Essays on the Role of Government in Shaping Racial Segregation in School and Work

By

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DEDICATION

To Leah and Henry – life is not the mountain tops; it's the walking in between and I like you

walking next to me.

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[1] This paper is coauthored with Dr. Ashley Jardina (University of Virginia), Dr. Peter Q. Blair (Harvard University), and Dr. Papia Debroy (Opportunity@Work).

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ABSTRACT

In this dissertation, I explore Black-white segregation in public schools and in the workplace and the government's role in perpetuating and mitigating said segregation. I argue that segregation is a social choice and, often through state action, the United States has created and maintained a bifurcated society in which Blacks and whites occupy separate social spaces. Despite the historical legacies of discriminatory government policies, I document contemporary instances in which government action has increased racial integration in public schools and in the workplace.

In Chapter 1, I highlight existing explanations of racial segregation in America's neighborhoods, schools, and workplaces. I also provide a host of evidence regarding the consequences of racial segregation, much of which demonstrates that Blacks are segregated in ways that are distinctly disadvantageous for them.

In Chapter 2, I examine the impact of school boards on segregation through the drawing of school attendance zones. I use data from the School Area Boundary Survey for the 2013-14 school year coupled with fine-grained GIS census block shapefiles linked to data from the 2010 Decennial Census. Comparing enacted school attendance zones and generated counterfactuals which assign all students to the school in their district nearest to their home, I demonstrate that school boards affect the level of within-district school segregation. Despite expectations that school boards are incentivized to protect exclusive, predominantly white spaces, my findings suggest that school assignment policies are more frequently used as a voluntary measure to pursue greater racial integration. However, I also find that the costs of integration are borne much more by Black students than white students.

In Chapter 3, I measure the historical persistence of occupational segregation by race and education to uncover the degree to which differences in human capital explain the relegation of Black workers to roles with less compensation, authority, and mobility. I use data from the 1980, 1990, and 2000 U.S. Decennial Censuses and the 2010 and 2019 1-year American Community Survey (ACS) accessed through the University of Minnesota Integrated Public Use Microdata Series (IPUMS). Even after controlling for differences in education, Black workers are in fundamentally different and lower quality occupations than similarly educated whites. Segregation has always been a feature of the American labor market; using a Monte Carlo simulation, I demonstrate that occupational segregation by race is significantly higher than we would expect under race-neutral conditions.

In Chapter 4, I examine the role of government as employer and make comparisons between occupational segregation in the public and private sectors over time. Using data from the 1980, 1990, and 2000 U.S. Decennial Censuses and the 2010 and 2019 5-year ACS, I find that Black and white employees of federal, state, and local governments have been substantially less segregated than workers in the private sector over the past four decades. While this finding holds for workers who are skilled through alternative routes (STARs) than a bachelor's degree, public sector workers with a bachelor's degree or more are as segregated or more segregated than similarly educated workers in the private sector. I also consider whether these differences emerge across all geographies. Among private sector workers, there is no difference in the level of occupational segregation in southern states versus those elsewhere. However, among public sector workers, the South is significantly less segregated than the rest of the country.

CHAPTER 1

Introduction

Racial hierarchy and inequality have long been fundamental aspects of American society and its politics (Myrdal 1964; Smith 1993; Mickey 2015). At its core, America's evolution as a modern, wealthy, and powerful nation is centrally linked to its history of violence toward and commodification of Black bodies (Baptist 2014). Despite the relative political, social, and economic progress that Black Americans have achieved in the past century (Allen and Farley 1986; O'Flaherty 2015; Derenoncourt et al. 2022), race and racism continue to play a central role in determining "one's political rights, one's location in the labor market, and indeed one's sense of identity" (Omi and Winant 2014, 8). Indeed, in many social contexts, such as schools, neighborhoods, workplaces, and places of worship, Black and white Americans continue to be segregated by race.

In this dissertation, I explore contemporary Black-white segregation in public schools and in the workplace, two social contexts notable for the ways in which they shape an individual's opportunities for social and economic mobility, and the government's role in perpetuating and mitigating said segregation. Segregation is neither natural or necessary; it is a social choice resulting from racial prejudice and racist behavior which is often channeled through the political process. Often through state action, the United States has created, tolerated, and maintained a bifurcated society in which Blacks and whites occupy different and disconnected social spaces in which they live, work, learn, and worship. For example, government action led to the denial of

Black public schooling of the same quality as that available to white students (Carruthers and

Wanamaker 2017), the reduction of Black wealth during the Jim Crow era (Darity Jr. and Frank

2007), the creation of affordable and exclusively white spaces (Jackson 1985; Massey and

Denton 1993; Nall 2015) and the devaluation of disproportionately Black spaces (Rothstein

2017), and the patchwork development of a belated, racially unequal, and stingy welfare state

(Quadagno 1994; Alesina and Glaeser 2004).

In this introduction, I will first highlight existing explanations of racial segregation in

America's neighborhoods, schools, and workplaces. While the empirical chapters to follow are

not focused on residential segregation, it is important to highlight this literature because of the

volume of scholarly attention given to residential segregation and because of the spillover effects

of residential segregation, particularly in regard to school segregation. Next, I will provide a host

of evidence regarding the consequences of racial segregation, much of which demonstrates that

Black Americans are segregated in ways that are distinctly disadvantageous for them. Finally, I

will outline the three empirical chapters that follow.

1.1 Causes of Segregation

Explanations of segregation, regardless of context, can be broadly grouped into two categories:

those emphasizing individual-level factors, and those focusing on structural factors. While they

are worth discussing in turn, the two are also inextricably linked in that personal attributes,

whether those be human capital, experiences with racial prejudice, economic resources, job

preferences, are shaped by the environments and norms in which a person lives.

Consider residential segregation by race, which has received the most attention in the

literature. It is certainly partially a product of aggregated individual preferences. Although

residential choices can be influenced by a person's willingness and ability to pay for local public goods (Tiebout 1956), the racial composition of an area or neighborhood continues to be one of the most important non-economic factors guiding residential choice. Despite expressing preferences to live in places with racial and ethnic diversity, white Americans have stronger preferences to live among a critical mass of coethnic neighbors (Charles 2006; Havekes, Bader, and Krysan 2016) and to avoid living near Blacks because of racial prejudice (Massey and Denton 1993; Krysan, Farley, and Couper 2008; Krysan et al. 2009). In addition, whites use race as a proxy for social class to act upon their preference to live among more educated and affluent neighbors (Harris 2001; Emerson, Chai, and Yancey 2001). Regardless of the sources of these preferences, even a public with modest preferences for segregation can lead to high levels of segregation in practice (Schelling 1969).

However, across a variety of social contexts, individual factors cannot fully explain segregation. Again, the example of residential segregation by race is a useful starting point. Individual preferences and qualities do not suffice to account for residential segregation, primarily because residential choices are limited by structural constraints (Bruch and Mare 2006; Lareau and Goyette 2014). Residential segregation in America was created "via unalloyed racism" (Timberlake 2018, 93) including, but not limited to, physical violence and terrorism toward Blacks by white residents, who often organized into homeowners' associations around the expressed goal of maintaining white homogeneity in their neighborhoods (Sugrue 2014). These grassroots efforts were combined with state action that engineered affordable and exclusively white spaces (Massey and Denton 1993; Nall 2015) at the expense of Black Americans (Rothstein 2017). Local authorities further maintained racially segregated spaces through their zoning decisions (Trounstine 2018; Trounstine 2020).

Segregation in America's public schools is related to the persistence of residential segregation because geographic proximity remains a primary factor in which schools children can access and ultimately attend. However, in the past five decades, Black-white residential segregation has consistently declined (Iceland, Weinberg, and Steinmetz 2002; Glaeser and Vigdor 2012) without similar declines in school segregation. As a result, persistent segregation in public schools cannot be explained by residential patterns alone (Orfield, Kucsera, and Siegel-Hawley 2012). Efforts to integrate schools are inherently limited in scope by the Supreme Court's decision in *Milliken v. Bradley* (1974), which held that individual school districts could not be held responsible for segregation that exists across district lines. Further, increased adoption of school choice policies has allowed white parents to opt out of their children's assigned school (Sikkink and Emerson 2008) and limited district integration efforts (Holme et al. 2013). Nonetheless, as I will demonstrate in Chapter 2, school boards still have and use their power to shape the level of segregation within their districts through their student assignment policies.

Similarly, explanations of occupational segregation can be sorted into those which focus on personal factors, such as the characteristics and preferences of workers, and structural factors including the shared beliefs and behaviors of employers. Similar to the way that residential segregation captures group differences in residential patterns, racial occupational segregation measures the degree to which members of different racial groups are distributed unequally across different types of jobs. A common explanation for the fact that Black and white workers are sorted into different occupations has centered on the lower rates of college education among Blacks relative to whites and the idea that Black workers have less human capital (Reskin and Padavic 2006). As a result, policymakers and practitioners have focused primarily on increasing

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Black college accessibility and attainment as a means of equipping Black workers with the skills that employers value (Wilson 1980; Krymkowski and Mintz 2011). While these efforts have been successful at increasing four-year degree completion rates and wages for Black Americans, occupational segregation has not decreased in the past three decades. In fact, as I will show in Chapters 3 and 4, Black and white workers with the same level of education remain in vastly different occupations, with Black workers relegated to occupations with lower wages, less authority, and less possibility for upward mobility.

These results align with research that suggests that occupational segregation has less to do with the quality of Black workers and more to do with demand-side forces and structural racism. For example, employers tend to believe that Black workers are less productive, unreliable, insubordinate, and lazy (Tomaskovic-Devey 1993; Peffley, Hurwitz, and Sniderman 1997; Holzer 1996; Kirschenman and Neckerman 1991; Moss and Tilly 2001; Wilson 1996). There is a cyclical relationship between these beliefs about Black workers and beliefs about jobs. Employers' stereotypes about Black workers' skills and capabilities are reinforced by the type of occupations in which they see Black workers currently employed and employers' perceptions of the skills needed is shaped by the share of Black workers in the role (J. Greenhaus, Parasuraman, and Wormley 1990; Braddock and McPartland 1987).

Further work suggests that whites actively seek to preserve their positions of dominance in the labor force through social closure in response to fear among whites about racial competition over jobs and resources (Blalock 1956, 1967; Allport 1954; Wilson 1980; Reskin and Roos 1990; Tomaskovic-Devey 1993; DiTomaso 2013). To limit Black "encroachment" into privileged roles, white employers channel Black applicants into race-coded positions that require more manual labor, increased interface with other people of color, or decreased interaction with

customers (Collins 1993; Pager, Western, and Bonikowski 2009). Social closure and opportunity hoarding by whites is reinforced by the fact that many workers learn about job opportunities through social and professional networks (Fernandez and Fernandez-Mateo 2006; Erickson 2003; Marsden 1999; Bayer, Ross, and Topa 2008) and most Americans' social networks are composed of people of the same racial and ethnic background (Cox, Navarro-Reivera, and Jones 2016).

1.2 Consequences of Segregation

The segregation of Black and white Americans is far from benign. As Chief Justice Earl Warren noted in *Brown v. Board of Education of Topeka* in regard to schools, "separate but equal" environments are consequential on their own; however, it is rarely the case that Black and white Americans inhabit separate social environments that are in fact equal. More often, whether measured in terms of the quality of schools, neighborhoods, occupations, workplaces, or healthcare environments, Black Americans are regularly experiencing environments that are both separate and vastly unequal.

Consider the unrealized benefits of racial integration that are foregone in segregated public schools. Efforts to increase integration have been some of the most successful in closing the racial gap in educational achievement (Hoxby 2000; Rothstein 2004; Hanushek, Kain, and Rivkin 2009; Reardon et al. 2019). Minority students that attend racially integrated schools are substantially more likely to graduate from high school (Guryan 2004; Orfield et al. 2012), graduate from college (Camburn 1990), and earn higher wages after school (Johnson and Schoeni 2011). Similar results hold in terms of wealth and income. When low-income students were randomly placed with higher-income peers as the result of a public housing authority's

lottery program, those students academically outperformed their low-income peers who remained in low-income settings (Schwartz 2010).

Continued white opposition to integration efforts is often rooted in the assumption that the benefits of integration for minority students come at the expense of white students. Empirical evidence would suggest that this is not the case. For example, a recent report by the National Center for Education Statistics about the relationship between eighth-grade achievement and the demographic makeup of public schools found that "White student achievement in schools with the highest Black student density did not differ from White student achievement in schools with the lowest density" (Bohrnstedt, Kitmitto, Ogut, and Chan 2015, 1). In addition, there is reason to believe that white students benefit from superior learning outcomes in diverse schools in ways that may not be captured by standardized testing (Siegel-Hawley 2012; Mickelson and Nkomo 2012). For example, classrooms with increased racial and ethnic diversity are associated with higher levels of dialogue and debate (Chang et al. 2006). Diverse spaces are more likely to bring together unique perspectives which can lead to higher quality and more creative solutions to problems (Page 2008). Intergroup contact also increases trust and empathy between groups while reducing anxiety and empathy (Allport 1954; Boisjoly et al. 2006; Pettigrew et al. 2011). The converse is also true: white supremacy is most likely to reproduce in racially isolated, white spaces (Embrick and Moore 2020). These impacts are also long-lasting and have intergenerational consequences, with people who attended more diverse schools more likely to seek out diverse neighborhoods and workplaces (Wells and Crain 1994).

