Race and home values in Durham, North Carolina: 1940-2020

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Abstract

We examine the relationship between race and home values in Durham, North Carolina using two methods to partition the city geographically: first, using the racial composition of census tracts, and second, the rating assigned to neighborhoods by the Home Owners' Loan Corporation. We find that home values are strongly associated with racial composition and neighborhood rating. Homes in Black neighborhoods are worth less than those in white neighborhoods, and homes in redlined neighborhoods are worth less than those in greenlined neighborhoods. We confirm that home values in 1940 correspond to the ranking implied by HOLC ratings, and that these patterns remain in the present. Furthermore, within the areas with the lowest home values for each partition, Black home-owners occupy the least valuable homes. Taken together, our findings add confirmatory evidence to the literature on the persistence of racial disparities in housing outcomes.

Keywords: race, housing, inequality, wealth
JEL codes: I3, J7, N3, N9

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1 Introduction

The study of racial inequality in the United States has yielded a stubborn fact: the outcomes of Black individuals and households significantly lag those of whites across the vast majority of socioeconomic indicators, including measures of health, education, financial resources, and treatment by the criminal-legal system.[1] Questions about the origins and persistence of these socioeconomic disparities continue to generate a robust literature. Candidate explanations range from those that emphasize the discriminatory treatment that shadows Black men and women as they seek to build livelihoods today, to those that assign contemporary racial inequality to a long series of historical developments.[2] The large racial wealth gap - that the median white household owns roughly ten times the wealth of the median Black household (Darity Jr, Hamilton, et al., 2018) - has been identified as a potential driver of racial disparities in other outcomes (Shapiro, 2004). Recent work has shown that the racial wealth gap remained largely unchanged over the past 50 years. In "The Wealth of Two Nations," (Derenoncourt et al., 2024) document the racial wealth gap (calculated as the ratio of white:Black wealth at the mean and median) since the eve of emancipation in 1860. The study finds that Black wealth converged rapidly in the decades following the Civil War, with the mean ratio falling from 56:1 in 1860 to around 11:1 in 1920. Since then, however, the pace of convergence has slowed with the ratio reaching 9:1 in 1930 and hovering between 5:1 and 7:1 over the past 50 years.

Wealth correlates with a variety of socioeconomic outcomes, as it enables individuals to sustain stable economic lives and take advantage of potential opportunities. Drawing from wealth helps households withstand disruptions to income and employment during economic downturns (Keister, 2000). Often, start-up capital for small businesses comes from household or family wealth.[3] For the majority of American households, home-ownership accounts for the most important share of wealth holdings.[4] Unlike renters, owners benefit from both the housing services their dwellings provide, as well as the wealth gains achieved through home value appreciation. Not surprisingly, there is also a large home-ownership gap between Black and white households that has remained remarkably

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[1]See D. R. Williams (2012) for a summary of racial disparities in health outcomes; Reardon and Portilla (2016), Little (2017), Fryer Jr. (2011), Heckman and LaFontaine (2010), Schneider and Saw (2016), and Ciocca Eller and DiPrete (2018) for disparities in educational outcomes; Cajner et al. (2017), Boatner (2019), and Golan and Sanders (2019) for disparities in economic outcomes, and Pettit and Gutierrez (2018) for disparities in criminal-legal outcomes.

[2]See the following examples for work on discrimination in education (Reardon, 2016), hiring (Fryer Jr., Pager, and Spenkuch, 2013; Quillian et al., 2017), home buying (Charles and Hurst, 2002), law enforcement (Kramer and Remster, 2018; Goncalves and Mello, 2020), and the legal system (Arnold, Dobbie, and Yang, 2018). For examples of work that emphasizes long-run consequences of historical events, see Darity Jr, Hamilton, et al. (2018), Darity Jr and Mullen (2020), Aaronson, Hartley, and Mazumder (2021), and Faber (2020). There is also work that assigns racial inequality to gaps in educational achievement that may arise independently of discrimination (see, for example, Fryer Jr. (2011)).

[3]See Fairlie and Krashinsky (2012), Adelino, Schoar, and Severino (2015), and Schmalz, Sraer, and Thesmar (2017).

[4]Housing and other non-financial assets (mainly cars) accounted for more than 80% of the wealth of households in the bottom 50% of the wealth distribution, two thirds of wealth for households between 50%-90% of the wealth distribution, and less than 20% for those in the top 10% (Kuhn, Schularick, and Steins, 2020, pp. 3506–3509).

stable over the past century (Collins and Margo, 2011). While racial disparities in home-ownership contribute towards inequality in wealth holdings, home-ownership alone cannot account for the racial wealth gap, since there remain significant racial differences in wealth holdings among home-owners, as well as between Black and white renters (Darity Jr, Hamilton, et al., 2018). Nevertheless, understanding the extent and evolution of differences in home values among Black and white home-owners is an important step towards characterizing racial disparities in household wealth.

This paper investigates the trajectory of the value of owner-occupied homes in Durham, North Carolina over the 80 years between 1940 and 2020.[5] At the beginning of this period, the city was rigidly segregated by race. Black residents occupied five neighborhoods surrounding the central business district. These neighborhoods were identified and rated in the residential security map drafted by the Home Owners' Loan Corporation (henceforth HOLC) in 1939.[6] In the area description forms accompanying the maps, the HOLC includes the Black share of residents for each neighborhood: Walltown (100%), Lyon Park (100%), Hayti (90%), the East End (80%), and Hickstown (20%), a neighborhood in the northwestern edge of the city (see Figure 1).

Residential segregation could no longer be maintained through legal means following the civil rights acts of the 1960s. Nevertheless, the Black share of residents in census tracts falling within the boundaries of these neighborhoods remained close to 100% until 1990, and all but two of the Black census tracts we study had a Black share above 75% until 2010 (see Appendix Figure A.1). While the city-wide Black and white shares of residents have hovered around rough parity for the duration of our study period, the Black share did increase between 1970 and 1990, at which point Black residents were a clear majority. Since then, however, it has steadily declined, coinciding with the revitalization of downtown Durham, and a rise in rents as well as home values (De Marco and Hunt, 2018). The year 2000 was the last time Black residents constituted a majority.

Studying the evolution of home values allows us to explore how opportunities for wealth accumulation through home-ownership differed across neighborhoods, as well as by the race of home-owners. Unlike much of the existing literature that examines racial disparities in housing within large cities in the North and Midwest, our work concerns a relatively small city in the South, where the populations of Black and white residents were roughly equal for the duration of the study period.[7] While not nationally representative, Durham is an interesting case study because of the size

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[5]We focus on owner-occupied units, while mindful of the importance of the rental market. The home-ownership rate among Black residents of Durham at the beginning of the study in 1940 was 15.1%, and was 29.5% among whites (Levitt, 1940). Home-owners tend to be economically better off than renters, making this a study of racial wealth inequality near the top of the wealth distribution.

[6]The HOLC was a New Deal government agency with a mandate to refinance the mortgages of delinquent home-owners following the Great Depression. In order to manage its portfolio of mortgages, employees drafted residential security (commonly referred to as "redlining") maps of almost 240 urban areas in the United States (Michney and Winling, 2019; Michney, 2021).

[7]See the following for work on Detroit (Freund, 2007) and St. Louis (Gordon and Bruch, 2019). Akbar et al. (2022) study ten large cities in the North and Midwest. Some studies have considered cities in the South: Fishback, Rose, et al. (2022) include Greensboro, NC, and Baltimore, MD, however the focus of their study is the presence of mortgages

of its Black professional class, and relative economic success of its Black community (Du Bois, 1912).

Indeed, W.E.B. Du Bois singled out the city and its Black community for "its exceptional progress that characterizes the progress of the Negro American out of the feudal darkness of the past and into an era of capitalist stability" (Lyons, 2010). This sentiment is perhaps best exemplified by the business success that members of Durham's Black elite enjoyed: North Carolina Mutual Life, an insurance company founded in Durham eventually became the most valuable Black-owned business in the United States. Along with successful businesses, the community also benefited from a college that would eventually become North Carolina Central University (NCCU), as well as a hospital, banks, manufacturing plants and many churches. Concentrated in a relatively compact area near Durham's business district, the arrangement appeared promising to observers at the time and differed significantly from the prospects of Black communities in destination cities of the Great Migration where arrivals often worked stable but hardly lucrative manufacturing jobs. Additionally, in those cities where racial disparities in housing have been studied such as St. Louis, Philadelphia, and Detroit, population peaked in the mid-twentieth century. Durham's total population, on the other hand, increased consistently throughout this period, even as broader trends in the United States led to economic and population declines in urban areas elsewhere. At the outset, therefore, we might expect racial disparities in home values to be relatively mild, or that, despite their existence in 1940, they would diminish over time as de jure segregation and discrimination subside.

Durham also presents an opportunity to understand the trajectory of home values by linking historic data from the 1940 Census with contemporary data from accessible property records. Matching properties over this time period requires street addresses to be standardized since street names can change. The relatively small footprint of Durham's urban core makes this step feasible. The city was also one of the 240 urban areas mapped by the HOLC, which allows us to investigate how neighborhoods that differed in HOLC ratings fared over time. Finally, its location in North Carolina allows us to leverage voter data in the contemporary period to observe household race.

Documenting the trajectory of home values is one strategy for assessing wealth building opportunities and how they differ by neighborhood. However, a more direct method would be to calculate housing returns - the difference between a home's sale price and its purchase price (Kermani and Wong, forthcoming). Before the 1990s, data on ownership spells that would allow for calculating housing returns is unavailable since real estate data providers generally focus on contemporary transactions. As a result, studies that seek to examine wealth gains from home-ownership over the long run are restricted to using home values, which serve as a proxy for housing wealth.

The starting point for the analysis in this paper is the 1940 census, from which we obtain data on the value of dwellings along with street addresses and race of owner-occupants. We restrict attention to owner-occupied homes for two reasons. The first is data availability: the census only collects home value data from owner-occupants. As a result, while data on rents is available for re-

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insured by Federal Housing Administration among Black home-owners, not disparities in home values.

spondents who were tenants at the time, the value of tenant-occupied units is unavailable. Second, the motivation for this paper is to consider the appreciation in home values (and consequent wealth building) that would have accrued to a hypothetical home-owner who owned their home in 1940. In particular, we are interested in understanding whether home-owners in Black neighborhoods faced the same opportunities to build wealth as those in white neighborhoods over the second half of the 20th century and the first two decades of the 21st. In 1940s Durham, strict racial segregation meant that Black and white home-owners almost always resided in neighborhoods that we eventually categorize as having one racial majority throughout the duration of our study. Wealth building may take place over multiple generations as the original owner bequeaths their home to their children and so forth.

To understand how the trajectory of home values differs across neighborhoods, we partition the area comprising the historical urban core of Durham in two ways: first, according to neighborhood ratings in the 1939 HOLC residential security map, and second, according to the demographic composition of census tracts. The HOLC "redlining" maps have become synonymous with the practice of discriminatory lending that characterized federal housing programs between the New Deal and Civil Rights eras (Greer, 2013). Recent work argues that HOLC maps did not play a causal role in those practices, as they were not used in refinancing decisions (Fishback, Rose, et al., 2022). The maps were composed by the HOLC's Mortgage Rehabilitation Department in collaboration with local real estate and mortgage professionals in roughly 240 urban areas at a time when the agency had completed its refinancing activity and was concerned with how best to unwind its mortgage portfolio (Michney, 2021). As a result, they capture the professional consensus among (white) real estate and mortgage professionals at the time, and accurately delineate neighborhood boundaries. The map divides the city into neighborhoods, which are assigned a rating between "A" (best) and "D" (hazardous). Black residents were concentrated in D-rated neighborhoods.

When using census tracts to partition the city, we distinguish between three types: those that remained majority white for the entire period between 1940 and 2016 (henceforth *white census tracts*), those that remained majority Black over that period (henceforth *Black census tracts*), and all others (henceforth *integrated census tracts*). Five census tracts fall in the white category, five fall into the Black category, and 9 fall into the integrated category.

Our findings are as follows: in 1940, home values in Black census tracts were less than half of those in white census tracts, and the gap widens over time. Moreover, we find that home values in Black census tracts experienced little appreciation since 1970, while those in white census tracts increased more than two-fold. In contrast, real residential property prices for the US as a whole increased by a factor of 1.93 between 1970 and 2016 [8] In a sample of homes, for which 1940 home values were obtained and linked to contemporary sales records, 25% of sales in Black census tracts between 1997 and 2020 were below the 1940 value of the home. In white census tracts, on the other

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[8]See Bank for International Settlements (2021).

hand, that proportion was only 2%.

Turning to the partition of neighborhoods by HOLC rating: we confirm that home values in 1940 were the highest in neighborhoods rated "A" (median value in 2020 dollars of $120,162), decreased in tandem with their assigned rating, and were lowest in neighborhoods rated "D" (median value in 2020 dollars of $33,276). This ranking persists over the next 80 years: using data from real estate transactions over the period 1997-2016, we find that the pattern of home values across neighborhoods today remains the same as it was in 1940 (see Figure 2).

While the prior literature examining disparities in home values has largely focused on documenting differences across geographies (census tracts, blocks etc.), our paper leverages address-level data that allows us to document changes in the value of the same property over time.[9] We also leverage data on the race of individuals, finding that Black home-owners purchased the least valuable homes within each area, regardless of partition choice. Namely, even within census tracts with a majority of Black residents, the least valuable homes went to Black buyers. The same is true for neighborhoods rated by the HOLC: in those with a "D" rating, Black households occupied the least valuable homes in 1940, and purchased the least valuable homes in the 1997-2020 period.[10] Indeed, we find that the sales price of homes sold to Black buyers exhibit relatively little change, despite a significant increase in home values across the city during the recent period of revitalization. While home values do increase in Black census tracts during this time, we show that the increase is due to the prices paid by white buyers.

The results, which are described at length in Sections 3 and 4, are related to a number of recent studies. Akbar et al. (2022) study racial transition in city blocks between 1930 and 1940, finding that pioneer Black homeowners in white neighborhoods paid a premium to purchase homes, then experienced a drop in the value of their property once neighborhoods transitioned from mostly-white to mostly-Black. Krivo and Kaufman (2004) and Perry, Rothwell, and Harshbarger (2018) document substantial racial gaps in housing equity after controlling for a number of confounding factors in 2001 and the 2012-2016 period, respectively. Flippen (2004) studies the contribution of racial composition to the difference in appreciation rates of home values between 1970 and 1990 in white, integrated, and minority neighborhoods. The findings assign a large share of the disparity to socioeconomic factors, yet suggest that racial composition remains an important contributor, especially in neighborhoods where the Black share of residents increases significantly. A similar exercise examining home values between 1940 and 1990 was conducted in Collins and Margo (2003), with the results showing that the value gap between white and Black owner-occupants decreased between 1940 and 1970, but remained stable thereafter. For the period between 1980 and 2015, Howell and Korver-Glenn (2020) find that racial composition becomes increasingly important for

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[9]See, for example, Howell and Korver-Glenn (2020), Howell and Korver-Glenn (2018), Aaronson, Hartley, and Mazumder (2021), and Akbar et al. (2022).

[10]These findings were obtained by combining recent home sales data with North Carolina voter files, which include the race of registrants.

home values, and document a growing gap in home values of properties in white and non-white neighborhoods.[11]

There are also studies that examine racial disparities in housing markets using individual addresses as the unit of analysis, rather than broader geographies such as the neighborhood, block or tract. However, these tend to be focused on contemporary housing markets since granular data on housing transactions are only available from the 1990s onward. They offer evidence that points to the persistence of racial disparities in the present as well. For example, Bayer, Casey, et al. (2017) use data on housing transactions that cover four metropolitan areas to document a 2% premium paid by Black and Hispanic buyers. At the same time, Bayer, Ferreira, and Ross (2016) show that Black and Hispanic buyers had higher rates of delinquency and default than similarly situated white buyers following the aftermath of the housing crisis of 2007. In a study that links home-owner distress to home values at the neighborhood level, Kermani and Wong (forthcoming) show that racial disparities in housing returns are driven by the preponderance of distressed sales in minority neighborhoods. Adding another dimension to this literature, Avenancio-León and Howard (2022) show that unequal assessments by municipalities place a 10-13% higher tax burden on Black and Hispanic residents.

Gordon and Bruch (2019) is perhaps the closest study to ours. Following a sample of 99 owner-occupied homes across St. Louis, they document large racial differences in the trajectories of home values between 1940 and 2016.[12] They find that as the city experienced de-industrialization and population loss over the second half of the 20th century, homes in white neighborhoods were able to sustain their value, while homes in Black neighborhoods were not. While this study is similar to ours in its approach, the two differ in a number of key ways. First, we collect a comprehensive sample of geo-coded owner-occupied, single family homes with an observable sale in the contemporary period. Our sample constitutes 15% of all owner-occupied units in 1940 (see table B.1). Second, we complement the analysis of our address-level data with census data covering the same period of time (with gaps in 1950, when data on home values is unavailable, and 1960, when standardized census tract boundaries are unavailable). Third, we use the HOLC map's neighborhood partitions as another lens through which to examine disparities in home values. Finally, we center our study on Durham, as opposed to St. Louis, contributing an examination of a city that has hitherto attracted

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[11]While this study emphasizes persistence, Lee and Lin (2018) use a similar methodological approach to understand the determinants of neighborhood change. Briefly, they study neighborhoods proxied by US census tracts across an unbalanced panel of up to 308 metro areas in the United States. Historically, their data extend backwards to 1880, though the sample is smaller in the early years, falling to one metro area in 1910, 2 in 1920 and 10 in 1930. Neighborhoods are characterized by income and the main outcome of interest is a neighborhood's rank in the local income distribution. They find that persistence in the spatial distribution of income is more likely to occur in metro areas with less heterogeneity in natural amenities (such as coastlines and mountains).

[12]D. Connor et al. (2018) and D. S. Connor et al. (2020) conduct a similar exercise to our analysis of census tracts for Denver, Colorado. Their focus, however, is on the persistence in income rank of neighborhoods rather than their racial composition and how that affects the trajectory of home values. Nevertheless, their findings are similar to ours in that inequality in 1940 persists over time, largely driven by high income neighborhoods maintaining their relative advantage.

little scholarly attention.

Data on individual addresses were collected from the de-anonymized 1940 decennial census (Ruggles et al., 2021). A sample of exactly 700 addresses from the census was successfully matched with contemporary real estate records obtained from a commercial database and supplemented with records maintained by Durham county. This allows us to uncover how the home value of the same address changed between 1940 and when it appears in property sales data between 1990 and 2016.

