed linearly interpolated census variables for the survey year and the preceding 24 years. For example, I

[6] Gentrification surveys in eight of the 23 cities use 1990 census tract boundaries. While the majority of tract boundaries remained the same from 1990-2000, in tracts that were split into multiple tracts, I assigned the same gentrification category to all tracts, and, in tracts that were merged or where boundaries were revised, I assigned the gentrification category that comprised the majority of the spatial area.

[7] The 1970 Census includes Hispanics in tabulations for race groups and Asians in tabulations with the Native American and "other race" categories. I employ Timberlake and Iceland's (2007) strategy to allocate Hispanics to racial categories based on the proportions of Hispanics identifying by each race in the tract in 1980 and to separate Asians from other groups based on the 1980 proportions of Asians among a combined category of Asians, Native Americans, and other races. I exclude individuals who reported being a member of more than one racial and ethnic group, which only applies to the 2000 Census.

created interpolated census variables from 1970-1994 for cities observed in 1994 and from 1977-2001 for cities observed in 2001. Since 1970 is the earliest year for which census data harmonized to 2000 Census boundaries is available, 24 years is the longest period for which the data span all 23 cities. This strategy allows me to assess the same length of time for each tract.[8] The final dataset consists of 2,096 gentrifiable census tracts, whether each tract was gentrifying when HW observed it, and various census-based characteristics of these tracts over 24 years.

For the analysis, I first compare racial and ethnic compositions over time of gentrifying and non-gentrifying census tracts. Then, I report results from logistic regression analyses predicting the likelihood of gentrification. The dependent variable in all models is whether or not a tract was gentrifying when observed,[9] and I only include gentrifiable tracts in the analyses.[10] I use separate models to test the effects of the presence of Asians and Hispanics on gentrification 24 years prior to the surveys and the effects of Asian and Hispanic population gains on gentrification in the first 8 years of the 24-year period. Beginning 24 years prior to the surveys ensures that I capture racial and ethnic compositions across all of the cities preceding the rise of

[8] Models using 1970 or 1980 as baseline years and changes for 1970-1980 and 1980-1990, respectively, with survey year fixed effects yield similar results. Asians in 1980 only had a positive effect in high-immigration cities, and Hispanics in 1980 had a positive effect in all but high-immigration cities and a weaker change effect during the 1980s. Complete results are presented in Appendix B.

[9] HW distinguished between whether tracts showed early signs of gentrification or intense gentrification activity. Multinomial logistic regression models predicting gentrification levels show similar results for Asians and Hispanics across levels. Black population changes are negatively associated with late-stage but not early-stage gentrification.

[10] I do not use a selection model because the goal of the analysis is to understand the determinants of gentrification among gentrifiable tracts, rather than to infer what neighborhoods would have experienced across the economic spectrum. Thus, there is no need to adjust for the fact that non-gentrifiable tracts are excluded from the sample.

gentrification during the late 1970s, with the latest baseline year being 1977.[11] Examining racial and ethnic changes during the first 8 years allows me to examine early population changes that may have also influenced the trajectory of gentrification but also limits the analysis from population changes that occurred as a consequence of gentrification, with the latest final year being 1985.

Control variables for all models presented are census-based measures at the baseline year. I include variables for the share of blacks and overall population to account for the remaining variation in the population composition.[12] In models examining Asian and Hispanic population changes, I account for simultaneous changes in the neighborhood racial composition by including changes in the logged black population and logged white population.[13] Production-side perspectives on gentrification emphasize the importance of the available housing supply as a major factor predicting gentrification (Smith 1996). Thus, I control for residential stability (share of residents who have lived in their home for more than five years), homeownership rates, and vacancy rates. I also include a variable for the share of residents older than 65 years old as an indicator for increased available housing in the future. In addition, I include poverty rates and logged median household incomes to control for socioeconomic differences between

[11] The main results for models examining tract characteristics 16 years prior to the survey and population changes over the subsequent 8 years are similar with weaker effects for the presence of Asians and Hispanic change. However, I find no negative effect in low-immigration cities with blacks, and the presence of Hispanics at baseline is negative. These differences are not surprising since neighborhoods had already begun to gentrify. Complete results are presented in Appendix B.

[12] Models with percent whites instead of blacks yield similar results.

[13] All group population counts are trimmed at the 5$^{th}$ and 95$^{th}$ percentiles in the results presented.

neighborhoods.[14]

Finally, I include city-level dummy variables to identify categories of cities based on characteristics relevant the literature reviewed above—the context of immigration and black population share.[15] I categorize cities with more than twice the 1970 national average share of Asians (0.8%)—Oakland, San Francisco, and Seattle—or Hispanics (4.4%)—Denver, Phoenix, San Diego, and San Jose—as early Asian and Hispanic destinations, respectively.[16] Of the remaining cities, I categorize cities as high-immigration destinations if they experienced growth in their Asian, Hispanic, and/or foreign-born populations from 1970-1980 and had either shares in 1970 and 1980 or population growth from 1970-1980 of foreign-born residents or the combined Asian and Hispanic population greater than national averages (foreign-born: 4.7% (1970), 6.2% (1980); 46.8% (1970-1980); Asians and Hispanics: 5.2% (1970), 7.9% (1980); 62.7% (1970-1980)). These cities include Atlanta, Boston, Chicago, Dallas, Fort Worth, New Orleans, and Washington, DC. I categorize the remaining cities as low-immigration cities. Among high-immigration and low-immigration cities, I also distinguish whether or not they were predominantly white in 1970—having a ratio of non-Hispanic whites to blacks greater than

[14] Consumption-side perspectives of gentrification emphasize socioeconomic and demographic characteristics of gentrifiers, such as education levels and professionals (Ley 1996), but these variables reflect ongoing gentrification, rather than predictors of gentrification and, therefore, are not included in the regression models.

[15] Given the importance of the distinction between city contexts in the 1970s for this analysis, I do not use other common typologies to categorize immigrant destinations, which focus on the timing of immigrant flows over the last century (e.g., Singer 2004).

[16] In cities where both groups exceed twice the national average, I assign them based on which group is larger in each city. Alternative models that separate early gateways for both groups show that the early presence of Asians and Hispanics have stronger positive effects in these cities, and the effect of Asian population changes is negative in Asian-only early destinations.

three.[17] These cities include Boston, Fort Worth, Indianapolis, Kansas City, Milwaukee, and Minneapolis-St. Paul.[18]

The variables described above are included in the basic models to test the first and main hypothesis—neighborhoods with more Asians and/or Hispanics are more likely to gentrify. I test the second and third hypotheses about predominantly black and white neighborhoods, respectively, by including dummy indicators in separate models for tracts greater than 75% black and 75% white, which comprise 34% and 27% of the sample, respectively, and interaction terms with Asian and Hispanic populations. In separate models, I include interaction terms between Asians and Hispanics with percent black, high immigration and early destination city indicators, and high black population share city indicators to test hypotheses 4, 7, and 8, respectively. To examine ethnic enclaves for hypothesis 6, I include dummy indicators for tracts greater than 40% Hispanic and greater than 40% Asian to identify enclaves.[19] These comprise less than 9% of the sample in the baseline year, and results are similar if I consider tracts that became enclaves by the gentrification survey year (22%) instead.

[17] The findings do not change if I separate early destinations by white-black ratios.

[18] Models with city fixed effects instead of city categories produce similar results, except the interaction effect of Asians with percent black is positive and statistically significant ($p<.05$).

[19] Given that these measures include all Asian and Hispanic ethnic groups, I use a slightly higher threshold relative to other studies identifying enclaves with census data that focus on specific ethnic groups (Alba, Logan, and Crowder 1997; Logan, Zhang, and Alba 2002). The results are similar with thresholds as low as 9% for shares of Asians, Hispanics, or foreign-born residents by the survey year. Over 40% of census tracts that eventually became over 40% Asian, Hispanic, or foreign-born during the analysis period were in non-gentrifiable tracts, indicating that many ethnic enclaves formed in higher-income areas or in areas that declined in later years but prior to immigrant growth. Supplementary analysis of tracts that were low-income in 1970 and 1980 using census-based gentrification measures produce similar results and are presented in Appendix B.

## Results

### *Racial-Ethnic Composition and Gentrification*

Table 1.1 displays averages of selected characteristics for tracts across all 23 cities starting 24 years prior to the gentrification field observations and up to the observation year. The tracts are separated by whether or not they were gentrifiable and by whether or not HW observed gentrification in the gentrifiable tracts. Tracts that were gentrifying were distinct in many ways from their counterparts, even in the 1970s. Twenty-four years prior to the surveys, the average share of whites in subsequently gentrifying tracts was much higher than the average share in tracts that did not gentrify, and the average share of blacks in gentrifying tracts was much lower. Average population sizes by group show that the white population declined in the first period across all tracts, but gentrifying tracts had increases in subsequent periods. Both tracts that did not gentrify and gentrifying tracts had declining black populations, but tracts that did not gentrify had steeper declines in the years that followed the initial 8-year period.

The average share of Hispanics in gentrifying tracts was lower than in non-gentrifying tracts but larger than non-gentrifiable tracts, and, notably, the average share of Asians and foreign-born residents in gentrifying tracts was higher than tracts in *both* other categories. All tracts had substantial Asian, Hispanic, and foreign-born population growth, but gentrifying tracts had much smaller increases in both the share and size of Hispanics and immigrants. Compared to tracts that did not gentrify and non-gentrifiable tracts, the percent of whites, Hispanics, and blacks remained stable in gentrifying tracts. Altogether, these trends suggest that gentrification is associated with higher initial levels of Asians and foreign-born residents, an increase of Asians, the mitigated increase of Hispanics and foreign-born residents, and stalled white and black population declines.

***Table 1.1.*** *Average Neighborhood Characteristics by Gentrification Categories over 24 Years*

| | 24 years prior to gentrification field survey, 1970-1977 | | | 16 years prior to gentrification field survey, 1978-1985 | | | 8 years prior to gentrification field survey, 1986-1993 | | | Year of gentrification field survey, 1994-2001 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | "Gentrifiable" | | Not | "Gentrifiable" | | Not | "Gentrifiable" | | Not | "Gentrifiable" | | Not |
| | Not Gentri-fying | Gentri-fying | "gentri-fiable" | Not Gentri-fying | Gentri-fying | "gentri-fiable" | Not Gentri-fying | Gentri-fying | "gentri-fiable" | Not Gentri-fying | Gentri-fying | "gentri-fiable" |
| Racial, ethnic, and nativity composition | | | | | | | | | | | | |
| % non-Hispanic white | 39.3 | 65.5 | 78.7 | 31.7 | 61.9 | 68.7 | 26.2 | 61.8 | 60.9 | 22.0 | 61.5 | 52.2 |
| % black | 47.2 | 22.3 | 15.0 | 49.9 | 23.1 | 21.4 | 51.0 | 22.3 | 25.6 | 50.6 | 20.5 | 29.2 |
| % Hispanic | 11.1 | 8.5 | 4.5 | 14.2 | 9.0 | 6.3 | 17.0 | 9.2 | 8.6 | 20.7 | 9.9 | 12.1 |
| % Asian | 0.9 | 1.9 | 0.7 | 2.2 | 3.0 | 1.8 | 4.8 | 5.6 | 4.2 | 5.9 | 7.3 | 5.8 |
| % foreign-born | 7.2 | 10.4 | 7.6 | 9.9 | 12.2 | 8.7 | 12.5 | 12.6 | 10.1 | 15.8 | 14.3 | 13.0 |
| Population | 3,621 | 3,201 | 3,888 | 3,262 | 2,892 | 3,898 | 3,145 | 2,947 | 3,985 | 3,129 | 3,134 | 4,162 |
| Non-Hispanic white | 1,301 | 2,113 | 2,976 | 1,003 | 1,839 | 2,599 | 844 | 1,860 | 2,386 | 710 | 1,947 | 2,153 |
| Black | 1,879 | 694 | 683 | 1,649 | 597 | 922 | 1,482 | 566 | 1,042 | 1,334 | 550 | 1,161 |
| Hispanic | 366 | 276 | 159 | 468 | 273 | 236 | 608 | 300 | 342 | 828 | 352 | 542 |
| Asian | 27 | 55 | 31 | 73 | 94 | 77 | 181 | 189 | 188 | 232 | 260 | 279 |
| Foreign-born | 231 | 350 | 309 | 325 | 379 | 349 | 452 | 427 | 427 | 633 | 519 | 602 |
| Socioeconomic characteristics | | | | | | | | | | | | |
| Household income ($) | 43,380 | 47,991 | 66,881 | 41,279 | 50,284 | 65,920 | 42,635 | 63,315 | 69,693 | 48,594 | 75,650 | 73,955 |
| % below poverty | 25.1 | 22.5 | 8.8 | 29.8 | 22.7 | 11.3 | 33.1 | 21.1 | 13.3 | 31.2 | 19.0 | 14.2 |
| % college-educated | 7.0 | 20.1 | 15.9 | 9.7 | 31.2 | 20.3 | 11.9 | 41.0 | 24.0 | 14.4 | 49.4 | 27.0 |
| % in professional or managerial occupations | 14.7 | 27.9 | 26.4 | 17.9 | 36.3 | 28.6 | 21.1 | 44.1 | 31.9 | 23.5 | 51.4 | 34.2 |
| Residential characteristics | | | | | | | | | | | | |
| % same residence 5 years ago | 49.3 | 38.3 | 51.3 | 52.1 | 37.7 | 53.7 | 50.7 | 35.2 | 53.5 | 50.9 | 34.7 | 53.6 |
| % of units owned | 39.4 | 27.4 | 61.9 | 36.5 | 21.1 | 59.6 | 36.1 | 22.8 | 58.0 | 37.1 | 26.3 | 58.0 |
| % of units vacant | 8.8 | 10.7 | 4.8 | 11.0 | 11.9 | 6.1 | 13.0 | 12.4 | 7.1 | 12.4 | 9.6 | 6.3 |
| % over 65 years old | 10.9 | 15.2 | 11.3 | 11.7 | 14.2 | 12.4 | 11.6 | 12.0 | 12.8 | 10.6 | 10.2 | 12.1 |

[a] Gentrification categories are based on Hammel and Wyly's field observations of "gentrifiable" tracts. "Non-gentrifiable" tracts had median household incomes above the respective city's median income value in 1960 (for the Northeast and Midwest) and 1970 (for the South and West). All dollar values are in 2009 constant dollars. Data are linearly interpolated to the relevant year.

Despite the racial, ethnic, and nativity differences to start, household incomes and poverty levels were generally similar among gentrifiable tracts but substantially different from tracts that were not gentrifiable. Over time, the socioeconomic gaps between tracts that were gentrifying and those that were not grew substantially, as incomes increased among gentrifying tracts and poverty rates increased among tracts that were not gentrifying. Moreover, gentrifying tracts had greater shares of highly-educated and professional/managerial residents—characteristics often associated with gentrifiers, which suggests that gentrification was already underway in these tracts. However, they also had lower residential stability, lower ownership rates, higher vacancy rates, and higher shares of elderly residents—characteristics often associated with the stage prior to gentrification. In addition, gentrifying tracts had increases in income and college-educated and professional/managerial residents and decreases in poverty and homeownership during the first 8 years, despite average declines in the white population.

*Multiethnic Neighborhoods and Gentrification*

I further investigate the racial and ethnic differences between tracts that were gentrifying and those that were not by categorizing tracts by their racial and ethnic compositions and comparing their likelihoods of gentrification. Following Logan and Zhang's (2010) analysis of racial and ethnic transitions in multiethnic neighborhoods, I categorize each tract into one of 15 possible types: all white (W), all black (B), all Hispanic (H), all Asian (A), all six combinations with two groups present (WA, WB, WH, BH, BA, HA), all four combinations with three groups present (WBA, WHA, WBH, BHA), and all four groups present (WBHA). I determine the presence or absence of a racial-ethnic group using thresholds based on the relative share of the population at

each time point and within each city.[20] This classification scheme allows me to account for the varying presence of Asians and Hispanics over time and across cities. A 25% criterion means that if the shares of whites and blacks in a city are 50% and 20%, respectively, a share of 12.5% (25% of 50%) is required for whites to be considered present in a tract, and a share of 5% (25% of 20%) is required for blacks to be considered present in a tract. The results presented use the 25% criterion, but the general conclusions are consistent across threshold levels ranging from 10-50%. Appendix B displays the average racial and ethnic composition of all tracts and results for each composition category across this range of thresholds.

Table 1.2 presents the percent of tracts that were not gentrifying, the percent of tracts that were gentrifying, and the probability of gentrification for each racial and ethnic category 24 years prior to the survey year and in the survey year. For example, 4.3% of tracts that were not gentrifying and 16.2% of tracts that were gentrifying were in the WHA category, and tracts in this category had a 43.9% chance of gentrifying. Nearly 90% of tracts that were gentrifying contained whites and either Hispanics or Asians 24 years prior to the surveys, and over 50% of these tracts were "global" neighborhoods, having whites, blacks, and Hispanics and/or Asians.[21] While the trajectory of most low-income tracts is not gentrification, the probabilities of gentrification are highest in tracts with both whites and Asians (WHA, WBHA, WA, and WBA).

[20] Because tract populations vary widely in my sample, I use population shares, rather than actual population thresholds, for my classifications. I use relative, rather than fixed, threshold values to define neighborhood racial categories to account for the changing Hispanic and Asian populations over time and relative differences between cities. For similar reasons, I define racial categories based on the relative share within each city, in contrast to Logan and Zhang (2010), who constructed categories based on relative shares across their entire sample of high-immigration metropolitan areas to examine the relative presence and growth of Asians and Hispanics within tracts.

[21] While Logan and Zhang (2010) describe "global" neighborhoods as containing all four groups, I also include tracts with either Hispanics or Asians.

Moreover, 52% of gentrifying tracts did not contain Asians at baseline, but 83% of these gained Asians over the 24-year period. Only 11% of gentrifying tracts did not contain Hispanics at baseline, and 45% of these tracts gained Hispanics over the 24 years. By the survey, over 65% of the gentrifying tracts were global neighborhoods, and another 28% contained whites and Hispanics and/or Asians.

In contrast, low-income tracts that did not gentrify were predominantly WBH, BH, WH, and B at baseline, and global neighborhoods comprised a far smaller share of the tracts. Compared to gentrifying tracts, non-gentrifying tracts were both less likely to contain Asians at baseline (79% did not) and less likely to gain them (48%). These tracts were also less likely to contain Hispanics (22% did not) and less likely to gain them (28%).

***Table 1.2.*** *Low-income Tracts and Gentrification Outcomes by Race and Ethnic Classification Categories over 24 Years*

| | 24 years prior to gentrification field survey, 1970-1977 | | | Year of gentrification field survey, 1994-2001 | | |
|---|---|---|---|---|---|---|
| Racial and Ethnic Classification Category | Not Gentrifying % | Gentrifying % | Probability of Gentrifying | Not Gentrifying % | Gentrifying % | Probability of Gentrifying |
| Whites (W) | 1.2 | 1.4 | 19.2 | 0.1 | 0.6 | 66.7 |
| Blacks (B) | 14.9 | 1.4 | 1.9 | 20.2 | 0.6 | 0.6 |
| Hispanics (H) | 0.2 | 0.0 | 0.0 | 1.6 | 0.0 | 0.0 |
| Asians (A) | 0.1 | 0.3 | 33.3 | 0.2 | 0.3 | 25.0 |
| Hispanics/Asians (HA) | 0.1 | 0.0 | 0.0 | 0.4 | 0.0 | 0.0 |
| Whites/Asians (WA) | 0.8 | 2.2 | 36.4 | 1.5 | 6.4 | 46.9 |
| Whites/Hispanics (WH) | 16.6 | 20.3 | 20.2 | 2.6 | 3.1 | 19.3 |
| Whites/Hispanics/Asians (WHA) | 4.3 | 16.2 | 43.9 | 8.8 | 18.4 | 30.1 |
| Blacks/Asians (BA) | 2.5 | 0.8 | 6.5 | 4.0 | 0.3 | 1.4 |
| Blacks/Hispanics (BH) | 17.1 | 3.6 | 4.2 | 12.7 | 0.6 | 0.9 |
| Blacks/Hispanics/Asians (BHA) | 2.9 | 0.6 | 3.8 | 10.0 | 0.0 | 0.0 |
| Whites/Blacks (WB) | 1.5 | 1.7 | 18.8 | 2.0 | 1.9 | 17.1 |
| Whites/Blacks/Asians (WBA) | 1.2 | 2.8 | 33.3 | 2.6 | 8.9 | 41.6 |
| Whites/Blacks/Hispanics (WBH) | 27.7 | 23.1 | 14.7 | 7.4 | 4.2 | 10.5 |
| Whites/Blacks/Hispanics/Asians (WBHA) | 8.9 | 25.6 | 37.2 | 26.0 | 54.9 | 30.4 |
| N | 1737 | 359 | | 1737 | 359 | |

These descriptive results show that the majority of neighborhoods that were gentrifying

began the period as global neighborhoods, and most were global by the end of the period. These patterns support prior findings that early gentrification took place in racially diverse neighborhoods (e.g., Freeman 2009) but also highlight the importance of Asians and Hispanics in this racial and ethnic mix. Further, neighborhoods containing blacks were more likely to gentrify if they contained both whites and Asians.

*Regression Results*

I further investigate these relationships in regression analyses to account for structural conditions of neighborhoods and differences across cities. Table 1.3 displays results predicting the likelihood of gentrification for the presence of Asians and Hispanics 24 years prior to the surveys, using the logged population for each group, and Table 1.4 presents results for the early influx of Asians and Hispanics over the next 8 years, using the difference in the logged populations for each group. I use the log-transformations of these measures because the Asian and Hispanic population and percentage distributions are highly skewed. Appendix B presents similar results using dummy variables indicating the presence of Asians and Hispanics based on the threshold categories presented above and dummy variables indicating any population increase of the groups over the next 8 years.

Model 1 in Table 1.3 examines the likelihood of gentrification on the early presence of Asians and Hispanics, controlling for residential and socioeconomic tract characteristics and city-level differences. The results show that Asians are positively associated with gentrification, and there is no association for Hispanics. The estimates indicate that a one-unit increase in the logged Asian population (*mean*=.91; *s.d.*=1.56*)* increases the odds of gentrification by 48% ($e^{0.39}$=1.48), supporting Hypothesis 1 for Asians but not Hispanics. Wald tests indicate that the

Asian and Hispanic coefficients are different ($p<.05$), consistent with Hypothesis 5. The share of blacks is also negatively associated with the likelihood of gentrification, unsurprisingly, and early Asian gateways and cities with high levels of immigration have higher gentrification levels than early Hispanic gateways and low-immigration cities.

Models 2 and 3 assess if the added diversity that Asians and Hispanics bring to homogeneously black or white neighborhoods increases the likelihood of gentrification. Although predominantly black tracts are negatively associated with gentrification and predominantly white tracts are positively associated, the results reveal that Hispanics have a weak negative effect in neighborhoods that are not predominantly black and in predominantly white neighborhoods.[22] Thus, the results do not support Hypotheses 2 and 3. Model 4 includes interaction terms with percent black and shows that Hispanics have a positive effect on the likelihood of gentrification in neighborhoods with greater shares of blacks. Further inspection suggests that this positive effect occurs in neighborhoods with substantial but not a vast majority of blacks. These results support Hypothesis 4 for Hispanics and suggest that preferences for racial diversity are limited. In all models, the effect of Asians on gentrification remains positive.

Models 5 and 6 assess how immigration flows may influence the observed relationships. The results in Model 5 indicate that both Asian and Hispanic enclaves are far less likely to gentrify than neighborhoods that are not enclaves, supporting Hypothesis 6. Model 6 includes interaction terms with city-level immigration patterns. The results indicate that the early presence of Hispanics is positively associated ($p<.10$) with gentrification in cities that do not have high post-1965 immigration levels and is negatively associated with gentrification in high-

[22] The positive interaction effects of the baseline Hispanic population and change in the Hispanic population are not statistically significant in tracts over 80% black and 79% white, respectively.

immigration cities, supporting Hypothesis 7 for Hispanics.[23] Finally, Model 7 includes interaction terms with cities based on their black population shares. Counter to Hypothesis 8, the findings indicate that Hispanics have a particularly negative effect in cities with a substantial share of blacks and high immigration levels and no effect in other cities.

The results presented in Table 1.4 test each hypothesis for early Asian and Hispanic population changes.[24] Results from Model 1 show no association for Asians and a strong negative association for Hispanics, inconsistent with Hypothesis 1. The coefficient for the Hispanic population change indicates that an increase in the logged Hispanic population (*mean*=.05; *s.d.*=.73) by one standard deviation decreases the odds of gentrification by a factor of 0.68 ($e^{-.53*.73}$=.68). Wald tests indicate that the effects for the Asian and Hispanic population changes are different ($p$<.05), which is consistent with Hypothesis 5. The effect of the early presence of Asians is weaker but remains statistically significant, while the negative coefficient for the share of blacks is larger. Black population change is negatively associated with the likelihood of gentrification, and white population change is positively associated. Cities with high immigration levels after 1965 also have higher rates of gentrification on average compared to early destinations and low-immigration cities.[25]

The interaction between Hispanic changes and predominantly black neighborhoods is positive in Model 2, indicating that the negative effect of Hispanic growth is not present in predominantly black neighborhoods, which have low likelihoods of gentrification. Although

[23] Results are similar for Puerto Rican gateways.

[24] Models examining percent changes and non-transformed population counts produce similar main results, but the negative Asian effect is statistically significant ($p$<.05) for non-transformed population changes.

[25] Tract-level income gains and poverty losses are also positively associated with gentrification, but the main results hold in models including these variables.

there is an interaction effect, Hispanic growth does not make neighborhoods *more* likely to gentrify and, therefore, does not support Hypothesis 2. There are no interaction effects for Asian or Hispanic population changes in predominantly white neighborhoods in Model 3. Similar to Model 2, the results in Model 4 show that the negative Hispanic change effect decreases as the share of blacks increases. However, in contrast to the positive effect that the early presence of Hispanics has in neighborhoods with more blacks, the negative Hispanic change effect is just weaker in neighborhoods with more blacks and does not support Hypothesis 4. Figure 1.1 illustrates these differential interaction effects between the early presence of Hispanics and Hispanic population change on the predicted probabilities of gentrification for tracts that are 10%, 50%, and 90% black, holding all other control variables at their means.

In Model 5, both Asian and Hispanic enclaves, based on the share of each group in a tract after the first 8 years of the 24-year period preceding the gentrification surveys, are much less likely to gentrify than tracts that are not ethnic enclaves, supporting Hypothesis 6. However, the growth in Hispanics is negatively associated with gentrification even in neighborhoods that do not become ethnic enclaves. The results in Model 6 show that the negative effect of Hispanic change is especially negative in early Hispanic destinations, and, consistent with Hypothesis 7, the Asian population change is negatively associated with gentrification in cities with high levels of post-1965 immigration. Lastly, I find no differential effects for Asian and Hispanic population changes based on cities' share of blacks. Table 1.5 presents a summary of findings pertaining to each hypothesis.

***Table 1.3.*** *Logistic Regression Results Predicting Gentrification on the Early Presence of Asians and Hispanics*

Table 1.3 (Continued)

| | (0) | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
|---|---|---|---|---|---|---|---|---|
| | No Controls | Asian and Hispanic Presence | x Predomi-nantly Black | x Predomi-nantly White | x Percent Black | Ethnic Enclaves | x City Immigration Levels | x City Black Presence |
| Asian population (logged) | 0.39 ** | 0.21 ** | 0.18 ** | 0.28 ** | 0.23 ** | 0.23 ** | 0.14 * | 0.25 ** |
| | (0.04) | (0.05) | (0.05) | (0.06) | (0.05) | (0.05) | (0.07) | (0.06) |
| Hispanic population (logged) | -0.02 | -0.04 | -0.11 † | 0.12 | 0.01 | -0.01 | 0.17 † | 0.12 |
| | (0.05) | (0.06) | (0.07) | (0.09) | (0.07) | (0.07) | (0.10) | (0.09) |
| % black | -1.62 ** | -1.49 ** | -0.58 | -0.80 † | -1.37 ** | -1.79 ** | -1.52 ** | -1.60 ** |
| | (0.22) | (0.32) | (0.41) | (0.42) | (0.33) | (0.33) | (0.32) | (0.33) |
| % black * Asians | | | | | 0.20 | | | |
| | | | | | (0.13) | | | |
| % black * Hispanics | | | | | 0.42 ** | | | |
| | | | | | (0.16) | | | |
| Total population (in thousands) | -0.14 ** | -0.08 | -0.05 | -0.09 † | -0.06 | -0.10 * | -0.08 † | -0.09 † |
| | (0.04) | (0.05) | (0.05) | (0.05) | (0.05) | (0.05) | (0.05) | (0.05) |
| Predominantly black (>75%) | | | -0.95 * | | | | | |
| | | | (0.38) | | | | | |
| Predominantly black * Asians | | | 0.09 | | | | | |
| | | | (0.14) | | | | | |
| Predominantly black * Hispanics | | | 0.24 | | | | | |
| | | | (0.17) | | | | | |
| Predominantly white (>75%) | | | | 0.57 * | | | | |
| | | | | (0.23) | | | | |
| Predominantly white * Asians | | | | -0.12 | | | | |
| | | | | (0.08) | | | | |
| Predominantly white * Hispanics | | | | -0.21 † | | | | |
| | | | | (0.11) | | | | |
| Asian enclave (>40%) | | | | | | -3.11 ** | | |
| | | | | | | (1.11) | | |
| Hispanic enclave (>40%) | | | | | | -1.04 ** | | |
| | | | | | | (0.36) | | |
| *City types* | | | | | | | | |
| Early Asian destination | | 0.70 * | 0.73 * | 0.77 * | 0.77 * | 0.86 ** | 0.03 | 0.24 |
| | | (0.30) | (0.30) | (0.30) | (0.30) | (0.30) | (0.37) | (0.29) |
| Early Hispanic destination | | -0.05 | 0.10 | 0.03 | 0.10 | 0.06 | -0.55 | -0.56 † |
| | | (0.29) | (0.30) | (0.30) | (0.30) | (0.30) | (0.42) | (0.30) |
| High immigration city | | | | | | | 0.53 ** | |
| | | | | | | | (0.19) | |
| High immig./black presence city | | 0.95 ** | 1.04 ** | 1.05 ** | 1.07 ** | 1.03 ** | | 0.70 ** |
| | | (0.24) | (0.24) | (0.25) | (0.25) | (0.24) | | (0.21) |
| High immig./no black presence city | | 0.80 * | 0.81 * | 0.85 * | 0.84 * | 0.78 * | | |
| | | (0.33) | (0.33) | (0.33) | (0.33) | (0.34) | | |
| Low immigration/black presence city | | 0.39 | 0.29 | 0.46 † | 0.39 | 0.38 | | 0.35 |
| | | (0.27) | (0.27) | (0.27) | (0.27) | (0.27) | | (0.27) |
| *Interactions with city types* | | | | | | | | |
| Early Asian destination * Asians | | | | | | | 0.12 | |
| | | | | | | | (0.12) | |
| Early Hispanic destination * Hisp. | | | | | | | -0.17 | |
| | | | | | | | (0.22) | |
| High immigration city * Asians | | | | | | | 0.14 | |
| | | | | | | | (0.09) | |
| High immigration city * Hisp. | | | | | | | -0.32 ** | |
| | | | | | | | (0.11) | |
| High immig./black city * Asians | | | | | | | | -0.02 |
| | | | | | | | | (0.09) |
| High immig./black city * Hisp. | | | | | | | | -0.26 * |
| | | | | | | | | (0.11) |
| Low immig./black city * Asians | | | | | | | | -0.10 |
| | | | | | | | | (0.11) |
| Low immig./black city * Hisp. | | | | | | | | 0.05 |
| | | | | | | | | (0.15) |
| AIC | 1664 | 1463 | 1455 | 1461 | 1457 | 1443 | 1457 | 1466 |

[a] N = 2,087. **p<0.01, *p<0.05, †p<0.10 (t wo-tailed test). Standard errors are in parentheses. All variables are 24 years prior to gentrification field surveys. Models 1-7 also include controls for median household income (logged), % below poverty, % same residents 10 years ago, homeownership rate, vacancy rate, and % over 65 years old. Low-immigration/no black presence city is the reference category for Models 1-5. Low-immigration is the reference category for Model 6, and no black presence is the reference category for Model 7. Interaction term variables are mean-centered.

***Table 1.4.*** *Logistic Regression Results Predicting Gentrification on Early Population Changes (First 8 Years) of Asians and Hispanics*

Table 1.4 (Continued)

| | (0) No Controls | (1) Asian and Hispanic Change | (2) x Predominantly Black | (3) x Predominantly White | (4) x Percent Black | (5) Ethnic Enclaves | (6) x City Immigration Levels | (7) x City Black Presence |
|---|---|---|---|---|---|---|---|---|
| Asian population (logged) | 0.29 ** | 0.15 ** | 0.12 * | 0.16 ** | 0.14 ** | 0.15 ** | 0.16 ** | 0.17 ** |
| | (0.04) | (0.05) | (0.05) | (0.05) | (0.05) | (0.06) | (0.05) | (0.05) |
| Hispanic population (logged) | 0.00 | -0.04 | -0.09 | -0.01 | -0.05 | 0.05 | -0.03 | -0.01 |
| | (0.05) | (0.07) | (0.07) | (0.08) | (0.07) | (0.08) | (0.07) | (0.07) |
| % black | -2.23 ** | -2.25 ** | -1.11 * | -2.01 ** | -2.02 ** | -2.75 ** | -2.08 ** | -2.19 ** |
| | (0.26) | (0.36) | (0.46) | (0.43) | (0.38) | (0.37) | (0.35) | (0.36) |
| % black * Δ Asians | | | | | 0.17 | | | |
| | | | | | (0.18) | | | |
| % black * Δ Hispanics | | | | | 0.65 * | | | |
| | | | | | (0.28) | | | |
| Total population (in thousands) | -0.08 * | -0.02 | 0.01 | -0.03 | -0.01 | -0.05 | -0.04 | -0.03 |
| | (0.04) | (0.05) | (0.05) | (0.05) | (0.05) | (0.05) | (0.05) | (0.05) |
| Δ logged Asian population | -0.16 ** | -0.05 | -0.06 | -0.03 | -0.02 | -0.07 | 0.05 | -0.03 |
| | (0.05) | (0.06) | (0.06) | (0.07) | (0.04) | (0.06) | (0.08) | (0.07) |
| Δ logged Hispanic population | -0.57 ** | -0.53 ** | -0.70 ** | -0.52 ** | -0.52 ** | -0.45 ** | -0.41 * | -0.48 ** |
| | (0.10) | (0.11) | (0.14) | (0.14) | (0.12) | (0.12) | (0.17) | (0.18) |
| Δ logged black population | -0.42 ** | -0.46 ** | -0.39 ** | -0.48 ** | -0.44 ** | -0.57 ** | -0.39 ** | -0.48 ** |
| | (0.11) | (0.12) | (0.12) | (0.12) | (0.12) | (0.13) | (0.12) | (0.12) |
| Δ logged white population | 1.54 ** | 1.65 ** | 1.75 ** | 1.62 ** | 1.63 ** | 1.54 ** | 1.70 ** | 1.66 ** |
| | (0.18) | (0.19) | (0.20) | (0.19) | (0.19) | (0.19) | (0.19) | (0.19) |
| Predominantly black (>75%) | | | -1.57 ** | | | | | |
| | | | (0.48) | | | | | |
| Predominantly black * Δ Asians | | | -0.22 | | | | | |
| | | | (0.26) | | | | | |
| Predominantly black * Δ Hispanics | | | 0.53 * | | | | | |
| | | | (0.25) | | | | | |
| Predominantly white (>75%) | | | | 0.21 | | | | |
| | | | | (0.23) | | | | |
| Predominantly white * Δ Asians | | | | -0.04 | | | | |
| | | | | (0.10) | | | | |
| Predominantly white * Δ Hispanics | | | | -0.02 | | | | |
| | | | | (0.23) | | | | |
| Asian enclave (>40%) (after 8 years) | | | | | | -2.80 ** | | |
| | | | | | | (0.82) | | |
| Hispanic enclave (>40%) (after 8 years) | | | | | | -1.54 ** | | |
| | | | | | | (0.36) | | |
| *City types* | | | | | | | | |
| Early Asian destination | | 0.45 | 0.48 | 0.49 | 0.45 | 0.65 † | 0.21 | 0.17 |
| | | (0.33) | (0.33) | (0.34) | (0.33) | (0.34) | (0.30) | (0.30) |
| Early Hispanic destination | | -0.24 | -0.13 | -0.21 | -0.12 | -0.15 | -0.25 | -0.52 |
| | | (0.34) | (0.34) | (0.35) | (0.35) | (0.34) | (0.37) | (0.32) |
| High immigration city | | | | | | | 0.64 ** | |
| | | | | | | | (0.21) | |
| High immig./black presence city | | 1.00 ** | 1.07 ** | 1.04 ** | 1.03 ** | 1.12 ** | | 0.69 ** |
| | | (0.25) | (0.25) | (0.26) | (0.25) | (0.25) | | (0.24) |
| High immig./no black presence city | | 0.59 † | 0.60 † | 0.60 † | 0.61 † | 0.51 | | |
| | | (0.35) | (0.35) | (0.36) | (0.36) | (0.36) | | |
| Low immigration/black presence city | | 0.21 | 0.09 | 0.25 | 0.23 | 0.20 | | 0.09 |
| | | (0.28) | (0.28) | (0.29) | (0.28) | (0.28) | | (0.26) |
| *Interactions with city types* | | | | | | | | |
| Early Asian destination * Δ Asians | | | | | | | -0.05 | |
| | | | | | | | (0.14) | |
| Early Hisp. destination * Δ Hisp. | | | | | | | -2.71 ** | |
| | | | | | | | (0.68) | |
| High immigration city * Δ Asians | | | | | | | -0.23 † | |
| | | | | | | | (0.13) | |
| High immigration city * Δ Hisp. | | | | | | | -0.09 | |
| | | | | | | | (0.22) | |

Table 1.4 (Continued)

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| High immig./black city * Δ Asians | | | | | | | | -0.13 |
| | | | | | | | | (0.14) |
| High immig./black city * Δ Hisp. | | | | | | | | -0.08 |
| | | | | | | | | (0.24) |
| Low immig./black city * Δ Asians | | | | | | | | 0.21 |
| | | | | | | | | (0.16) |
| Low immig./black city * Δ Hisp. | | | | | | | | -0.01 |
| | | | | | | | | (0.30) |
| AIC | 1554 | 1360 | 1346 | 1365 | 1357 | 1324 | 1344 | 1365 |

[a] N = 2,087. **p<0.01, *p<0.05, †p<0.10 (t wo-tailed test). Standard errors are in parentheses. All variables are 24 years prior to gentrification field surveys and changes are over the first 8 years. Models 1-7 also include controls for median household income (logged), % below poverty, % same residents 10 years ago, homeownership rate, vacancy rate, and % over 65 years old. Low-immigration/no black presence city is the reference category for Models 1-5. Low-immigration is the reference category for Model 6, and no black presence is the reference category for Model 7. Interaction term variables are mean-centered.

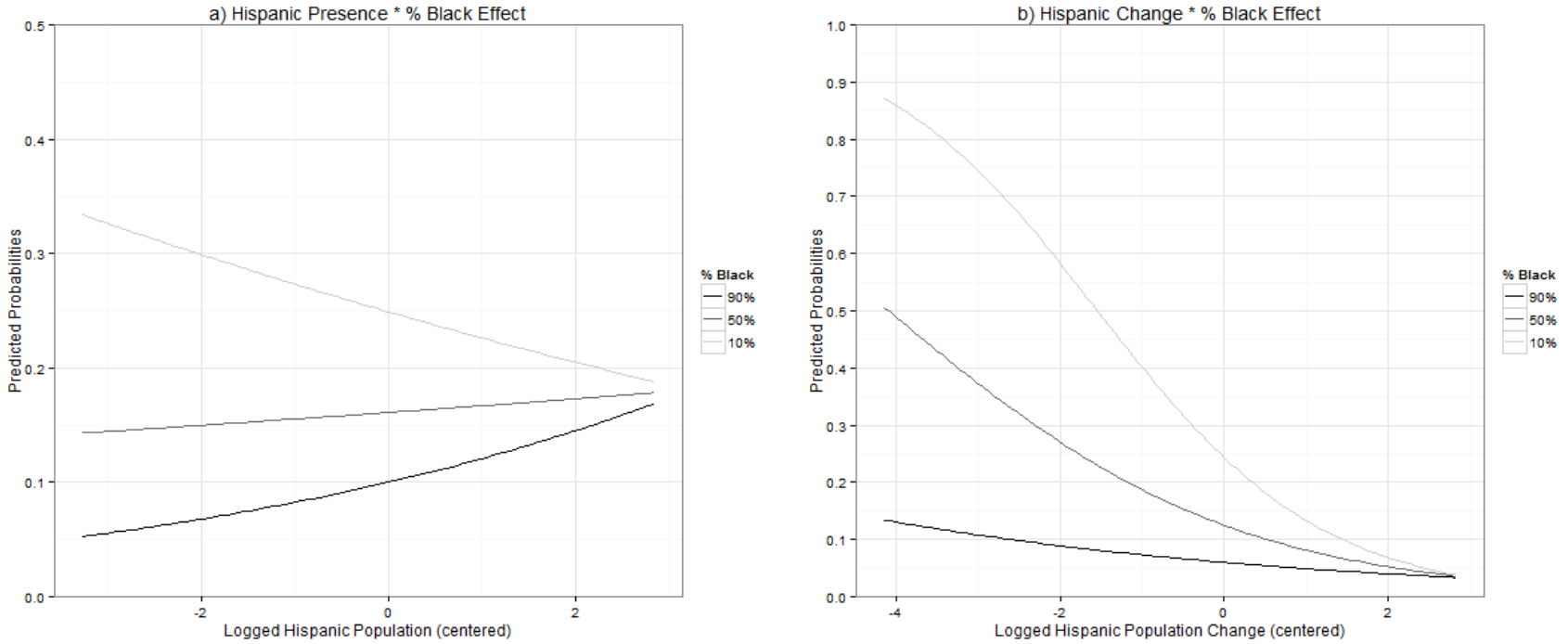


***Figure 1.1.*** *Predicted Probabilities of Gentrification for (a) Early Hispanic Presence and (b) Early Hispanic Growth at Various Black Population Levels*

***Table 1.5.*** *Hypotheses and Summary of Results*

| | Asians | | Hispanics | |
|---|---|---|---|---|
| | Early Presence | Early Growth | Early Presence | Early Growth |
| *Hypothesis 1:* Neighborhoods with more Asians and/or Hispanics are more likely to gentrify…….. | yes | – | yes, except in high-immig. cities | no, less likely |
| *Hypothesis 2:* Gentrification in predominantly black neighborhoods is more likely when more Asians and/or Hispanics are present…….. | – | – | – | – |
| *Hypothesis 3:* Gentrification in predominantly white neighborhoods is more likely when more Asians and/or Hispanics are present…….. | – | – | no, less likely | – |
| *Hypothesis 4:* Gentrification in neighborhoods with greater shares of blacks is more likely when more Asians and/or Hispanics are present…….. | – | – | yes | – |
| *Hypothesis 5:* The positive effect on the likelihood of gentrification is greater for Asians than for Hispanics……. | yes | yes | n/a | n/a |
| *Hypothesis 6:* Gentrification is less likely in neighborhoods that serve as Asian and/or Hispanic enclaves…… | yes | yes | yes | yes |
| *Hypothesis 7:* Gentrification is less likely in neighborhoods with more Asians and/or Hispanics in cities with high levels of Asian and/or Hispanic post-1965 growth…….. | – | yes | yes | only in early gateways |
| *Hypothesis 8:* Gentrification is more likely in neighborhoods with more Asians and/or Hispanics in cities with large shares of blacks……. | – | – | no, less likely if also high-immig. city | – |

*Limitations*

While this study sheds light on the link between post-1965 immigration and gentrification, the conclusions that I can draw about the precise and causal role of immigrants are limited. Publicly available Census data do not distinguish race and ethnicity by nativity before 2000, and, therefore, I cannot distinguish between whether the effects are due to race and ethnicity or the nativity of the Asians and Hispanics examined in the study. These limitations also preclude the consideration of non-Hispanic black immigrants; however, their arrival to the US occurred primarily in later decades, beyond the period of the analysis and in far fewer numbers. Only 2.6% and 5.8% of foreign-born residents were black in 1970 and 1980, respectively, and they primarily concentrated in New York City (Waters 1999), which is not included in this study. In

addition, the data do not distinguish the socioeconomic status of residents by nativity or race and ethnicity, which limits my ability to make distinctions within the broad foreign-born, Asian, and Hispanic categories. Moreover, although the gentrification field surveys are the most comprehensive and reliable measures of gentrification to date for multiple cities, having only one observation in time in a limited set of cities, which excludes the largest US cities most heavily impacted by immigration—New York City and Los Angeles, limits broader conclusions and causal inference. Gentrification is also an evolving and temporally uneven process, and the data limit identification of when gentrification began in these neighborhoods. Thus, immigrants may have been attracted to neighborhoods where gentrification had already begun, reflecting an assimilation process instead.

**Discussion and Conclusion**

The rise of Asians and Hispanics to low-income urban neighborhoods following 1965 is an important dimension left out of existing scholarship on gentrification. By examining this factor, this study offers several key contributions to our understanding of urban transformations in the late twentieth century. First, counter to most characterizations of gentrification, low-income tracts that were gentrifying by the 1990s were overwhelmingly "global" as early as the 1970s, and most remained global through the 1990s. Second, the early presence of Asians is positively associated with gentrification, and the early presence of Hispanics is positively associated with gentrification in neighborhoods with higher shares of blacks and in cities that did not experience high levels of immigration after 1965. Third, the *non*-growth of Hispanics in neighborhoods was associated with subsequent gentrification across all neighborhoods and cities, and the *non*-growth of Asians in neighborhoods was associated with subsequent gentrification in cities with

high levels of immigration. Indeed, ethnic enclaves were far less likely to gentrify, and neighborhoods with growing numbers of these groups that did not become enclaves were also less likely to gentrify. While the influx and concentration of these groups may have *revitalized* the neighborhoods in which they settled in these subsequent years, these neighborhoods did not experience the distinct changes associated with gentrification—the physical investment, renewal, and influx of middle- and upper middle-class residents—by the 1990s. Further, although gentrification occurred more frequently in high-immigration cities on average, the effects of their growth in these cities were negative.

I am unable to definitively assess the mechanisms by which the presence of these groups spurred gentrification in low-income neighborhoods, but the findings that the early presence of Asians and, in some conditions, Hispanics, is positively associated with gentrification suggest that these groups served as early pioneers to low-income neighborhoods in the wake of urban decline across US cities. These groups improved the economic and social conditions of low-cost neighborhoods by stimulating the local economy and housing market and filling vacancies and simultaneously altered the racial and ethnic compositions of areas in ways that align with gentrifiers' race-based residential preferences. Controlling for socioeconomic characteristics of neighborhoods weakened the effect of Asians on gentrification, but the effects remained high and statistically significant across all contexts, suggesting that both mechanisms may be at work for Asians. Moreover, the positive effect of Hispanics in particular contexts—black neighborhoods and low-immigration cities—after controlling for socioeconomic indicators lend further support to these explanations. The results for Asian and Hispanic growth, and the larger negative effect of Hispanics in early Hispanic destinations, are consistent with existing scholarship on immigration. As these groups continued to grow and concentrate in enclaves, new arrivals were

increasingly likely to settle into these areas, rather than act as pioneers in other low-income neighborhoods. Consequently, these neighborhoods were less likely to gentrify during early waves of gentrification.

The findings from this study point to the importance of considering the roles of both immigration on broader housing market dynamics and metropolitan-level conditions on structuring processes of neighborhood change. Although this study examined early waves of gentrification, the rapid and widespread gentrification and immigrant settlement patterns of today are often dependent on preexisting neighborhood formations (Hackworth and Smith 2001; Waldinger 1989). The increased demands for affordable housing, the growth of multiethnic neighborhoods, and changing race-based residential preferences impact residential selection processes and have important implications for the future of residential segregation and immigrant incorporation. While the data in this analysis do not distinguish population nativity by race and ethnicity, since 2000, the Census has made these data publicly available, and this should be examined in studies of more recent neighborhood changes. Moreover, an updated understanding of residential selection processes, and discriminatory behaviors more generally, that considers the intersection of nativity with race and ethnicity would enhance this area of research.

This study also advances explanations of the durability of poor, minority neighborhoods despite major urban transformations. Gentrification has generated highly contentious debates surrounding racial and socioeconomic inequality that have generally centered on the direct displacement of low-income minorities living in neighborhoods that gentrify, but the findings show that few predominantly black and growing Hispanic neighborhoods actually experienced gentrification in this early period. This highlights the extent to which black and Hispanic neighborhoods generally remained isolated and disadvantaged amid the expansion of

gentrification that took place during the late twentieth century, leaving these neighborhoods particularly vulnerable to gentrification in recent decades, especially in cities with high housing demand. In addition to increasing the affordable housing supply to meet demand, policymakers must also consider the various vulnerable neighborhoods and populations beyond gentrifying neighborhoods. As some low-income neighborhoods with particular characteristics garner investment, others tend to remain left behind, perpetuating and increasing, neighborhood inequality. Nevertheless, the results reveal the potential of global neighborhoods to transform low-income neighborhoods in decline.

# 2

# Divergent Pathways of Gentrification:

# The Racial Order of Renewal in Chicago Neighborhoods, Before and Beyond the Recession[1]


## Abstract

Gentrification has inspired considerable debate, but direct examination of its uneven evolution across time and space is rare. We address this gap by developing a conceptual framework on the social pathways of gentrification and introducing a method of systematic social observation using Google Street View to detect visible cues of neighborhood change. We argue that a durable racial hierarchy governs residential selection and, in turn, gentrifying neighborhoods. Integrating census data, police records, prior street-level observations, community surveys, proximity to amenities, and city budget data on capital investments, we find that the pace of gentrification in Chicago from 2007 to 2009 was negatively associated with the concentration of blacks and Latinos in neighborhoods that either showed signs of gentrification or were adjacent and still disinvested in 1995. Racial composition has a threshold effect, however, attenuating gentrification when the share of blacks in a neighborhood is greater than 40 percent. Consistent with theories of neighborhood stigma, we also find that collective perceptions of disorder, which are higher in poor minority neighborhoods, deter gentrification, while observed disorder does not. Moreover, among these neighborhoods, those with greater shares of blacks were


[1] This article borrows from and builds on the following publication: Jackelyn Hwang and Robert J. Sampson. 2014. "Divergent Pathways of Gentrification: Racial Inequality and the Social Order of Renewal in Chicago Neighborhoods." *American Sociological Review*, 79(4):726-51.

disproportionately affected by the housing crisis and were less likely to experience development during the housing market recovery. The results help explain the persistence of neighborhood racial inequality amid urban transformation.

**Keywords:** gentrification, neighborhoods, racial inequality, disorder, urban change

Many scholars of the city depict the past two decades as a period of profound social transformation characterized by widespread gentrification (Ellen and O'Regan 2008; Hackworth 2007; Hyra 2008, 2012; Wyly and Hammel 1999). These changes have launched highly contentious debates over the costs and benefits of gentrification, especially for poor minority residents (e.g., Atkinson 2004; Freeman 2005; Pattillo 2007; Smith 1996; Vigdor 2002).

Contemporary pathways of neighborhood gentrification—a process of neighborhood *change*—are not well understood, however, especially their coexistence with the *persistence* of neighborhood inequality by race and class. Most quantitative studies of gentrification tend to rely on census and administrative measures that lack direct indicators of neighborhood upgrading. In particular, census-based strategies neglect the distinctly visible changes to the urban landscape produced by changes in the built environment that are inherent to gentrification (Krase 2012; Kreager, Lyons, and Hays 2011; Papachristos et al. 2011; Smith and Williams 1986). Traditional data sources also do not usually capture political and economic forces, such as large-scale private developers, city capital investments, and public housing policies, which increasingly play critical roles in facilitating or stalling gentrification.

Moreover, although most scholars agree that gentrification is a temporally uneven process across neighborhoods, quantitative research has rarely examined variation in the evolution of gentrification's properties and expansion over time or how this relates to the persistent forms of racial segregation and neighborhood inequality that characterize U.S. cities (Massey and Denton 1993; Sampson 2012; Sharkey 2013). Studies show that poor neighborhoods adjacent to gentrified or high-income neighborhoods are likely to upgrade (Guerrieri, Hartley, and Hurst 2013; Hackworth 2007). Considerable evidence also demonstrates the powerful role of race and ethnicity in neighborhood selection, shaping residential patterns of

segregation and neighborhood decline (Charles 2003). Yet, until recently, scholarship on gentrification has not systematically incorporated racial stratification in shaping the trajectory of gentrifying neighborhoods and their surrounding areas (Anderson and Sternberg 2013).

We address these gaps by joining research on gentrification with sociological literature on neighborhood racial preferences and residential selection to build a testable conceptual framework for understanding how gentrification plays out over time. To assess our framework, we propose a novel method for measuring gentrification that exploits the technology of Google Street View to provide estimates of recent gentrification trajectories. We then integrate data from an influential field survey of gentrification conducted in 1995 with additional data sources to assess how racial and ethnic composition shapes the future trajectories of neighborhoods that were either gentrifying in 1995 or were adjacent to these neighborhoods and disinvested. We find that gentrification is racially ordered in a distinct way, with both percent Hispanic and percent black attenuating neighborhood trajectories of reinvestment and renewal. Percent black operates nonlinearly, however, having the strongest effect on gentrification only beyond a threshold of about 40 percent. Perceptions of disorder, but not observed disorder, also deter the process of gentrification. Additional analyses indicate that neighborhoods with greater shares of blacks had higher foreclosure rates and were less likely to experience continued development during the years following the Recession. These findings enhance our understanding of pathways of contemporary gentrification and help explain the mechanisms by which neighborhood inequality persists in an era of urban transformation in Chicago.