Similar consequences affect Black Americans across other social contexts in which segregation occurs. Residential segregation disproportionately exposes Black Americans to high concentrations of poverty and unfavorable neighborhood environments, including "crime,

environmental hazards, inferior municipal services, and 'food deserts'" (Acevedo-Garcia et al. 2008, 322). Although Black-white differences in health outcomes can be attributed to a complex set of social factors, there is significant evidence that residential segregation and Black social isolation are associated with worse health outcomes and higher levels of Black mortality (Polednak 1996; Collins and Williams 1999; Morello-Frosch and Jesdale 2006). Because people tend to seek out healthcare in the communities in which they live, Black and white Americans tend to be treated in separate healthcare facilities, and Blacks have less access to quality healthcare (Bailey et al. 2017). In Black neighborhoods, these facilities tend to have fewer technological resources, fewer specialists, and more negligent adverse events (Landrine and Corral 2009). Relatedly, Blacks are more likely to reside in nursing homes and assisted living facilities with more inspection deficiencies and lower staffing ratios (Smith et al. 2007).

Residential segregation also affects the social mobility of Black workers through the access to quality job opportunities and the space-related costs accrued during the job search. Because spatial search patterns are anchored around a worker's home and the spatial mismatch between Black neighborhoods and job growth (Kain 1968), Black workers are more likely to search in areas with weak employment growth (Stoll and Raphael 2000). Additionally, segregation undermines Black homeownership (Charles 2003), and differences in Black-white home valuations and the rate of homeownership directly contribute to the Black-white wealth gap (Shapiro 2004).

Segregation in the labor force, both by occupation and place of employment, directly contributes to the Black-white wage gap because Black workers hold jobs which are poorly compensated by employers (Hirsch and Schumacher 1992; Gyimah-Brempong, Fichtenbaum, and Willis 1992; Kmec 2003; Browne et al. 2001; Reskin, McBrier, and Kmec 1999; King 1992;

Tomaskovic-Devey 1993; Lockette and Spriggs 2016; Hamilton, Austin, and Darity 2011). Because people of color are overrepresented in less desirable jobs, these jobs are further devalued because society devalues the people who primarily hold these positions (Petersen and Saporta 2004). For example, in Atlanta, Blacks employed in jobs where most of their co-workers were also Black earned $3,740 less annually than Blacks employed in predominantly white jobs (Browne et al. 2001).

In addition to wages, occupational segregation also has implications for mobility and hierarchies of authority. Black workers are regularly excluded from positions with power, authority, and status. For example, only four of the CEOs for companies in the *Fortune 500* were Black as of 2021. Although 11.6 percent of all workers are Black, only 3.2 percent of executives and senior manager-level employees in the U.S. are Black (Center for Talent Innovation 2019). This vertical segregation limits Blacks' upward mobility and access to higher wages (Kluegel 1978; Elliott and Smith 2004).

Beyond the cost of occupational segregation for individual economic mobility and wellbeing, occupational segregation is a market inefficiency which creates negative externalities for both employers and regional talent ecosystems. Writing about occupational segregation by sex, Anker (1997) noted that "[e]xcluding a majority of workers from a majority of occupations, as at present, is wasteful of human resources, increases labour market inflexibility, and reduces an economy's ability to adjust to change" (315). The same logic extends to occupational segregation by race.

1.3 Chapter Overview

As emphasized above, segregation is a costly choice that has been collectively made and maintained through both government action and inaction. To adopt Trounstine's (2018) language, "[s]egregation is not organic or inevitable. Rather, it is a matter of design pursued through the political process" (23). In this dissertation, I explore the level of segregation between Black and white Americans and the government's role in manufacturing, maintaining, and mitigating that segregation in two key social contexts: public schools and the labor market. These social environments are particularly notable for their economic ramifications. In addition to the immediate economic consequences of occupational segregation, both school and the workplace are social environments in which people build the skills, knowledge, and human capital which structure their opportunities for future mobility (Becker 1994; Blair, Debroy, and Heck 2021).

In Chapter 2, I examine the role that school boards play in shaping the experience of segregation within their districts through the ways that they draw the school attendance zones which determine which school in the district a student attends. Making comparisons between enacted school attendance zones and generated counterfactuals which assign all students to the school in their district nearest to their home, I demonstrate that school boards affect the level of within-district school segregation between Black and white students. Although school boards face jurisdictional, legal, and political constraints when setting policy, in about one-half of school districts, the level of school segregation substantially deviates from the level we would expect based on neighborhood residential patterns alone. Despite expectations derived from the literature which would suggest that school boards are incentivized to protect exclusive, predominantly white spaces, the empirical findings suggest that school assignment policies are more frequently used as a voluntary measure to pursue greater racial integration. In fact, in about

one-third of districts studied, school segregation between Black and white students is more than 10 percent lower than would be expected if all students were assigned to attend the school nearest their home. However, I also find that the costs of integration are much more likely to affect Black students than white students.

In Chapter 3, I measure the historical persistence of occupational segregation by race and education to uncover the degree to which differences in human capital explain the relegation of Black workers to roles with less compensation, authority, and mobility. Even after controlling for differences in education, Black workers are in fundamentally different and lower quality occupations than similarly educated whites. Segregation has always been a feature of the American labor market; using a Monte Carlo simulation, I demonstrate that occupational segregation by race is significantly higher than we would expect under race-neutral conditions. This finding suggests that improving college access, while valuable to improve a worker's economic prospects, is not sufficient as a solution for all forms of racial inequality, and is effectively impossible as a broad-based solution for most workers already active in the labor market without a bachelor's degree. Better solutions must consider and address the role that employers play in maintaining occupational segregation.

In Chapter 4, I examine the role of government as employer and make comparisons between occupational segregation in the public and private sectors over time. I find that Black and white workers who are employees of federal, state, and local governments have been substantially less segregated than workers in the private sector over the past four decades. While this finding holds for workers who are skilled through alternative routes (STARs) than a bachelor's degree[2], public sector workers with a bachelor's degree or more are as segregated or

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[2] Following prior research on the latter group (Blair et. al. 2020), I refer to workers without a four-year degree as those "skilled through alternative routes" (STARs). Avoiding marginalizing deficit-based rhetoric (Baldridge 2014), this term describes this population of workers based on the assets they bring to the labor market.

more segregated than similarly educated workers in the private sector. This finding is surprising, and complements the insight in Chapter 3 that college is not a panacea for all forms of racial inequality. I also consider whether these differences emerge across all geographies, with specific interest in the South. State-level differences in occupational segregation between the public and private sectors are primarily due to a state's share of Black workers and whether the state is in the South. States with higher concentrations of Blacks workers are associated with more segregation in the private sector, but not more segregation in the public sector. Among private sector workers, there is no difference in the level of occupational segregation in states in the South versus states in other parts of the country. However, among public sector workers, the South is significantly less segregated than the rest of the country.

Each empirical chapter is written to be self-contained and includes a more lengthy literature review than was included in this chapter. The conclusion lays out some final thoughts on the shared themes and insights across these three empirical studies. Additionally, I discuss the future research implicated by this work.

CHAPTER 2

School Segregation and Local School Board Behavior

2.1 Introduction

In 2019, the school board of the Howard County Public School System in Maryland directed the district's superintendent to begin a comprehensive redistricting process to address both the high levels of school crowding and high levels of economic segregation. In response, the superintendent proposed a plan to the school board that involved reassigning 7,400 students to different schools than the ones they currently attended (Cano and Rankin 2020). The Howard County school board then presented this attendance area adjustment plan to the community over a series of seven public hearings.

The response from the public was disproportionately negative. Led by the organized efforts of mostly white and affluent parents, almost 600 community members attended the public hearings with most there to voice their disapproval. Additional protests were held at an area mall. Parents carried signs that read 'Kids before politics,' 'Swapping kids creates new inequities,' and 'No forced busing' (Cano and Rankin 2020). One statement from a parent teacher student association suggested that the reassignment of students from one high school to another could lead to higher levels of substance abuse and suicide.

From a purely administrative perspective, adjustments to the school attendance zone (SAZ) boundaries were necessary in the Howard County Public School System. Located in a

suburban community between Baltimore and Washington D.C., the district had experienced high levels of growth over the last two decades. In 1997, the district reported 39,134 total students. By 2007 that number hit 48,508 students and by 2017 almost 55,000 students. In order to accommodate the growing student body, the school district built an additional seven elementary schools, five middle schools, and two high schools during that same time frame. In addition to choices about where and when to open each additional school, district leadership needed to make decisions about how to adjust their student attendance zones to account for the new schools

However, in addition to the student body's growth, it also became rapidly more diverse. In 1997, 73 percent of the district's students were white. By 2007, that value had dropped to 58 percent. As of 2017, 39 percent of the district's students were white, 25 percent were black, 23 percent were Asian, and 11 percent were Hispanic. Similarly, the district became relatively more socioeconomically diverse. In 1999, 10.3 percent of the students participated in the free or reduced lunch program. By 2007, that number rose to 11.1 percent; by 2017, 20.2 percent of the study body received free or reduced lunches.

This increasing level of racial and socioeconomic diversity was accompanied by rising levels of segregation. One way of measuring the level of segregation in a school district is to use the variance-ratio segregation index, which measures how isolated Black and Hispanic students are within a school district relative to the maximum level of isolation possible given the district's overall racial composition. The index is bounded between 0 and 1 and can be interpreted as the level of segregation achieved relative to the level of segregation possible. In 1997, Howard County's schools were 12 percent as segregated as they could be. By 2017, they were 22 percent as they could be. In terms of socioeconomic segregation, in 2019, about 75 percent of the

district's students from low-income families were grouped into five of the county's twelve high schools (Duncan and King Jr. 2019).

At the onset of the comprehensive redistricting process, the school board expressed the dual motives of addressing school crowding and economic segregation. Though district leadership never cited racial integration as a goal for the redistricting plan, most students from low-income families in the district were Black and Hispanic. In 2017, the correlation between the percent of students in a school receiving free or reduced lunches and the percent of students who were Black or Hispanic was 0.85. As a result, efforts to integrate children from wealthy and non-wealthy families often indirectly lead to higher racial integration as well.

The written testimonies collected during the school board's public hearings demonstrate the public awareness of the racial dynamics underlying the redistricting plan. For example, the testimony of one middle school student equated racial and socioeconomic diversity while also arguing that additional diversity seemed unnecessary. "My friend community is already diverse. I have had friends who are rich and poor. White and black. Yellow and brown. Short and tall. I do not need to go to another school to experience it nor do I think there's any meaningful benefit." In comparison, another high school student expressed concern that the redistricting plan "has stirred up the social divide and racial hatred." In their testimonies, other parents and students actively insisted that their opposition was unrelated to race (Cano and Rankin 2020).

Proponents of the plan also noted how the public discourse about the plan evolved into critiques of nonwhite and low-income members of the community. One mother reported that, "things have gotten nasty. I've read so many disgusting comments about our students of color and our families living in poverty, I can only conclude that lots of people in this county want to keep their kids separate from '*those kids*.'" Another community member sought to remind the board

about the eleven years it took for the county to comply with the decision of *Brown vs. Board of Education*. She then went on to list a variety of arguments previously offered to explicitly support racial segregation, before suggesting that these same arguments were still being used but with the word "poor" or "FARM eligible" substituted for "black."

After the public hearings, the school board ultimately approved a revised plan that moved fewer students, affected fewer schools, and ultimately led to a more meager improvement in terms of district integration (Howard County Board of Education, 2019). Although the school board declared the adopted plan as successfully balancing capacity differences across the county's schools and advancing socioeconomic equity, community sentiment was certainly more mixed. Some parents expressed disappointment in the plan's reduced ambition while others began challenging the plan in court. In an opinion piece published in *The Baltimore Sun*, one county resident explicitly highlighted the potential electoral ramifications of the school board's actions, writing that, "Howard County's government is committed to transforming the demographic makeup of the community. Maybe voters should change the makeup of the county government instead" (Olowski 2019).

In the example of the Howard County Public School System, competing notions of the value of socioeconomic diversity and the cost of increased student travel times led to a public conflict about the school board's actions. While the original redistricting proposal was grounded in the expert recommendation of the superintendent, the final decision more clearly reflected the preferences of the community members most capable of powerfully voicing their opinions through the political process.

Public schools and the school boards that govern them are often overlooked by political scientists, instead receiving attention from economists interested in the relationship between

school quality and housing prices (Black 1999) or education scholars interested in the working dynamics between school boards and superintendents (Mountford 2004). While some work explores the factors that influence support for increased school spending (Berkman and Plutzer 2005; Schueler and West 2016) or the impact of teacher unions on school performance or state policies (Moe 2009; Hartney and Flavin 2011), the formal study of local school governance is relatively undeveloped within political science. As Will Howel argues, "[f]ew studies in the social sciences concentrate explicitly on the local political institutions that govern public schools. Indeed, key aspects of local school governance—elections, mobilization of interest groups, interagency relations, and notions of power—have essentially been ignored" (2005, 15).

The Howard County school board's redistricting plan and the surrounding political conflict are an illuminating reminder that school boards are local political institutions which filter public values and interests and control access to public goods. Particularly in the case of student assignment policies, school board decisions are not administrative, perfunctory, or formulaic. Instead, these decisions "reflect politics broadly defined; that is, conflicting interests—primarily those associated with race and class—in which groups with varying power struggle to preserve their privileged position or achieve a more privileged position in American society" (Squires, 1994, 3).

In this chapter, I will demonstrate the ways in which school assignment plans are being used to weaken the relationship between residential and school segregation, explore the political factors that may influence school board decisions about whether and how to use school assignment as a tool to impact school segregation, and identify the students most likely to be affected by educational gerrymandering. In the next section, I examine existing understandings about the relationship between racial residential patterns and those in the classroom.