In addition to the address-level sample that we construct, we leverage tract-level data on home values from the US Census and American Community Survey (ACS). Population data on home values from decennial censuses are obtained between 1970 and 1990, 1-in-6 sample census data are obtained for 2000, and data from the American Community Survey are obtained for the years 2008-2012 and 2014-2018. Whereas the address sample provides granular detail that illuminates the disparities in home value appreciation across and within neighborhoods, the census tract data present a more comprehensive picture, often using the complete set of relevant respondents. Both analyses point to the same conclusion. Overall, we find that home values in majority Black census tracts are lower, and that homes accumulate less value over time. Section 2 provides some historical background, Section 3 describes the analysis of home values by HOLC rating, Section 4 describes the analysis by demographic composition of census tracts, and Section 5 concludes. Additional figures and details of how we construct our data are relegated to Appendix A and C, respectively.

2 Background

2.1 Historical development of Durham

The city of Durham was established on April 10, 1869, by the North Carolina General Assembly, and had a mere 256 residents in 1870. Before and during the Civil War, the village that would eventually become Durham was a trade and mail shipping center with a small railroad post, known as Durham's Station. This small community grew rapidly over the subsequent decades, from 2,041 residents in 1880 to 52,037 by 1930 (Boyd, 1925, p. 97). Newly freed men and women were particularly attracted to the city in their pursuit of economic security and physical safety (Brown, 2008).

Although economic activity in Durham had primarily revolved around agriculture, the embrace of industrial processes made the town a notable destination in the New South of the early 1900s (Brown, 2008). Under Washington Duke's leadership, the Duke family became Durham's leading industrialists. The installation of the Bonsack cigarette rolling machine in their factories (an invention "able to perform the work of forty-eight handrollers" (Anderson, 2011, p. 148)) allowed the Dukes to excel in the global tobacco market (Durden, 1975). Businessman and former Confederate colonel, Julian Carr, is another notable figure who contributed to Durham's growing influence in the tobacco, cotton, railroad, banking, and construction industries (Anderson, 2011, 146–161). Black workers mi-

grated to Durham in search of employment in the town's growing economy. The manufacturing sector's rapid growth required Duke and Carr to maintain access to a "reliable and constant pool of black labor" in order to meet the demand for their products (Anderson, 2011, p. 137).

Facing poverty and exploitation as rural sharecroppers, many Black workers viewed Durham favorably (Brown, 2008). Black women also benefited from moving to Durham in the early 20th century. The city's booming economy offered an escape from rural poverty, limited their exposure to sexual violence, and presented them with employment opportunities in the tobacco and textile industries, and in domestic service (Brown, 2008).

Like many other Southern cities, Durham was strictly segregated. Throughout the Jim Crow South, Black men and women were prohibited from fraternizing with whites, attending integrated schools, patronizing white businesses, and residing in racially integrated neighborhoods. In response, many inwardly focused Black communities were established. Black Durham was born out of this necessity, and grew to become one of the most successful Black communities in the United States (Du Bois, 1912).[13]

Between 1880 and 1930, Black households were effectively restricted to five neighborhoods in the city (Brinton, 1930, pp. 193–195). The East End district was located east of downtown Durham; Lyon Park and the West End were located towards the southwest. In the city's far western side was Hickstown. The Walltown community was northwest of downtown, and just north of Duke University's East Campus. Hayti, the largest Black community within Durham, was located south of the Southern Railroad (see Appendix Figure A.2). Black scholars including W.E.B. Du Bois and E. Franklin Frazier remarked on Hayti's self-sustaining economic ecosystem (Du Bois, 1912; Frazier, 1925). Within a matter of decades, a hospital, a cluster of Black-owned businesses, educational centers, social organizations, and religious institutions lined the streets of Fayetteville, Pettigrew, and Pine, thoroughfares located within historic Hayti (Vann and Jones, 1999). Of the many thrift and savings businesses within Hayti, two stood at the center: North Carolina Mutual Life Insurance Company, and Mechanics and Farmers Bank (Weare, 1993). The notable success of these financial institutions earned Hayti the moniker "Capital of the Black Middle Class" (Frazier, 1925).

Founded sometime in the early twentieth century by former bondsman, George Wall, Walltown gradually became a Black working-class neighborhood (Deutsch, 2004).[14] While some residents of Walltown found well-paying jobs in Durham's tobacco and textile factories, most collected wages as janitors, housekeepers, yardmen, and line cooks at Duke University (Van Brocklin, 2015). Like Hayti, Walltown founded its own academic and religious institutions (Deutsch, 2004).

Class tensions developed among Durham's Black residents. Incidents of racial injustice, and cases of racial violence in particular, exposed these economic fault lines (Greene, 2005, 18–21). The general

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[13]According to Booker T. Washington, Durham was "the city of cities to look to for prosperity of the Negroes and the greatest amount of friendly feelings between the two races of the South" (Washington, 1911).

[14]Wall was a formerly enslaved man who worked as a custodian for Trinity College prior to, as well as after, its move to Durham from Randolph county in 1892. The College would change its name to Duke University in 1924.

view among the Black working-class was that Durham's Black businessmen were more concerned with their economic well-being than with achieving true racial equality (Brown, 2008). Dissatisfied with what they perceived as the accommodationist leadership style of Black Durham's elite, some Black residents gravitated toward the Carolina Times' editor, Louis Austin, and his confrontational stance on issues of racial injustice (Gershenhorn, 2018).[15] Frequently covered in the Carolina Times was Durham's racial inequities in housing, an issue that garnered significant attention in the aftermath of the Great Depression.

2.2   Durham housing market

Developments in the local housing market occurred in the shadow of larger national trends. While cities in the United States remain segregated by race, the extent and manner in which Black and white residents were separated across neighborhoods changed over the 20th century. Racial segregation before 1910 was generally upheld by custom. Between 1910 and 1917, some municipalities began passing ordinances that restricted where Black households could live (Rice, 1968; Jones-Correa, 2000). In North Carolina, Greensboro, Mooresville, and Winston-Salem passed segregation ordinances between 1912 and 1914, but there was no such effort in Durham (Troesken and Walsh, 2019). These plans, however, were struck down by the Supreme Court in Buchanan v. Warley in 1917. Alternative methods were then adopted to maintain the segregated order. Racial restrictive covenants prohibited homeowners from selling and renting to non-whites. Unlike laws passed by local governments, covenants were agreements between homeowners in the same neighborhood and, therefore, not subject to the court's 1917 ruling. Racial covenants were first implemented against Chinese immigrants in 1894 in California, and against Black residents in the South in 1904. They continued to be legally enforced and spread to Western and Northern cities over the first half of the 20th century (Jones-Correa, 2000). Durham was not immune to this trend, and some of its neighborhoods, including Forest Hills, Watts Hospital Hillandale, Duke Forest, Northgate Park, and Glendale Heights implemented deed restrictions to keep Black residents out, though exceptions were made for domestic workers (Addy, 2021).[16]

In the Fall of 1929, the Great Depression plunged the United States into the worst economic downturn in history, eliminating the economic boom of the Roaring Twenties, and severely disrupting the housing market. Durham, much like the rest of the country, experienced significant economic dislocation as well as a housing crisis (Anderson, 2011, p. 294). In response, the Roosevelt

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[15]As the long-serving editor, Austin used the paper to "expose the suffering and injustice" Black men and women experienced in Durham, throughout North Carolina, and across the United States (Gershenhorn, 2018, p. 22). Steeped in the principles of advocacy journalism, Austin wielded the Carolina Times to refute racist commentary disseminated through white newspapers like Raleigh's News and Observer. Austin's ability to leverage the Carolina Times as a "bullhorn for racial justice and equality" led the FBI to monitor him and the editorials he published during the World War II era (Gershenhorn, 2018, pp. 70–72).

[16]Covenants were legally enforceable until the Supreme Court's Shelley v. Kraemer decision in 1948.

administration began a program of federal intervention in the housing market. Major legislative acts established the HOLC in 1933, and the Federal Housing Administration (FHA) in 1934. The HOLC sought to rescue home-owners at risk of default while protecting the credit institutions that held their mortgages. The FHA encouraged new home purchases, renovations and building in an effort to spur economic activity. These government agencies, it is argued, adopted the real estate industry's prevailing views that the presence of Black residents was detrimental to property values, and that neighborhoods ought to be racially homogeneous (Rothstein, 2017). The HOLC's residential security maps have become identified with the practice of "redlining," whereby certain neighborhoods are disfavored in the provision of mortgages insured by the FHA and guaranteed by the Veterans Administration. Neighborhoods with restrictive covenants were preferred by the FHA, since they had legally binding mechanisms for ensuring racial homogeneity (Rothstein, 2017). Federal mortgage insurance is credited with expanding home-ownership among white households, and facilitating wealth building by subsidizing the acquisition of assets, while excluding Black households from the same opportunity (Katznelson, 2006; Rothstein, 2017).

There are many excellent discussions of the role these agencies played in reshaping the residential real estate market in the United States.[17] It is important to note, however, that while their role in expanding home-ownership is well accepted, the precise mechanism through which they exacerbated racial segregation and disparities in home-ownership and wealth remains contested (Ali, 2022; Michney and Winling, 2019; Faber, 2020). Hillier (2003), for example, argues that HOLC maps of urban areas merely formalized information about neighborhoods that was well known to local lenders. Fishback, LaVoice, et al. (2020) argue that racial considerations played a minor role compared to the economic characteristics of neighborhoods in the HOLC's rating exercise. Furthermore, they argue that HOLC maps may not have shaped FHA lending decisions as imagined, because the HOLC was a separate agency and the FHA had drafted its own maps. Settling these debates is beyond the scope of this study. In particular, we cannot say whether racial or economic considerations predominated in assigning ratings to neighborhoods in the many maps drafted by the HOLC. However, in the case of Durham's residential security map, the presence of Black residents defined the contours of neighborhoods and appears to have determined their rating. First, Black neighborhoods were accurately identified in the HOLC map (see Figure 1 and Appendix Figure A.3). Second, there was no neighborhood with an A (best) or B (still desirable) rating that contained any Black residents. Third, in one C-rated neighborhood, the appraiser's comments clearly implied that the presence of Black residents was a detrimental factor:

> *Northern part is gradually being taken over by negroes* [sic]. *Southern part along Duke Street is considerably better.* - Clarifying remarks for neighborhood C6 in HOLC map of Durham (Mapping Inequality, (Nelson et al., 2022))

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[17]See, for example, Jackson (1980), Hillier (2003), Katznelson (2006), Freund (2007), and Rothstein (2017).

Fourth, all neighborhoods with a D rating (hazardous) contained a significant number of Black residents. Finally, C7 was the only Black neighborhood that was not assigned the lowest rating. Instead, it was assigned the second lowest (C - definitely declining). But this neighborhood housed high income families described as "Negro professional men, insurance men [...]", and the estimated annual income range had an upper bound of $10,000 (Mapping Inequality, (Nelson et al., 2022)). This was higher than, or at least as high as the top of the income range in *all* B-rated neighborhoods, as well as all but two of the A-rated neighborhoods (A4 and A5).

Regardless of whether HOLC neighborhoods in Durham were drawn with racial considerations in mind, our findings show that redlined neighborhoods experienced slower appreciation in home values over the next 80 years (see Figure 2). Since 1940, the disparity between A- and D-rated neighborhoods grew in both absolute value (from $86,887 to $369,578 in 2020 $) and in proportion (from 361% to 945%). The median value of homes in A-rated neighborhoods grew by 344% from 1940 to the period 1991-2016 while the same rate for D-rated neighborhoods was 131%. While this paper does not draw a causal link between redlining and subsequent disparities in home values, that claim has been made elsewhere (Krimmel, 2018; Aaronson, Hartley, and Mazumder, 2021; Hynsjö and Perdoni, 2024). A more plausible explanation is that the HOLC maps identified neighborhoods where the lowest income residents lived and where the housing stock was least valuable. Over the subsequent decades, these conditions persisted so that those same neighborhoods remain disadvantaged.[18] Since economic conditions tended to correlate strongly with the racial composition of neighborhoods, federal programs were bound to have a racially disparate impact even if their implementation was race-blind due to a long history of disinvestment and racial subjugation before the HOLC maps were drawn.

A 1940 housing study sponsored by the City of Durham, Durham County, and the North Carolina State Planning Board sheds light on the city's racial disparities in housing. According to the report, whereas 45 percent of Durham's white families resided in substandard housing, among Durham's Black families, that proportion was 80 percent (Levitt, 1940). These households often lacked heat, running water, a lavatory, and gas or electricity. Aside from having their basic housing needs unmet, Durham's Black residents were also more likely to reside in overcrowded housing, have lower home-ownership rates, and pay higher rents for similar housing when compared to whites (Levitt, 1940).[19]

Some of these disparities likely resulted from policies enacted by the city's leaders in the decades prior to the report. In 1926, Durham's City Council passed zoning and land-use policies that exac-

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[18]This may not have been the intended effect of the federal government's effort. During his second inaugural address, president Franklin D. Roosevelt stated that "[t]he test of our progress is not whether we add more to the abundance of those who have much; it is whether we provide enough for those who have too little" Peters and Woolley (1937). https://www.presidency.ucsb.edu/documents/inaugural-address-7

[19]This is consistent with recent evidence on the change in rental prices and home values in cities as the share of Black residents changes. Akbar et al. (2022) find that occupancy and rents increased by about 40 percent in blocks that changed from majority white to majority Black between 1930 and 1940, while home values fell by as much as 50 percent in Chicago, Philadelphia and Detroit.

erbated racial inequities in housing. By regulating the height of building structures, controlling the number of families allowed within certain zones, and selecting the location of mandatory open spaces, Durham's zoning ordinances corralled Black residents into densely populated residential districts (Brinton, 1930, pp. 195–200).[20]

The economic diversity of Durham's Black residents translated into notable differences in their housing (Brinton, 1930, 192–295). Hayti's Black professional class tended to reside along the northern section of Fayetteville street, where they had direct access to grocery stores, barbershops, hair salons, educational facilities, recreational centers, medical centers, and other residential amenities. In comparison to Black working-class households, wealthier households were more likely to have paved streets with curbs and sidewalks. Their homes also had plumbing, electricity, heat, painted frames, gardens, and flowers or shrubberies (Brinton, 1930).

Furthermore, whereas Durham's Black working class were renters, "in the skilled class area most of the families own their homes" (Brinton, 1930, p. 237). For example, of the 104 Black families who lived in Hayti's "laboring class" area, 98 (94.2%) of them were renters (Brinton, 1930, pp. 234–235). Black home-ownership in Durham was 15.1% in 1940, a rate that is nearly half the corresponding rate for whites, 29.5% of whom owned their homes (Levitt, 1940).[21]

Durham's housing situation worsened when the United States entered the Second World War, an event that revived the American South's industrial production and spurred Durham's economic revitalization. The wartime effort led to the establishment of military installations within Durham and the city became home to a significant number of servicemen and their families (Anderson, 2011, p. 322). The city once again became a residential magnet for hopeful workers seeking to benefit from the wartime economy. The problem, however, was that eight thousand residents were without shelter, as Durham "suffered an acute housing shortage with 23,000 families crowded in 17,085 units" (Anderson, 2011, p. 324). A disproportionate share of these families were Black. Returning World War II veterans only exacerbated Durham's housing shortage, as they also competed for housing that was in short supply (Anderson, 2011, p. 329).

Around this time, the Hayti neighborhood underwent a profound transformation due to Urban Renewal, a national program conceived by the federal government to redevelop blighted urban areas. The program began with the Housing Act of 1949, Title I of which established federal financing for slum clearance, and ended 25 years later by the Housing and Community Development Act of 1974. Urban renewal projects were intended to bring affordable, high-quality housing to communities plagued by urban decay, and revitalize blighted areas through new business development. The federal program provided funds to local municipalities in order to oversee these efforts (J. A. Williams, 1969).

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[20]In addition to reinforcing residential segregation, these zoning policies placed landfills, industrial facilities, and other dis-amenities in or near Black residential communities (Brinton, 1930, pp. 200–201); see Appendix Figure A.2.

[21]The share of owners for both Black and white residents was lower than the national averages, which stood at 45.6% for white households and 23% for Black households (Collins and Margo, 2011, Appendix Table 2).

Under the leadership of Durham's planning director, Paul Brooks, a group of students at the University of North Carolina at Chapel Hill's Department of City and Regional Planning devised a study to explore how Durham could benefit from this land redevelopment program. They concluded that Durham's Hayti community had the most to gain by participating. Hayti's residents initially welcomed the plan. However, excitement about the project waned as residents learned the details. Hayti, like most Black communities across the nation, saw few benefits from urban renewal (Brundage, 2005, 227–240). Officially, there were 9 urban renewal projects implemented in the city between 1959 and 1974, six of which were part of the Hayti-Elizabeth St redevelopment effort. All of the projects affected a contiguous area that included the central business district and stretched south and east across the freeway to encompass the northern part of the Hayti neighborhood (Digital Scholarship Lab, 2022).

The Durham Redevelopment Commission was established in 1958 and authorized the construction of the Durham Freeway (NC 147), which cut through the Hayti neighborhood. The decline of Hayti is often traced to the combined fallout of urban renewal and highway construction (Darity Jr and Mullen, 2020, p. 223).[22] Toward the end of the 1960s, 713 families were displaced by Durham's urban renewal projects, 74 percent of whom were Black households (Digital Scholarship Lab, 2022). Today, there are four highways that intersect the urban core of the city of Durham, only one of which was constructed through an established community: NC 147 (Durham Freeway). Interstate I-85 predates the 1956 Federal Highway Act and runs along the old northern boundary of the city. Interstate I-885 runs along the eastern boundary of the city and serves primarily as a connector between I-85 and another interstate highway further south, I-40. US Route 501 runs along the western boundary of the city, eventually merging with US 15 to form 15-501, which is the primary route between Durham and Chapel Hill. Like I-85 and I-885, this road existed prior to the Federal Highway Act and its construction did not displace existing residents and businesses. In addition to Hayti, the construction of the Durham Freeway also displaced residents in the Crest Street neighborhood, another Black neighborhood in the north-western section of the city.

Out-migration of middle-class Black families from Hayti following urban renewal jeopardized the community's economic stability. Without the social and economic resources middle-class African Americans provided, many of Hayti's social institutions - churches, recreational facilities, banks, and neighborhood stores - faltered. To remedy the housing shortage precipitated by the removal of dwellings through the urban renewal and highway projects, the Housing Acts of 1949 and 1954 were leveraged to accommodate Hayti's displaced Black families in public housing developments. It has been argued that these housing projects were explicitly designed to uphold racial segregation (Hirsch, 2000; Lyons, 2010).