**Gentrification and Racial Stratification**

For our purposes, we adopt Smith's (1998:198) influential definition of gentrification: "the

process by which central urban neighborhoods that have undergone disinvestments and economic decline experience a *reversal, reinvestment,* and the *in-migration* [emphasis added] of a relatively well-off middle- and upper middle-class population." This definition does not require that displacement or racial turnover occur, which are still widely debated empirical questions (see Atkinson 2004; Freeman 2005; Pattillo 2007). By defining gentrification in this way, we focus on the social process of neighborhood renewal as it unfolds over time.

Prominent theoretical perspectives explain gentrification in terms of consumption and production attracting the middle and upper-middle classes (Ley 1986; Smith 1982). Economic forces (e.g., a tight housing market) and state or corporate actors (e.g., universities or large-scale developers) can play important roles in advancing gentrification, but these actors require demand by a neighborhood's potential residents and businesses to secure stability in their investments (Hamnett 1991). As a reversal of the invasion-succession process described by the early Chicago School, or the last stage of the neighborhood life cycle, gentrification involves affluent movers who have virtually unlimited choices in the housing market (Laska, Seaman, and McSeveney 1982).

Taken together, these perspectives argue that social processes of neighborhood selection interact with political and economic forces to simultaneously shape both the supply and demand for potential neighborhood reinvestment. Visible signs of neighborhood reinvestment further facilitate upgrading as neighborhood identities and reputations are reconstituted. Whether new construction or rehabilitation is driven by households, developers, investors, or policies, the decision to move to or invest in a neighborhood—or *neighborhood selection*—is an important social process with emergent consequences for a neighborhood's trajectory. Research on gentrification, segregation, and disorder implicate racial composition in neighborhood selection

but in different ways. Integrating this literature provides a basis for theorizing how gentrifying neighborhoods evolve over time.

*Diversity and the Neighborhood Tastes of Gentrifiers*

Consumption-side perspectives of gentrification emphasize the unique cultural tastes of gentrifiers. Stemming largely from qualitative inquiry, research indicates that gentrifying residents, especially in the early stages, are attracted to bohemian-like settings that tolerate diversity and thus are likely to have greater predilections toward racial integration and higher thresholds for out-group neighbors than would the general population (Brown-Saracino 2009; Ley 1996; Zukin 1987). Gentrifiers also appear to have a higher tolerance for risk and seek out "gritty" areas, often on the edge of "ghetto" neighborhoods (Anderson 1990; Lloyd 2006), with this preference varying by the timing in which a gentrifier enters a neighborhood (Clay 1979). Research using survey data shows that preferences for gentrifying neighborhoods extend to minority renters, who are particularly attracted to racially diverse neighborhoods, although white survey respondents report that proximity to amenities and housing characteristics, rather than racial mix, is the attraction of redeveloped neighborhoods (Bader 2011). Gentrifiers have thus been portrayed in heterogeneous ways—as risk-takers who are not deterred by predominantly minority and poor neighborhoods (Clay 1979), as in-movers who have negative intentions to take over the neighborhood (Smith 1996), and as "social preservationists" who embrace diversity and have positive intentions (Brown-Saracino 2009). Whatever the motivations of individual gentrifiers, the literature generally portrays contemporary gentrification as a process of middle- and upper-middle-class whites moving into poor, and often minority, neighborhoods.

*Race-Based Neighborhood Selection*

Stratification-based explanations for residential selection and segregation center on housing market discrimination and racial composition preferences (Charles 2003; Massey and Denton 1993). All race groups prefer integrated neighborhoods with a substantial presence of same-race neighbors, with whites having the strongest preference for same-race neighbors and blacks having the weakest (Charles 2003). Latinos and Asians favor integration when potential out-group neighbors are white, but when potential out-group neighbors are black, they tend to favor co-ethnic neighbors over integration. These preferences reflect an imposed neighborhood racial hierarchy where white neighborhoods are most favored, black neighborhoods the least, and Asian and Latino neighborhoods in the middle, paralleling the racial ordering of inequality generally found in contemporary U.S. society (Charles 2000). Using vignettes and video-computer-assisted self-interviews, recent research shows the effect of race on residential preferences after accounting for social class, crime, school quality, and housing values, suggesting that whites' out-group prejudices toward blacks and Latinos, rather than in-group preferences by any racial group, are at work in residential segregation (Krysan et al. 2009; Lewis, Emerson, and Klineberg 2011).

*Crime, Disorder, and Neighborhood Stigma*

Although not usually linked to gentrification debates, relevant research demonstrates that implicit biases or stereotyping toward minorities and minority neighborhoods are significant in shaping residential decisions. Ellen (2000) argues that whites avoid integrated neighborhoods through the mechanism of race-based neighborhood stereotyping; rather than exercising explicit racial prejudice, whites associate blacks with low neighborhood quality and predict that

integrated neighborhoods will eventually turn entirely black. She specifically argues that decisions about neighborhood entry, or "white avoidance," reflect a distinct social process that is perhaps more influential in contributing to contemporary residential segregation than "white flight." Studies by Quillian and Pager (2001) and Sampson and Raudenbush (2004) support this cognitive expectations hypothesis with respect to perceptions of crime and disorder. Their evidence shows that perceptions are shaped by racial-ethnic composition, independent of socioeconomic standing, actual crime rates, objective measures of disorder, and respondents' race or ethnicity, suggesting that this relationship stems from neighborhood stigma or implicit biases rather than overt prejudice. Because particular minority groups, especially when poor, induce stereotypes in the U.S. context and are easily observable, racial composition tends to map onto perceptions of disorder, triggering implications for gentrification.

America's legacy of racial stratification and pervasive segregation further suggests that perceptions are resistant to short-term changes or even contrary evidence. For example, despite the decreasing "blackness" of neighborhoods with the arrival of immigrants, and the increasing heterogeneity of social class and residential location of African Americans, Anderson (2012) emphasizes the persistent stereotype of "iconic" black ghettoes. Sampson (2012) argues that perceptions—rather than visible (or "objective") cues—cohere into a meaningful social property of an environment when reinforced through social interactions, institutional practices, and collective reputations. These perceptions, in turn, influence both individual- and neighborhood-level outcomes, mediating or explaining in part the effects of racial and class composition. This neighborhood version of the self-fulfilling prophecy is characterized as the "looking-glass neighborhood" (Sampson 2012:365; see also Krysan and Bader 2007).

**Racial Inequality in the Great Recession**

Widespread speculation and development coupled with the proliferation of risky loan products in the early 2000s accelerated the pace of development in US cities. Some scholars have argued that these factors have contributed to gentrification, particularly in historically disadvantaged black neighborhoods located in central cities (Hyra 2012; Wyly, Atia, and Hammel 2004). Indeed, gentrification scholars have documented the shifting character of gentrification relative to its past, noting its increased occurrence in "risky" neighborhoods, the increased role of state and corporate actors, and its rapid spread (Hackworth 2007). Several studies have found higher concentrations of subprime loans in black and Hispanic neighborhoods, particularly in highly segregated cities like Chicago (Been, Ellen, and Madar 2009; Calem, Herschaff, and Wachter 2004; Hwang, Hankinson, and Brown 2015; Hyra et al. 2013; Immergluck 2008). While this brought reinvestment to neighborhoods that had experienced decades of disinvestment and decline, the collapse of the housing market in 2007 disproportionately hurt these very same neighborhoods, as borrowers of subprime loans were far more likely to experience foreclosure (Coulton et al. 2008; Immergluck 2008). Thus, although the housing boom may have facilitated renewal at rapid rates, particularly in minority neighborhoods, it is likely that the Recession slowed the trajectory of renewal in minority neighborhoods to a greater degree than in other neighborhoods experiencing gentrification.

Since the Great Recession ended in 2009, the housing market has gradually recovered at varying levels across neighborhoods and cities. In an examination of three predominantly black gentrifying neighborhoods across different cities, including Chicago, Hyra and Rugh (forthcoming) find that the Chicago neighborhood, which experienced gentrification by middle- and upper-income blacks, rather than whites, continued to experience decline after the

Recession, while the neighborhoods boomed in the other cities, which the housing crisis affected less severely. Other studies have found that foreclosed properties in low-income and minority neighborhoods generally take longer to sell and are more likely to be purchased by investors, particularly large investors, although there is substantial variation across cities (Coulton, Schramm, and Hirsh 2010; Ellen, Mader, and Weselcouch 2014; Herbert et al. 2013; Immergluck 2010; Smith and Duda 2009). Thus, vacancies and declines in homeownership, which are associated with property neglect and declines in local property values, often accompany foreclosures (Lambie-Hanson 2014). Such conditions may further negatively impact the desirability of these neighborhoods (Immergluck 2010).

Altogether, these studies suggest that the foreclosure crisis had disproportionately negative and lasting effects on the trajectories of minority neighborhoods. With the exception of Hyra and Rugh (forthcoming), few studies have examined these effects in the context of gentrification. These findings, however, inform our hypotheses of how gentrifying neighborhoods evolve over time in the years following the housing crisis.

**Hypotheses and Strategy**

The persistence of disadvantaged minority neighborhoods and a durable neighborhood hierarchy implies that residential selection and stratification mechanisms continue to shape the contemporary urban landscape. Yet despite much research on race and neighborhood *decline*, few studies have empirically examined how these processes work within the broader context of neighborhood *ascent* (Owens 2012). Some studies show that minorities play an important role as gentrifiers (Bostic and Martin 2003; Pattillo 2007), but this form of gentrification constitutes a small proportion of socioeconomic ascent (Owens 2012). Studies that examine patterns of

neighborhood ascent across large samples find associations with race-related factors, but overall, they do not advance a theoretical account of racial mechanisms in gentrification processes. Helms (2003), for example, shows that the proportion of black residents in 1990 predicts housing renovations on Chicago blocks, based on filed building permits from 1995 to 2000. In another study, Galster and colleagues (2003) find that in neighborhoods with poverty rates greater than 20 percent in 1980, percent minority positively predicts reductions in poverty from 1980 to 1990, especially in neighborhoods with relatively lower proportions of low-income households. Building on Galster and colleagues' (2003) analysis, Ellen and O'Regan (2008) find a positive association between the share of black residents among the poorest quintile of central city tracts and relative changes in income during the 1990s, which may be attributable to welfare reform or the widespread demolition of high-rise public housing. These are important findings, but these studies use measures that capture only narrow or correlated aspects of the gentrification process.

Furthermore, although gentrifiers may have preferences for racial or ethnic diversity or a greater tolerance for minority neighbors, the durability of race-based residential stratification suggests that gentrifiers' preferred level of diversity is limited. In *Paths of Neighborhood Change*, Taub, Taylor, and Dunham (1984) show that racial preferences and tolerance for risk are neither uniform across residents nor the only influences on neighborhood selection (other factors include affordability and location). While gentrifiers' tolerance for diversity may indeed be greater than that of the general population, such preferences may be limited to the extent that they generate *aggregate patterns* of neighborhood inequality (cf. Schelling 1971) that do not necessarily reflect the cultural accounts of individual gentrifiers.

Synthesizing these ethnographic and large-sample studies, we propose a theoretical account of gentrification as embedded in a process of neighborhood sorting whereby selection is

shaped in important ways by racial composition and shared evaluations of a neighborhood's disorder. Following previous findings on residential preferences by race, we accept that residents, and especially gentrifiers, report favoring integrated over homogeneous neighborhoods. But while gentrifiers may prefer integrated neighborhoods, we hypothesize that the processes driving gentrification follow a racialized social hierarchy—specifically, that percent black and percent Hispanic will attenuate the degree of gentrification among neighborhoods that either showed signs of gentrification in 1995 or were adjacent to these neighborhoods and still disinvested, controlling for alternative neighborhood characteristics associated with desirability. Second, based on threshold processes posited in research on residential segregation (e.g., Schelling 1971), we test the hypothesis that the negative effect of percent black on gentrification is nonlinear and increases at higher levels.

Third, we extend the idea of the looking-glass neighborhood and disorder-induced stigma to hypothesize that the pace of gentrification is slowed by inter-subjectively shared perceptions of disorder. We specifically predict that collective perceptions of disorder will reduce the pace of gentrification among neighborhoods that either previously showed signs of gentrification or were adjacent to these neighborhoods, independent of socioeconomic conditions, crime, and importantly, observed disorder. Fourth, we hypothesize that collective perceptions of disorder partially mediate the influence of neighborhood racial, ethnic, and poverty composition on the degree of gentrification through the mechanism of implicit bias (see also Sampson 2012:131–32). Lastly, we examine the trajectories of gentrifying neighborhoods in the years following the Great Recession. Given the uneven effects of the housing crisis on minorities and minority neighborhoods, we hypothesize that neighborhoods with greater shares of minorities experienced slower rates of redevelopment during the housing recovery after accounting for pre-recovery

levels of reinvestment and renewal.

In evaluating these hypotheses, we take into account proximity to jobs, institutions, physical amenities, public housing, and state investment practices. A number of studies argue that proximity to jobs in the growing professional and managerial sectors and neighborhood stability and reinvestment afforded by large institutions, such as universities, hospitals, and downtown businesses, as well as the attractiveness of amenities such as transportation centers, waterfronts, and parks, help explain the uneven geography of gentrification (Ley 1996; Taub, Taylor, and Dunham 1984). In addition, recent work emphasizes the increasing role of the state in gentrification. Lees and Ley (2008), for example, declare the gentrification of the 1990s and 2000s as fully intertwined with public policy, while others point to the role of the state in the allocation of housing and direct investments in city infrastructures and other public provisions (Hackworth 2007; Hyra 2012; Wacquant 2008; Wyly and Hammel 1999). State actions in housing policy, such as the large-scale demolition of public housing projects and capital investment in infrastructure, also offer signals to developers, corporate actors, and individuals that encourage further investment. More than demographic and socioeconomic neighborhood characteristics, institutional and state factors are *external* to a neighborhood; yet, they may have real implications for gentrification and can influence race-based reputations through their power to reconstitute neighborhood identities (Anderson and Sternberg 2013). We therefore consider institutions, physical amenities, and "state effects" in addition to sociodemographic factors in assessing our theoretical framework.

In summary, our overarching thesis is that racial-ethnic composition and perceived neighborhood disorder intervene in the urban landscape to influence gentrification in a way that sustains and helps explain the durability of neighborhood hierarchies amid the social

transformation of Chicago in the 1990s and 2000s and beyond the Recession. We further propose that visible aspects of gentrification express the social transformation of a neighborhood and offer a way to observe a process that is facilitated by a complex combination of actors (Beauregard 1986; Smith 1996). Studies focusing on single neighborhoods capture qualitative changes but cannot draw quantitative inferences over time and across neighborhoods, and large sample studies, which typically rely on census and administrative data, cannot distinguish gentrification from other forms of neighborhood change and typically do not capture important qualitative or visible aspects of reinvestment, neighborhood upgrading, and hence renewal. Perhaps it is not surprising that many studies yield mixed results on the causes and consequences of gentrification. To address these challenges, we assess our theoretical account with an observational method tailored to our theoretical objectives of capturing the *visible cues* and *degree* of gentrification across *multiple* neighborhoods.

**Research Design**

The first building block of our research design is the large-scale effort by Hammel and Wyly (1996) (hereafter HW), who conducted gentrification field surveys during the 1990s in several U.S. cities, including Chicago (see also Wyly and Hammel 1998, 1999).[2] Using a working definition of gentrification similar to ours, HW surveyed tracts that experienced prior decline resulting from urban dislocations and disinvestment and were thus "gentrifiable," defined as tracts with median incomes below the citywide median in 1960. HW then reviewed archival sources, such as scholarly research, city planning documents, and local press, to develop a list of

[2] Taub, Taylor, and Dunham (1984) was one of the first studies to address the shortcomings of administrative data for identifying gentrification; they used systemized observation instruments in eight Chicago neighborhoods to assess neighborhood levels of deterioration and upgrading.

gentrified neighborhoods. They triangulated these sources with block-by-block field surveys, in which raters walked through neighborhoods documenting visible evidence of housing reinvestment and class turnover, giving particular attention to residential structural improvements and new construction for each block.[3]

Census tracts categorized as "core gentrified" had at least one improved housing structure on most blocks, with at least one-third of all structures in the tract showing evidence of reinvestment. Areas categorized as "fringe gentrified" had a minimum of one improved structure on a majority of blocks, and at least one block in the tract with at least one-third of the structures improved. Gentrifiable neighborhoods without these criteria of reinvestment were rated as "poor." After completing field surveys, HW attempted to distinguish gentrified areas from other urban neighborhoods using census variables. Although gentrified tracts correlated with expected socioeconomic variables, HW found that a large number of tracts were incorrectly classified as gentrified when using only census indicators. This finding demonstrates the shortcomings of relying on census data alone (e.g., class composition) and the importance of visible cues for detecting gentrification.

Our second building block comes from the suite of studies conducted by the Project on Human Development in Chicago Neighborhoods (PHDCN)—particularly the systematic social observation of Chicago streets (for more details, see Sampson 2012:77–90). Observer logs and videotapes of block faces were recorded from a sports utility vehicle driven slowly down city streets during 1995 in a stratified sample of neighborhoods. Raters later systematically coded

[3] HW's (1996) instrument identified improved structures by the presence of the following indicators for single-family homes: structural soundness; reconstruction of latticework, gutters, steps, porches, windows and frames, and fences; renovations to accessory structures; and a security system. For multiple-family buildings, they also assessed sandblasted brick, prominent entryway and signage, lobby and foyer appointments, and porch furniture.

tapes and investigator logs for aspects of physical and social disorder. In an extension of the PHDCN, a follow-up study in 2002 incorporated the same observation methods but used trained observers to walk around Chicago neighborhoods and assess street-block indicators.

Our third and major building block extends these methods by exploiting Google Street View to systematically detect the visible character and degree of gentrification. Google Street View is free, fully accessible to the public, and provides nearly full-rotation panoramic views at the street level that are updated every one to four years, giving viewers the virtual experience of walking down the street. In essence, Google Street View, while not intended as such, provides a convenient tool for assessing neighborhood gentrification by capturing reliable observational data in concordance with in-person audits—information on which administrative data are limited. A small but growing literature provides encouraging results on the validity and inter-rater reliability of using Google Street View for measuring other neighborhood characteristics (Clarke et al. 2010; Odgers et al. 2012; Rundle et al. 2011).

*Observing Gentrification with Google Street View*

HW identified 30 "core gentrified" and 36 "fringe gentrified" tracts in their original observations in 1995 of Chicago's 402 "gentrifiable" (median income below the citywide median in 1960) tracts. To examine our outcome of interest—variation in trajectories of gentrification—we systematically observed and coded street level images from 2007 to 2009[4] in a random sample of blocks stratified by 140 Chicago census tracts that were selected to match the 66 core and fringe

[4] Google images for Chicago vary between 2007 and 2009. Some block faces had more years to change than others, limiting our method, but because we are comparing these observations to 1995, we still capture general trends of neighborhood change. We included dummy variables for image years in preliminary analyses, but they were unrelated to measurement properties of the gentrification stage score used in this study.

gentrified tracts and the 74 "gentrifiable" tracts that were adjacent to these core and fringe gentrified tracts and rated as "poor" in 1995.[5] This population of tracts allows us to examine how gentrification evolved since HW's observations in 1995, including the spread of gentrification into adjacent gentrifiable tracts.[6]

After completing pretests in two cities other than Chicago, a trained observer implemented the same coding rules across all sampled block faces in the 140 census tracts. A census *block* is the smallest areal unit used by the U.S. Census Bureau and is typically a three- or four-sided geographic area bounded by streets, railroads, bodies of water, or other physical features. Chicago census tracts typically contain 10 to 20 blocks that have building properties (rather than rivers, railroads, and lots). Within each tract, the coder observed a random sample of blocks. The unit of observation was the *block face*, a single segment of a block, or one side of a street. For each sampled block, the coder observed all block faces that contained residential or commercial units. When at least 10 block faces were coded from at least four different blocks from a tract, observations were considered complete for the tract.

The coder virtually toured each block face using panoramic, rotation, and zoom features of the Google Street View application and recorded observations for each block face using an instrument we designed to detect theoretically driven indicators of gentrification.[7] Our final

[5] We coded 140 census tracts to align with HW and our theoretical interest in gentrification trajectories, but we are expanding this effort within Chicago and to other cities.

[6] Like HW, we operationalize neighborhoods using census tracts. Comparability with independent data sources gives the analysis power to assess each census tract over time and with more degrees of freedom than would larger aggregate levels. In addition, ecological variables overlap much less at the tract level than at larger aggregations, helping to deal with multicollinearity.

[7] We tested the inter-rater reliability of our gentrification instrument on street-level images in Chicago, which were updated to 2009 through 2012, using two raters. In 103 block faces from 78

sample of observations consists of 2,709 block faces, of which 1,905 contain the required residential or commercial properties for coding gentrification.

*Definition and Reliability of Gentrification Measures*

The substantive goals of our measurement method are to capture the visible aspects of gentrification—reinvestment, renewal, and in-migration of middle- and upper-middle-class residents—and to identify a neighborhood's degree of gentrification. Hoover and Vernon's (1959) life cycle theory of neighborhood change describes urban neighborhoods as experiencing various stages from decline to renewal to class turnover, providing a useful starting point for operationalizing gentrification's evolving stage-like pattern.

We measure three main characteristics that, taken together, define a neighborhood's stage of gentrification: (1) the "structural mix" of an area—the combined condition of older structures, which indicates an area's preexisting socioeconomic status, and the degree of new structures and rehabilitation; (2) visible beautification efforts; and (3) lack of disorder and decay. These characteristics provide conceptually sound measures of visible neighborhood transformations consistent with our working definition of gentrification.

Because the population of coded neighborhoods experienced disinvestment after major urban transformations of the mid-twentieth century, the condition of existing structures and the presence of new construction or rehabilitation serve as direct indicators of physical reinvestment. We specifically consider both the condition of older building structures and the degree of

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tracts, the blinded raters had an average agreement rate of 83 percent and average kappa score of .50 across the 12 instrument indicators, and Pearson and intraclass correlations of .68 and .68, respectively, for the final stage scores. This level of agreement compares favorably with other studies of inter-rater reliability using Google Street View (e.g., Odgers et al. 2012).

structures that appear to be new or rehabilitated in the past 10 to 15 years in the area observed. Using the Google Street View survey, we measure the condition of preexisting structures as a binary indicator for whether most or all structures on the block face that are not new or rehabilitated appear to be well-kept, attractive, and sizable.[8] We measure the degree of new structures and rehabilitation with the following indicators: the amount of new or rehabilitated building structures, new traffic signs/structures, new public courtesies, new large developments, and new construction for sale. This measure focuses on various aspects of new construction and rehabilitation, capturing both public and private reinvestment and small- and large-scale development. A disinvested and declined area with no signs of gentrification would have neither new structures being built nor older structures in good condition; an area beyond the final stage of gentrification would have all of its older housing structures in good condition and may or may not have new or rehabilitated structures. An area undergoing gentrification would have some degree of new structures with not all, if any, of its older structures in good condition.

Our second and third measures of gentrification—visible beautification efforts and lack of disorder and decay—are conceptually distinct elements of reinvestment in the aesthetics of a neighborhood, beyond the building stock, that further reflect social transformation. Beautification efforts are visible cues of the presence of community investment that, in turn, attract further reinvestment. We combined the following binary indicators to capture beautification: efforts discouraging disorder (e.g., painting over graffiti), personal frontage beautification, and vacant/public space beautification. By contrast, physical signs of disorder and decay, such as trash and unkempt vacant lots, are visible cues that signal neighborhood

[8] For brevity, we refer to this descriptive condition—well-kept, attractive, and sizable—as "good" through the rest of the article.

disinvestment and deter reinvestment. We combined the following binary indicators to measure the lack of disorder and decay in a neighborhood: lack of physical disorder, lack of unkempt vacant/public space, and lack of decaying structures.

All indicators were originally recorded at the block-face level. For each block face, we combined the relevant indicators to calculate a summary score for each of our three measures. We define the overall gentrification stage score for a block face as the average of the three summary measures. The block-level score for each indicator is the average of its block-face scores, and each tract-level score is the average of its randomly sampled blocks' scores. Instrument details, item frequency distributions, descriptive statistics by census tract, and a detailed description of how we calculated the three measures from the indicators are available in Appendix A. Appendix A also contains a coding guide and visual demonstration with detailed descriptions of the coding process and the purpose of each instrument item, giving the reader concrete exposure to actual coding decisions and the basics for conducting Google Street View gentrification observations (hereafter GGO) in other cities.

Figure 2.1 presents a conceptual typology by which our three summary measures capture a neighborhood's stage in the life cycle of neighborhood change, and Table 2.1 displays descriptive statistics for the three measures of gentrification and the overall gentrification stage scores at the tract level for all observed tracts, as well as hierarchical linear model variance and measurement properties. The average gentrification stage score for the 140 tracts was .67 with a standard deviation of .12. Tracts with stage scores below approximately .50 tend to be disinvested or in the early stage of gentrification (left portion of Figure 2.1), having little to no signs of reinvestment and renewal. Tracts with scores ranging from around .50 to .65 are in the middle stage of gentrification, having a mix of decline and renewal. Scores ranging from around

.65 to .80 indicate the late stage of gentrification, having high levels of reinvestment and renewal but some evidence of prior decline. Tracts with stage scores above around .80 tend to be entirely middle- and upper-middle-class neighborhoods with little to no signs of disinvestment and decline (see Appendix A for visual examples).

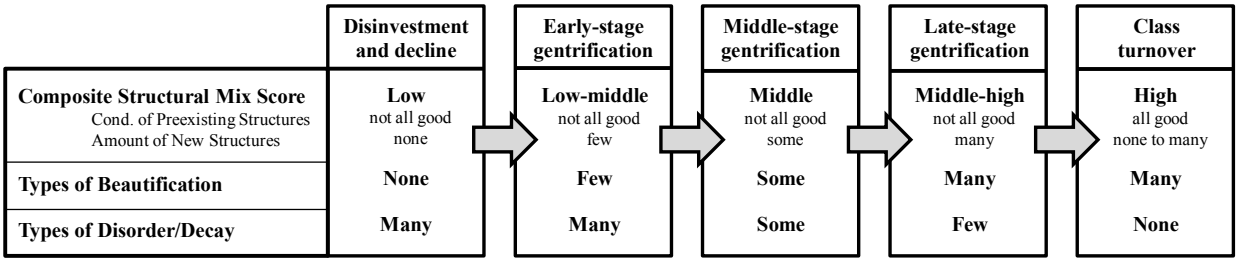


***Figure 2.1.*** *Neighborhood Life Cycle of Gentrification: Conceptual Typology and Measures*

The reliability coefficients in Table 2.1 measure the precision of the stage scores in detecting variance *between* blocks and tracts, with block faces and blocks as the level-1 units nested within blocks and tracts, respectively; thus, they are the proportion of the observed variance explained with the true between-block or between-tract variance. The intraclass correlations indicate how strongly units in the same group resemble each other, thus indicating the reliability of our measures in detecting block- and tract-level differences. Reliability estimates are relatively strong and intraclass correlations are high compared to prior studies using systematic social observation (e.g., Raudenbush and Sampson 1999).[9]

[9] In our study, gentrification is an outcome rather than a predictor variable assumed to be measured without error, hence we do not incorporate the full item-response methodology of Raudenbush and Sampson (1999).

***Table 2.1.*** *Descriptive Statistics for Tract-level Gentrification Measures and Hierarchical Linear Model Variance and Measurement Properties for GGO Stage Scores for Block Faces within Blocks and for Blocks within Tracts*

| Measure | Mean | SD | Min. | Max. |
|---|---|---|---|---|
| Structural mix | 0.53 | 0.19 | 0.12 | 1.00 |
| Beautification efforts | 0.66 | 0.12 | 0.29 | 0.91 |
| Lack of disorder and decay | 0.81 | 0.15 | 0.30 | 1.00 |
| | | | | |
| Total stage score | 0.67 | 0.12 | 0.35 | 0.95 |
| Block faces (Level-1) within blocks (Level-2): | | | | |
| Variance | | 0.03 | | |
| Reliability | | 0.61 | | |
| Intra-class correlation | | 0.39 | | |
| Blocks (Level-1) within tracts (Level-2): | | | | |
| Variance | | 0.01 | | |
| Reliability | | 0.73 | | |
| Intra-class correlation | | 0.37 | | |

*Note:* Census tract units, N=140; between block face units, N=682; between block units, N=140; Block face units, N=1,905.

*Post-Recession Gentrification Observations*

The measures described above use Google Street View images from 2007 and 2009. At the time of the first wave of data collection, images from these years were the most recent and often earliest images available. We use these images for the main set of analyses assessing general trends of change beginning in 1995, when neighborhoods were last surveyed for gentrification. To assess gentrification trajectories following the Recession, we use two sets of data. First, we repeat the data collection process on images primarily taken in 2011. For approximately 7 percent of the street segments, the most recent images available were from 2007 and 2009, and another 6 percent had images available from 2012 or 2013. We construct identical measures and stage scores as described above for the 122 census tracts that were observed in both waves and excluding street segments where the most recent image was the same as that observed in the first

wave of data collection.[10] Table 2.2 presents descriptive statistics and measurement properties for the second set of data, as well as correlations of each measure and the stage score between the first and second waves of data collection. The second wave of data collection used an updated coding guide and instrument,[11] and details are available in Appendix A. Comparisons between measures and stage scores constructed using identical indicators are correlated by .54, .30, .52, and .53, respectively, which suggests that comparisons between measures reflect actual changes rather than measurement error.

Second, in April 2014, Google released a new feature that allows users to see all available Google Street View images ever taken from 2007 to the present. Prior to this time, users were only able to view the most recent image available. We revisited all block faces for which we had collected data in the second wave and examined if there were additions of newly constructed buildings or major renovation or disappearances of blighted properties and vacant lots from previous images to the most recent image. For over 80 percent of block faces, the most recent image was taken in 2014, and all but 1.6 percent of block faces had their most recent image taken in 2011 or after. For the analysis, we only include block faces for which images in

[10] The sampling frame between data collection waves differed slightly. In the second wave, tracts that were adjacent to gentrifying tracts but had median household incomes below the citywide median after 1970 but before 2000 were included. This included 21 additional tracts and excluded 17 tracts that were observed in the first wave.

[11] Specifically, we collected data on the presence or absence of disorder on block faces containing commercial properties, and we did not collect data on the presence or absence of new construction for sale or include emergency stands and security cameras as signs of efforts discouraging disorder. Our intention was to improve upon the measures and indicators in the next wave of data collection. Given that commercial properties are also important actors in the neighborhood, we believe that trash and litter are also important to capture on these block faces. In the midst of the housing market crash, new construction for sale may reflect overspeculation and neighborhood decline, rather than continued reinvestment. Lastly, emergency stands and security cameras often indicate the presence of institutions, like universities and hospitals, rather than efforts to beautify an area.

both 2011 or after and 2009 or earlier are available. These measures are averaged across block faces for each block and then subsequently averaged across blocks for each tract, resulting in the average percentage of each block that experienced one of these changes. Table 2.3 displays the frequencies of these measures and the distributions across the census tracts in the sample. Appendix A contains the survey instrument used for this data collection.

***Table 2.2.*** *Descriptive Statistics for Tract-level Gentrification Measures for Second Wave of GGO, Correlations with First Wave of GGO, and Hierarchical Linear Model Variance and Measurement Properties*

| Measure | Mean | SD | Min. | Max. | Corr. |
|---|---|---|---|---|---|
| Structural mix | 0.61 | 0.18 | 0.14 | 1.00 | 0.53 |
| Beautification efforts | 0.66 | 0.15 | 0.00 | 0.93 | 0.36 |
| Lack of disorder and decay | 0.55 | 0.18 | 0.11 | 0.94 | 0.52 |
| | | | | | |
| Total stage score | 0.63 | 0.11 | 0.30 | 0.89 | 0.51 |
| Block faces (Level-1) within blocks (Level-2): | | | | | |
| Variance | | | 0.02 | | |
| Reliability | | | 0.64 | | |
| Intra-class correlation | | | 0.46 | | |
| Blocks (Level-1) within tracts (Level-2): | | | | | |
| Variance | | | 0.02 | | |
| Reliability | | | 0.63 | | |
| Intra-class correlation | | | 0.25 | | |

*Note:* Census tract units, N = 122; between block face units, N = 320; between block units, N = 122; block face units, N = 1,472.

***Table 2.3.*** *Block Face Frequencies and Tract-Level Distributions for Google Street View Timeline Measures*

| Indicator | Freq. | Mean | SD | Min. | Max. |
|---|---|---|---|---|---|
| New building | 212 | 14.1 | 16.1 | 0.0 | 100.0 |
| Disorder gone | 68 | 5.6 | 7.8 | 0.0 | 33.3 |

*Note:* Block faces units: N = 1,472; Census tract units: N = 122.

*Construct Validity*

To assess the construct validity of the GGO stage score, we first used demographic data from the

2005 to 2009 American Community Survey (ACS), in addition to 1990 and 2000 census data, and compare the data to our original stage score based on Google Street View images from 2007 to 2009. We find that stage scores are moderately to highly correlated with characteristics often associated with gentrification—percent whites, blacks, college graduates, and persons below poverty (correlations of .49, –.45, .61, and –.46, respectively, for 2005 to 2009). Gentrification has lower but still significant correlations with ownership rate, income, housing value, and rent: .27, .34, .34, and .30, respectively.[12] While capturing a broad array of demographic and economic transformations, decennial census variables do not tap the qualitative aspects unique to gentrification (Hammel and Wyly 1996; Ley 1996).

We therefore examined two alternative measures that capture more qualitative characteristics of gentrification—the locations of green roofs and Starbucks. Research and media often refer to "green consumption" and the appearance of coffee shops, particularly Starbucks, as cultural symbols of gentrification (e.g., Papachristos et al. 2011; Quastel 2009). We obtained green roof addresses from the City of Chicago Data Portal (https://data.cityofchicago.org/) based on 2011 satellite imagery, and Starbucks locations from the company website (http://www.starbucks.com/), geocoding each to the census tracts in our study. Adjusting for the number of housing units and population density, we used Poisson regression models to predict the number of green roofs and Starbucks. Our GGO score positively predicts both outcomes, with coefficients of 3.59 (s.e. = .88) and 6.60 (s.e. = 1.17) in each model, respectively. Because

[12] Census indicators of poverty and racial composition were highly correlated across census years (e.g., from 1995 to 2005 through 2009). Perhaps not surprisingly then, GGO scores are weakly and insignificantly correlated with changes from 1995 to 2005 through 2009 in proportion black, proportion college-educated, and poverty rate (with correlations of –.04, –.19, and .15, respectively). Correlations with changes in housing value and rent were also less than .25.

the GGO scores strongly predict both green roof and Starbucks counts, we also constructed a principal component score based on the logged counts of the two indicators. Modeling a linear regression model of the first principal component on the GGO score, population density, and housing units, we find that the GGO score positively predicts the first principal component, having a coefficient of 1.75 (s.e. = .53).

We further assessed how well our GGO score compares to traditional census variables measured more or less contemporaneously. When we add ACS estimates for 2005 to 2009 of proportion black, proportion Hispanic, and poverty rates to these models, the GGO score has coefficients of 1.99 (s.e. = 1.06) and 4.80 (s.e. = 1.34) in the Poisson regression models for the number of green roofs and Starbucks, respectively. In the linear regression model of the first principal component of logged green roofs and Starbucks counts, the GGO score has a coefficient of 1.34 (s.e. = .62). In all three models, the GGO score has substantively greater explanatory power compared to racial composition and poverty. Moreover, likelihood ratio tests between models excluding and including the GGO score lend support for the added power of the GGO score in capturing gentrification beyond demographic characteristics.

**Supplementary Data Sources**

We integrated several additional data sources with our GGO scores. Census data are based on the Geolytics Neighborhood Change Database with 2000 normalized census tract boundaries. All measures were linearly interpolated for 1995 based on the 1990 and 2000 censuses. We assess racial-ethnic composition with proportion *non-Hispanic black* and proportion *Hispanic*.[13] Because socioeconomic and housing conditions may account for variation in neighborhood

[13] Results do not change when we include proportion Asian; we thus exclude it for parsimony.

trajectories (Crowder and South 2008), we also included census variables for *poverty* rate (measured as the proportion of the population in families with incomes below the federal poverty line), *homeownership* rate (measured as the proportion of housing units that are owner-occupied), and *vacancy* rate (measured as the proportion of housing units that are unoccupied).[14]

We geocoded *homicide* incidents recorded by the Chicago Police Department from 1995 through 1997 to construct logged average annual rates per 100,000 at the tract level.[15] Because crime rates are highly variable from year to year, we used three-year averages, but results are similar using only 1995 data. Systematically *observed disorder* comes from the Chicago Community Adult Health Study, an affiliated study of PHDCN. These observations were collected in 2002 (and thus prior to our GGO) by trained raters who recorded observational data on the characteristics of the block around the 3,105 survey respondents' homes using a modified version of the instrument used in the PHDCN observational study conducted in 1995.[16] The observed disorder measure is a multi-item scale based on the presence or absence of the following items: cigarette/cigar butts, garbage/broken glass, empty bottles, graffiti, abandoned cars, condoms, and drug paraphernalia. Block-face scaled scores were aggregated to the tract level using empirical Bayes estimates to account for measurement error (Sampson and Raudenbush 1999).

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[14] We also considered alternative measures of neighborhood conditions (median household income, median housing values, median rent, logged population, population density, percent over 65 years old, and percent under 18 years old). Results were similar; we exclude them for parsimony.

[15] We use homicide incidents because they are more accurately reported and "visible" in media outlets. Burglary rates were not statistically significant and produced similar results.

[16] The 1995 video-taped disorder observations were collected in fewer than 200 of Chicago's more than 860 tracts, and thus only a small proportion of the tracts in our GGO study.

We measured inter-subjective *perceptions of disorder* using the PHDCN survey of 8,782 adult residents who were interviewed in person in 1995 using a stratified, multistage probability sampling design.[17] Residents were asked to rate "how much of a problem" various social and physical incivilities were in their neighborhood—including drinking in public, selling/using drugs, teenagers causing a disturbance, litter, graffiti, and vacant housing. We used perceived disorder scores aggregated to the tract level, again using empirical Bayes estimates to adjust for measurement error.

Finally, we deployed 10 indicators from a variety of sources to assess proximity to jobs, institutions, and amenities, as well as two distinct kinds of "state effects." Using data gathered from the City of Chicago Data Portal, we calculated the distance of each tract in our sample to the nearest university or hospital, and we constructed a dummy variable for whether a tract falls within one mile of Chicago's central business district, known as the Loop. We also constructed dummy variables for whether a tract contains a rapid transit station, whether it is located on Lake Michigan's waterfront, and whether it contains a park. Altogether, these indicators represent direct controls for proximity to Chicago's major institutions, downtown, and various amenities.

To assess public housing policy, we used a geographic shapefile of Chicago public housing in 2000 and created a dummy variable for whether at least 10 percent of the spatial area of a tract was occupied by public housing. We chose a threshold of 10 percent to identify large housing projects, which have since been demolished as part of an effort in Chicago to rehabilitate and redevelop its entire public housing stock.[18] To capture state investment policy, we

[17] A pooled measure of perceived disorder over the 1995 and 2002 survey waves weighted by sample size was correlated over .97 with the 1995 measure and produced similar results.

[18] A percentage-based measure for the area in a tract occupied by public housing yielded similar results.

constructed measures of capital expenditures by the city of Chicago for each of its 77 community areas, which average about 38,000 residents and are widely recognized by local authorities and residents (Sampson 2012). Because large investments in capital infrastructure extend across multiple tracts, our intent was to capture the "investment profile" of the larger community surrounding gentrified and gentrifiable tracts. Investment data containing the dollar amount, year, and budget category of the approximately 2,450 capital projects in the city budget from 1995 to 2002 were coded under contract by the Neighborhood Capital Budget Group, a nonprofit organization concerned with budgetary issues in Chicago. We then classified the data into two broad categories: (1) *neighborhood space and infrastructure*, which includes amenities such as school parks, greenways, neighborhood parks, street resurfacing, and lighting; and (2) *other capital*, which includes economic development, municipal facilities, transportation, sewers, and water. For each category, we geocoded the project dollar amounts and constructed 1995 baseline expenditures as logged rates per 100,000 residents, along with the residual change scores from 1996 to 2002 with 1995 expenditures as the baseline predictor. The latter procedure captures changes not explained by the larger dynamics of city budgeting and capital investment.

Of the 140 tracts in our GGO data, 99 contain data on all measures and thus form the basis of our analysis. The reduction is because tracts with low residential populations, such as commercial areas or areas experiencing major housing transformations, do not contain measures for perceived and observed disorder from the PHDCN. Logistic regression models using the 140 tracts from the GGO data confirm that only population size was significant in predicting which tracts were sampled in the PHDCN. Table 2.4 presents descriptive statistics for the 99 tracts used in our analysis, which consists of 26 core gentrified, 16 fringe gentrified, and 57 adjacent "poor" tracts, and are compared with all Chicago tracts for 1995 (linearly interpolated) and 2005 to

2009. These 99 tracts had higher percentages of whites and college graduates; higher median incomes, housing values, and rents; and lower percentages of Hispanics and owner-occupied units than the city in both 1995 and recent measures. In 1995, the 99 tracts had similar shares of blacks and poverty rates to Chicago overall but had lower levels by 2005 to 2009.[19] Over time, the 99 tracts had greater increases than Chicago overall in their percentage of whites and college graduates and greater decreases in their percentage of blacks and persons below poverty—characteristics often associated with gentrification.[20]

For analyses assessing gentrification following the Recession, we also incorporate tract-level estimates of *foreclosure risk* from the Department of Housing and Urban Development (http://www.huduser.org/portal/datasets/NSP.html). These estimates are based on models using statewide foreclosure data from January 2007 to June 2008, the share of home loans originated from 2004 to 2006 that are subprime (having an interest rate at origination 3 percent or greater than a comparable US Treasury security), unemployment rates in Chicago in June 2008, and the percent change of the metropolitan area home price index in 2008 relative to its maximum index between 2000 to 2008. For comparisons across neighborhoods in Chicago, these data best capture differences in subprime lending rates.

[19] The 57 "poor" tracts in the analysis had substantially higher rates of poverty and percent black than the gentrified tracts in 1995.

[20] Compared to all of HW's 402 gentrifiable tracts, these 99 tracts had larger proportions of whites and college graduates; higher median incomes, housing values, and rents; lower poverty; and lower shares of blacks and Hispanics in both 1995 and 2005 through 2009. Both groups, however, experienced similar changes over time for these variables.

***Table 2.4.*** *Descriptive Statistics for 99 Analysis Tracts and City of Chicago*

| | 1995 Census (interpolated) | | 2005-2009 ACS | |
|---|---|---|---|---|
| Census Variables | Chicago | Analysis | Chicago | Analysis |
| Total population | 3,285 | 3,398 | 3,266 | 3,468 |
| % Non-Hispanic white | 31.9* | 45.5 | 29.4*† | 49.9 |
| % Non-Hispanic black | 41.9 | 37.1 | 39.9*† | 31.1 |
| % Hispanic | 20.7* | 10.9 | 23.0*† | 8.9 |
| % Asian | 3.8* | 6.1 | 4.6*† | 8.5 |
| % Foreign-born | 16.0 | 13.4 | 16.9 | 15.5 |
| Diversity Index | 0.281* | 0.356 | 0.332* | 0.422 |
| % College graduates | 20.0* | 44.2 | 29.2*† | 57.9 |
| Median household income ($) | 50,225 | 62,526 | 46,758* | 58,878 |
| % Below poverty | 23.5 | 24.6 | 22.8*† | 19.2 |
| Ownership rate | 0.409* | 0.263 | 0.460*† | 0.397 |
| Vacancy rate | 0.098* | 0.123 | 0.142 † | 0.137 |
| Median housing value ($) | 174,574* | 339,755 | 274,780*† | 352,944 |
| Median rent ($) | 721* | 834 | 856* | 982 |

| | Chicago | | Analysis | |
|---|---|---|---|---|
| Additional Variables | Mean | SD | Mean | SD |
| GGO stage score (2007-09) | | | 0.67 | 0.12 |
| Prior gentrification (1995) | | | 0.69 | 0.86 |
| Logged murder rate (mean, 1995-1997) | 2.39* | 1.84 | 1.86 | 1.84 |
| Observed disorder (2002) | -1.65 | 1.50 | -1.91 | 1.17 |
| Perceived disorder (1995) | 2.28 | 0.47 | 2.22 | 0.46 |
| Distance to hospitals and universities (miles) | 0.83* | 0.77 | 0.38 | 0.30 |
| Chicago "Loop" (within 1 mile) (dummy) | 0.05* | 0.22 | 0.20 | 0.40 |
| Chicago "El" station (dummy) | 0.12 | 0.32 | 0.16 | 0.37 |
| Lakefront (dummy) | 0.05* | 0.21 | 0.17 | 0.40 |
| Park (dummy) | 0.55* | 0.50 | 0.69 | 0.47 |
| Public housing (dummy) | 0.04* | 0.19 | 0.11 | 0.32 |
| Neighborhood space and infrastructure investments (logged) (1995) | 2.55 | 0.76 | 2.62 | 0.76 |
| "Other" capital investments (logged) (1995) | 3.86* | 1.22 | 4.56 | 1.46 |
| Residual change in neighborhood space/ instrastructure investments (1996-2002) | -0.14 | 0.62 | -0.14 | 0.75 |
| Residual change in "Other" capital investments (1996-2002) | -0.02* | 0.70 | 0.15 | 0.80 |

*Notes:* *Chicago tracts statistically different from analysis tracts at the $p<0.05$ level (two-tailed tests); †Chicago change from 1995 to 2005-2009 statistically different from analysis tract change at the $p<0.05$ level (two-tailed tests). All dollar values are in constant 2009 dollars. Chicago observations vary by dataset and range from 697 to 866.

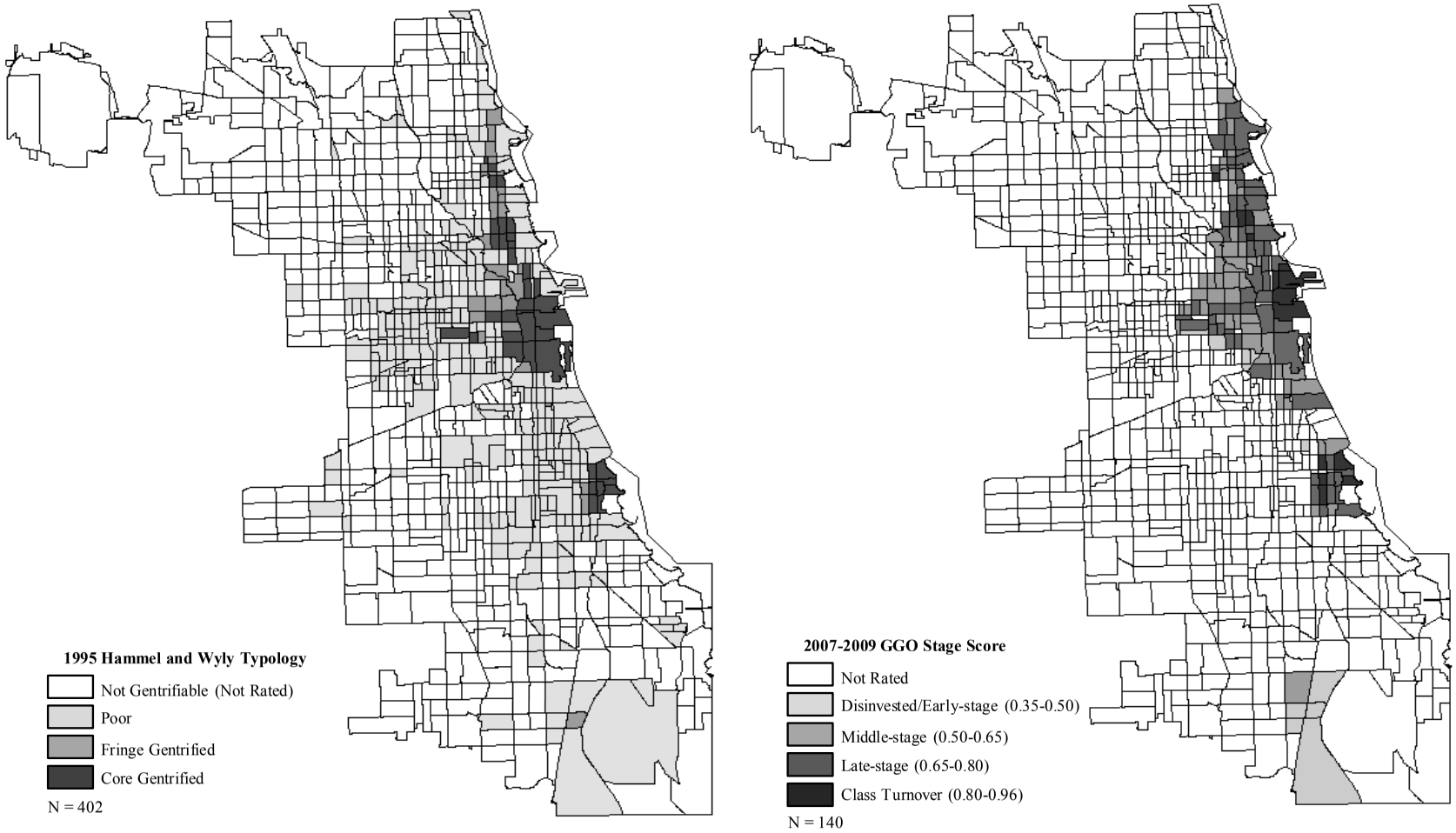



***Figure 2.2.*** *Gentrification in Chicago in 1995 and 2007 to 2009*

**Pathways of Gentrification**

Figure 2.2 presents maps of Chicago with HW's 1995 field survey results using their gentrification typology (left) and GGO neighborhood stage score results from 2007 to 2009 (right). Among the tracts in our analysis, which either showed visible signs of gentrification in 1995 or were neighboring gentrifiable tracts and thus had a high likelihood of experiencing the spread of gentrification from neighboring tracts, the correlation between HW's gentrification categories and the GGO stage scores is positive and significant (.45).[21]

The boxplots in Figure 2.3 display GGO stage score distributions by the HW gentrification categories and illustrate how neighborhoods at similar baselines have fared over time, revealing both a general upward trajectory and significant variation among tracts with similar baselines. Neighborhoods that had already tipped, or were "core gentrified" by 1995, tend to have higher GGO stage scores relative to the other groups—nevertheless, there is still variation from the middle- and late-stages of gentrification in the rightward direction of our typology of the neighborhood life cycle of gentrification (see Figure 2.1). Poor or fringe gentrified neighborhoods exhibit greater variation in their GGO stage score distributions and yield a wide range of scores, indicating that while many of these tracts remained disinvested or in early stages of gentrification (left portion of Figure 2.1), several gentrified rapidly in this period.

Bivariate correlations between prior racial-ethnic composition characteristics and neighborhood gentrification provide an initial picture of the racialized structure of neighborhood change. Table 2.5 compares the 1995 HW gentrification categories and our 2007 to 2009 stage scores. For the 99 tracts in our analysis, gentrification levels in 1995 have a significant positive

[21] We coded poor, fringe, and core gentrified tracts as 0, 1, and 2, respectively.

correlation with percent white and a negative correlation with percent black in 1980. The correlations with percent Latino and Asian are weaker and not statistically significant but are similarly rank-ordered to prior findings on residential racial preferences (Charles 2003).[22] The 2007 to 2009 GGO stage scores exhibit a similar pattern of racial ordering, except correlations for percent black and Hispanic are similar to each other and much stronger.

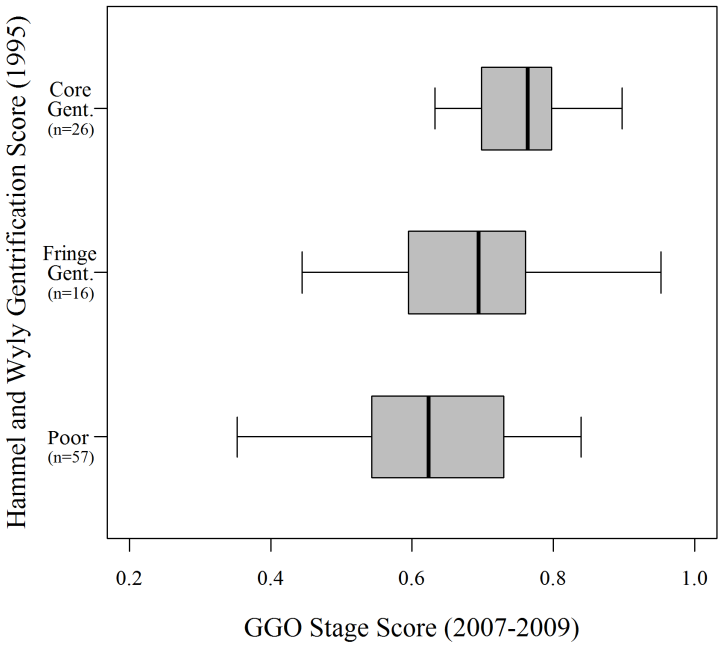



***Figure 2.3.*** *Boxplots of GGO Stage Scores (2007-2009) by Hammel and Wyly Gentrification Typology (1995). N = 99.*

[22] We also used proportion foreign-born and the diversity index instead of the racial composition variables in our analysis; neither alternative variable was statistically significant when we controlled for baseline gentrification. Proportion Hispanic also revealed a quadratic-like relationship with the GGO stage score, but very few tracts had high proportions of Hispanics.

***Table 2.5.*** *Correlations with Gentrification Scores by Prior Racial and Ethnic Composition and Heterogeneity Variables for 99 Analysis Tracts*

| | 1995 HW Typology | 2007-2009 GGO Stage Scores | | |
|---|---|---|---|---|
| | (1) 1980 | (2) 1980 | (3) 1990 | (4) 2000 |
| Racial/Ethnic composition | | | | |
| % Non-Hispanic white | 0.31** | 0.56** | 0.57** | 0.54** |
| % Asian | 0.04 | 0.07 | 0.13 | 0.23* |
| % Hispanic | -0.15 | -0.32** | -0.37** | -0.36** |
| % Non-Hispanic black | -0.20* | -0.34** | -0.34** | -0.40** |
| Racial/Ethnic heterogeneity | | | | |
| % Foreign-born | -0.08 | -0.05 | -0.07 | 0.03 |
| Diversity Index | 0.30** | 0.19† | 0.22* | 0.21* |

*Note:* N = 99. †p<0.10; *p<0.05; **p<0.01 (two-tailed tests).