2.2 The Relationship Between Residential and School Segregation

Segregation has been broadly defined as, "the extent to which individuals of different groups occupy or experience different social environments" (Reardon and O'Sullivan 2004, 122). In the context of metropolitan areas, measures of segregation may capture the similarity of the demographic composition of cities or neighborhoods in comparison to a metropolitan area as a whole in an effort to understand the degree to which groups have overlapping or isolated experiences. In the context of education, the social environment of interest has been the school district, the school, or even the classroom when scholars have considered the role that tracking and ability grouping can play in separating students.

Existing explanations of segregation in housing by income and race in the United States have primarily been in terms of either individual preferences or structural constraints to housing choices. At the individual-level, residential choices may be informed by a person's willingness and ability to pay for local public goods (Tiebout 1956) or non-economic desires, "for example, to associate with 'nice' people" (418). Racial composition remains one of the most important non-economic factors guiding relocation decisions. Although Americans often express a desire for racial and ethnic diversity in their neighborhoods, they also have a strong desire to live among a critical mass of coethnic neighbors (Charles 2006). For white Americans, the preference to live among white neighbors tends to outweigh the preference for diversity (Havekes, Bader, and Krysan 2016).

However, economic and racial concerns often overlap: the preference to live among affluent neighbors equates to a preference to live among whiter neighbors in a country where race and income are correlated. As a result, it may be the case that whites prefer to avoid living near Blacks because of racial prejudice (Massey and Denton 1993), both whites and Blacks

prefer to live among coethnic neighbors (Charles 2006), or whites prefer to live among more educated, affluent neighbors and use race as a proxy for social class (Harris 2001; Emerson, Chai, and Yancey 2001). However, there is significant evidence that racial composition has an independent effect on white residential preferences (Crowder 2000; Krysan, Farley, and Couper 2008; Krysan, Couper, Farley, and Forman 2009; Billingham and Hunt 2016). Regardless of the precise mechanism or motivation, even modest preferences to live among neighbors of the same race or socioeconomic status can lead to high levels of residential segregation (Schelling 1969).

Individual preferences do not explain residential segregation in its entirety, primarily because residential choices are limited by structural constraints (Bruch and Mare 2006; Lareau and Goyette 2014). At its simplest, residential choices are limited by the qualities and prices of the available housing stock in any given neighborhood. However, the housing stock and its geographic distribution within cities and metropolitan areas is the product of government intervention. The United States government played an active role in creating and subsidizing segregated environments for people to live in. Through both the Federal Housing Administration's unwillingness to provide home loans in neighborhoods where any African Americans lived (Rothstein 2017) and the subsidization of the suburbs and the highways that connected the suburbs to jobs in cities (Massey and Denton 1993; Nall 2015), the United States government engineered affordable and exclusively white spaces. Local authorities also used zoning decisions to maintain racially segregated spaces, whether explicitly or with a wink and a nod (Rothstein 2017; Trounstine 2018; Trounstine 2020).

These government policies were aided still further by the grassroots organizing of homeowners' associations (HOAs). Framed in ideological terms around hard work and property rights, these groups worked to retain white homogeneity in their neighborhoods by requiring all

home purchases to include racial covenants which prevented the purchaser from selling their property in the future to African American homebuyers. After the Supreme Court ruled that racial covenants could not be enforced in the courts, HOAs were not always able to use preventive measures to protect the whiteness of their neighborhoods. African Americans that successfully purchased homes in white neighborhoods were often met with white mobs, bricks, and Molotov cocktails (Sugrue 2014). The effects of decades of government intervention in the housing market as a force for segregation persist in the racial wealth gap (Shapiro 2004), current residential patterns, and the classrooms of public schools.

In a nation where most children are assigned to attend public schools as a function of geographic proximity, it is not surprising that systems of neighborhood schools naturally reflect the segregation of the neighborhoods. As a result, politicians and school board members regularly dismiss high levels of school segregation as something beyond their control and claim that it is the product of residential segregation alone.

However, while residential segregation is still higher among African Americans than for other racial or ethnic minorities in the United States, residential segregation has consistently declined since the 1980s (Iceland, Weinberg, and Steinmetz 2002). While almost half of the Black population lived in neighborhoods that were over 80 percent Black in the 1970s, as of 2010, only 20 percent of African Americans lived in such racially isolated neighborhoods (Glaeser and Vigdor 2012). During this same time period, there have not been similar decreases in school segregation.

One could also try to dismiss the high levels of contemporary segregation by suggesting that the integration of public schools was never successful to begin with. Perhaps a focus on the public opposition to busing in the 1970s might lead one to draw this conclusion. However,

efforts to integrate America's public schools in the 1970s and 1980s were largely effective. In 1968, 76.6 percent of African Americans attended a majority-minority school (Orfield et al. 1994). Almost two-thirds of Black students attended a school with more than 90 percent nonwhite students. By the peak of integration in the 1980s, those numbers had fallen to 62.9 percent and 33.2 percent, respectively. It is only since then that school integration has stalled and largely been undone. As of 2010, about three quarters of Black students attended a majority-minority school and almost 40 percent of Black students attended a school composed of more than 90 percent nonwhite students (Reardon et al. 2012). Despite 45 percent of American children being nonwhite, the typical white child attended a school where three quarters of her peers were white. School segregation cannot be explained by residential patterns alone (Orfield, Kucsera, and Siegel-Hawley 2012).

These competing patterns beg the question: if school segregation is merely a product of residential segregation, how are America's public schools becoming more segregated even as its neighborhoods are slowly integrating?

Scholars have offered three primary explanations to explain these diverging trends: (1) increased residential segregation across district lines; (2) the growth of school choice policies; and (3) increased segregation within school districts via student assignment policies. The first theory suggests that while cities and metropolitan areas have integrated, this residential integration cuts off sharply at the exterior borders of school districts. The Supreme Court's decision in *Milliken v. Bradley* (1974) held that individual school districts could not be held responsible for segregation that exists across district lines. This ruling hampered a series of metropolitan desegregation plans and led to the formation of white, suburban schools districts that were relatively safe from broader integration efforts (Ryan 2010; Lassiter 2013). As recently

as 2017, groups of parents have continued to attempt to secede from poorer, Blacker county districts under the guise of increased local control (Hannah-Jones 2017). Although this explanation of increasing segregation in schools is compelling, it does not do well to address the changing dynamics of residential segregation or the growing levels of diversity within school districts.

A second explanation focuses on the growth of the school choice movement in the form of charter schools, magnet schools, and flexible school transfer policies and its potential to weaken the link between residential segregation and school segregation. In districts in which parents have more power to choose which school their children attend without needing to change their address, school and neighborhood segregation need not be so closely related. For example, a recent study of New York City's schools found that in the 2016-17 school year, 40 percent of kindergartners attended a school other than the one to which they are assigned (Mader, Hemphill, and Abbas 2018). Students who leave their assigned school tend to enroll in schools with higher test scores and fewer low-income classmates.

Historical evidence also suggests that this uncoupling of residential patterns and school assignment policies may be motivated by efforts to maintain segregation in schools. Following the decision in *Brown v. Board of Education* (1954), states and localities began to develop plans to obey the ruling while avoiding its intended impact. For example, Alabama passed the Pupil Placement (or Freedom of Choice) Act in order to theoretically allow parents to "choose whether to send their children to Black, white, or mixed schools," while giving superintendents the practical authority to reject any "'free choices' that represented a threat to the 'peace'" (McWhorter 2001, 105). While school choice options are growing in their prevalence, the vast majority of American children still attend a public school that they are assigned to based on the

location of their home. As a result, the availability of opportunities to opt out of one's assigned public school should be viewed as a variable to control for rather than the primary explanation.

A third explanation focuses on intradistrict segregation, or segregation that exists between the schools within the same district. This explanation is most directly connected to the levers of power controlled by local school district officials and grounded in what led to the success of public school integration in the 1970s and 1980s: busing, or the intentional use of student attendance zones to reduce experienced segregation in schools. Although some districts pursued voluntary integration plans, much of the success of integration efforts in American public schools can be attributed to court desegregation orders and continued judicial oversight of student assignment plans. As this supervision was removed in the late 1990s and early 2000s, empirical evidence suggests that the effects of court desegregation orders have largely been undone (Reardon et al. 2012). It is important to emphasize that the removal of court supervision did not cause student assignment plans to automatically revert to prior assignment plans with higher levels of segregation. Changes to student assignment policies were actively made by local school district officials.

Recently, there has been increased attention given to student assignment policies as a potential force for both socioeconomic and racial integration. A nascent debate has emerged about the prevalence, influence, and motivation for so-called "educational gerrymandering." Ill-defined in both popular and academic use, the phrase generally refers to the influence that irregularly shaped attendance zones may have on the demographic composition of a district's schools. Some research has found evidence that school boards use rezoning opportunities to reinforce patterns of racial segregation and isolation (Siegel-Hawley 2013; Richards and Stroub 2015). Competing claims suggest that educational gerrymandering is primarily used as a tool to

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achieve more racially integrated schools by drawing irregularly shaped school attendance zones that sprawl beyond areas of concentrated residential segregation (Saporito and Van Riper 2015; Saporito 2017; Macartney and Singleton 2017).

It is likely that all three of these explanations are playing some role in the observed resegregation of public schools. There may also be some interaction between these forces. For example, the effectiveness of school assignment policies might be constrained by the presence of school choice alternatives. Public demand for educational gerrymandering might be conditional on the absence of alternatives to an assigned public school. It may be the case that, "Zones provide families of means with exclusive access to the schools they like, while choice allows them to flee the ones they don't" (Mader, Hemphill, and Abbas 2018, 3).

However, there is reason to suspect that racial disparities within districts is a dominant cause of persistent or growing segregation. Recent research on segregation in North Carolina from 1998 to 2016 found that the majority of the state's segregation could be attributed to racial disparities within school districts (Clotfelter et al. 2023). In this chapter, I also focus my attention on the influence of intradistrict factors on school segregation to better understand the role local political institutions and actors play.

Because contemporary discussions about student assignment policies are less frequently framed in terms of integration or busing, limited public and scholarly attention has been given to the role that local administrators play in shaping the racial and socioeconomic composition of schools. In fact, at the height of integration, Rivkin (1994) went so far as to argue that "whether Blacks and Whites attend school together is an issue over which school districts often exert little control. If Blacks and Whites continue to live apart, many districts will be strapped to maintain

their present levels of integration and hard pressed to go further… Only students' movements across district boundaries will reduce the present level of racial isolation" (291).

Thirty years later, this outright dismissal of the role of local government in shaping intradistrict segregation and access to a specific set of public goods needs to be reassessed because, although housing patterns remain a limit on desegregation efforts, increased residential integration suggests that they are most certainly a weaker limit. In the next section, I clarify existing definitions of educational gerrymandering and its potential impact on segregation and student access to quality schools.

2.3 Educational Gerrymandering

Previous studies of public schools have considered school spending through the lens of public goods provision, exploring whether and to what degree public goods are provided in a community. Consider the example given in Alesina, Baqir, and Easterly (1999). Prince George's County in Maryland, once a predominantly white community, passed a law in 1978 imposing a legal ceiling on the property tax after the influx of Black middle class residents. As a result, Prince George's County collects much less local education revenue through property taxes than neighboring counties which are less diverse. The authors go on to make the connection between higher levels ethnic diversity and reduced public goods provision.

However, this anecdote overlooks a key aspect of public education which is particularly relevant in a county school system. While public schools are public goods in that access to the school district is generally non-excludable and non-rivalrous for children living within the school district's borders, access to individual schools in a district is both excludable and rivalrous. Because there are a limited number of seats in any given school, the benefit of attending a

specific school within a district is not possible for all students in the district. As a result, school attendance zoning is better understood as a question of goods allocation or service distribution: which children have access to which schools in a district? As the example of Howard County school board's redistricting plan made clear, this question also forces us to consider whether the answer is connected to a child's race or socioeconomic condition.

Although exogenous forces influence the demographic composition of students living in a district, school attendance zoning gives school boards the opportunity to directly shape the racial and socioeconomic composition of the schools within their districts. More specifically, through this policy lever, school board members can mitigate, maintain, or reinforce existing residential segregation. This argument centers on the fact that "[s]egregation is not organic or inevitable. Rather, it is a matter of design pursued through the political process, offering spoils to those with political power" (Trounstine, 2018, 23).

Decisions about how to change school attendance zones are not typically unifying or popular. For school board members, the process of making these decisions can be time-consuming and ultimately leaves some parents unhappy if their children are negatively affected. Nonetheless, circumstances arise in which school board members have no choice but to make changes to their district's student assignment plan. This is particularly true when a school district is experiencing population growth that is not proportionately distributed throughout the district or when student populations exceed the capacity of a district's facilities. In these situations, school board members are forced to redistribute students from schools that are over capacity to those that are under capacity or they must choose sites for additional school buildings and adjust accompanying SAZs accordingly.

This process can be amplified by racial and class-based concerns in demographically diverse and residentially segregated school districts because school attendance zoning shapes the racial and socioeconomic composition of schools. When used strategically, zoning decisions can exclude specific students from an otherwise homogeneous student body and can be used to group together a heterogeneous blend of students that would not otherwise have opportunities to interact with one another. Even if school administrators are assumed to be motiveless or apolitical during the redistricting process, decisions about student assignment affect student access to educational opportunities.

To be clear, as of 2017, Howard County Public School System is more diverse than typical for a school district in the United States. Not every school district in the United States has enough racial or socioeconomic diversity to actively pursue student assignment policies that change the level of integration within their district's borders. As noted above, significant levels of segregation and inequality persist in America's public schools across school district lines. For example, there is greater variation in the racial and socioeconomic composition of schools between the schools in the Detroit Public Schools Community District and the schools in a neighboring district like Grosse Pointe Public Schools than there is within either of the districts. As a result, past studies have typically focused on school districts' external borders and the associated obstacles of gaining residence within those borders. Particularly in light of the Supreme Court's decision in *Milliken v. Bradley* (1974) which limited integration efforts to individual school districts, many have concluded that school boards lack the "independence and initiative" to make meaningful reforms to public education and should instead be viewed primarily as performing primarily "essential administrative functions" (Howell 2005).