The first public housing projects, Few Gardens and MacDougald Terrace, were built in 1953 and

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[22]See also McKoy (2018). These evaluations are in line with the findings of recent empirical work (Brinkman and Lin, 2019; LaVoice, 2024).

<div align="center">

(a)   (b)
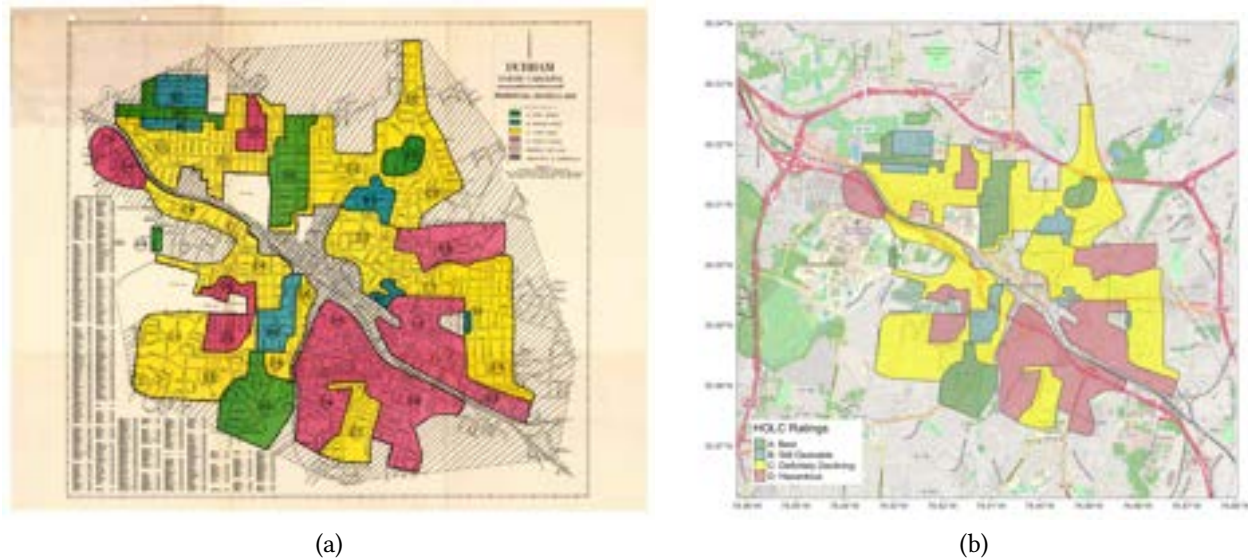
Figure 1: HOLC residential security map and ratings

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Left: HOLC map of Durham. Source: Mapping Inequality (Nelson et al., 2022); Right: digitized HOLC map shapefile overlaid on contemporary map of Durham (color version available online)

1954, respectively. The projects were segregated by race: Few Gardens (demolished in 2003) was intended for white occupancy, while MacDougald Terrace was built east of the Hayti neighborhood and intended for Black occupancy. Over the subsequent decades, some 20 or so sites were developed for public housing, ranging from multi-story apartment buildings to low density town-homes. The location of these sites is telling: almost all were built in neighborhoods where the Black share of residents was at least 60% in 2010.[23] The development of public housing coincided with the loss of housing units from urban renewal and freeway construction. Since Black households were more likely to be displaced by these projects, they constituted the vast majority of public housing residents.

Durham's Walltown neighborhood experienced its own housing challenges in the post-WWII era. Neighborhood quality in the once close-knit community had severely deteriorated by the 1970s and worsened still by the 1990s. Like many urban neighborhoods during those decades, Walltown declined in the face of de-industrialization, surging rates of community violence, and the emergence of the crack epidemic (Van Brocklin, 2015). At the turn of the twenty-first century, 757 of Walltown's dwelling units required some form of repair and another 600 houses were vacant. Walltown's median home value in 1990 was $53,200, 34% less than the city average of $80,000 (Deutsch, 2004).[24]

While this is the first study to systematically document home value disparities in Durham, our findings fit a general pattern that has been established by a large body of existing work. In the

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[23]See Appendix Figure A.4 for a map of the location of public housing projects and Black share of neighborhoods.

[24]Note that home values are in 1990 $, whereas the rest of the paper reports home values in 2020 $. Even this disparity understates the extent of the economic decline in Walltown, as the $50,000 median home value is based on tract data from the 1990 census. The census tract containing Walltown also includes homes in the Trinity Heights neighborhood, which borders Duke's East Campus, and tends to have much more expensive homes.

discussion of some of the most closely related existing studies below, we draw a distinction between those that focus on home values in the contemporary period (roughly over the last 20 years), and those with a historical focus.

Beginning with studies that document racial disparities in home values in the recent past, Howell and Korver-Glenn (2020) show that unexplained differences in the value of homes between white and non-white census tracts within the same metropolitan area are significant, and have increased since 1980.

The analysis in this paper is organized around two geographic partitions of the city. The first partition follows the residential security ratings in the 1939 HOLC map. The second is according to the demographic composition of census tracts over the period 1940-2016. The unit of observation is either the address (in both partitions) or the census tract (in the second partition). While some of the data sources we use for the two analyses are the same, the two partitions yield slightly different samples of addresses. Data sources and construction of the analysis files are introduced and explained in detail below, and in Appendix C.

We restrict attention to the area surveyed by the HOLC in 1939, since that area represents the historic core of the city and allows us to consider places that were continuously populated over the entire course of the study period. To that end, we included only those 2010 census tracts with boundaries that intersect with HOLC neighborhoods, using shapefiles from the census bureau and Mapping Inequality, respectively (Nelson et al., 2022). These inclusion criteria yielded 19 census tracts, out of 60 potential tracts in Durham County. Of course, the city of Durham today extends well beyond this boundary.

3   Home values by HOLC rating

In this section, we investigate the association between HOLC neighborhood ratings and the trajectory of home values between 1940 and 2020. We combine address-level data on home values from the 1940 de-anonymized U.S. Census (Ruggles et al., 2021), and a file of public records of property transactions maintained by CoreLogic, a private real estate data provider. For a subset of transactions in this file, we are also able to obtain the race of the buyer by linking the name and address to North Carolina's voter files. Details of how we construct our data using these sources are in Data Appendix Sections C.1, C.2, and C.3.

Each address is assigned to the HOLC rating that corresponds to its neighborhood, using the HOLC map shapefile, obtained from Mapping Inequality (Nelson et al., 2022). Geo-coding properties from the 1940 census is infeasible if the street address changes. This is because only modern street addresses have known co-ordinates. As a result, we manually linked historic street names found in the 1940 census with their modern counterparts. A key tool in making this correspondence was the HOLC's map, which included Durham street names, and was drawn around the same time as the
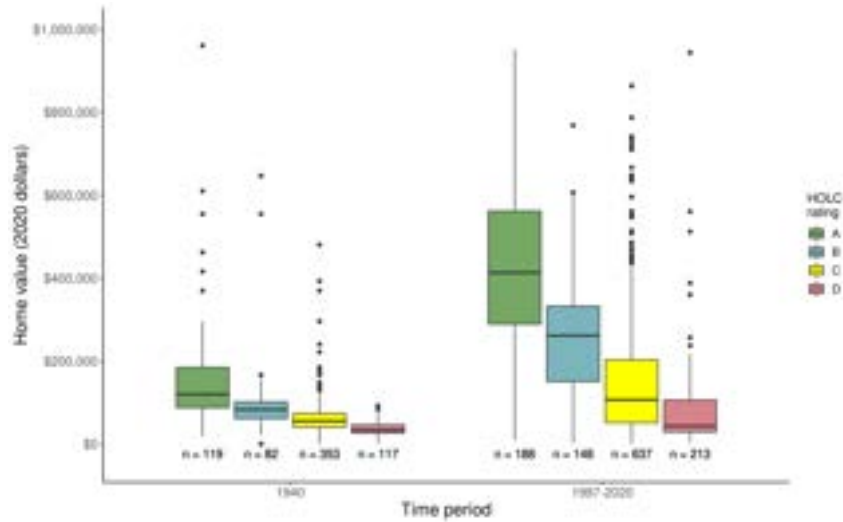
Figure 2: Home values in each HOLC neighborhood in 1940 and in 1997-2020.

Notes: Each observation is a record of a property's value. Properties are single family homes that were owner-occupied in 1940. For each time period, moving from the box plot on the left to the one on the right corresponds to data from properties in A, B, C, and D neighborhoods, respectively. For 1940, property values are self-reported by the owner in the U.S. Census form. For the period 1997-2020, property values are from public real estate transactions data. A property generates an observation every time it is sold between 1997 and 2020. The number of addresses in the sample is 671 and the number of transactions in 1997-2020 is 1,186 (color version available online).

collection period of the 1940 census.[25]

3.1 Disparities in home values by HOLC rating

We find that the value of owner-occupied homes in 1940 is stratified by HOLC neighborhood ratings. While this is not surprising, we also find that stratification persists into the contemporary period. Figure 2 presents the distributions of home values for properties in 1940 and the contemporary period, by HOLC residential security rating. In 1940, homes in lower-ranked neighborhoods tended to have lower property values. Properties in D-rated neighborhoods had the lowest median home value at $33,275 (in 2020 dollars), while A-rated neighborhoods had the highest at $120,162. The disparity between the median value of homes in A- and D-rated neighborhoods has grown both in absolute terms (from $86,887 to $369,578) and in terms of percentage difference (from 361% greater, to 945% greater in A-rated neighborhoods).

We find that appreciation of home values was also lower in D- than in A-rated neighborhoods. The median value for homes in A-rated neighborhoods grew by 344% from 1940 to 1997-2020 while the rate for D-rated neighborhoods was 131%, despite starting from a lower base. We find analogous results when partitioning the city by census tracts (see Appendix Figure A.5).

To investigate the persistence of disparities in home values across neighborhoods with different

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[25]Variables describing dwelling characteristics (e.g. rooms and bathrooms, age of building, number of stories) are only available from 1960 onward in the census and hence omitted from this analysis.

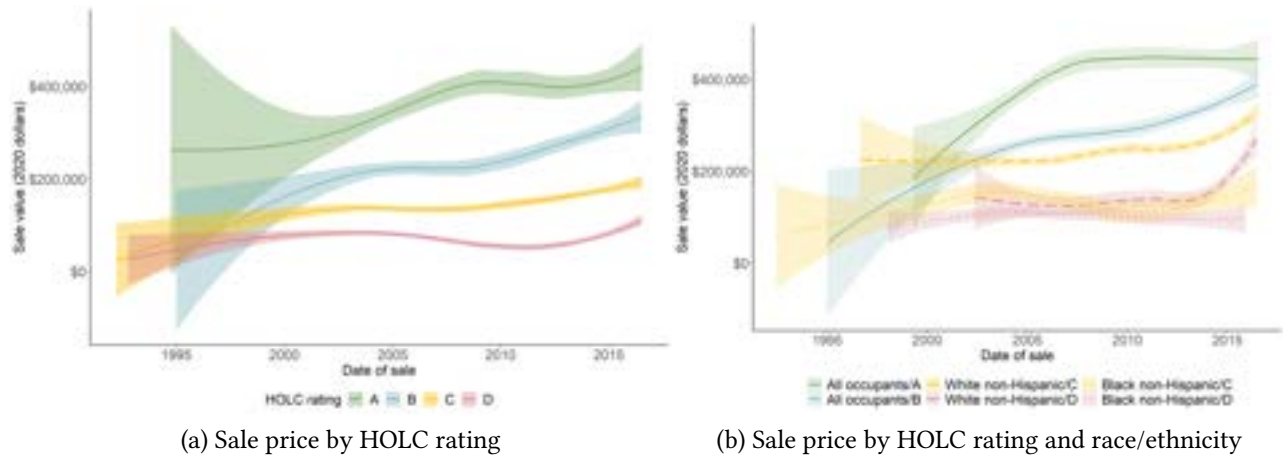| (a) Sale price by HOLC rating | (b) Sale price by HOLC rating and race/ethnicity |

Figure 3: Home sale prices, 1990-2016

Notes: Left panel: observations represent the value of property sales. Towards the end of the figure on the right, the top line corresponds to the sale price of properties in A-rated neighborhoods, the second from the top to those in B-rated neighborhoods, the third from the top to those in C-rated neighborhoods, and the bottom line to those in D-rated neighborhoods. Total number of transactions: 6,591. Right panel: observations represent the value of property sales for buyers whose race was successfully obtained from the North Carolina voter registry. When two buyers are listed, the value of the home is counted twice. This method over-weights home values for some addresses to account for households where joint owners of the same property do not report the same race. Number of transactions in 1990-2016: 3,538. Data construction is described in Data Appendix Section C.1 (color version available online).

HOLC ratings, we can study contemporary sales prices grouped by whether the address falls within the boundaries of HOLC neighborhoods. Figure 3a confirms that mean home values are consistently higher in higher-rated neighborhoods. Home values in neighborhoods across all four categories appear to show signs of appreciation in the years leading up to 2016.

Figure 3b shows that appreciation in home values in C- and D-rated neighborhoods is due disproportionately to homes acquired by white buyers. Indeed, in redlined neighborhoods, mean home values of properties acquired by Black buyers actually decrease in the most recent period leading to 2016. An analogous result is obtained when we partition by racial composition of census tracts (see Appendix Figure A.6a).

4 Home values by racial composition

In this section, we investigate the association between racial composition of census tracts and the trajectory of home values between 1940 and 2020. To do so, we divide the city into areas that have been continuously inhabited by a majority of residents of the same race, and those areas where the racial majority changed at some point between 1940 and 2016. More specifically, we distinguish between three types of census tracts: those where the majority of residents were white for the entire period between 1940 and 2016 (*white census tracts*), those with a Black majority (*Black census tracts*), and all others (*integrated census tracts*). Census tracts that encompass the area of Durham that is the

focus of our study separate roughly evenly across these three categories.

4.1 Data set construction

Census tract data

We obtain census tract data on racial composition and home values from Social Explorer, a software company that distributes census data. Alongside the description of home value trajectories by HOLC rating, these data allow for a complementary analysis of home values by areas that differ in their racial composition. A challenge arises from the fact that boundaries of census tracts are not fixed from census to census. Through Social Explorer, however, we are able to acquire data from the 1970 through 2000 censuses on the tract boundaries of the 2010 census. Geocoding individual addresses from the 1940 census allows us to summarize home values in 1940 by the 2010 census tract boundaries. Using this geographically consistent longitudinal data on racial composition, we partition the city into different areas based on the historic racial makeup of the tracts (see Appendix Figure A.7). We can then follow the evolution of home values in the Black, white, and integrated areas over the nearly 80-year period between 1940 and 2020.

In order to categorize tracts by racial composition, we rely on demographic data from the 1940 census, the 1970 through 2010 censuses, as well as the 2014-2018 American Community Survey (ACS) 5-year estimates. Similarly, we use home value data from the 1940 census, the 1970 through 2000 censuses, as well as the 2008-2012 and 2014-2018 ACS 5-year estimates. We are not able to use home value data from the 2010 census because this information was not collected from the entire population that year (U.S. Census Bureau, 2021). As a substitute, we use the 2008-2012 ACS 5-year estimates. Likewise, we use race and home value data collected by the ACS between 2014 and 2018 as a substitute for 2016, which is the latest data we use at the census tract level.[26]

Census tract partition

The starting sample of census tracts was chosen as follows. Taking the 2010 census geographies, tracts were selected if their boundaries intersected with the HOLC map shapefile (see Appendix Figure A.8).

We define Black census tracts as those where over 50% of residents identified as African American, Black, or Negro in the 1940, 1970-2010 censuses, as well as the 2014-2018 American Community Surveys. Similarly, white tracts are those where over 50% of residents identified as white in those years. Integrated tracts are those that cannot be classified as either Black or white. This categorization is similar to the one employed by Gordon and Bruch (2019) in their study of neighborhoods in St. Louis, MO. Appendix Figure A.7 illustrates where Black, white, and integrated census tracts are

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[26]The types of housing units included in these data are not uniform across censuses and ACS waves. Additional information about this issue can be found in Appendix Section C.

located across the city. There are 5 Black census tracts, 5 white tracts, and 9 integrated tracts. The 5 Black tracts constitute what we will call the *Black area* of Durham, while the white and integrated tracts constitute the white area and integrated area, respectively. Lastly, because home value data are not available for all 19 tracts in the 2008-2012 ACS and the 2014-2018 ACS, three tracts were dropped from our analysis. Tracts 11, 15.02, and 23 are missing home value data for either one or both ACS waves. After dropping these three tracts, we are left with 16 tracts, comprised of 4 Black tracts, 5 white tracts, and 7 integrated tracts.

Appendix Figure A.1 plots the Black and white shares of Black, integrated, and white census tracts over time. Six of the nine integrated census tracts started out with a majority of white residents in 1940. In 1960, all but one were majority white, but none of them remained so by the year 2000. In that year, all except one had a Black majority of residents. Across all integrated census tracts, the white share declined from nearly 75% in 1960 to 25% in 2000. Between 2000 and 2016, however, the decline in the white share was reversed, following the same pattern observed across all census tracts in the city. Three of the nine census tracts recover their white majority by the end of the period. In summary, integrated census tracts transition from having a relatively high white share of residents to a nadir in 2000, before beginning a recovery that continues through the end of the study period.

Geographically, six of the integrated census tracts form a contiguous region North of the railroad tracks towards the east of the city. This region roughly corresponds to neighborhoods rated "C" or "definitely declining" by the HOLC largely because they abutted Black neighborhoods and central areas with industrial activity. The remaining three integrated census tracts encompass smaller Black neighborhoods bordering the campuses of Duke University. North of Duke's East Campus is the Black neighborhood of Walltown, which is encompassed by one of the remaining three integrated tracts. South of East Campus and due east of Duke's main campus are the neighborhoods of West End and Lyon Park encompassed by the second; west of Duke's main campus is Crest Street, which is encompassed by the third.

Construction of address-level analysis file

The process for building a data set of individual addresses located in each of the three areas (Black, white, and integrated) is very similar to that described in Appendix Section C.3 for HOLC neighborhoods. The main difference between the two is how we define the boundaries of the area of study. Whereas previously we only included addresses lying within the boundaries of the HOLC map, now we include all addresses located in one of the 19 census tracts that encompass the HOLC map's footprint. Figure A.8 shows how the boundaries of census tracts and HOLC neighborhoods intersect. As a result, the sample of eligible addresses increases slightly.