Although several studies suggest that recent immigration has reshaped neighborhoods in several positive ways, including through renewal and revitalization (e.g., Sampson 2012), we find no correlation with gentrification scores and percent foreign-born within our 99 tracts, most likely because these tracts do not contain either immigrant areas that may have gentrified after HW's 1995 field surveys or Chicago's large immigrant pockets on the southwest and northwest sides (e.g., only one tract is majority foreign-born). We also examined racial-ethnic heterogeneity to consider both cultural accounts of gentrifiers' preferences for diversity and evidence that residential racial preferences for nearly all racial groups favor some level of integration (Brown-Saracino 2009; Charles 2003). We calculated heterogeneity using the commonly employed diversity index, defined as $D = 1 - \sum p_i^2$, where $p_i$ denotes the proportion of the race-ethnic group $i$ in a census tract, with $i$ = {non-Hispanic black, Hispanic, Asian, non-Hispanic white; other race}. Racial heterogeneity is indeed positively and significantly correlated

with gentrification, although weak for present-day GGO stage scores (see Table 2.5).[23]

Prior research on neighborhood segregation and residential racial preferences and accounts of gentrifiers' preferences for diversity also suggest that racial-ethnic composition may matter in nonlinear ways (Schelling 1971). Consistent with this expectation, exploratory analysis indicated a negative quadratic-like relationship between the GGO stage score and proportion black.[24] In assessing competing hypotheses, we thus include a quadratic term for proportion black.

Our full specification yields the following model, which we estimate with weighted least squares regression:[25]

$$GGO_{2007-09} = \beta_0 + \beta_1 G_{95} + \beta_2 B_{95} + \beta_3 B_{95}^2 + \beta_4 H_{95} + \sum_{k=5}^{n} \beta_k Z_k + \epsilon, \quad (1)$$

where $GGO_{2007-09}$ is the continuous standardized gentrification stage score for each tract measured for 2007 to 2009; $\beta_0$ is the intercept; $G_{95}$ is the 1995 HW gentrification category (poor, fringe, or core) with associated coefficient $\beta_1$; $B_{95}$ and $B_{95}^2$ are each tract's 1995 proportion black and squared proportion black (centered) with associated coefficients $\beta_2$ and $\beta_3$, respectively; $H_{95}$ is a vector of tracts' proportion Hispanic with associated coefficient $\beta_4$; $Z$ is a matrix of control variables with associated coefficients $\beta_k$; and $\epsilon$ is the error term.

[23] Among the 402 gentrifiable tracts examined, bivariate correlations are similar to the 99 tracts used in our analysis, except percent Asian and percent Hispanic have statistically significant correlations of .12 and –.12, respectively, at the $p < .05$ level.

[24] Introducing a quadratic term for proportion Hispanic induced high levels of multicollinearity and is therefore excluded.

[25] Because the number of blocks used to create the GGO stage score varied by tract, we use weighted regressions to induce homoscedasticity of error variances. Following Raudenbush and Sampson (1999), each case is weighted by the square root of the number of assessed blocks to give more weight to tracts with more coded data. We also estimated separate unweighted models with robust standard errors using the "Sandwich" package in R, which yields heteroskedasticity-consistent standard errors, and results were similar.

**Assessing Competing Explanations**

Table 2.6 presents regression results for a series of theoretically relevant models predicting the standardized GGO stage score. Model 1 begins with a neighborhood's prior state of gentrification in 1995 to provide a baseline from which we can assess trajectories of neighborhood gentrification over time. The 1995 baseline category of gentrification for tracts accounts for approximately 20 percent of the variation in GGO stage scores, which differ, on average, by .53 standard deviations (mean = .67; s.d. = .12) between 1995 gentrification categories.

Model 2 introduces the major racial-ethnic composition variables for our analysis—proportion black, proportion black-squared, and proportion Hispanic. The relationship between prior gentrification and GGO stage scores declines substantially, and the model accounts for over 29 percent of additional variation in the GGO stage scores. All composition variables are negatively associated with GGO stage scores, controlling for baseline gentrification. Estimates indicate that a neighborhood with 10 percent more Hispanics than another has a lower gentrification stage score by .31 standard deviations at all levels of Hispanic composition, holding proportion black, proportion black-squared, and prior gentrification constant. The association of race with GGO stage scores, however, is considerably greater in neighborhoods with relatively more blacks. For example, a neighborhood that is 15 percent black has a stage score .14 standard deviations lower than one that is 5 percent black, but a 45 percent black neighborhood has a stage score .27 standard deviations lower than one that is 35 percent black—nearly double the effect.

***Table 2.6.*** *Weighted Least Squares Regression Estimates for Predicting 2007 to 2009 Neighborhood Gentrification Stage Scores*

Table 2.6 (Continued)

| | (1) Baseline Gentrification | (2) Racial Composition | (3) Structural Factors | (4) Perceived Disorder | (5) Institutions/ Downtown | (6) Amenities Proximity | (7) Public Housing | (8) City Budget |
|---|---|---|---|---|---|---|---|---|
| Prior gentrification (1995) | 0.53** | 0.15 | 0.14 | 0.14 | 0.13 | 0.17† | 0.13 | 0.17† |
| | (0.10) | (0.10) | (0.10) | (0.10) | (0.10) | (0.10) | (0.09) | (0.10) |
| Proportion Non-Hispanic black (1995) | | -0.91** | -0.37 | -0.32 | -0.68† | -0.64† | -0.60† | -0.54 |
| | | (0.31) | (0.41) | (0.41) | (0.34) | (0.34) | (0.34) | (0.35) |
| Proportion black-squared (1995) | | -2.27* | -2.46* | -2.43* | -2.37* | -2.31* | -2.51* | -2.06* |
| | | (0.99) | (1.03) | (1.01) | (0.99) | (1.04) | (1.04) | (1.00) |
| Proportion Hispanic (1995) | | -3.09** | -2.73** | -2.47** | -2.87** | -2.56** | -2.60** | -2.23** |
| | | (0.48) | (0.54) | (0.54) | (0.60) | (0.53) | (0.53) | (0.55) |
| Proportion below poverty (1995) | | | -1.61* | -0.87 | | | | |
| | | | (0.67) | (0.75) | | | | |
| Ownership rate (1995) | | | -0.47 | -0.29 | | | | |
| | | | (0.60) | (0.60) | | | | |
| Vacancy rate (1995) | | | 1.97 | 2.30† | 1.96 | 1.63 | 1.32 | 2.39† |
| | | | (1.25) | (1.24) | (1.23) | (1.17) | (1.27) | (1.35) |
| Logged murder rate (mean, 1995-1997) | | | -0.05 | -0.05 | | | | |
| | | | (0.05) | (0.05) | | | | |
| Observed Disorder (2002) | | | -0.03 | 0.00 | | | | |
| | | | (0.06) | (0.07) | | | | |
| Perceived Disorder (1995) | | | | -0.49* | -0.66** | -0.54* | -0.65** | -0.81** |
| | | | | (0.24) | (0.21) | (0.22) | (0.21) | (0.23) |
| Alternative Factors | | | | | | | | |
| Institutions/Downtown | | | | | | | | |
| Distance to hospitals and universities (miles) | | | | | 0.20 | | | |
| | | | | | (0.28) | | | |
| Chicago "Loop" (within 1 mile) | | | | | -0.16 | | | |
| | | | | | (0.19) | | | |
| Amenties Proximity | | | | | | | | |
| Chicago "El" station | | | | | | -0.14 | | |
| | | | | | | (0.20) | | |
| Lakefront | | | | | | 0.31 | | |
| | | | | | | (0.20) | | |
| Park | | | | | | -0.17 | | |
| | | | | | | (0.16) | | |
| Public Housing | | | | | | | | |
| Public housing (2000) | | | | | | | 0.18 | |
| | | | | | | | (0.33) | |

Table 2.6 (Continued)

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| City Budget | | | | | | | | |
| Neighborhood space and infrastructure investments (logged) (1995) | | | | | | | | -0.18<br>(0.14) |
| "Other" capital investments (logged) (1995) | | | | | | | | 0.07<br>(0.08) |
| Residual change in neighborhood space/ instrastructure investments (1996-2002) | | | | | | | | -0.37*<br>(0.18) |
| Residual change in "other" capital investments (1996-2002) | | | | | | | | 0.14<br>(0.15) |
| Adjusted $R^2$ | 0.203 | 0.491 | 0.507 | 0.524 | 0.525 | 0.528 | 0.524 | 0.548 |

*Note:* N=99.†p<0.10; *p<0.05; **p<0.01 (two-tailed tests).

Model 3 controls for structural features of neighborhood social differentiation that are commonly posited to shape neighborhood trajectories. Specifically, we include socioeconomic and housing characteristics using interpolated 1995 measures of poverty, ownership, and vacancy rates, as well as controls for logged average annual homicide rates from 1995 to 1997 and a measure of systematically observed neighborhood disorder in 2002. Poverty has a negative association with gentrification—the GGO stage score is estimated to be lower by .16 standard deviations in a neighborhood with a poverty rate 10 percentage points higher than another one. The linear estimate for proportion black is reduced, but the negative estimates for proportion black-squared and proportion Hispanic remain. Observed disorder appears to play no role in predicting gentrification trajectories. Overall, the addition of these control variables in Model 3 explains an additional 2 percent of the variation in GGO stage scores.

Model 4 adds a neighborhood-level measure of collectively perceived disorder to assess the hypothesized pathway by which racial, ethnic, and socioeconomic contexts shape neighborhood trajectories beyond actual crime and observed disorder. Consistent with prior findings by Sampson (2012:141–45), perceived disorder is racially ordered and linked to poverty among the 99 tracts, having the following correlations: $r_{white} = -.64$ ($p < .01$); $r_{Asian} = -.19$ ($p < .10$); $r_{Hispanic} = .15$ ($p > .10$); $r_{black} = .54$ ($p < .01$); and $r_{poverty} = .74$ ($p < .01$). Moreover, adding perceived disorder reduces the coefficient estimates for poverty and racial-ethnic composition, mediating their effects to a degree, but both the nonlinear black and linear Hispanic effects remain significant. Controlling for other local conditions, a neighborhood with a share of Hispanics 10 percentage points higher than another is estimated to have a gentrification stage score .25 standard deviations lower at all levels of Hispanic composition, and a neighborhood that is 45 percent black, for example, has a stage score .23 standard deviations less than one that

is 35 percent black. Vacancy becomes significant at the $p < .10$ level, suggesting that conditioned on other neighborhood characteristics, vacancies provide increased entry points into neighborhoods for gentrifiers. Finally, the coefficient for perceived disorder is statistically significant and substantively large—a one-unit increase in collectively perceived disorder (mean = 2.22, s.d. = .46) decreases the stage score by .49 standard deviations, independent of observed disorder, which is measured at a later point in time and remains insignificant.[26]

*Institutions, Amenities, and State Effects*

Although the results presented thus far underscore the role of neighborhood racial-ethnic composition and perceived disorder in shaping contemporary trajectories of gentrification in Chicago, the question remains: What about external institutions, amenities, and state-driven policies that influence neighborhoods? We examine several new predictors to answer this question. Because of the modest sample size, we estimate a series of reduced models. We control for baseline gentrification for theoretical purposes, and we retain racial-ethnic composition, vacancy rate, and perceived disorder variables based on results from Models 1 through 4.

Models 5 and 6 examine proximity to Chicago's major institutions, downtown, and amenities. The coefficients for key variables further support our findings. However, proportion black has a stronger negative effect and is significant at the $p < .10$ level. Although the vacancy rate is no longer significant, the coefficient for perceived disorder is also slightly stronger.

[26] As a further check on key results, we estimated models using 1995 gentrification categories as dummy variables (with "poor" as the reference category) to account for the possibility that the HW field survey categories are nonlinear, and we constructed a variable of the average of the 1995 gentrification scores of adjacent tracts, weighted by the proportion of shared boundaries to examine the relevance of spatial proximity. Regression results are substantively similar to the models presented.

We assess "state effects" in Models 7 and 8. Model 7 includes the dummy variable for public housing. Again, results are nearly identical for our key variables, although proportion black-squared has a stronger negative effect. Model 8 introduces the new capital expenditures variables, with 1995 data and residual changes from 1996 to 2002.[27] The addition of capital expenditures and residual changes attenuates the effects of racial-ethnic composition and strengthens the effects of perceived disorder and vacancies. Residual change in neighborhood space and infrastructure spending also has a statistically significant negative effect on neighborhood trajectories, reducing the gentrification stage score by .37 standard deviations with a one-unit increase (mean = –.14, s.d. = .75). This counterintuitive result may reflect that disproportionate changes in capital investments by the city are spread in complex ways that require further exploration beyond the purpose of our study. Nonetheless, our key estimates of racial-ethnic composition—including the nonlinear pattern for percent black—and perceived disorder remain largely the same and substantively large. Despite various local amenities and the increasing hand of the state, racial-ethnic context and perceptions of disorder remain robust in shaping gentrification trajectories.

**A Limit to Preferred Diversity?**

Results to this point consistently reaffirm the strength of racial-ethnic contexts and collectively shaped perceptions in shaping divergent neighborhood trajectories of renewal. Summary results for racial composition are presented visually in Figure 2.4. The left panel displays the partial residual plot for tracts' share of blacks in 1995, predicting standardized GGO stage scores after

[27] Results were not affected when we employed a total budget variable and its residual change instead of its component budget categories. We also tested for evidence of multicollinearity, and variance inflation factors were under four in all models.

removing the effects of prior gentrification, proportion Hispanic, socioeconomic and housing conditions, crime, observed disorder, and perceived disorder. The dashes at the bottom of the plot indicate each tract's 1995 proportion of blacks. The plot demonstrates the nonlinear pattern—the relationship between proportion black and GGO stage scores becomes negative at a faster rate in neighborhoods that are around 40 percent black. Although the additional control variables mediate some of the relationship between proportion black and neighborhood trajectories, a negative influence of proportion black appears to be operating beyond a threshold. Residents, developers, and institutions may make neighborhood selection decisions using neighborhood stereotyping based simply on a neighborhood having a relatively high proportion of blacks, believing they have sufficient "evidence" to make judgments about the neighborhood. On the other hand, the curve in the left panel of Figure 2.4 is flat when a neighborhood has a lower proportion of blacks, which indicates that the proportion Hispanic, vacancies, and perceptions of disorder play a greater role in neighborhood trajectories. The partial residual plot for tracts' share of Hispanics predicting GGO stage scores (not shown) reveals a steep initial decline that becomes relatively flat as the number of tracts with relatively large shares of Hispanics decreases substantially.

To further assess our findings on racial composition, we included proportion white instead of proportion black to predict GGO stage scores. The partial residual plot for proportion white, which is displayed in Figure 2.4 (right), reveals a quadratic relationship between GGO stage scores and proportion white, after removing the effects of all control variables used in Model 4, and is nearly symmetric to the partial residual plot for proportion black. The steeply increasing curve flattens around .35, indicating that for tracts with relatively low proportions of whites, an increase in the share of whites has a strong positive effect on GGO stage scores after

controlling for other variables, and tracts have their highest GGO stage scores beyond this threshold. Other control variables, including proportion Hispanic and perceived disorder, account for much of the variation in GGO stage scores in neighborhoods beyond this minimum share of whites.

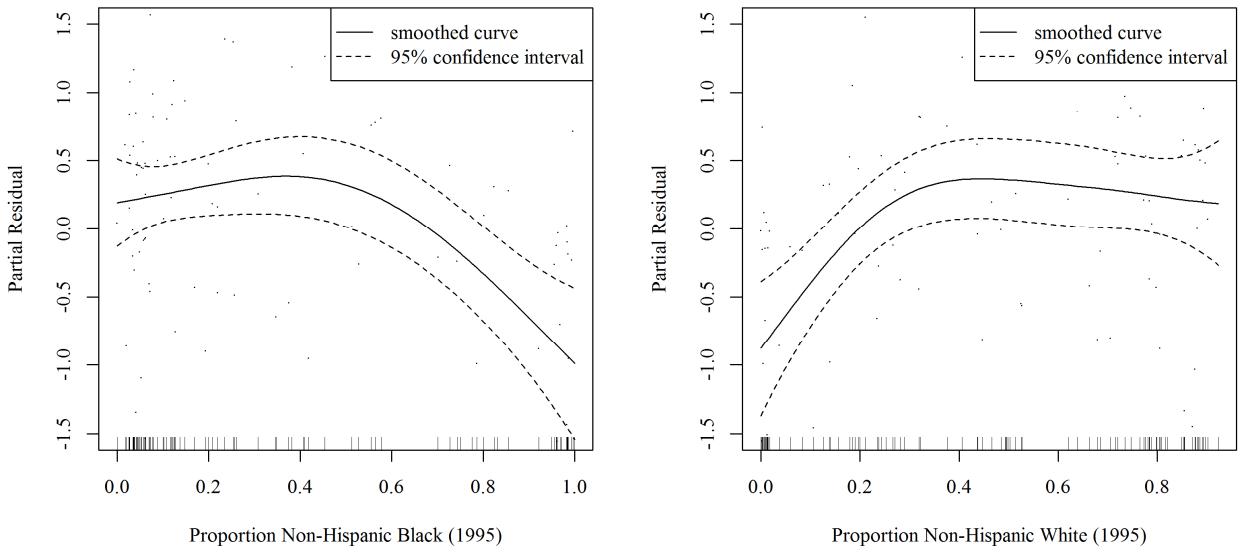



***Figure 2.4.*** *Partial Residual Plot for Proportion Black (left) and Proportion White (right) Predicting 2007 to 2009 Neighborhood Gentrification Stage Scores*

Altogether, these results suggest that racial heterogeneity works in a particular way to shape neighborhood trajectories among gentrifying tracts and their initially low-income adjacent tracts. Upward neighborhood trajectories tend to follow a pattern of black and Hispanic neighborhood avoidance, such that gentrification trajectories are less pronounced in neighborhoods with a substantial proportion of black residents and as the proportion of Hispanics increases. In addition, gentrification trajectories favor neighborhoods with a minimum share of whites. These results suggest that preferences for diversity are contextual in nature and have limits.

**Recession Recovery**

The time frame of the results presented thus far begins in 1995 and ends during the Recession, with the majority of images from 2009. Thus, the racial disparities that we demonstrate may reflect the disproportionately negative toll that the housing crisis had on minority neighborhoods, even among those that had shown signed of gentrification in 1995 or were adjacent to those that did. Indeed, among the 122 census tracts that we observed in both time periods, the foreclosure risk score and the share of blacks in a tract based on 2005 to 2009 ACS 5-year estimates have a correlation of .48 ($p < .05$), while the correlation with the share of Hispanics is only .17 ($p < .10$).

As a final step in our analysis, we examine the continued trajectory of these neighborhoods as the housing market recovered. First, we assess the factors predicting changes in the gentrification stage scores between the first and second wave of data collection for the gentrification indicators. For the first set of models, we present results predicting the residual change of the gentrification stage score (scaled by a factor of 100) on similar indicators presented above using 2005 to 2009 ACS data.[28] To construct the residual change scores, we used a weighted least squares regression model predicting the gentrification stage score from the second wave on the first wave gentrification stage score, and we used precision-weighting based on the number of blocks observed in the second wave of data collection. To predict the residual change scores, we use an ordinary least squares regression model, and, since we do not find a nonlinear effect for the share of blacks, we only include a linear term in the models. The full specification of the model is as follows:

[28] Although residual change measures adjust for possible regression to the mean by removing the predicted effect of a measure for a later point in time, residual changes with only two measures in time assume that the model fully adjusts for baseline differences in both level and slope between tracts (Morgan and Winship 2007). While we cannot confirm this assumption, the residual change score shows no correlation with the initial gentrification stage score.

$$GGO_{r\Delta(Wave2 \sim Wave\ 1)} = \beta_0 + \beta_1 B_{09} + \beta_2 H_{09} + \beta_3 F + \sum_{k=4}^{n} \beta_k Z_k + \epsilon, \quad (2)$$

where $GGO_{r\Delta(Wave2 \sim Wave\ 1)}$ is the residual change between gentrification stage scores from measures based on images from 2007 or 2009 and measures based on 2011 to 2013 images; $\beta_0$ is the intercept; $B_{09}$ and $H_{09}$ are each tract's 2005 to 2009 ACS estimates of proportion black and proportion Hispanic; $\beta_1$ and $\beta_2$ are their associated coefficients, respectively; $F$ is each tract's foreclosure risk score with its associated coefficient $\beta_3$; $Z$ is a matrix of control variables with associated coefficients $\beta_k$; and $\epsilon$ is the error term. These control variables include poverty, vacancy, and homeownership rates.

The first two columns of Table 2.7 present the results from the analysis. The results for Model 1 show that the share of blacks is negatively associated with the residual change in the gentrification stage score, and the effect disappears when we include the foreclosure risk score in Model 2. Without the share of blacks included in the model, the foreclosure risk score negatively predicts the residual stage score change ($p < .05$) (not shown). Given that the share of blacks and the foreclosure risk score are highly correlated, we can only conclude from these results that neighborhoods with high shares of blacks, which were also disproportionately affected by the foreclosure crisis, are negatively associated with the pace of gentrification in these neighborhoods during the housing recovery. The maps in Figure 2.5 illustrate the greater degree to which negative residual changes in gentrification stage scores occurred in tracts with greater shares of blacks (left) and greater foreclosure risk scores (right).

The images based on the second wave of gentrification data collection are primarily from 2011.[29] To assess neighborhood development further into the housing recovery, we assess the

[29] Results using scores constructed only from blocks observed in 2011 reveal similar results, though the 36 block faces based on 2013 images had higher gentrification stage scores on average.

factors that predict the appearance of new construction and the disappearance of vacant lots or blighted buildings since the Recession after controlling for the gentrification stage score from the first wave of data collection. For most of the observed block faces, the most recent images are from 2014. The next set of models examines the tract-level factors predicting the likelihood of these outcomes for individual block faces using hierarchical logistic regression models. The hierarchical model accounts for the nested nature of the block faces within census tracts and allows us to adjust for the year of the most recent image to account for the different time periods for which the block faces were observed. This is useful since block faces with later image years would have longer to experience the outcomes.

***Table 2.7.*** *Regression Estimates Predicting Residual Changes in Gentrification Stage Scores, New Development, and Disorder Removal*

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| | Baseline | Fore-closures | Baseline | Fore-closures | Baseline | Fore-closures |
| Dependent Variable | Residual Change in GGO Stage Score, 2009-2011 | | Appearance of Block-level New Development, 2009-2014 | | Disappearance of Block-level Disorder, 2009-2014 | |
| Model | Ordinary Least Squares Regression | | Hierarchical Logistic Regression | | Hierarchical Logistic Regression | |
| GGO, wave 1 | | | -1.94 | -2.15† | -4.17** | -4.57** |
| | | | (1.18) | (1.22) | (1.52) | (1.65) |
| % black | -0.10* | -0.07 | -0.01* | -0.01 | 0.00 | 0.01 |
| | (0.04) | (0.05) | (0.01) | (0.01) | (0.01) | (0.01) |
| % Hispanic | -0.14 | -0.10 | -0.02* | -0.02 | -0.02 | -0.01 |
| | (0.09) | (0.09) | (0.01) | (0.01) | (0.01) | (0.01) |
| % below poverty | 0.00 | -0.02 | 0.00 | -0.01 | -0.01 | -0.02 |
| | (0.09) | (0.09) | (0.01) | (0.01) | (0.01) | (0.01) |
| % units vacant | 0.08 | 0.08 | 0.02† | 0.02† | -0.02 | -0.02 |
| | (0.10) | (0.10) | (0.01) | (0.01) | (0.02) | (0.01) |
| % homeownership | 0.01 | 0.00 | 0.00 | 0.00 | -0.02* | -0.02* |
| | (0.06) | (0.06) | (0.01) | (0.01) | (0.01) | (0.01) |
| Foreclosure risk score | | -64.3 | | -10.7 | | -15.2† |
| | | (48.6) | | (6.52) | | (7.76) |
| Most recent image year | | | 0.13 | 0.12 | 0.30† | 0.24† |
| | | | (0.10) | (0.10) | (0.15) | (0.15) |
| N | 122 | | -- | | -- | |
| Level-1 N | -- | | 1,472 | | 122 | |
| Level-2 N | -- | | 122 | | 122 | |

Notes: **p<0.01, *p<0.05, †p<0.10 (two-tailed tests).


***Figure 2.5.*** *Maps of Residual Change in Gentrification Stage Scores and Percent Black (left) and Foreclosure Risk (right)*

Formally, the model specification is as follows:

Level-1: $$log\left(\frac{G_{bt}}{1-G_{bt}}\right) = \beta_{0t} + \beta_{1t}Year_{bt}, \quad (3)$$

Level-2: $$\beta_{0t} = \gamma_{00} + \gamma_{01}B_{09t} + \gamma_{02}H_{09t} + \gamma_{03}F_t + \sum_{k=4}^{n}\gamma_{0k}Z_{kt} + u_{0t}, \quad (4)$$

$$\beta_{1t} = \gamma_{10}, \quad (5)$$

where $G_{bt}$ is the probability that the gentrification indicator (new development, disorder removal) occurred over the time period for block face *b* in tract *t*; $\beta_{0t}$ is the log-odds of the outcome variable for tract *t*, adjusted for differences in the most recent image year; $Year_{bt}$ indicates the most recent image year (grand mean-centered) for each block face; and, $\beta_{1t}$ is its associated coefficient. The first level-2 equation models each tract's level-1 intercept as a function of tract-level characteristics, where $\gamma_{00}$is the mean log-odds of the outcome variable for the average tract. The other tract-level variables are identical to those used in the previous model, in addition to the Wave 1 gentrification stage score, and are grand-mean centered. The second level-2 equation models the fixed image year slope for each tract.

The results for each outcome are presented in the last four columns of Table 2.7. Model 3 indicates that the appearance of new buildings is less likely to occur in neighborhoods with greater shares of blacks and Hispanics. However, once foreclosure risk scores are included in Model 4, the negative effect of racial and ethnic composition is not statistically significant. Models 5 and 6 indicate that the disappearance of vacant lots or blighted buildings is less likely in neighborhoods with high foreclosure risk scores but is not directly associated with the racial and ethnic composition of the neighborhood. Blocks within tracts with lower stage scores in Wave 1 are also less likely to undergo new development or disorder removal.

In sum, the foreclosure crisis conditioned the continuation of reinvestment and renewal in gentrifying neighborhoods in the years following the housing recovery. Among neighborhoods

that were gentrifying by 1995 or were adjacent to these gentrifying areas, neighborhoods with higher shares of blacks are disproportionately affected by the foreclosure crisis. While the pace of gentrification was negatively associated with the shares of blacks and Hispanics from 1995 to 2009, the Recession slowed redevelopment even more in neighborhoods with higher shares of blacks.

**Implications**

The past two decades have been characterized by extensive gentrification, often depicted as an influx of white, middle-class residents invading poor, minority neighborhoods. Yet, a hierarchy of neighborhood socioeconomic status remains surprisingly persistent in Chicago (Sampson 2012) and nationally (Owens 2012; Sharkey 2013). This article offers a plausible mechanism by which these seemingly contradictory accounts of the contemporary city coexist. Extending prior work on racial preferences and neighborhood selection, we find that the evolution of gentrification is governed by a hierarchy in which poor black and Latino neighborhoods are least likely to continue to gentrify and are more likely to experience depressed trajectories among neighborhoods that showed signs of gentrification in 1995 or were adjacent to these neighborhoods and disinvested. We also find that collective perceptions of disorder deflect gentrification above and beyond systematically observed disorder. These results held when we controlled for poverty, vacancy rates, ownership, and crime; proximity to institutions, jobs, and amenities; and state-driven policy external to the neighborhood. Lastly, we find that the housing crisis had a disproportionately negative effect in neighborhoods with greater shares of blacks among the neighborhoods we observed, and, in the wake of the Recession as the housing market recovered, these neighborhoods experienced slower redevelopment.

Consistent with our main thesis, black and Latino neighborhoods in Chicago were less likely to experience the potential spread of reinvestment or renewal from neighboring tracts or to continue on upward trajectories if they had shown signs of reinvestment in 1995. Counter to prior evidence that residential preferences favor Latinos over blacks as neighbors, the Hispanic estimate was more negative than the black effect in neighborhoods that were less than about 40 percent black. While these results suggest a need for updated studies on race-based residential preferences in light of the drastic rise in immigration and signs of nativism in the United States, the black compositional effect is stronger beyond a threshold of about 40 percent. Because blacks and Hispanics tend to be segregated from one another in Chicago, however, these results suggest it is minority neighborhoods overall—both black *and* Latino neighborhoods—that are driving the slowed pace of gentrification in different parts of the city. Nonetheless, high cost lending and foreclosures affected black neighborhoods, in particular, consequently slowing further reinvestment and renewal in the years following the Recession, having implications on the racial order of renewal in more recent years.

On the flip side, gentrification tends to favor neighborhoods beyond a substantial share of white residents, around 35 percent. The threshold effects for black and white neighborhoods help resolve another seemingly contradictory account in the urban literature—they are consistent with prior research on the cultural aspects of gentrification, which depicts gentrifiers as tolerant and keen to live in minority neighborhoods, but they demonstrate an observed limit.

Rather than a process of race-based neighborhood selection, one might argue that the neighborhoods that showed signs of gentrification in HW's 1995 field surveys and had higher proportions of minorities reflect gentrification by minority gentrifiers. If so, our results indicate that these neighborhoods had lower or slower degrees of reinvestment and upgrading relative to

neighborhoods with larger white populations, which may be due to factors such as racial inequalities in wealth or biases by external sources of reinvestment. From this perspective, the role of racial-ethnic composition is even more striking, as these neighborhoods' rates of change slowed or stagnated despite initial signs of upward trajectories. These findings may reflect the negative fallout following the expansion of subprime lending that enabled moderate- and middle-income minorities to purchase homes in these areas that may have initially facilitated gentrification in these neighborhoods. Our findings on the slower recovery in these neighborhoods suggest that the inequities of the housing crisis continue to negatively impact the trajectories of these neighborhoods.

Our data suggest that minority gentrification does not result in substantial neighborhood reinvestment overall, a finding consistent with recent research in Chicago (Anderson and Sternberg 2013) and Owens's (2012) national-level results, which show that only about 11 percent of metropolitan-area neighborhoods experiencing socioeconomic ascent from 1990 through 2009 were predominantly black. Our results also highlight the staying power of neighborhood stigma and collective negative appraisals, even for neighborhoods inclined to changing reputations. Although perceived disorder mediates the effect of poverty and, to a small degree, racial-ethnic context, it maintains a direct link to lower gentrification trajectories. In a context where perceived disorder is not tightly bound to observed disorder, the power of shared expectations is enhanced.

*Technology and Advances in Measurement*

Our study offers an alternative conceptual and methodological approach for capturing gentrification, an area of research that has struggled with measurement. Following arguments

that visible cues tap into cultural aspects of gentrification, as well as mechanisms of neighborhood perceptions and residential selection, we took advantage of recent technological developments that have made systematic field surveys a more feasible means for tracking neighborhood change over time. The GGO approach to gentrification is a natural extension of a wider effort to develop sound "ecometric" measures (Raudenbush and Sampson 1999) for ecological contexts using cost-effective online tools that have become widely available. Other investigators are also using Google technology as a new means for understanding neighborhood contexts (e.g., Odgers et al. 2012).

In particular, for measuring gentrification, GGO provides an alternative to census data, from which neighborhood changes are difficult to disentangle, or investment indicators like building permits or home loans, which impose limited definitions of gentrification. We note, too, that urban features widely associated with gentrification, such as density of green roofs and Starbucks locations, are significantly related to our measure of gentrification, even after controlling for poverty and racial composition. Furthermore, the GGO strategy captures a wide range of elements that incorporate the complexities of contemporary gentrification—public and private and small- and large-scale reinvestment, as well as neighborhood aesthetics. Finally, it permits direct assessment of the evolving and expanding nature of gentrification, incorporating the *degree* of gentrification—an important and often overlooked aspect in assessing this phenomenon.

*Limitations and Future Research*

Nonetheless, the GGO approach is clearly limited. Although we made every effort to follow systematic rules for coding, and inter-rater reliability was comparatively high, there is an

undeniable level of subjectivity in determining the nature and condition of visible street-level features. In addition, for theoretical reasons and for comparability with HW's prior gentrification measures, our approach undoubtedly favors physical forms of reinvestment and renewal as important cues of gentrification. While our approach provides a means for capturing visual forms of contemporary gentrification, further research is needed to examine how GGO interacts with changing class composition, community activities, and local discourse about gentrification.

Beyond the limitations of the GGO method, the data-intensive nature of these assessments limited our analysis to one city, and with a small sample and nonexperimental methods, we could not definitively assess causality. In particular, Chicago has a history and geography of racial strife and segregation that may intensify race-based residential preferences. Given the time frame of our observations, our data may reflect higher instances of disorder and decay and lower levels of reinvestment resulting from the disproportionate impact of the housing crisis in these neighborhoods. Future research should explore the role of racial-ethnic composition and neighborhood perceptions, as well as the role of immigrants in neighborhood revitalization, in other cities and time frames.

Spatial aspects beyond the local neighborhood are another area of research we were unable to explore in depth. Our results may reflect a re-concentration of poverty as residents of gentrified neighborhoods are displaced to neighboring minority tracts, or a process of boundary maintenance between disadvantaged minorities and gentrifiers—a reactive process illustrated in Anderson's (1990) ethnographic account of gentrification. In addition, Crowder and South (2008) find that the changing racial composition of contiguous neighborhoods predicts neighborhood out-migration after controlling for local neighborhood conditions and correlates of mobility. An examination of how the composition of surrounding neighborhoods matters for in-

migration would provide further insight. Finally, while we incorporated institutional and state effects arising from forces external to the neighborhood, we recognize that our indicators were not exhaustive. Future research should assess additional extra-local factors, such as zoning changes, political coalitions for development, and school reforms.

**Conclusions**

Our results shed new light on debates about gentrification, racial stratification and the changing U.S. city, and urban social policy. Laissez-faire or state-sanctioned policies that rely on gentrification to improve declining cities and neighborhoods may not reduce concentrated neighborhood poverty if reinvestment occurs far less, or to a lesser degree, in poor, minority neighborhoods. Such a pattern perpetuates, and perhaps worsens, urban inequality. Whiter neighborhoods that tend to gentrify and continue on upward trajectories offer the potential for original low-income residents to receive the benefits of gentrification, although negative consequences such as displacement may be part of the bargain. By contrast, nearby minority neighborhoods tend to remain disadvantaged and isolated, and areas that do show signs of gentrification experience weaker trajectories of reinvestment and renewal compared to their white counterparts. Moreover, the disproportionate impacts of the housing crisis on minority homeowners and minority neighborhoods further erases the potential gains that many of these previously disinvested and declining neighborhoods had made. The reality of gentrification is problematic for low-income minorities, and contrary to many claims, not solely due to displacement—the aspirations of individual gentrifiers notwithstanding, the racialized social order of gentrification leads most poor minority neighborhoods to remain so.

Findings from this study are particularly sobering because a clear implication is that

racial integration that satisfies particular thresholds is the norm, at least in Chicago, before meaningful reinvestment takes place. Interventions that promote racial integration yet protect against displacement and the loss of affordable housing may therefore be necessary to create the possibility for substantial reinvestment. More generally, if urban policy increases its reliance on market-based interventions, with gentrification a leading favorite of city leaders, our findings imply that urban racial inequality will persist, leaving the condition of disadvantaged minorities in place and suppressing opportunities for systemic improvements.

# 3

# Gentrification without Segregation:

# Race and Renewal in a Diversifying City


## Abstract

Past research that asserts a racial order in how gentrification unfolds in the US is based on evidence from contexts of high levels of racial segregation. High levels of segregation, however, make neighborhood racial composition a key factor constraining residential mobility decisions and neighborhood change. Therefore, in cities with low levels of segregation, gentrification may be less likely to unfold along racial lines. I examine patterns of race and gentrification in Seattle neighborhoods to test this hypothesis. Although housing and socioeconomic characteristics and geographic location are important predictors of gentrification, neighborhoods with greater shares of Asians, which also have many of the characteristics that predict gentrification, are less likely to experience gentrification or to continue on upward trajectories of gentrification. The share of blacks is also negatively associated with early gentrification and its trajectory, but to a lesser degree than Asians, and is positively associated with recent gentrification. Thus, a racial hierarchy is evident in Seattle gentrification that runs counter to the traditional racial order that marks US society. The findings suggest changing racial preferences or new housing market mechanisms as Seattle diversifies.



**Keywords**: gentrification, segregation, neighborhoods, race and ethnicity, immigration, Seattle

Gentrification has become increasingly widespread in US cities over the last few decades, generating considerable debate surrounding its negative consequences, particularly for racial and ethnic minorities. While studies of gentrification are now numerous, until recently, few studies considered the role of race in gentrification, despite the importance of race in the development of residential patterns in the US (Anderson and Sternberg 2013; Bader 2011; Lees 2000; Massey and Denton 1993). Studies that do examine race and gentrification in the US generally argue that gentrification follows a racial order, such that minority neighborhoods are least likely to gentrify (e.g., Anderson and Sternberg 2013; Hwang and Sampson 2014; Smith 1996), but these studies are overwhelmingly based in highly segregated settings, such as Chicago and New York City, although less segregated cities comprise a substantial proportion of places in which gentrification occurs. Studies spanning a large number of cities and neighborhoods generally neglect variation in segregation levels across cities, even though studies show that high levels of segregation make racial composition a key factor constraining neighborhood change and residential mobility (Charles 2006; Crowder, Pais, and South 2012; Massey and Denton 1993). Given that segregation levels intensify the degree to which race influences residential patterns, I do not expect to find a negative relationship between minority composition and gentrification in a city with low levels of segregation. This study aims to test this hypothesis to refine our understanding of the role of race in gentrification.

Incorporating additional racial and ethnic neighborhood categories that consider the increasingly multiethnic urban landscape can further advance the study of race and gentrification. Past studies of race and neighborhood change, including gentrification, often consider only broad race categories, such as predominantly white, predominantly black, or racially mixed, which are adequate for studying US cities during most of the twentieth century

(Logan and Zhang 2010). However, the growth of Asians and Hispanics in the US resulting from the massive rise of immigration over the last several decades has drastically altered the racial and ethnic compositions of cities and neighborhoods (Fong and Shibuya 2005). Although research on residential segregation has increasingly incorporated this new diversity (Fong and Shibuya 2005), research on gentrification has not adequately considered how multiethnic settings may affect residential patterns. Qualitative accounts document the importance of racial and ethnic diversity in attracting gentrification to neighborhoods (Berrey 2005; Zukin 1995), but the increasingly multiethnic composition of cities requires greater attention to the broader range of neighborhood types in assessing the role of race in gentrification.

This article contributes to existing literature by examining the relationship between neighborhood racial and ethnic composition and gentrification over several decades in Seattle—a predominantly white city with relatively low levels of segregation compared to other large cities[1] and a small but sizeable black population. In addition, while Asians have been present in Seattle for over a century (Taylor 1994), their numbers have grown substantially in recent decades, along with Hispanics, and surpassed the black population by 1990. Because Seattle has low levels of segregation and relatively small minority shares, it has few predominantly minority neighborhoods. Therefore, if a relationship between neighborhood minority composition and gentrification exists, I expect it to be positive by satisfying gentrifiers' preferences for diversity. As the city diversifies with its rapidly growing Asian and Hispanic populations, influxes of these groups to neighborhoods may make them less likely to gentrify, or neighborhood minority

[1] Across metropolitan areas with over 500,000 residents, Seattle ranked in the bottom third for black-white, Hispanic-white, and Asian-white dissimilarity indices. Calculations by William H. Frey (Brookings Institution) and University of Michigan's Social Science Data Analysis Network using 2010 decennial Census tract data (http://www.psc.isr.umich.edu/dis/census/segregation2010.html).

composition may become negatively associated with gentrification over time. I test these hypotheses across three distinct facets of gentrification: the location of early gentrification, the trajectory of early gentrification, and the location of recent gentrification. By examining a city in which gentrification is prevalent and racial segregation is not, this study broadens our limited understanding of the role of race in how gentrification unfolds.

**Race, Gentrification, and Segregation**

Gentrification is a process by which low-income central city neighborhoods undergo reinvestment and renewal and experience an in-migration of middle- and upper-middle class residents (Smith 1998:198). Therefore, it is a process of residential selection, in which individual households, commercial businesses, state and corporate actors, and/or institutions make decisions to invest in a low-income neighborhood. Over time, the neighborhood experiences a socioeconomic transformation, as middle- and upper-middle class residents and businesses continue to move into the neighborhood, altering the physical, cultural, and political character of the neighborhood.

Accounts of earlier waves of gentrification during the 1970s and 1980s document that gentrification was far more common among non-black neighborhoods (e.g., Smith 1996; Spain 1980; Wilson and Grammenos 2005). Smith (1996) attributes this pattern to the strength of negative reputations surrounding black poverty and public housing. Consistent with this aversion to homogeneously black neighborhoods, Freeman (2009) finds that most neighborhoods that gentrified in this period were racially diverse as early as 1970.

Several accounts of gentrification in recent decades, however, document gentrification occurring in predominantly black and Latino neighborhoods and the contentious race relations

that occur within them (e.g., Hyra 2014; Lloyd 2006; Mele 2000). Hackworth and Smith (2001) argue that the gentrification of the 1990s and beyond, in contrast to the gentrification of the past, takes place in more "economically risky" neighborhoods. While some scholars attribute this to the increased role of the state in facilitating gentrification through pro-development regimes and public housing policies, such as their demolition (Goetz 2011; Hackworth and Smith 2001; Hyra 2012; Wacquant 2008), others have documented the role of middle-class blacks as important actors driving gentrification in black neighborhoods (e.g., Boyd 2008; McKinnish, Walsh, and White 2010; Moore 2009; Pattillo 2007). Studies also suggest that gentrifiers favor racial and ethnic diversity, which should increase the likelihood of gentrification in neighborhoods with greater shares of minorities (Berrey 2005; Zukin 1995). Survey evidence in Chicago on the preferences of urban whites attracted to redevelopment, however, contrasts these claims (Bader 2011), and Berrey (2005) finds that gentrifiers in a Chicago neighborhood who claim to value diversity prefer a limited share of minorities.

While predominantly black neighborhoods experienced small increases in whites from 2000 to 2010 (Freeman and Cai 2015), national trends show that few black and Hispanic neighborhoods experience socioeconomic upgrading or racial turnover (Logan and Zhang 2010; Owens 2012; Sampson 2012). Despite the changes increasingly occurring in minority neighborhoods, gentrification is not the dominant trajectory of minority neighborhoods. Moreover, among neighborhoods that showed signs of gentrification or were adjacent to these neighborhoods in Chicago, those with higher shares of blacks and Latinos experience redevelopment at slower rates than neighborhoods with fewer minority residents (Hwang and Sampson 2014).

Altogether, existing studies find that minority neighborhoods are negatively associated

with the likelihood of gentrification and the degree to which neighborhoods continue to gentrify, though minority neighborhoods have become increasingly more likely to gentrify in recent decades. Given these distinct findings, I examine both early and later waves of gentrification and the trajectory of early gentrification in this study. If residential segregation levels do not condition the relationship between race and gentrification, I expect similar findings in Seattle.

*Segregation and Residential Selection*

Such racialized patterns of gentrification, however, reflect residential selection patterns that are more likely to operate in cities with high levels of residential segregation and relatively large minority populations. Rather than increasing racial integration, larger shares of minorities exacerbate preferences to avoid minority neighbors (Blalock 1967). White and Glick (1999) argue that a similar process occurs in cities with large concentrations of Hispanics or Asians, leading to higher levels of residential segregation. As a result, highly segregated cities contain larger numbers of predominantly minority neighborhoods that have deteriorated housing, greater levels of crime, and lower quality schools, leading residents with greater socioeconomic ability to avoid them (Charles 2003; Jargowsky 1997; Massey and Denton 1993; Wilson 1987).

In addition to neighborhood quality, studies find that residential preferences are structured by a racial order, in which people generally prefer integrated neighborhoods, but favor white neighbors the most, black neighbors the least, and Asian over Latino neighbors in the middle (Charles 2003). Implicit biases against blacks and Latinos, rather than explicit race-based residential preferences, also bolster the avoidance of minority neighborhoods (Ellen 2000; Krysan et al. 2009; Lewis, Emerson, and Klineberg 2011). People tend to associate areas with blacks, and sometimes Latinos, with low neighborhood quality and high levels of crime and

disorder, leading residents to avoid these neighborhoods (Quillian and Pager 2001; Sampson and Raudenbush 2004). Elijah Anderson (2012) argues that predominantly black neighborhoods, in particular, carry enduring stigmas as "iconic ghettos" as a result of their persistence for decades as black and poor and the structural conditions of public housing. Comparing gentrification in a predominantly black and a predominantly Latino neighborhood in Chicago, Anderson and Sternberg (2013) find that outsiders view the Latino neighborhood more positively, and Hwang and Sampson (2014) find that neighborhood perceptions of disorder, in addition to minority composition, negatively influence the trajectory of gentrification in Chicago. These findings suggest that neighborhood reputations have lasting effects in these neighborhoods. With few racially integrated neighborhoods in highly segregated contexts, predominantly white neighborhoods tend to be the primary option satisfying the residential preferences of middle- and upper-class residents.

Taken together, the literature suggests that segregation constrains the degree to which gentrification takes place in racially mixed or minority neighborhoods by affecting residential selection decisions. Limited neighborhood options of various racial and ethnic compositions, intensified race-based residential preferences, and lasting neighborhood stigmas influence residential selection decisions in highly segregated cities. In a city with low levels of segregation and few majority-minority neighborhoods, other factors, such as housing characteristics, socioeconomic characteristics, and proximity to amenities (Ley 1996; Smith 1996), should predict gentrification instead of racial and ethnic composition, as previous work on race and gentrification has found. Therefore, I hypothesize that a negative relationship does not exist between minority group shares in neighborhoods and the likelihood and rate of gentrification in Seattle.

In addition, in a city with low segregation levels, integrated neighborhoods are more likely to exist, and highly concentrated minority neighborhoods are less likely to exist. Although the degree of gentrifiers' preferred diversity may be limited, qualitative accounts depict gentrifiers as attracted to racially and ethnically diverse neighborhoods (Zukin 1995). These findings imply that integrated neighborhoods should be more likely to gentrify than neighborhoods comprised of a single racial or ethnic group. In a less segregated city, where there are more options for diverse neighborhoods and few predominantly minority neighborhoods, I also expect that racially and ethnically diverse neighborhoods are more likely to gentrify than predominantly white neighborhoods.

*Diversification and Residential Selection*

Although Seattle continues to have relatively low segregation levels, it has become increasingly multiethnic: its share of whites dropped from 86 percent in 1970 to 67 percent by 2013.[2] Similar to most major cities, the overall white population declined substantially from 1960 to 1990 and has been steadily increasing since 1990. Its share of blacks has wavered between 7 and 10 percent since 1970 and has generally remained steady in size. The Asian population, on the other hand, has increased rapidly in the last several decades, surpassing that of blacks by 1990. By 2013, Asians comprised 14 percent of the total population and had doubled in size from 1980. The Hispanic population in Seattle more than tripled since 1980 but only comprised 6 percent of the population by 2013.

As a city becomes increasingly multiethnic, residential patterns of mobility also change (Fong and Shibuya 2005). Farley and Frey (1994) argue that, in cities with high levels of black-

[2] Population and migration data presented in this section are author's calculations using US Census and American Community Survey data unless otherwise noted.

white segregation, whites are more willing to live with blacks when other groups are present by serving as buffers to antagonistic black-white relations. In cities with low levels of segregation and growing Asian and/or Latino populations, however, these groups become increasingly segregated as they form their own communities (Fischer et al. 2004; Frey and Farley 1996; Iceland 2004; Logan, Stults, and Farley 2004). Studies also find an increasing aversion to these groups as immigration continues to rise (Sanchez 1997), but this has not been considered in the context of gentrification. Extending these findings to gentrification leads to the following hypothesis: growth in Asian and Hispanic populations in neighborhoods is negatively associated with the likelihood and rate of gentrification compared to neighborhoods without growth in these populations.

Others argue that the growth in the overall minority population, however, leads to greater segregation between whites and all minority groups as whites feel an enhanced motivation to avoid minorities (Blalock 1967; White and Glick 1999). Counter to recent studies based on highly segregated cities that argue that gentrification is increasingly more likely to occur in minority neighborhoods (Hackworth and Smith 2001; Hyra 2012), a racial order may emerge over time in a diversifying city. Thus, I expect that neighborhoods with greater minority shares are increasingly less likely to gentrify over time in Seattle.

**Racial and Ethnic Groups in Seattle**

Before I detail the analyses, I describe the racial and ethnic residential context of Seattle. Figure 3.1 presents maps of racial and ethnic compositions in 1980 and 2013 (based on 2009 to 2013 American Community Survey 5-year estimates, referred to as 2013 hereafter) for Seattle census

block groups.[3] As Figure 3.1 illustrates, Seattle's Asian and Hispanic populations grew substantially over recent decades, concentrating in various areas throughout the city but also having a presence in most other areas. Although there are clusters of minority groups, other groups are also present in these same areas. Indeed, no block groups were majority Asian or Hispanic in 1980, and only 5 percent were in 2013. For blacks, less than 3 percent of block groups were majority black in either year. Even Seattle's International District, a cultural center for the Asian-American community, is not majority Asian. Unlike highly segregated cities, Seattle has few majority-minority and ethnic neighborhoods, relatively more racially diverse neighborhoods, and mostly predominantly white areas.

Although the Asian population in Seattle is relatively large and diverse compared to other major cities, ethnic origins and nativity generally do not distinguish block groups containing Asians. Therefore, I would not observe differences in the likelihood of gentrification due to these factors at the block group- or tract-level. Seattle's Asians were primarily Japanese, Chinese, and Filipino prior to major legislative reforms surrounding immigration in 1965.[4] During this period, the Japanese and Chinese had high rates of business and property ownership and were more socioeconomically advantaged than Filipinos (Taylor 1994). Following 1965, the Chinese and Filipino populations grew rapidly, and Koreans and Vietnamese began arriving in large numbers. Most of Seattle's Asian growth, however, occurred after 1980, and is attributable to these groups' continued growth and new arrivals from Cambodia, Laos, and India. In 2013, 65 percent of Asians were foreign-born, with slightly more from Southeast Asia, and Asians comprised

[3] Block groups are divisions of census tracts and the smallest geographic unit for which the US Census provides demographic estimates. Data using identical boundaries over time are available beginning in 1980 for census block groups and in 1970 for census tracts.

[4] All demographic calculations using data prior to 1970 are from Taylor (1994).

more than half of the foreign-born population.[5] The Asian ethnic groups are generally spread throughout Seattle with Filipinos least concentrated and more often in neighborhoods with higher shares of blacks (see Appendix B). Foreign-born residents and recent immigrants are heavily concentrated in block groups with relatively higher shares of Asians, and both foreign-born and native-born Asians are located in similar areas to each other.

Seattle's Hispanic population has also grown substantially but is relatively small and more socioeconomically advantaged than both Asians and blacks. While I examine population growth for both the Asian and Hispanic populations, the predicted negative effect of these population changes may be greater for Asians, given their larger growth and overall population size and lower socioeconomic status.[6] Only one-third of the Hispanic population was foreign-born in 2013, and about one-third do not have origins in Latin American countries. Approximately half of Hispanics have origins in Mexico, and their growth after 1980 is largely attributable to migrants from Central and South America.

Blacks have comprised a substantial proportion of Seattle's minority population since World War II, which brought large influxes of African-Americans in search of labor opportunities. Despite early claims of Seattle's racial tolerance, both Asians and blacks experienced intense housing discrimination, as the use of restrictive covenants was widespread until the 1968 passage of the Fair Housing Act banned the practice. As a result, most blacks lived in the Central District. Nonetheless, few blocks in the area were predominantly black: many whites and Asians were present. Following 1968, blacks moved to other sections of Seattle,

[5] The remainder came from Europe (15 percent), East Africa (12 percent), Latin America (12 percent), and Central America (9 percent).

[6] Seattle's Asians and Hispanics had a median per capita income of $22,336 and $27,271, respectively, and a poverty rate of 19 and 22 percent, respectively in 1990.

particularly the southeast, and the suburbs, becoming far less concentrated: while 80 percent of Seattle's black population lived in the Central District in 1960, only 38 percent did so by 1980. The deconcentration of blacks may explain observed relationships, if any, between the share of blacks and gentrification. (Taylor 1994).

In addition to living in more racially integrated areas, blacks are more socioeconomically advantaged on average compared to blacks in other major US cities with high levels of segregation. This is consistent with research that finds that segregation has greater detrimental effects for socioeconomic mobility (Chetty et al. 2014). In Seattle, both Asians and blacks have historically high ownership rates (Taylor 1994). In addition, the median per capita income and poverty rate for blacks in Seattle in 1990 was $19,745 (in 2013 constant dollars) and 25 percent, respectively, while these median figures were $16,390 and 30 percent among the 10 most segregated large US cities.[7] As a result, socioeconomic differences between blacks and Asians in Seattle are smaller than in cities with high segregation levels, though this difference between Seattle and other cities is less so today. If racial differences do exist in the likelihood or rate of gentrification in Seattle, I expect that the differences will follow this racial socioeconomic order, with neighborhoods with greater shares of blacks less likely to gentrify relative to neighborhoods with greater shares of Asians.

[7] Segregation ranks are based on the 1990 black-white dissimilarity index, calculated by the Longitudinal Tract Data Base at Brown University (http://www.s4.brown.edu/us2010/segregation2010/Default.aspx).