However, the dominant conception of white and wealthy suburban enclaves surrounding city centers of poor, Black, and Hispanic residents is no longer so straightforward. More than half of all racial and ethnic minority groups now live in the suburbs (Frey 2011). Although the poverty rate remains higher in central cities and rural areas, more poor residents live in the suburbs than cities (Kneebone 2017). As suburban neighborhoods continue to experience intense demographic changes, the school districts that serve these communities will continue making choices about how to adjust their school assignment plans to accommodate these new students and whether to actively pursue racial and economic equity given the increased opportunity to do so (Asson et al. 2023).

In addition, the conception of homogeneous school quality within school districts is misguided. As an example, I calculate the range of state percentile rankings within each school district containing more than one elementary school using data from the Michigan Department of Education's Top-to-Bottom School Rankings from the 2015-16 school year. These rankings combine standardized test scores, test score improvement, and graduation rates. Figure 2.1 highlights the range of within-district variation. Returning to the previous example, it is again worth noting that the average elementary school in the Detroit Public Schools Community District is in the 10th percentile in the state compared to the average elementary school in Grosse Pointe Public Schools being in the 90th percentile. The difference in school quality across school districts is often vast and parents with the means to pursue housing in higher ranked districts often do so. However, the student experience within these districts is also highly varied. For example, within the Detroit Public Schools Community District, the lowest rated elementary school is in the 0th percentile while the highest rated elementary school is in the 56th percentile. Similarly, in Grosse Pointe Public Schools, the lowest rated elementary school is in the 60th

percentile while the highest rated elementary school is in the 99th percentile. For parents with the ability to make choices about where they live, access to a school district is often not enough; access to specific schools within the district matters.
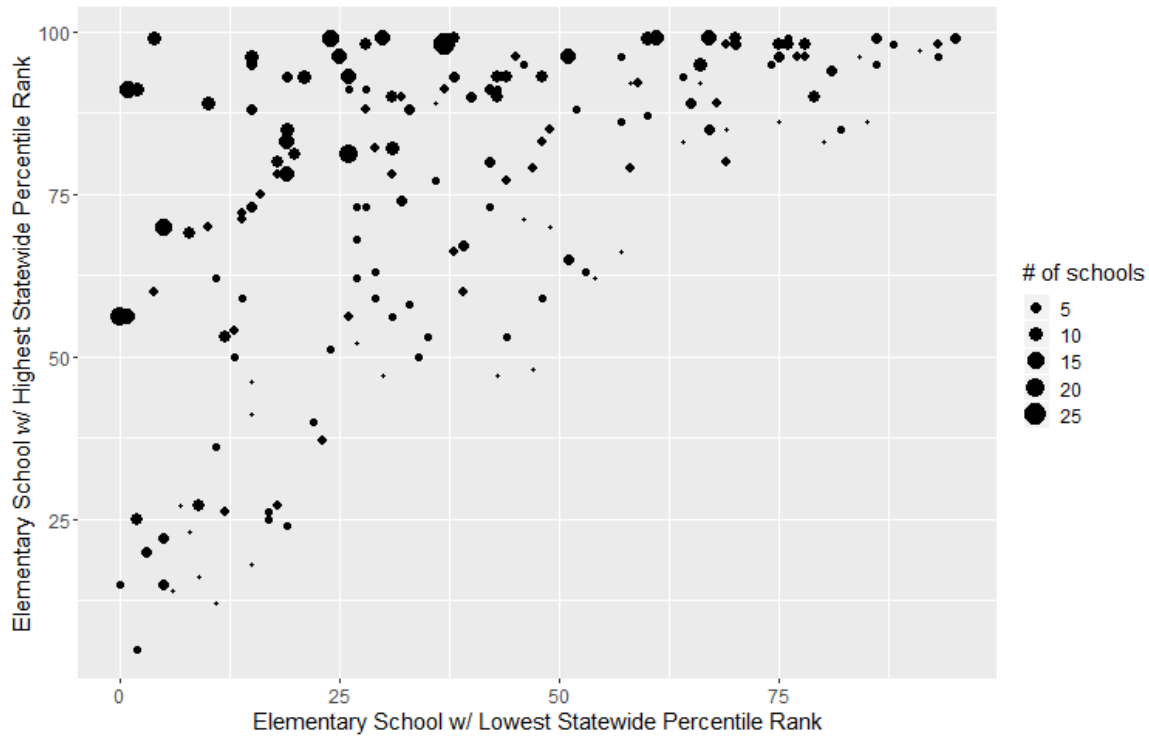
Figure 2.1. **Range in Elementary School Quality Within Michigan Public School Districts, 2015-16.** Statewide percentile rankings come from the Michigan Department of Education's Top-to-Bottom School Rankings from the 2015-16 school year. The sample is limited to the 164 school districts with more than one school with students in grade K to 6.

The combination of increasing racial heterogeneity and the varied school quality within districts makes clear the necessity of studying the politics that shape internal school district decisions, particularly those shaping which students have access to which schools. School assignment plans have the capability to shape the demographic composition of schools, the amount of diversity students are exposed to in the classroom, and the educational opportunities students can access. As mentioned previously, certain types of school assignment plans have been denoted as a form of educational gerrymandering. This term has been casually applied to

discussions of school attendance zone boundaries by journalists and scholars alike to refer to boundaries that have been drawn so as to intentionally reinforce or disrupt patterns of residential segregation (Siegel-Hawley 2013; Hannah-Jones 2014; Richards and Stroub 2015).

In order to motivate a more cohesive and theoretically grounded definition of educational gerrymandering, it is worth noting the current variation in the term's use. One author defines educational gerrymandering as occurring wherever "school systems choose to redraw attendance boundaries in such a way as to intensify racial segregation, often through the creation of oddly formed or discontinuous zones" (Siegel-Hawley 2013, 581). According to this definition, this boundary drawing process does not need to explicitly acknowledge racial parameters or goals; Siegel-Hawley argues that, generally, plans "either advance the goals of integration or allow the troubling patterns of segregation that have long defined American central cities to take hold" (2013, 581). This definition highlights a specific type of educational gerrymandering, but it unnecessarily limits our understanding of the phenomenon. While educational gerrymandering can be used to increase or reinforce racial segregation, it can also be used to pursue racial integration or to impact the levels of socioeconomic integration.

Alternatively, Richards and Stroub define educational gerrymandering as "evidence of a process by which educational boundaries are distorted to exclude certain students living relatively close to a school in favor of other students living farther away" (2015, 6). While Siegel-Hawley's definition was a bit too limited, this definition is overly expansive and considers any instance in which a child is zoned to a school other than the geographically most proximate school to be an instance of educational gerrymandering irrespective of school board intent or policy consequence. In comparison to these definitions, Saporito (2017) chooses to avoid using the word "gerrymandering" altogether in his study of attendance zone irregularity because it

"implies that school districts intentionally manipulate their attendance zones to achieve segregation–and the current literature, including this study, cannot make such causal claims given the limitation of available data" (2017, 1374). Although this choice successfully avoids improper causal inference, it also avoids any contribution to our understanding of school board behavior and treats attendance zones as naturally occurring phenomena to be studied outside of the political and institutional contexts in which they are created.

A natural starting point for a definition of gerrymandering in the educational context is gerrymandering in its original electoral context. Electoral gerrymandering is typically defined as the strategic drawing of electoral districts to include or exclude certain types of voters in order to maximize the likelihood of an electoral outcome. The electoral outcome of interest can vary. For example, partisan gerrymandering involves maximizing a party's electoral success and probability of winning enough seats to control government. In comparison, racial gerrymandering pursues the goal of either increasing or decreasing the probability of racial minorities electing their preferred candidates.

Unlike electoral gerrymandering, which has a clear maximizing function, educational gerrymandering is not as directly connected to a political outcome. Although school board members may be assigned to school clusters as points of contact for each school community, there is typically no direct relationship between a member's election district and a set of attendance zones. That is, efforts to adjust school attendance zones do not give school board members the ability to choose the set of voters they will face come election time. This is especially true for school board members who hold at-large seats that represent a school district in its entirety. However, the absence of a direct electoral connection does not mean that the redistricting of student attendance zones is apolitical. Although attendance zoning certainly

serves the administrative function of balancing student populations within the capacities of district facilities, there are numerous ways for school boards to concurrently pursue electoral or ideological goals. For example, a school board could use redistricting to actively pursue the goal of greater socioeconomic integration. Alternatively, a school board could redistrict in ways that avoid negatively impacting their most likely voters, namely wealthier homeowners and parents. A third strategy may seek to impact as few students as possible to minimize public attention to the redistricting process. All three of these strategies can accomplish the balancing of students across schools while leaving room for school board members to pursue political goals.

To incorporate the breadth of political purposes for which it can be used, I define educational gerrymandering as the strategic drawing of school attendance zones to systematically include or exclude certain students of specific groups, namely racial and socioeconomic in nature. Notably, this definition is expansive enough to incorporate instances of educational gerrymandering that lead to greater segregation or integration by both race and socioeconomic status. It also excludes scenarios where there is a minimal impact of irregularly shaped attendance zones or zoning that assigns students to a school other than the one closest to their homes. In the next section, I consider the usefulness of existing theories of school governance to explain varying levels of educational gerrymandering.

2.4 Theories of School Governance

As local governments, school boards "levy taxes, hire teachers and administrators, approve curriculum, set specific academic standards and school discipline codes, disburse billions of dollars, and decide who will use the high school gymnasium" (Lutz 1980, 452-453). While the federal and state governments certainly play a larger role in school governance today than they

did in the early 20th century, most of these decisions are made by elected officials on local school boards. Political theories of local educational governance focus on the ways in which voters shape the decision-making process and policy outputs of school boards.

Existing work on educational governance is limited and often centers on establishing a normative understanding of whether school governance in the United States is or can be democratic. For example, continuous competition theory, also referred to as continuous participation theory, concludes that voters have little democratic control of school policy because of limited voter turnout and the absence of serious competitors or differentiating political platforms (Zeigler 1974). Alternatively, decision output theory examines the congruence between the demands placed on school boards by the public and the programs and policies a school board produces (Lutz and Gresson III 1980). Like continuous competition theory, this theory finds school boards to be generally undemocratic because of their inability to respond to the specific requests of parents through the generalized policies that they set. Despite their normative contributions to our understanding of democracy in local institutions, these theories offer limited means of generating a positive understanding of why the policy outcomes of school board governance look the way they do.

In contrast, dissatisfaction theory allows for a meaningful electoral connection between local citizens and school boards even when voters have limited political knowledge or participate at low levels (Iannaccone and Lutz 1970). In its original formulation, the theory was intended to qualitatively describe a sequence of political events in which changing community values lead to dissatisfaction, dissatisfaction leads to higher levels of community involvement in school elections, greater participation leads to the defeat and removal of incumbent school board members, and finally the changes to the composition of the school board lead to the replacement

of a district's superintendent or changes to district policies (Iannaccone 1996; Alsbury 2003). This theory is marked by long periods of political inactivity in which a latent and inattentive citizenry assumes good performance from school leadership unless given reason to believe otherwise. It is only when dissatisfaction reaches a certain critical level, whether due to shifting public preferences or specific changes in district policy, that these voters actively participate to remove incumbent leadership. Understanding dissatisfaction theory as a somewhat inverted version of retrospective voting, it can be a useful tool to understand school board behavior more generally. Even without voters regularly participating or actively monitoring the performance of the district or its leadership, the potential dissatisfaction of the public creates a clear and consistent political incentive for representatives interested in reelection to avoid divisive or attention-generating policy decisions. In the context of school assignment planning, dissatisfaction theory suggests that school boards would be interested in limiting the number of students affected through rezoning or limiting the effect on the most attentive and politically active portions of their electorate.

While congressional behavior is typically interpreted through the lens of electoral incentives (Mayhew 2004), there is good reason to believe that school board members are susceptible to similar pressures to make decisions with the next election in mind. To be clear, local school boards lack the professionalization of many of the deliberative bodies studied most frequently in the field. Unlike a U.S. congressperson, many state legislators, or mayors of large cities, the average school board member is poorly compensated, not well known, and lacks the opportunity to convert the position into a career. As a result, one may assume that school board members are less interested in reelection. However, empirically, school board members frequently seek to retain their seats. For example, in the 1,000 largest school districts by student

enrollment, over 71 percent of incumbents sought reelection from 2014 to 2016 (Ballotpedia 2017). Of these candidates, over 80 percent won reelection. With such a large proportion of school board members seeking reelection, it is defensible to assume that school board members are generally interested in reelection and, as such, their policy decisions can be influenced by electoral incentives.

In addition to dissatisfaction theory, Greene (1992) introduces two more positive theories of school governance which may prove useful in explaining the differences in the use of school attendance zoning. Greene argues that school boards are unique governmental units because of the conflicting expectations that they simultaneously serve as representative bodies which reflect community preferences while also deferring to the professional expertise of the superintendents that they hire. Although this form of government is analogous to a council-manager form of local governance, Greene classifies school boards as professional organizations if they tend to pursue technical solutions through the expertise of their superintendent or political bodies if they tend to respond to parent and community demands (Tucker and Zeigler 1980).