Data on home values

We obtain data on home values from a number of sources that differ in their granularity. The earliest data on home values is from the 1940 decennial census. These de-anonymized data are at the address level and are accessed through the IPUMS restricted data archive. Moving forward, we use tract-level home value data for 1970, 1980, 1990, 2000, 2008-2012, and 2014-18 from the respective decennial censuses and ACS waves. In the modern period (roughly 1991-2020), home value data at the address level are collected from publicly-accessible county records compiled by CoreLogic. Unlike census data, the CoreLogic values are the sales prices, not the estimated value of the home by the owner. All the figures reported in this paper are in real 2020 dollars. We use the CPI (obtained from the Bureau of Labor Statistics) to adjust all values for inflation from the reporting year to 2020.

4.2   Racial composition

How has the racial composition of the city and its constituent neighborhoods changed since 1940? To answer this question we study the racial composition of 19 census tracts that cover the geographic footprint of Durham, partitioned into Black, white and integrated according to the criteria described above. Two main findings emerge when we evaluate the change in racial composition of the city using this partition.

Comparing the racial composition of the three areas reveals that majority-Black and majority-white census tracts remain segregated, although the extent of segregation has declined since 1990. More than 75% of residents in Black census tracts are African American, while they make up less than 20% of residents in white census tracts (see Figure 4). Second, the Black share of residents in the city grew between 1940 and 1990, peaking at roughly 60% before declining to less than 50% in 2016. The opposite pattern is true for the white share of residents, which peaked in 1940, declined through the year 2000, and has climbed since then to eclipse the Black share in 2016 (see Appendix Figure A.9).

The aggregate population dynamics in the city are reflected in each of the three areas depicted in Figure 4. For instance, we observe that the Black share of the population in the Black, white, and integrated areas increased from 1970 to 1990, likely due to white flight. The Black share continued to grow in the white area until 2000. During the 21st century, however, the Black population share fell in all three areas. The Black area, which had a Black share of 92% in 1970, witnessed an increase in this share by 4 percentage points from 1970 to 1990. In a mirror image of this trend, the white share declined after 1970 in all three areas only to increase again around the turn of the millennium. And just as the growth in the Black share of residents was muted in the Black area, the decline in the white share was relatively small there as well.[27] This makes sense given that 8% of the 1970

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[27]When tracts with missing home value data are excluded from Figure 4, the increase in Black share and decrease in white share that occurred in the Black area during the 70s and 80s become less pronounced. Otherwise, the patterns

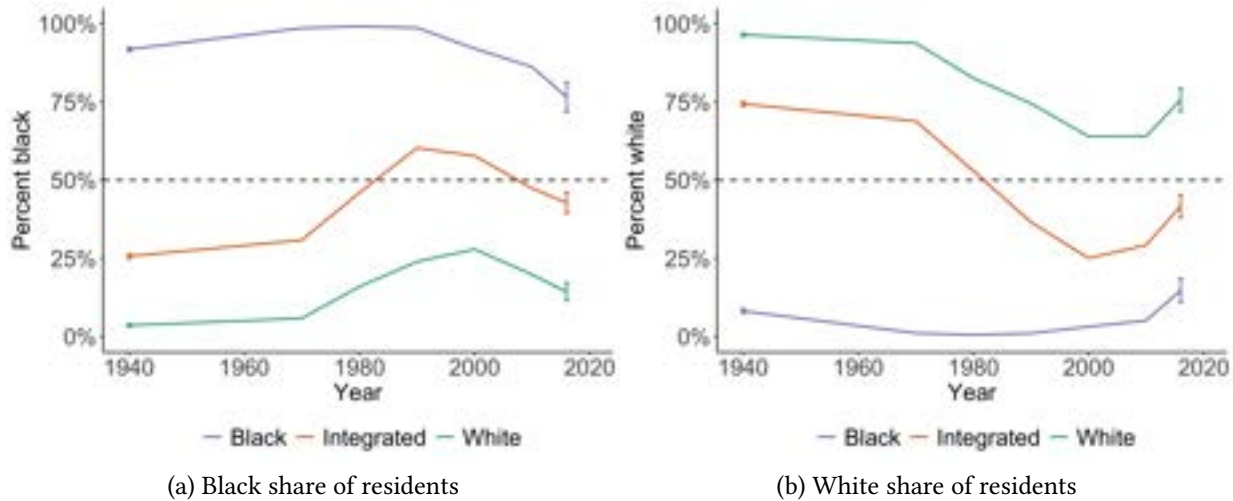(a) Black share of residents

(b) White share of residents

Figure 4: Racial composition of Black, white, and integrated areas of Durham, 1940-2016

Notes: Demographic shares calculated using 19 census tracts that intersect with the HOLC map. The top (bottom) line in the figure on the left (right) corresponds to Black census tracts; the middle lines in both figures correspond to integrated census tracts, and the bottom (top) line on the left (right) corresponds to white census tracts. Data for 1940 is from individual records of the de-anonymized decennial census geo-coded to 2010 census tract boundaries. Data for 1970-2010 are from census data summarized by 2010 census tracts. Data for 2016 is from the 2014-2018 American Community Survey (color version available online).

population in the Black area was white. After 2000, the white share increased in all three areas.

Note that our historical analysis is restricted to homes that were owner-occupied in 1940. This means that a significant portion of Durham's residents who rented their homes are not included in the study sample. The goal of this paper is to show that even among the wealthier segment of the population (home-owners), there remain significant racial disparities. In the contemporary data on sales between 1997 and 2020, absentee owners who are listed as buyers are included, and renters are again excluded. For context, Figure 5 plots rates of home-ownership within the 19 census tracts of interest. There is a large gap between the home-ownership rate in the white area and the Black area of around 20 percentage points. Whereas roughly one in two households in the white area own their homes, that fraction falls to 1 in 4 in the Black area.

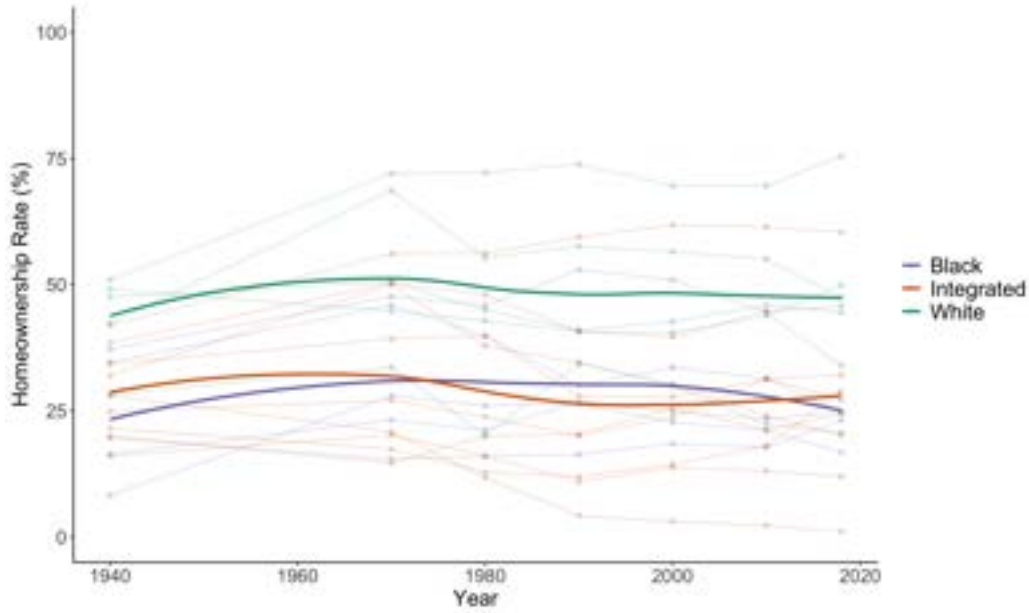remain roughly the same. These plots are available in Appendix Figure A.10.

Figure 5: Home-ownership by census tract and area

Notes: Home-ownership rates calculated using 19 census tracts that intersect with the HOLC map. This figure shows that home-ownership rates in Black and integrated census tracts hovered around 25% for the duration of the study period, while they were around 50% in white census tracts. Data for 1940 is from individual records of the de-anonymized decennial census geo-coded to 2010 census tract boundaries. Data for 1970-2010 are from census data summarized by 2010 census tracts. Data for 2016 is from the 2014-2018 American Community Survey (color version available online).

4.3   Home values by census tract

Do neighborhoods that differ in their racial composition exhibit different trajectories in home values? In the results described in this section, we find that this is indeed the case. Figure 6 plots the trajectory of mean home values since 1940 in Black, white, and integrated areas. Figure 7a shows the ratio of mean home values in white census tracts to those in Black tracts, while Figure 7b shows the absolute difference. Since 1940, the average home value in the Black area appreciated by 119% (from $49,457 to $108,273), while the average home value in the white area increased by 231%, from $104,679 to $346,097.[28] At the same time, integrated tracts experienced an increase of 208% from $62,944 in 1940 to $194,082 in 2016.

Figure 6 shows that between 1940 and 2016 mean home values in the white area have been consistently higher than those in either the Black or integrated areas. The mean home value in the city's Black census tracts hovered around $100,000 since 1970. At that time, the value of homes in white census tracts was roughly 51% higher: $151,634. Since then, the gap between white and Black areas has increased, with the latest available data from the 2014-2018 ACS revealing that mean home values in white areas have reached $346,097. This is 220% greater than the mean home value in the Black area ($108,273). Figure 7b shows that the absolute white-Black difference in mean home values

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[28]The difference in appreciation rates between the Black and white areas is not significant at the 5% level.
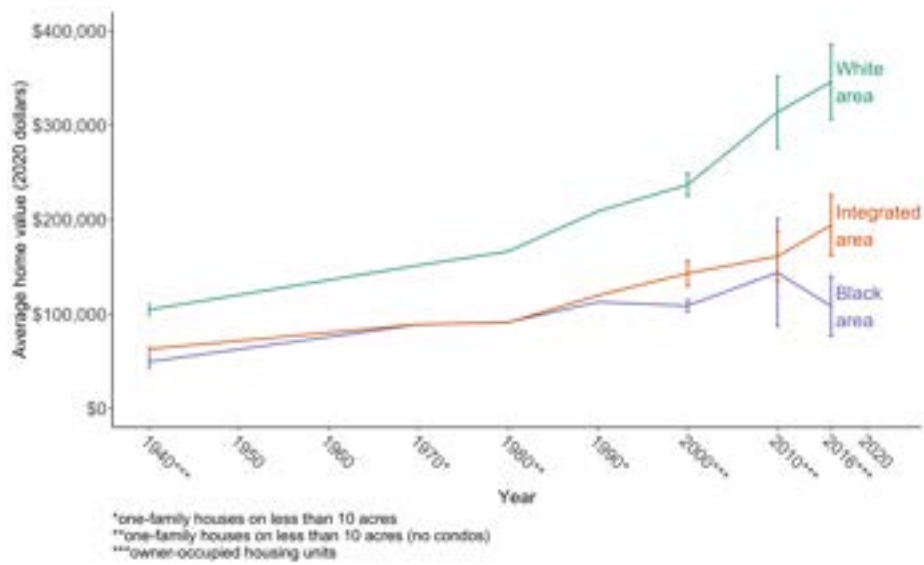
Figure 6: Mean home values by area

Notes: Home values in 1940 obtained from individual geo-coded census data of owner-occupied units from de-anonymized census data projected onto 2010 census tract boundaries. Home values in 1970-1990 are obtained from complete census samples and standardized 2010 census tract boundaries. Home values in 2000 obtained from 1-in-6 sample census data. Home values for 2010 and 2016 obtained from the 2008-2012 and 2014-2018 American Community Survey, respectively. Data provided in Appendix Table B.2.

(a) Ratio of home values (white:Black)

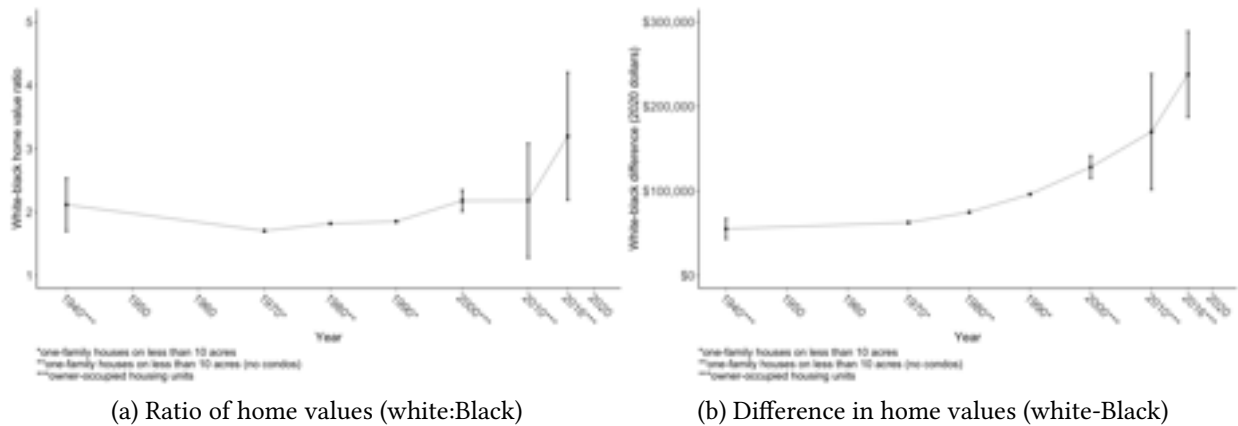(b) Difference in home values (white-Black)

Figure 7: Racial disparities in mean home values

Notes: Home values in 1940 obtained from individual geo-coded census data of owner-occupied units from de-anonymized census projected onto 2010 census tract boundaries. Home values in 1970-1990 are obtained from complete census samples and standardized 2010 census tract boundaries. Home values in 2000 obtained from 1-in-6 sample census data. Home values for 2010 and 2016 obtained from the 2008-2012 and 2014-2018 American Community Survey, respectively. Data provided in Appendix Table B.2.

has increased over time. Whereas the 1970 white-Black difference had only been $62,739 in 2020 dollars, the 2016 difference was $237,825: an increase of 279% over the last 50 or so years. This pattern is consistent with nationwide evidence on the appreciation in home values across neighborhoods that differ in their racial composition. Howell and Korver-Glenn (2020) document a similar pattern across 107 metropolitan areas in the US, while controlling for census tract-level characteristics of the housing stock (number of rooms, proportion of single family homes, and year of construction) and market demand. They show that, nationally, the difference in home values between census tracts that are disproportionately white relative to the surrounding metropolitan area and those that are disproportionately Black/Hispanic increased by 100% over the course of the period between 1980 to 2015 in a graph of nationwide data similar to Figure 6. One possible reason that our estimate for Durham is so much higher than the national rate calculated by Howell and Korver-Glenn (2020) is that we do not attempt to control for underlying characteristics of the housing stock in each census tract.[29]

While these results use sample (and in some years, population) census data to provide a representative account of the changes in home values across census tracts, Figure 8 plots the change in home values in a sample of 700 properties, for which we were able to obtain data from 1940 as well as the contemporary period. Comparing sales values between 1997 and 2020 to the 1940 value of each property in this sample, we find that 25% of home sales that occurred in the Black area were made for less than the inflation-adjusted value of the home in 1940. On the other hand, this was true for only 2% of sales in the white area. A balance table comparing the characteristics of the home-owners in this 700 property sample with those in the rest of the city suggests that they are representative though with slightly higher socio-economic status (see Appendix Table B.1).

Using the sample of 700 addresses with data in 1940 as well as the contemporary period, Appendix Figure A.5 compares median home values in the Black, white and integrated areas. Addresses in the Black area had the lowest median home value in 1997-2020 at $51,105 while the opposite is true for the white area, which had a median home value of $308,271 during this period. The relative ordering of home values is the same in 1940. With regard to appreciation rates, home values in the white area, which grew 242% from 1940 to 1997-2020, again outpace those in the Black area, which grew 26% from 1940 to 1997-2020.

In order to ensure that results in Figure 8 are not driven by differences in the timing of sales or property characteristics across samples, we estimate the following regression model:

$$\Delta Value = \alpha + \sum_{y=1997}^{2020} \delta_y d_y + BlackArea \times \sum_{y=1997}^{2020} \beta_y d_y + \overline{\omega}.\overline{X} + \epsilon, \tag{1}$$

where $\Delta Value$ is the difference between the (inflation-adjusted) reported sale price of a dwelling

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[29]Appendix Figure A.6a provides a view of disparities over a shorter period of time using address-level data.
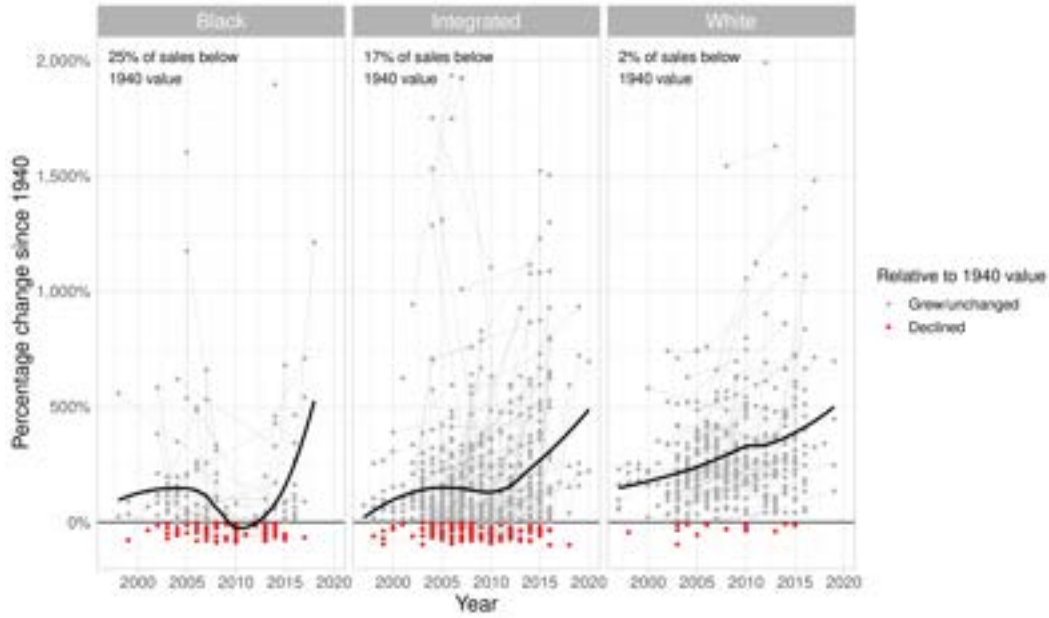
Figure 8: Sales values by area between 1997 and 2020 as percentage of the 1940 value.