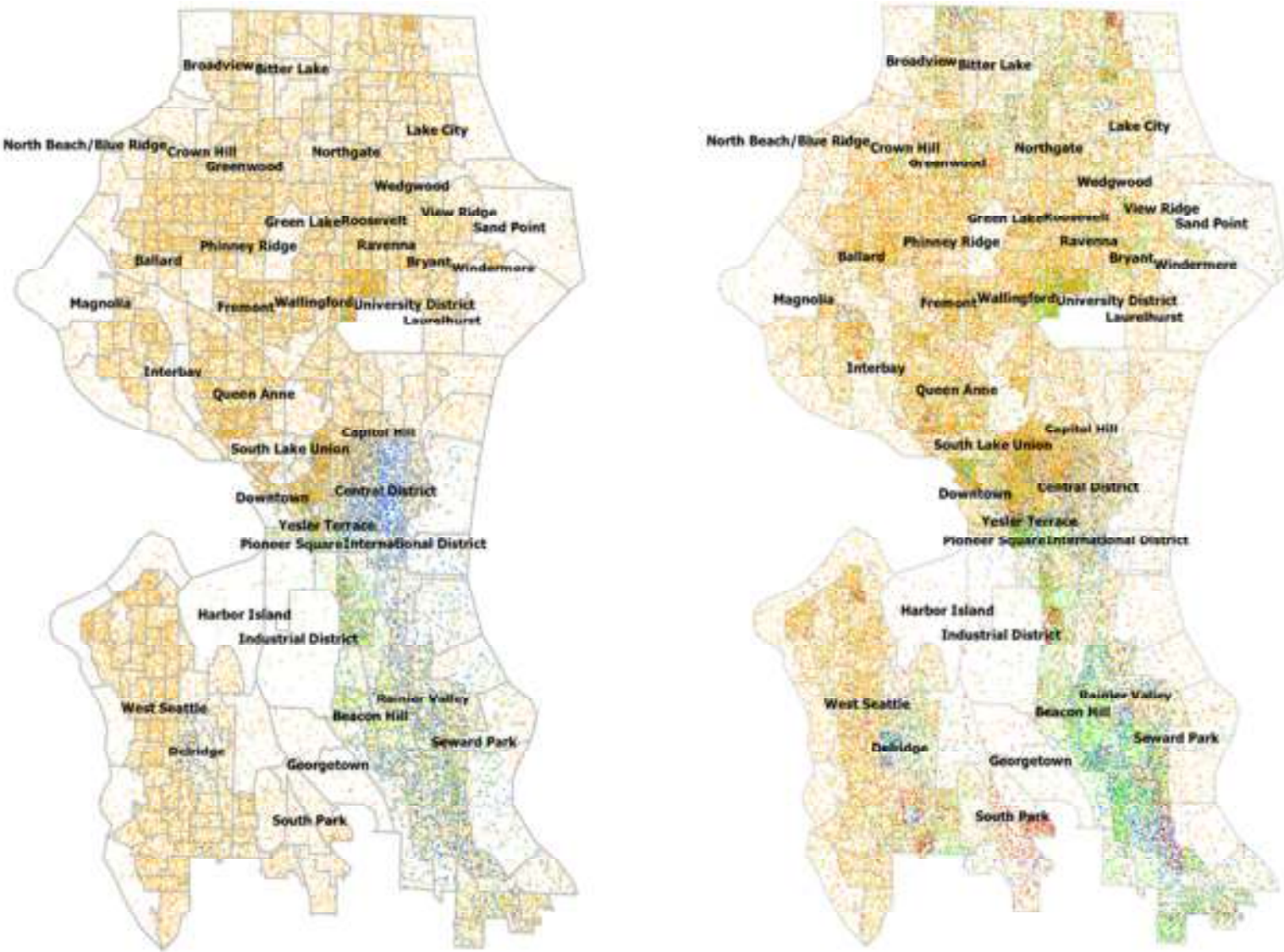



***Figure 3.1.*** *Maps of Racial and Ethnic Groups in Seattle in 1980 (left) and 2013 (right). Green = Asians, blue = blacks, red = Hispanics, orange = whites, 1 dot = 10 persons.*

Lastly, a description of Seattle's racial and ethnic context is incomplete without mention of its public housing. The presence of public housing can deter gentrification by preventing the possibility for higher-income residents to move into these areas through regulations and creating lasting neighborhood stigmas (Anderson 2012). Unlike other major US cities, however, Seattle's public housing is intentionally racially integrated (Taylor 1994). Yesler Terrace, Seattle's largest and only remaining public housing development,[8] originally imposed racial and ethnic group size restrictions, but it primarily houses blacks and Asians. The remaining smaller housing projects, which were all converted to mixed-income housing beginning in 1995, were intentionally built in predominantly white areas. Nonetheless, areas containing or that once contained public housing may be less likely to gentrify.

**Seattle Gentrification**

Accounts of gentrification describe distinct periods occurring since the 1970s, particularly with how gentrification relates to neighborhood racial and ethnic composition in US cities. The early waves of gentrification took place during the 1970s and 1980s and were slow and sporadic, often avoiding minority neighborhoods (Hackworth and Smith 2001; Smith 1996). Following the recession of the early 1990s, gentrification became increasingly rapid and widespread, both expanding upon the slower gentrification that had already taken place and increasingly occurring in economically riskier and minority neighborhoods relative to early waves of gentrification (Hackworth and Smith 2001). Therefore, I separately assess three aspects of gentrification in Seattle and use distinct datasets that best capture each form: 1) the location of early gentrification; 2) the rate and spread of early gentrification in recent decades; and, 3) the location

[8] In 2014, Yesler Terrace began undergoing redevelopment and is being converted to mixed-income housing.

of recent gentrification. While I do not expect to find a negative relationship between minority group shares and gentrification in Seattle across these three facets of gentrification, my last hypothesis predicts that the relationship in recent gentrification may be negative relative to the relationship in early gentrification. I describe the gentrification data, methods, and sample for each analysis below. Data for racial and ethnic, socioeconomic, and housing characteristics are from the 1980 to 2000 decennial US Censuses and American Community Survey 5-year estimates from 2009 to 2013, harmonized to identical boundaries for each analysis.[9]

*Early Gentrification*

To examine the location of early gentrification, I borrow data from an influential survey conducted by geographers Daniel Hammel and Elvin Wyly in 1998 in Seattle (Hammel and Wyly 1996; see also Wyly and Hammel 1998, 1999). While studies often use census-based variables to identify gentrification across multiple cities and neighborhoods, Hammel and Wyly (1996) recognized the shortcomings of this approach. First, these measures often lack direct and distinctly visible indicators of neighborhood upgrading that are inherent to gentrification, such as changes to the built environment, commercial changes, and cultural aesthetics (Hwang and Sampson 2014; Krase 2012; Kreager, Lyons, and Hays 2011; Papachristos et al. 2011). Second, census indicators can capture shifts in the characteristics of the residential population, but these shifts are over 10-year periods and cannot distinguish whether these are due to within-individual

[9] For the first two analyses, to match gentrification survey data, I use harmonized Census data to 2000 Census boundaries from the Geolytics Neighborhood Change Database and harmonized American Community Survey data to 2000 boundaries using the crosswalk file from the Longitudinal Tract Database developed by the Spatial Structures in the Social Sciences at Brown University. A few variables are not available in the Neighborhood Change Database, and I use Longitudinal Tract Database variables instead. I use harmonized Census data to 2010 Census boundaries from the Geolytics Neighborhood Change Database for the third analysis.

or population changes (Hammel and Wyly 1996). Moreover, increases in housing values may simply reflect changes in public housing policies, such as an increased supply of subsidized low-income housing, or price spillovers from neighborhood upgrading in adjacent neighborhoods (Waldorf 1991; Wyly and Hammel 1998).

To more accurately identify gentrification across neighborhoods and cities, Hammel and Wyly conducted block-by-block field surveys across "gentrifiable" census tracts in several US cities during the 1990s, looking for signs of renovation and new construction in building structures and thereby capturing signs of redevelopment. They considered tracts to be gentrifiable in Seattle if they had a median household income in 1970 below the 1970 citywide median, marking when cities in the West experienced large population declines after steady growth in preceding decades. Among gentrifiable census tracts, they considered tracts to be gentrifying if the majority of blocks had at least one improved structure and at least one block in the tract had at least one-third of its structures improved. Hammel and Wyly triangulated their findings with archival resources, such as city planning documents and local press. They also compared their findings to census-based variables, confirming that their observations were highly correlated with expected variables, such as the shares of college-educated residents and professionals, median home values, rents, and incomes. Nevertheless, these same census variables alone also identified some neighborhoods to be gentrifying that they had not identified in their field surveys. Thus, the field surveys more reliably identify gentrification compared to census-based measures.

In Seattle, they considered 41 tracts to be "gentrifiable," of which 22 exhibited evidence of gentrification. Because Hammel and Wyly conducted their field surveys at the tract-level, I use census tracts as the units of analysis in assessing early gentrification. In Seattle, census tracts

span larger geographic areas than in other, denser major cities, but familiar neighborhood identities still span tract boundaries. Figure 3.2 displays a map of the census tracts that were gentrifying by 1998 according to the surveys. Note that most tracts in Seattle were not gentrifiable based on Hammel and Wyly's criterion, particularly the southeastern areas of the city to which a large number of African-Americans moved over the last several decades and have since become gentrifiable by this standard. In 1970, these areas had median incomes slightly above the city-wide median. I assess these areas in the analysis of recent gentrification and supplementary analysis of early gentrification discussed below. Consistent with studies on early waves of gentrification, many of the tracts that were gentrifying by 1998 were located in or near the downtown area and the University of Washington, i.e., University District.

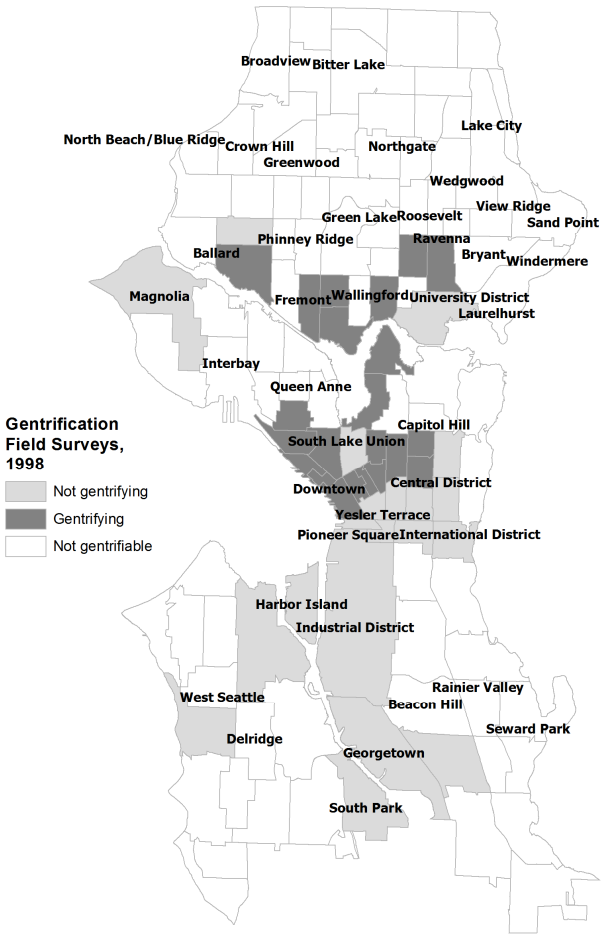



***Figure 3.2.*** *Map of Early Gentrification in Seattle from 1998 Gentrification Field Surveys.*

Table 3.1 presents average racial and ethnic, socioeconomic, and housing characteristics in 1980 and 2000 for the tracts that were gentrifying by 1998, those that were gentrifiable and not gentrifying by 1998, and those that were not gentrifiable.[10] Although gentrifiable tracts were majority white on average, gentrifying tracts had higher shares of whites and lower shares of blacks, Asians, and Hispanics compared to tracts that did not gentrify, similar to patterns in Chicago. In addition, gentrifying tracts had more college-educated residents and professionals, and low residential stability, having lower homeownership rates and higher residential turnover. Although both groups of gentrifiable tracts had similar incomes, rent values, and foreign-born residents in 1980, gentrifying tracts had higher incomes per capita and rents and lower shares of immigrants by 2000. In 1980, gentrifying tracts had similar shares of whites, blacks, college-educated residents, and professionals as non-gentrifiable tracts. Comparisons using 1970 data reveal similar patterns. Compared to both tracts that did not gentrify and non-gentrifiable tracts, gentrifying tracts had lower shares of Asians, children, and homeownership rates and higher shares of new residents and multiunit structures in 1980.

To examine the relationship between racial composition and early gentrification, I use a logistic regression model predicting the binary measure of whether or not a tract was gentrifying by 1998 on composition characteristics in 1980 among gentrifiable tracts, and I control for alternative characteristics that predict gentrification, which I describe in further detail below. Given that only 41 tracts were considered gentrifiable and therefore observed by Hammel and Wyly in their field surveys, I use Firth's (1993) penalized likelihood approach to adjust for bias

[10] Early gentrification in many cities began taking place during the 1970s (Hackworth and Smith 2001). Because 1970 marks the wake of urban decline based on Hammel and Wyly's criterion and Seattle's population did not begin to rebound until after 1980, I present results for this analysis beginning in 1980. The main findings using 1970 data are similar and appear in Appendix B.

in the estimates that can result from having a small sample size and separation—when predictors with values above a certain point have the same outcome.[11] The method uses an alternative function in the maximum likelihood estimation to reduce the bias that occurs in logistic regression that is particularly problematic for small sample sizes and guarantees finite estimates when separation exists.

***Table 3.1 .*** *Average Tract Characteristics in 1980 and 2000 of Early Gentrification Based on 1998 Gentrification Field Survey Categories*

| | Not Gentrifying | | Gentrifying | | Not Gentrifiable | |
|---|---|---|---|---|---|---|
| | 1980 | 2000 | 1980 | 2000 | 1980 | 2000 |
| % white | 53.7** | 48.9** | 83.1 | 77.7 | 83.5 | 72.9 |
| % black | 24.4* | 19.9** | 7.2 | 7.2 | 6.2 | 7.2 |
| % Hispanic | 4.3* | 9.0* | 3.0 | 4.7 | 2.2* | 4.5 |
| % Asian | 12.0** | 19.7* | 2.7 | 9.1 | 4.4† | 14.5** |
| % foreign-born | 15.4 | 22.9* | 11.3 | 12.7 | 10.8 | 15.8* |
| % below poverty | 22.6 | 22.6 | 20.2 | 17.0 | 8.1** | 8.9** |
| Median household income | $47,653 | $47,818 | $46,196 | $50,439 | $73,420** | $76,259** |
| Income per capita | $22,542 | $29,222** | $25,914 | $47,708 | $30,301* | $43,957 |
| % college-educated | 17.7** | 31.5** | 31.1 | 55.7 | 29.1 | 49.3* |
| % professional/managerial | 19.4** | 37.0** | 29.1 | 51.6 | 29.4 | 49.9 |
| Median home value | $167,889* | $301,474** | $220,774 | $451,805 | $224,847 | $402,765 |
| Median gross rent | $658 | $846† | $720 | $960 | $963** | $1,134** |
| % new resident in last 10 years | 73.8** | 76.8** | 83.4 | 86.1 | 62.7** | 65.2** |
| % homeownership | 34.6* | 33.5† | 18.6 | 22.9 | 63.8** | 61.0** |
| % vacant units | 8.4 | 6.2 | 6.7 | 6.8 | 3.5** | 3.5** |
| % multiunit structures | 55.3** | 59.1** | 80.4 | 83.9 | 27.4** | 31.3** |
| % units built over 30 years ago | 65.7 | 70.7 | 66.9 | 64.5 | 55.8** | 74.9** |
| % units built in last 20 years | 22.3 | 20.4 | 22.6 | 26.4 | 24.2 | 15.4** |
| % over 65 years old | 16.1 | 11.7 | 20.5 | 10.5 | 14.9* | 12.9† |
| % under 18 years old | 18.9** | 15.0** | 7.2 | 5.6 | 19.1** | 17.4** |
| N | 19 | | 22 | | 83 | |

Note: **p<0.01, *p<0.05, †p<0.10 (two-tailed t-test). T-tests compare ungentrified tracts to gentrifying tracts and non-gentrifiable tracts to gentrifying tracts. Dollars are in 2013 constant dollars.

*Trajectories of Gentrification*

To examine the rate and spread of early gentrification into more recent decades, I use original data that builds on previous work by Hwang and Sampson (2014). Hwang and Sampson used

[11] Gentrifiable tracts with shares of Asians above 6 percent did not gentrify.

Google Street View—a publicly accessible, free online tool that provides panoramic views of actual streetscapes—to capture various observable aspects of gentrification. Google began collecting images in 2007 and updates them every one to four years. I collected data on the degree of gentrification in neighborhoods that Hammel and Wyly had identified as gentrifying, the adjacent neighborhoods that Hammel and Wyly had found to be ungentrified during their 1998 surveys, and any neighborhoods adjacent to gentrifying tracts that Hammel and Wyly did not observe because they were not gentrifiable in 1970 but became gentrifiable in either 1980 or 1990. This set of census tracts allows me to examine how early gentrification has evolved in recent decades. Overall, I observed the 22 tracts that Hammel and Wyly had identified as gentrifying and 20 adjacent tracts.

I use a revised survey instrument from Hwang and Sampson's original data collection to capture indicators of four main characteristics of gentrification that, taken together, define the neighborhood's stage of gentrification: 1) the condition of physical buildings; 2) the degree of new structures; 3) visible beautification efforts; and 4) the lack of disorder and decay. These characteristics capture both visible changes in the built environment and the overall neighborhood upkeep that reflect reinvestment and renewal activity in a neighborhood and correlate well with socioeconomic characteristics and alternative indicators often associated with gentrification (see Appendix A). Given the increased role of state and corporate actors, as well as large-scale institutions, such as universities, in facilitating development in the recent wave of gentrification (Hackworth and Smith 2001), the visible streetscape also captures both large- and small-scale and public- and private-led developments. Moreover, this approach can capture aspects of gentrification that alternative approaches used to supplement census data, such as building permits (Helms 2003), home loans (Kreager, Lyons, and Hays 2011), and coffee shop

counts (Papachristos et al. 2011), do not necessarily capture.

Using specified coding rules and guidelines, observers navigated Google Street View and coded each side of the block, i.e., block face, for a sample of census blocks from each census tract included in the analysis. A census block is the smallest areal unit defined by the US Census Bureau and is typically a three- to four-sided geographic area bounded by streets, railroads, bodies of water, or other physical features. For each tract, blocks were randomly sampled without replacement until data were collected for at least 20 block faces from at least six different blocks in the tract. Seattle census tracts typically contain 20 to 30 census blocks that have building parcels, as opposed to highways, bodies of water, and parking lots. The Google Street View images used in this analysis were primarily from 2011.

For each block face, I combined indicators into scaled scores that can range from 0 to 1 for each of the four main characteristics and then averaged these measures, resulting in a continuous "gentrification stage score," indicating the degree of revitalization on a block face. I average the gentrification stage scores for all of the block faces of a block, and subsequently average the block stage scores across all of the observed blocks in a census tract. The gentrification stage scores in Seattle for the tracts observed for the analysis had an average of .68 and ranged from .53 to .81. This range is higher and narrower than in Chicago, where Hwang and Sampson (2014) collected similar data, and the variation is relatively smaller (*s.d.*=.08). This difference is likely due to the intensity of gentrification's continuation and spread in Seattle relative to the pace of development in Chicago, where some neighborhoods in the sample disproportionately experienced the negative fallout of the housing crisis, racial and ethnic composition plays an important role in the trajectories of gentrification, and populations are still declining (Hwang and Sampson 2014). Appendix A includes a copy of the coding guide and

survey instrument, item frequencies, results testing inter-rater reliability, descriptive statistics for measures and scores and their reliability properties, construct validity results, and correlations with alternative specifications for the gentrification stage score.

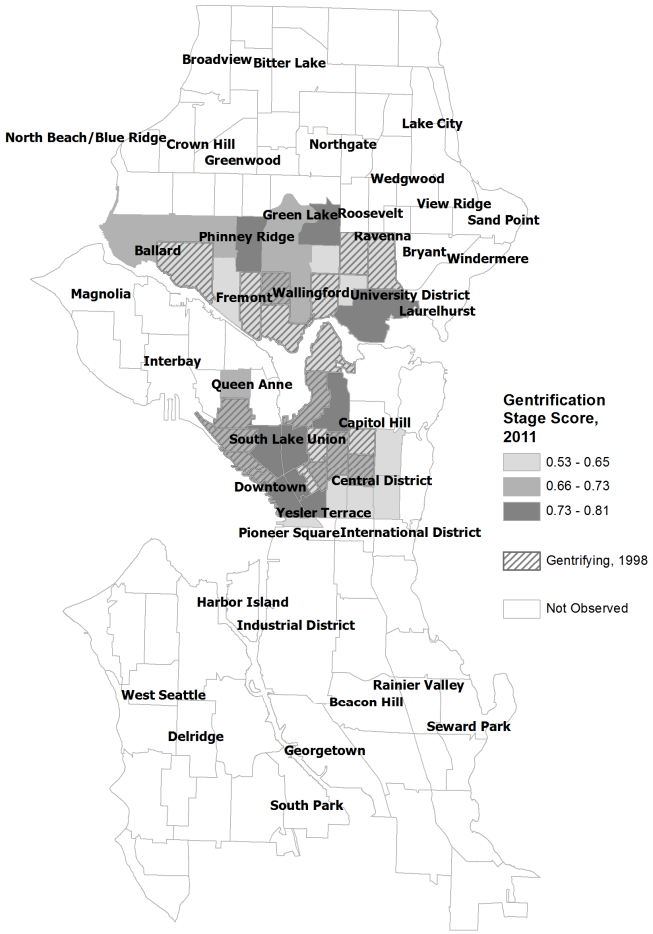



***Figure 3.3.*** *Map of Gentrification Trajectories in Seattle for 2011 Gentrification Google Street View Observations*

Figure 3.3 presents a map of the gentrification stage scores based on 2011 images. Tracts with stripes running through them indicate that Hammel and Wyly had identified them as gentrifying in 1998. The figure shows that tracts that were adjacent to those that were gentrifying in 1998 have particularly higher levels of gentrification compared to tracts that were already experiencing gentrification. Differences in beautification efforts and the lack of disorder and

decay scores, rather than the physical structures, explain this pattern. Tracts that had already gentrified, which had lower scores on these dimensions, had greater proportions of commercial areas and renter-occupied housing, which likely accounts for these differences. Nonetheless, results are similar in models using stage scores that exclude these two measures.

***Table 3.2.*** *Average Tract Characteristics in 1990 and 2013 of Trajectories of Gentrification Based on 2011 Gentrification Google Street View Observations*

| | Below Median | | Above Median | | Not Observed | |
|---|---|---|---|---|---|---|
| | 1990 | 2013 | 1990 | 2013 | 1990 | 2013 |
| % white | 70.4* | 71.5 | 82.7 | 72.4 | 73.3* | 66.3† |
| % black | 16.0† | 6.1 | 5.9 | 4.4 | 9.1 | 7.5* |
| % Hispanic | 3.5 | 5.2 | 3.4 | 6.5 | 3.4 | 6.4 |
| % Asian | 8.4 | 11.6 | 6.0 | 11.2 | 12.7** | 14.7 |
| % foreign-born | 11.3 | 13.7 | 10.2 | 15.4 | 13.9** | 18.2 |
| % below poverty | 21.3 | 20.8 | 18.3 | 16.1 | 10.5* | 11.6 |
| Median household income | $42,471 | $57,544 | $41,970 | $63,598 | $63,562** | $76,091† |
| Income per capita | $26,624** | $39,061** | $35,439 | $51,818 | $34,532 | $43,520* |
| % college-educated | 42.4 | 64.7 | 41.8 | 63.8 | 35.3† | 54.8** |
| % professional/managerial | 34.5 | 54.9† | 36.9 | 61.1 | 35.3 | 54.1* |
| Median home value | $263,118 | $424,747 | $357,981 | $465,461 | $269,902† | $445,969 |
| Median gross rent | $843 | $1,053 | $770 | $1,085 | $984** | $1,035 |
| % new resident in last 10 years | 79.6 | 82.0 | 80.7 | 82.3 | 63.4** | 67.5** |
| % homeownership | 30.0* | 32.0 | 25.9 | 31.0 | 60.3** | 59.4** |
| % vacant units | 6.1 | 6.1* | 6.9 | 8.7 | 4.2* | 6.1* |
| % multiunit structures | 65.0 | 65.0 | 74.0 | 74.3 | 30.8** | 32.7** |
| % units built over 30 years ago | 68.3 | 70.9 | 69.3 | 64.8 | 66.3 | 74.0 |
| % units built in last 20 years | 19.9 | 21.6 | 19.8 | 28.2 | 20.7 | 18.3† |
| % over 65 years old | 12.7 | 12.7 | 16.2 | 15.8 | 16.2 | 18.7* |
| % under 18 years old | 11.6† | 9.3 | 7.8 | 8.3 | 18.6** | 18.7** |
| N | 21 | | 21 | | 82 | |

Note: **p<0.01, *p<0.05, †p<0.10 (two-tailed t-test). T-tests compare tracts with low gentrification scores to tracts with high gentrification scores and non-observed tracts to tracts with high gentrification scores. Dollars are in 2013 constant dollars.

Table 3.2 presents characteristics for tracts below and above the median gentrification stage score from 1990 and 2013, as well as tracts that were not observed.[12] The observed tracts are similar along most socioeconomic and housing characteristics, and they had greater

[12] Although these tracts were observed in 1998, they had been gentrifying for several years and even decades. Given that gentrification began to rapidly expand after the recession of the early 1990s (Hackworth and Smith 2001), I present results for this analysis beginning in 1990. Descriptive data and findings using 2000 data are similar and are presented in Appendix B.

socioeconomic advantage and less residential stability compared to tracts that were not observed. Tracts that had higher levels of gentrification, however, had higher average shares of whites, lower shares of blacks, and higher incomes per capita in 1990 than tracts with lower levels of gentrification, although both groups of tracts still had relatively large shares of whites. Tracts below and above the median stage score had similar racial compositions to each other by 2013.

To examine the relationship between racial composition and the degree of gentrification, I use a weighted least squares regression model predicting tracts' standardized gentrification stage scores, a continuous measure, on racial and ethnic composition characteristics in 1990, controlling for alternative factors predicting gentrification and whether or not the tract was gentrifying by 1998 according to Hammel and Wyly's field surveys. The models are precision-weighted using the number of blocks that were observed for gentrification in each census tract to induce homoscedastic errors.[13]

*Recent Gentrification*

To identify gentrification in recent decades, I rely on a measure using census-based variables. While visible indicators are preferable to census-based measures for identifying gentrification, as I have argued, there are limitations to relying on observable data on gentrification. In particular, systematic measures over extended periods of time are absent. Hammel and Wyly's field surveys were only conducted at one point in time and only when the intensification and expansion of gentrification in recent decades were beginning. Further, Google Street View only began collecting images in 2007, and thus gentrification observations with this approach can only be

[13] Results using a penalized linear regression model with both lasso and ridge penalties yield similar results for the racial composition variables. The change in the Asian population is not statistically significant ($p<.05$) in these models.

conducted after 2007, though gentrification often takes much longer. Census data offers a way to compare similar aggregate measures over time and various units of analysis. Because census tracts are large spatial areas in Seattle, I conduct the third analysis using census block groups.

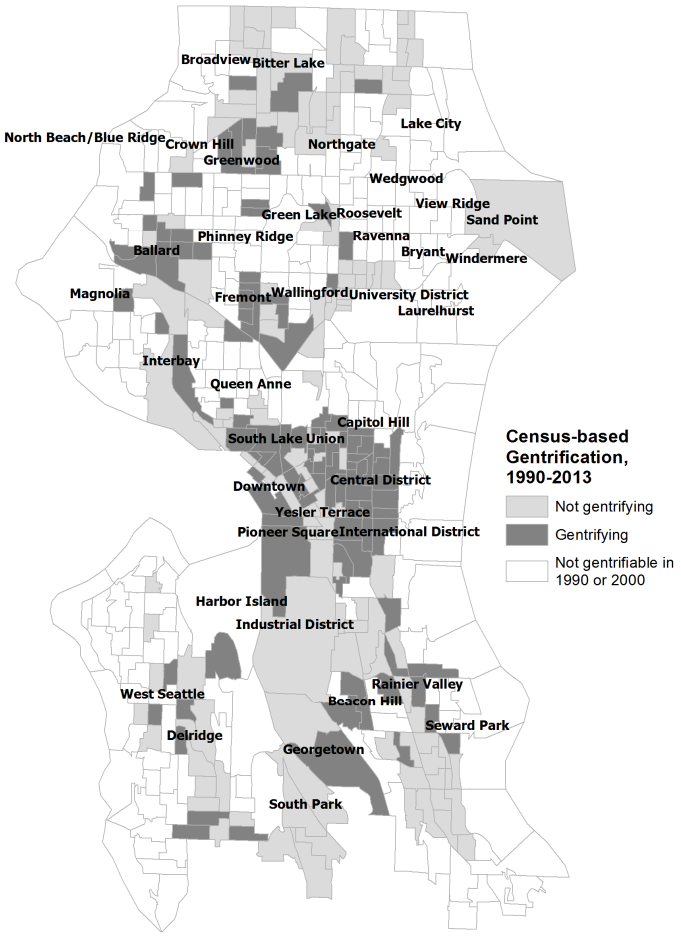



***Figure 3.4.*** *Map of Recent Gentrification in Seattle for 1990-2013 Census-Based Block Group Gentrification Measures*

Following Hammel and Wyly (1996), I first identify block groups that are gentrifiable based on whether their median household income is below the citywide median household

income in either 1990 or 2000.[14] I consider a block group to be gentrifying if it had an above-median increase in either its median rent or median home value and an above-median increase in either its share of college-educated residents or median household income from either 1990 to 2013 or from 2000 to 2013, allowing for both slower and more rapid gentrification.[15] Figure 3.4 displays a map of recent gentrification using this measure. There is substantial overlap with the areas that Hammel and Wyly had identified as gentrifying in 1998, but there is also considerable expansion beyond the adjacent areas observed with Google Street View into non-adjacent areas.

Table 3.3 displays characteristics in 1990 and 2013 for recent gentrification. Among gentrifiable block groups, those that gentrified and those that did not were similar on many dimensions in 1990, including the share of whites and Hispanics, poverty and income levels, college-educated residents, housing and rental values, homeownership rates, and multiunit structures. Block groups that gentrified, however, had higher shares of blacks, lower shares of Asians and foreign-born residents, and an older housing stock in 1990. By 2013, block groups that gentrified had higher shares of whites, college-educated residents, income levels, and ownership rates and lower shares of blacks and Hispanics compared to tracts that did not gentrify—consistent with changes commonly associated with gentrification. These block groups differed from non-gentrifiable block groups on nearly every characteristic. Though whites still comprised nearly two-thirds of the population on average in these block groups, they also had greater shares of minorities compared to non-gentrifiable block groups. In the analysis, I use a logistic regression model predicting the binary measure of whether or not a block group was

[14] I also constructed gentrification measures using gentrifiable tracts based on the metropolitan area median household income, and the main findings are similar. Descriptive statistics and results are in Appendix B.

[15] I developed these measures to best match Hammel and Wyly's survey results using 1970 to 1990 Census data. Comparisons with correlates of gentrification are presented in Appendix B.

gentrifying by 2013 on racial and ethnic composition in 1990, controlling for alternative factors predicting gentrification.

***Table 3.3.*** *Average Block Group Characteristics in 1990 and 2013 of Recent Gentrification Based on 2013 Census-Based Gentrification Measures*

| | Not Gentrifying | | Gentrifying | | Not Gentrifiable | |
|---|---|---|---|---|---|---|
| | 1990 | 2013 | 1990 | 2013 | 1990 | 2013 |
| % white | 64.5 | 53.3** | 65.0 | 64.9 | 82.2** | 76.5** |
| % black | 11.5* | 11.9* | 17.7 | 8.4 | 5.7** | 3.7** |
| % Hispanic | 4.4 | 9.4** | 3.9 | 6.4 | 2.6** | 4.5** |
| % Asian | 17.5** | 19.6** | 11.6 | 14.5 | 8.4* | 10.6* |
| % foreign-born | 18.4** | -- | 13.2 | -- | 10.4** | -- |
| % families below poverty | 4.1 | 7.0** | 3.4 | 3.9 | 0.8** | 2.2** |
| Median household income | $44,549† | $47,060** | $41,867 | $64,341 | $73,403** | $90,352** |
| Income per capita | $27,640 | $31,035** | $28,150 | $42,823 | $40,432** | $51,961** |
| % college-educated | 30.8 | 44.8** | 30.6 | 59.9 | 42.4** | 63.4* |
| % professional/managerial | -- | 44.9** | -- | 54.5 | -- | 60.5** |
| Median home value | $234,505 | $345,731** | $221,929 | $416,426 | $301,518** | $515,206** |
| Median gross rent | $846 | $892** | $815 | $1,039 | $1,083** | $1,206** |
| % new resident in last 10 years | 77.2 | 80.3 | 76.6 | 80.3 | 59.1** | 62.1** |
| % homeownership | 33.5 | 33.9† | 32.5 | 38.1 | 69.5** | 68.7** |
| % vacant units | 5.7* | 6.7 | 6.8 | 7.3 | 3.2** | 5.3** |
| % multiunit structures | 61.7 | 62.6 | 62.7 | 60.8 | 20.1** | 21.7** |
| % units built over 30 years ago | 53.2** | 64.2 | 64.7 | 64.5 | 76.4** | 82.1** |
| % units built in last 20 years | 29.2** | 25.0 | 23.2 | 28.2 | 13.3** | 12.0** |
| % over 65 years old | 14.4 | 11.2 | 15.3 | 10.0 | 16.0 | 12.7** |
| % under 18 years old | 15.7 | 13.9† | 14.5 | 11.5 | 17.4** | 18.5** |
| N | 133 | | 111 | | 231 | |

Note: **p<0.01, *p<0.05, †p<0.10 (two-tailed t-test). T-tests compare ungentrified tracts to gentrifying tracts and non-gentrifiable tracts to gentrifying tracts. Dollars are in 2013 constant dollars. % poverty for individuals is not available for block groups; missing values are not available in normalized block group data.

*Additional Data and Variables*

The main racial and ethnic compositional variables that I include in the models are the shares of Asians, blacks, and Hispanics. To test the hypothesis that racially and ethnically diverse neighborhoods will be more likely to gentrify than predominantly white neighborhoods, I use a dummy indicator for neighborhoods that are less than the share of whites for the city's total population (78 percent in 1980 and 74 percent in 1990). While some studies measure racial and ethnic diversity using entropy indices, it is more plausible that the type of diversity that attracts

gentrifiers in a predominantly white city like Seattle are neighborhoods that are not predominantly white.[16] I also include Asian and Hispanic population changes in separate models to test the hypothesis that these changes are negatively associated with gentrification.

To control for additional factors that may predict variation in where and to what degree gentrification occurs, I construct measures using principal component analysis from relevant factors to deal with the relatively small sample sizes of the analyses. This approach transforms a set of related variables into linearly uncorrelated variables and, therefore, minimizes multicollinearity and preserves statistical power. Previous literature on gentrification identifies characteristics associated with an available, affordable, and older housing supply to which gentrifiers are attracted and provide entry points in neighborhoods for newcomers of higher socioeconomic status relative to its existing residents (Ley 1996; Smith 1996; Zukin 1987). To capture these factors, I include median rent and home value (logged), residential turnover, homeownership rate, vacancy rate, the share of multiunit housing, and the share of buildings over 30 years old in constructing the principal components. Moreover, proximity to downtown and institutions, where jobs are primarily located, may also serve as an important factor for attracting gentrification (Ley 1996). I constructed a measure of the square root of the distance to either Seattle's Downtown or the University of Washington. In addition, while gentrifiers may be attracted to low-cost neighborhoods, among the pool of gentrifiable neighborhoods, neighborhoods that have relatively higher socioeconomic status may be more likely to gentrify or may be in its early stages. Therefore, I also include variables for income per capita (logged), median household income (logged), poverty rate, the share of college-educated residents, and the

[16] Analyses using Blau's diversity index: $D = (1 - \sum i^2) * 100$, where $i$ = {proportion non-Hispanic white, proportion black, proportion Hispanic, proportion Asian, proportion other race}, yield similar results to the findings presented. The diversity index coefficient is negative and statistically significant ($p$<.05) in the models examining gentrification trajectories.

share of residents in professional or managerial occupations.

Using all of the variables mentioned, I obtain the first two components from the principal component analysis for each census year for tracts and block groups. The first component reflects high residential opportunities—such as low housing costs and homeownership; high vacancies, multiunit housing, and older buildings; and close proximity to downtown. The second component reflects high socioeconomic status—such as high shares of college-educated residents and professionals. Together, the first two components explain over 90 percent of the variance for characteristics associated with 1980 tracts, 1990 tracts, and 1990 block groups.[17] Factor loadings and correlations for each variable included in constructing the principal components are presented in Appendix B.

Crime is an additional factor that affects residential selection and therefore may impact which neighborhoods gentrify and their pace of gentrification. For the first analysis examining early gentrification, I use crime rates reported in 1980 by Miethe's Testing Theories of Criminality and Victimization Study in Seattle. Crime rates are not reported for the area occupying the University of Washington, and I therefore exclude it from the analysis. For the second and third analyses examining the expansion and location of recent gentrification, I use tract-level logged crime rates per 100,000 residents reported by the Seattle Police Department in 1996—the earliest and closest year to 1990 for which the tract-level data is publicly available.[18] Crime rates are not available for block groups located in two census tracts that are partially

[17] All models using the first principal components constructed separately for the residential and geographic location variables and socioeconomic status variables yield similar main results. The share of Hispanics is not statistically significant for early gentrification in these models.

[18] In models only including property crimes (burglary and vehicle theft), the main results are similar to those presented. When only violent crimes (homicide, rape, robbery, and assault) are included, the coefficients for the shares of blacks and Hispanics are negative but not statistically significant in models predicting early gentrification.

outside of the city boundaries, and therefore, the three block groups in these tracts are also excluded. The main results are similar for models excluding crime rates and including tracts and block groups with missing crime data.

***Table 3.4.*** *Descriptive Statistics for Additional Variables by Gentrification Measures and Categories*

| | Not Gentrifying/ Low Gentrification | | Gentrifying/ High Gentrification | | Not Gentrifiable/ Not Observed | |
|---|---|---|---|---|---|---|
| | Mean | Std. dev. | Mean | Std. dev. | Mean | Std. dev. |
| Early Gentrification | | | | | | |
| Diversity dummy | 0.68** | 0.48 | 0.23 | 0.43 | 0.18 | 0.39 |
| Distance (in feet) (sq. rt.) | 53.0** | 54.8 | 20.2 | 31.0 | 99.3** | 46.6 |
| First PC (residential opportunity) | 33.9* | 63.4 | 78.2 | 34.8 | -28.5** | 46.9 |
| Second PC (socioeconomic status) | -11.63 | 21.9 | -13.3 | 19.5 | 6.19** | 31.0 |
| Crime rate (logged) | 8.94 | 0.72 | 8.69 | 0.73 | 7.91** | 0.46 |
| N | 19 | | 22 | | 83 | |
| Gentrification Trajectories | | | | | | |
| Diversity dummy | 0.33 | 0.48 | 0.19 | 0.40 | 0.31** | 0.47 |
| Distance (in feet) (sq. rt.) | 40.6 | 36.9 | 25.4 | 39.9 | 101** | 47.7 |
| First PC (residential opportunity) | 48.5 | 42.3 | 65.9 | 51.3 | -29.3** | 47.6 |
| Second PC (socioeconomic status) | -5.63 | 23.6 | -4.62 | 25.3 | 2.63 | 34.3 |
| Crime rate (logged) | 9.24 | 0.48 | 9.57 | 1.15 | 8.80** | 0.60 |
| N | 21 | | 21 | | 82 | |
| Recent Gentrification | | | | | | |
| Diversity dummy | 0.48 | 0.50 | 0.42 | 0.50 | 0.20** | 0.40 |
| Distance (in feet) (sq. rt.) | 91.3** | 62.1 | 68.6 | 53.2 | 103** | 43.1 |
| First PC (residential opportunity) | 15.8* | 66.2 | 34.8 | 60.3 | -25.9** | 44.0 |
| Second PC (socioeconomic status) | -27.5** | 29.9 | -12.6 | 25.2 | 21.8** | 27.4 |
| Crime rate (logged) | 9.25 | 0.66 | 9.36 | 0.68 | 8.64** | 0.40 |
| N | 133 | | 111 | | 231 | |

Note: **p<0.01, *p<0.05, †p<0.10 (t wo-tailed t-test). T-tests compare ungentrified tracts to gentrifying tracts and non-gentrifiable tracts to gentrifying tracts. All early gentrification variables are from 1980, and variables for gentrification trajectories and recent gentrification are from 1990 except crime rates are from 1996.

Table 3.4 presents descriptive statistics for these additional variables for each analysis. Tracts that gentrify early began with lower diversity levels, higher levels of the first principal component, and were closer to downtown or the University of Washington. There were no differences between these tracts' crime rates, but their crime rates were higher than the rest of Seattle. Like the census-based variables presented earlier, the tracts below and above the median gentrification stage score were similar on average for these additional variables. Finally, block

groups that gentrified in recent decades had higher levels of the first and second principal components and were closer to Downtown or the University of Washington. These gentrifiable block groups had higher diversity, residential opportunities, and crime rates, and lower levels of socioeconomic status than the remainder of the city.

**Regression Results**

Table 3.5 presents results testing the relationship between racial and ethnic composition and early gentrification, the rate and spread of early gentrification, and recent gentrification. For each outcome, the table presents results for a series of three racial compositional variables to test the first set of hypotheses: 1) minority composition, using percent black, percent Asian, and percent Hispanic; 2) racial diversity, using a dummy variable for having a share of whites less than the city-wide share; and, 3) Asian and Hispanic population changes in the decade following the baseline variables. I discuss the results pertaining to each hypothesis in turn.

***Table 3.5.*** *Regression Coefficients and Standard Errors Predicting Early Gentrification, Gentrification Trajectories, and Recent Gentrification on Racial and Ethnic Composition*

| | Early Gentrification (Gentrification Field Surveys, 1998) | | | Gentrification Trajectories (Gentrification Stage Score, 2011) | | | Recent Gentrification (Census-Based Gentrification, 1990-2013) | | |
|---|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) |
| | % Minority Groups | Diversity | Δ Asian/Hisp. Population | % Minority Groups | Diversity | Δ Asian/Hisp. Population | % Minority Groups | Diversity | Δ Asian/Hisp. Population |
| % black | -0.10† | | -0.026 | -0.024** | | -0.024* | 0.029** | | 0.031** |
| | (0.056) | | (0.030) | (0.008) | | (0.009) | (0.010) | | (0.011) |
| % Asian | -0.722** | | -0.310** | -0.083** | | -0.096** | -0.040** | | -0.040** |
| | (0.347) | | (0.150) | (0.030) | | (0.028) | (0.012) | | (0.012) |
| % Hispanic | -1.313† | | -0.722† | -0.097 | | -0.123 | -0.029 | | -0.027 |
| | (0.763) | | (0.399) | (0.079) | | (0.077) | (0.039) | | (0.040) |
| Diversity indicator | | -3.170** | | | -0.541 | | | -0.314 | |
| | | (1.328) | | | (0.412) | | | (0.278) | |
| Δ Asian population | | | 0.004 | | | -0.002* | | | -0.002 |
| | | | (0.002) | | | (0.001) | | | (0.002) |
| Δ Hispanic population | | | -0.015 | | | -0.002 | | | -0.001 |
| | | | (0.010) | | | (0.002) | | | (0.002) |
| First PC (residential opportunity) | 0.062** | 0.033** | 0.055** | 0.013** | 0.006 | 0.016** | 0.000 | 0.001 | 0.000 |
| | (0.026) | (0.011) | (0.022) | (0.005) | (0.004) | (0.004) | (0.003) | (0.003) | (0.003) |
| Second PC (socioeconomic status) | -0.046 | -0.010 | -0.045 | -0.011 | -0.004 | -0.014* | 0.017** | 0.018** | 0.016** |
| | (0.048) | (0.023) | (0.037) | (0.007) | (0.008) | (0.007) | (0.006) | (0.005) | (0.006) |
| Crime rate (logged) | 4.286 | -0.394 | -0.009 | 0.107 | 0.217 | 0.206 | 0.060 | 0.110 | 0.084 |
| | (3.086) | (0.732) | (1.784) | (0.200) | (0.219) | (0.195) | (0.242) | (0.233) | (0.243) |
| Prior Gentrification | | | | -1.25** | -0.632 | -1.426** | 0.158 | 0.332 | 0.116 |
| | | | | (0.386) | (0.395) | (0.356) | (0.362) | (0.345) | (0.367) |
| AIC | -21.3 | -14.2 | -16.2 | 114.5 | 125.4 | 108.1 | 311.9 | 326.0 | 313.7 |
| N | | 40 | | | 42 | | | 241 | |
| Model | Penalized logistic regression | | | Weighted least squares regression | | | Logistic regression | | |

Note: **p<.01; *p<.05; †p<.10 (two-tailed test).

*Minority Composition*

I hypothesized that there would not be a negative relationship between minority group shares and neighborhood gentrification in Seattle, given its low levels of segregation. Counter to this hypothesis, the results from Model 1 show that the shares of blacks, Asians, and Hispanics are negatively associated with the likelihood of early gentrification in Seattle census tracts after controlling for residential and socioeconomic characteristics. The coefficient for Hispanics is largest and indicates that a one percentage point increase in the share of Hispanics (*mean*=3.6, *s.d.*=2.1) in a tract reduces the odds of gentrification by 73 percent ($e^{-1.31}$=.27), and the coefficients for Asians and blacks indicate decreases in the odds of gentrification by 51 percent and 9 percent for a one percentage point increases in the shares of Asians (*mean*=6.8, *s.d.*=10.1) and blacks (*mean*=15.4, *s.d.*=22.2), respectively. Given the small sample size, however, the estimates are imprecise, and statistical significance at the $p<.10$ level should be interpreted with caution.[19]

Counter to prior findings exhibiting a racial hierarchy of residential preferences (Charles 2003) and inconsistent with the racial hierarchy of socioeconomic status within Seattle, the negative coefficient for the share of blacks is weaker that the coefficient for the share of Asians ($p<.05$). Indeed, tracts with shares of blacks as high as 44 percent in 1980 eventually gentrified. However, no tracts more than 6 percent Asian ($n$=9) and only one tract more than 6 percent

[19] Alternative analyses for census block groups using census-based gentrification measures with data beginning in 1980 are presented in Appendix B. Early gentrification is not associated with the share of minorities but is negatively associated with changes in the Asian and Hispanic populations. Like models predicting recent gentrification, the share of Asians negatively predicts gentrification trajectories, but the share of blacks positively predicts it. These results are distinct from those presented. These models may better capture variation across minority groups and provide more precise coefficient estimates by having larger sample sizes, but the measures less reliably capture gentrification.

Hispanic ($n$=6) in 1980 were gentrifying by 1998.[20] Areas with higher levels of the first principal component (residential opportunities) were more likely to gentrify, and although neighborhoods with higher shares of blacks and Asians had higher values of this variable on average, those with higher shares of Asians did not gentrify.

Model 4 presents results predicting the degree of gentrification in tracts that were gentrifying by 1998 and their adjacent gentrifiable tracts. Similar to Model 1, the shares of Asians and blacks are negatively associated with the degree of gentrification in a neighborhood. The coefficients indicate that a one percentage point increase in the share of Asians (*mean*=7.2, *s.d.*=6.1) and blacks (*mean*=11.0, *s.d.*=17.5) decreases the gentrification stage score by .08 and .02 standard deviations, respectively, and, like Model 1, the negative effect of the share of Asians is stronger ($p$<.05). Further examination shows that three majority black census tracts that had not gentrified by 1998 drive the results for blacks. The Asian effect, however, is only statistically significant when I include all of the control variables into the models. Thus, while tracts with greater shares of Asians are not necessarily less likely to continue to gentrify, the results indicate racial differences associated with the degree of gentrification in a neighborhood when all else is equal.

Model 7 presents results for the location of recent gentrification across Seattle's gentrifiable block groups. The share of Asians remains negatively associated with the likelihood of gentrification in both the bivariate and full models, and, in contrast to the prior findings, the results reveal a positive association between the share of blacks and gentrification. The magnitude of these coefficients are much smaller than in Model 1, which is not surprising given the greater variation among the sample, more units of analysis, and the less conservative measure

[20] These thresholds are generally low relative to other criterion used for identifying ethnic enclaves (Alba, Logan, and Crowder 1997; Logan, Zhang, and Alba 2002).

of gentrification. The coefficients indicate that a one percentage point increase in the share of Asians (*mean*=14.7 *s.d.*=15.1) decreases the odds of gentrification by 4 percent, and a one percentage point increase in the share of blacks (*mean*=14.4, *s.d.*=18.9) increases the odds of gentrification by 3 percent. The latter findings are consistent with claims that gentrification in recent decades is increasingly occurring in neighborhoods with greater shares of blacks (e.g., Freeman and Cai 2015; Hackworth and Smith 2001; Hyra 2012).

*Racial and Ethnic Diversity*

The second hypothesis predicts that racially and ethnically diverse neighborhoods are more likely to gentrify than predominantly white neighborhoods. The results in Model 2 do not support this hypothesis, indicating, instead, that neighborhoods that are not predominantly white were far less likely to gentrify than their counterparts. The coefficients in Models 5 and 8 examining gentrification trajectories and recent gentrification show a negative but not statistically significant relationship between racially diverse neighborhoods and the degree of gentrification or the likelihood of gentrification in the recent wave of gentrification.

*Asian and Hispanic Changes*

Models 3, 6, and 9 test the hypothesis that neighborhoods with growing Asian and Hispanic populations are less likely to gentrify than neighborhoods with no Asian or Hispanic growth. The results from Model 3 do not support the hypothesis and show no association between changes in the Asian or Hispanic populations and the likelihood of early gentrification. The addition of these variables substantially reduces the size of the coefficients for all race groups. The results for group population changes in other decades (not shown) are similar. Model 6 shows that Asian

population change is negatively associated with the degree of gentrification in a neighborhood, and similar to Model 4, these results are induced when I control for all other factors. The results do not hold if I employ alternative specifications that flexibly control for the baseline Asian population. Thus, it is unlikely that changes in the Asian population are influencing gentrification trajectories in these neighborhoods.

Model 9 shows that changes in the Asian and Hispanic populations are not associated with gentrification. However, changes from 1980 to 1990 for both the Asian and Hispanic populations are negatively associated with gentrification (not shown), and the negative effect of Asians is no longer statistically significant. These results may suggest a period effect: the growth of these populations within block groups deterred gentrification as these populations grew at higher rates across the city during the 1980s, but the share of Asians deterred gentrification in the decades that followed. Additional analyses based on formal tests using a panel dataset of census-based measures for gentrification from 1980 to 2013, however, do not find support for this pattern.

*Changes over Time*

I also hypothesized that neighborhoods with greater shares of minorities are increasingly less likely to gentrify over time. While the results presented use different measures of gentrification, samples, and units of analysis, the results do not appear to support this hypothesis. The share of blacks is positively associated with recent gentrification but not early gentrification, and the share of Asians is negatively associated with gentrification in both periods. In addition, the share of Hispanics is negatively associated with early gentrification and not associated with recent gentrification. Formal tests examining gentrification using the panel dataset of census-based

measures from 1980 to 2013 only indicate statistically significant ($p<.05$) differences in the coefficients for Hispanics between 1990 and 2000 but in the opposite direction from what the hypothesis predicts.

**Assessing Explanations**

Taken together, the results generally do not support the hypothesized outcomes for Seattle, nor are they entirely consistent with previous findings from highly segregated cities. The findings for blacks are consistent with other accounts of gentrification in highly segregated cities: gentrification was less likely to occur in neighborhoods with higher shares of blacks in its early wave and expansion, similar to the findings in Chicago, but was more likely to occur in neighborhoods with greater shares of blacks in recent decades, consistent with some accounts of recent gentrification. Influxes of Asians and Hispanics during the 1980s are also negatively associated with recent gentrification. Despite higher concentrations of blacks, there is a consistent negative relationship between the share of Asians and gentrification, and the effects are larger for Asians than for blacks. Below, I examine possible explanations.

Seattle's public housing developments, which have a substantial share of Asians, may explain the results. Models excluding public housing developments, both with and without Yesler Terrace—the one remaining and largest development, however, do not change the main results for the share of Asians, but the negative effect of the share of blacks on early gentrification disappears. Thus, public housing may explain the negative effects for the share of blacks in early waves of gentrification but does not explain the associations for the share of Asians.

Although few areas had high concentrations of blacks or Asians, majority-black block

groups had higher vacancy rates than majority-Asian ones. Nonetheless, the negative result for the share of Asians remains when these areas are excluded from the analysis, and the positive effect for blacks and recent gentrification is not statistically significant ($p<.10$), indicating that gentrifying majority-black block groups drive the results for the recent wave of gentrification.

Though not majority Asian, the ethnic character of the International District may influence the relationship between percent Asian and gentrification. Neighborhoods that out-groups perceive as enclaves may be less attractive to out-group individuals with greater socioeconomic ability, and, therefore, they may be less likely to gentrify. However, census-based gentrification measures and historical accounts of the neighborhood indicate that this area did indeed undergo gentrification in recent decades (Chin 2001). In models excluding the area, the negative association for the share of Asians remains for early and recent gentrification but is not statistically significant in predicting the trajectory of gentrification.

Although few neighborhoods became Asian enclaves, the negative association of Asian and Hispanic population increases suggests that *signs* of the formation of ethnic enclaves may deter further gentrification. Prior research has argued that residents were more likely to exit or avoid neighborhoods with even small increases in the shares of blacks, associating this with eventual neighborhood decline (Ellen 2000; Taub, Taylor, and Dunham 1984). A similar process may be at work for Asians and Hispanics, or immigrants, in Seattle as it diversifies.[21] Although I cannot directly assess this hypothesis, I examine if neighborhood perceptions are associated with these population shares and changes rather than the share of blacks in neighborhoods. I use two different measures of neighborhood perceptions—disorder and danger—constructed from

[21] The results are similar when substituting percent foreign-born and foreign-born population changes for Asians and Hispanics.

surveys of Seattle residents to assess this possibility.[22] Among gentrifiable tracts and block groups, the 1990 measures are positively correlated with the share of blacks, and the 2003 measures are positively correlated with the shares of all minority groups and Hispanic population changes. However, including the measures in models does not change the results.