While the terminology of political and professional governance might be unique to school boards, the underlying concepts are not. Much like other elected officials, school board members must consider how to best represent the voters that elected them. This works out to a question of representation that has long been considered by political scientists including Mill, Burke, and Madison (Fox and Shotts 2009). Elected officials can act as delegates who rely less on their own opinions or available expertise and instead pursue the policies that are supported by the majority of the public. In this case, whether seeking to fulfill campaign promises made to the public or anticipate the wishes of future voters, representatives tend to look outward to the preferences of the public. Alternatively, elected officials can act as trustees who pursue policies that promote

the general welfare on behalf of the public even if the public has undeveloped or negative

opinions about those policies. While representatives may consult the policy recommendations of

subject experts, they ultimately look inward to make decisions grounded in their beliefs and

principles. This gyroscopic model of representation suggests that the public primarily shapes the

actions of their representatives through the action of choosing representatives with similar

preferences who also seem honest, principled, and sufficiently skilled (Mansbridge 2003).

These models of representation have primarily been used to study the actions of

representatives in federal legislatures, but can and should be extended to understand local

political bodies as well. In the context of school district governance, the professional model of

school board decision-making is a version of trustee representation and the political model

corresponds with delegate representation. Greene's nomenclature which classifies school boards

as either political or professional is misleading because it suggests that professional school

governance is apolitical. However, both the professional and political models allow for school

board members to pursue their own electoral interests. For school board members, it is primarily

a question of whether voters will most reward their technical competence or their congruence

with public opinion. As a result, I adopt the terminology of delegate representation and refer to

Greene's political model as the delegate model moving forward.

Outside of Greene's work, earlier studies of school governance tend to dismiss a political

understanding of school board members arguing that the "vast majority" of board members "try

to come to decisions that are equally good for *all* the people" and they "honestly strive to do

what is best for the total community" (Lutz 1980, 459). This conclusion should not be accepted

on face value for at least two reasons. First, there is evidence that school board conflict is more

common and the boards themselves are more politicized than they were in the past (Greene

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1992). Second, school boards regularly set policies which unevenly impact students. Particularly in the case of school assignment rezoning, all students cannot attend the same school and so it is not possible for board members to come to "decisions that are equally good for all people." Decisions which distribute students among schools with limited seats are zero-sum decisions which are more likely to draw attention from voters and can lead to higher levels of political conflict.

In the context of school assignment, the professional model of school governance would suggest school board decision making that is relatively insulated from public opinion. The observable implications of the professional model on student attendance zones are rather ambiguous. School board members may seek to minimize transportation costs by sending students to the schools nearest their homes, pursue assignment plans that increase racial or socioeconomic integration because of the known benefits of integration for student outcomes, or pursue any number of other goals based on their own perceptions of what is most important to accomplish through the drawing of student attendance zones.

In comparison, the delegate model of school governance centers on a school board actively seeking to understand and incorporate public opinion, either as a means of assessing common values or improving public buy-in for final decisions (Castro, Parry, and Siegel-Hawley 2022). As a result, the delegate model would suggest that school boards draw school attendance zones in the ways that reflect their understanding of public opinion, which will be disproportionately shaped by residents who are most politically active. Although differences in political participation rates can be primarily attributed to differences in participatory resources, it remains the fact that white and wealthy citizens are more likely to participate in politics and have

their concerns heard by policymakers (Verba et al. 1993). In many districts, it may be the case that school assignment zoning is biased in ways that benefit the white and wealthy.

2.5 Constraints on School Board Behavior

School governance does not happen in a vacuum. Regardless of the preferences and incentives of school board members about whether and how to use school assignment plans to pursue racial equity, school board decision making is constrained by three notable forces: the public, federal oversight, and the demographic context within their jurisdiction.

As noted above, the dissatisfaction and delegate models of school governance both suggest that school board members are attentive to public opinion, whether they are seeking to avoid the attention of a latent public or actively seeking to understand and incorporate public value. In response to proposed rezoning efforts, school board members may face a potential electoral backlash, as seen in the example of Howard County Public Schools, or the threat of parents voting with their feet. In an analysis of public comments on rezoning plans in Richmond, VA, multiple parents threatened to opt into private schools or other school districts if their students were rezoned to a school with a higher concentration of Black students (Castro, Parry, and Siegel-Hawley 2022). The increased implementation and availability of school choice policies – whether charter schools, magnet schools, or open enrollment plans – further impacts the ability of school boards to use school assignment plans as effective policy levers to shape within-district segregation (Holme et al. 2013). Even if school boards opted to use rezoning as a method to improve integration within a district, school choice gives more parents the ability to opt out of their assigned school and effectively unlink the relationship between the composition of student attendance zones and the composition of schools.

In addition to the threatened and realized behavior of affected parents, school board action is also constrained by the demographic composition of the district. As noted previously, the Supreme Court's decision in *Milliken v. Bradley* (1974) prevents individual school districts from being held responsible for cross-district segregation. As a result, desegregation plans are only enforceable within a school district and all school board action must be measured relative to the theoretical maximum level of integration possible given the racial composition of a district's student body.

Finally, some school districts are still under court-ordered desegregation plans. Past research has demonstrated that this form of court oversight is effective at reducing racial school segregation, though segregation tends to increase gradually after districts are released from these court orders (Reardon et al. 2012). For districts under court oversight, school boards may have incentives to seek more integration than they would otherwise, but they are certainly limited in pursuing more segregation.

2.6 Data and Methods

In order to assess the role of school boards in shaping racial segregation within districts through the drawing of school attendance zones, I make a series of comparisons between the level of segregation in districts according to student enrollment totals, estimates based on enacted school attendance zones, and estimates based on neighborhood residential patterns. Deviations between the level of segregation under enacted school attendance zones and the level expected based on residential patterns are evidence of policy impact. Additionally, I seek to identify the district-level factors that best explain these deviations and the characteristics of the students most affected by these zoning decisions.

2.6.1 Data

Data about existing school attendance zones are from the School Area Boundary Survey (SABS) conducted by the Department of Education's National Center for Education Statistics (NCES) for the 2013-14 school year. With the exception of school districts in a few states which regularly collect statewide data on school attendance zones (e.g., Minnesota), each school district or local education agency was contacted directly and asked to self-report current SAZs for the schools in its district. The NCES cleaned and condensed these responses to form a nationwide database of Geographic Information System (GIS) files which includes the SAZs in 85 percent of the United States' regular school districts. Collectively, these districts are responsible for the education of 38.8 million students, more than three quarters of American children.

I narrow my sample for both theoretical and practical purposes. First, I focus attention on a district's public elementary schools with students in grades pre-kindergarten to 6, rather than its intermediate or high schools. In order to identify a set of mutually exclusive and collectively exhaustive SAZs within a district, it is necessary to limit attention to one level of schools, with elementary school attendance zones often combining to form intermediate and high school attendance zones in defined feeder patterns. Elementary schools tend to have the smallest student populations and are therefore most numerous within districts, with even relatively small districts having multiple elementary schools while only having one intermediate or high school. As a result, a broader set of school boards are likely to draw elementary school attendance zones which tangibly shape student access. While analyses of intermediate or high schools are valuable for future study, focusing the analysis on elementary schools retains a more diverse set of school districts such as suburban or rural school districts rather than urban and county-based school districts alone.

Next, I filter out charter schools, magnet schools, or open-enrollment schools that do not serve students based on their residential location. There is good reason to believe that the presence of these schools impacts the amount and effectiveness of educational gerrymandering in a district. Politically active parents are less likely to work to influence the shape of SAZ boundaries if the spatial environment is made irrelevant. For now, my analysis sets this data aside, but I expect this to be a future source of rich information.

Additionally, I remove school districts in which all students of the same grade are assigned to attend the same school. This includes districts with only a single elementary school, but it also includes districts with multiple elementary schools that are split by grade in such a way that students of the same grade are never in separate buildings. For example, a district with two elementary schools might have a K-2 school and a 3-5 school. In either of these scenarios, all students of the same grade attend the same school and, as a result, school boards could not increase or decrease segregation within the district's borders through zoning decisions. It is possible that, in an attempt to maximize integration, a school board with two or three schools might adopt a tiered, split grade system. However, without longitudinal data and a much larger sample of schools adopting this zoning style, including these districts is not theoretically interesting or empirically useful.

Finally, I limit my sample to school districts with elementary student populations which are at least 5 percent Black and at least 5 percent white. Because this analysis centers on a comparison between the social environments inhabited by Black and white students, it is necessary to limit my analysis to districts with sufficient levels of diversity. Additionally, segregation indices are known to be unreliable or biased when the minority group's share is not sufficiently large (Allen et al. 2015; Mazza 2017).

After making these adjustments, I have data on the 2013-14 school attendance zones for 1,078 public school districts in the United States comprising 13,689 elementary schools in 39 states. The median school district had six elementary schools and 3,135 enrolled elementary students. Collectively, these schools served more than 7.5 million elementary-aged children or about 34.1% percent of U.S. children in this age range. These limits primarily filter out schools in smaller, rural districts and districts with either limited Black or white student populations. As a result, this data is slightly more diverse than the population of American elementary school students. While, nationally, elementary school students are 49.1 percent white and 14.4 percent Black, in this sample, the students are 39.4 percent white and and 21.4 percent Black

Enrollment data for the 2013-14 school year for the schools in these districts come from the National Center for Education Statistics's (NCES) Common Core of Data (CCD). In order to understand how the demographic composition of a school might change under an alternative zoning plan, I also use GIS census block shapefiles from the 2010 Decennial Census linked to block-level data on race. By overlaying this demographic data onto the SAZs, particularly the school district's exterior boundary, I can measure fine-grained demographic patterns of each district while also generating school-level estimates of the racial and socioeconomic composition under alternative SAZs.

Within the boundaries of the 1,078 school districts in my sample, there are over 1.5 million Census blocks with a median population of 37 people represented by each block. The median district has 852 blocks. With this fine-grained geospatial demographic data, I am able to estimate the demographic composition of a district's schools under its enacted student assignment plans using residential patterns and I can also reassign Census blocks to consider

what the demographics of schools could be under alternative assignment plans. I will discuss this process in greater detail in Section 2.6.3.

As noted above, the availability of school choice alternatives to public education has the potential to redefine the relationship between the demographic composition of a school district's neighborhoods and its schools and the incentives and effectiveness of school board action in regard to student assignment zoning. To better account for this, I use two datasets to measure the availability of school choice at the district-level. First, I use data from the NCES CCD on the location and enrollment totals of both charter schools and magnet schools with students in grades pre-kindergarten to 6. Because charter schools do not always fall under the administrative purview of the districts in which they're located, I use geocoded information about the physical location of charter and magnet schools, overlay this data onto GIS data on each school district's exterior boundaries, and limit my sample to charter and magnet schools which are located within the geography of my sample of school districts. For each district, I estimate the availability of school choice in the form of charter and magnet schools as the ratio between the total number of students enrolled in charter and magnet schools in the district and the total number of students enrolled in the district's non-charter, non-magnet public elementary schools.

Adopting a similar methodology to understand the availability of private schools in a district, I use data from the 2013 Private School Universe Survey (PSS) which is conducted biannually and captures factors such as student enrollment, faculty size, program emphasis, and religious orientation. For my purposes, the PSS is primarily useful because it provides geocoded information about the location of private schools which I can use to create a spatial object to overlay on the school district boundaries generated from the SABS dataset and estimate the total number of students enrolled in private schools. For each district, I estimate the availability of

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school choice in the form of private schools as the ratio between the total number of students enrolled in private schools located within the district and the total number of students enrolled in the district's public elementary schools.[3]

Next, I incorporate data from Reardon et al. (2012) on court-ordered desegregation plans. This dataset was constructed to understand the impact of the increasing number of desegregation plans that have been dismissed in the past few decades and includes whether a district was previously or is currently subject to a court-ordered desegregation plan. Although court enforcement of these plans is not particularly robust today, the presence of these plans may still serve as a tangible constraint on or incentive for school board action.

Finally, I estimate the partisan composition of school districts using the county-level election returns data from the CQ Voting and Elections Collection. There is reason to suspect higher levels of segregation in more Republican geographies. Conservatives are more skeptical about the value of pursuing policies which address racial equality (Lewis and Nice 1994). Additionally, almost four out of five Republican voters believe that little or nothing needs to be done to ensure racial equality (Pew 2021). For each district, I calculate the county-level Democratic share of the two-party vote in the 2012 presidential election.[4]

2.6.2 Measures of Segregation

Primarily through the study of residential segregation, scholars have developed numerous measures of segregation, recognizing that segregation is a fundamentally multidimensional phenomenon (Massey and Denton 1988). As a result, I adopt measures of two dimensions of

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[3] These measures of school choice do not take into account the affordability of private schools or the fact that parents may send their children to private schools located beyond the borders of the district in which they live. However, this measure serves as a sufficient initial proxy for the availability of private school choice.

[4] This measure is unable to capture within-county differences in partisanship. More localized electoral data would improve its usefulness.

segregation to separately capture the degree to which Black and white students are evenly

distributed across the schools in a district and the degree to which Black and white students are

exposed to one another as a result of that distribution.[5]

As a measure of evenness, I first adopt Duncan and Duncan's (1955) index of

dissimilarity (*D*), which measures how evenly individuals in two groups are distributed among

units (e.g., neighborhoods, schools, occupations) as my measure of school segregation. The

index is bounded by 0 (perfect integration) and 1 (perfect segregation) and is formulated as:

$$D \; = \; \frac{1}{2} \sum_{j=1}^{J} \left| \frac{n_j^1}{n^1} - \frac{n_j^0}{n^0} \right|$$

where there are $j \; = \; 1, \; ..., \; J$ occupations in the labor market and all individuals $i \; = \; 1, \; ..., \; n$

are in either group, $g \; = \; \{0, \; 1\}$. This measure is valuable because of its consistent use in the

literature, which allows for more direct comparisons across time and contexts, and for its ease of

interpretation. In the context of a school district, the dissimilarity index *D* represents the

proportion of one group that would need to change occupations in order for the two groups to be

evenly represented across each occupation.