Notes: Each connected series of points represents one address. Properties are single family homes that were owner-occupied in 1940. Dots below the x-axis represent a sale for an amount below the 1940 value of the home and vice versa for dots above the x-axis. For 1940, property values are self-reported by the owner in the U.S. Census form. For the period 1997-2020, property values are from public real estate transactions data. A property generates an observation every time it is sold between 1997 and 2020. Number of addresses in sample: 700; number of transactions in 1997-2020: 1,935 (color version available online).

in the modern property sales data and the 1940 value of the home, as recorded in the census. Positive values of this variable are generated by dwellings that have appreciated in value at a rate that exceeds the rate of inflation, and vice versa. The sequence of indicator variables, d_y take a value of 1 when a sale takes place in year y. *BlackArea* is an indicator variable that takes a value of 1 if an address is in one of the census tracts categorized as falling within the Black majority area. Finally, the vector $\overline{X}$ includes the following property characteristics: a second order polynomial of the dwelling size in square feet, and the number of bedrooms. The coefficients of interest - β_y - multiply the interaction terms between the Black area indicator, *BlackArea*, and each of the sale year indicators, β_y. These coefficients measure the difference between the sale price of homes sold in the Black area, compared to those sold outside of the Black area in the same year. They can be interpreted as the disparity in home values remaining after accounting for the time of sale and property characteristics.[30] The results of the model are displayed in Figure 9.

Full regression results can be found in Appendix Table B.3. Overall, the results suggest that appreciation in home values was significantly lower in Black neighborhoods, even when considering homes with similar characteristics that were sold in the same calendar year.

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[30]Property characteristics were obtained by merging transactions data with 2015 county tax records, also provided by CoreLogic.
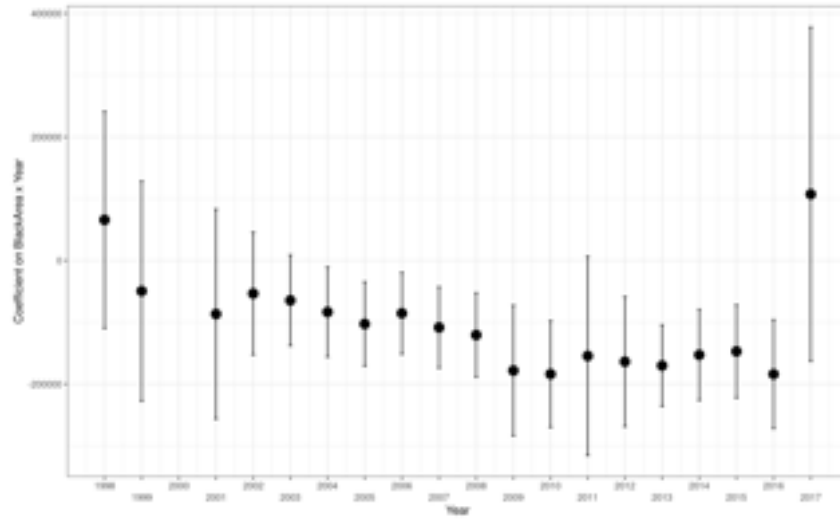
Figure 9: Estimated coefficients β_y from model in Equation 1, and 95% CIs

Notes: Properties included are single family homes that were owner-occupied in 1940. For 1940, property values are self-reported by the owner in the U.S. Census form. For the period 1997-2020, property values are from public real estate transactions data, and property characteristics (square footage, number of bedrooms) are from public tax data. A property generates an observation every time it is sold between 1997 and 2020. Number of addresses in sample: 639; number of transactions in 1997-2020: 1,776.
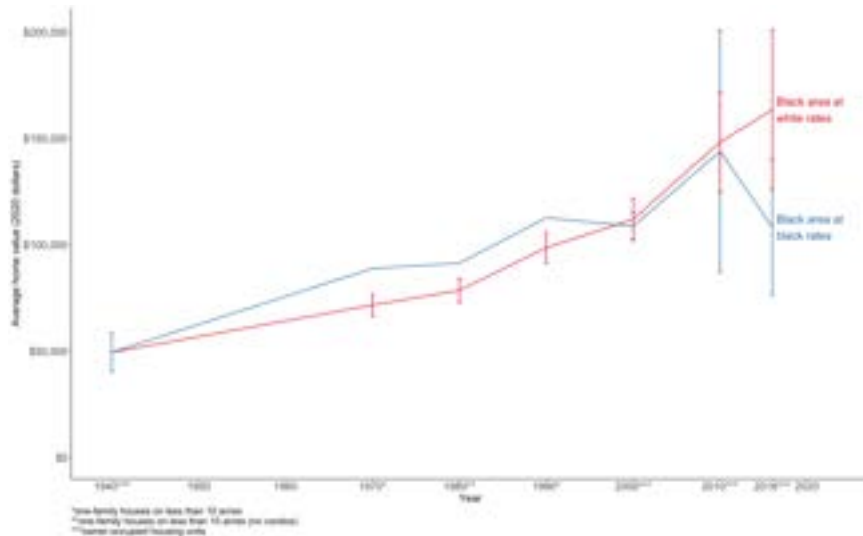

Figure 10: Actual and counter-factual trajectory of home values in Black area since 1940

Notes: The actual trajectory of mean home values in the area composed by Black census tracts (blue line), and the counter-factual trajectory had home values experienced the same rate of appreciation as those in white census tracts.

To illustrate the disparity in appreciation rates between home values in the white and Black areas of the city, we conducted a counterfactual exercise in which we applied the decade-to-decade appreciation rates documented in the white area to the mean home value in the Black area since 1940. Figure 10 plots this counterfactual trajectory in red and the actual trajectory in blue. Had mean home values in the Black area appreciated at the same rate as the white area since 1940, they would have reached $163,518 by 2016. Although this is $55,245 more than the actual value reported by the 2014-2018 ACS, the estimates under the two appreciation scenarios are statistically indistinguishable by 2000 and 2010.

We also conducted a counterfactual exercise in which we applied appreciation rates documented in the white area to average home values in the Black area starting in 1970, instead of 1940. Figure A.11 plots this trajectory in red and the actual trajectory in blue. This time, mean home values in the Black area would have reached $202,896 in 2016, which is $94,623 more than the actual value reported by the 2014-2018 ACS. The estimated aggregate dollar value of forgone home value appreciation amounts to $68,696,000. A similar exercise that takes the base year as 1980 arrives at an estimate of forgone home value appreciation of $81,870 per home, and a total of $59,437,000.
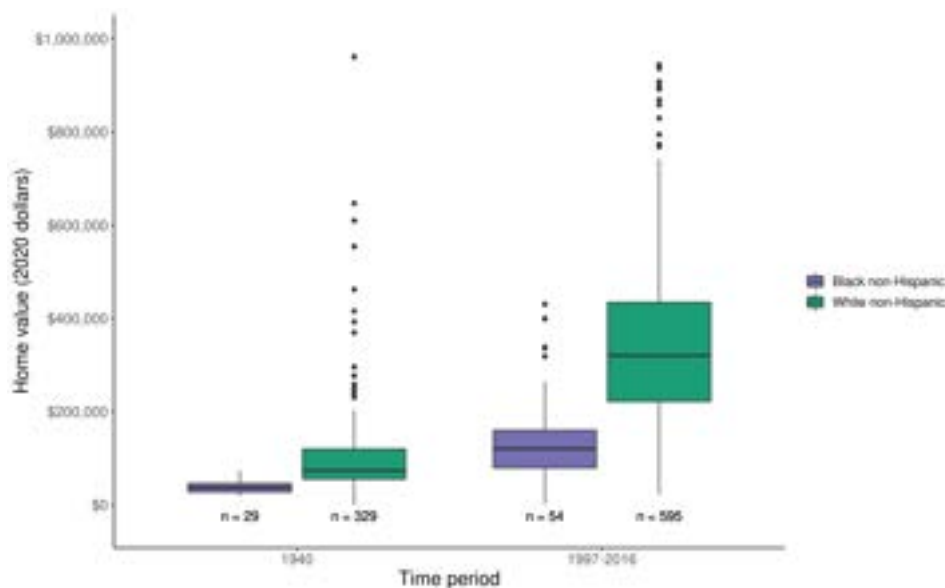

Figure 11: Home values across owner-identified race from 1940 to 2016.

Notes: Each point is an observation of a property's value. Properties are single family homes that were owner-occupied in 1940. For 1940, property values are self-reported by the owner in the U.S. Census form. For the period 1997-2016, property values are from public real estate transactions data. A property generates an observation every time it is sold. Data construction is described in Data Appendix Section C.1. Transactions in this period are matched to the voter registry, and only exact matches are kept. Only Black and white individuals are shown for this figure. Number of addresses in sample: 358; number of transactions in 1997-2016: 1,007.

4.4 Home values by race of owner-occupants

We linked a subset of contemporary sales records to the North Carolina voter registry to obtain the race of buyers (see Data Appendix Section C.2 for details). Figure 11 summarizes sales transactions involving 1,007 buyers and 358 unique properties observed in 1940 as well as 1997-2016, for which we were able to obtain the race of buyers. In 1940, the homes of white owner-occupants were more valuable than homes of Black owner-occupants. Similarly, in the period 1997-2016, white buyers acquired properties that were, in general, more valuable than those acquired by Black buyers. In 1940, the median value of white-owned homes was $73,946, while the median value of a home owned by Black respondents was $36,973. This disparity is reflected in the contemporary transactions data: the median sale price of homes acquired by white buyers was $320,463, while Black buyers purchased homes with a median sale price of $120,511. All aforementioned differences are statistically significant at 5%.

4.5 Contemporary disparities in home values

For the period of time between 1997 and 2016 (contemporary period), we obtained sales records for a near-complete sample of addresses in the city. While our window of observation is narrower (roughly 20 years in total), the large sample size and high frequency allow us to investigate patterns stemming from more recent developments in the housing market. This period coincided with a revitalization of downtown Durham and a sustained increase in home values across the city.

The following results were generated using data on real estate transactions that were matched with the North Carolina voter registry to ascertain the race of buyers. Our principal findings from these data are in line with the rest of the paper: Black homeowners occupy the least valuable homes even within the majority-Black census tracts that make up the Black area of the city. We also find that the share of Black residents in majority-Black census tracts declines as home values increase. Moreover, to the extent that home values in Black census tracts have increased in the most recent period, that increase appears to be driven by white buyers (Appendix Figure A.6b).

Figure 12 shows the trajectory of sales prices for individual addresses in the Black, integrated and white areas. The same data are graphed in Appendix Figure A.6a. The Black area exhibits a sudden increase in home values towards the end of the period of data availability around 2016. This can be gleaned from the figure by observing that there are relatively more vertical price trajectories in the years immediately before 2016 than there are in the earlier period. These vertical lines suggest that the same address underwent a large change in value from one sale to the next.
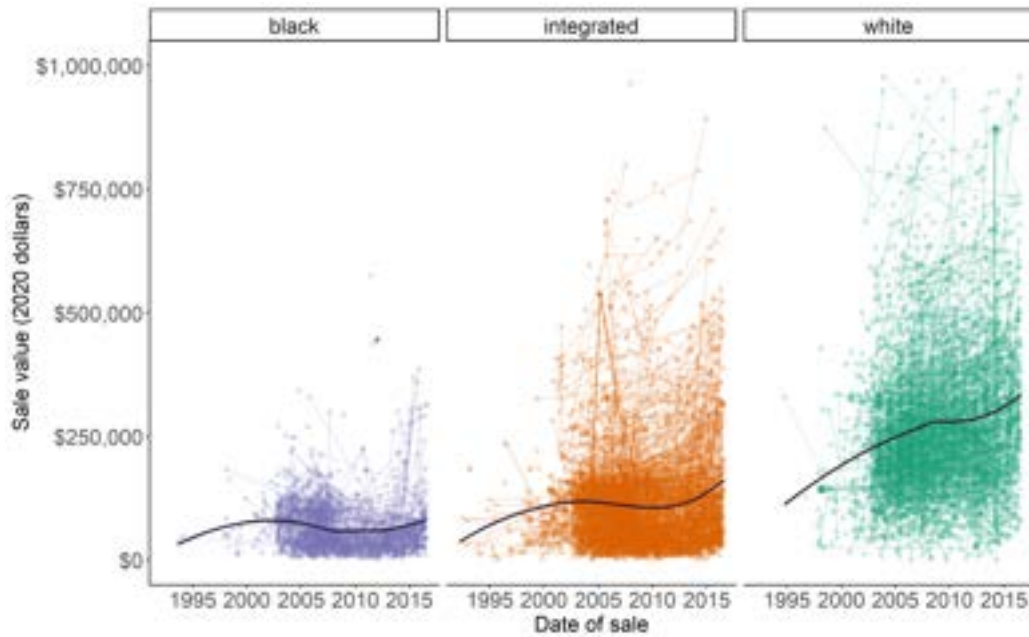
Figure 12: Home sale prices by area (Black, integrated, and white)

Notes: Each connected series of points represents a sequence of sales for a unique address. Data construction is described in Data Appendix Section C.1. Total number of transactions in 1991-2016: 9,911.

5 Conclusion

Large and persistent gaps between Black and white individuals and households exist across many socioeconomic indicators. Wealth holdings, in particular, are extremely unequally distributed. The median white household owns roughly ten times the wealth of the median Black household (Darity Jr, Hamilton, et al., 2018). Home-ownership is an important vehicle of wealth accumulation in the United States, and homes represent a significant share of wealth holdings for households in the middle and working class (Kuhn, Schularick, and Steins, 2020). Homes tend to accrue value over time, thereby serving as an investment for the owner as well as a means to bequeath wealth to the next generation. Real estate has always been entwined with racial identity in the United States. Black home-ownership rates are significantly lower than white rates, and home-ownership has not been equally rewarding either (Gordon and Bruch, 2019). The idea that the presence of Black households is associated with stagnating home values has animated many of the developments in the housing market over the 20th century. One of these developments is the set of New Deal policies aimed at encouraging home-ownership through the Federal Housing Administration (FHA), and the Veterans' Administration (VA). These agencies together made mortgages more accessible, and mortgage lending less risky. However, an important body of work argues that these government agencies were responsible for shaping market conditions that disfavored integrated neighborhoods and Black buyers (Faber, 2020; Rothstein, 2017). The result of these dynamics is that Black neighborhoods failed

to receive mortgages or home improvement loans. Coupled with broader disinvestment, the result was lower quality of life and, ultimately, lower home values.

This paper investigates the extent to which the value of homes in Black neighborhoods in Durham experienced a different trajectory than that of homes in white neighborhoods. Our analysis leverages the 1940 full count census, home sales data between 1990 and 2020, and census tract data between 1940 and 2016. Linking home sales data to North Carolina voter files, we also identify the race of home buyers in the contemporary period, allowing us to document disparities between individuals, and not just neighborhoods.

The analyses presented above point in the same direction: home values are strongly associated with race. Homes in Black neighborhoods are worth less and accumulate less value over time, and Black buyers purchase the least valuable homes within each neighborhood. Historical disparities identified by the HOLC maps persist through the present. Taken together, our findings show that despite changes in the legal framework in favor of racial equality over the past 80 years, the racial gap in home values grew. This is particularly important in light of the fact that home equity accounts for the primary source of wealth for the majority of US households.

Several limitations of our analysis are worth highlighting. First, our primary objects of study are neighborhoods, not individual households, so the results should be interpreted as documenting long-run differences in the trajectories of home values across predominantly Black, predominantly white, and integrated areas rather than as a full account of racial disparities in household-level housing wealth accumulation. This is mainly due to data limitations preventing us from following individual households and their descendants over time. Second, our comparisons are deliberately unconditional: we do not control for neighborhood characteristics such as changes in the housing stock, resident income and wealth, or local amenities. Rather, we focus on neighborhoods with a relatively stable racial composition to describe how race correlates with home values. Relatedly, because we cannot separately track incumbent home-owners or distinguish them from in- and out-movers, we are unable to disentangle lower wealth accumulation for long-term residents from selective sorting of households with different incomes or preferences into and out of these neighborhoods over time. Third, while we document that neighborhoods with different racial compositions follow different price trajectories, our data do not allow us to identify the causal effect of racial composition per se, or to cleanly separate the role of race from that of housing quality, income, and neighborhood amenities. As a result, our findings speak to persistent spatial disparities in prices rather than to the full set of mechanisms that generate those disparities.