Another possibility is that Asians may be more socioeconomically disadvantaged than blacks among the gentrifiable neighborhoods, and thus the association of Asians with lower social class, relative to blacks, explains the negative Asian association with gentrification. However, among the sample of census tracts observed by Hammel and Wyly and excluding those containing public housing, Asians have significantly higher household incomes compared to blacks, and in neighborhoods with relatively higher shares of each respective group, Asians also have lower poverty rates than blacks. Nonetheless, among tracts that gentrified early and their adjacent tracts, black homeownership rates are higher, and for block groups that were gentrifiable in 1990 or 2000, household incomes were higher for blacks. When I include group poverty rates in models, the negative effects for blacks on early gentrification and for Asians on gentrification trajectories disappear, and group ownership rates negate the effect of the share of blacks in predicting the gentrification trajectories. Thus, while socioeconomic differences by race explain the negative effects for the share of blacks in early gentrification and the share of Asians in its expansion, these differences still do not explain the negative results for Asians on

[22] The 1990 measures come from Miethe's survey of 5,302 Seattle residents across 100 of Seattle's 123 populated census tracts and the 2003 measures come from the Seattle Neighborhood and Crime Survey of 3,365 residents across all Seattle tracts. I use scaled measures, aggregated using empirical Bayes estimates, of neighborhood perceptions of danger (based on fear of walking alone at night and a safety rating of the neighborhood for the 1990 survey and concerns with safety, worries of attack, and a safety rating for the 2003 survey) and neighborhood disorder (based on if teens hanging out, vandalism, and abandoned and run-down housing for the 1990 survey and teens hanging out, litter, graffiti, abandoned and run-down housing, and neighbors causing trouble for the 2003 survey were problems).

the location of early and recent gentrification.

It is possible that the relative differences within these groups across the city may matter instead. The sample of neighborhoods included in each analysis contains areas with relatively less owner-occupied housing by Asians compared to the remainder of Seattle but relatively more owner-occupied housing by blacks. However, both the black and Asian median household incomes and poverty rates are much lower and higher, respectively, than non-gentrifiable tracts and block groups.

While other studies have found that transportation access is an important factor attracting gentrification, Seattle did not implement its public transportation system until 2003. I test if the square root of the distance from a tract or block group to the nearest stop along the light rail line that is either completed, under construction, or planned explains the findings in models examining the pace and location of recent gentrification. The results for Asians remain, and the negative effect of the share of blacks on trajectories of gentrification is no longer statistically significant.

Given the large-scale deconcentration of blacks following the passage of the 1968 Fair Housing Act, I also examine if black population changes in the preceding decade explains the findings. While black population changes are negatively associated with gentrification, they do not change the main results.

In summary, beyond observable socieoconomic and residential characteristics, crime rates, public housing, ethnic enclaves, neighborhood perceptions, socioeconomic differences, transportation access, and residential mobility of blacks do not explain the negative association between the share of Asians and the location of early and recent gentrification, but they do explain the associations between the share of blacks and gentrification. I offer two possible

explanations for which the existing data cannot adjudicate. First, explicit or implicit racial biases against Asians and not blacks may be present in residential selection processes of gentrification in Seattle. This counters assumptions about cities with low levels of segregation and qualitative accounts that suggest that negative prejudices were historically evenly distributed between blacks and Asians in Seattle (Chin 2001; Taylor 1994). Increased biases against Asians may be emerging in response to large increases in the Asian population in recent decades. Although group threat theory implies that increased concentrations of Asians or Hispanics result in the increased avoidance of mixed and minority neighborhoods more generally (White and Glick 1999), an increased avoidance of neighborhoods with specific groups is plausible. Such group differences in biases are not consistent with neighborhood perceptions data on disorder and danger. However, these survey questions do not directly assess race-based residential preferences.

Alternatively, although areas with higher shares of Asians tend to have residential characteristics that favor the likelihood of gentrification, such as older housing, low ownership rates, and high shares of multiunit housing, distinct housing markets and conditions may exist in areas with higher shares of Asians that the data used in this study do not detect. Accounts of early Japanese and Chinese immigrants in Seattle and other cities in the West document the high rates of commercial and residential ownership among these groups, enabled by rotating credit associations, in which members of ethnic communities contributed to funds that could then be drawn upon for capital to purchase properties or start small businesses (Light 1972; Taylor 1994). Many of the residential properties were in and around the downtown area and had single-room occupancy units, serving the predominantly male Asian population, who had come to the US for temporary work opportunities (Chin 2001; Taylor 1994). Chin (2001) describes the poor

conditions of Asian-owned properties during the 1960s and 1970s in the International District due to vacancies and absentee landlords. Thus, development may have been slower in these areas due to high renovation costs compared to alternative areas with residential characteristics conducive for redevelopment but with different ownership and property conditions.

Other Asian landlords may also serve growing immigrant populations, rather than selling their properties to developers or rehabilitating the properties to rent at higher rates to middle- and upper-income gentrifiers. Evidence from other cities show that new immigrants rely on co-ethnic networks and employers for information on resources and housing and that ethnic landlords often prefer in-group tenants (Ball and Yamamura 1960; Massey 1988; Wong 1998). These economies often span beyond co-ethnic groups to immigrant groups, more broadly, particularly for ethnic groups with weaker entrepreneurial resources (Light, Bernard, and Kim 1999). For example, high shares of the employees of Asian-owned businesses in the Los Angeles garment industry are Latino immigrants (Light, Bernard, and Kim 1999). In the analyses of recent gentrification, tracts that did not gentrify experienced greater increases in their foreign-born populations relative to other neighborhoods ($p<.05$).

**Conclusion**

Counter to expectations for cities with low segregation levels, the results reflect a racial hierarchy in how gentrification unfolds, but the racial order does not reflect the one found in highly segregated contexts or in US society more broadly. Thus, the results demonstrate that the history and context of residential segregation and immigration in a city are important factors that shape the relationship between neighborhood racial and ethnic composition and gentrification. While I draw on theories and empirical evidence on segregation and how it relates to residential

mobility and neighborhood change to develop my hypotheses, the results do not confirm them. For neighborhoods with higher shares of blacks, the results are similar to those found in highly segregated settings—early gentrification is less likely and the degree to which these neighborhoods continue to gentrify is lower, but recent gentrification is more likely. Nonetheless, the negative association between share of Asians and gentrification is stronger than for the share of blacks and is persistent over time, in contrast to past studies of gentrification and residential inequality by race.

The findings suggest alternative mechanisms that the literature on gentrification has not considered but are important for explaining the uneven patterns of development by race. First, they suggest that the influx of Asians and Hispanics associated with rise of immigration may elicit nativism, trumping prejudices against neighborhoods with greater concentrations of blacks, contrary to the racial order documented in past studies of race-based residential preferences (Charles 2003). Given that the Asian and Hispanic populations have grown in recent decades at unprecedented rates, updated understandings of race-based residential preferences, including distinguishing between ethnoracial and nativity-based preferences, are necessary. Second, the findings suggest that landlords, their incentives, and behaviors, which have generally been understudied in sociological literature despite the importance of their role as both gatekeepers to housing and mediators of market forces (Desmond 2012; Gilderbloom 1989; Rosen 2014), and immigrant entrepreneurship, which have not been considered in relation to gentrification (Waldinger 1989; except see Godfrey 1988), may also play a role in explaining uneven patterns of gentrification. Further research should examine the role of these actors in gentrification and, more generally, neighborhood change, particularly as immigrants play increasingly important roles in shaping housing dynamics (Vigdor 2014).

Such alternative mechanisms in shaping patterns of gentrification have important implications for neighborhood inequality, particularly for African-Americans. In Seattle, neighborhoods with higher shares of blacks were more likely to gentrify in recent decades, and these neighborhoods experienced declines in their black populations over the last two decades. If race-based residential preferences and distinct housing markets exist that preserve affordable housing for incoming immigrants and co-ethnics, then affordable housing will decline disproportionately for minority populations that do not have similar capital within co-ethnic communities, thereby producing the social order that has traditionally marked inequality in the US. Thus, as Seattle diversifies, the familiar racial order that marks neighborhood inequality in other highly segregated cities may emerge; however, the mechanisms producing this pattern are more complex than existing literature suggests.

Both the measures and analyses are not without limitations. While the measures that rely on visible characteristics of gentrification are more reliable than census-based measures at detecting gentrification, they are limited to census tracts as the unit of analysis. Seattle's relatively small number of tracts, as well as the small number of gentrifiable tracts, limits the first two analyses to very small sample sizes. Although I employed statistical practices to deal with the limited sample sizes and made efforts to carefully describe the distinct characteristics of the samples, the coefficient estimates in the analyses of early gentrification and its trajectories are imprecise. Another limitation of small sample sizes is that I am only able to use a limited set of control variables simultaneously. I selected and constructed variables based on theoretically relevant factors and examined individual factors separately, but it is possible that particular features that comprise the principal components may explain gentrification better if I had considered them separately.

In addition, although the measures that rely on visible indicators are more reliable than census-based measures at detecting gentrification, they also place greater emphasis on the physical features of neighborhood reinvestment and renewal. While this approach provides measures that correlate well with socioeconomic characteristics associated with the process, it does not necessarily capture cultural activities, population changes, and local discourse that are also part of gentrification. Moreover, these gentrification measures only capture one point in time, thus limiting causal inference. As Google continues to collect images, researchers will be able to use similar survey instruments to assess changes over time. Lastly, although the technology makes systematic social observation of streets much easier than before, data collection and coding are still time consuming and costly. Developments in automated visual coding methods and expanded efforts to collect information on neighborhood characteristics across cities would advance measurements of gentrification, as well as neighborhood change.

Beyond the limitations of the data, the analysis is limited to one city with both low segregation levels and few predominantly minority neighborhoods. While this analysis builds on our current understandings of gentrification and race, which largely stem from evidence in highly segregated cities with many minority neighborhoods, other cities, like those in the Sunbelt and new immigrant destinations, have distinct underlying racial structures and immigrant histories for which other patterns may emerge. Studies of these cities and multicity analyses of city- and metropolitan-level segregation, minority group size, and immigration effects on neighborhood-level changes would shed light on the increasingly dynamic and complex processes of residential selection and gentrification.

Despite limitations, the results from this study offer insights for debates surrounding gentrification and racial and ethnic inequality. As gentrification has become a highly contentious

topic in public discourse, empirical research still lags behind in explaining both its causes and consequences, particularly when it comes to racial and ethnic change. Understanding the uneven patterns of development and its mechanisms are necessary for abating the negative consequences that come with gentrification and fostering solutions for equitable development.

# 4

# Conclusion

The evidence presented in this dissertation demonstrates that race and ethnicity are important factors organizing how neighborhood gentrification unfolds in US cities. Moreover, how race and ethnicity matter depend on cities' contexts of race and immigration. Despite the increasingly widespread characterization of gentrification as targeting predominantly minority neighborhoods and claims of its embrace of racial and ethnic diversity, gentrification follows a racial order in both its location and pace, thereby leaving most minority neighborhoods behind. While previous research has documented several mechanisms contributing to the persistence of poor, minority neighborhoods, such as discriminatory institutional practices, neighborhood selection, and social reproduction, the findings presented in this dissertation shed light on how the pace and place of gentrification serve as additional processes contributing to this durable hierarchy of neighborhoods by race.

Drawing on the insight from classic urban sociological theory that neighborhoods are interdependent, I looked beyond neighborhoods that persistently remain poor and examined the racial and ethnic dimensions of one major aspect of contemporary urban change—gentrification—to better understand the stability of poor, minority neighborhoods. In doing so, I proposed an alternative framework for conceptualizing gentrification as a process of residential selection by multiple actors, incorporating sociological literature on residential stratification to advance the theoretical understanding of the role of race in gentrification. I also considered the rise of Asians and Latinos following the passage of the 1965 Hart-Celler Act as an integral part

of studying how gentrification evolves along racial and ethnic lines and took seriously the distinct racial and ethnic structures of cities—shaped by demographic and economic shifts, immigration flows, and histories of racial strife—that condition neighborhood racial and ethnic compositions and their socioeconomic trajectories. Further, I argued that visible indicators capture the characteristics and degree of reinvestment and renewal inherent to gentrification and facilitated by a variety of actors more reliably than publicly available administrative data. I borrow field survey data on gentrification collected by geographers Elvin Wyly and Daniel Hammel during the 1990s to capture the early gentrification that took place during the late 1970s and 1980s. To assess variation in the rate and spread of gentrification in recent decades, I took advantage of the recently developed Google Street View to introduce a method for measuring the degree of gentrification in neighborhoods.

Using these theoretical and empirical approaches, I examined various aspects of gentrification in the three preceding empirical chapters to assess the role of race and ethnicity in how gentrification unfolds. The first chapter analyzed the neighborhood locations of the early wave of gentrification across 23 large US cities. The second chapter focused on the trajectories of neighborhoods that had gentrified during this early wave in Chicago—a city marked by high levels of racial segregation between whites, blacks, and Hispanics. The third chapter examined the location of both early and recent waves of gentrification, as well as the trajectories of early wave gentrification, in Seattle—a city characterized by low levels of racial segregation and recent diversification. In addition to the gentrification data described above, I also relied on US census and American Community Survey demographic and housing data; crime reports; neighborhood surveys from the Project on Human Development in Chicago Neighborhoods, the Seattle Testing Theories of Criminality and Victimization Survey, and the Seattle Neighborhoods

and Crime Survey; systematic social observations from the Chicago Community Adult Health Study; foreclosure risk data from the Department of Housing and Urban Development; and various spatial data, such as public transportation and public housing locations. I primarily use regression analyses in all three chapters to test hypotheses relevant to each aspect of gentrification examined.

The main findings from these chapters advance our understanding of residential stratification, race and gentrification, and immigration in several ways and offer new directions for future research. First, I demonstrated that there is a racial order to gentrification in its location and pace and in cities with both low and high levels of segregation, consequently leaving particular low-income, minority neighborhoods ungentrified. Across 23 US cities, among low-income neighborhoods, black neighborhoods that did not gain Asians or Latinos by the early 1970s and neighborhoods with large Latino gains remained ungentrified through the 1990s. In Chicago, even among neighborhoods that did gentrify by the 1990s and low-income neighborhoods adjacent to them, those with greater shares of blacks and Latinos gentrified at slower rates and even declined by 2011. In Seattle, however, neighborhoods with greater shares of Asians, the largest minority group in the city, were least likely to gentrify in both the early and recent waves of gentrification. The low-income neighborhoods with greater shares of Asians in Seattle are not marked by durable poverty, which I discuss more below, but the findings across several cities and in Chicago demonstrate how the unevenness of gentrification contributes to the persistent disadvantage that many black and Latino neighborhoods experience.

More broadly, this dissertation advocated for the examination of urban processes beyond poor neighborhoods and the processes that take place within them to advance understanding of how they remain poor. To do this, I focused on one aspect of urban change, tying in immigration

and the recent housing crisis, but further research on the direct links between these major urban changes, as well as the increased suburbanization of poverty, and their relationship to housing markets are important for advancing research on urban inequality by race in today's dynamic cities.

Second, the findings showed that post-1965 immigration and the growth of Asians and Latinos in cities are important factors for advancing our understanding of race and gentrification. The results from Chapter 1 suggest that Asians and, in some conditions, Latinos, served as early pioneers in low-income, declining urban neighborhoods, bringing economic and social stability and racial and ethnic diversity to areas, subsequently attracting gentrification. In Seattle, while areas with greater shares of blacks were more likely to gentrify in recent years, neighborhoods with greater shares of Asians were consistently least likely to gentrify, despite having similar socioeconomic and housing characteristics when compared to other neighborhoods that gentrify. Yet, these neighborhoods were neither ethnic enclaves, based on their mixed racial compositions, nor areas of persistent poverty. These results suggest that distinct ethnic housing markets and landlords, either indirectly or directly, can also prevent gentrification in particular areas. For example, Asian landlords in Seattle may have indirectly prevented gentrification in neighborhoods by renting and selling their properties through informal networks to co-ethnics. Alternatively, gentrifiers may have a greater aversion to neighborhoods with greater shares of Asians compared to neighborhoods with greater shares of blacks in response to their rapid growth.

While the scope of this research does not uncover the mechanisms by which Asians and Latinos influence processes of gentrification, future research should explore this. The growth of these groups, as well as foreign-born blacks, and the continued rise of immigration affect

neighborhood dynamics and pressures for affordable housing, which have important implications for gentrification. In particular, greater attention to the role of landlords, especially ethnic landlords, would inform our understanding of how gentrification and ethnic housing markets are interrelated. Moreover, the increasing diversity of neighborhood compositions by race, ethnicity, and nativity that comes with post-1965 immigration calls for updated research on race-based residential selection processes that takes nativity into account.

Third, the findings from this dissertation suggest that the role of race in gentrification at the neighborhood-level is conditional on city-level racial structures and immigration flows. The results from Chapter 1 showed that early presence of Hispanics was only positively associated with gentrification in cities with low levels of post-1965 immigration across the 23 cities examined, and gentrification in Chicago and Seattle revealed starkly different patterns by race. Although differences in segregation levels motivated my comparison between these two cities, they also differ in many ways beyond segregation levels. Future research should study the role of race and gentrification in cities with other racial structures, such as high levels of Hispanic segregation and small black populations, or conduct multi-level analyses across the US that considers city or metropolitan area characteristics that influence neighborhood-level patterns of gentrification.

As gentrification continues to expand and the number of immigrants arriving to cities rises, the persistence of poor, minority neighborhoods appears to be weakening. Indeed, neighborhoods with greater shares of blacks, which had greater levels of poverty on average than other neighborhoods, were more likely to gentrify in Seattle in recent decades, and others have documented the expansion of gentrification into predominantly black neighborhoods in recent years. Thus, in cities with high demands for affordable housing, keeping vulnerable residents in

place should be a policy priority. Using creative funding solutions, cities can increase the supply of affordable housing to meet the incoming demand and prevent property tax and rent increases for long-term, low-income residents in gentrifying neighborhoods.

While gentrification has increasingly become central to debates about urban inequality, public discourse surrounding the persistence of poor, minority neighborhoods has decreased. The research presented in this dissertation demonstrates that the patterns of gentrification are part and parcel of the persistence of minority poverty. Though residential stratification looks difference across cities, gentrification occurs unevenly along racial and ethnic lines. Indeed, gentrification is not the primary trajectory of poor neighborhoods, especially for neighborhoods with greater shares of minorities. Therefore, while public discourse and debate surrounding low-income urban residents has focused on their displacement from the neighborhoods that gentrify, policy should not neglect the fact that most minority neighborhoods have been persistently disadvantaged and left behind for decades, despite the spread of gentrification. These neighborhoods need the reinvestment and renewal that other neighborhoods with more favored racial and ethnic compositions get first. This reinvestment and renewal needs to be sustained and intended to benefit the low-income residents in these areas, rather than solely to attract higher-income residents only to displace its original residents. By considering the consequences of gentrification more broadly, ecologically speaking, my research thus informs how we can confront urban inequality more effectively in today's rapidly changing cities.

# Appendix A

## Google Street View Gentrification Observations Supplementary Material[1]

[1] Material for Wave 1 data collection in Chicago also appears in the online supplement for the publication: Jackelyn Hwang and Robert J. Sampson. 2014. "Divergent Pathways of Gentrification: Racial Inequality and the Social Order of Renewal in Chicago Neighborhoods." *American Sociological Review*, 79(4):726-51. The online supplement is available at http://asr.sagepub.com/content/79/4/726/suppl/DC1.

***Figure A.1.*** *Wave 1 Google Street View Gentrification Observations Coding Guide for Chicago*

Figure A.1 (Continued)

**Coding Guide and Visual Demonstration of Google Gentrification Observation in Chicago**[1, 2]

**Example block face 1**
Address: 815 North Cambridge Avenue

**Example block face 2**
Address: 524 North Bishop Street

**Example block face 3**
Address: 1445 South Peoria Street

**Example block face 4**
Address: 1318 West Melrose Street

**To interactively explore Google Street View (using the classic version of Google Maps) with the example block faces:**

1. Enter https://maps.google.com/ in your web browser.
2. Type the street address listed for each example in the map search bar at the top of the screen and press "enter." The map will center to the address you entered.
3. Drag the "pegman" (the orange figure below the compass and above the zoom bar on the upper-left-hand side of the map) to one end of the block face. This will bring your screen to the Google Street View application.

[1] Using Google Street View to observe gentrification is part of an ongoing project. Updated instrument and coding guide are available at: http://scholar.harvard.edu/jackelynhwang/projects/ggo.
[2] The detailed characteristics for each indicator of the instrument described are specific to Chicago, although the GGO instrument was also tested in Boston, MA and Philadelphia, PA with similar results overall. However, due to variation between cities in building stock, public infrastructure styles, and land markets, we recommend that the specific characteristics used to identify each indicator be adjusted accordingly.

Figure A.1 (Continued)

4. To move forward and back along the street, use the up and down arrow keys on your keyboard or click along the street with your mouse. To get panoramic views, use the right and left arrow keys on your keyboard or drag on the screen with your mouse. To zoom in and out, use the scroll button on your mouse, click off the street with your mouse, or click on the "+" and "—" buttons below the compass in the upper left-hand side of the Google Street View screen.
5. Because block faces are only a single side of the street, only code the side of the street in the relevant census block unit.

**Example Block Face 1: 803–869 N. Cambridge Avenue, Chicago, IL 60610 (East block face)**
Block-face stage score: .41; Tract stage score: .47

| | | | |
|---|---|---|---|
| L1. 1 | N3. 0 | B2. 0 | D3. 0 |
| P1. 0 | N4. 0 | B3. 1 | G1. 2007/2009 |
| N1. 0% | N5. 0 | D1. 0 | G2a. 1 |
| N2. 1 | B1. 1 | D2. 1 | G2b. No diff. bt yr |

**Example Block Face 2: 508–579 N. Bishop Street, Chicago, IL 60642 (East block face)**
Block-face stage score: .58; Tract stage score: .60

| | | | |
|---|---|---|---|
| L1. 1 | N3. 0 | B2. 1 | D3. 1 |
| P1. 0 | N4. 0 | B3. 1 | G1. 2009 |
| N1. >50% | N5. 0 | D1. 0 | G2a. 0 |
| N2. 1 | B1. 0 | D2. 1 | G2b. n/a |

**Example Block Face 3: 1445–1519 S. Peoria Street, Chicago IL 60608 (West block face)**
Block-face stage score: .88; Tract stage score: .75

| | | | |
|---|---|---|---|
| L1. 0 | N3. 1 | B2. 1 | D3. 1 |
| P1. 0 | N4. 1 | B3. 1 | G1. 2009 |
| N1. >50% | N5. 0 | D1. 1 | G2a. 0 |
| N2. 1 | B1. 0 | D2. 1 | G2b. n/a |

**Example Block Face 4: 1300–1386 W. Melrose Street, Chicago, IL 60657 (North block face)**
Block-face stage score: .94; Tract stage score: .81

| | |
|---|---|
| L1. 1 | G2a. 0 |
| P1. 1 | G2b. n/a |
| N1. 11-50% | |
| N2. 1 | |
| N3. 0 | |
| N4. 0 | |
| N5. 1 | |
| B1. 0 | |
| B2. 1 | |
| B3. 1 | |
| D1. 1 | |
| D2. 1 | |
| D3. 1 | |
| G1. 2009 | |

Figure A.1 (Continued)

**Detailed Description for Each GGO Instrument Item**[3]

***L1. Primary land use (residential, commercial, institutional, mixed [residential/ commercial/ institutional], industrial, other [e.g., highway])***

This code categorizes the primary land use for a block face and includes the intended use of areas set for construction or under construction if distinguishable (e.g., based on signage). "Residential land use" consists of structures that appear to be used as single- or multi-family dwellings, including public or subsidized housing. "Commercial land use" consists of structures that appear to be used as office or retail space. "Institutional land use" consists of structures that appear to be used primarily as schools (including nonresidential university buildings), religious institutions, and medical facilities. A block face is coded as "mixed-use" if more than one of the first three listed land uses is present for at least one-third of the structures of the block face, including areas set for or under construction with the intended land use distinguishable. "Industrial land use" consists of structures that appear to be used for manufacturing, assembly, and warehouse. "Other" consists of any land uses not included above (e.g., highways, subway and railway tracks, parking lots and garages, stadiums, recreational parks and fields, brownfields, undeveloped vacant lots, miscellaneous green space between highways, and rail tracks). We also coded land uses as "other" if there was no Google Street View access to the block face and land use was indistinguishable. **We only observed and coded residential, commercial, and mixed land use block faces for the remaining instrument items.**

For the following two instrument items, coders first categorized structures from the exterior as older structures versus new construction or renovation. We used the following characteristics as guides for determining if a structure was "new":

- modern design: sleek, geometric, glass or steel exterior materials, lack of ornate detailing around window frames and façade, lack of aluminum siding
- sandblasted brick: unstained and bright
- reconstructed or restored porches and balconies, window frames, and doors: fresh paint, well-kept and attractive, modern design
- new signage (e.g., house numbering)

For large-scale multi-family dwellings (100+ units), we used the following characteristics to determine if a structure was "new":

- modern design: sleek, geometric, glass or steel exterior materials, large windows, rectangular, no concrete
- new balconies: fresh paint, well-kept and attractive, modern design
- new signage (e.g., building name), entryways, and walkways: no cracks in pavement, fresh paint, modern design

For commercial units, we used the following characteristics to determine if a structure was "new":

- modern design: sleek, geometric, glass or steel exterior materials, lack of ornate detailing around window frames and façade, lack of aluminum siding
- sandblasted brick: unstained and bright

[3] We only coded parcels on the block face and ignored structures and indicators that were visible from the observed block face but were part of parcels on adjacent block faces.

- reconstructed or restored window frames and doors: fresh paint, well-kept and attractive, modern design
- new signage

Because commercial uses can change frequently and undergo renovation with each change, buildings with mixed uses may have "new" (rehabbed) commercial structures with older residential units.

For all land uses, at least two characteristics should be present to be considered as "new." In addition, structures must not have peeling of faded paint, obvious necessary structural repairs, or deteriorated or discolored siding or brick. If buildings are undergoing construction or major rehabilitation at the time of observation, we considered these as "new."

These characteristics are consistent with accounts of gentrification as a process of preservation and restoration of older homes and converted-use warehouses, as well as new-build gentrification of modern home construction and condominiums. Because our working definition of gentrification entails reinvestment and renewal, we consider any new construction, both modest and luxury quality, as reinvestment in a neighborhood. We categorize structures that do not fit this description as older.

***P1. For land uses that are not new, most or all appear to be in good condition (well-kept, attractive, and sizeable)***

The purpose of this indicator is to determine the preexisting structural condition of the block face, particularly if structures on the block face have been in good condition for an extended period of time. For this instrument item ($P_1$), we coded block faces as 1 if at least 75% of the homes categorized as older are "well-kept, attractive, and sizeable." We used the following characteristics to determine if a structure was "well-kept, attractive, and sizeable":

- absence of peeling or faded paint, no obvious structural repairs needed, and no deteriorated or discolored siding or brick
- porches and balconies, windows and frames, doors, signage (e.g., house numbering, business signage), entryways, storefronts, and walkways beyond basic design or décor
- large enough to comfortably house at least a family of two adults with children

Because it is sometimes difficult to distinguish between new construction/rehabilitation and older homes that are well-kept, attractive, and sizeable, we combine the scores for the condition of older homes ($P_1$) with the degree of new structures ($N_1$, $N_2$, $N_3$, $N_4$, and $N_5$) to form a "structural mix" score for determining the neighborhood stage score, as described in the main text. A block face categorized as having most of its older homes in well-kept, attractive, and sizeable condition would receive the same structural mix score as a block face with all of its homes, both new and old, in well-kept, attractive, and sizeable condition, even if the coder only categorized a fraction of the homes as older. In addition, the block face would receive a similar structural mix score if we categorized all of the structures as newly constructed or rehabilitated.

We coded each example block face for the $P_1$ indicator as follows:

- Ex. 1: We coded this block face with a 0. We categorized all of the structures as older with a lack of modern design, no sandblasted brick, no new signage or walkways, and the presence of deteriorated brick. Furthermore, the deteriorated brick and basic design of

windows and frames, doors, and entryways, as well as the small size of units based on the spacing between exterior doors indicate these are not all well-kept, attractive, and sizeable units.

- Ex. 2: We coded this block face with a 0. We categorized most of the structures as newer except for one tan house, due to its lack of modern design and sandblasted brick. This structure is well-kept and has some features that are beyond basic design or décor (e.g., window frames and entryway), but it appears to be a split-level home and is of modest size. One could arguably consider this home to be rehabbed within the past 10 to 15 years—with its newer entryway and window frames—and if this was the case, the block would still receive the same structural mix score. While relatively modest in design (rather than luxury), we categorized the townhomes in the image as newly constructed. Another apartment building on the street is difficult to distinguish between older and newer, but based on its sandblasted brick and the absence of peeling paint, no obvious structural repairs needed, and no deteriorated siding or brick, we categorized the building as having been constructed or rehabilitated within the past 10 to 15 years. Based on the one structure categorized as older, we therefore coded the block face with a 0.
- Ex. 3: We coded this block face with a 0. We categorized all the structures as new based on the modern design, sandblasted brick, new entryways and walkways, absence of peeling paint, no obvious structural repairs needed, and no deteriorated siding or brick.
- Ex. 4: We coded this block face with a 1. We categorized a majority of the structures as older except for four houses with modern design and sandblasted brick. The homes we categorized as older were nearly all well-kept, attractive, and sizeable, with no peeling paint, no obvious structural repairs needed, and no deteriorating siding or brick; porches and balconies, windows and frames, doors, entryways, and walkways were beyond basic design or décor; and they were large enough to comfortably house a family. Only one home was modestly sized and lacked features beyond basic design or décor.

***N1. Amount of new land uses (rehabilitation or new construction appearing to be completed within approximately the past 10 to 15 years) (0%, 1–10%, 11–50%, >50%)***

See earlier description for how residential and commercial structures were categorized as new. We estimated percentages out of the amount of the block face occupied by buildings on the block face, including areas set for construction or under construction but excluding vacant areas. For Ex. 1, we coded 0% as new, >50% for Ex. 2, >50% for Ex. 3, and 11–50% for Ex. 4.

***N2. New signs or structures controlling traffic (e.g., speed, pedestrian crossing, bike lanes, parking)***

This indicator captures aspects of public reinvestment. Traffic signs and structures include speed limitation signs or speed bumps, pedestrian crosswalks and signs, bike lanes, parking limitation signs (e.g., handicap parking, no parking times), and any other public signs controlling traffic. "New" refers to signs and structures that appear to have been installed within approximately the past 10 to 15 years, presumably by the city. Bright and unfaded paint or print indicates new signs; speed bumps or crosswalks in the road without cracks or obvious repairs needed and bright and unfaded paint on the road (if applicable) indicate new traffic structures. We consider vandalism as a separate indicator that does not affect how we code the age of traffic signs and structures. All example block faces contained signs limiting traffic or parking with bright and unfaded paint or print and were thus all coded with a 1.

***N3. New public courtesies (e.g., bus stop or subway entrance, street furniture, bike racks, public trash cans, street lamps)***

This indicator captures aspects of public reinvestment in public space. Public courtesies include bus stops or subway entrances, public seating, bike racks, public trash cans, newspaper stands, mailing depositories, and street lamps. "New" refers to signs and structures that appear to have been installed or rehabilitated within approximately the past 10 to 15 years, presumably by the city. Bright and unfaded paint without obvious repairs needed and modern design or décor (for bus stops, subways entrances, public trash cans, and street lamps) indicate new public courtesies. We consider vandalism as a separate indicator that does not affect how we code the age of public courtesies. Modern bus stops and modern public trash cans in Chicago appear as in Figs. 1 and 2 below. We did not find any new subway entrances = in the observed sample. Only Ex. 3 contains public courtesies—street lamps—that appeared new based on their bright and unfaded paint and modern design and décor.

***Fig. 1. Modern bus stop in Chicago***
Address: 1809 West Polk Street

***Fig. 2. Modern public trash can in Chicago***
Address: 2986 North Sheridan Road

***N4. New large-scale development (e.g., luxury condos, large residential/commercial area developments, converted industrial use)***

This indicator captures aspects of large-scale reinvestment. We coded block faces with a 1 if they contain new structures that are also luxury high-rise condominiums, large residential/commercial area developments occupying at least the entire block face, or converted industrial use to residential or commercial use. If the development consists of single-family dwellings or are low-rise, we only considered these as "large-scale" if they occupied at least 75% of the block face. Warehouse buildings being used for residential or commercial purposes based on the signage, entryways, and walkways indicate converted industrial land use (see Fig. 3). See earlier description for "new" building structures. If all structures were considered "old," the block face received a 0 for this indicator. Signage, entryways, and walkways beyond basic design or décor indicate new luxury condos (see Fig. 4). Homogeneous architectural design with signage, entryways, and walkways beyond basic design or décor and that occupy at least the predominant land use of the block face indicate new large residential and commercial developments. We also included areas under construction in which signage indicated this land use. Only Ex. 3 has a new large residential development, which occupies the entire block face.

Figure A.1 (Continued)

***N5. Residential or commercial units for sale or lease in new condition or under construction***
This indicator captures aspects of recent reinvestment by outside investors or developers, that is, not by residents themselves. We coded block faces with a 1 if they contain new structures that are also for sale or lease (not rent) based on signage (e.g., Fig. 4). See description for "new" building structures from item P1. If all structures were considered "old," the block face received a 0 for this indicator. We also included areas under current construction that were for sale, as indicated by signage. Only Ex. 4 contains a residential unit in new condition for sale.

Figure A.1 (Continued)

***Fig. 3. Converted industrial use***
Address: 1962 South Halsted Street

***Fig. 4. Luxury high-rise condominiums***
Address: 705 North Dearborn Parkway

***B1. Sign discouraging disorder (e.g., neighborhood watch, anti-littering/ loitering/ drug use/ vandalism/ graffiti [including if painted over or mural art])***

This indicator captures reinvestment in the aesthetics of a neighborhood that go beyond physical building structures through signs of efficacy to counter disorder. This includes street signs explicitly discouraging crime and disorder (e.g., neighborhood watch, littering, loitering, drug use, vandalism, and graffiti), security cameras, and painting over graffiti, mural or sculptural art, and community markers (e.g., structures or sculptures that signify a community). This indicator does not include banners and signs on lamp posts or signs controlling traffic and parking. Paint over graffiti is often evident due to inconsistent paintbrush strokes and coloring. Ex. 1 had painted-over graffiti.

***B2. Beautification in personal frontage***

This indicator captures reinvestment in the aesthetics of a neighborhood that go beyond physical building structures through signs of efficacy to beautify the visible frontage of private space that is separate from the basic painting and upkeep of the building structure and façade. This includes evidence of well-kept landscaping or gardening work, patio or yard furniture, and planters and accessories beyond basic grass maintenance. For one-to-four-family residential structures, this includes modest landscaping (e.g., planted shrubs). For multi-family residential structures, we considered beautification present if there was landscaping or gardening work that was intentionally decorative, that is, beyond basic grass maintenance and planted trees and shrubs with no distinguishable design. We did not include fencing for this indicator. For commercial structures, this includes decorative signage and frontage beyond basic design or décor and with no signs of deteriorated condition or repairs needed. Ex. 2, 3, and 4 show residential landscaping or gardening work.

***B3. Vacant area and public street frontage beautification, upkeep, fencing, or set for construction***

This indicator captures reinvestment in the aesthetics of a neighborhood that go beyond physical building structures, through signs of efficacy to beautify visible public space (e.g., vacant lot areas and frontage areas from sidewalks to the street). This includes evidence of landscaping or gardening work, yard furniture, and planters and accessories in public space and improvement of

vacant spaces, including fencing, grounds maintenance, or indication of future construction. This indicator includes basic grass maintenance but does not include planted trees without additional planters or accessories. Vacant areas are only considered if they stand alone from other residences and structures and do not appear to be established park or recreational areas. Vacant areas need only show any sign of maintenance and may also have other visible signs of disorder. The kempt grass in the vacant lot from Ex. 1, the fencing around the vacant lot in Ex. 2, the landscaped grass and trees between the sidewalk and streets in Ex. 3, and the planters in the areas between the sidewalk and streets in Ex. 4 are all indicators of public space beautification.

***D1. Residential block faces lacking physical disorder (garbage, litter, graffiti, and vandalism)***
This indicator captures if there are no visible aspects of physical disorder that discourage reinvestment in a neighborhood, beyond physical building structures, through signs that show a lack of efficacy to counter visible physical disorder. This includes evidence of light garbage, litter, or broken glass on the street or sidewalk; graffiti (not painted over) on buildings, signs, or walls; and vandalism of any signs, public courtesies, or objects in private or public frontage (e.g., yard furniture or planters). For garbage, litter, and broken glass, we coded this indicator as present if the block face received a score lower than 2 (light) on a scale ranging from 0 (none) to 6 (very heavy) that measured the amount of garbage, litter, and broken glass present. This rule is intended to eliminate uncertainty with small pieces of garbage, litter, and broken glass that are sometimes hard to distinguish due to the resolution of the images. We coded Ex. 1 with a 0 for this indicator due to the litter and garbage in the vacant lot, and we coded Ex. 2 with a 0 due to the graffiti on the "for sale" sign in the vacant lot. We did not code this indicator for commercial or mixed-use blocks due to the overwhelming presence of litter and garbage in commercial areas.

***D2. Lacking unkempt vacant areas and public street frontage***
This indicator captures if there are no visible aspects of physical disorder that discourage reinvestment in the neighborhood, beyond physical building structures, through signs that show a lack of efficacy to counter visible physical disorder in public spaces (e.g., vacant lot areas, frontage areas from sidewalks to the street). This includes overgrown grass and weeds. Vacant areas are only considered if they stand alone from other residences and structures and do not appear to be established park or recreational areas. Vacant lots can simultaneously be unkempt as well as exhibit signs of beautification for item O3 in the instrument. We coded all examples with a 1 for this indicator.

***D3. Lack of structures that appear to be burned out, boarded up, abandoned, or in poor/badly deteriorated condition***
This indicator captures if there are no visible aspects of physical decay of the building structures. This includes evidence of a severe lack of maintenance and upkeep of any properties, indicated by windows or doorways boarded up or burned out, serious structural repairs needed, large amounts of peeled paint, or badly deteriorated siding. We included the appearance of any boarded up windows or doors as a sign of this indicator. Ex. 1 was coded with a 0 for this item, because all the windows of the property were boarded up. This indicator only includes vacant residential or commercial properties if they meet the structural characteristics outlined above.

Figure A.1 (Continued)

***G1. Google Street View image year***
This is the year an image was taken and can be found in the lower-left corner of the image. Note that the month of observation was not available during this wave of Google Street View images.

***G2a. Street View inconsistency***
We coded block faces with a 1 for this item if there were any inconsistencies with the Google Street View images. We found the following inconsistencies during the coding process: images from different years were present for different segments of the same block face,[4] images were too blurry (e.g., a few images were taken at night), and images only covered a portion of the block or none at all.[5]

***G2b. Inconsistency type (no difference between years, decline between years, improved between years, blurry image, limited Street View access, no Street View access)***
For block faces that we coded with a 1 for item G2a, the type of inconsistency was recorded. For items with images from different years in different segments of the same block face, we coded block faces based on visible improvements (evidence of reinvestment based on the instrument items), decline (evidence of disinvestment and disorder based on the instrument), or no change.

The GGO Instrument was developed partly based on the following systematic field efforts:

Community Strengths Longitudinal Neighborhood Study (C-STRENGTHS): Systematic Social Observation Using Google Street View. Odgers, Candace L., Christopher J. Bates, Avshalom Caspi, Robert J. Sampson, and Terrie E. Moffitt. 2009. "Systematic Social Observation Inventory: Tally of Observations in Urban Regions (SSO i-Tour)." Irvine, CA: Adaptlab Publications.

Project on Human Development in Chicago Neighborhoods (PHDCN): Systematic Social Observation. Sampson, Robert J. and Stephen Raudenbush. 1999. "Systematic Social Observation of Public Spaces: A New Look at Disorder in Urban Neighborhoods." *American Journal of Sociology* 105(3):603–651. Access to instruments and documentation is provided online at: http://www.icpsr.umich.edu/PHDCN/.

Block Environment Inventory. Perkins, Douglas D., John W. Meeks, and Ralph B. Taylor. 1992. "The Physical Environment of Street Blocks and Resident Perceptions of Crime and Disorder: Implications for Theory and Measurement." *Journal of Environmental Psychology* 12:21–34.

Analytic Audit Tool and Checklist Audit Tool. Hoehner, Christine M., Laura K. Brennan Ramirez, Michael B. Elliot, Susan L. Handy, and Ross C. Brownson. 2005. "Perceived

[4] If there were images from different years and changes in the streetscape between years, we coded instrument items based on the most recent image year.
[5] We coded block faces with limited access when block segments were short in length and could easily be observed from adjacent streets.

Figure A.1 (Continued)

and Objective Environmental Measures of Physical Activity among Urban Adults." *American Journal of Preventive Medicine* 28(2S2):105–116.

Irvine Minnesota Inventory for Observation of Physical Environment Features Linked to Physical Activity. Day, Kristen, Marlon Boarnet, and Mariela Alfonzo. 2005. Codebook accessed at: https://webfiles.uci.edu/kday/public/index.html.

**Note on Inter-rater Reliability**

We conducted inter-rater reliability tests on a set of 103 block faces that we randomly selected from the coded data. This set of block faces spanned 78 census tracts in the dataset. We hired a graduate student research assistant and trained the research assistant with three weekly one-hour in-person training sessions; we used this coding guide, e-mail correspondence, and a training set of 20 randomly selected block faces from the data. The rater completed training when inter-rater reliability was established within the training set. Because Google Street View recently updated their Chicago images to 2009 through 2012, the coder who performed the original coding recoded the set of 103 block faces to allow for comparison between the same images. Trained raters reported that identifying and coding each block face took approximately one to two minutes.

The two blinded raters had an average agreement rate of 83 percent and average kappa score of .50 across 12 instrument indicators, and Pearson and intraclass correlations of .68 and .68, respectively, for the final stage scores. Agreement was lowest—60 and 68 percent, respectively—for the amount of new land uses ($N_1$) and physical disorder ($D_1$) indicators. Distinguishing between new and old structures and noticing all of the disorder present on the block face were the most inconsistent between raters. Litter was sometimes difficult to identify due to image resolution, and raters could overlook graffiti and vandalism if they did not use the full panoramic view at each location on the block face.

***Figure A.2.*** *Wave 2 Google Street View Gentrification Observations Coding Guide for Chicago and Seattle*

Figure A.2 (Continued)

## Coding Guide and Visual Demonstration of Google Gentrification Observation[1]

**GGO Instrument (last updated 5/15/2014)**

O1. Observer: _____

O3b. City (Mark one.)
- □ Chicago
- □ Seattle

O3. Block ID: _____

O4. Block face direction (e.g., north, southwest): _____

O5. Street address: _____

O6. GSV image month (most recent): _____

O7. GSV image year (most recent): _____ _____

L1. The primary land use for the block face is: (Mark one.)
- □ residential
- □ commercial
- □ institutional (e.g., school, hospital)
- □ mixed residential/commercial/institutional (> 1/3)
- □ industrial
- □ other: _____

L1b. Notes on land use if "industrial" or "other" selected:
_____
_____
_____ _____

P0. % of structures considered old: (Mark one.)
- □ None
- □ 1-25%
- □ 26-50%
- □ 51-75%
- □ 76-100%

[1] The detailed characteristics for each indicator of the instrument described are specific to Chicago and Seattle, although the GGO instrument was also tested in Boston, MA and Philadelphia, PA with similar results overall. However, due to variation between cities in building stock, public infrastructure styles, and land markets, we recommend that the specific characteristics used to identify each indicator be adjusted accordingly.

Figure A.2 (Continued)

P1. For land uses that are NOT NEW, most (>75%) appears to be in GOOD condition—well-kept, attractive, sizeable (as opposed to at least some being in fair/poor condition OR all land uses are new): (Mark one.)

- □ Yes
- □ No

N1. Amount of NEW (rehab or new construction since HW baseline year (1995 for Chicago, 1998 for Seattle) land uses: (Mark one.)

- □ 0%
- □ 1-10%
- □ 11-50%
- □ >50%

N1b. What % of structures appear to be either NEW or OLD and in good condition (well-kept, attractive, and sizeable)? (round to nearest multiple of 5) _____

N2. New signs or structures controlling traffic (e.g., speed, pedestrian crossing, bike lanes, or parking) (Mark one.)

- □ Present
- □ Absent

N3. New public courtesies (e.g., bus stop or subway entrance, street furniture, bike racks, public trash cans, street lamps, parking pay machines) (Mark one.)

- □ Present
- □ Absent

N4. New large-scale development (e.g, luxury high-rise condos, large residential/commercial developments (>75% block), converted industrial use) (Mark one.)

- □ Present
- □ Absent

B1. Signs discouraging disorder (neighborhood watch, anti-littering/loitering/drug use/vandalism/graffiti (including if painted over), art) (Mark one.)

- □ Present
- □ Absent

B2. Beautification of personal frontage (e.g., landscaping/gardening, patio/yard furniture, decorate signage) (Mark one.)

- □ Present
- □ Absent

B3. Vacant area and public street frontage, beautification, upkeep, fencing, or set for construction (e.g., landscaping/gardening, planters, vacant lot fencing or in use) (Mark one.)

- □ Present
- □ Absent

Figure A.2 (Continued)

D1. Physical disorder (e.g., garbage, litter, graffiti, or vandalism) (> 2 on a scale from 0 to 6) (Mark one.)
- □ Present
- □ Absent

D2. Unkempt vacant area or public street frontage (e.g., overgrown grass/weeds) (Mark one.)
- □ Present
- □ Absent

D3. Structures that appear to be burned out, boarded up, or abandoned or in poor/badly deteriorated condition (e.g., structural repairs needed, peeled paint, deteriorated siding) (Mark one.)
- □ Present
- □ Absent

M1. Commercial uses that align with cultural aspects of gentrification (e.g., cafes, trendy restaurants/bars, pet stores, organic food markets, boutiques, art galleries) (Mark one.)
- □ Present
- □ Absent

M1b. Please describe these commercial uses: _____
_____

M2. Indicator of foreign presence (e.g., signs in another language, for foreign/ethnic clientele, locally-owned foreign/ethnic business) (Mark one.)
- □ Present
- □ Absent

M2b. Please describe indicators of foreign presence (note ethnicity): _____
_____

M3. Are people visible on the block face? (Mark one.)
- □ Present
- □ Absent

M3b. Please describe visible people (note race/ethnicity, age, amount). _____
_____

O8. Are there distinct inconsistencies among the Google Street View images? (Mark one.)
- □ No
- □ Yes: No different between years
- □ Yes: Decline between years
- □ Yes: Improved between years
- □ Yes: Blurry image
- □ Yes: Limited Street View access
- □ Yes: No Street View access

Figure A.2 (Continued)

□ Other: _____

O9. Notes on overall block face condition: _____
_____
_____
_____
_____
_____
_____
_____

T1. Which years of images are available for this block face? (Check all that apply.)

□ 2007
□ 2008
□ 2009
□ 2010
□ 2011
□ 2012
□ 2013
□ 2014

T2. Are there major differences between previous image years and the most recent year? (e.g., new construction, demolition, change in businesses, decline or beautification of vacant lots, change in vacant or abandoned houses) (Mark one.)

□ Yes
□ No

T2b. If answered yes above, briefly describe differences between image years. _____
_____

Figure A.2 (Continued)

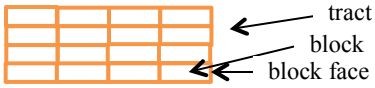
**Coding Procedures**

1. Enter https://maps.google.com/ in your web browser. Check that you are using the most recent version of Google Maps. It should look like this:

The newer version is necessary for answering questions T1 and T2, which do not require browsing along the block. However, because the new version of Google Maps has many components, it may be slow. If this is the case, switch back to Classic Google Maps to conduct observations. Instructions to do so can be found here: https://support.google.com/maps/answer/3045828?hl=en.

2. Enter the provided longitude and latitude into the search bar and press "enter." The map will center to the location entered.

3. In each observation, only one side of the street (a *block face*) should be coded. Use the census block maps to identify which side of each block face should be coded. Below are the links for the census block maps. The first link on these pages, "_000.pdf," provides an overall map of each city with the numbered map that pertains to each area. Once you identify the numbered area that contains the block that you are coding, you can click on the map for that number and zoom into the map to identify which side of the block matches the block ID.:
   a. Chicago: http://www2.census.gov/geo/maps/blk2000/st17_Illinois/Place/1714000_Chicago/
   b. Seattle: http://www2.census.gov/geo/maps/blk2000/st53_Washington/Place/5363000_Seattle/
   c. A note on census geography: block face ϵ block (ϵ block group) ϵ tract




   d. Example: You are given the following block ID, latitude and longitude: 530330092002012, 47.6008861560001, -122.33566272.
      i. After entering the latitude and longitude into Google Maps, you see that the location appears to be in the area numbered 14 in the Seattle map "_000.pdf".

ii. Click on the link for the map "_014.pdf" from the census link above.
iii. The tract number and block number are in the block ID:
53033[**009200**]2102 – the tract number is 92.00 (labeled as 92);
53033009200[**2102]** – the block number is 2012.
iv. Zoom in on the area labeled "92" on Map 14, and you will find the block "2012". From there you can see that the block is bordered by Alaskan Way on the west, S Washington Street on the north, 1st Avenue south on the east, and S Main Street to the south. Therefore, these are the sides of the street blocks that you would want to be observing.

4. Drag the "pegman" (the orange figure in the lower right hand corner by the zoom bar) to one end of the block face. This will bring your screen to the Google Street View application.

5. To move forward and back along the street, use the up and down arrow keys on your keyboard or click along the street with your mouse. To get panoramic views, use the right and left arrow keys on your keyboard or drag on the screen with your mouse. To zoom in and out, use the scroll button on your mouse or click on the "+" and "—" buttons below the compass in the upper left-hand side of the Google Street View screen.

6. Start at one end of the block face and move up and down the street, zooming in on things that require a closer look and checking panoramic views from each location along the block face until you reach the end of the block face. For consistency, start at the end of the block face such that you will be coding the **right** side of the street.

7. View the years for which images are available by clicking on the clock image in the upper left hand corner (only available with the New Google Maps version, not Classic version). A window will drop down, and the slider below the image indicates which years have images available.

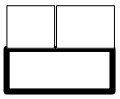
8. Code all block faces of each block. **Be sure you are coding the correct side of the street and with the most recent image year (unless instructed otherwise).**

Figure A.2 (Continued)

**Detailed Description for Each GGO Instrument Item**

Notes:

- Each entry is for one block face.
- For blocks in which the block face is intersected by other blocks, code each section of the block face as separate observations.
    - E.g.: The north side of the bolded block should be coded as two separate entries.



- Only code parcels on the block face and ignore structures that are visible from the observed block face but are part of parcels on adjacent block faces.
- Code the right side of the street for all block faces, i.e., start at the end of the street such that the side of the street relevant to the block id pertains to the right side.
- In some cases, street view images in one year are available for only some segments of a block face, and older images are available for other segments of the block. Code the block face for the most recent image year.
- In some cases, street view access is not available for portions or entire block face segments, but if the block face segment is visible from adjacent block faces or segments of the block face, code the block face based on what is visible utilizing the zoom features. Be sure to note this discrepancy in questions O8 and O9.

***O1. Observer:*** _____

Enter coder's name.

***O3b. City (Mark one.)***

- □ ***Chicago***
- □ ***Seattle***

Indicate which city pertains to the block face.

***O3. Block ID:*** _____

Enter the 15 digit block ID.

***O4. Block face direction (e.g., north, southwest):*** _____

Enter which side of the block pertains to the data entry.

- Possible entries: west, northwest, north, northeast, east, southeast, south, southwest, middle (west), middle (northwest), middle (north), middle (northeast), middle (east), middle (southeast), middle (south), middle (southwest).
- "Middle" indicates block faces that are accessible in Google Street View but may not be on the border of the block.
- Some examples:

Figure A.2 (Continued)

***O5. Street address:*** _____

Enter the street number and street name at the start of the block face. The address is listed in the upper left hand corner. The New Google Maps gives a range of numbers sometimes—just enter the beginning of the range.

- If there is no street number for the entire block face, simply enter the street name.
- If you do not have Google Street View access to the block face, enter "n/a".

***O6. GSV image month (most recent):*** _____

Enter the month of the most recent image year. Google Street View defaults to the most recent image available. The month and year is listed at the bottom of the image under "Image capture" and in the upper left corner next to the clock and under the address.

***O7. GSV image year (most recent):*** _____

Enter the year of the most recent image year. Google Street View defaults to the most recent image available. The month and year is listed at the bottom of the image under "Image capture" and also in the upper left corner next to the clock and under the address.

***L1. The primary land use for the block face is: (Mark one.)***

- □ ***residential***
- □ ***commercial***
- □ ***institutional (e.g., school, hospital)***
- □ ***mixed residential/commercial/institutional (> 1/3)***
- □ ***industrial***
- □ ***other:*** _____

Any land use that is at least 1/3 of the spatial area that the parcels of the block face occupy is considered to be "primary." Include areas set for construction or under construction if the land use is distinguishable (e.g., based on signage). Abandoned or vacant parcels should also be included based on its original use. Code any converted land uses as its current use.

- "Residential land use" consists of structures that appear to be used as single- or multi-family dwellings, including public or subsidized housing.
- "Commercial land use" consists of structures that appear to be used as office or retail space and also includes small (single-level) warehouse structures and parking garages.
- "Institutional land use" consists of structures that appear to be used primarily as schools (including nonresidential university buildings), religious institutions, and medical facilities.
- "Mixed" includes any blocks if more than one of the first three listed land uses is considered "primary".