As a measure of exposure, I adopt the Coleman index of exposure (Coleman et al. 1975).

Measures of exposure capture the degree of potential contact between two groups as a result of

sharing a common environment. While evenness can be a rather abstract measure of group

distribution, an exposure index is intended to more directly capture the degree of segregation

experienced by the average member of a group. Introduced by Bell (1954), the most common

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[5]Although multigroup measures of segregation have been developed and other racial groups, especially Hispanics, make up an increasing share of public education in the U.S., I focus on segregation between Black and white students because of the long history of anti-Black racism in U.S. public education.The results presented here are robust to a specification which separates all students into white and nonwhite.

measure of group exposure is the interaction index, ${}_xP^*_y$, which is formulated as the

majority-weighted average of each spatial unit's minority proportion. In the context of a school

district, this measure reflects the probability that a randomly drawn member of group X attends

the same school as a member of group Y and is inherently shaped by the demographic

composition of the district. To better account for the maximum exposure rate possible given a

district's demographics, the Coleman index (Coleman et al. 1975) functions as a corrected

exposure rate. If all schools within a district perfectly represented the demographic composition

of the district as a whole, the interaction index would equal P_y, the overall share of members

from group Y in the district. The Coleman exposure index can thus be expressed as:

$$Coleman_{xy} = (P_y - {}_xP^*_y)/P_y$$

The index is bounded by 0 (perfect integration) and 1 (perfect segregation) in the same way as

the dissimilarity index, but more explicitly connects the degree of interracial contact as a

function of a district's racial composition and the segregation of its schools (Clotfelter et al.

2023).

 For reference, Figure 2.2 presents a scatterplot of the level of segregation within public

school districts using the dissimilarity index and the Coleman exposure index. Although these

two measures of segregation tend to move together and similarly identify the most and least

segregated school districts, the two measures do appear to be capturing different facets of

segregation. In general, the Coleman exposure index is less sensitive to school compositions

deviating from the district composition so long as the minority and majority groups in a district

are still interacting with one another. As a result, there are numerous districts with somewhat

high levels of dissimilarity, say larger than 0.25, which have quite low levels of exposure, say

smaller than 0.12.
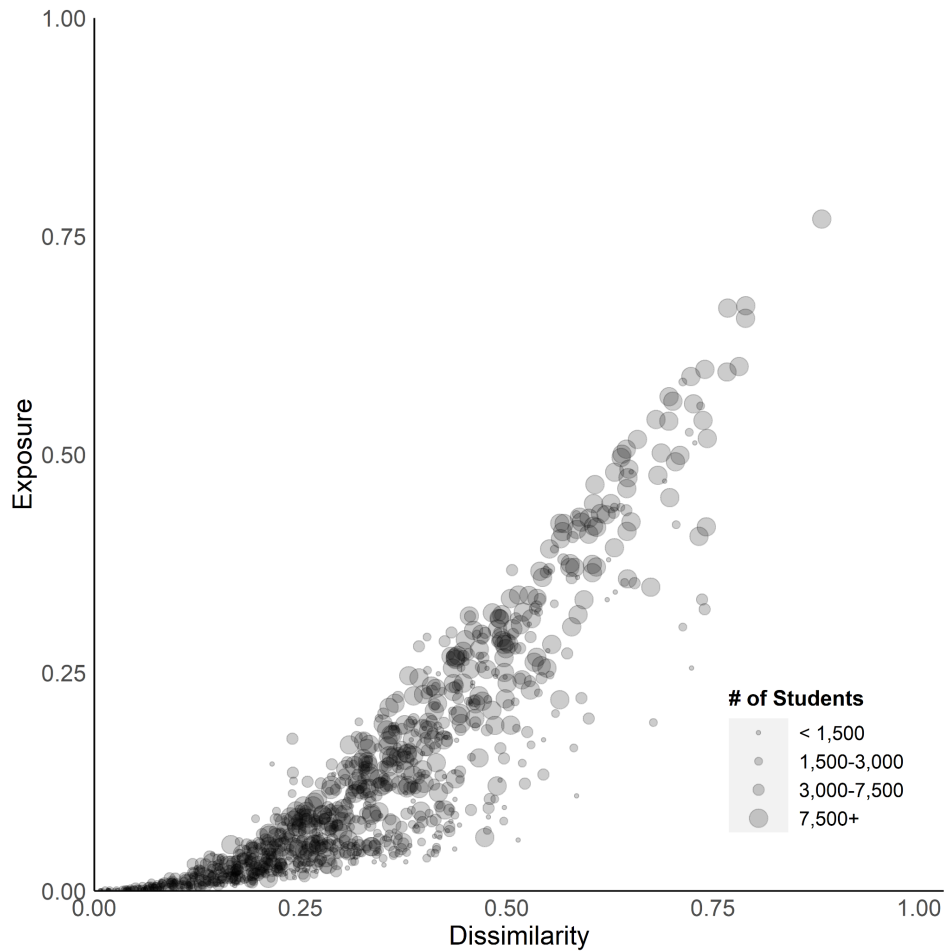
Figure 2.2. Black-White Dissimilarity and Exposure Within Public School Districts, 2013-14. Each point represents a public school district with multiple elementary schools serving children of the same age and a district student composition that is at least 5 percent Black and 5 percent white. Enrollment data for the 2013-14 school year for the schools in these districts come from the National Center for Education Statistics's (NCES) Common Core of Data (CCD).

2.6.3 Estimating Impact of School Attendance Zoning

Past efforts to measure educational gerrymandering have primarily relied on analyses of the

dispersion and indentation of the geometrics shapes of SAZ boundaries (Saporito and Van Riper

2015; Richards and Stroub 2015). Highly elongated shapes with jagged edges are considered to

be more gerrymandered than more compact shapes with smoother perimeters.

Although adoption of these geometric measures allows for a more direct comparison to the existing literature on electoral gerrymandering, these measures fail to account for the practical differences between an electoral district and a student attendance zone. Although an elected representative is expected to represent the shared interests of the constituents within their electoral district, most voters have a limited physical or intellectual relationship with the contours and geography of the electoral district and the composition of other constituents within the electoral district's boundary. In comparison, SAZs directly connect constituents to a geographically fixed public good which will be shared and experienced with the other constituents living in a SAZ's boundaries. In addition, geographic measures are potentially sensitive to instances in which an attendance zone is partially coterminous with the boundary of its school district, a natural or man-made geographic boundary such as a coastline, river, highway, or major thoroughfare.

Instead, I adopt a lesser used measure of educational gerrymandering which relies on simulating a reasonable counterfactual set of SAZs and comparing the level of segregation present in the enacted and counterfactual SAZs (Monarrez 2017). Because there are no legal constraints on school attendance zones that require them to be contiguous or balanced like the districts of U.S. House members and the vast majority of state legislators, it is less straightforward to define and explore an entire distribution of counterfactual attendance zone plans (Chen and Rodden 2013). Instead, I generate a single counterfactual that is plausible, efficient, and rooted in a commonly held assumption about how all students are assigned: a strict definition of "neighborhood schools" in which students are assigned to the school that is geographically most proximate to where they live. To do this, I assume each school district's exterior boundary and the location of schools are fixed. I then drew Voronoi polygons such that

every point within the district boundary was assigned to the nearest elementary school. Using the centroids of the Census blocks, I then assumed that all Census blocks that fell within a school's corresponding Voronoi polygon were assigned to that school.[6]

Figure 2.3 provides a useful example of ways in which enacted SAZs, as shown in panel A, can diverge from the concept of neighborhood schools, as shown in panel B, through the example of Ann Arbor Public Schools. Each point represents the location of an elementary school and the surrounding polygon, or set of polygons, represent the portion of the district in which students assigned to the school live. Many of the attendance zones in this district are noncontiguous as can be seen by the polygons in panel A which do not have a school within their borders. Additionally, these SAZs show visual evidence often associated with gerrymandering: the polygons are elongated and irregular. In comparison, the counterfactual SAZs shown in panel B assign all students to the school that is physically most proximate, resulting in more regular shapes that are compact and have smooth edges.[7]

To build on the example of Ann Arbor Public Schools used in Figure 2.3, consider the example of Angell Elementary. As highlighted in Figure 2.4, the student attendance zone for Angell Elementary is made up of three noncontiguous polygons; one of these polygons is particularly isolated from the rest of the SAZ with more than 3 miles from the polygon's nearest edge to the elementary school and about 2 miles between its border and the border of the polygon which contains the elementary school itself. For students living within this disconnected polygon that assigns them to attend Angell Elementary, there are eight elementary schools within the district that are physically more proximate. Thus, by drawing noncontiguous SAZs, the Ann

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[6] One limitation of this method of estimation is that it does not take into account the density of Census blocks or the possibility that this counterfactual may lead to over enrollment at some schools.
[7] One limitation of this method of drawing counterfactual SAZs is that it does not account for natural or man-made barriers, such as rivers, highways, or major thoroughfares, which may influence the way that neighborhoods are understood within a school district and may influence the amount of time it takes to travel to and from a school. With more robust data, this concern could be addressed directly.
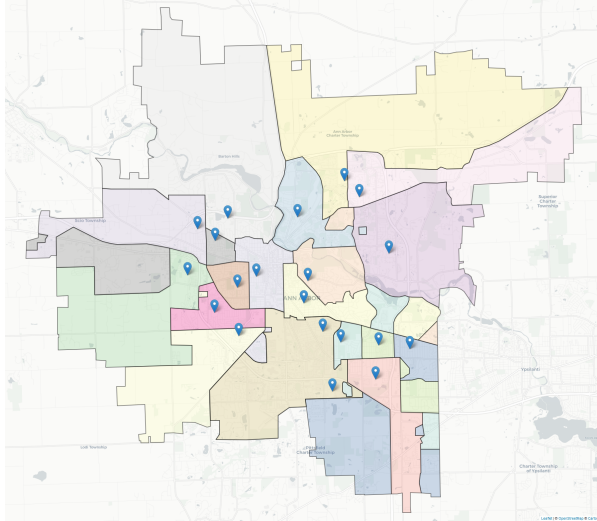
A   B
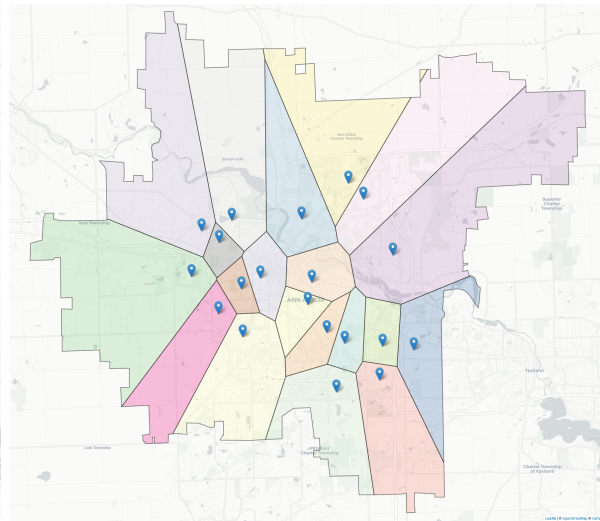
Figure 2.3. School Attendance Zones for Elementary Schools in Ann Arbor Public Schools, 2013-14.
Panel A shows the enacted elementary school attendance zones in Ann Arbor Public Schools for the
2013-14 school year. Each point represents an elementary school and each surrounding polygon (or set of
polygons) represents the attendance zone. Panel B shows the counterfactual school assignment plan in
which a Voronoi polygon is drawn around each school such that any given student is assigned to the
school closest to where she or he lives. Data are from the National Center for Education Statistics' School
Area Boundary Survey, 2013-14

Arbor Public Schools Board of Education strategically zoned students to attend Angell

Elementary while excluding the students that live in between the three polygons.

    Although Ann Arbor Public Schools is a somewhat extreme example in terms of the

irregularity of SAZs, a large share of students are zoned to schools other than the one closest to

their home, contrary to popular belief about the ubiquity of neighborhood schools. Across the

school districts in my sample, 29 percent of residents are assigned to an elementary school other

than the one nearest their home.

    The final step of this process is to understand how these zoning decisions impact the

racial composition of schools in a district. Through the combination of data from the NCES

CCD, SABS, and the 2010 Decennial Census, I am able to calculate the pair of segregation

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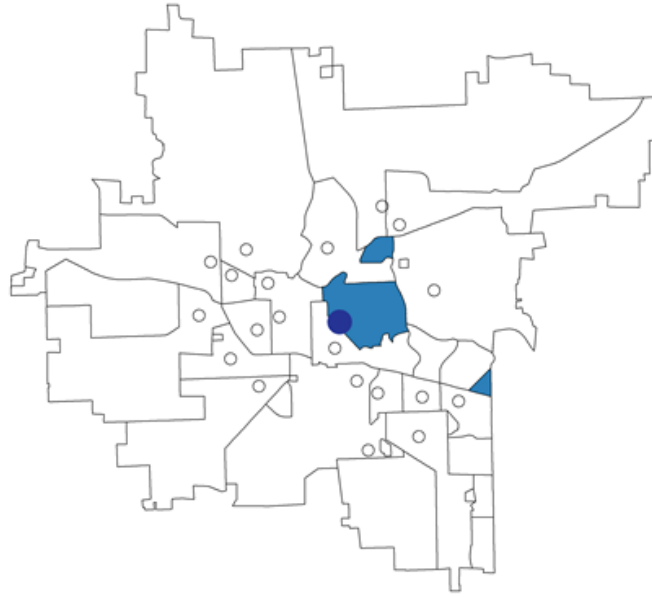
Figure 2.4. Example of Noncontiguous School Attendance Zones: Angell Elementary School in Ann Arbor Public Schools, 2013-14. This figure shows the enacted elementary school attendance zones in Ann Arbor Public Schools for the 2013-14 school year. Each point represents an elementary school and each surrounding polygon (or set of polygons) represents the attendance zone. The blue point represents the location of Angell Elementary School and the blue polygons represent the areas of the district from which students are assigned to attend the school. Data are from the National Center for Education Statistics' School Area Boundary Survey, 2013-14.

measures described above in three ways. First, I calculate the dissimilarity and exposure indices directly on the school enrollment data from the NCES CCD data from the 2013-14 school year. This data allows for the most direct and accurate measurement of school segregation experienced by students. Next, I calculate the dissimilarity and exposure using the demographic estimates generated from overlaying the Census block data on the enacted SAZs. Finally, I calculate both indices on the estimates of the school-level estimates generated from the Census block data and the counterfactual "neighborhood" SAZs.