Acknowledgements

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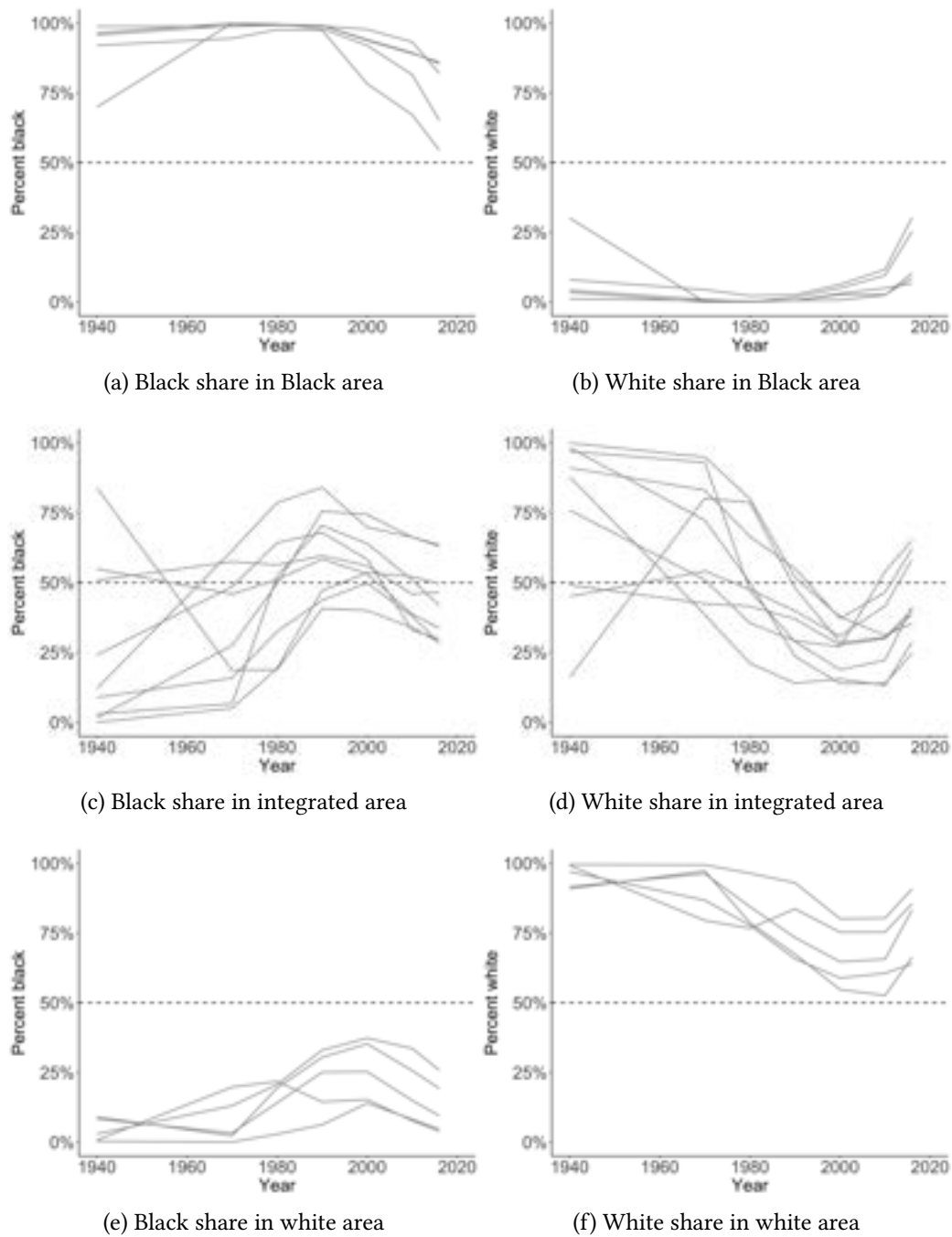
A Appendix figures

(a) Black share in Black area

(b) White share in Black area

(c) Black share in integrated area

(d) White share in integrated area

(e) Black share in white area

(f) White share in white area

Figure A.1: Racial composition in Durham by census tract (back to text)
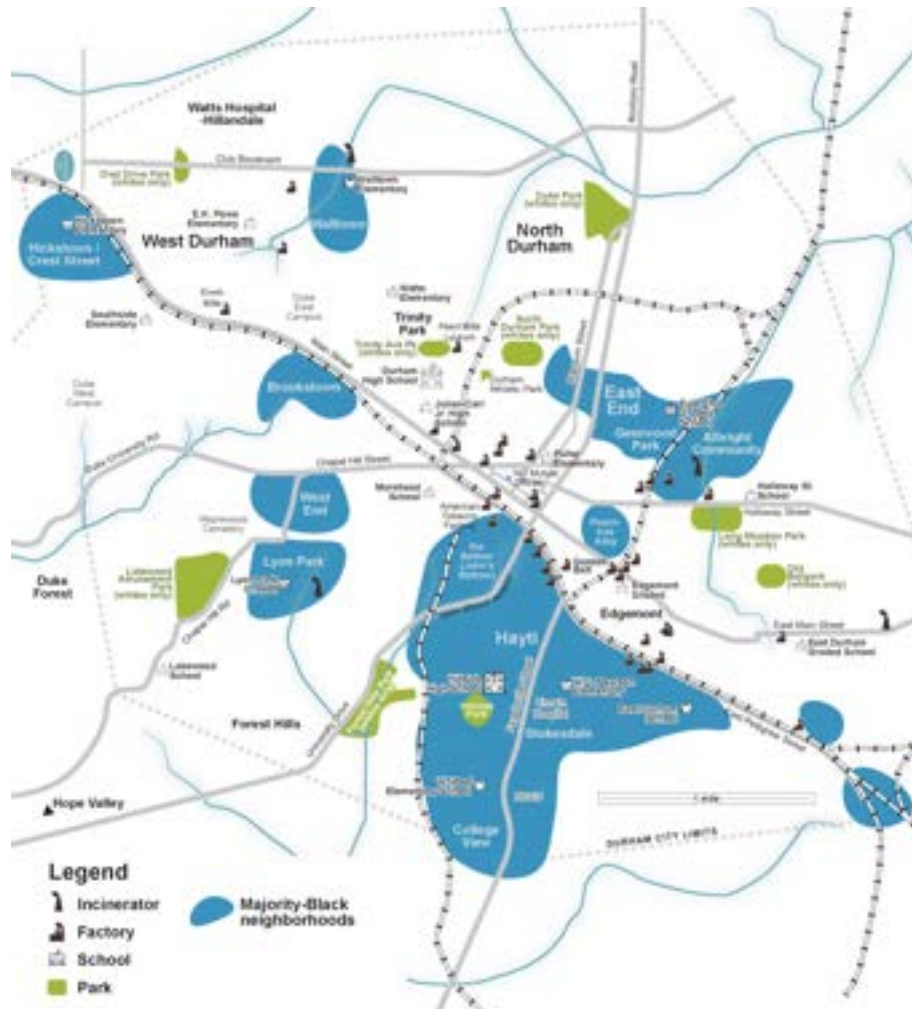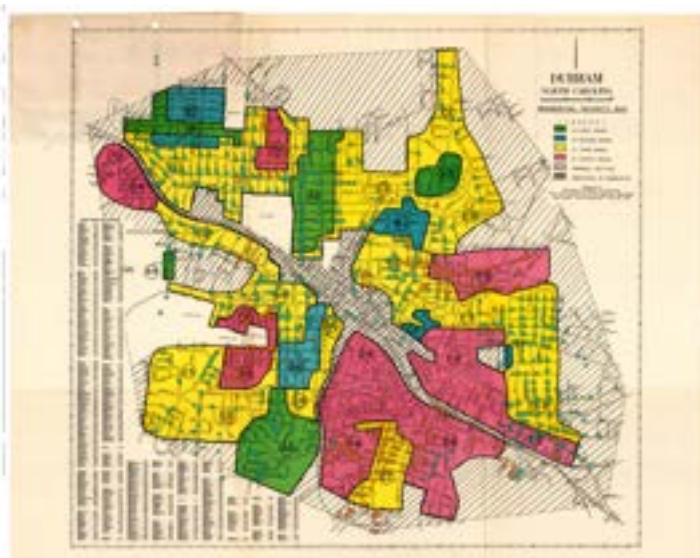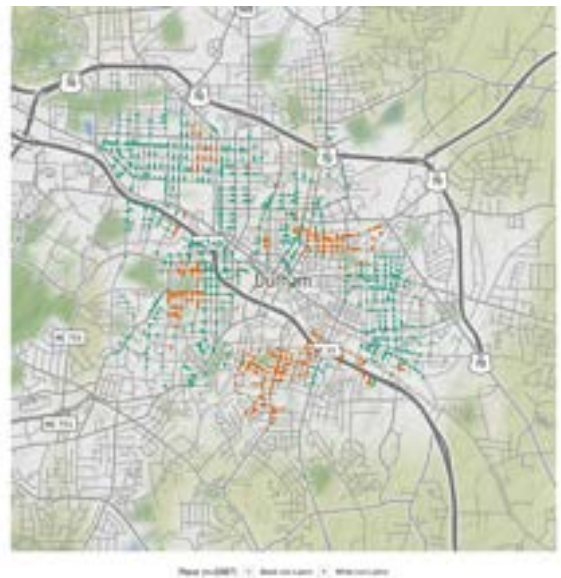
Notes: See figure notes of Figure 4.

Figure A.2: Black neighborhoods in Durham, around 1930 (back to text)

Notes: Map depicts Black neighborhoods, and public amenities and dis-amenities (color version available online, source: Norton, 2020).

(a)	(b)

Figure A.3: Racial composition of neighborhoods in 1940 (back to text)

Notes: These two figures depict all renter- and owner-occupied addresses that were geo-coded from the 1940 census. Orange circles are self-identified Black residents. Blue triangles are self-identified white residents. The figure on the left displays the data over the HOLC map, while the figure on the right displays the data over a modern street map (color version available online).
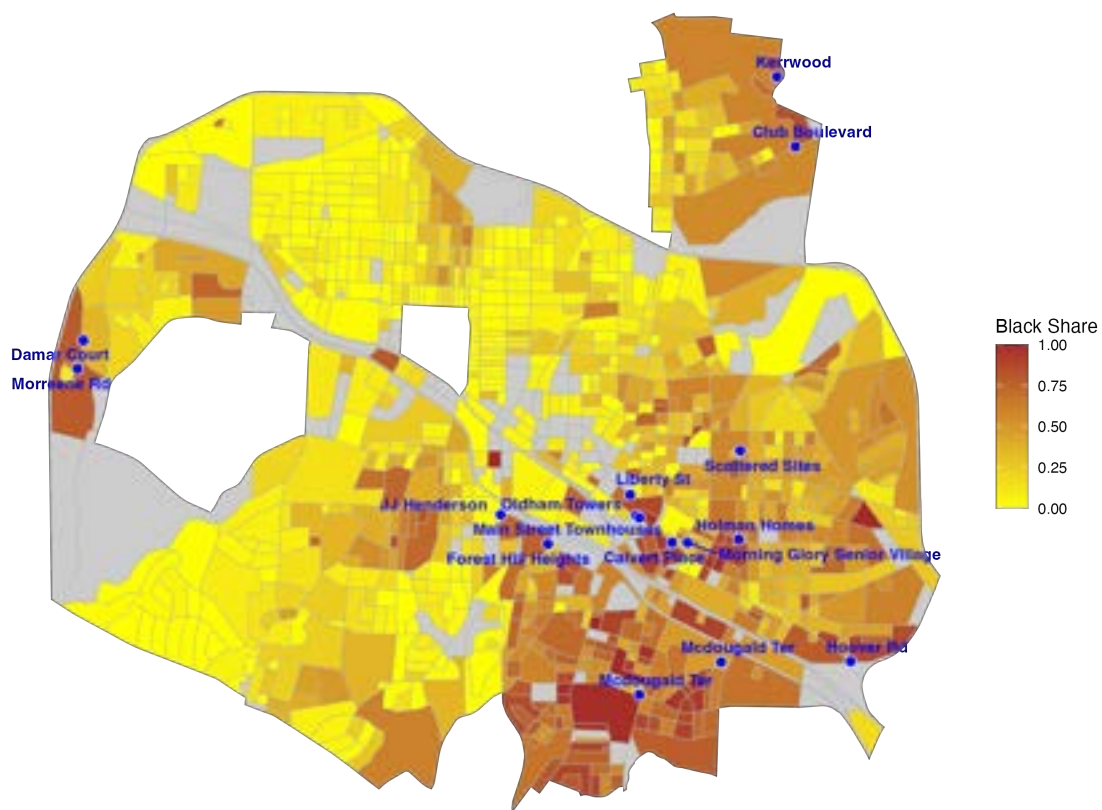
Figure A.4: Public housing projects and Black share of neighborhoods (back to text)

Notes: Each dot represents a public housing project located in one of the census tracts under study (out of 20 existing projects). The map depicts the 2020 Black share in each US Census Block (color version available online).
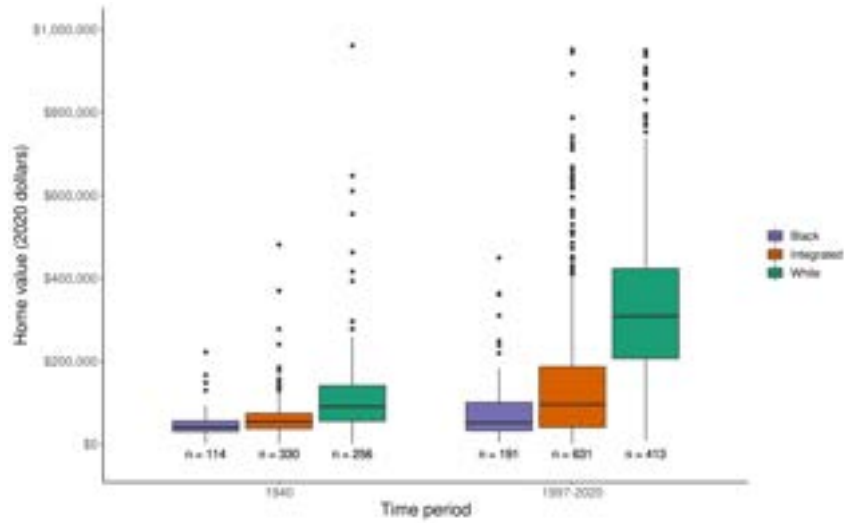
Figure A.5: Home values by area, in 1940 and 1997-2020 (back to text)

Notes: Each point is an observation of a property's value. For each panel, the box plots on the left, center and right correspond to Black, integrated, and white census tracts, respectively. Properties are single family homes that were owner-occupied in 1940. For 1940, property values are self-reported by the owner in the U.S. Census form. For the period 1997-2020, property values are from public real estate transactions data. A property generates an observation every time it is sold between 1997 and 2020. Number of addresses in sample: 700; number of transactions in 1997-2020: 1,935 (color version available online).
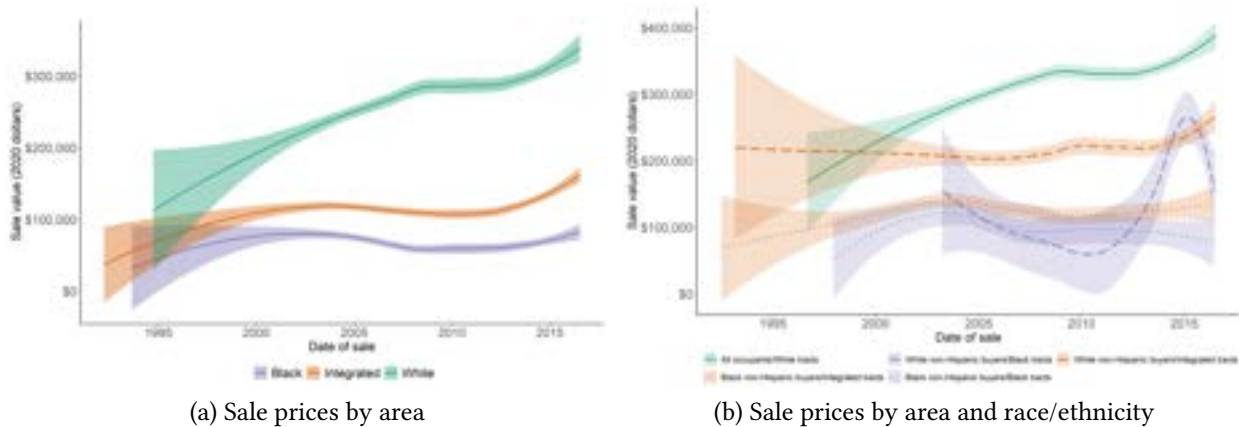

(a) Sale prices by area

(b) Sale prices by area and race/ethnicity

Figure A.6: Home sale prices by area and race, 1990-2016 (back to text)

Notes: Left panel: observations represent the prices of homes sold each year. The top line corresponds to sales in white census tracts, the middle line to sales in integrated census tracts, and the bottom to sales in Black census tracts. Total number of transactions: 9,911. Right panel: observations represent the prices of homes sold each year when the buyer's race was successfully obtained from the North Carolina voter registry. When two buyers are listed, the value of the home is counted twice. This method over-weights home values for some addresses to account for households where joint owners of the same property do not report the same race. Transactions are matched to the voter registry to ascertain the race of buyers, and only exact matches are kept. Number of transactions: 5,400. Data construction is described in Data Appendix Section C.1 and C.2 (color version available online).
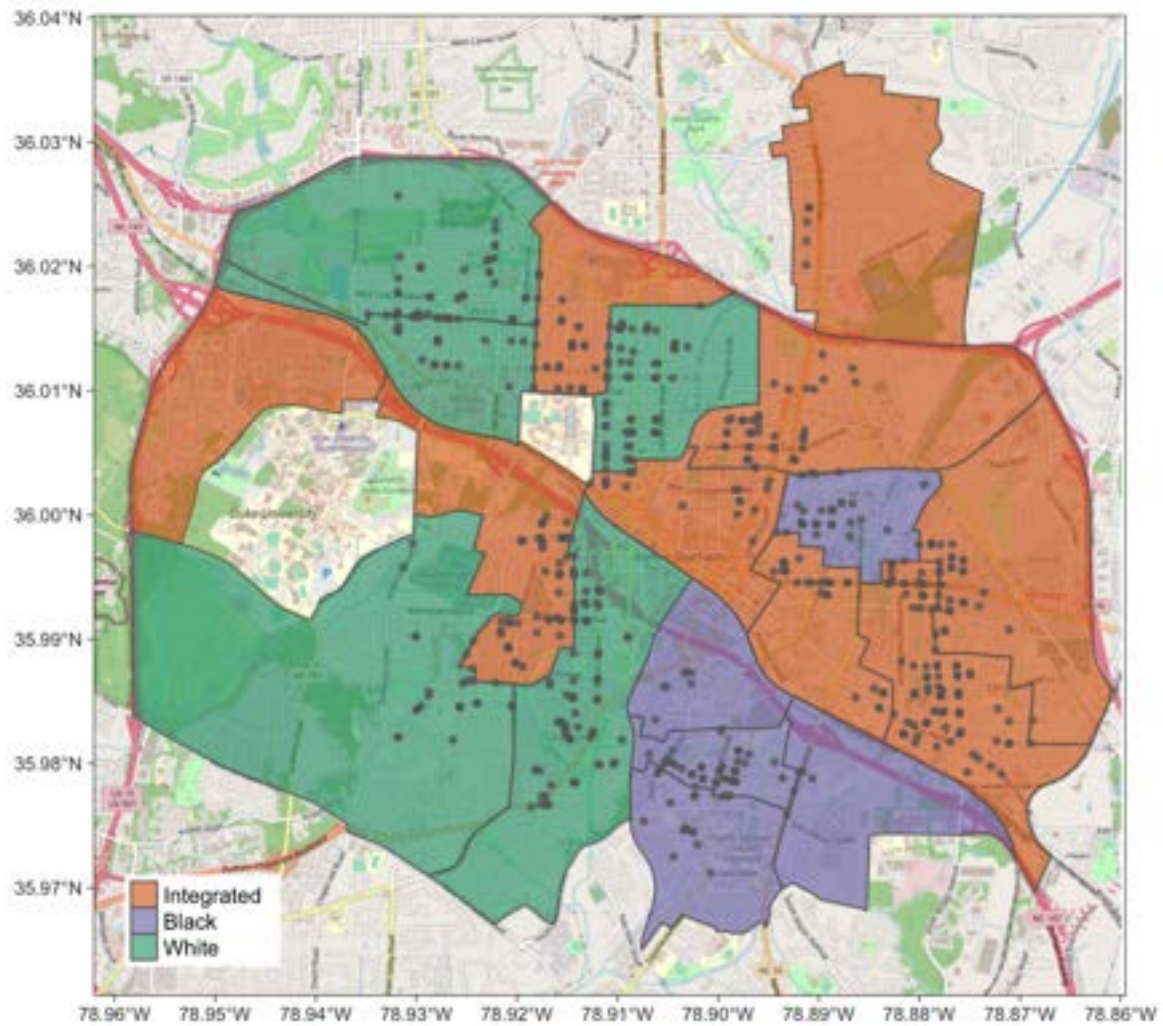
Figure A.7: Sample census tracts and addresses (back to text)