Figure A.2 (Continued)

- "Industrial land use" consists of structures that appear to be used for manufacturing, assembly, and large warehouse use.
- "Other" consists of any land uses not included above (e.g., highways, subway and railway tracks, parking lots, stadiums, recreational parks and fields, brownfields, undeveloped vacant lots, miscellaneous green space between highways, and rail tracks) or if there is no Google Street View access to the block face such that the land use was indistinguishable. Enter the land use in the provided blank or "no GSV access"

***L1b. Notes on land use if "industrial" or "other" selected:***

_____

_____

_____ _____

Only blocks with residential, commercial, institutions, or mixed land uses will be coded for gentrification. For industrial or other land uses, enter any notes related to the other indicators in this box (e.g., litter, visible people). Leave blank for residential, commercial, institutional, or mixed land uses.

**The remaining items of the instrument only pertain to residential, commercial, institutional, or mixed land uses.**

For the next 4 instrument items, first categorize structures based on the exterior as "older" structures versus "new" construction/renovation. "Older" applies to anything built approximately before the baseline year for the city (Chicago—1995; Seattle—1998). The following characteristics are guides for determining if a residential or commercial structure is "new" (includes new construction or renovation):

- modern design: sleek, geometric, glass or steel exterior materials, lack of ornate detailing around window frames and façade, lack of aluminum siding, lack of outdated awnings
- sandblasted brick or paint—unstained and bright
- reconstructed or restored porches and balconies, window frames, and doors: fresh paint, well-kept and attractive, modern design; glossy windows
- new signage (e.g., house numbering, store sign)

In addition, signage will often indicate if a building is "new," such as for sale or lease signs advertising new renovations.

For large-scale multi-unit dwellings (50+ units), we used the following characteristics to determine if a structure was "new":

- modern design: sleek, geometric, glass or steel exterior materials, large windows, rectangular, no concrete
- new balconies: fresh paint, well-kept and attractive, modern design
- new signage (e.g., building name), entryways, and walkways: no cracks in pavement, fresh paint, modern design
- conversions from industrial use

Because commercial uses can change frequently and undergo renovation with each change, buildings with mixed uses may have "new" (rehabbed) commercial structures with older residential units above the storefronts.

Figure A.2 (Continued)

For all land uses, at least two characteristics should be present to be considered as "new." In addition, structures must not have any of the following: peeling or faded paint, obvious necessary structural repairs, or deteriorated or discolored siding or brick. If buildings are undergoing construction or major rehabilitation at the time of observation, these are considered to be "new."

These characteristics are consistent with accounts of gentrification as a process of preservation and restoration of older homes and converted-use warehouses, as well as new-build gentrification of modern home construction and condominiums. Because our working definition of gentrification entails reinvestment and renewal, we consider any new construction, both modest and luxury quality, as reinvestment in a neighborhood. We categorize structures that do not fit this description as older.

It is sometimes difficult to distinguish between new construction/rehabilitation and older homes that are well-kept, attractive, and sizeable. Use your best judgment, and question N1b and the way in which the scores will be eventually aggregated attempt to deal with this uncertainty. A block face categorized as having most of its older homes in well-kept, attractive, and sizeable condition would receive the same structural mix score as a block face with all of its homes, both new and old, in well-kept, attractive, and sizeable condition, even if the coder only categorized a fraction of the homes as older. In addition, the block face would receive a similar structural mix score if all of the structures were coded as newly constructed or rehabilitated.

***P0. % of structures considered old: (Mark one.)***

- □ ***None***
- □ ***1-25%***
- □ ***26-50%***
- □ ***51-75%***
- □ ***76-100%***

Of the total volume of buildings, including those set for construction or under construction, on the block face, check the box that best indicates the number of buildings categorized as older.

***P1. For land uses that are NOT NEW, most (>75%) appears to be in GOOD condition—well-kept, attractive, sizeable (as opposed to at least some being in fair/poor condition OR all land uses are new): (Mark one.)***

- □ ***Yes***
- □ ***No***

The purpose of this indicator is to determine the preexisting structural condition of the block face, particularly if structures on the block face have been in good condition for an extended period of time, i.e., if this block predominantly "middle- or upper-middle-class" at the time of the baseline surveys (Chicago—1995; Seattle—1998). If at least 75% of the structures categorized as older are "well-kept, attractive, and sizeable," mark "yes."

The following characteristics indicate if a structure is "well-kept, attractive, and sizeable":

- absence of peeling or faded paint, no obvious structural repairs needed, and no deteriorated or discolored siding or brick

- porches and balconies, windows and frames, doors, signage (e.g., house numbering, business signage), entryways, storefronts, and walkways beyond basic design or décor with luxury decor; no outdated decor (e.g., old awnings)

For older, large scale multi-unit dwellings (50+ units), buildings must have luxury entryways and updated accessories and are often accompanied by elaborate landscaping. For older, office buildings, the exterior and entryway must be well-maintained, and the exterior/architectural design should be beyond basic design or décor. For older, commercial businesses, only include businesses that cater specifically to middle- or upper-class clientele (e.g., not McDonald's). In some cases, the front façade of a building is well-kept but not the sides. Rate the building based on the side facing the block face being observed. Rate the building based on the side facing the block face being observed.

See Figures 1-11 below for examples of older houses that are not well-kept, attractive, and sizeable according to the characteristics listed above (Figs. 1 and 2); older houses that are well-kept, attractive, and sizeable according to the characteristics listed above (Figs. 3 and 4); new residences according to the characteristics listed above (Figs. 5 and 6); an older office building that is not well-kept, attractive, and sizeable according to the characteristics listed above based on its basic design (Fig. 7); a newer office building (Fig. 8); an older, larger apartment building that is not well-kept, attractive, and sizeable (Fig. 9); an older, larger apartment building that is well-kept, attractive, and sizeable (Fig. 10); and a new larger apartment building (Fig. 11).

***Fig. 1. Older residence and not well-kept in Chicago***
1410 W Huron St, Chicago, IL


***Fig. 2. Older residence and not well-kept in Seattle***
1560 NE 50th St, Seattle, WA

Figure A.2 (Continued)

***Fig. 3. Older residence and well-kept in Chicago***
1428 W Huron St, Chicago, IL

***Fig. 4. Older residence and well-kept in Seattle***
829 NE 59th St, Seattle, WA

***Fig. 5. New residence in Chicago***
1410 W Huron St, Chicago, IL

***Fig. 6. New residence in Seattle***
1308 Lakeview Blvd E, Seattle, Wa

***Fig. 7. Older office building, basic design***
438 12th Ave, Seattle, WA

***Fig. 8. Newer office building***
413 S Jackson St, Seattle, WA

Figure A.2 (Continued)

***Fig. 9. Older large apartment building, not well-kept***
5039 S Champlain Ave, Chicago, IL

***Fig. 10. Older large apt. building, well-kept***
1019 W Foster Ave, Chicago, IL

***Fig. 11. New large apartment building***
901 N Kingsbury St, Chicago, IL


***N1. Amount of NEW (rehab or new construction since HW baseline year (1995 for Chicago, 1998 for Seattle) land uses: (Mark one.)***

- □ ***0%***
- □ ***1-10%***
- □ ***11-50%***
- □ ***>50%***

Of the total volume of buildings, including those set for construction or under construction, on the block face, check the box that best indicates the number of buildings categorized as new.

***N1b. What % of structures appear to be either NEW or OLD and in good condition (well-kept, attractive, and sizeable)? (round to nearest multiple of 5)*** _____

Please give an estimate of the total percent of the total volume of buildings, including those set for construction or under construction, that are either new or older and in good condition. Round to the nearest multiple of 5.

***N2. New signs or structures controlling traffic (e.g., speed, pedestrian crossing, bike lanes, or parking) (Mark one.)***

□ ***Present***
□ ***Absent***

This indicator captures aspects of public reinvestment. Traffic signs and structures include speed limitation signs or speed bumps, pedestrian crosswalks and signs, bike lanes, parking limitation signs (e.g., handicap parking, no parking times), and any other public signs controlling traffic. "New" refers to signs and structures that appear to have been installed since the baseline year for the city. The following characteristics indicate new signs or structures:

- Signs: bright and unfaded paint or print
- Structures: speed bumps or crosswalks in the road without cracks or obvious repairs needed and bright and unfaded paint on the road.

Note that vandalism or graffiti is a separate indicator that does not affect the coding of the age of traffic signs and structures.

***N3. New public courtesies (e.g., bus stop or subway entrance, street furniture, bike racks, public trash cans, street lamps, parking pay machines) (Mark one.)***

□ ***Present***
□ ***Absent***

This indicator captures aspects of public reinvestment in public space. Public courtesies include bus stops or subway entrances, public seating, bike racks, public trash cans, newspaper stands, mailing depositories, and street lamps. "New" refers to signs and structures that appear to have been installed or rehabilitated since the baseline year for the city. The following characteristics indicate new public courtesies:

- Bright and unfaded paint without obvious repairs needed
- Bus stops, subways entrances, public trash cans, and street lamps: modern design or décor.

Note that vandalism or graffiti is a separate indicator that does not affect the coding of the age of public courtesies. Modern bus stops and modern public trash cans in Chicago appear as in Figs. 12 and 13 below. In addition, solar powered compacter trashcans are also new.

***Fig. 12. Modern bus stop in Chicago***
Address: 1809 West Polk Street

***Fig. 13. Modern public trash can in Chicago***
Address: 2986 North Sheridan Road

***N4. New large-scale development (e.g, luxury high-rise condos, large residential/commercial developments (>75% block), converted industrial land use) (Mark one.)***

- □ ***Present***
- □ ***Absent***

This indicator captures aspects of very large-scale reinvestment. This indicator is considered to be present if the structures that the coder considered to be "new" are also any of the following:

- luxury high-rise (10+ stories) condominiums or offices, often indicated by signage, entryways, or walkways beyond basic design or décor (see Figure 14).
- large residential or commercial plazas that occupy at least the entire block face
- large single-family homes or low-rise (<5 stories) developments that occupied at least 75% of the block face, often indicated by homogeneous architectural design with signage, entryways, and walkways beyond basic design or décor and that occupy at least the predominant land use of the block face
- warehouse buildings being used for residential or commercial purposes based on the signage, entryways, and walkways indicating converted industrial land use (see Fig. 15).

This indicator only applies to structures that are considered to be "new." This indicator is present if areas under construction have signage indicating this land use.

*Fig. 14. Luxury high-rise condominiums*
Address: 705 North Dearborn Parkway

*Fig. 15. Converted industrial use*
Address: 1962 South Halsted Street

***B1. Signs discouraging disorder (neighborhood watch, anti-littering/loitering/drug use/vandalism/graffiti (including if painted over), art) (Mark one.)***

- □ ***Present***
- □ ***Absent***

This indicator captures reinvestment in the aesthetics of a neighborhood that go beyond physical building structures through signs of efficacy to counter disorder. This includes street signs explicitly discouraging crime and disorder (e.g., neighborhood watch, littering, loitering, drug use, vandalism, and graffiti), painting over graffiti, mural or sculptural art, and community markers (e.g., structures or sculptures that signify a community). This indicator does not include banners and signs on lamp posts or signs controlling traffic and parking, security cameras or emergency phone stands that are often found on college and hospital campuses, or security signs

on personal property (e.g., “no loitering”, “no trespassing”). Paint over graffiti is often evident due to inconsistent paintbrush strokes and coloring.

***B2. Beautification of personal frontage (e.g., landscaping/gardening, patio/yard furniture, decorate signage) (Mark one.)***

□ ***Present***
□ ***Absent***

This indicator captures reinvestment in the aesthetics of a neighborhood that go beyond physical building structures through signs of efficacy to beautify the visible frontage of private space that is separate from the basic painting and upkeep of the building structure and façade. This indicator is present if any of the following are visible:

- evidence of well-kept landscaping or gardening work
- updated patio or yard furniture
- planters and accessories beyond basic grass maintenance

For non-large-scale residential structures, this includes modest landscaping (e.g., planted shrubs). For large-scale, multi-family residential or commercial structures (50+ units), we considered beautification present if there was landscaping or gardening work that was intentionally decorative, that is, beyond basic grass maintenance or planted trees and shrubs with no distinguishable design. Fencing is not included for this indicator. For commercial businesses, this includes decorative signage and frontage beyond basic design or décor and with no signs of deteriorated condition or repairs needed.

***B3. Vacant area and public street frontage, beautification, upkeep, fencing, or set for construction (e.g., landscaping/gardening, planters, vacant lot fencing or in use) (Mark one.)***

□ ***Present***
□ ***Absent***

This indicator captures reinvestment in the aesthetics of a neighborhood that go beyond physical building structures, through signs of efficacy to beautify visible public space (e.g., vacant lot areas and frontage areas from sidewalks to the street). Areas are only considered to be vacant if they are clearly separate from other residences and structures and do not appear to be established park or recreational areas. This indicator is present if any of the following are visible:

- evidence of landscaping or gardening work, yard furniture, and planters and accessories in public space, including basic grass maintenance or planters on the sidewalk
- improvement of vacant spaces, including fencing, grounds maintenance, or indication of future construction

This indicator does not include planted trees without additional planters or accessories. Vacant areas need only show any sign of maintenance and may also have other visible signs of disorder (e.g., litter).

***D1. Physical disorder (e.g., garbage, litter, graffiti, or vandalism) (> 2 on a scale from 0 to 6) (Mark one.)***

□ ***Present***
□ ***Absent***

Figure A.2 (Continued)

This indicator captures if there are any visible aspects of physical disorder that discourage reinvestment in a neighborhood, beyond physical building structures, through signs that show a lack of efficacy to counter visible physical disorder. Based on the following criteria, rate the degree of physical disorder present on the block face on a scale from 0 (none) to 6 (very heavy):

- light garbage, litter, or broken glass on the street or sidewalk
- graffiti (not painted over) on buildings, signs, or walls
- vandalism of any signs, public courtesies, or objects in private or public frontage (e.g., yard furniture or planters).

If the coder considers the amount of physical disorder on the block face to be greater than 2 (light), then this indicator is considered to be present. This rule is intended to eliminate uncertainty with small pieces of garbage, litter, and broken glass that are sometimes hard to distinguish due to the resolution of the images.

***D2. Unkempt vacant area or public street frontage (e.g., overgrown grass/weeds) (Mark one.)***

□ ***Present***
□ ***Absent***

This indicator captures if there are any visible aspects of physical disorder that discourage reinvestment in the neighborhood, beyond physical building structures, through signs that show a lack of efficacy to counter visible physical disorder in public spaces (e.g., vacant lot areas, frontage areas from sidewalks to the street). Areas are only considered to be vacant if they are clearly separate from other residences and structures and do not appear to be established park or recreational areas. This indicator is considered to be present if any of the following are visible:

- overgrown grass and weeds

Vacant lots can simultaneously be unkempt as well as exhibit signs of beautification/upkeep (e.g., fencing).

***D3. Structures that appear to be burned out, boarded up, or abandoned or in poor/badly deteriorated condition (e.g., structural repairs needed, peeled paint, deteriorated siding) (Mark one.)***

□ ***Present***
□ ***Absent***

This indicator captures if there are any visible aspects of physical decay of the building structures. This indicator is considered to be present if any of the following are visible:

- severe lack of maintenance and upkeep of any properties
- boarded up or burned out windows or doors
- serious structural repairs needed
- large amounts of peeled paint or badly deteriorated siding

The degree of deterioration must be so severe that the place is not habitable, though sometimes the property may be occupied.

***M1. Commercial uses that align with cultural aspects of gentrification (e.g., cafes, trendy restaurants/bars, pet stores, organic food markets, boutiques, art galleries) (Mark one.)***

□ ***Present***

Figure A.2 (Continued)

□ ***Absent***

This indicator is considered to be present if any commercial uses are visible that align with the cultural aspects of gentrification, such as cafes, trendy restaurants/bars, upscale fast food, pet stores, organic food markets, boutiques, art galleries, bike stores, etc.

***M1b. Please describe these commercial uses: _____***

_____ _____

Briefly identify the commercial uses that align with the cultural aspects of gentrification (e.g., "café, art gallery"). This question must be answered if indicator M1 is marked as present.

***M2. Indicator of foreign presence (e.g., signs in another language, for foreign/ethnic clientele, locally-owned foreign/ethnic business) (Mark one.)***

□ ***Present***

□ ***Absent***

This indicator is considered to be present if any commercial uses or signs are visible that indicate a foreign presence, such as signs in another language, foreign/ethnic restaurants, or businesses catering to a foreign clientele.

***M2b. Please describe indicators of foreign presence (note ethnicity): _____***

_____ _____

Briefly identify the foreign presence (e.g., "Asian restaurant"). This question must be answered if indicator M2 is marked as present.

***M3. Visible people? (Mark one.)***

□ ***Present***

□ ***Absent***

This indicator is considered to be present if any people are visible on the block face.

***M3b. Please describe visible people (note race/ethnicity, age, amount). _____***

_____ ____

Briefly and generally describe the visible people (e.g., "few, mostly black, elderly"). Note the following if distinguishable:

- race/ethnicity: mixed, mostly black, mostly white, mostly latino, mostly Asian, etc.
- age: mixed, children/teens (<20), young adults (20s, 30s), middle-aged (40s, 50s), elderly (60s+)
- amount of people: few (<5), some (5-20), many (>20)

This question must be answered if indicator M3 is marked as present.

***O8. Are there distinct inconsistencies among the Google Street View images? (Mark one.)***

□ ***No***

Figure A.2 (Continued)

- □ ***Yes: No different between years***
- □ ***Yes: Decline between years***
- □ ***Yes: Improved between years***
- □ ***Yes: Blurry image***
- □ ***Yes: Limited Street View access***
- □ ***Yes: No Street View access***
- □ ***Other: _____***

Indicate whether there were issues with Google Street View that may have affected one's ability to code the block face. The following options are most common:

- If street view images in one year are available for only some segments of the block face, and older images are available for other segments of the block, indicate if there were any substantial differences between years based on the indicators (e.g., the presence of N1, N2, N3, N4, B1, B2, B3 would be considered "improvements," and the present of D1, D2, or D3 would be considered "declines").
- If the observer coded the block face but images were blurry (e.g., some images taken at night), select "Yes: Blurry image."
- If street view was only accessible for a portion of the block face, even if the entire block was visible from various adjacent points of the block face, or the structures were not visible (e.g., trees covering the view of an entire house), select "Yes: Limited Street View access." If street view was not accessible at all for the block face, even if the entire block was visible from various adjacent points of the block face, select "Yes: No Street View access."

If there are other issues with Street View that may have affected one's ability to code the block face, select "Other," and briefly note the issue.

***O9. Notes on overall block face condition: _____***

_____ _____
_____
_____
_____
_____
_____

Describe the overall condition of the block face, including specific visible items that justify decisions in the coding process. This description allows the option for creating further codes without revisiting every entry on Street View.

- Example: "new mid-rise apt developments under construction--one is almost built and for senior housing, several lots sectioned off for construction, new low-rise apts, beautification"

***T1. Which years of images are available for this block face? (Check all that apply.)***

- □ ***2007***
- □ ***2008***
- □ ***2009***
- □ ***2010***

Figure A.2 (Continued)

□ ***2011***
□ ***2012***
□ ***2013***
□ ***2014***

This indicator is based on the new Google Street View Timeline feature. Select a point in the middle of the block face. Click on the clock or the words "Street View – [Month] [Year]." An image will drop down, and the slider below the image indicates which years have images available. Each white dot indicates an available image. Check all years that apply.

***T2. Are there major differences between previous image years and the most recent year? (e.g., new construction, demolition, change in businesses, decline or beautification of vacant lots, change in vacant or abandoned houses) (Mark one.)***

□ ***Yes***
□ ***No***

Use the panoramic feature to assess the block face from the selected point in the middle of the block face for each image year. Indicate if there are major differences between previous image years and the most recent year, such as new construction or demolition, change in businesses, major decline or beautification of vacant lots, major changes in vacant or abandoned houses.

***T2b. If answered yes above, briefly describe differences between image years. _____***

_____

If answered "Yes" in Question T2, very briefly describe the differences (e.g., "new apts constructed"). "). This question must be answered if indicator T2 is marked as yes.

Figure A.2 (Continued)

The GGO Instrument was developed partly based on the following systematic field efforts:

Community Strengths Longitudinal Neighborhood Study (C-STRENGTHS): Systematic Social Observation Using Google Street View. Odgers, Candace L., Christopher J. Bates, Avshalom Caspi, Robert J. Sampson, and Terrie E. Moffitt. 2009. "Systematic Social Observation Inventory: Tally of Observations in Urban Regions (SSO i-Tour)." Irvine, CA: Adaptlab Publications.

Project on Human Development in Chicago Neighborhoods (PHDCN): Systematic Social Observation. Sampson, Robert J. and Stephen Raudenbush. 1999. "Systematic Social Observation of Public Spaces: A New Look at Disorder in Urban Neighborhoods." *American Journal of Sociology* 105(3):603–651. Access to instruments and documentation is provided online at: http://www.icpsr.umich.edu/PHDCN/.

Block Environment Inventory. Perkins, Douglas D., John W. Meeks, and Ralph B. Taylor. 1992. "The Physical Environment of Street Blocks and Resident Perceptions of Crime and Disorder: Implications for Theory and Measurement." *Journal of Environmental Psychology* 12:21–34.

Analytic Audit Tool and Checklist Audit Tool. Hoehner, Christine M., Laura K. Brennan Ramirez, Michael B. Elliot, Susan L. Handy, and Ross C. Brownson. 2005. "Perceived and Objective Environmental Measures of Physical Activity among Urban Adults." *American Journal of Preventive Medicine* 28(2S2):105–116.

Irvine Minnesota Inventory for Observation of Physical Environment Features Linked to Physical Activity. Day, Kristen, Marlon Boarnet, and Mariela Alfonzo. 2005. Codebook accessed at: https://webfiles.uci.edu/kday/public/index.html.

**Note on Inter-rater Reliability**

We conducted inter-rater reliability tests on a set of 103 block faces that we randomly selected from the coded data. This set of block faces spanned 78 census tracts in the dataset. We hired a graduate student research assistant and trained the research assistant with three weekly one-hour in-person training sessions; we used this coding guide, e-mail correspondence, and a training set of 20 randomly selected block faces from the data. The rater completed training when inter-rater reliability was established within the training set. Because Google Street View recently updated their Chicago images to 2009 through 2012, the coder who performed the original coding recoded the set of 103 block faces to allow for comparison between the same images. Trained raters reported that identifying and coding each block face took approximately one to two minutes.

The two blinded raters had an average agreement rate of 83 percent and average kappa score of .50 across 12 instrument indicators, and Pearson and intraclass correlations of .68 and .68, respectively, for the final stage scores. Agreement was lowest—60 and 68 percent, respectively—for the amount of new land uses ($N_1$) and physical disorder ($D_1$) indicators. Distinguishing between new and old structures and noticing all of the disorder present on the block face were the most inconsistent between raters. Litter was sometimes difficult to identify due to image resolution, and raters could overlook graffiti and vandalism if they did not use the full panoramic view at each location on the block face.

Figure A.2 (Continued)

**Examples and Explanations for Coding Decisions**

**Example block face 1**

803 North Cambridge Avenue, Chicago, IL

**Example Block Face 1: 803-869 N. Cambridge Avenue, Chicago, IL 60610 (east block face)**

| | | | |
|---|---|---|---|
| O1. jh | P1. No | D3. Present | boarded up, boarded |
| O3b. Chicago | N1. 0% | M1. Absent | up entry area with |
| O3. 170310819001010 | N1b. 0 | M1b. | graffiti painted over |
| O4. West | N2. Absent | M2. Absent | and litter |
| O5. 821 N Cambridge | N3. Absent | M2b. | T1. 2007, 2011 |
| Ave | N4. Absent | M3. Present | T2. Yes |
| O6. Jun | B1. Present | M3b. one young adult | T3. More boarded up |
| O7. 2011 | B2. Absent | black woman | windows in 2011 |
| L1. Residential | B3. Absent | O8. No | |
| L1b. | D1. Present | O9. older low-rise apt | |
| P0. 76-100% | D2. Absent | buildings—look | |

- The block face consists of low-rise apartments that are part of a larger apartment development.
- We categorized all of the structures as older due to their lack of modern design, no sandblasted brick, no new signage or walkways, and the presence of deteriorated and discolored brick. The deteriorated brick and basic design of windows and frames, doors, and entryways, as well as the small size of units based on the spacing between exterior doors indicate these are not all "well-kept, attractive, and sizeable" units, i.e., middle- and upper-middle class residential areas since 1995. Therefore, we coded this as "76-100%" for P0, "No" for P1, "0%" for N1, and "0" for N1b.
- There are no visible new signs or public courtesies on the block face. The signs for street names are well-kept but are not traffic signs. Given that there are no "new" structures, there are no new developments present on the block. Therefore, we coded N2, N3, and N4 as "Absent."
- There appears to be painted over graffiti towards the end of the block (870 N. Cambridge Ave), indicated by the uneven paint color and brush strokes and faint black paint underneath. Therefore, we coded B1 as "Present." There is no beautification in front of these houses or in the public space (e.g., sidewalk). Therefore, we coded B2 and B3 as "Absent."
- There is some litter present at the beginning of the block and in the middle of the block and therefore coded D1 as "Present." Given that there are no vacant lots or public street frontage

grass, there were not any unkempt areas. Therefore, we coded D2 as "Absent." There are boarded up windows throughout the block and in the structure at the beginning of the block that appears to be once used for security/entry. Therefore, we coded D3 as "Present."

- Given that there are no commercial uses, commercial uses related to gentrification are absent. There are no indicators of foreign presence. Therefore, we coded M1 and M2 as "Absent." A young adult black woman is visible walking around 835 N Cambridge Ave, and we therefore coded M3 as "Present."
- The images are from 2011 for the entire block and the block face is fully visible. Therefore, we coded O8 as "No." Based on 835 N Cambridge Ave, the timeline has images for 2007 and 2011. The 2007 image has a family sitting outside of a house and some more litter. There appear to be more boarded up windows in 2011.

**Example block face 2**
Address: 524 North Bishop Street, Chicago, IL

**Example Block Face 2: 503–598 N. Bishop Street, Chicago, IL 60642 (East block face)**

| | | | |
|---|---|---|---|
| O1. jh | N1b. 90 | M2. Absent | building with updated |
| O3b. Chicago | N2. Present | M2b. | entryway—appears |
| O3. 170312433003000 | N3. Absent | M3. Yes | rehabbed, two other |
| O4. west | N4. Absent | M3b. one young adult | houses/split-levels— |
| O5. 803 N Bishop St | B1. Absent | white male | one with modern |
| O6. Sep | B2. Present | O8. No | design, the other has |
| O7. 2013 | B3. Present | O9. new townhouses, | updated entryways |
| L1. Residential | D1. Present | large vacant lot for | T1. 2007, 2009, 2011, |
| L1b. | D2. Present | sale—fenced and well- | 2013 |
| P0. 1-25% | D3. Absent | kept but litter, | T2. Yes |
| P1. No | M1. Absent | unkempt public | T3. Vacant lot for sale |
| N1. >50% | M1b. | frontage, low-rise apt | in 2013 |

- The block face consists of five newer townhouses, a large fenced vacant lot for sale, a townhouse with modern design, a smaller townhouse that has an older design, and a low-rise apartment building.
- We categorized all of the structures as new except the tan house, due to its lack of modern design and sandblasted brick. This structure is well-kept and has some features that are updated but not luxury beyond basic design or décor (e.g., window frames and entryway), but it appears to be a split-level home. One could arguably consider this home to be rehabbed

Figure A.2 (Continued)

since 1995—with its newer entryway and window frames—and if this was the case, the block would still receive the same structural mix score. While relatively modest in design (rather than luxury), the townhomes in the image still appeared to be newly constructed. Another apartment building on the street is difficult to distinguish between older and newer, but based on its sandblasted brick and the absence of peeling paint, no obvious structural repairs needed, no deteriorated siding or brick, and well-kept entryway, we categorized the building as having been rehabilitated since 1995. Therefore, we coded this block face as "1-25%" for P0, 0 for P1, ">50%" for N1, and "90" for N1b.

- The stop sign appears to be new due to its bright paint, even though it has been vandalized with stickers, and the crosswalk at the southern end of the block is newly painted. There are no public courtesies present, and there are not new large-scale developments. The new townhouses only occupy a small fraction of the block face. Therefore, we coded this block face as "Present" for N2 and "Absent" for N3 and N4.
- There are no visible signs of efforts countering disorder, but there are planters in front of some of the townhouses and on the public street frontage between the sidewalk and street by the new townhouses. In addition, the vacant lot is fenced off and contains generally well-kept grass. Therefore, we coded B1 as "Absent" and B2 and B3 as "Present."
- There is some litter visible throughout the block, particularly at the corners and by the vacant lot. In addition, there are stickers on the stop sign. The public street frontage between the sidewalk and street is unkempt by the new townhomes and in front of the vacant lot. There is no evidence of vacant, boarded up, or decaying properties. Therefore, we coded D1 and D2 as "Present" and D3 as "Absent."
- Given that there are no commercial uses, commercial uses related to gentrification are absent. There are no indicators of foreign presence. Therefore, we coded M1 and M2 as "Absent." A young adult white man with his dog is visible in front of the new townhouses, and we therefore coded M3 as "Present."
- The images are from 2013 for the entire block and the block face is fully visible. There is some limited view of the tan house due to a tree, but because the structure is still visible from various angles, one can still determine the condition of the structure. Therefore, we coded O8 as "No." Based on 531 N Bishop St, the timeline has images for 2007, 2009, 2011, and 2013. The vacant lot is more unkempt in earlier years and has a for sale sign in the 2013 image.

**Example block face 3**
Address: 1445 South Peoria Street, Chicago, IL

Figure A.2 (Continued)

**Example Block Face 3: 1445–1519 S. Peoria Street, Chicago IL 60608 (West block face)**

| | | | |
|---|---|---|---|
| O1. jh | N3. Present | M3b. few middle-aged | development with |
| O3b. Chicago | N4. Present | white males in | modern design, next to |
| O3. 170312837002002 | B1. Present | construction | el tracks, graffiti on |
| O4. east | B2. Present | O8. Yes: Improved | side of building by |
| O5. 1445 S Peoria St | B3. Present | between years | tracks, some litter, |
| O6. Sep | D1. Present | O9. Large new | security cameras, |
| O7. 2012 | D2. Absent | townhouse | graffiti painted over in |
| L1. Residential | D3. Absent | development— | 2012 image but not |
| L1b. | M1. Absent | "university village"- | 2011 |
| P0. None | M1b. | nice beautification, a | T1. 2007, 2009, 2011, |
| P1. No | M2. Absent | few white workers | 2012 |
| N1. >50% | M2b. | visible doing | T2. No |
| N1b. 100 | M3. Yes | construction, large new | T3. |
| N2. Present | | mid-rise apt | |

- The block face consists of a large new townhouses/apartments complex and a new mid-rise apartment building.
- We categorized all the structures as new based on the modern design, sandblasted brick, new entryways and walkways, absence of peeling paint, no obvious structural repairs needed, and no deteriorated siding or brick. Therefore, we coded this block face as "None" for P0, "0" for P1, ">50%" for N1, and "100" for N1b.
- All of the parking signs appear to be new based on the bright paint. There are also new lampposts throughout the block face. The houses are clearly part of a large-scale development—they take about more than 75% of the block face and have identical design to each other and to buildings across the street. Therefore, we coded this block face as "Present" for N2, N3, and N4.
- There is graffiti painted over on the apartment building based on the uneven paint—only visible from 1519 S Peoria St, and there is decorative landscaping in front of all of the houses and the public street frontage between the sidewalk and street is well-maintained. Therefore, we coded B1, B2, and B3 as "Present."
- There is some graffiti on the apartment building right by the el tracks. There is no evidence of unkempt public frontage or vacant, boarded up, or decaying properties. Therefore, we coded D1 as "Present" and D2 and D3 as "Absent."
- Given that there are no commercial uses, commercial uses related to gentrification are absent. There are no indicators of foreign presence. Therefore, we coded M1 and M2 as "Absent." Several middle-aged white men are visible doing construction work, and we therefore coded M3 as "Present."
- The images are from 2012 for most of the block face and only go to 2011 by the apartment building. However, there are no major differences between years—one cannot tell if the graffiti by the el tracks disappeared, but there appears to be new graffiti painted over. Therefore, we coded O8 as "Yes: Improved between years." Based on 1496 S Peoria St, the timeline has images for 2007, 2009, 2011, and 2013, but there are no substantial differences between image years.

***Table A.1.*** *Google Street View Gentrification Observation Instrument and Block-Face Frequency Distributions*

| | | | | |
|---|---|---|---|---|
| Observer ID | | | | |
| Date | | | | |
| Census Tract Number | | | | |
| Census Block Number | | | | |
| Block Face Address | | | | |
| City | | Chicago | | Seattle |
| Survey | | Wave 1 | Wave 2 | Wave 2 |
| Indicator | Category | Freq. | Freq. | Freq. |
| L1. Land Use[a] | resid. | 974 | 874 | 564 |
| | commerc. | 369 | 481 | 219 |
| | instit. | 202 | 170 | 19 |
| | mixed | 562 | 571 | 198 |
| | indust. | 71 | 13 | 3 |
| | other | 531 | 580 | 76 |
| P1. For land uses that are not new, most or all appear to be in good condition (well-kept, attractive, sizable) | 0 | 1,427 | 1,483 | 579 |
| | 1 | 478 | 613 | 421 |
| N1. Amount of new land uses (rehab or new construction appearing to be done within approximately the last 10-15 years) | 0% | 727 | 987 | 335 |
| | 1-10% | 125 | 70 | 43 |
| | 11-50% | 419 | 479 | 297 |
| | >50% | 634 | 560 | 325 |
| N1b. Percent of structures that appear either new or old and in good condition | Mean | n/a | 64.0 | 73.5 |
| | Std. Dev. | n/a | 39.8 | 33.4 |
| N2. New signs or structures controlling traffic (e.g., speed, pedestrian crossing, bike lanes, or parking) | 0 | 365 | 217 | 268 |
| | 1 | 1,540 | 1,879 | 732 |
| N3. New public courtesies (e.g., bus stop or subway entrance, street furniture, bike racks, public trash cans) | 0 | 1,432 | 1,353 | 812 |
| | 1 | 473 | 743 | 188 |
| N4. New large-scale development (e.g., luxury condos, large res./comm. area developments, or converted indust. use) | 0 | 1,598 | 1,744 | 895 |
| | 1 | 307 | 352 | 105 |
| N5. Residential or commercial units for sale or lease in new condition or under construction | 0 | 1,531 | n/a | n/a |
| | 1 | 374 | n/a | n/a |
| B1. Signs discouraging disorder (e.g., neighborhood watch, anti-littering/loitering/drug use/vandalism/graffiti (including if painted over or mural art)) | 0 | 1,738 | 1,804 | 787 |
| | 1 | 167 | 292 | 213 |
| B2. Beautification in personal frontage | 0 | 593 | 470 | 114 |
| | 1 | 1,312 | 1,626 | 886 |
| B3. Vacant area and public street frontage beautification, upkeep, fencing, or set for construction | 0 | 833 | 940 | 379 |
| | 1 | 1,072 | 1,156 | 621 |

Table A.1 (Continued)

| | | | | |
|---|---|---|---|---|
| D1. Lack of physical disorder (garbage, litter, graffiti, vandalism) | 0 | 232 | 1,208 | 379 |
| | 1 | 743 | 888 | 621 |
| D2. Lack of unkempt vacant areas or public street frontage | 0 | 141 | 475 | 220 |
| | 1 | 1,764 | 1,621 | 780 |
| D3. Lack of structures that appear to be burnt out, boarded up, or abandoned or in poor/badly deteriorated condition | 0 | 222 | 188 | 78 |
| | 1 | 1,683 | 1,908 | 922 |
| G1. Google Street View image year | 2007 | 223 | 33 | 1 |
| | 2007/2009 | 129 | n/a | n/a |
| | 2008 | n/a | 0 | 6 |
| | 2009 | 1,553 | 127 | 4 |
| | 2010 | n/a | 0 | 0 |
| | 2011 | n/a | 1,816 | 1028 |
| | 2012 | n/a | 88 | 39 |
| | 2013 | n/a | 32 | 0 |
| G2a. Street View inconsistency | 0 | 1,658 | 1,956 | 868 |
| | 1 | 244 | 140 | 132 |
| G2b. Inconsistency type | No diff. b.t. yrs | 81 | 4 | 41 |
| | Decline b.t. yrs | 2 | 7 | 3 |
| | Improved b.t. yrs | 34 | 18 | 16 |
| | Blurry image | 21 | 5 | 0 |
| | Limited Street View access | 103 | 41 | 72 |
| | No Street View access | 3 | 65 | 0 |
| Total observed block faces | | 1,905 | 2,096 | 1,000 |

*Notes:* Only block faces with residential, commercial, or mixed land uses were observed. The remainder of the frequency distributions presented in this table only consider the observed block faces. Google Street View access was limited particularly in block faces surrounding President Obama's home. Block faces were only coded if the indicators were discernible from all aspects of the block face. Preliminary analysis revealed that inconsistencies were unrelated to the measurement properties of the gentrification stage score.

***Table A.2.*** *Inter-rater Reliability Results for Wave 1 and Wave 2*

| | Wave 1 | Wave 2 |
|---|---|---|
| Average item agreement | 0.83 | 0.74 |
| Average item kappa score | 0.50 | 0.30 |
| Structural mix intraclass correlation | 0.55 | 0.30 |
| Beautification efforts intraclass correlation | 0.64 | 0.46 |
| Lack of disorder/decay intraclass correlation | 0.46 | 0.39 |
| Gentrification stage score intraclass correlation | 0.68 | 0.47 |
| Block faces tested | 103 | 95 |

*Note:* Wave 2 scores presented are constructed using the same methods as Wave 1. Most disagreement occurred in distinguishing between whether buildings were new and old. Following these tests, I implemented indicators for the overall percentage of buildings in well-maintained physical condition, and measures and scores relying on Wave 2 data used this indicator in the main analyses instead.

***Table A.3.*** *Descriptive Statistics for GGO Indicators by Census Tracts*

| | Chicago, Wave 1 | | | | | Chicago, Wave 2 | | | | | Seattle, Wave 2 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Indicator | N | Mean | SD | Min. | Max. | N | Mean | SD | Min. | Max. | N | Mean | SD | Min. | Max. |
| Old structures in good condition ($P_1$) | 140 | 0.26 | 0.25 | 0.00 | 1.00 | 144 | 0.28 | 0.24 | 0.00 | 1.00 | 42 | 0.42 | 0.21 | 0.07 | 0.86 |
| New amount ($N_1$) | 140 | 0.44 | 0.23 | 0.00 | 1.00 | 144 | 0.34 | 0.24 | 0.00 | 1.00 | 42 | 0.45 | 0.18 | 0.05 | 0.80 |
| Percent new or old in good condition ($N_{1b}$) | n/a | n/a | n/a | n/a | n/a | 144 | 61.60 | 22.80 | 0.00 | 100.00 | 42 | 73.56 | 14.30 | 40.80 | 95.00 |
| New traffic signs/structures ($N_2$) | 140 | 0.80 | 0.16 | 0.28 | 1.00 | 144 | 0.92 | 0.13 | 0.35 | 1.00 | 42 | 0.74 | 0.20 | 0.25 | 1.00 |
| New public courtesies ($N_3$) | 140 | 0.26 | 0.24 | 0.00 | 0.85 | 144 | 0.37 | 0.28 | 0.00 | 1.00 | 42 | 0.18 | 0.22 | 0.00 | 0.83 |
| New large developments ($N_4$) | 140 | 0.16 | 0.20 | 0.00 | 0.79 | 144 | 0.15 | 0.21 | 0.00 | 0.94 | 42 | 0.12 | 0.19 | 0.00 | 0.71 |
| New construction for sale ($N_5$) | 140 | 0.19 | 0.15 | 0.00 | 0.67 | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| Efforts discouraging disorder ($B_1$) | 140 | 0.09 | 0.11 | 0.00 | 0.50 | 144 | 0.14 | 0.15 | 0.00 | 0.65 | 42 | 0.21 | 0.13 | 0.00 | 0.53 |
| Personal frontage beautification ($B_2$) | 140 | 0.67 | 0.24 | 0.00 | 1.00 | 144 | 0.77 | 0.21 | 0.00 | 1.00 | 42 | 0.88 | 0.14 | 0.45 | 1.00 |
| Vacant/public space beautification ($B_3$) | 140 | 0.57 | 0.21 | 0.00 | 1.00 | 144 | 0.23 | 0.26 | 0.00 | 1.00 | 42 | 0.62 | 0.24 | 0.08 | 0.97 |
| Lack of physical disorder ($D_1$) | 128 | 0.77 | 0.25 | 0.00 | 1.00 | 144 | 0.39 | 0.23 | 0.00 | 0.90 | 42 | 0.63 | 0.23 | 0.21 | 1.00 |
| Lack of unkempt vacant/public space ($D_2$) | 140 | 0.92 | 0.14 | 0.15 | 1.00 | 144 | 0.77 | 0.22 | 0.00 | 1.00 | 42 | 0.78 | 0.14 | 0.50 | 1.00 |
| Lack of decaying structures ($D_3$) | 140 | 0.89 | 0.14 | 0.37 | 1.00 | 144 | 0.9 | 0.14 | 0.33 | 1.00 | 42 | 0.62 | 0.24 | 0.08 | 0.97 |

*Notes:* Face- and block-level descriptive statistics are similar at the face- and block-levels but span the full range of the 0 to 1 scales. Details are available upon request.

***Table A.4.*** *Descriptive Statistics for Tract-level Gentrification Measures and Hierarchical Linear Model Variance and Measurement Properties for GGO Stage Scores for Block Faces within Blocks and Blocks within Tracts*

| | Chicago, Wave 1 | | | | Chicago, Wave 2 | | | | Seattle, Wave 2 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Measure | Mean | SD | Min. | Max. | Mean | SD | Min. | Max. | Mean | SD | Min. | Max. |
| Structural mix | 0.53 | 0.19 | 0.12 | 1.00 | 0.61 | 0.18 | 0.14 | 1.00 | | | | |
| Physical condition of buildings | | | | | | | | | 0.74 | 0.14 | 0.41 | 0.95 |
| Degree of new structures | | | | | | | | | 0.50 | 0.19 | 0.14 | 0.92 |
| Beautification efforts | 0.66 | 0.12 | 0.29 | 0.91 | 0.66 | 0.15 | 0.00 | 0.93 | 0.76 | 0.11 | 0.48 | 0.90 |
| Lack of disorder and decay | 0.81 | 0.15 | 0.30 | 1.00 | 0.55 | 0.18 | 0.11 | 0.94 | 0.68 | 0.16 | 0.37 | 1.00 |
| Total stage score | 0.67 | 0.12 | 0.35 | 0.95 | 0.63 | 0.11 | 0.30 | 0.89 | 0.68 | 0.08 | 0.53 | 0.81 |
| Block faces (Level-1) within blocks (Level-2): | | | | | | | | | | | | |
| Variance | | 0.03 | | | | 0.02 | | | | 0.01 | | |
| Reliability | | 0.61 | | | | 0.64 | | | | 0.68 | | |
| Intra-class correlation | | 0.39 | | | | 0.46 | | | | 0.42 | | |
| Blocks (Level-1) within tracts (Level-2): | | | | | | | | | | | | |
| Variance | | 0.01 | | | | 0.02 | | | | 0.01 | | |
| Reliability | | 0.73 | | | | 0.63 | | | | 0.68 | | |
| Intra-class correlation | | 0.37 | | | | 0.25 | | | | 0.18 | | |
| Census tract units | | 140 | | | | 122 | | | | 42 | | |
| Block units | | 682 | | | | 320 | | | | 296 | | |
| Block face units | | 1,905 | | | | 1,472 | | | | 1,000 | | |

**Construction of Gentrification Measures from Instrument Indicators**

To calculate the structural mix measure used in the Chicago analyses, we assign a block face a score of 1 if its older structures are in good condition ($P_1$); otherwise, we assign the block face the average score of indicators for the degree of new and rehabilitated structures ($N_1$, $N_2$, $N_3$, $N_4$, and $N_5$; $N_5$ is not included in Wave 2).[2] Formally: $Structural\ mix = max(P_1, N)\ , where\ N = \frac{N_1 + N_2 + N_3 + N_4 + N_5}{5}$ for Wave 1 and $N = \frac{N_1 + N_2 + N_3 + N_4}{4}$ for Wave 2. Therefore, an area with all of its older structures in good condition will be at the top of the structural mix score distribution, or at the end stage of the neighborhood life cycle of gentrification in our typology. Because determining whether structures are old or new/rehabilitated is uncertain, particularly for older structures in good condition, this approach assigns block faces with most or all older housing in good condition similar scores to block faces with some new/rehabilitated structures mixed with older housing in good condition. Combining indicators for old and new structures attenuates potential problems resulting from this uncertainty in coding. For example, even if a coder had difficulty distinguishing between old and new structures on a block face with a mix of old and new structures that are all in good condition, the block face would receive the same structural mix score whether the observer considered all or just some of the structures to be older. Consistent with our typology, disinvested neighborhoods that became fully middle-or upper-middle-class either in the past decade or many years earlier yield similar structural mix scores.

In the Seattle analyses, we did not construct a structural mix score to improve upon relatively lower rater agreement for distinguishing between new and old buildings. Instead, the

[2] We also calculated Wave 1 scores excluding new construction for sale, $N_5$, which may reflect effects of the housing crisis rather than upward neighborhood trajectories, and the resulting composite stage scores were nearly perfectly correlated with the stage scores presented and yielded nearly identical results.

condition of physical building structures ($N_{1b}$), new or old, is considered as a separate measure, and the degree of new and rehabilitated structures is constructed with the average of the remaining indicators ($N_2$, $N_3$, and $N_4$). Composite stage scores between the method used in Chicago and Seattle are strongly correlated (see Table A.5). We also calculated the structural mix score using only the condition of old structures ($P_1$) and new construction and rehabilitation ($N_1$) to align with Hammel and Wyly's instrument, which emphasizes investments in building structures over other forms of reinvestment. This alternative measure makes some difference for the composite stages scores (see Table A.5), but regression results for our variables of interest remain similar.

We combine indicators for beautification efforts ($B_1$, $B_2$, and $B_3$) and the lack of disorder and decay ($D_1$, $D_2$, and $D_3$) for their respective summary measures. Because the presence of any indicator for each summary measure is conceptually more significant than having multiple kinds of indicators, we construct summary measure scores using a quadratic fit, such that the number of indicators present has decreasing weight for the summary beautification measure and increasing weight for the summary lack of disorder measure. Using a linear rather than quadratic fit makes little difference for the composite stage scores (see Table A.5). The summary measure scores range from 0 to 1 with the maximum scores representing the presence of all three indicators of beautification efforts and the absence of all three indicators of disorder/decay, respectively. Because residential and commercial/mixed-use streets yield different means for the instrument items due to the unequal levels of foot traffic that take place in these land uses and differences in the physical disorder instrument item ($D_1$) used in the first wave of data collection, we standardized scores between residential and commercial/mixed-use streets and then normalized them to scales ranging from 0 to 1.

***Table A.5.*** *Correlation Matrix for Alternative Measures and Stage Scores*

| | Struct. mix (unwtd.) | Struct. mix (struct.) | Beauti-ficaiton (linear) | Beauti-fication (quad.) | Lack of disorder (linear) | Lack of disorder (quad.) | Stage score (equal) | Stage score (housing) |
|---|---|---|---|---|---|---|---|---|
| Chicago, Wave 1 | | | | | | | | |
| Structural mix (unweighted) | 1.00 | | | | | | | |
| Structural mix (structures only) | 0.80 | 1.00 | | | | | | |
| Beautification efforts (linear) | 0.35 | 0.20 | 1.00 | | | | | |
| Beautification efforts (quadratic) | 0.34 | 0.19 | 0.98 | 1.00 | | | | |
| Lack of disorder/decay (linear) | 0.51 | 0.47 | 0.11 | 0.11 | 1.00 | | | |
| Lack of disorder/decay (quadratic) | 0.51 | 0.47 | 0.11 | 0.12 | 0.99 | 1.00 | | |
| Stage score (equal weights) | 0.87 | 0.72 | 0.55 | 0.56 | 0.73 | 0.74 | 1.00 | |
| Stage score (weighted housing) | 0.81 | 0.88 | 0.47 | 0.47 | 0.73 | 0.74 | 0.93 | 1.00 |

| Chicago, Wave 2 | Struct. mix (unwtd.) | Struct. mix (struct.) | Beauti-ficaiton (linear) | Beauti-fication (quad.) | Lack of disorder (linear) | Lack of disorder (quad.) | Stage score (equal) | Stage score (housing) |
|---|---|---|---|---|---|---|---|---|
| Structural mix (unweighted) | 1.00 | | | | | | | |
| Structural mix (structures only) | 0.83 | 1.00 | | | | | | |
| Beautification efforts (linear) | 0.29 | 0.08 | 1.00 | | | | | |
| Beautification efforts (quadratic) | 0.32 | 0.12 | 0.98 | 1.00 | | | | |
| Lack of disorder/decay (linear) | 0.59 | 0.49 | 0.08 | 0.09 | 1.00 | | | |
| Lack of disorder/decay (quadratic) | 0.58 | 0.46 | 0.08 | 0.09 | 0.97 | 1.00 | | |
| Stage score (equal weights) | 0.88 | 0.68 | 0.48 | 0.51 | 0.81 | 0.81 | 1.00 | |
| Stage score (weighted housing) | 0.87 | 0.86 | 0.37 | 0.40 | 0.78 | 0.78 | 0.94 | 1.00 |

| Seattle, Wave 2 | Physical condition | Struct. mix (unwtd.) | Struct. mix (struct.) | New (linear) | New (quad.) | Beauti-ficaiton (linear) | Beauti-fication (quad.) | Lack of disorder (linear) | Lack of disorder (quad.) | Stage score (equal) | Stage score (equal, Chicago) | Stage score (housing, Chicago) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Physical condition of buildings | 1.00 | | | | | | | | | | | |
| Structural mix (unweighted) | 0.88 | 1.00 | | | | | | | | | | |
| Structural mix (structures only) | 0.92 | 0.91 | 1.00 | | | | | | | | | |
| Degree of new structures (linear) | 0.35 | 0.47 | 0.40 | 1.00 | | | | | | | | |
| Degree of new structures (quadratic) | 0.60 | 0.43 | 0.36 | 0.98 | 1.00 | | | | | | | |
| Beautification efforts (linear) | 0.20 | 0.06 | 0.14 | -0.13 | -0.11 | 1.00 | | | | | | |
| Beautification efforts (quadratic) | 0.22 | 0.09 | 0.17 | -0.16 | -0.14 | 0.98 | 1.00 | | | | | |
| Lack of disorder/decay (linear) | 0.59 | 0.65 | 0.61 | 0.08 | 0.03 | 0.08 | 0.19 | 1.00 | | | | |
| Lack of disorder/decay (quadratic) | 0.54 | 0.61 | 0.57 | 0.03 | -0.02 | 0.04 | 0.15 | 0.99 | 1.00 | | | |
| Stage score (equal weights, new measures) | 0.86 | 0.87 | 0.85 | 0.52 | 0.49 | 0.26 | 0.32 | 0.79 | 0.75 | 1.00 | | |
| Stage score (equal weights, Chicago measure) | 0.79 | 0.85 | 0.81 | 0.21 | 0.16 | 0.28 | 0.36 | 0.92 | 0.89 | 0.92 | 1.00 | |
| Stage score (weighted housing, Chicago measure) | 0.82 | 0.82 | 0.87 | 0.19 | 0.15 | 0.31 | 0.39 | 0.89 | 0.86 | 0.92 | 0.98 | 1.00 |

*Notes:* Seattle scores are constructed using different measures (see Appendix A on "Construction of Gentrification Measures from Instrument Indicators"). "Stage score (equal weights)" for Chicago and "Stage score (equal weights, new measures)" for Seattle are used in analyses presented in main text.

***Table A.6.*** *Construct Validity of Gentrification Stage Score*

| | Chicago, Wave 2 | Seattle, Wave 2 | |
|---|---|---|---|
| Correlations | Tracts | Tracts | Block groups |
| % white | 0.51** | 0.16 | 0.20** |
| % black | -0.40** | -0.22 | -0.23** |
| % Hispanic | -0.19* | -0.13 | -0.10 |
| % Asian | -0.02 | 0.02 | 0.02 |
| % foreign-born | 0.04 | -0.16 | n/a |
| % families below poverty | -0.35** | 0.06 | -0.14 |
| Median household income (logged) | 0.41** | -0.11 | 0.14 |
| % college-educated | 0.52** | 0.04 | 0.14† |
| % professionals | 0.48** | 0.18 | 0.28** |
| % homeownership | 0.20* | -0.17 | 0.08 |
| Median home value (logged) | 0.29** | 0.03 | 0.30** |
| Median rent (logged) | 0.45** | -0.03 | 0.02 |
| Starbucks | 0.30** | | |
| Green roofs | 0.31** | | |
| Coffee shops | | 0.28† | 0.23** |
| Building permits | | 0.24 | 0.28** |
| Gentrification Stage Score Poisson Regression Results Predicting Alternative Indicators | | | |
| Starbucks/Coffee shops | 5.30** (1.06) | 4.09** (0.99) | 4.17** (0.72) |
| Green Roofs/Permits | 4.75** (0.82) | 1.08** (0.17) | 1.96** (0.13) |
| N | 143 | 42 | 136 |

Notes: **p<0.01; *p<0.05; †p<0.10. All analyses presented use 2005-2009 American Community Survey 5-year estimates. Regression models include controls for population density, % black, % Hispanic (Chicago), % Asian (Seattle), % families below poverty, % homeownership.

***Figure A.3.*** *Google Street View Timeline Survey for Chicago and Seattle*

Figure A.3 (Continued)

GGO Timeline Survey

. Please enter your name.

. Please enter the Unique ID.

Q1. Which years of images are available for this block face? (Check all that apply.)

| 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | N/A |
|---|---|---|---|---|---|---|---|---|
| ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |

Q2.
Which of the following differences are present from previous image years to the most recent year? Weather-related changes are not applicable. (check all that apply)

- ☐ new construction or full property renovation
- ☐ demolition of property
- ☐ addition of vacant lots
- ☐ disappearance/repurposing (e.g., turned into a park) of vacant lots
- ☐ repair of visibly abandoned and blighted property (e.g., boarded up, burnt out)
- ☐ addition of visibly abandoned and blighted property (e.g., boarded up, burnt out)
- ☐ changes in commercial use (e.g., store name change; store use change)
- ☐ none of the above

.
**Instructions:**

**For the URL and ending street/landmark listed, click on the URL link.** This link will place you at the corner of a street block in Google Street View facing the right side of the street. You should see a clock image on the upper left hand corner of the screen.