2.7 Results

2.7.1 The Impact of School Assignment Plans on Segregation

Figure 2.5 illustrates the difference between the level of segregation that exists under currently enacted SAZs and that which would exist under the counterfactual system of neighborhood SAZs. In the figure, each point represents a school district, with the x-axis representing the level of segregation that would exist if all students were zoned to attend their "neighborhood" school which is defined as the school that is most geographically proximate to their home. This value can be understood as the baseline level of segregation that might exist as a result of existing residential segregation and the fixed location of school buildings. The y-axis represents the difference in the level of segregation that exists under the school assignment plans in effect as of the 2013-14 school year and that which would exist using neighborhood zoning. These values are signed such that positive values represent districts in which the current school assignment plans lead to more segregation than a plan in which every student attended the nearest school.

There are two key takeaways from Figure 2.5. First, many districts have a similar level of segregation under the current school assignment plan and the neighborhood counterfactual assignment plan. These districts are clearly visible in the clustering of districts around a difference value of zero whether measured using the dissimilarity or exposure indices. Particularly when measured using the Coleman exposure index, shown in panel B, many districts have low levels of segregation to begin with and therefore school board actions can only be used to increase segregation. In these districts, it is either the case that enacted SAZs and counterfactual SAZs are highly similar or that the differences do not have a substantial impact on Black-white segregation. It is worth noting that these results do not suggest that school assignment plans could not be used to reduce segregation; recent findings on three suburban school districts in Maryland suggest that school attendance zoning is underutilized as a tool to improve racial and socioeconomic integration in districts (Asson et al. 2023). However, in many

A

B
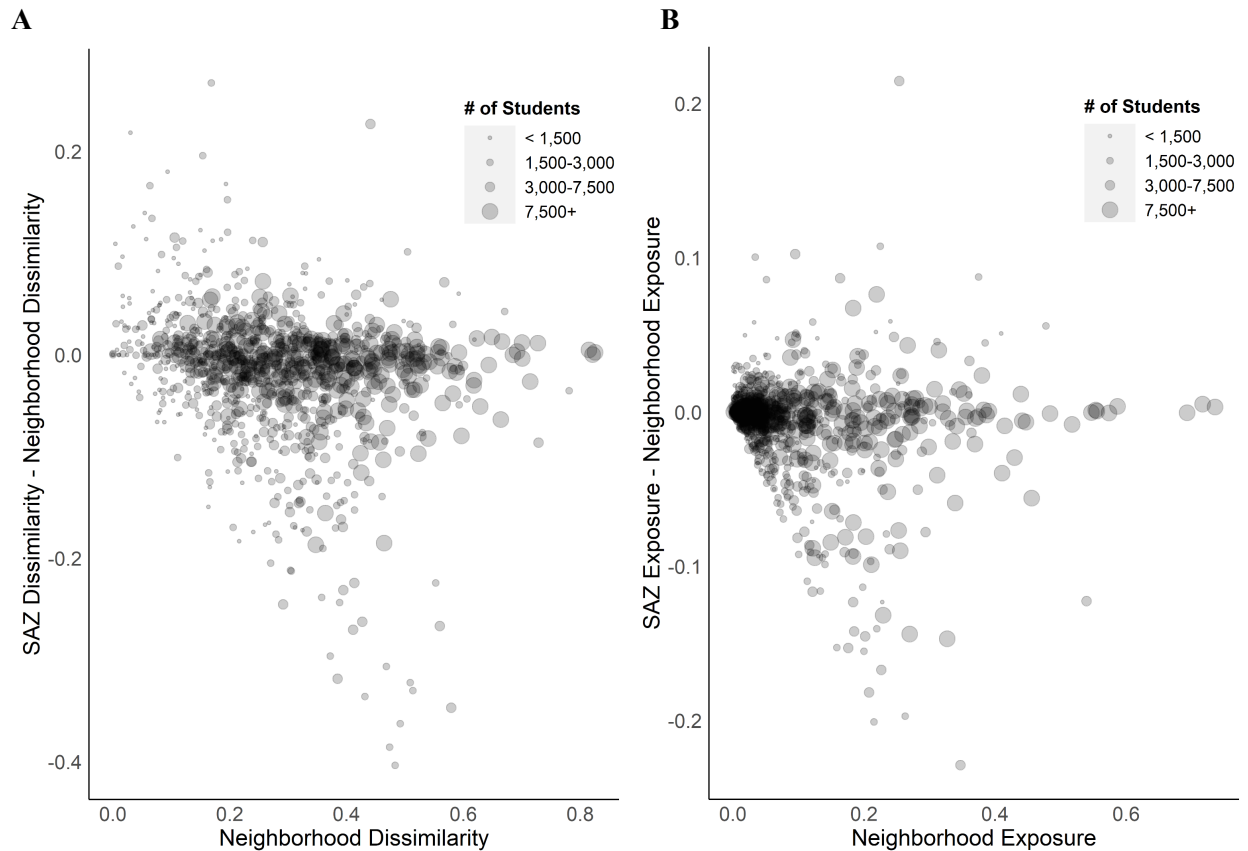
Figure 2.5. Difference in Black-White Segregation between Enacted School Attendance Zones and Neighborhood School Attendance Zones. Each point represents a school district and is sized according to the total number of elementary school students in the district. The x-axis represents the level of segregation that would exist if all students were zoned to attend their "neighborhood" school or the school that is most geographically proximate to their home. The y-axis represents the difference in the level of segregation that exists under the school assignment plans in effect as of the 2013-14 school year and that which would exist using neighborhood zoning; these values are signed such that positive values represent districts in which the current school assignment plans lead to more segregation than a plan in which every student attended the nearest school. Segregation between Black and white students is measured in Panel A using Duncan's dissimilarity index and it is measured in Panel B using Coleman's exposure index. Data are from the National Center for Education Statistics' School Area Boundary Survey, 2013-14 and the 2010 Decennial Census.

districts, it is not currently being used to successfully alter the level of district-wide Black-wide

segregation.

The second notable takeaway from Figure 2.5, is that when school assignment plans alter

the demographics of a district's schools, they are more likely to be used as a tool for racial

integration than racial segregation. We see this in the figure as the higher density of points with a negative value for the difference between SAZ and neighborhood segregation. The dissimilarity index in the median district is 2.3% lower than would be expected under a system of strict neighborhood assignment. The dissimilarity index is more than 10 percent lower under enacted SAZs in 30% of districts. In comparison, the dissimilarity index is only more than 10 percent higher under enacted SAZs in 18% of districts. Similarly, the Coleman exposure index in the median district is 3.1% lower than would be expected using neighborhood assignment. The Coleman index is more than 10 percent lower under enacted SAZs in 39% of districts.

This finding is surprising and runs counter to the narrative emphasized in past work on educational gerrymandering (Siegel-Hawley 2013; Richards and Stroub 2015). This is not to suggest that school zoning is not being used as a tool to preserve segregation: it may be the case that advantaged families do actively not seek more segregation, but instead merely seek to retain their present advantages through boundary maintenance and opportunity hoarding (Andrene, Parry, and Siegel-Hawley 2022; Sattin-Bajaj & Roda, 2018).

As noted Section 2.4, school choice has the potential to unlink the relationship between residential geography and school composition. As a result, student assignment plans do not directly translate into the racial composition of neighborhoods into the racial composition of schools.[8] To better understand the role of student assignment plans and other competing factors shaping the level of segregation at the school-district level, I estimate a multivariate linear regression in which the dependent variable is within-district segregation measured using student enrollment totals. I estimate separate models for the dissimilarity index and Coleman exposure index. The primary independent variable of interest is the difference in the level of segregation

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[8] The relationship between the demography of schools and their SAZs is strong and positive. The correlation between the dissimilarity index using student enrollment totals and my estimates of the demographic composition of schools using Census block data is 0.83. For the Coleman exposure index, it is 0.85.

that exists under the school assignment plans in effect as of the 2013-14 school year and that

which would exist using neighborhood zoning. Again, these values are coded such that positive

values indicate districts in which student assignment plans increase segregation relative to strict

neighborhood zoning and negative values indicate districts in which student assignment plans

reduce segregation.

In addition, I include a variety of covariates to control for other factors known to affect

the level of segregation in a district including whether a district is currently subject to a

court-ordered desegregation plan or has previously been subject to a court order that has been

dismissed, the prevalence of school choice alternatives in the form of charter schools, magnet

schools, and private schools, the share of Black students in the district, the level of Black-white

diversity, county-level Democratic vote share, and dummy variables for whether a district is

located in an urban setting and whether a district is located in the South. I estimate each model

with and without state fixed effects.

The results of these models are presented in Table 2.1. Even after controlling for

competing factors to explain school segregation, enacted school assignment plans which are

more integrated than neighborhood zoning plans are significantly related to more integrated

schools. The converse is also true: segregationary school assignment plans increase the level of

segregation students experience. In models I and II, the coefficient for the difference between

SAZ and neighborhood dissimilarity is 0.337 and 0.351, respectively. In models III and IV, the

coefficient for the difference between SAZ and neighborhood exposure is 0.488 and 0.545. This

finding suggests that student assignment zoning is a policy lever with the ability to disrupt

residential patterns and shape the level of segregation in schools.

| | Dependent variable: | | | |
| | Dissimilarity | | Exposure | |
	I	II	III	IV
Difference in Segregation: SAZ - Neighborhood	0.337***	0.351***	0.488***	0.545***
	(0.062)	(0.062)	(0.097)	(0.094)
Desegregation Order: Dismissed	0.015	0.014	0.033***	0.030***
	(0.013)	(0.014)	(0.010)	(0.010)
Desegregation Order: Active	0.040**	0.010	0.052***	0.026**
	(0.016)	(0.017)	(0.012)	(0.012)
Access to Charters/Magnets	0.028	0.042	0.012	0.028
	(0.027)	(0.027)	(0.020)	(0.020)
Access to Private Schools	-0.025	-0.020	-0.016	-0.021*
	(0.016)	(0.016)	(0.012)	(0.012)
log(# of schools in district)	0.096***	0.094***	0.069***	0.068***
	(0.005)	(0.006)	(0.004)	(0.004)
% Black	0.172***	0.130***	0.184***	0.130***
	(0.026)	(0.028)	(0.019)	(0.020)
Black-White Gini-Simpson	-0.066***	-0.050*	0.082***	0.129***
	(0.023)	(0.029)	(0.017)	(0.021)
County Democratic Vote Share	0.032	0.081**	0.051**	0.097***
	(0.027)	(0.032)	(0.020)	(0.023)
Urban	0.015	0.024**	0.015**	0.022***
	(0.010)	(0.011)	(0.008)	(0.008)
South	0.017	0.068*	0.015*	0.064**
	(0.011)	(0.041)	(0.008)	(0.030)
Constant	0.101***	0.047	-0.146***	-0.207***
	(0.020)	(0.039)	(0.015)	(0.028)
Fixed Effects	None	State	None	State
Observations	1,065	1,065	1,065	1,065
R^2	0.364	0.426	0.452	0.519
Adjusted R^2	0.357	0.400	0.446	0.497

Note: *p<0.1; **p<0.05; ***p<0.01

Table 2.1. Multivariate Regression of District-Level Segregation and the Use of School Assignment Policies. School districts are limited to those with multiple elementary schools serving students of the same grade and district-wide student populations that are at least 5 percent Black and 5 percent white. Data are from the National Center for Education Statistics' School Area Boundary Survey, 2013-14, the National Center for Education Statistics's Common Core of Data, the 2010 Decennial Census, the 2013 Private School Universe Survey, the CQ Voting and Elections Collection, and Reardon et al. (2011).

As expected, the level of segregation in a school district is conditional on the demographic context of the district. Generally, districts that are larger, Blacker, urban, and located in the American South are more likely to have higher levels of school segregation, whether measured as dissimilarity or exposure. Although the coefficient is not statistically significant in every model specification, school districts that were subject to a court-ordered desegregation plan that was dismissed or are currently subject to such a desegregation plan are somewhat more segregated than districts that were never under such scrutiny. This result does not suggest that federal oversight increases school segregation; it is much more likely that school districts are still under court scrutiny because of higher levels of racial segregation. An investigation of longitudinal enrollment data paired with the timing of court orders, such as that conducted by Reardon et al. (2012), is much more effective at understanding the causality of this relationship. However, it is useful to note that the relationship between school board activity, in the form of the difference in segregation under enacted SAZs and neighborhood plans, is robust to the inclusion of a measure of federal oversight. Similarly, it is not useful to over interpret the results in regard to the availability of school choice, but the model benefits from the inclusion of these variables as controls.