Notes: This map shows the 19 census tracts we study, categorized by whether they had a Black majority, white majority or neither between 1940 and 2020. Dots displayed on the map are the 700 owner-occupied (in 1940) addresses that were possible to geo-code, and were successfully matched with at least one real estate transaction in the period 1997-2020 (color version available online).
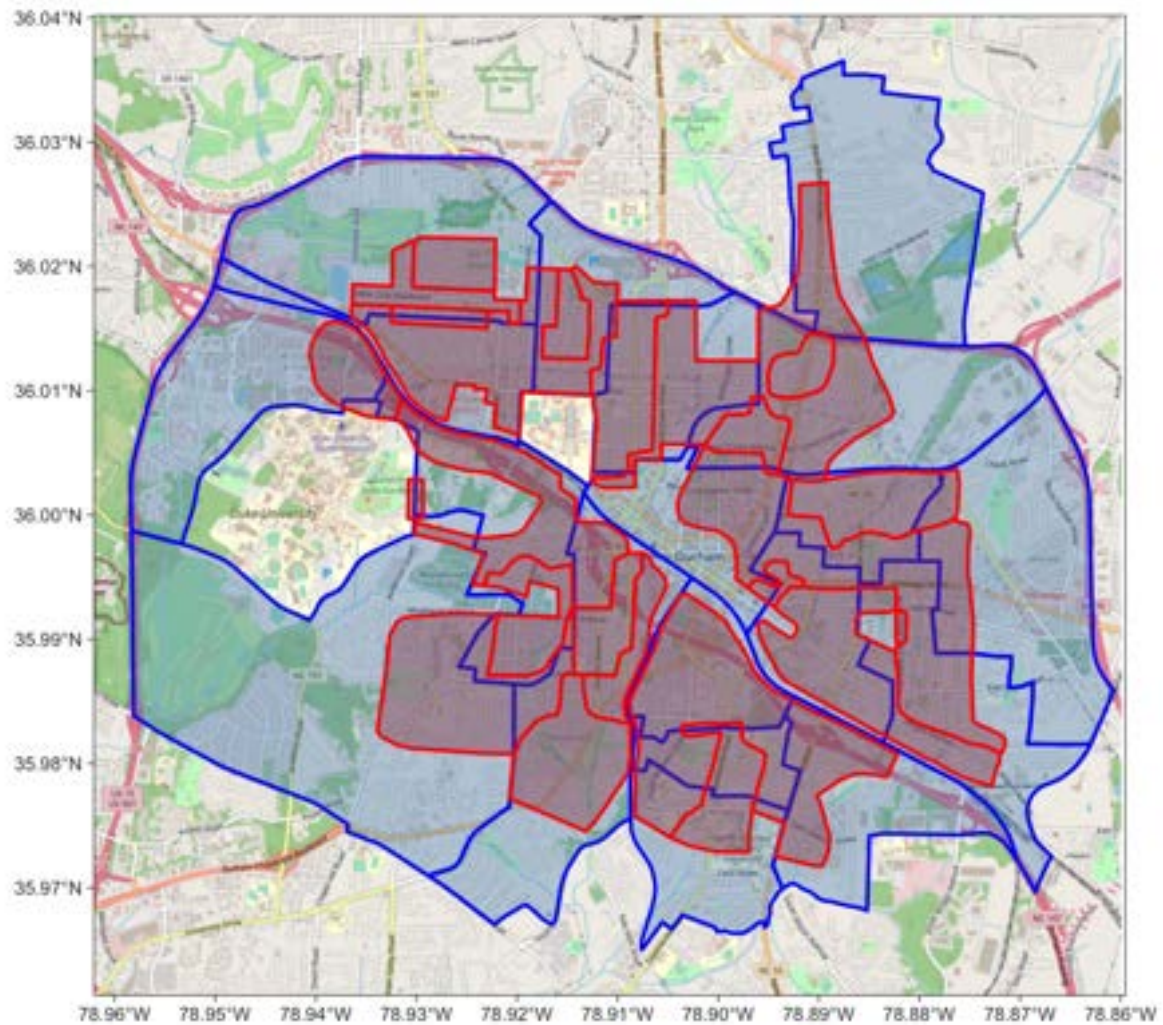
Figure A.8: Census tracts in blue, and HOLC neighborhoods in red (back to text).

Notes: Boundaries of census tracts from the 2010 census tract shapefile; boundaries of HOLC neighborhoods from shapefile provided by Mapping Inequality (Nelson et al., 2022). Only those tracts that intersected with the HOLC neighborhoods shapefile were included (color version available online).
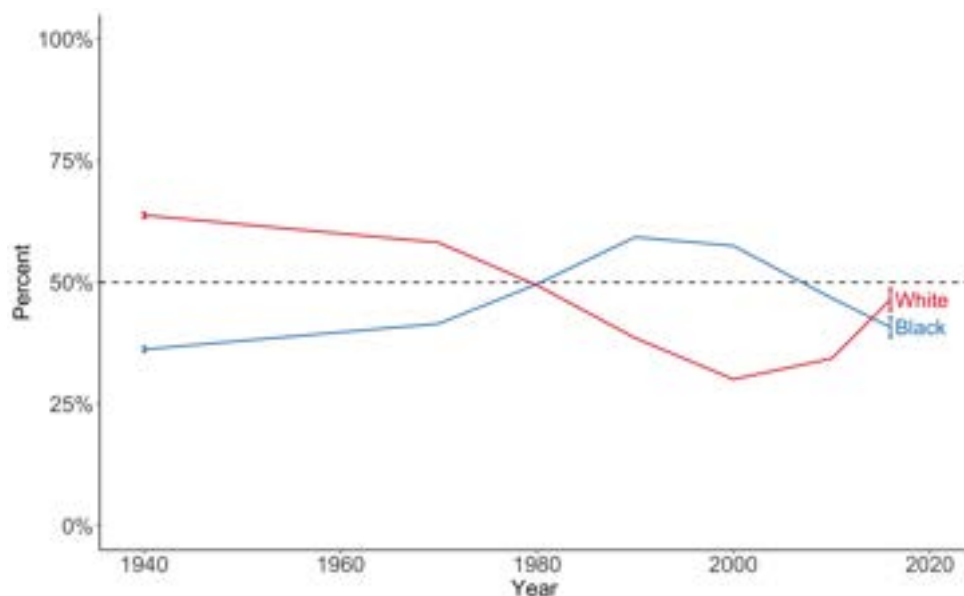
Figure A.9: Racial composition of Durham, 1940-2016 (back to text)

Notes: Demographic shares calculated using 19 census tracts that intersect with the HOLC map. Data for 1940 is from individual records of the de-anonymized decennial census geo-coded to 2010 census tract boundaries. Data for 1970-2010 are from census data summarized by 2010 census tracts. Data for 2016 is from the 2014-2018 American Community Survey.

(a)   (b)
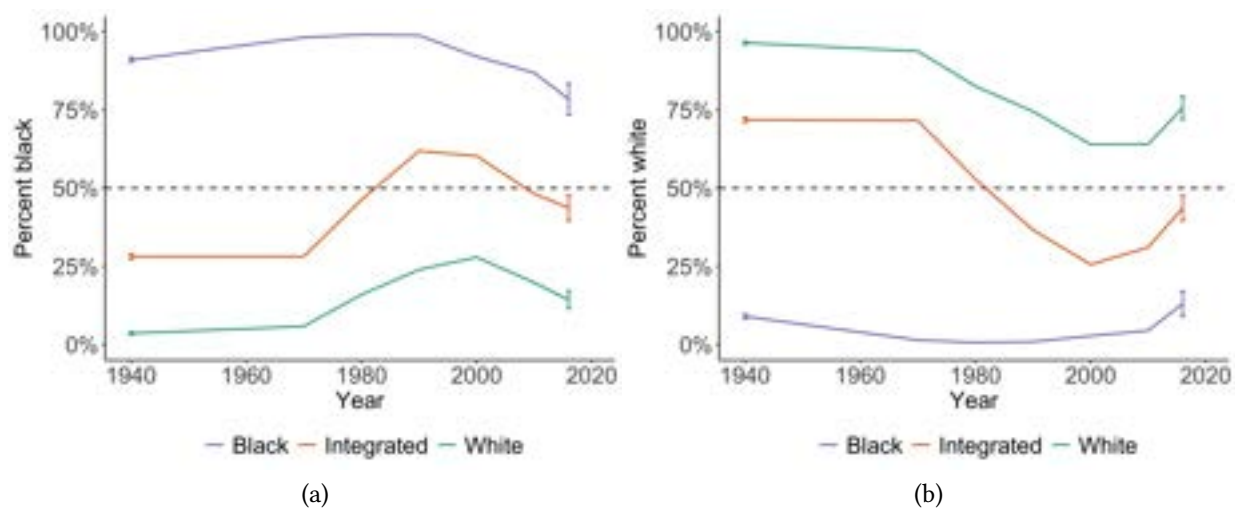
Figure A.10: Black share (left) and white share (right) of residents over time (back to text)

Notes: Demographic shares calculated using census tracts that intersect with the HOLC map with the exclusion of tracts 11, 15.02, and 23, which were missing home value data. The top (bottom) line in the figure on the left (right) corresponds to Black census tracts; the middle lines in both figures correspond to integrated census tracts, and the bottom (top) line on the left (right) corresponds to white census tracts. Data for 1940 is from individual records of the de-anonymized decennial census geo-coded to 2010 census tract boundaries. Data for 1970-2010 are from census data summarized by 2010 census tracts. Data for 2016 is from the 2014-2018 American Community Survey (color version available online).

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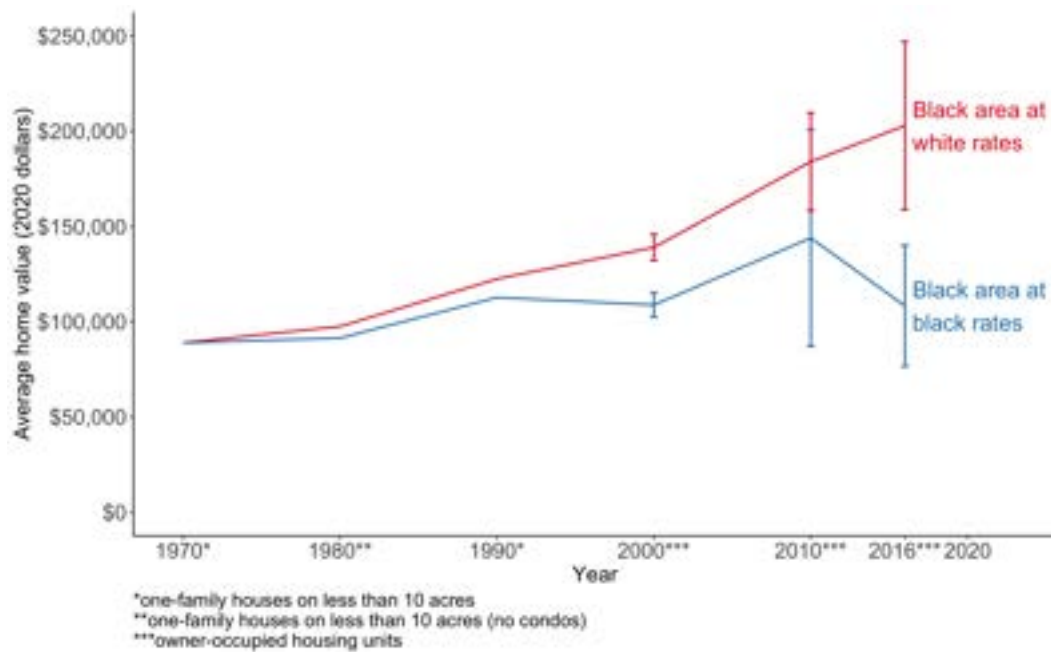
Figure A.11: Actual and counter-factual trajectory of home values in Black area since 1970 (back to text)

Notes: The actual trajectory of mean home values in the area composed by Black census tracts (blue line), and the counter-factual trajectory had home values experienced the same rate of appreciation as those in white census tracts (red line, color version available online).

B Appendix tables

Table B.1: Characteristics of geo-coded sample addresses and universe of owner-occupied homes in 1940 (back to text)

| | Black home-owners | | White home-owners | |
	All	Geo-coded	All	Geo-coded
Occupational score	18.422 (0.461)	19.590 (1.054)	25.938 (0.316)	27.775 (0.694)
Home value	2223.276 (96.689)	2234.583 (131.816)	4791.725 (92.799)	4835.939 (195.829)
Employed	73.603%	77.778%	76.767%	81.982%
Unemployed	5.470%	5.556%	1.386%	0.541
Not in Labor Force	20.927%	16.667%	21.845%	17.477
Self-employed	11.548%	7.639%	18.344%	17.297%
Works for wages	67.024%	75.900%	60.759%	66.486%
Weeks worked last year	46.949 (0.401)	45.282 (1.175)	48.096 (0.195)	48.231 (0.413)
Hours worked last week	42.685 (0.533)	43.857 (1.321)	43.636 (0.278)	43.641 (0.609)
Number of families in hh	1.467 (0.0343)	1.382 (0.0696)	1.251 (0.0129)	1.209 (0.0261)
Number of subfamilies in hh	0.202 (0.0158)	0.215 (0.0396)	0.136 (0.00725)	0.110 (0.0149)
Number of couples in hh	0.779 (0.0191)	0.868 (0.0421)	0.869 (0.00924)	0.895 (0.0180)
Number of mothers in hh	0.697 (0.0224)	0.674 (0.0538)	0.786 (0.0116)	0.793 (0.0245)
Number of fathers in hh	0.488 (0.0191)	0.521 (0.0502)	0.621 (0.0104)	0.629 (0.0221)
Multigenerational hh: 1 gen	34.839%	39.583%	27.753%	26.126%
Multigenerational hh: 2 gens	54.459%	50.694%	61.561%	64.865%
Multigenerational hh: 3+ gens	10.702%	9.722%	10.686%	9.009%
Age	50.592 (0.433)	47.944 (1.028)	49.876 (0.257)	46.859 (0.560)
Married	70.630%	78.472%	78.702%	82.523%
Single	4.043%	2.083%	4.121%	2.342%
Highest grade: Grade 12	22.302%	22.917%	44.741%	44.058%
Highest grade: 4th year of college	10.791%	13.194%	15.333%	16.636%
Wage and salary income	602.752 (23.823)	640.075 (47.517)	1232.922 (27.012)	1376.564 (57.933)
Lived same MET area 5 years ago	99.804%	99.306%	97.245%	97.080%
Lived same SEA 5 years ago	99.043%	99.306%	97.575%	97.263%
Total number of observations	841	144	2742	555

Notes: Data from the 1940 de-anonymized census (Ruggles et al., 2021). Standard deviation in parentheses. Geo-coded column includes only households living in single family homes, with addresses that are possible to geo-code, and with an observable sale in the modern transactions data.

Table B.2: Home values by census tract categories (back to text)

Year	Tract	Mean home value (s.e.) in 2020 $
1940	Black	49,457 (4,531)
1940	Integrated	62,944 (1,679)
1940	White	104,679 (3,824)
1970	Black	88,894
1970	Integrated	89,055
1970	White	151,634
1980	Black	91,355
1980	Integrated	90,953
1980	White	166,284
1990	Black	112,707
1990	Integrated	119,700
1990	White	208,846
2000	Black	108,771 (3,193)
2000	Integrated	143,068 (6,788)
2000	White	237,041 (5,875)
2010	Black	143,906 (28,431)
2010	Integrated	161,115 (13,113)
2010	White	313,845 (18,971)
2016	Black	108,273 (15,879)
2016	Integrated	194,082 (16,013)
2016	White	346,097 (19,810)

Notes: Home values in 1940 are obtained from individually geo-coded census entries of owner-occupied units from the de-anonymized 1940 census that are then projected onto 2010 census tract boundaries. Home values in 1970-1990 are obtained from complete census samples and standardized 2010 census tract boundaries. Home values in 2000 obtained from 1-in-6 sample census data. Home values for 2010 and 2016 obtained from the 2008-2012 and 2014-2018 American Community Survey, respectively. Data correspond to Figures 6, 7a, and 7b.