**If you do not see a clock image**, click on this link to run the newer version of Google Maps (no downloads are necessary): http://www.google.com/maps/tt/optin?status=invite and reopen the URL listed below. If a clock image still is not visible, then answer with the year that is available for Question 1 and "none of the above" for Question 2.

**For Question 1:** Click on the clock image in the upper left hand corner. A window will drop down. Click on each dot in the slider below the image to see which years have images available. Check the boxes of the years available in Question 1.
- **If only one year is available**, answer "none of the above" in Question 2 and continue to the next link.
- **If the street contains multiple lanes**, click on the pavement of each lane to make sure that there are not more years available on other lanes.

**Starting with the most recent year, for each year of available images:** Click on one of the dots in that year in the drop-down window. (There may be multiple dots per year.)
- Then, click on the image in the drop-down window above the slider. This switches the entire street view to the month and year indicated by the dot.
- Quickly move forward along the street **until you reach the "Ending Street or Landmark"** listed using the up arrow key on your keyboard or clicking along the street with your mouse. The ending street or landmark can be viewed easily using the small map on the lower left corner of the screen.

Figure A.3 (Continued)

**- Note the present buildings, vacant lots, abandoned or blighted property, and commercial uses on the right-hand side of the street only.**

**For Question 2:** Indicate if there are differences between ANY of the previous image years to the most recent image year in the presence of buildings (e.g., new construction or demolition), vacant lots, abandoned or blighted property, and commercial uses.

# Appendix B

## Supplemental Tables and Figures

## Chapter 1. Pioneers of Gentrification: Transformation in Global Neighborhoods in the Late Twentieth Century

***Table B.1.*** *Logistic Regression Results Predicting Census-Based Gentrification on the Early Presence and Population Changes of Asians and Hispanics for Tracts below 1970 National Median Income*

| | Early Presence of Asians and Hispanics | | | | | | | Early Asian and Hispanic Population Change | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) | (13) | (14) |
| | Asian and Hispanic Presence | x Predominantly Black | x Predominantly White | x Percent Black | Ethnic Enclaves | x City Immig. Levels | x City Black Presence | Asian and Hispanic Presence | x Predominantly Black | x Predominantly White | x Percent Black | Ethnic Enclaves | x City Immig. Levels | x City Black Presence |
| Asian population (logged) | 0.19 ** | 0.19 ** | 0.19 ** | 0.20 ** | 0.20 ** | 0.13 * | 0.17 ** | 0.12 * | 0.10 * | 0.13 ** | 0.11 * | 0.12 ** | 0.13 ** | 0.15 ** |
| | (0.04) | (0.04) | (0.06) | (0.05) | (0.04) | (0.06) | (0.06) | (0.05) | (0.05) | (0.05) | (0.05) | (0.05) | (0.05) | (0.05) |
| Hispanic population (logged) | -0.17 ** | -0.18 ** | -0.13 † | -0.14 † | -0.14 * | -0.16 † | -0.12 | -0.17 ** | -0.20 ** | -0.13 † | -0.17 * | -0.11 | -0.16 * | -0.18 ** |
| | (0.06) | (0.06) | (0.10) | (0.07) | (0.06) | (0.08) | (0.08) | (0.07) | (0.07) | (0.07) | (0.07) | (0.07) | (0.07) | (0.07) |
| % black | -1.46 ** | -1.01 * | -0.84 | -1.39 ** | -1.59 ** | -1.40 ** | -1.53 ** | -1.91 ** | -1.11 * | -0.57 ** | -2.34 ** | -2.13 ** | -2.00 ** | -2.16 ** |
| | (0.30) | (0.42) | (0.46) | (0.33) | (0.30) | (0.30) | (0.31) | (0.33) | (0.46) | (0.43) | (0.45) | (0.34) | (0.34) | (0.35) |
| % black * (Δ) Asians | | | | 0.08 | | | | | | | -0.69 * | | | |
| | | | | (0.16) | | | | | | | (0.32) | | | |
| % black * (Δ) Hispanics | | | | 0.16 | | | | | | | 0.67 ** | | | |
| | | | | (0.20) | | | | | | | (0.28) | | | |
| Total population (in thousands) | -0.04 | -0.03 | -0.06 | -0.03 | -0.05 | -0.03 | -0.04 | 0.04 | 0.05 | 0.01 | 0.03 | 0.02 | 0.02 | 0.04 |
| | (0.04) | (0.04) | (0.04) | (0.04) | (0.04) | (0.04) | (0.04) | (0.04) | (0.04) | (0.04) | (0.04) | (0.04) | (0.04) | (0.04) |
| Δ logged Asian population | | | | | | | | -0.10 † | -0.10 † | -0.17 * | -0.28 ** | -0.11 † | 0.04 | 0.07 |
| | | | | | | | | (0.05) | (0.05) | (0.08) | (0.10) | (0.06) | (0.07) | (0.07) |
| Δ logged Hispanic population | | | | | | | | -0.73 ** | -0.85 ** | -0.56 ** | -0.62 ** | -0.68 ** | -0.37 * | -0.76 ** |
| | | | | | | | | (0.10) | (0.11) | (0.16) | (0.11) | (0.10) | (0.15) | (0.17) |
| Δ logged black population | | | | | | | | -0.29 ** | -0.27 ** | -0.30 ** | -0.29 ** | -0.32 ** | -0.27 ** | -0.30 ** |
| | | | | | | | | (0.08) | (0.08) | (0.08) | (0.08) | (0.08) | (0.08) | (0.08) |
| Δ logged white population | | | | | | | | 2.01 ** | 2.02 ** | 1.93 ** | 1.94 ** | 1.88 ** | 2.25 ** | 2.13 ** |
| | | | | | | | | (0.21) | (0.21) | (0.21) | (0.20) | (0.21) | (0.22) | (0.21) |
| Predominantly black (>75%) | | -0.72 | | | | | | | -1.15 † | | | | | |
| | | (0.50) | | | | | | | (0.69) | | | | | |
| Predominantly black * (Δ) Asians | | -0.18 | | | | | | | -0.25 | | | | | |
| | | (0.22) | | | | | | | (0.48) | | | | | |
| Predominantly black * (Δ) Hisp. | | -0.06 | | | | | | | 0.74 * | | | | | |
| | | (0.23) | | | | | | | (0.30) | | | | | |
| Predominantly white (>75%) | | | 0.52 * | | | | | | | 0.29 | | | | |
| | | | (0.24) | | | | | | | (0.21) | | | | |
| Predominantly white * (Δ) Asians | | | 0.02 | | | | | | | 0.12 | | | | |
| | | | (0.07) | | | | | | | (0.09) | | | | |
| Predominantly white * (Δ) Hispanics | | | -0.06 | | | | | | | -0.23 | | | | |
| | | | (0.11) | | | | | | | (0.20) | | | | |
| Asian enclave (>40%) | | | | | -16.3 | | | | | | | -2.77 ** | | |
| | | | | | (290) | | | | | | | (0.79) | | |
| Hispanic enclave (>40%) | | | | | -1.60 ** | | | | | | | -2.05 ** | | |
| | | | | | (0.61) | | | | | | | (0.61) | | |

## Table B.1 (Continued)

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *City types* | | | | | | | | | | | | | | |
| Early Asian destination | 0.44 † | 0.43 † | 0.53 * | 0.46 † | 0.47 † | 0.65 * | 0.22 | 0.22 | 0.26 | 0.26 | 0.22 | 0.37 | 0.02 | -0.15 |
| | (0.25) | (0.25) | (0.25) | (0.25) | (0.25) | (0.33) | (0.26) | (0.28) | (0.28) | (0.28) | (0.28) | (0.28) | (0.25) | (0.25) |
| Early Hispanic destination | 0.09 | 0.13 | 0.03 | 0.12 | 0.14 | 0.12 | -0.18 | -0.06 | 0.03 | -0.12 | -0.16 | 0.00 | -0.35 | -0.68 * |
| | (0.25) | (0.26) | (0.26) | (0.26) | (0.26) | (0.30) | (0.26) | (0.29) | (0.28) | (0.29) | (0.30) | (0.28) | (0.31) | (0.28) |
| High immigration city | | | | | | 0.38 * | | | | | | | 0.62 ** | |
| | | | | | | (0.17) | | | | | | | (0.18) | |
| High immig./black presence city | 0.60 ** | 0.62 ** | 0.56 ** | 0.63 ** | 0.61 ** | | 0.40 * | 0.84 ** | 0.89 ** | 0.79 ** | 0.82 ** | 0.87 ** | | 0.59 ** |
| | (0.21) | (0.21) | (0.21) | (0.21) | (0.21) | | (0.18) | (0.22) | (0.22) | (0.22) | (0.22) | (0.22) | | (0.20) |
| High immig./no black presence city | 0.55 * | 0.55 * | 0.49 † | 0.56 * | 0.50 † | | | 0.58 * | 0.63 * | 0.51 † | 0.57 * | 0.52 † | | |
| | (0.26) | (0.26) | (0.26) | (0.26) | (0.26) | | | (0.28) | (0.28) | (0.29) | (0.28) | (0.28) | | |
| Low immigration/black presence city | 0.31 | 0.28 | 0.34 | 0.30 | 0.28 | | 0.14 | 0.16 | 0.11 | 0.15 | 0.15 | 0.15 | | -0.04 |
| | (0.21) | (0.21) | (0.21) | (0.21) | (0.21) | | (0.24) | (0.22) | (0.22) | (0.22) | (0.22) | (0.22) | | (0.20) |
| *Interactions with city types* | | | | | | | | | | | | | | |
| Early Asian destination * Asians | | | | | | -0.10 | | | | | | | -0.05 | |
| | | | | | | (0.10) | | | | | | | (0.13) | |
| Early Hisp. destination * Hisp. | | | | | | -0.20 | | | | | | | -1.88 ** | |
| | | | | | | (0.18) | | | | | | | (0.53) | |
| High immigration city * Asians | | | | | | 0.18 * | | | | | | | -0.34 ** | |
| | | | | | | (0.08) | | | | | | | (0.10) | |
| High immigration city * Hisp. | | | | | | 0.01 | | | | | | | -0.57 ** | |
| | | | | | | (0.10) | | | | | | | (0.20) | |
| High immig./black city * Asians | | | | | | | 0.04 | | | | | | | -0.36 ** |
| | | | | | | | (0.08) | | | | | | | (0.11) |
| High immig./black city * Hisp. | | | | | | | -0.08 | | | | | | | -0.17 |
| | | | | | | | (0.11) | | | | | | | (0.21) |
| Low immig./black city * Asians | | | | | | | 0.01 | | | | | | | -0.26 † |
| | | | | | | | (0.10) | | | | | | | (0.14) |
| Low immig./black city * Hisp. | | | | | | | -0.01 | | | | | | | 0.64 * |
| | | | | | | | (0.14) | | | | | | | (0.28) |
| AIC | 2035 | 2038 | 2031 | 2038 | 2011 | 2031 | 2045 | 1881 | 1874 | 1881 | 1875 | 1846 | 1857 | 1869 |

[a] N = 3,255. **p<0.01, *p<0.05, †p<0.10 (t wo-tailed test). Standard errors are in parentheses. All variables are 24 years prior to gentrification field surveys and changes are over the first 8 years. All models also include controls for median household income (logged), % below poverty, % same residents 10 years ago, homeownership rate, vacancy rate, and % over 65 years old. Low-immigration/no black presence city is the reference category for Models 1-5 and 8-12. Low-immigration is the reference category for Models 6 and 13, and no black presence is the reference category for Models 7 and 14. Interaction term variables are mean-centered.

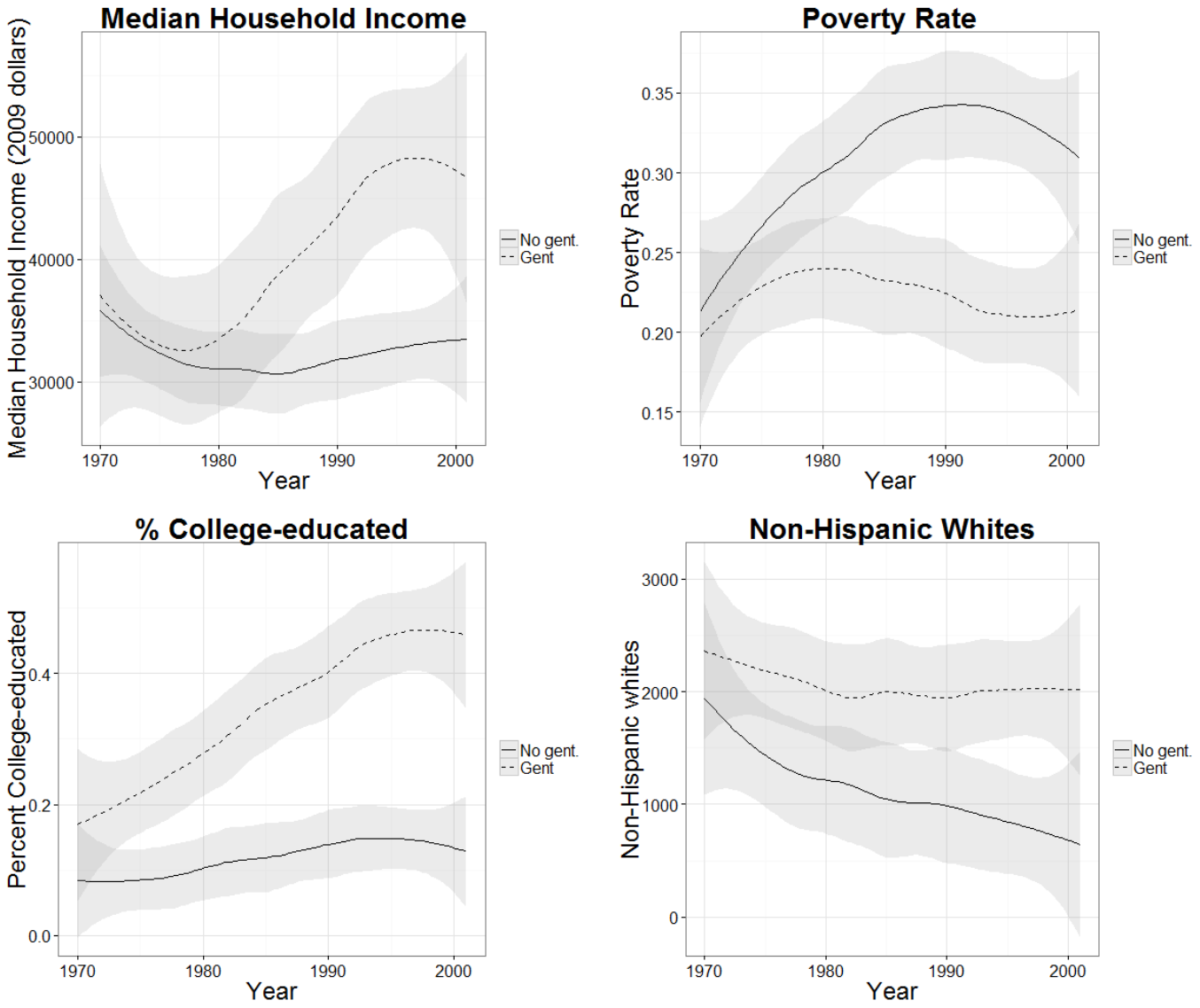



***Figure B.1.*** *Plots of Neighborhood Characteristics over Time between Gentrifying and Non-Gentrifying Tracts*

***Table B.2.*** *Logistic Regression Results Predicting Gentrification on the Early Presence and Population Changes (First 8 Years) of Foreign-born Residents*

| | Early Presence of Foreign-born Residents | | | | | | | Early Population Changes of Foreign-born Residents | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | (1) Asian and Hispanic Presence | (2) x Predomi-nantly Black | (3) x Predomi-nantly White | (4) x Percent Black | (5) Ethnic Enclaves | (6) x City Immig. Levels | (7) x City Black Presence | (8) Asian and Hispanic Change | (9) x Predomi-nantly Black | (10) x Predomi-nantly White | (11) x Percent Black | (12) Ethnic Enclaves | (13) x City Immig. Levels | (14) x City Black Presence |
| Foreign-born population (logged) | 0.13 | 0.04 | 0.26 * | 0.14 | 0.23 * | 0.15 | 0.43 ** | 0.11 | 0.06 | 0.13 | 0.13 | 0.26 ** | 0.17 † | 0.16 † |
| | (0.09) | (0.10) | (0.11) | (0.09) | (0.09) | (0.13) | (0.13) | (0.09) | (0.10) | (0.10) | (0.09) | (0.10) | (0.09) | (0.09) |
| % black | -1.11 ** | -0.36 | -0.51 | -1.11 ** | -1.36 ** | -1.06 ** | -1.13 ** | -1.81 ** | -0.75 | -1.71 ** | -1.60 ** | -2.18 ** | -1.45 ** | -1.72 ** |
| | (0.33) | (0.42) | (0.41) | (0.32) | (0.34) | (0.33) | (0.34) | (0.37) | (0.46) | (0.43) | (0.38) | (0.38) | (0.37) | (0.37) |
| % black * (Δ) foreign-born | | | | 0.39 * | | | | | | | 1.17 ** | | | |
| | | | | (0.18) | | | | | | | (0.40) | | | |
| Total population (in thousands) | -0.09 † | -0.07 | -0.12 * | -0.07 | -0.12 * | -0.09 * | -0.11 * | -0.05 | -0.03 | -0.06 | -0.05 | -0.09 † | -0.08 | -0.06 |
| | (0.05) | (0.05) | (0.05) | (0.05) | (0.05) | (0.05) | (0.05) | (0.05) | (0.05) | (0.05) | (0.05) | (0.05) | (0.05) | (0.05) |
| Δ logged foreign-born population | | | | | | | | -1.07 ** | -1.20 ** | -1.09 ** | -0.97 ** | -0.77 ** | -0.36 | -1.33 ** |
| | | | | | | | | (0.17) | (0.19) | (0.20) | (0.17) | (0.18) | (0.28) | (0.27) |
| Δ logged black population | | | | | | | | -0.48 ** | -0.43 ** | -0.50 ** | -0.46 ** | -0.58 ** | -0.40 ** | -0.49 ** |
| | | | | | | | | (0.12) | (0.12) | (0.13) | (0.12) | (0.13) | (0.12) | (0.12) |
| Δ logged white population | | | | | | | | 2.04 ** | 2.08 ** | 2.02 ** | 1.92 ** | 1.78 ** | 1.98 ** | 2.04 ** |
| | | | | | | | | (0.21) | (0.21) | (0.21) | (0.21) | (0.21) | (0.21) | (0.21) |
| Predominantly black (>75%) | | -0.88 * | | | | | | | -1.28 ** | | | | | |
| | | (0.37) | | | | | | | (0.39) | | | | | |
| Predominantly black * (Δ) foreign | | 0.19 | | | | | | | 0.56 | | | | | |
| | | (0.19) | | | | | | | (0.36) | | | | | |
| Predominantly white (>75%) | | | 0.60 * | | | | | | | 0.12 | | | | |
| | | | (0.24) | | | | | | | (0.22) | | | | |
| Predominantly white * (Δ) foreign | | | -0.09 | | | | | | | 0.14 | | | | |
| | | | (0.14) | | | | | | | (0.31) | | | | |
| Immig. enclave (>40%) | | | | | -1.52 ** | | | | | | | -1.63 ** | | |
| | | | | | (0.33) | | | | | | | (0.31) | | |
| *City types* | | | | | | | | | | | | | | |
| Early Asian destination | 0.79 ** | 0.81 ** | 0.91 ** | 0.86 ** | 0.86 ** | -0.01 | 0.25 | 0.56 † | 0.55 † | 0.57 † | 0.57 † | 0.59 † | 0.23 | 0.40 |
| | (0.29) | (0.29) | (0.29) | (0.29) | (0.29) | (0.41) | (0.27) | (0.31) | (0.30) | (0.31) | (0.30) | (0.31) | (0.27) | (0.27) |
| Early Hispanic destination | -0.51 † | -0.41 | -0.40 | -0.41 | -0.40 | -0.97 * | -0.96 ** | -0.54 † | -0.45 | -0.54 † | -0.43 | -0.49 † | -0.52 † | -0.60 * |
| | (0.27) | (0.27) | (0.28) | (0.28) | (0.27) | (0.39) | (0.26) | (0.29) | (0.29) | (0.29) | (0.29) | (0.29) | (0.27) | (0.27) |
| High immigration city | | | | | | 0.53 ** | | | | | | | 0.57 ** | |
| | | | | | | (0.17) | | | | | | | (0.19) | |
| High immig./black presence city | 0.75 ** | 0.81 ** | 0.85 ** | 0.83 ** | 0.82 ** | | 0.63 ** | 1.01 ** | 1.05 ** | 1.01 ** | 1.01 ** | 1.09 ** | | 0.89 ** |
| | (0.23) | (0.23) | (0.24) | (0.24) | (0.23) | | (0.20) | (0.25) | (0.25) | (0.25) | (0.25) | (0.25) | | (0.21) |
| High immig./no black presence city | 0.72 * | 0.73 * | 0.74 * | 0.75 * | 0.62 † | | | 0.49 | 0.50 | 0.47 | 0.50 | 0.29 | | |
| | (0.33) | (0.33) | (0.33) | (0.33) | (0.33) | | | (0.35) | (0.35) | (0.35) | (0.35) | (0.35) | | |
| Low immigration/black presence city | 0.44 | 0.37 | 0.49 † | 0.42 | 0.39 | | 0.30 | 0.16 | 0.08 | 0.16 | 0.22 | 0.11 | | 0.14 |
| | (0.27) | (0.27) | (0.27) | (0.27) | (0.27) | | (0.24) | (0.27) | (0.27) | (0.27) | (0.27) | (0.27) | | (0.27) |

Table B.2 (Continued)

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Interactions with city types* | | | | | | | | | | | | | | | |
| Early Asian dest. * (Δ) foreign | | | | | | 0.40 | | | | | | | | -1.71 * | |
| | | | | | | (0.25) | | | | | | | | (0.80) | |
| Early Hisp. dest. * (Δ) foreign | | | | | | 0.23 | | | | | | | | -3.79 ** | |
| | | | | | | (0.29) | | | | | | | | (0.79) | |
| High immig. city * (Δ) foreign | | | | | | -0.06 | | | | | | | | -0.64 † | |
| | | | | | | (0.14) | | | | | | | | (0.34) | |
| High immig./bl. city * (Δ) foreign | | | | | | | -0.40 ** | | | | | | | | 0.40 |
| | | | | | | | (0.14) | | | | | | | | (0.34) |
| Low immig./bl. city * (Δ) foreign | | | | | | | -0.22 | | | | | | | | 0.52 |
| | | | | | | | (0.18) | | | | | | | | (0.43) |
| AIC | 1483 | 1478 | 1480 | 1481 | 1459 | 1483 | 1482 | 1348 | 1337 | 1352 | 1341 | 1318 | 1320 | 1350 | |

[a] N = 2,087. **p<0.01, *p<0.05, †p<0.10 (t wo-tailed test). Standard errors are in parentheses. All variables are 24 years prior to gentrification field surveys and changes are over the first 8 years. All models also include controls for median household income (logged), % below poverty, % same residents 10 years ago, homeownership rate, vacancy rate, and % over 65 years old. Low-immigration/no black presence city is the reference category for Models 1-5 and 8-12. Low-immigration is the reference category for Models 6 and 13, and no black presence is the reference category for Models 7 and 14. Interaction term variables are mean-centered.

***Table B.3.*** *Logistic Regression Results Predicting Gentrification on the Early Presence (1970) and Population Changes (1970-1980) of Asians and Hispanics with Survey Year Fixed Effects*

| | Early Presence of Asians and Hispanics (1970) | | | | | | | Early Asian and Hispanic Population Change (1970-1980) | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | (1) Asian and Hispanic Presence | (2) x Predomi-nantly Black | (3) x Predomi-nantly White | (4) x Percent Black | (5) Ethnic Enclaves | (6) x City Immig. Levels | (7) x City Black Presence | (8) Asian and Hispanic Presence | (9) x Predomi-nantly Black | (10) x Predomi-nantly White | (11) x Percent Black | (12) Ethnic Enclaves | (13) x City Immig. Levels | (14) x City Black Presence |
| Asian population (logged) | 0.21 ** | 0.19 ** | 0.26 ** | 0.24 ** | 0.23 ** | 0.13 † | 0.23 ** | 0.18 ** | 0.16 ** | 0.19 ** | 0.19 ** | 0.19 ** | 0.18 ** | 0.19 ** |
| | (0.05) | (0.05) | (0.06) | (0.05) | (0.05) | (0.07) | (0.07) | (0.05) | (0.05) | (0.05) | (0.05) | (0.05) | (0.05) | (0.05) |
| Hispanic population (logged) | 0.02 | -0.01 | 0.09 | 0.02 | 0.03 | 0.13 † | 0.12 | -0.03 | -0.07 | -0.03 | -0.02 | 0.04 | -0.03 | -0.03 |
| | (0.05) | (0.05) | (0.07) | (0.05) | (0.05) | (0.07) | (0.08) | (0.06) | (0.06) | (0.06) | (0.06) | (0.06) | (0.06) | (0.06) |
| % black | -1.39 ** | -0.47 | -1.14 ** | 1.42 ** | 1.66 ** | -1.42 ** | -1.70 ** | -1.77 ** | -0.73 † | -1.76 ** | -1.68 ** | -2.21 ** | -1.72 ** | -2.00 ** |
| | (0.30) | (0.41) | (0.39) | (0.30) | (0.31) | (0.30) | (0.30) | (0.32) | (0.43) | (0.39) | (0.32) | (0.33) | (0.32) | (0.32) |
| % black * (Δ) Asians | | | | 0.22 † | | | | | | | 0.43 | | | |
| | | | | (0.13) | | | | | | | (0.37) | | | |
| % black * (Δ) Hispanics | | | | 0.13 | | | | | | | 0.37 ** | | | |
| | | | | (0.12) | | | | | | | (0.13) | | | |
| Total population (in thousands) | -0.07 | -0.05 | -0.06 | -0.06 | -0.07 † | -0.07 † | -0.07 † | -0.03 | 0.00 | -0.03 | -0.03 | -0.05 | -0.04 | -0.03 |
| | (0.04) | (0.04) | (0.04) | (0.04) | (0.04) | (0.04) | (0.04) | (0.04) | (0.05) | (0.04) | (0.04) | (0.04) | (0.04) | (0.04) |
| Δ logged Asian population | | | | | | | | 0.00 | -0.01 | 0.12 | 0.08 | 0.03 | 0.22 | 0.17 |
| | | | | | | | | (0.12) | (0.13) | (0.19) | (0.13) | (0.12) | (0.16) | (0.18) |
| Δ logged Hispanic population | | | | | | | | -0.13 * | -0.26 ** | -0.06 | -0.14 * | -0.08 | -0.11 | -0.17 * |
| | | | | | | | | (0.06) | (0.07) | (0.07) | (0.06) | (0.06) | (0.08) | (0.09) |
| Δ logged black population | | | | | | | | -0.14 ** | -0.10 * | -0.12 * | -0.12 ** | -0.19 ** | -0.11 * | -0.12 * |
| | | | | | | | | (0.06) | (0.05) | (0.05) | (0.06) | (0.05) | (0.05) | (0.05) |
| Δ logged white population | | | | | | | | 0.38 ** | 0.45 ** | 0.39 ** | 0.41 ** | 0.35 ** | 0.41 ** | 0.40 ** |
| | | | | | | | | (0.08) | (0.08) | (0.08) | (0.09) | (0.08) | (0.08) | (0.08) |
| Predominantly black (>75%) | | -1.15 ** | | | | | | | -1.27 ** | | | | | |
| | | (0.37) | | | | | | | (0.38) | | | | | |
| Predominantly black * (Δ) Asians | | 0.12 | | | | | | | 0.25 | | | | | |
| | | (0.14) | | | | | | | (0.37) | | | | | |
| Predominantly black * (Δ) Hisp. | | -0.02 | | | | | | | 0.35 ** | | | | | |
| | | (0.12) | | | | | | | (0.11) | | | | | |
| Predominantly white (>75%) | | | 0.20 | | | | | | | -0.04 | | | | |
| | | | (0.23) | | | | | | | (0.21) | | | | |
| Predominantly white * (Δ) Asians | | | -0.09 | | | | | | | -0.19 | | | | |
| | | | (0.08) | | | | | | | (0.25) | | | | |
| Predominantly white * (Δ) Hispanics | | | -0.13 | | | | | | | -0.17 | | | | |
| | | | (0.08) | | | | | | | (0.11) | | | | |
| Asian enclave (>40%) | | | | | -3.25 ** | | | | | | | -3.10 ** | | |
| | | | | | (1.25) | | | | | | | (0.91) | | |
| Hispanic enclave (>40%) | | | | | -0.91 * | | | | | | | -1.40 ** | | |
| | | | | | (0.37) | | | | | | | (0.33) | | |

## Table B.3 (Continued)

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *City types* | | | | | | | | | | | | | | |
| Early Asian destination | 0.99 ** | 1.04 ** | 0.99 * | 1.08 ** | 1.20 ** | 0.57 | 0.48 | 0.94 * | 0.99 * | 0.89 * | 0.89 * | 1.14 ** | 0.86 ** | 0.62 * |
| | (0.38) | (0.38) | (0.39) | (0.38) | (0.39) | (0.38) | (0.32) | (0.39) | (0.39) | (0.39) | (0.39) | (0.39) | (0.30) | (0.30) |
| Early Hispanic destination | 0.41 | 0.52 | 0.48 | 0.48 | 0.55 | -0.19 | -0.13 | 0.36 | 0.50 | 0.32 | 0.34 | 0.53 | 0.18 | 0.07 |
| | (0.36) | (0.36) | (0.36) | (0.36) | (0.36) | (0.44) | (0.31) | (0.36) | (0.36) | (0.36) | (0.37) | (0.37) | (0.31) | (0.30) |
| High immigration city | | | | | | 0.67 ** | | | | | | | 0.75 ** | |
| | | | | | | (0.21) | | | | | | | (0.29) | |
| High immig./black presence city | 0.89 ** | 0.94 ** | 0.93 ** | 0.95 ** | 0.97 ** | | 0.72 ** | 0.98 ** | 1.00 ** | 0.97 ** | 0.96 ** | 1.12 ** | | 0.81 ** |
| | (0.29) | (0.29) | (0.29) | (0.30) | (0.29) | | (0.24) | (0.30) | (0.30) | (0.30) | (0.30) | (0.30) | | (0.25) |
| High immig./no black presence city | 0.77 † | 0.52 † | 0.76 † | 0.82 † | 0.86 † | | | 0.60 | 0.68 | 0.56 | 0.58 | 0.65 | | |
| | (0.44) | (0.44) | (0.44) | (0.44) | (0.44) | | | (0.44) | (0.44) | (0.45) | (0.45) | (0.45) | | |
| Low immigration/black presence city | 0.25 | 0.19 | 0.23 | 0.23 | 0.34 | | -0.21 | 0.16 | 0.09 | 0.15 | 0.14 | 0.29 | | -0.21 |
| | (0.40) | (0.40) | (0.40) | (0.40) | (0.40) | | (0.31) | (0.40) | (0.40) | (0.40) | (0.40) | (0.40) | | (0.29) |
| *Interactions with city types* | | | | | | | | | | | | | | |
| Early Asian destination * Asians | | | | | | 0.11 | | | | | | | -0.72 | |
| | | | | | | (0.12) | | | | | | | (0.48) | |
| Early Hisp. destination * Hisp. | | | | | | 0.06 | | | | | | | -0.86 ** | |
| | | | | | | (0.19) | | | | | | | (0.28) | |
| High immigration city * Asians | | | | | | 0.14 | | | | | | | -0.49 † | |
| | | | | | | (0.10) | | | | | | | (0.29) | |
| High immigration city * Hisp. | | | | | | -0.18 * | | | | | | | 0.04 | |
| | | | | | | (0.09) | | | | | | | (0.10) | |
| High immig./black city * Asians | | | | | | | 0.03 | | | | | | | -0.54 † |
| | | | | | | | (0.10) | | | | | | | (0.32) |
| High immig./black city * Hisp. | | | | | | | -0.18 † | | | | | | | 0.10 |
| | | | | | | | (0.10) | | | | | | | (0.11) |
| Low immig./black city * Asians | | | | | | | -0.06 | | | | | | | -0.11 |
| | | | | | | | (0.12) | | | | | | | (0.28) |
| Low immig./black city * Hisp. | | | | | | | -0.07 | | | | | | | 0.09 |
| | | | | | | | (0.12) | | | | | | | (0.13) |
| AIC | 1469 | 1486 | 1494 | 1491 | 1476 | 1488 | 1504 | 1465 | 1448 | 1458 | 1458 | 1429 | 1454 | 1479 |

[a] N = 2,087. **p<0.01, *p<0.05, †p<0.10 (t wo-tailed test). Standard errors are in parentheses. All variables are in 1970 and changes from 1970-1980. All models also include controls for median household income (logged), % below poverty, % same residents 10 years ago, homeownership rate, vacancy rate, and % over 65 years old. Low-immigration/no black presence city is the reference category for Models 1-5 and 8-12. Low-immigration is the reference category for Models 6 and 13, and no black presence is the reference category for Models 7 and 14. Interaction term variables are mean-centered.

***Table B.4.*** *Logistic Regression Results Predicting Gentrification on the Early Presence (1980) and Population Changes (1980-1990) of Asians and Hispanics with Survey Year Fixed Effects*

| | Early Presence of Asians and Hispanics (1980) | | | | | | | Early Asian and Hispanic Population Change (1980-1990) | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | (1) Asian and Hispanic Presence | (2) x Predominantly Black | (3) x Predominantly White | (4) x Percent Black | (5) Ethnic Enclaves | (6) x City Immig. Levels | (7) x City Black Presence | (8) Asian and Hispanic Presence | (9) x Predominantly Black | (10) x Predominantly White | (11) x Percent Black | (12) Ethnic Enclaves | (13) x City Immig. Levels | (14) x City Black Presence |
| Asian population (logged) | 0.14 ** | 0.10 † | 0.16 ** | 0.17 ** | 0.15 ** | 0.03 | 0.15 * | 0.15 ** | 0.10 † | 0.19 ** | 0.13 * | 0.14 * | 0.15 ** | 0.14 * |
| | (0.05) | (0.05) | (0.05) | (0.05) | (0.05) | (0.07) | (0.07) | (0.06) | (0.06) | (0.06) | (0.06) | (0.06) | (0.06) | (0.06) |
| Hispanic population (logged) | -0.02 | -0.10 † | 0.05 | -0.01 | 0.02 | 0.20 * | 0.10 | -0.06 | -0.13 * | 0.04 | -0.08 | 0.04 | -0.06 | -0.05 |
| | (0.05) | (0.06) | (0.07) | (0.06) | (0.06) | (0.08) | (0.09) | (0.06) | (0.06) | (0.07) | (0.06) | (0.07) | (0.06) | (0.06) |
| % black | -1.10 ** | 0.02 | -0.54 | -1.02 ** | -1.66 ** | -1.15 ** | -1.04 ** | -1.93 ** | -0.77 † | -1.23 ** | -1.93 ** | -2.38 ** | -1.77 ** | -1.55 ** |
| | (0.31) | (0.40) | (0.39) | (0.32) | (0.33) | (0.31) | (0.34) | (0.36) | (0.44) | (0.42) | (0.36) | (0.37) | (0.36) | (0.37) |
| % black * (Δ) Asians | | | | 0.23 | | | | | | | 0.11 | | | |
| | | | | (0.15) | | | | | | | (0.12) | | | |
| % black * (Δ) Hispanics | | | | 0.30 * | | | | | | | 0.42 ** | | | |
| | | | | (0.13) | | | | | | | (0.16) | | | |
| Total population (in thousands) | -0.09 † | -0.05 | -0.14 ** | -0.06 | -0.11 * | -0.10 * | -0.10 * | -0.06 | -0.01 | -0.12 ** | -0.04 | -0.11 * | -0.07 | -0.07 |
| | (0.05) | (0.05) | (0.05) | (0.05) | (0.05) | (0.05) | (0.05) | (0.05) | (0.05) | (0.06) | (0.05) | (0.05) | (0.05) | (0.05) |
| Δ logged Asian population | | | | | | | | 0.04 | 0.02 | 0.05 | 0.05 | 0.03 | 0.03 | -0.05 |
| | | | | | | | | (0.05) | (0.05) | (0.05) | (0.05) | (0.05) | (0.07) | (0.07) |
| Δ logged Hispanic population | | | | | | | | -0.12 † | -0.29 ** | -0.06 | -0.17 * | -0.06 | -0.07 | -0.18 |
| | | | | | | | | (0.07) | (0.09) | (0.07) | (0.07) | (0.07) | (0.09) | (0.13) |
| Δ logged black population | | | | | | | | -0.37 ** | -0.33 ** | -0.39 ** | -0.35 ** | -0.41 ** | -0.34 ** | -0.37 ** |
| | | | | | | | | (0.08) | (0.08) | (0.08) | (0.08) | (0.08) | (0.08) | (0.08) |
| Δ logged white population | | | | | | | | 0.75 ** | 0.86 ** | 0.71 ** | 0.76 ** | 0.66 ** | 0.76 ** | 0.75 ** |
| | | | | | | | | (0.10) | (0.11) | (0.10) | (0.10) | (0.10) | (0.10) | (0.10) |
| Predominantly black (>75%) | | -1.15 ** | | | | | | | -1.95 ** | | | | | |
| | | (0.37) | | | | | | | (0.46) | | | | | |
| Predominantly black * (Δ) Asians | | 0.24 | | | | | | | -0.17 | | | | | |
| | | (0.16) | | | | | | | (0.14) | | | | | |
| Predominantly black * (Δ) Hisp. | | 0.10 | | | | | | | 0.36 ** | | | | | |
| | | (0.13) | | | | | | | (0.13) | | | | | |
| Predominantly white (>75%) | | | 0.81 ** | | | | | | | 0.79 ** | | | | |
| | | | (0.23) | | | | | | | (0.24) | | | | |
| Predominantly white * (Δ) Asians | | | -0.01 | | | | | | | 0.03 | | | | |
| | | | (0.08) | | | | | | | (0.08) | | | | |
| Predominantly white * (Δ) Hispanics | | | 0.10 | | | | | | | -0.08 | | | | |
| | | | (0.10) | | | | | | | (0.14) | | | | |
| Asian enclave (>40%) | | | | | -2.84 ** | | | | | | | -1.98 ** | | |
| | | | | | (0.82) | | | | | | | (0.55) | | |
| Hispanic enclave (>40%) | | | | | -1.39 ** | | | | | | | -1.69 ** | | |
| | | | | | (0.34) | | | | | | | (0.35) | | |

## Table B.4 (Continued)

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *City types* | | | | | | | | | | | | | | |
| Early Asian destination | 0.60 | 0.73 † | 0.87 * | 0.71 † | 0.87 * | -0.09 | 0.20 | 0.23 | 0.32 | 0.45 | 0.24 | 0.54 | 0.17 | 0.13 |
| | (0.39) | (0.40) | (0.40) | (0.40) | (0.40) | (0.40) | (0.33) | (0.42) | (0.42) | (0.42) | (0.41) | (0.42) | (0.33) | (0.33) |
| Early Hispanic destination | 0.04 | 0.26 | 0.09 | 0.20 | 0.19 | -0.24 | -0.38 | -0.19 | 0.04 | -0.12 | -0.05 | -0.06 | 0.37 | -0.08 |
| | (0.37) | (0.38) | (0.38) | (0.38) | (0.37) | (0.43) | (0.33) | (0.39) | (0.40) | (0.40) | (0.39) | (0.39) | (0.40) | (0.34) |
| High immigration city | | | | | | 0.50 * | | | | | | | 0.59 * | |
| | | | | | | (0.22) | | | | | | | (0.24) | |
| High immig./black presence city | 0.81 ** | 0.87 ** | 1.01 ** | 0.90 ** | 0.97 ** | | 0.77 ** | 0.77 * | 0.81 * | 0.95 ** | 0.79 * | 0.95 ** | | 0.64 * |
| | (0.31) | (0.31) | (0.32) | (0.31) | (0.31) | | (0.27) | (0.32) | (0.33) | (0.33) | (0.32) | (0.33) | | (0.28) |
| High immig./no black presence city | 0.54 | 0.60 | 0.66 | 0.55 | 0.59 | | | 0.31 | 0.38 | 0.41 | 0.33 | 0.37 | | |
| | (0.47) | (0.47) | (0.48) | (0.47) | (0.48) | | | (0.49) | (0.49) | (0.50) | (0.49) | (0.49) | | |
| Low immigration/black presence city | 0.16 | 0.09 | 0.44 | 0.13 | 0.31 | | 0.25 | 0.09 | -0.04 | 0.34 | 0.08 | 0.28 | | 0.07 |
| | (0.41) | (0.42) | (0.42) | (0.42) | (0.42) | | (0.33) | (0.42) | (0.43) | (0.43) | (0.42) | (0.42) | | (0.33) |
| *Interactions with city types* | | | | | | | | | | | | | | |
| Early Asian destination * Asians | | | | | | 0.19 | | | | | | | 0.00 | |
| | | | | | | (0.12) | | | | | | | (0.12) | |
| Early Hisp. destination * Hisp. | | | | | | -0.28 | | | | | | | -1.27 ** | |
| | | | | | | (0.20) | | | | | | | (0.45) | |
| High immigration city * Asians | | | | | | 0.20 * | | | | | | | 0.03 | |
| | | | | | | (0.10) | | | | | | | (0.08) | |
| High immigration city * Hisp. | | | | | | -0.33 ** | | | | | | | -0.06 | |
| | | | | | | (0.10) | | | | | | | (0.12) | |
| High immig./black city * Asians | | | | | | | 0.02 | | | | | | | 0.12 |
| | | | | | | | (0.10) | | | | | | | (0.09) |
| High immig./black city * Hisp. | | | | | | | -0.25 * | | | | | | | 0.06 |
| | | | | | | | (0.10) | | | | | | | (0.06) |
| Low immig./black city * Asians | | | | | | | -0.14 | | | | | | | 0.28 * |
| | | | | | | | (0.12) | | | | | | | (0.12) |
| Low immig./black city * Hisp. | | | | | | | 0.13 | | | | | | | 0.13 |
| | | | | | | | (0.13) | | | | | | | (0.17) |
| AIC | 1386 | 1372 | 1375 | 1381 | 1352 | 1374 | 1364 | 1308 | 1286 | 1302 | 1303 | 1267 | 1304 | 1290 |

[a] N = 2,087. **p<0.01, *p<0.05, †p<0.10 (t wo-tailed test). Standard errors are in parentheses. All variables are in 1980 and changes from 1980-1990. All models also include controls for median household income (logged), % below poverty, % same residents 10 years ago, homeownership rate, vacancy rate, and % over 65 years old. Low-immigration/no black presence city is the reference category for Models 1-5 and 8-12. Low-immigration is the reference category for Models 6 and 13, and no black presence is the reference category for Models 7 and 14. Interaction term variables are mean-centered.

***Table B.5.*** *Logistic Regression Results Predicting Gentrification on the Early Presence (16 Years Earlier) and Population Changes (Next 8 Years) of Asians and Hispanics*

| | Early Presence of Asians and Hispanics (1980) | | | | | | | Early Asian and Hispanic Population Change (1980-1990) | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | (1) Asian and Hispanic Presence | (2) x Predominantly Black | (3) x Predominantly White | (4) x Percent Black | (5) Ethnic Enclaves | (6) x City Immig. Levels | (7) x City Black Presence | (8) Asian and Hispanic Presence | (9) x Predominantly Black | (10) x Predominantly White | (11) x Percent Black | (12) Ethnic Enclaves | (13) x City Immig. Levels | (14) x City Black Presence |
| Asian population (logged) | 0.09 † | 0.02 | 0.13 * | 0.09 † | 0.09 † | 0.02 | 0.05 | 0.10 | 0.06 | 0.14 * | 0.08 | 0.11 † | 0.10 † | 0.06 |
| | (0.05) | (0.05) | (0.05) | (0.06) | (0.05) | (0.07) | (0.07) | (0.06) | (0.06) | (0.06) | (0.06) | (0.06) | (0.06) | (0.06) |
| Hispanic population (logged) | -0.17 ** | -0.28 ** | -0.07 | -0.12 † | -0.10 | 0.04 * | -0.06 | -0.22 ** | -0.28 ** | -0.09 | -0.24 ** | -0.11 | -0.21 ** | -0.22 ** |
| | (0.06) | (0.07) | (0.08) | (0.07) | (0.07) | (0.09) | (0.09) | (0.07) | (0.07) | (0.08) | (0.07) | (0.08) | (0.07) | (0.07) |
| % black | -1.40 ** | -0.19 | -0.75 † | -1.11 ** | -1.97 ** | -1.39 ** | -1.58 ** | -2.93 ** | -1.79 ** | -2.10 ** | -3.00 ** | -3.44 ** | -2.58 ** | -2.82 ** |
| | (0.33) | (0.41) | (0.41) | (0.33) | (0.34) | (0.33) | (0.35) | (0.42) | (0.51) | (0.48) | (0.42) | (0.43) | (0.41) | (0.42) |
| % black * (Δ) Asians | | | | 0.11 | | | | | | | 0.18 | | | |
| | | | | (0.14) | | | | | | | (0.20) | | | |
| % black * (Δ) Hispanics | | | | 0.41 ** | | | | | | | 0.87 ** | | | |
| | | | | (0.16) | | | | | | | (0.28) | | | |
| Total population (in thousands) | 0.00 | -0.02 | -0.11 † | -0.02 | -0.07 | -0.03 | -0.05 | 0.00 | 0.04 | -0.07 | 0.01 | -0.06 | -0.01 | -0.01 |
| | (0.00) | (0.05) | (0.06) | (0.05) | (0.05) | (0.05) | (0.05) | (0.00) | (0.06) | (0.06) | (0.06) | (0.06) | (0.06) | (0.06) |
| Δ logged Asian population | | | | | | | | -0.02 | -0.04 | 0.03 | -0.02 | -0.04 | -0.10 | -0.21 |
| | | | | | | | | (0.08) | (0.08) | (0.08) | (0.08) | (0.08) | (0.12) | (0.14) |
| Δ logged Hispanic population | | | | | | | | -0.29 ** | -0.63 ** | -0.25 * | -0.44 ** | -0.23 * | -0.25 † | -0.64 ** |
| | | | | | | | | (0.11) | (0.15) | (0.12) | (0.12) | (0.11) | (0.14) | (0.23) |
| Δ logged black population | | | | | | | | -1.15 ** | -1.01 ** | -1.18 ** | -1.07 ** | -1.27 ** | -1.05 ** | -1.12 ** |
| | | | | | | | | (0.18) | (0.18) | (0.18) | (0.18) | (0.18) | (0.18) | (0.18) |
| Δ logged white population | | | | | | | | 2.31 ** | 2.51 ** | 2.21 ** | 2.33 ** | 2.11 ** | 2.28 ** | 2.32 ** |
| | | | | | | | | (0.22) | (0.24) | (0.22) | (0.23) | (0.22) | (0.22) | (0.22) |
| Predominantly black (>75%) | | -1.35 ** | | | | | | | -1.77 ** | | | | | |
| | | (0.43) | | | | | | | (0.51) | | | | | |
| Predominantly black * (Δ) Asians | | 0.43 ** | | | | | | | -0.30 | | | | | |
| | | (0.15) | | | | | | | (0.22) | | | | | |
| Predominantly black * (Δ) Hisp. | | 0.03 | | | | | | | 0.74 ** | | | | | |
| | | (0.18) | | | | | | | (0.23) | | | | | |
| Predominantly white (>75%) | | | 0.90 ** | | | | | | | 0.86 ** | | | | |
| | | | (0.24) | | | | | | | (0.25) | | | | |
| Predominantly white * (Δ) Asians | | | -0.02 | | | | | | | -0.10 | | | | |
| | | | (0.09) | | | | | | | (0.15) | | | | |
| Predominantly white * (Δ) Hispanics | | | 0.18 | | | | | | | -0.08 | | | | |
| | | | (0.12) | | | | | | | (0.25) | | | | |
| Asian enclave (>40%) | | | | | -2.69 ** | | | | | | | -2.03 ** | | |
| | | | | | (0.81) | | | | | | | (0.60) | | |
| Hispanic enclave (>40%) | | | | | -1.51 ** | | | | | | | -1.51 ** | | |
| | | | | | (0.36) | | | | | | | (0.37) | | |

## Table B.5 (Continued)

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *City types* | | | | | | | | | | | | | | |
| Early Asian destination | 0.56 † | 0.74 * | 0.62 † | 0.67 * | 0.78 * | 0.07 | 0.34 | -0.17 | -0.11 | -0.10 | -0.19 | -0.02 | -0.49 | -0.39 |
| | (0.33) | (0.33) | (0.33) | (0.33) | (0.33) | (0.64) | (0.32) | (0.35) | (0.35) | (0.36) | (0.35) | (0.36) | (0.32) | (0.31) |
| Early Hispanic destination | -0.39 | 0.00 | -0.45 | -0.09 | -0.32 | -0.44 | -0.78 ** | -0.72 * | -0.46 | -0.71 * | -0.64 † | -0.66 † | -0.05 | -0.83 ** |
| | (0.31) | (0.32) | (0.32) | (0.33) | (0.31) | (0.48) | (0.32) | (0.34) | (0.34) | (0.34) | (0.34) | (0.34) | (0.39) | (0.30) |
| High immigration city | | | | | | 0.41 * | | | | | | | 0.42 † | |
| | | | | | | (0.20) | | | | | | | (0.22) | |
| High immig./black presence city | 0.87 ** | 0.99 ** | 0.98 ** | 1.00 ** | 1.00 ** | | 0.67 ** | 0.78 ** | 0.78 ** | 0.88 ** | 0.72 ** | 0.88 ** | | 0.47 † |
| | (0.25) | (0.26) | (0.26) | (0.26) | (0.25) | | (0.32) | (0.28) | (0.28) | (0.28) | (0.28) | (0.28) | | (0.25) |
| High immig./no black presence city | 0.70 * | 0.82 * | 0.63 † | 0.73 * | 0.60 † | | | 0.29 | 0.33 | 0.25 | 0.28 | 0.18 | | |
| | (0.35) | (0.35) | (0.36) | (0.35) | (0.35) | | | (0.39) | (0.39) | (0.39) | (0.39) | (0.39) | | |
| Low immigration/black presence city | 0.58 * | 0.48 † | 0.67 * | 0.62 * | 0.61 * | | 0.72 * | 0.44 | 0.28 | 0.53 † | 0.40 | 0.46 | | 0.25 |
| | (0.28) | (0.28) | (0.29) | (0.29) | (0.28) | | (0.29) | (0.30) | (0.31) | (0.31) | (0.30) | (0.30) | | (0.29) |
| *Interactions with city types* | | | | | | | | | | | | | | |
| Early Asian destination * Asians | | | | | | 0.03 | | | | | | | -0.45 | |
| | | | | | | (0.21) | | | | | | | (0.61) | |
| Early Hisp. destination * Hisp. | | | | | | -0.37 | | | | | | | -2.75 ** | |
| | | | | | | (0.25) | | | | | | | (0.83) | |
| High immigration city * Asians | | | | | | 0.14 | | | | | | | 0.11 | |
| | | | | | | (0.09) | | | | | | | (0.13) | |
| High immigration city * Hisp. | | | | | | -0.32 ** | | | | | | | -0.04 | |
| | | | | | | (0.11) | | | | | | | (0.20) | |
| High immig./black city * Asians | | | | | | | 0.09 | | | | | | | 0.22 |
| | | | | | | | (0.10) | | | | | | | (0.15) |
| High immig./black city * Hisp. | | | | | | | -0.25 * | | | | | | | 0.38 |
| | | | | | | | (0.11) | | | | | | | (0.27) |
| Low immig./black city * Asians | | | | | | | 0.02 | | | | | | | 0.37 |
| | | | | | | | (0.13) | | | | | | | (0.25) |
| Low immig./black city * Hisp. | | | | | | | 0.24 | | | | | | | 0.49 † |
| | | | | | | | (0.16) | | | | | | | (0.28) |
| AIC | 1376 | 1354 | 1361 | 1371 | 1342 | 1373 | 1373 | 1202 | 1180 | 1196 | 1195 | 1172 | 1197 | 1202 |

[a] N = 2,087. **p<0.01, *p<0.05, †p<0.10 (t wo-tailed test). Standard errors are in parentheses. All variables are 16 years prior to gentrification field surveys and changes are over the next 8 years. All models also include controls for median household income (logged), % below poverty, % same residents 10 years ago, homeownership rate, vacancy rate, and % over 65 years old. Low-immigration/no black presence city is the reference category for Models 1-5 and 8-12. Low-immigration is the reference category for Models 6 and 13, and no black presence is the reference category for Models 7 and 14. Interaction term variables are mean-centered.