Table B.3: Complete results for model described in Equation 1 and depicted in Figure 9 (back to text)

	Dependent variable:
	Home value change from 1940
D1995	43,389.300(110,192.800)
D1997	84,327.950(77,937.800)
D1998	-5,541.199(39,175.190)
D1999	39,267.520(41,844.270)
D2000	67,623.890** (32,070.810)
D2001	99,676.190*** (32,083.880)
D2002	115,432.300*** (24,462.730)
D2003	98,980.940*** (14,544.440)
D2004	103,387.500*** (13,695.740)
D2005	117,205.900*** (12,988.170)
D2006	130,821.900*** (12,657.740)
D2007	129,317.100*** (11,996.780)
D2008	119,431.500*** (15,111.330)
D2009	153,334.000*** (15,484.740)
D2010	154,351.200*** (14,885.760)
D2011	160,714.300*** (17,545.930)
D2012	160,168.600*** (14,747.820)
D2013	155,901.200*** (16,831.680)
D2014	200,090.900*** (14,757.690)
D2015	170,561.300*** (13,721.980)
D2016	233,293.100*** (17,345.150)
D2017	280,460.500*** (77,963.030)
D2018	253,400.400*** (77,947.380)
D2019	336,139.100*** (45,138.530)
D2020	112,938.300(110,174.400)
building square feet	104.020*** (9.984)
square of building square feet	-0.010*** (0.002)
number of bedrooms	-13,734.520*** (3,308.115)
D1995 x Black	
D1997 x Black	
D1998 x Black	93,361.840(87,020.740)
D1999 x Black	-21,028.150(88,278.520)
D2000 x Black	
D2001 x Black	-58,310.770(84,068.240)
D2002 x Black	-26,778.580(48,253.640)
D2003 x Black	-37,210.320(34,729.760)
D2004 x Black	-55,742.120(34,331.290)
D2005 x Black	-75,142.470** (31,877.690)
D2006 x Black	-58,203.330* (30,873.130)
D2007 x Black	-81,034.160*** (30,596.740)
D2008 x Black	-93,070.690*** (31,901.460)
D2009 x Black	-150,713.600*** (51,441.670)
D2010 x Black	-156,222.000*** (41,435.150)
D2011 x Black	-127,658.300(79,787.980)
D2012 x Black	-136,453.700*** (51,229.460)
D2013 x Black	-142,965.200*** (30,685.290)
D2014 x Black	-125,600.200*** (34,819.950)
D2015 x Black	-119,803.500*** (35,698.580)
D2016 x Black	-156,678.500*** (42,416.950)
D2017 x Black	134,980.400(134,850.400)
D2018 x Black	
D2019 x Black	
D2020 x Black	
Constant	-115,010.100*** (12,964.410)
Observations	1,776
R^2	0.394
Adjusted R^2	0.378
Residual Std. Error	110,045.500 (df = 1728)
F Statistic	23.910*** (df = 47; 1728)

Note: created by stargazer (Hlavac, 2022) *p<0.1; **p<0.05; ***p<0.01

Table B.4: Sample size by year and area (back to text)

	1940	1995	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
White	540	1	2	8	7	12	12	21	63	72	81	86	97
Black	99	0	0	2	2	0	2	7	12	12	14	15	15
	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
White	58	55	60	42	61	46	61	72	43	2	2	6	1
Black	15	5	8	2	5	18	12	11	8	1	0	0	0

C Data Appendix

C.1 Constructing data set of contemporary property transactions

Data on contemporary property transactions are obtained from CoreLogic's "Deeds and Mortgages" data set. We prune CoreLogic's national data to include only transactions in Durham County (FIPS code 37063), which yields 442,004 distinct transactions. We then remove entries with sale amounts that are either missing or recorded as $0, along with transactions with no sale date. We include only transactions that flag the unit as a single-family residence – we don't include any kind of multi-family structures in our data. Finally, we remove refinances from the data and filter for grant deeds only. This removes auctions, foreclosures, and other transactions that aren't relevant to our research questions.

To assign addresses to their respective HOLC neighborhoods, we first need to determine their co-ordinates. This is done using the U.S. Census online geo-coder, which returns co-ordinates as well as the census geography for all addresses.[31] The Census geo-coder classifies an address as either an exact match (with coordinates and geography), a non-exact match (with estimated coordinates and geography), or not a match. Only addresses that are exact matches and are within the 19 census tracts of interest are kept. The final data set includes 6,276 unique addresses, and 10,206 transactions between 1992 and 2016.

C.2 Obtaining the race of home buyers

Some of the analysis that follows characterizes home values by the race of the buyer. While property records include the name of the buyer, they do not include their race. The state of North Carolina, however, maintains public voter registration data that does include the (self-reported) race of individuals alongside their name and address. We leverage these data by matching entries in the voter file to observations in our property data by name and address.

We combined publicly available Historical Voter Snapshots from the North Carolina State Board of Elections website for the years 2016, 2015, 2010, 2008, 2007, 2006, and 2005. Property transactions were then matched with the combined voter file using the name of the buyer and address of the property. Property transactions were paired with voters only when the two addresses matched exactly. However matching of names allowed for slight variations in spelling. For example, an entry with Christina Smith in the property transaction and Chrystina Smith in the voter file was matched as long as the associated addresses were the same.[32] For property transactions with a successful match in the voter data, we extract the race, sex, and ethnicity of the buyer. We end up with 4,118 transactions for 3,193 unique properties where we know the race of the buyer.

In the final stages of our data construction, we remove transactions with buyers who, on their voter registry, listed their race as "Other" or "Undesignated." We then generate a simplified racial identity variable takes ethnicity into consideration; people are tagged as either White non-Hispanic, Black non-Hispanic, Asian non-Hispanic, Hispanic, or Other.[33]

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[31]https://geocoding.geo.census.gov

[32]We use the full Damerau-Levenshtein distance method from the *stringdist* package in R. The full Damerau-Levenshtein distance method approximates string distance by calculating the number of "deletions, insertions, and substitutions" needed to turn one string into another (Loo, 2014). To match names between transactions data and the voter registry, we specify that the Damerau-Levenshtein distance has to be less than or equal to 2.

[33]Our "Other" category includes people who did not mark Hispanic on their voter registry and also didn't mark their race as White, Black, or Asian. For example, a non-Hispanic Pacific Islander and a non-Hispanic Native American would

Transaction date	Sale Amount	Address	Buyer 1	Buyer 1 R/E*	Buyer 2*	Buyer 2 R/E*	Census Tract	HOLC rating*
5/1/2001	$120,000	1 Main St.	Jane Brown	Black, NH	Jim Brown	Black, NH	1.02	
6/2/2010	$200,000	1 Main St.	Amy Smith	Black, NH	John Smith	Black, NH	1.02	
9/1/2005	$180,000	2 Broad St.	Mary Lee				13.01	D
8/2/2012	$250,000	2 Broad St.	Lisa Jones				13.01	D

Table C.1: Dataset format (back to text)

Notes: R/E - race/ethnicity; NH - non-Hispanic; * indicates variables that are not fully populated

Our final data cut removes transactions that are marked as inter-family transfers and all transactions that are less than 5,000 dollars or more than 1,000,000 dollars that are flagged as corporate transactions. Address co-ordinates are used to assign each property to a neighborhood in the HOLC map, as long as it falls within the boundaries of the shapefile. Some addresses fall outside the boundary of the map, but within the boundary of one of the 19 census tracts included in our study. As a result, the HOLC neighborhood rating variable is missing for some addresses, but every address is contained within a census tract. Complete information (including the race of the buyer and HOLC neighborhood containing the property) is available for 3,538 transactions and 1,973 unique addresses. For each of these owner-occupied addresses, we have the 1940 value, a sale price in the period between 1992 and 2016, and the race and ethnicity of the buyer.

Note that home buyer race and ethnicity are obtained only for registered voters, which excludes non-citizens and those U.S. citizens who did not (or were ineligible to) register during the period 2005-2016. As a result, the sample with complete data may not be representative of the typical home-owner.

Additionally, the CoreLogic data may not include all transactions that took place between 1991 and 2020. This was confirmed by comparing a comprehensive list of transactions from 150 addresses that we manually traced through the Durham Property Search website, which makes all property records available to the public. We found that for these 150 addresses, the CoreLogic file did not have complete data for some transactions, and was missing a few transactions altogether.

The number of observations used to conduct the analysis in the paper varies from one exercise to the other. The sample size depends on the kind of information we need. In some cases, we are only interested in whether addresses have a recorded sale in the contemporary period. In other cases, we are interested in the race of the buyer as well. The sample sizes in these two example cases will be different: larger when we do not require the race of the buyer to be known. Details of the data samples used to conduct each exercise are described in the relevant figure notes. The final data set is described in Table C.1.

C.3 Constructing data set of 1940 home values

As previously mentioned, part of the HOLC partitioned analysis is guaranteeing that every address in our data frame has an anchor point in 1940. To do this, we had to get access to and use the 1940 Full Count Census via IPUMS USA Ruggles et al., 2021.

The 1940 Full Count Census contains millions of data points for individuals across the country,

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both be categorized as "Other" for our identity variable. While our team does recognize the value of disaggregating the data by every possible permutation of race, sex, and ethnicity, we use this identity variable for the sake of graphical simplicity. Figures that use all permutations are available within our code.

only a small fraction of which are relevant for our study. First, we subset the national 1940 file to include only individuals in Durham. We then subset the data to include exclusively owner occupied heads of home. The Census data are pruned further to remove nonsensical home value data (all transactions with a home value of $999,999 are removed, for example) and entries without a complete address. This leaves us with 3325 unique individuals across Durham.

Crucial to our analysis is linking the 1940 addresses to their modern counterparts, a task that required extensive re-coding of historical address data. Many street names in Durham have changed since 1940, despite remaining geographically the same. These name changes are not always well documented, and the ones that are can't be accessed in any central location. In an effort to include homes that changed address but not property characteristics, we created a lookup table of confirmed matches between historic and modern street names. This was done by going through every unique street name in the 1940 data, finding it on the 1939 HOLC map, and cross-referencing it on modern Google Maps. If the street remained geographically the same, but there was a name change, the street was added to our lookup table. Once completed, the lookup table was used to modernize all of the historic street names in the 1940 data, facilitating a more lossless merge with modern property data[34].

When modernizing some street names, we found that many addresses in Durham that didn't have a direction in 1940 were given one in the modern day. For example, Roxboro Street was split into North Roxboro Street and South Roxboro Street at some point between 1940 and 2020. Using Census data alone, we are unable to determine whether an address tagged as Roxboro Street in 1940 corresponds to a property on North or South Roxboro in the modern day. These directionally ambiguous addresses were removed from the data set since we didn't want to run the risk of having two matches in the modern day for one 1940 observation. This shrinks our sample size to 2,610

At this point, we merge the 1940 data with modern property data. This merge is done on the street address variable. Since the 1940 census data include the universe of individuals in the United States at the time, the sample is constrained by the completeness of the modern transactions data.

C.4   Types of homes included in census/ACS analysis

Figure C.1 shows that in the 2000 Census, the average home values of owner-occupied and specified owner-occupied housing units are roughly similar. The data we used from the 1970 and 1990 censuses describe owner-occupied, single-family houses on properties of less than 10 acres (Data Access and Use Laboratory, n.d., p. 111; Bureau of the Census, 1991, p. B-20). (In years other than 1970, census and ACS documentation refer to such domiciles as specified owner-occupied housing units (Data User Services Division, Bureau of the Census, 1981, p. 147; Bureau of the Census, 1991, p. B-20; U.S. Census Bureau, 2002, p. B-62; U.S. Census Bureau, n.d., p. 33; U.S. Census Bureau, n.d., p. 35).) The data we used from 1980 also cover such housing units except with the further exclusion of condominiums, which are defined as housing units located in communities where shared spaces are collectively owned even as residents possess their own personal units (Data User Services Division, Bureau of the Census, 1981, p. 116). (By this definition, single-family houses can be considered condominiums if they are located in such a community.) By contrast, the data we report from the 2008-2012 ACS and the 2014-2018 ACS use the broader category of owner-occupied housing units.

We have data from Census 2000 for both owner-occupied housing units and specified owner-

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[34]We do assume that the only thing that changes about the naming of an address from 1940 to the modern period is the name of the street, meaning we assume that street number remains the same.
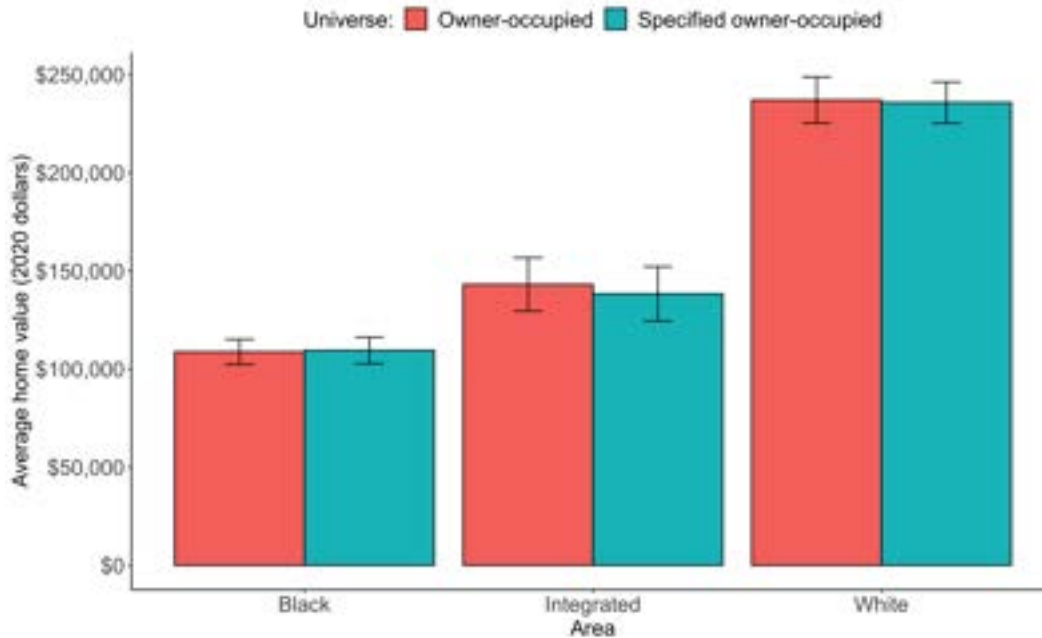
Figure C.1: Mean home values of owner-occupied and specified owner-occupied housing units (back to text)

Notes: For each area (Black, white and integrated), the columns on the left and right correspond to home values calculated using "owner-occupied" and "specified owner-occupied" units, respectively (color version available online).

occupied housing units. We observe minor differences in our results when using the former as opposed to the latter. These differences are visualized in Figure C.1.

C.5   Calculating the average home value of areas

Figure C.2 shows that in the 1990 census, mean home values calculated with either $0 or $15,000 representing "Less than $15,000" are roughly similar. For a given year, we calculated the average home values of Black, white, and integrated areas by first computing the total number and value of homes in each area. We summed up the number of homes located in each component tract of a given area as well as the total home value of each tract. However, the latter is not directly available for the 1980 or 1990 censuses. Moreover, even though it is available for the 2000 census, we did not use it so that the standard errors we calculated for 2000 home values would coincide with the point estimates. In these three cases, we arrived at the total home value for a tract by using the distribution of home values within said tract. We know, for instance, how many homes are valued from $25,000 to $29,999 in a given tract in 1980. This number can be multiplied by the midpoint of the bracket, ($25,000 + $29,999) / 2 = $27,499.50, and such products can then be summed to produce the total home value of a tract. For those brackets that are unbounded on one side, "Less than $10,000" for instance, census documentation provides values that can be used to calculate total value.

Using the census documentation in this way poses an issue for Census 1990. The bracket for the least valuable homes in 1990 is "Less than $15,000." However, the value provided in the documentation, $9,000, is intended for the bracket "Less than $10,000" (Bureau of the Census, 1991, B-20), which cannot be found in the data. In light of this discrepancy, we used $12,000 to represent this bracket in our calculations. We also assessed the impact of this decision by completing our calcu-
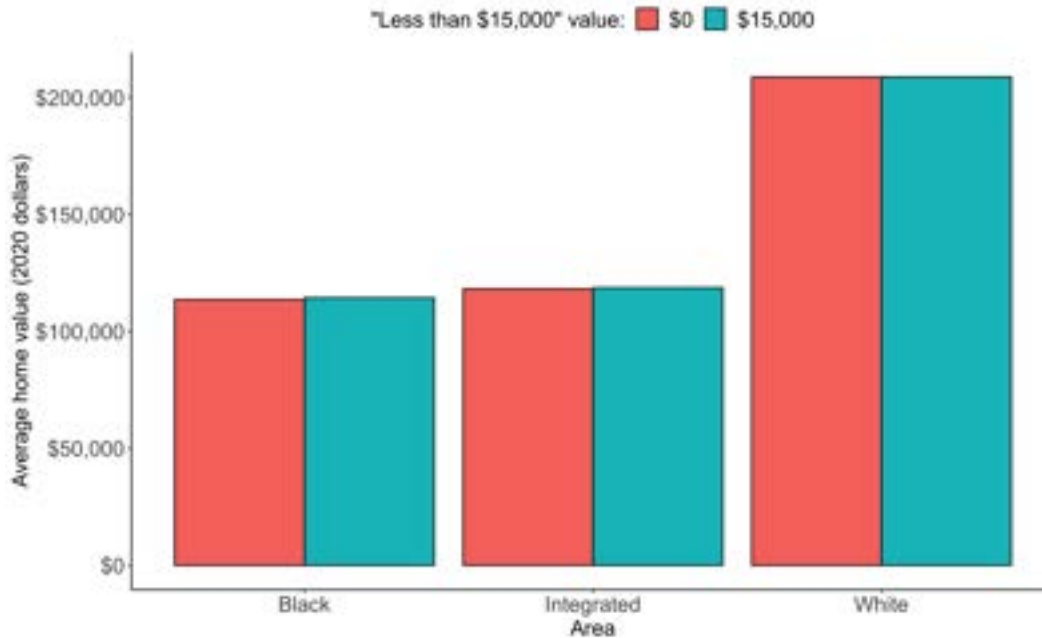
Figure C.2: For the 1990 Census, the average home values calculated with either $0 or $15,000 representing "Less than $15,000" are roughly similar (back to text)

Notes: For each area (Black, white and integrated), the columns on the left and right correspond to home values calculated using $0 and $15,000 respectively for the category "Less than $15,000" (color version available online).

lations with $0 and $15,000 as the representative value for "Less than $15,000." We found that the difference between using the lower bound value and the upper bound value was most pronounced for the average home value in the Black area and least for the white area. The integrated area fell in between. However, these differences are minor when compared to the average home values themselves, as can be gleaned from Figure C.2. Indeed, for all three areas, the differences are less than 1% of the average home values calculated using the lower bound of $0. Thus, we believe the lack of clear instructions from census documentation does not impact our results significantly.

C.6   Confidence intervals and hypothesis tests for census/ACS analysis

Home value data from Census 2000 was derived from a sample and not the entire population. As a result, confidence intervals had to be estimated. Likewise, ACS data originated from samples. Thus, we also computed estimated confidence intervals for 2010 and 2016 point estimates. These confidence intervals were calculated using formulas provided in documentation from the U.S. Census Bureau. All confidence intervals are 95% confidence intervals and every hypothesis test has an α of 0.05. We used a critical value of 2 because census and ACS documentation define the boundaries of 95% confidence intervals as being around 2 standard errors away from the sample statistic ((U.S. Census Bureau, 2002, pp. 8–9); (U.S. Census Bureau, 2013, p. 10); (U.S. Census Bureau, n.d.[b], p. 10)).