***Table B.6.*** *Logistic Regression Results Predicting Census-Based Gentrification on the Early Presence and Population Changes of Asians and Hispanics for Gentrifiable Tracts in Either 1970 or 1980*

| | Early Presence of Asians and Hispanics | | | | | | | Early Asian and Hispanic Population Change | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) | (13) | (14) |
| | Asian and Hispanic Presence | x Predominantly Black | x Predominantly White | x Percent Black | Ethnic Enclaves | x City Immig. Levels | x City Black Presence | Asian and Hispanic Presence | x Predominantly Black | x Predominantly White | x Percent Black | Ethnic Enclaves | x City Immig. Levels | x City Black Presence |
| Asian population (logged) | 0.19 ** | 0.19 ** | 0.19 ** | 0.19 ** | 0.20 ** | 0.16 * | 0.21 ** | 0.13 ** | 0.10 * | 0.14 ** | 0.12 * | 0.13 ** | 0.16 ** | 0.17 ** |
| | (0.04) | (0.04) | (0.05) | (0.04) | (0.04) | (0.06) | (0.05) | (0.05) | (0.05) | (0.05) | (0.05) | (0.05) | (0.05) | (0.05) |
| Hispanic population (logged) | -0.19 ** | -0.19 ** | -0.16 * | -0.18 ** | -0.15 ** | -0.05 | -0.06 | -0.17 ** | -0.20 ** | -0.12 † | -0.18 ** | -0.07 | -0.19 ** | -0.15 * |
| | (0.05) | (0.06) | (0.08) | (0.06) | (0.06) | (0.08) | (0.07) | (0.06) | (0.06) | (0.07) | (0.06) | (0.06) | (0.06) | (0.06) |
| % black | -0.98 ** | -0.38 | -0.58 | -0.98 ** | -1.17 ** | -0.89 ** | -1.03 ** | -1.44 ** | -0.48 | -0.96 ** | -1.13 ** | -1.75 ** | -1.31 ** | -1.41 ** |
| | (0.25) | (0.36) | (0.37) | (0.27) | (0.25) | (0.25) | (0.26) | (0.28) | (0.40) | (0.36) | (0.30) | (0.29) | (0.28) | (0.29) |
| % black * (Δ) Asians | | | | 0.00 | | | | | | | -0.23 | | | |
| | | | | (0.12) | | | | | | | (0.16) | | | |
| % black * (Δ) Hispanics | | | | 0.01 | | | | | | | 1.02 ** | | | |
| | | | | (0.14) | | | | | | | (0.23) | | | |
| Total population (in thousands) | -0.07 † | -0.06 | -0.09 * | -0.07 † | -0.08 * | -0.04 | -0.07 * | -0.01 | 0.01 | -0.03 | 0.00 | -0.04 | 0.00 | -0.02 |
| | (0.04) | (0.04) | (0.04) | (0.04) | (0.04) | (0.04) | (0.04) | (0.04) | (0.04) | (0.04) | (0.04) | (0.04) | (0.04) | (0.04) |
| Δ logged Asian population | | | | | | | | -0.06 | -0.08 | -0.04 | -0.01 | -0.07 | 0.09 | -0.08 |
| | | | | | | | | (0.05) | (0.05) | (0.06) | (0.06) | (0.05) | (0.06) | (0.06) |
| Δ logged Hispanic population | | | | | | | | -0.57 ** | -0.84 ** | -0.38 ** | -0.59 ** | -0.49 ** | -0.69 ** | -0.73 ** |
| | | | | | | | | (0.09) | (0.11) | (0.12) | (0.10) | (0.10) | (0.14) | (0.16) |
| Δ logged black population | | | | | | | | -0.33 ** | -0.28 ** | -0.33 ** | -0.29 ** | -0.39 ** | -0.30 ** | -0.33 ** |
| | | | | | | | | (0.08) | (0.08) | (0.08) | (0.08) | (0.08) | (0.08) | (0.08) |
| Δ logged white population | | | | | | | | 1.73 ** | 1.78 ** | 1.66 ** | 1.69 ** | 1.59 ** | 1.75 ** | 1.77 ** |
| | | | | | | | | (0.16) | (0.16) | (0.16) | (0.16) | (0.16) | (0.16) | (0.16) |
| Predominantly black (>75%) | | -0.85 * | | | | | | | -0.80 * | | | | | |
| | | (0.36) | | | | | | | (0.38) | | | | | |
| Predominantly black * (Δ) Asians | | -0.06 | | | | | | | 0.18 | | | | | |
| | | (0.13) | | | | | | | (0.18) | | | | | |
| Predominantly black * (Δ) Hisp. | | -0.11 | | | | | | | 0.86 ** | | | | | |
| | | (0.15) | | | | | | | (0.21) | | | | | |
| Predominantly white (>75%) | | | 0.40 * | | | | | | | 0.39 * | | | | |
| | | | (0.20) | | | | | | | (0.19) | | | | |
| Predominantly white * (Δ) Asians | | | 0.03 | | | | | | | -0.02 | | | | |
| | | | (0.07) | | | | | | | (0.08) | | | | |
| Predominantly white * (Δ) Hispanics | | | -0.10 | | | | | | | -0.40 * | | | | |
| | | | (0.09) | | | | | | | (0.18) | | | | |
| Asian enclave (>40%) | | | | | -16.6 | | | | | | | -2.98 ** | | |
| | | | | | (315) | | | | | | | (0.79) | | |
| Hispanic enclave (>40%) | | | | | -1.66 ** | | | | | | | -2.08 ** | | |
| | | | | | (0.48) | | | | | | | (0.42) | | |

## Table B.6 (Continued)

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *City types* | | | | | | | | | | | | | | |
| Early Asian destination | 1.12 ** | 1.10 ** | 1.18 ** | 1.12 ** | 1.26 ** | 0.56 † | 0.63 ** | 0.87 ** | 0.93 ** | 0.96 ** | 0.89 ** | 1.03 ** | 0.17 | 0.30 |
| | (0.24) | (0.24) | (0.25) | (0.24) | (0.25) | (0.30) | (0.24) | (0.27) | (0.27) | (0.27) | (0.27) | (0.28) | (0.24) | (0.24) |
| Early Hispanic destination | 0.09 | 0.14 | -0.01 | 0.10 | 0.16 | -0.11 | -0.40 † | -0.18 | -0.02 | -0.15 | -0.02 | -0.18 | -0.76 ** | -0.83 ** |
| | (0.23) | (0.24) | (0.24) | (0.24) | (0.23) | (0.26) | (0.24) | (0.27) | (0.27) | (0.28) | (0.28) | (0.27) | (0.28) | (0.26) |
| High immigration city | | | | | | 0.49 ** | | | | | | | 0.74 ** | |
| | | | | | | (0.15) | | | | | | | (0.17) | |
| High immig./black presence city | 1.19 ** | 1.21 ** | 1.15 ** | 1.19 ** | 1.22 ** | | 0.82 ** | 1.46 ** | 1.57 ** | 1.51 ** | 1.57 ** | 1.53 ** | | 0.98 ** |
| | (0.21) | (0.20) | (0.20) | (0.20) | (0.19) | | (0.17) | (0.21) | (0.21) | (0.21) | (0.21) | (0.21) | | (0.19) |
| High immig./no black presence city | 1.12 ** | 1.13 ** | 1.06 ** | 1.12 ** | 1.08 ** | | | 1.15 ** | 1.26 ** | 1.16 ** | 1.26 ** | 1.03 ** | | |
| | (0.26) | (0.26) | (0.26) | (0.26) | (0.26) | | | (0.28) | (0.28) | (0.29) | (0.29) | (0.28) | | |
| Low immigration/black presence city | 1.20 ** | 1.17 ** | 1.23 ** | 1.20 ** | 1.16 ** | | 0.86 ** | 1.22 ** | 1.20 ** | 1.29 ** | 1.27 ** | -1.19 ** | | 0.85 ** |
| | (0.21) | (0.21) | (0.21) | (0.21) | (0.21) | | (0.23) | (0.22) | (0.23) | (0.23) | (0.23) | (0.22) | | (0.20) |
| *Interactions with city types* | | | | | | | | | | | | | | |
| Early Asian destination * Asians | | | | | | -0.04 | | | | | | | -0.02 | |
| | | | | | | (0.10) | | | | | | | (0.12) | |
| Early Hisp. destination * Hisp. | | | | | | -0.48 ** | | | | | | | -0.87 * | |
| | | | | | | (0.16) | | | | | | | (0.46) | |
| High immigration city * Asians | | | | | | 0.14 † | | | | | | | -0.31 ** | |
| | | | | | | (0.08) | | | | | | | (0.10) | |
| High immigration city * Hisp. | | | | | | -0.15 | | | | | | | 0.29 | |
| | | | | | | (0.09) | | | | | | | (0.18) | |
| High immig./black city * Asians | | | | | | | -0.03 | | | | | | | -0.28 ** |
| | | | | | | | (0.08) | | | | | | | (0.11) |
| High immig./black city * Hisp. | | | | | | | -0.16 | | | | | | | 0.30 |
| | | | | | | | (0.10) | | | | | | | (0.20) |
| Low immig./black city * Asians | | | | | | | 0.02 | | | | | | | -0.17 |
| | | | | | | | (0.09) | | | | | | | (0.12) |
| Low immig./black city * Hisp. | | | | | | | -0.06 | | | | | | | 0.30 |
| | | | | | | | (0.13) | | | | | | | (0.25) |
| AIC | 2166 | 2166 | 2163 | 2170 | 2125 | 2188 | 2188 | 2001 | 1976 | 1998 | 1982 | 1945 | 2019 | 2014 |

[a] N = 2,824. **p<0.01, *p<0.05, †p<0.10 (t wo-tailed test). Standard errors are in parentheses. All variables are 24 years prior to gentrification field surveys and changes are over the first 8 years. All models also include controls for median household income (logged), % below poverty, % same residents 10 years ago, homeownership rate, vacancy rate, and % over 65 years old. Low-immigration/no black presence city is the reference category for Models 1-5 and 8-12. Low-immigration is the reference category for Models 6 and 13, and no black presence is the reference category for Models 7 and 14. Interaction term variables are mean-centered.

***Table B.7.*** *Average Racial and Ethnic Composition by Racial and Ethnic Classification Categories Using Various Thresholds*

| | 10% Threshold | | | | 25% Threshold | | | | 40% Threshold | | | | 50% Threshold | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | % white | % black | % Hisp. | % Asian | % white | % black | % Hisp. | % Asian | % white | % black | % Hisp. | % Asian | % white | % black | % Hisp. | % Asian |
| 24 years prior to gentrification field surveys (1970-1977) | | | | | | | | | | | | | | | | |
| W | 99.2 | 0.3 | 0.3 | 0.0 | 97.6 | 0.8 | 0.9 | 0.0 | 96.1 | 1.4 | 1.8 | 0.0 | 95.2 | 1.8 | 2.2 | 0.1 |
| B | 1.9 | 97.8 | 0.2 | 0.0 | 2.9 | 96.4 | 0.5 | 0.0 | 4.3 | 94.6 | 0.9 | 0.0 | 5.6 | 93.1 | 1.0 | 0.0 |
| H | -- | -- | -- | -- | 14.3 | 1.9 | 83.3 | 0.0 | 20.1 | 3.1 | 75.5 | 0.0 | 22.3 | 3.5 | 72.6 | 0.0 |
| A | 1.4 | 0.0 | 0.0 | 98.6 | 3.2 | 0.2 | 0.5 | 96.0 | 8.1 | 0.5 | 1.9 | 88.6 | 11.4 | 0.9 | 1.8 | 84.9 |
| HA | 0.0 | 0.4 | 1.4 | 98.1 | 12.2 | 1.1 | 4.4 | 80.2 | 19.4 | 6.7 | 5.1 | 67.7 | 22.7 | 11.3 | 5.0 | 60.4 |
| WA | 95.7 | 0.4 | 0.2 | 3.4 | 94.5 | 1.1 | 1.1 | 2.6 | 92.9 | 1.8 | 1.9 | 2.6 | 90.6 | 2.7 | 2.2 | 3.3 |
| WH | 90.1 | 0.6 | 8.6 | 0.0 | 87.1 | 1.4 | 10.4 | 0.0 | 84.8 | 2.3 | 11.5 | 0.0 | 83.5 | 3.0 | 12.1 | 0.1 |
| WHA | 93.2 | 0.8 | 3.0 | 2.1 | 90.3 | 2.0 | 3.6 | 2.8 | 87.9 | 3.6 | 4.0 | 2.9 | 87.3 | 4.7 | 4.2 | 2.4 |
| BA | 1.8 | 97.7 | 0.2 | 0.1 | 4.4 | 94.2 | 0.5 | 0.5 | 7.0 | 91.5 | 0.7 | 0.5 | 9.3 | 89.0 | 0.8 | 0.6 |
| BH | 2.3 | 94.2 | 3.3 | 0.0 | 5.4 | 86.8 | 7.2 | 0.0 | 9.4 | 79.7 | 10.1 | 0.0 | 12.4 | 74.2 | 12.3 | 0.0 |
| BHA | 2.5 | 96.0 | 0.9 | 0.3 | 6.0 | 90.4 | 1.5 | 1.7 | 10.1 | 85.1 | 2.0 | 2.0 | 14.4 | 78.2 | 2.5 | 3.7 |
| WB | 53.8 | 45.6 | 0.2 | 0.0 | 58.7 | 39.9 | 0.8 | 0.0 | 53.8 | 44.1 | 1.3 | 0.1 | 57.7 | 39.2 | 2.0 | 0.2 |
| WBA | 59.8 | 38.2 | 0.2 | 1.1 | 60.5 | 36.0 | 1.0 | 1.6 | 61.6 | 33.4 | 1.4 | 2.4 | 62.4 | 31.8 | 1.9 | 2.6 |
| WBH | 58.1 | 27.6 | 12.2 | 0.0 | 56.8 | 28.1 | 12.7 | 0.0 | 57.0 | 26.7 | 13.6 | 0.1 | 57.4 | 25.9 | 13.8 | 0.1 |
| WBHA | 64.8 | 26.8 | 3.5 | 3.1 | 62.1 | 28.7 | 3.8 | 3.1 | 62.1 | 27.8 | 4.2 | 3.4 | 61.8 | 28.1 | 4.2 | 3.2 |
| Year of gentrification field survey (1994-2001) | | | | | | | | | | | | | | | | |
| W | 98.6 | 0.3 | 0.4 | 0.1 | 95.2 | 1.5 | 2.2 | 0.7 | 91.8 | 2.2 | 3.6 | 1.9 | 90.4 | 2.7 | 4.1 | 2.2 |
| B | 0.8 | 98.5 | 0.5 | 0.1 | 1.5 | 97.4 | 0.7 | 0.1 | 2.0 | 96.5 | 1.0 | 0.2 | 2.5 | 95.7 | 1.1 | 0.3 |
| H | 2.5 | 1.4 | 95.9 | 0.1 | 5.5 | 1.9 | 92.0 | 0.2 | 8.1 | 3.2 | 87.6 | 0.6 | 9.9 | 4.0 | 84.8 | 0.8 |
| A | 1.9 | 3.4 | 1.7 | 93.0 | 5.3 | 3.7 | 1.6 | 89.2 | 8.8 | 3.3 | 2.6 | 85.0 | 10.7 | 3.5 | 3.1 | 82.4 |
| HA | 2.5 | 1.6 | 95.1 | 0.7 | 9.1 | 1.1 | 87.3 | 2.3 | 11.8 | 4.6 | 67.4 | 15.5 | 13.0 | 4.9 | 60.8 | 20.6 |
| WA | 91.1 | 1.0 | 1.4 | 6.1 | 86.1 | 2.1 | 3.1 | 8.2 | 81.8 | 3.1 | 4.4 | 10.1 | 80.0 | 4.0 | 5.0 | 10.4 |
| WH | 57.4 | 1.3 | 40.7 | 0.1 | 67.1 | 2.4 | 29.2 | 0.7 | 68.1 | 3.5 | 26.1 | 1.6 | 66.9 | 4.8 | 25.5 | 2.0 |
| WHA | 74.4 | 1.5 | 18.5 | 5.0 | 71.1 | 3.4 | 18.1 | 6.9 | 68.8 | 5.2 | 18.5 | 6.8 | 66.9 | 6.4 | 19.3 | 6.7 |
| BA | 1.3 | 95.5 | 0.5 | 2.5 | 3.0 | 93.0 | 0.6 | 3.0 | 6.1 | 86.3 | 1.3 | 5.8 | 8.3 | 80.5 | 2.1 | 8.6 |
| BH | 1.5 | 86.4 | 11.6 | 0.1 | 3.6 | 73.2 | 22.2 | 0.3 | 5.7 | 65.1 | 27.7 | 0.7 | 7.4 | 60.0 | 30.8 | 1.0 |
| BHA | 2.1 | 79.8 | 13.8 | 3.9 | 5.9 | 49.7 | 30.5 | 13.1 | 10.0 | 39.8 | 31.2 | 17.9 | 13.5 | 35.3 | 30.2 | 19.6 |
| WB | 17.8 | 81.5 | 0.2 | 0.0 | 30.2 | 68.1 | 1.0 | 0.3 | 35.5 | 61.3 | 1.9 | 0.7 | 39.0 | 55.9 | 3.0 | 1.5 |
| WBA | 34.1 | 60.2 | 0.7 | 4.6 | 46.8 | 44.6 | 2.7 | 5.3 | 51.9 | 35.0 | 4.8 | 7.6 | 51.4 | 32.9 | 5.9 | 9.1 |
| WBH | 26.4 | 52.3 | 20.4 | 0.1 | 39.4 | 39.0 | 20.0 | 0.7 | 45.1 | 31.9 | 19.9 | 2.0 | 47.8 | 30.3 | 18.2 | 2.6 |
| WBHA | 49.7 | 24.2 | 16.5 | 8.7 | 49.5 | 23.8 | 15.9 | 9.7 | 48.3 | 24.5 | 15.7 | 10.3 | 47.5 | 25.3 | 15.9 | 10.0 |

W = whites, B = blacks, H = Hispanics, A = Asians

***Table B.8.*** *Low-income Tracts and Gentrification Outcomes by Racial and Ethnic Classification Categories over 24 Years Using Various Thresholds*

| | 10% Threshold | | | | | | 40% Threshold | | | | | | 50% Threshold | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 24 years prior to gentrification field survey, 1970-1977 | | | Year of gentrification field survey, 1994-2001 | | | 24 years prior to gentrification field survey, 1970-1977 | | | Year of gentrification field survey, 1994-2001 | | | 24 years prior to gentrification field survey, 1970-1977 | | | Year of gentrification field survey, 1994-2001 | | |
| | Not Gentrifying | Gentrifying | Probability of Gentri-fying | Not Gentrifying | Gentrifying | Probability of Gentri-fying | Not Gentrifying | Gentrifying | Probability of Gentri-fying | Not Gentrifying | Gentrifying | Probability of Gentri-fying | Not Gentrifying | Gentrifying | Probability of Gentri-fying | Not Gentrifying | Gentrifying | Probability of Gentri-fying |
| | % | % | | % | % | | % | % | | % | % | | % | % | | % | % | |
| W | 0.5 | 0.3 | 11.1 | 0.0 | 0.0 | -- | 2.4 | 3.1 | 21.2 | 0.6 | 2.2 | 42.1 | 3.6 | 5.0 | 22.2 | 1.0 | 5.3 | 51.4 |
| B | 7.5 | 0.3 | 0.8 | 12.0 | 0.6 | 1.0 | 20.8 | 3.6 | 3.5 | 26.1 | 1.1 | 0.9 | 24.5 | 5.3 | 4.3 | 28.8 | 1.9 | 1.4 |
| H | 0.0 | 0.0 | -- | 0.3 | 0.0 | 0.0 | 0.9 | 0.3 | 5.9 | 3.2 | 0.3 | 1.8 | 1.4 | 0.3 | 4.0 | 4.7 | 0.3 | 1.2 |
| A | 0.0 | 0.3 | 100.0 | 0.1 | 0.0 | 0.0 | 0.3 | 0.3 | 16.7 | 0.5 | 0.3 | 11.1 | 0.3 | 0.3 | 14.3 | 0.6 | 0.3 | 8.3 |
| HA | 0.1 | 0.0 | 0.0 | 0.1 | 0.0 | 0.0 | 0.1 | 0.0 | 0.0 | 1.8 | 0.3 | 3.1 | 0.1 | 0.0 | 0.0 | 2.2 | 0.3 | 2.6 |
| WA | 0.3 | 0.3 | 16.7 | 0.4 | 0.6 | 22.2 | 1.6 | 5.3 | 40.4 | 2.6 | 12.8 | 50.0 | 2.1 | 7.5 | 42.9 | 3.2 | 18.4 | 54.5 |
| WH | 11.2 | 11.1 | 17.1 | 1.4 | 0.0 | 0.0 | 18.7 | 24.5 | 21.4 | 4.8 | 5.8 | 20.2 | 19.2 | 27.0 | 22.6 | 5.2 | 8.9 | 26.0 |
| WHA | 2.9 | 5.8 | 29.6 | 5.8 | 8.6 | 23.7 | 3.6 | 17.3 | 49.6 | 7.7 | 20.9 | 36.1 | 4.1 | 13.9 | 41.0 | 7.0 | 14.8 | 30.3 |
| BA | 1.1 | 0.3 | 5.0 | 4.1 | 0.6 | 2.7 | 3.6 | 0.8 | 4.5 | 4.0 | 0.6 | 2.8 | 4.1 | 0.8 | 4.1 | 3.9 | 1.1 | 5.6 |
| BH | 15.4 | 2.8 | 3.6 | 9.6 | 0.6 | 1.2 | 17.0 | 3.9 | 4.5 | 13.6 | 0.8 | 1.3 | 16.4 | 5.8 | 6.9 | 14.2 | 1.4 | 2.0 |
| BHA | 2.9 | 0.3 | 1.9 | 7.3 | 0.0 | 0.0 | 2.2 | 0.8 | 7.1 | 9.7 | 0.6 | 1.2 | 2.0 | 1.7 | 15.0 | 9.4 | 0.3 | 0.6 |
| WB | 1.8 | 1.9 | 18.4 | 2.1 | 0.0 | 0.0 | 2.0 | 2.5 | 20.5 | 2.0 | 3.3 | 25.5 | 2.1 | 3.1 | 23.4 | 2.2 | 4.7 | 30.9 |
| WBA | 0.6 | 1.4 | 31.3 | 2.3 | 2.2 | 16.7 | 1.6 | 4.2 | 35.7 | 2.6 | 14.5 | 53.6 | 1.8 | 5.0 | 36.7 | 2.6 | 13.9 | 52.6 |
| WBH | 40.4 | 31.8 | 14.0 | 8.5 | 3.1 | 6.9 | 19.2 | 16.7 | 15.3 | 6.9 | 10.9 | 24.7 | 14.9 | 12.5 | 14.8 | 5.9 | 11.4 | 28.5 |
| WBHA | 15.4 | 43.5 | 36.9 | 46.1 | 83.8 | 27.3 | 6.1 | 16.7 | 36.1 | 14.0 | 25.6 | 27.5 | 3.5 | 11.7 | 41.2 | 8.9 | 17.0 | 28.2 |
| N | 1737 | 359 | | 1737 | 359 | | 1737 | 359 | | 1737 | 359 | | 1737 | 359 | | 1737 | 359 | |

W = whites, B = blacks, H = Hispanics, A = Asians

***Table B.9.*** *Logistic Regression Results Predicting Gentrification on the Early Presence and Population Changes (First 8 Years) of Asians and Hispanics (Dummy)*

| | Early Presence of Asians and Hispanics (25% threshold criterion dummy) | | | | | | | Early Asian and Hispanic Growth (group population increase, dummy) | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | (1) Asian and Hispanic Presence | (2) x Predomi-nantly Black | (3) x Predomi-nantly White | x Percent Black | Ethnic Enclaves | x City Immig. Levels | x City Black Presence | (8) Asian and Hispanic Presence | (9) x Predomi-nantly Black | (10) x Predomi-nantly White | x Percent Black | Ethnic Enclaves | x City Immig. Levels | x City Black Presence |
| Asian population (dummy) | 0.65 ** | 0.64 ** | 0.77 ** | 0.64 ** | 0.63 ** | 0.35 | 0.47 ** | 0.51 ** | 0.50 ** | 0.52 ** | 0.50 ** | 0.48 ** | 0.55 ** | 0.51 ** |
| | (0.15) | (0.16) | (0.20) | (0.17) | (0.16) | (0.23) | (0.22) | (0.16) | (0.16) | (0.16) | (0.16) | (0.17) | (0.16) | (0.16) |
| Hispanic population (dummy) | 0.38 † | 0.21 | 0.72 * | 0.37 | 0.29 | 0.53 | 0.24 | 0.32 | 0.24 | 0.34 | 0.34 | 0.24 | 0.32 | 0.34 |
| | (0.23) | (0.28) | (0.30) | (0.23) | (0.23) | (0.35) | (0.38) | (0.23) | (0.24) | (0.24) | (0.24) | (0.24) | (0.24) | (0.24) |
| % black | -1.28 ** | -0.43 | -0.97 ** | -1.77 ** | -1.67 ** | -1.25 ** | -1.31 ** | -2.01 ** | -1.08 * | -1.78 ** | -2.59 ** | -2.71 ** | -1.97 ** | -2.06 ** |
| | (0.28) | (0.40) | (0.31) | (0.54) | (0.30) | (0.28) | (0.29) | (0.33) | (0.44) | (0.35) | (0.42) | (0.35) | (0.32) | (0.33) |
| % black * Asians (presence/gain) | | | | 0.04 | | | | | | | 0.10 | | | |
| | | | | (0.46) | | | | | | | (0.48) | | | |
| % black * Hisp. (presence/gain) | | | | 0.60 | | | | | | | 1.27 ** | | | |
| | | | | (0.55) | | | | | | | (0.46) | | | |
| Total population (in thousands) | -0.08 † | -0.07 | -0.07 † | -0.07 † | -0.08 † | -0.07 † | -0.07 † | -0.02 | -0.02 | -0.03 | -0.02 | -0.03 | -0.03 | -0.02 |
| | (0.04) | (0.04) | (0.04) | (0.04) | (0.04) | (0.04) | (0.04) | (0.04) | (0.05) | (0.04) | (0.04) | (0.05) | (0.04) | (0.04) |
| Asian population gain (dummy) | | | | | | | | 0.29 † | 0.31 † | 0.38 † | 0.30 | 0.22 | 0.21 | 0.62 * |
| | | | | | | | | (0.17) | (0.19) | (0.21) | (0.19) | (0.18) | (0.25) | (0.28) |
| Hispanic population gain (dummy) | | | | | | | | -0.79 ** | -0.92 ** | -0.78 ** | -0.56 ** | -0.71 ** | -0.46 * | -0.67 ** |
| | | | | | | | | (0.15) | (0.16) | (0.20) | (0.17) | (0.16) | (0.22) | (0.22) |
| Δ logged black population | | | | | | | | -0.50 ** | -0.46 ** | -0.53 ** | -0.50 ** | -0.60 ** | -0.47 ** | -0.51 ** |
| | | | | | | | | (0.12) | (0.12) | (0.12) | (0.12) | (0.13) | (0.12) | (0.12) |
| Δ logged white population | | | | | | | | 1.55 ** | 1.65 ** | 1.49 ** | 1.53 ** | 1.43 ** | 1.53 ** | 1.56 ** |
| | | | | | | | | (0.19) | (0.20) | (0.19) | (0.19) | (0.19) | (0.19) | (0.19) |
| Predominantly black (>75%) | | -1.11 * | | | | | | | -1.50 ** | | | | | |
| | | (0.53) | | | | | | | (0.46) | | | | | |
| Predominantly black * Asians | | -0.12 | | | | | | | -0.57 | | | | | |
| | | (0.47) | | | | | | | (0.52) | | | | | |
| Predominantly black * Hisp. | | 0.17 | | | | | | | 1.25 ** | | | | | |
| | | (0.49) | | | | | | | (0.45) | | | | | |
| Predominantly white (>75%) | | | 1.19 * | | | | | | | 0.47 | | | | |
| | | | (0.49) | | | | | | | (0.33) | | | | |
| Predominantly white * Asians | | | -0.30 | | | | | | | -0.21 | | | | |
| | | | (0.29) | | | | | | | (0.31) | | | | |
| Predominantly white * Hisp. | | | -0.77 † | | | | | | | -0.05 | | | | |
| | | | (0.46) | | | | | | | (0.30) | | | | |
| Asian enclave (>40%) | | | | | -2.73 * | | | | | | | -2.68 ** | | |
| | | | | | (1.09) | | | | | | | (0.81) | | |
| Hispanic enclave (>40%) | | | | | -1.11 ** | | | | | | | -1.41 ** | | |
| | | | | | (0.35) | | | | | | | (0.34) | | |

## Table B.9 (Continued)

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *City types* | | | | | | | | | | | | | | |
| Early Asian destination | 0.89 ** | 0.81 ** | 1.04 ** | 0.88 ** | 1.10 ** | 0.69 * | 0.65 ** | 0.31 | 0.22 | 0.46 | 0.26 | 0.65 * | -1.55 † | 0.01 |
| | (0.26) | (0.26) | (0.28) | (0.26) | (0.27) | (0.34) | (0.24) | (0.29) | (0.29) | (0.31) | (0.29) | (0.30) | (0.83) | (0.27) |
| Early Hispanic destination | -0.16 | -0.13 | -0.05 | -0.15 | -0.01 | -12.2 | -0.47 † | -0.61 * | -0.60 * | -0.46 | -0.57 † | -0.35 | 0.07 | -0.94 ** |
| | (0.27) | 0.27 | (0.28) | (0.27) | (0.28) | (368) | (0.26) | (0.30) | (0.30) | (0.31) | (0.31) | (0.30) | (0.40) | (0.28) |
| High immigration city | | | | | | 0.61 | | | | | | | 1.15 ** | |
| | | | | | | (0.45) | | | | | | | (0.28) | |
| High immig./black presence city | 0.95 ** | 0.96 ** | 1.05 ** | 0.97 ** | 1.05 ** | | 0.31 | 0.96 ** | 0.97 ** | 1.07 ** | 0.97 ** | 1.18 ** | | 1.25 ** |
| | (0.23) | (0.23) | (0.24) | (0.23) | (0.23) | | (0.49) | (0.24) | (0.24) | (0.25) | (0.24) | (0.24) | | (0.31) |
| High immig./no black presence city | 0.87 ** | 0.82 * | 0.90 ** | 0.85 ** | 0.88 ** | | | 0.52 | 0.45 | 0.60 † | 0.50 | 0.54 | | |
| | (0.32) | (0.32) | (0.32) | (0.32) | (0.32) | | | (0.35) | (0.35) | (0.35) | (0.35) | (0.35) | | |
| Low immigration/black presence city | 0.40 | 0.33 | 0.40 | 0.38 | 0.41 | | -0.19 | 0.06 | 0.00 | 0.12 | 0.09 | 0.09 | | -0.08 |
| | (0.27) | (0.27) | (0.27) | (0.27) | (0.27) | | (0.65) | (0.28) | (0.29) | (0.29) | (0.28) | (0.28) | | (0.41) |
| *Interactions with city types* | | | | | | | | | | | | | | |
| Early Asian destination * Asians | | | | | | 0.04 | | | | | | | 2.02 * | |
| | | | | | | (0.04) | | | | | | | (0.87) | |
| Early Hisp. destination * Hisp. | | | | | | 11.70 | | | | | | | -1.02 * | |
| | | | | | | (368) | | | | | | | (0.46) | |
| High immigration city * Asians | | | | | | 0.74 * | | | | | | | -0.11 | |
| | | | | | | (0.32) | | | | | | | (0.34) | |
| High immigration city * Hisp. | | | | | | -0.18 | | | | | | | -0.51 | |
| | | | | | | (0.45) | | | | | | | (0.31) | |
| High immig./black city * Asians | | | | | | | 0.50 | | | | | | | -0.56 |
| | | | | | | | (0.33) | | | | | | | (0.38) |
| High immig./black city * Hisp. | | | | | | | 0.21 | | | | | | | -0.38 |
| | | | | | | | (0.49) | | | | | | | (0.33) |
| Low immig./black city * Asians | | | | | | | 0.04 | | | | | | | -0.22 |
| | | | | | | | (0.39) | | | | | | | (0.47) |
| Low immig./black city * Hisp. | | | | | | | 0.32 | | | | | | | 0.21 |
| | | | | | | | (0.66) | | | | | | | (0.43) |
| AIC | 1469 | 1466 | 1468 | 1472 | 1451 | 1468 | 1479 | 1357 | 1345 | 1360 | 1353 | 1325 | 1349 | 1360 |

[a] N = 2,087. **p<0.01, *p<0.05, †p<0.10 (t wo-tailed test). Standard errors are in parentheses. All variables are 24 years prior to gentrification field surveys and changes are over the first 8 years. All models also include controls for median household income (logged), % below poverty, % same residents 10 years ago, homeownership rate, vacancy rate, and % over 65 years old. Low-immigration/no black presence city is the reference category for Models 1-5 and 8-12. Low-immigration is the reference category for Models 6 and 13, and no black presence is the reference category for Models 7 and 14. Interaction term variables are mean-centered.

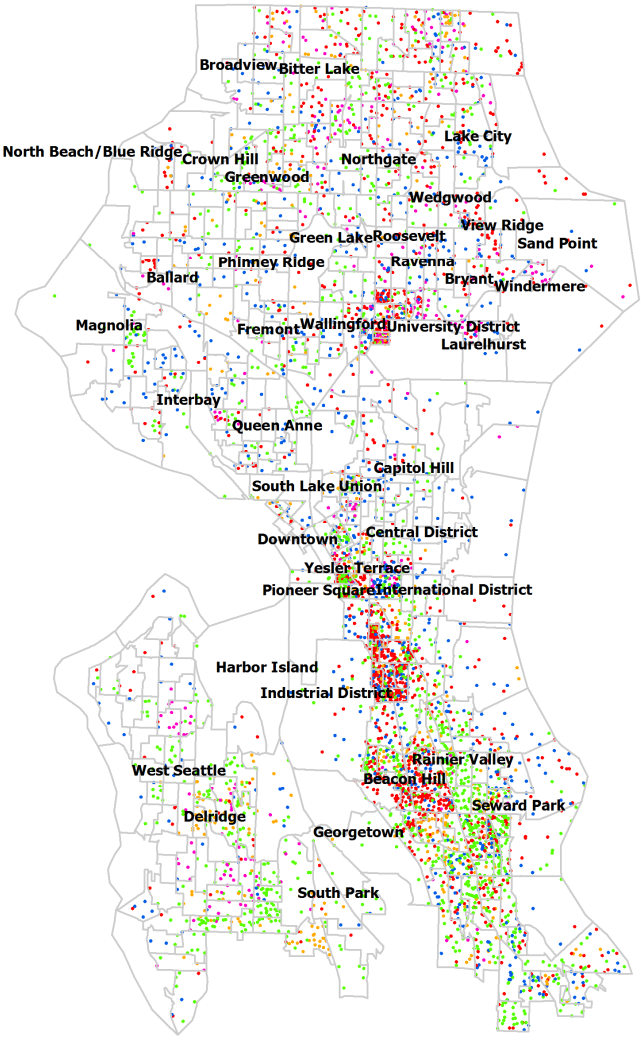



***Figure B.2.*** *Map of Asian Ethnic Groups in Seattle in 1990. Green = Filipinos, blue = Japanese, red = Chinese, orange = Vietnamese, pink = Koreans, 1 dot = 10 persons.*

***Table B.10.*** *Average Tract Characteristics in 1970 and 2000 of Early Gentrification Based on 1998 Gentrification Field Survey Categories*

| | Not Gentrifying | | Gentrifying | | Not Gentrifiable | |
|---|---|---|---|---|---|---|
| | 1970 | 2000 | 1970 | 2000 | 1970 | 2000 |
| % white | 58.3** | 48.9** | 88.5 | 77.7 | 90.9 | 72.9 |
| % black | 25.8* | 19.9** | 6.1 | 7.2 | 3.5 | 7.2 |
| % Hispanic | 2.5† | 9.0* | 1.5 | 4.7 | 2.1* | 4.5 |
| % Asian | 11.2** | 19.7* | 2.2 | 9.1 | 2.9 | 14.5** |
| % foreign-born | 12.7 | 22.9* | 10.3 | 12.7 | 8.3** | 15.8* |
| % families below poverty | 19.3 | 22.6 | 17.4 | 17.0 | 7.5** | 8.9** |
| Median household income | $50,562 | $47,818 | $46,517 | $50,439 | $74,538** | $76,259** |
| Income per capita | $25,263 | $29,222** | $25,884 | $47,708 | $31,898** | $43,957 |
| % college-educated | 10.3 | 31.5** | 16.6 | 55.7 | 17.2 | 49.3* |
| % professional/managerial | 17.6** | 37.0** | 25.8 | 51.6 | 28.8 | 49.9 |
| Median home value | $113,055* | $301,474** | $154,224 | $451,805 | $134,612 | $402,765 |
| Median gross rent | $534† | $846† | $612 | $960 | $764** | $1,134** |
| % new resident in last 10 years | 71.9** | 76.8** | 81.5 | 86.1 | 65.3** | 65.2** |
| % homeownership | 47.6 | 33.5† | 33.6 | 22.9 | 67.9** | 61.0** |
| % vacant units | 11.9 | 6.2 | 9.9 | 6.8 | 5.1** | 3.5** |
| % multiunit structures | 53.2** | 59.1** | 77.8 | 83.9 | 23.7** | 31.3** |
| % units built over 30 years ago | 60.2 | 70.7 | 65.8 | 64.5 | 39.6** | 74.9** |
| % units built in last 20 years | 22.1 | 20.4 | 24.7 | 26.4 | 38.1** | 15.4** |
| % over 65 years old | 15.6* | 11.7 | 23.4 | 10.5 | 11.4** | 12.9† |
| % under 18 years old | 23.4** | 15.0** | 11.1 | 5.6 | 28.5** | 17.4** |
| N | 19 | | 22 | | 83 | |

Note: **p<0.01, *p<0.05, †p<0.10 (two-tailed t-test). T-tests compare ungentrified tracts to gentrifying tracts and non-gentrifiable tracts to gentrifying tracts. Dollars are in 2013 constant dollars.

***Table B.11.*** *Average Tract Characteristics in 2000 and 2013 of Trajectories of Gentrification Based on 2011 Gentrification Google Street View Observations*

| | Below Median | | Above Median | | Not Observed | |
|---|---|---|---|---|---|---|
| | 2000 | 2013 | 2000 | 2013 | 2000 | 2013 |
| % white | 71.0 | 71.5 | 78.0 | 72.4 | 67.8** | 66.3† |
| % black | 11.6 | 6.1 | 7.0 | 4.4 | 9.1 | 7.5* |
| % Hispanic | 5.5 | 5.2 | 4.4 | 6.5 | 5.4 | 6.4 |
| % Asian | 10.6 | 11.6 | 9.0 | 11.2 | 16.6** | 14.7 |
| % foreign-born | 13.2 | 13.7 | 12.5 | 15.4 | 18.1** | 18.2 |
| % below poverty | 19.0 | 20.8 | 15.3 | 16.1 | 10.1* | 11.6 |
| Median household income | $53,066 | $57,544 | $56,779 | $63,598 | $73,670** | $76,091† |
| Income per capita | $36,520* | $39,061** | $49,873 | $51,818 | $41,939† | $43,520* |
| % college-educated | 52.6 | 64.7 | 53.4 | 63.8 | 45.0† | 54.8** |
| % professional/managerial | 48.1 | 54.9† | 52.8 | 61.1 | 47.0* | 54.1* |
| Median home value | $396,598 | $424,747 | $467,642 | $465,461 | $377,417† | $445,969 |
| Median gross rent | $995 | $1,053 | $973 | $1,085 | $1,097* | $1,035 |
| % new resident in last 10 years | 80.5 | 82.0 | 82.5 | 82.3 | 65.2** | 67.5** |
| % homeownership | 30.7 | 32.0 | 28.0 | 31.0 | 60.6** | 59.4** |
| % vacant units | 4.5† | 6.1* | 6.7 | 8.7 | 3.9* | 6.1* |
| % multiunit structures | 66.9 | 65.0 | 74.7 | 74.3 | 31.7** | 32.7** |
| % units built over 30 years ago | 72.5 | 70.9 | 69.8 | 64.8 | 73.1 | 74.0 |
| % units built in last 20 years | 18.5 | 21.6 | 23.4 | 28.2 | 16.7 | 18.3† |
| % over 65 years old | 9.6 | 12.7 | 10.0 | 15.8 | 13.6** | 18.7* |
| % under 18 years old | 9.3 | 9.3 | 7.7 | 8.3 | 18.3** | 18.7** |
| N | 21 | | 21 | | 82 | |

Note: **p<0.01, *p<0.05, †p<0.10 (two-tailed t-test). T-tests compare tracts with low gentrification scores to tracts with high gentrification scores and non-observed tracts to tracts with high gentrification scores. Dollars are in 2013 constant dollars.

***Table B.12.*** *Average Block Group Characteristics in 1990 and 2013 of Recent Gentrification Based on 2013 Census-Based Gentrification Measures for Block Groups below the Metropolitan Area Median Income*

| | Not Gentrifying | | Gentrifying | | Not Gentrifiable | |
|---|---|---|---|---|---|---|
| | 1990 | 2013 | 1990 | 2013 | 1990 | 2013 |
| % white | 68.7 | 58.1** | 67.9 | 66.9 | 84.7** | 79.6** |
| % black | 9.5** | 9.6 | 15.6 | 7.9 | 5.1** | 3.0** |
| % Hispanic | 4.1 | 8.1* | 3.6 | 6.4 | 2.3** | 3.9** |
| % Asian | 15.8** | 18.8** | 11.1 | 13.1 | 7.1** | 9.0** |
| % foreign-born | 16.9** | -- | 12.4 | -- | 9.6** | -- |
| % families below poverty | 3.2 | 5.8** | 3.1 | 3.7 | 0.5** | 1.8** |
| Median household income | $50,249** | $54,082** | $45,879 | $68,950 | $80,397** | $98,612** |
| Income per capita | $29,534 | $33,475** | $29,336 | $44,072 | $44,510** | $57,283** |
| % college-educated | 31.9 | 46.4** | 32.1 | 60.6 | 46.6** | 68.0* |
| % professional/managerial | -- | 46.9** | -- | 55.8 | -- | 63.7** |
| Median home value | $242,024† | $364,803** | $224,853 | $424,875 | $333,430** | $567,503** |
| Median gross rent | $907** | $944** | $852 | $1,066 | $1,121** | $1,266** |
| % new resident in last 10 years | 73.2 | 75.8 | 73.8 | 77.7 | 56.2** | 59.3** |
| % homeownership | 42.3 | 41.7 | 38.5 | 43.2 | 74.4** | 73.8** |
| % vacant units | 5.1* | 6.6 | 6.1 | 6.6 | 2.9** | 5.2** |
| % multiunit structures | 50.5 | 52.8 | 55.2 | 53.2 | 16.4** | 17.4** |
| % units built over 30 years ago | 57.9** | 68.6 | 67.2 | 68.1 | 79.2** | 83.7** |
| % units built in last 20 years | 26.2** | 21.5 | 20.9 | 24.9 | 11.3** | 11.0** |
| % over 65 years old | 14.7 | 11.6* | 14.9 | 9.9 | 16.9* | 13.6** |
| % under 18 years old | 16.2 | 14.5 | 15.3 | 13.1 | 17.3* | 19.5** |
| N | 183 | | 149 | | 143 | |

Note: **p<0.01, *p<0.05, †p<0.10 (two-tailed t-test). T-tests compare ungentrified tracts to gentrifying tracts and non-gentrifiable tracts to gentrifying tracts. Dollars are in 2013 constant dollars. % poverty for individuals is not available for block groups; missing values are not available in normalized block group data.

***Table B.13.*** *Regression Results Predicting Early Gentrification with 1970 Variables, Gentrification Trajectories with 2000 Variables, and Recent Gentrification Based on Metropolitan Area Median Income Threshold*

| | Early Gentrification (Gentrification Field Surveys, 1998) | | | Gentrification Trajectories (Gentrification Stage Score, 2011) | | | Recent Gentrification (Census-Based Gentrification, 1990-2013) | | |
|---|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) |
| | % Minority Groups | Diversity | Δ Asian/Hisp. Population | % Minority Groups | Diversity | Δ Asian/Hisp. Population | % Minority Groups | Diversity | Δ Asian/Hisp. Population |
| % black | -0.076† | | -0.054* | -0.028† | | -0.029† | 0.029** | | 0.032** |
| | (0.038) | | (0.029) | (0.016) | | (0.015) | (0.010) | | (0.011) |
| % Asian | -0.231** | | -0.265** | -0.069† | | -0.085* | -0.031** | | -0.032** |
| | (0.101) | | (0.111) | (0.035) | | (0.036) | (0.011) | | (0.011) |
| % Hispanic | -2.336* | | -2.231* | -0.128 | | -0.069 | -0.024 | | -0.022 |
| | (0.979) | | (0.929) | (0.102) | | (0.101) | (0.038) | | (0.040) |
| Diversity indicator | | -4.296** | | | -0.735 | | | -0.210 | |
| | | (1.637) | | | (0.449) | | | (0.281) | |
| Δ Asian population | | | -0.002 | | | 0.001* | | | -0.003† |
| | | | (0.011) | | | (0.001) | | | (0.002) |
| Δ Hispanic population | | | -0.014 | | | 0.001 | | | -0.002 |
| | | | (0.014) | | | (0.001) | | | (0.002) |
| First PC (residential opportunity) | 0.064** | 0.033** | 0.061** | 0.014* | 0.007† | 0.012* | 0.000 | 0.000 | -0.001 |
| | (0.028) | (0.012) | (0.028) | (0.005) | (0.004) | (0.005) | (0.003) | (0.003) | (0.003) |
| Second PC (socioeconomic status) | -0.041 | -0.014 | -0.035 | -0.011 | -0.005 | -0.005 | 0.019** | 0.020** | 0.019** |
| | (0.032) | (0.020) | (0.032) | (0.007) | (0.007) | (0.007) | (0.006) | (0.005) | (0.006) |
| Crime rate (logged) | -0.348 | 0.534 | 0.191 | 0.145 | 0.191 | 0.261 | 0.107 | 0.160 | 0.144 |
| | (1.091) | (0.921) | (1.267) | (0.250) | (0.257) | (0.263) | (0.243) | (0.236) | (0.243) |
| Prior Gentrification | | | | -1.124** | -0.730† | -1.190** | 0.522 | 0.575† | 0.494 |
| | | | | (0.366) | (0.397) | (0.358) | (0.342) | (0.331) | (0.346) |
| AIC | -24.5 | -17.2 | -18.2 | 116.3 | 124.1 | 110.6 | 311.9 | 322.1 | 312.4 |
| N | | 40 | | | 42 | | | 241 | |
| Model | Penalized logistic regression | | | Weighted least squares regression | | | Logistic regression | | |

Note: **p<.01; *p<.05; †p<.10 (two-tailed test).

***Table B.14.*** *Correlations between Census-Based Gentrification Measure for 1990-2013 and Various Indicators*

| | 1990 | 2013 |
|---|---|---|
| % white | 0.01 | 0.24** |
| % black | 0.17** | -0.13* |
| % Hispanic | -0.08 | -0.15* |
| % Asian | -0.20** | -0.18** |
| % college-educated | -0.01 | 0.40** |
| % below poverty | -0.05 | -0.17** |
| % professional/managerial | -- | 0.32** |
| Median household income (logged | -0.08 | 0.42** |
| Income per capita (logged) | 0.06 | 0.38** |
| Median home value (logged) | -0.08 | 0.31** |
| Median gross rent (logged) | -0.08 | 0.33** |

Note: **p<.01; *p<.05; †p<.10 (two-tailed test).

***Table B.15.*** *Factor Loadings and Correlations for Principal Components*

| | Early Gentrification (Gentrification Field Surveys, 1998) | | | | Gentrification Trajectories (Gentrification Stage Score, 2011) | | | | Recent Gentrification (Census-Based Gentrification, 1990-2013) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | First PC (1980 tracts) | | Second PC (1980 tracts) | | First PC (1990 tracts) | | Second PC (1990 tracts) | | First PC (1990 block groups) | | Second PC (1990 block groups) | |
| | Factor Loadings | Correlation | Factor Loadings | Correlation | Factor Loadings | Correlation | Factor Loadings | Correlation | Factor Loadings | Correlation | Factor Loadings | Correlation |
| % vacant units | -0.02 | 0.44 | -0.04 | -0.34 | 0.02 | 0.44 | -0.04 | -0.38 | 0.02 | 0.39 | -0.03 | -0.29 |
| % homeownership | 0.32 | -0.81 | 0.50 | 0.57 | -0.30 | -0.78 | 0.46 | 0.60 | -0.32 | -0.75 | 0.46 | 0.62 |
| Median home value (logged) | 0.00 | -0.02 | 0.00 | 0.43 | 0.00 | 0.25 | 0.01 | 0.44 | 0.00 | 0.20 | 0.00 | 0.43 |
| Median gross rent (logged) | 0.00 | -0.53 | 0.01 | 0.53 | 0.00 | -0.48 | 0.01 | 0.56 | 0.00 | -0.41 | 0.00 | 0.39 |
| % multiunit structures | -0.38 | 0.84 | -0.52 | -0.52 | 0.38 | 0.82 | -0.49 | -0.53 | 0.42 | 0.80 | -0.52 | -0.57 |
| % units built over 30 years ago | -0.11 | 0.40 | 0.22 | 0.36 | -0.01 | -0.06 | 0.31 | 0.64 | -0.04 | -0.11 | 0.41 | 0.74 |
| % new resident in last 10 years | -0.14 | 0.74 | -0.24 | -0.57 | 0.14 | 0.74 | -0.21 | -0.55 | 0.17 | 0.69 | -0.24 | -0.56 |
| Distance (in feet) (sq. rt.) | 0.84 | -0.97 | -0.43 | -0.23 | -0.85 | -0.97 | -0.41 | -0.23 | -0.83 | -0.94 | -0.48 | -0.32 |
| % college-educated | -0.05 | 0.23 | 0.32 | 0.66 | 0.07 | 0.25 | 0.36 | 0.69 | 0.08 | 0.30 | 0.25 | 0.52 |
| % below poverty | -0.10 | 0.64 | -0.15 | -0.45 | 0.10 | 0.55 | -0.18 | -0.50 | 0.00 | -0.01 | -0.04 | -0.30 |
| Median household income (logged) | 0.00 | -0.62 | 0.01 | 0.59 | 0.00 | -0.60 | 0.01 | 0.65 | 0.00 | -0.53 | 0.01 | 0.58 |
| Income per capita (logged) | 0.00 | -0.13 | 0.01 | 0.47 | 0.00 | -0.01 | 0.01 | 0.58 | 0.00 | -0.01 | 0.00 | 0.43 |
| % professional/managerial | -0.01 | 0.09 | 0.24 | 0.70 | 0.01 | 0.06 | 0.29 | 0.75 | -- | -- | -- | -- |

***Table B.16.*** *Logistic Regression Coefficients and Standard Errors Predicting Early Gentrification and Gentrification Trajectories with Census-Based Block Group Measures*

| | Early Gentrification (Census-Based Gentrification, 1980-1990) | | | Early Gentrification (Census-Based Gentrification, 1980-1990) | | | Gentrification Trajectories (Census-Based Gentrification, 1990-2013) | | | Gentrification Trajectories (Census-Based Gentrification, 1990-2013) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) |
| | % Minority Groups | Diversity | Δ Asian/Hisp. Population | % Minority Groups | Diversity | Δ Asian/Hisp. Population | % Minority Groups | Diversity | Δ Asian/Hisp. Population | % Minority Groups | Diversity | Δ Asian/Hisp. Population |
| % black | 0.003 | | 0.003 | 0.003 | | 0.001 | 0.006** | | 0.006** | 0.005* | | 0.005† |
| | (0.010) | | (0.010) | (0.011) | | (0.012) | (0.002) | | (0.002) | (0.003) | | (0.003) |
| % Asian | -0.025 | | -0.014 | -0.004 | | 0.020 | -0.006* | | -0.007* | -0.012* | | -0.014* |
| | (0.016) | | (0.017) | (0.024) | | (0.028) | (0.003) | | (0.003) | (0.006) | | (0.006) |
| % Hispanic | -0.113 | | 0.135 | -0.343 | | -0.101 | 0.000 | | 0.000 | -0.006 | | -0.007 |
| | (0.188) | | (0.212) | (0.219) | | (0.246) | (0.011) | | (0.012) | (0.014) | | (0.015) |
| Diversity indicator | | -0.217 | | | 0.130 | | | -0.011 | | | 0.016 | |
| | | (0.355) | | | (0.428) | | | (0.084) | | | (0.099) | |
| Δ Asian population | | | -0.005* | | | -0.009* | | | 0.000 | | | -0.001 |
| | | | (0.002) | | | (0.004) | | | (0.000) | | | (0.001) |
| Δ Hispanic population | | | -0.020** | | | -0.016† | | | 0.000 | | | 0.000 |
| | | | (0.006) | | | (0.009) | | | (0.001) | | | (0.001) |
| First PC (residential opportunity) | 0.002 | 0.002 | 0.001 | -0.003 | -0.001 | -0.006 | 0.000 | 0.000 | 0.000 | -0.002† | -0.004** | -0.002 |
| | (0.003) | (0.003) | (0.003) | (0.004) | (0.004) | (0.005) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) |
| Second PC (socioeconomic status) | -0.001 | 0.001 | -0.003 | -0.012 | -0.006 | -0.008 | 0.002 | 0.004* | 0.002 | -0.001 | 0.002 | -0.001 |
| | (0.008) | (0.008) | (0.009) | (0.013) | (0.011) | (0.014) | (0.002) | (0.002) | (0.002) | (0.002) | (0.002) | (0.002) |
| Crime rate (logged) | -0.312 | -0.362 | -0.593 | -0.329 | -0.571 | -0.648 | 0.037 | 0.061 | 0.040 | 0.089 | 0.136† | 0.096 |
| | (0.380) | (0.313) | (0.397) | (0.441) | (0.361) | (0.469) | (0.063) | (0.065) | (0.064) | (0.070) | (0.070) | (0.072) |
| Prior Gentrification | | | | | | | 0.009 | 0.029 | 0.008 | -0.021 | -0.034 | -0.018 |
| | | | | | | | (0.085) | (0.087) | (0.086) | (0.094) | (0.096) | (0.094) |
| AIC | 281.9 | 281.5 | 271.4 | 178.0 | 177.2 | 171.2 | 218.8 | 228.1 | 222.7 | 148.9 | 153.4 | 151.4 |
| N | | 206 | | | 126 | | | 153 | | | 108 | |
| Sample | All block groups with median household incomes below the citywide median in 1980 | | | All block groups with median household incomes below the citywide median in 1980 in tracts observed by Hammel and Wyly in 1998 | | | All block groups that gentrified in 1980-1990 and adjacent block groups with median household incomes below the citywide median in 1990 | | | All block groups with median household incomes below the citywide median in 1990 in tracts observed using Google Street View Gentrification Observations in 2011 | | |

Note: **p<.01; *p<.05; †p<.10 (two-tailed test).

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