2.7.2 Who is Being Zoned?

The evidence above suggests that local school boards continue to play a fundamental role in shaping the racial composition of schools in their districts, with school assignment policies playing a significant role that is disproportionately used as a tool for racial integration. Past research has demonstrated the benefits of integration, especially for Black and minority students (Mickelson and Nkomo 2012; Reardon et al. 2019). Although the quality of schools, often

measured by student performance, is shaped by school factors (e.g., resources, teacher quality, parent involvement, there is also significant evidence to suggest that the racial and socioeconomic composition of schools and classrooms contributes to learning outcomes (Mickelson, Bottia, and Lambert 2013). As a result, the benefits of integration can be realized by moving Black students to disproportionately white schools and they can also be realized by moving white students to disproportionately Black schools. Despite the benefits of school district integration in terms of learning outcomes, it is important to also consider which students are paying the costs of integration accrued by attending schools further from their homes. The potential costs of attending a school outside of one's neighborhood include longer daily commutes, reduced participation in after-school activities, and fewer overlapping social relationships in one's school and neighborhood.

In subsequent model specifications, I first control for three key geographic predictors that may be reasonably related to the probability of assignment to a neighborhood school. First, I

To investigate this cost directly, I consider a binomial logistic regression on whether a given census block is assigned to its neighborhood school, defined as the most geographically proximate school. The regression is weighted by the total number of people in each census block. The primary independent variable of interest is the percent of people in a census block who are Black, though I also consider the percent of people who are renting as a proxy for socioeconomic status. The results of estimating this model are presented in Table 2.2 as model I. There is a significant, negative relationship between the likelihood of neighborhood school assignment and the share of a Census block's population who are Black or renters. Put differently, Census blocks that are Blacker and poorer are more likely to be assigned to a school other than their neighborhood school.

In subsequent model specifications, I first control for three key geographic predictors that may be reasonably related to the probability of assignment to a neighborhood school. First, I

	Dependent variable:				
	Assignment to Neighborhood School				
	I	II	III	IV	V
% Black	-0.185***	-0.299***	-0.302***	-0.271***	-0.222***
	(0.004)	(0.004)	(0.004)	(0.005)	(0.005)
% Renters	-0.261***	-0.190***	-0.186***	-0.236***	-0.262***
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
Distance to nearest school (km)		-0.269***	-0.266***	-0.253***	-0.240***
		(0.001)	(0.001)	(0.001)	(0.001)
Distance b/w two nearest schools (km)		0.795***	0.797***	0.814***	0.833***
		(0.002)	(0.002)	(0.002)	(0.002)
log(# of schools in district)		0.064***	0.038***	0.026***	0.045***
		(0.001)	(0.001)	(0.001)	(0.002)
SAZ: Integrationary			-0.214***	-0.215***	-0.188***
			(0.003)	(0.003)	(0.003)
SAZ: Segregationary			-0.063***	-0.080***	-0.079***
			(0.004)	(0.004)	(0.004)
County Democratic Vote Share				0.227***	0.156***
				(0.007)	(0.008)
South				-0.170***	-0.180***
				(0.003)	(0.016)
Desegregation Order: Dismissed				-0.042***	0.029***
				(0.003)	(0.004)
Desegregation Order: Active				0.165***	0.156***
				(0.004)	(0.005)
Access to Charters/Magnets				0.131***	0.135***
				(0.008)	(0.008)
Access to Private Schools				-0.124***	-0.140***
				(0.005)	(0.005)
Fixed Effects	None	None	None	None	State
Observations	1,084,694	1,084,694	1,084,694	1,084,694	1,084,694
Log Likelihood	-2,624,523	-2,340,008	-2,336,948	-2,329,538	-2,320,624
AIC	5,249,053	4,680,028	4,673,912	4,659,104	4,641,348

Note: $^{*}p<0.1$; $^{**}p<0.05$; $^{***}p<0.01$

Table 2.2. Logit Estimates of Census Block Assignment to Neighborhood School. Regression models are weighted by the log of the total population in each census block. Census blocks are limited to those in school districts with multiple elementary schools serving students of the same grade and district-wide student populations that are at least 5 percent Black and 5 percent white. Census blocks are additionally limited to those with a population of at least 20 people. Data are from the National Center for Education Statistics' School Area Boundary Survey, 2013-14, the National Center for Education Statistics's Common Core of Data, the 2010 Decennial Census, the 2013 Private School Universe Survey, the CQ Voting and Elections Collection, and Reardon et al. (2011).

account for the distance between a Census block and the distance to the neighborhood school assuming that blocks that are closer to their neighborhood school are more likely to be included in that school's attendance zone. Second, I account for the distance between the neighborhood school and the next nearest school assuming that blocks with a nearby alternative are less likely to be assigned to their neighborhood school's attendance zone. Finally, I control for the number of schools in the district in which a census block is located in case larger districts are more likely to assign students to their non-neighborhood school. The results of this model are represented by model II in Table 2.2. These covariates are significant and signed in the direction I expected, but they have no impact on the significance of the relationship between the likelihood of assignment to a neighborhood and a block's share of Black residents.

Models III, IV, and V control for a range of district-level variables. First, I control for whether a Census block is in a school district in which school assignment planning results in more segregation than would be expected relative to neighborhood assignment, similar levels of segregation, or less segregation.[9] Although districts with both integrationary and segregationary school assignment plans are less likely to zone students to the nearest possible school relative to districts whose school assignment plans have little impact on segregation, the results in model III suggest that Census blocks are about three times more likely to be zoned to a school other than their neighborhood schools in integrationary districts than in segregationary districts. This again points to the fact that, when used to impact segregation, school assignment plans are primarily used as a tool for integration.

Model IV controls for additional contextual factors including the Democratic vote share that a district is located in, whether a district is in the South, whether a district has been or is

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[9] I classify districts as integrationary if the difference in the dissimilarity index between enacted SAZs and neighborhood SAZs is less than -0.02 (35% of districts), as neutral if the difference is between -0.02 and 0.02 (46% of districts), and as segregationary if the difference is greater than 0.02 (19% of districts).

currently subject to a court-ordered desegregation plan, and the availability of school choice alternatives in the district. Model V includes state fixed effects.

However, even after controlling for these variables, the coefficient on the share of a block's residents who are Black or renters remains consistently negative. In a broader sense, this suggests that integration via student assignment policy tends to move Blacker and poorer students further from their neighborhoods rather than a more equitable exchange of the poor and wealthy and Black and white.

2.8 Conclusion

This chapter generates three significant insights which improve our understanding of the contemporary role of government in addressing and attenuating school segregation. First, through a comparison of enacted school attendance zones and simulated counterfactuals based on a strict definition of neighborhood schools, I measure the degree to which school attendance zoning mediates a district's residential segregation. This is not a perfunctory task. Because of high levels of segregation across school district boundaries, less attention has been given to persistent racial segregation that exists within a district's boundaries. In fact, previous research on school segregation accepted the hypothesis that local school boards are powerless over segregation as given (Rivkin 1994) and the underlying assumption is mirrored in contemporary public opinion about the causes of school segregation. For example, at a Century Foundation panel in 2016, then U.S. Education Secretary John King argued that many efforts to prioritize socioeconomic and racial diversity are "thwarted by communities who see the current lack of real integration as a fact over which they have no control" (DeRuy 2016).

The results in this chapter demonstrate that contemporary school attendance zones regularly diverge from the public conception of neighborhood schools in ways that meaningfully impact within-district school segregation. In about half of school districts, the level of school segregation substantially deviates from the level suggested by neighborhood residential patterns alone. This relationship is more formally tested and verified using a multivariate analysis with results presented in Table 2.1.

Second, educational gerrymandering is more likely to be used as a tool for integration than for segregation. Many district's school attendance zones are not being used in ways that significantly reshape the level of segregation in the district; this is not particularly surprising. There is more public support for theoretical integration than there is for policies that actively pursue integration (Castro, Perry, and Siegel-Hawley 2022). What is surprising is the number of districts that are using school assignment policies as a voluntary measure to pursue greater levels of racial integration. In about a third of school districts, racial school segregation is more than 10 percent lower due to the ways that school attendance zones are gerrymandered.

Third, educational gerrymandering is most likely to require poorer and Blacker students to attend schools outside of their neighborhoods and further from their homes. Although these students likely benefit from attending a more integrated school, the costs of integration, in terms of increased travel times, reduced ability to participate in after-school programming, and disrupted social networks, are being disproportionately borne by Black students. This suggests that educational gerrymandering is currently being used as a tool for integration in ways that primarily bring Black students to majority white schools, rather than a more equitable exchange of Black and white students.

While I concede that educational gerrymandering is not the primary cause of all segregation in schools nor should it be the only policy solution used to reduce segregation, the evidence presented here demonstrates that school assignment policies can and do shape the racial and socioeconomic composition of schools and ultimately impact access to quality educational opportunities. Though they may be reluctant to do so frequently, school board members are capable of shaping political spaces in ways that influence the immediate distribution of public goods, perceptions of property value within a city, and the long term academic outcomes and racial attitudes of children who live within their jurisdictions. Mayor of New York City Bill de Blasio echoed a sentiment about school segregation held by many local officials when he dismissed efforts to actively integrate schools and said "We cannot change the basic reality of housing in New York City" (Harris and Katz 2018). While school districts cannot undo the reality of residential segregation, this work suggests that school districts can respond to and influence the impact of residential segregation on the level of segregation experienced in schools in meaningful ways.

CHAPTER 3

The Limits of Educational Attainment in Mitigating Occupational Segregation Between Black and White Workers[10]

3.1 Introduction

The social sciences have accumulated substantial evidence over time and place of racial inequities in wages, employment, and mobility (Charles and Guryan 2008; Bayer and Charles 2018; Chetty et al. 2020). A smaller body of work has also focused on racial occupational segregation–that is, the degree to which members of different racial groups are distributed unequally across different types of jobs (Reskin and Cassirer 1996; Semyonov et al. 2000; Kaufman 2002; Queneau 2009; Mintz and Krymkowski 2010; Gradín 2013; Río and Alonso-Villar 2015; Ferguson and Koning 2018). Occupational segregation can have far reaching consequences on wages, mobility, and on beliefs about the value of certain jobs and who ought to occupy them. Few studies, however, have examined racial occupational segregation in recent years as the U.S. workforce has become increasingly racially diverse. Furthermore, little work to date has explored racial occupational segregation by levels of education. In this paper, we therefore examine occupational segregation by race over time and by education levels, comparing workers with and without four-year degrees. We also consider the

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[10] This paper is coauthored with Dr. Ashley Jardina (University of Virginia), Dr. Peter Q. Blair (Harvard University), and Dr. Papia Debroy (Opportunity@Work). Although I contributed to the paper in its entirety, I am disproportionately responsible for the paper's methodological choices, data analysis, and discussion of results.

consequences of racial occupational segregation by education for wage inequality in the U.S. today.

Our motivations for re-examining the contemporary state of racial occupational segregation are twofold. First, many prior studies exploring racial occupational segregation considered the state of the labor market in the latter half of the twentieth century and do not account for the impact that policy changes and generational turnover may have had on occupational segregation in the ensuing decades. Second, academics, policymakers, and practitioners have long touted rising education levels among people of color as a solution to many forms of racial inequality in the labor market, including occupational segregation (Gradín 2013; Zhavoronkova, Khattar, and Brady 2022; Ndumele, Roque, and Dorazio 2022; JFF 2022). Although this work often acknowledges the additional barriers that people of color face in the labor market in the forms of structural racism, discrimination, stereotyping, and social capital, investment in college attainment and other forms of human capital development, like sector-based training programs and apprenticeships, remain a primary solution to occupational segregation by race. One implication of this perspective is that the significant increase in education levels among workers of color should have significantly reduced occupational segregation in the U.S. in recent decades.

Building on prior work (Spriggs and Williams 1996; Hellerstein and Neumark 2008), we therefore examine occupational segregation in the contemporary era by race and educational attainment to assess whether it persists among both workers with and without four-year degrees. We focus in particular on differences between Black and white workers. Historically and today, Black Americans have been the targets of racial prejudice and subject to significant *de jure* and *de facto* forms of discrimination (Jardina 2019; Lee et al. 2019; Nunley et al. 2014; Pager and

Shepherd 2008; Quillian et al. 2017). Thus, it is not implausible that, relative to white Americans, Black Americans, across levels of education, continue to face systematic barriers to access to many occupations while being relegated to others (Kline, Rose, and Walters 2022).

We draw comparisons in occupational segregation between Black and white workers with a four-year college degree and workers with high school diplomas but not bachelor's degrees. Following prior research on the latter group (Blair et. al. 2020), we refer to workers without a four-year degree as those "skilled through alternative routes" (STARs). This terminology was created, in part, to shift away from marginalizing deficit-based rhetoric (Baldridge 2014) and instead use asset-based language to describe this population of workers. STARs are aged 25 or older, active in the labor force, have a high school diploma or equivalent, and have developed their skills through routes other than a four-year diploma such as community college, apprenticeships, bootcamps, and, most commonly, on-the-job work experience (Opportunity@Work and Accenture 2020; Blair et al. 2020). STARs compose more than half of the civilian, non-institutionalized labor market and are in markedly different positions in the labor market than those with four-year degrees.

Drawing on data from the U.S. Decennial Censuses and the American Community Survey, we use a dissimilarity index to compare the degree of racial occupational segregation in the labor market by education levels in each decade between 1980 and 2019. We find that significant racial occupational segregation in the labor market exists in 2019, and while segregation has slightly declined since 1980, it has also increased somewhat since 2000. We also find that while racial occupational segregation is marginally lower among workers with bachelor's degrees than among STARs, it nevertheless persists across levels of education,

consistent with our argument that rising levels of education do not necessarily eliminate occupational segregation.

We also compare observed segregation to that which would occur under race-neutral conditions estimated with a Monte Carlo simulation, and we find that observed segregation is substantially higher than would be expected at random, conditional on educational attainment, gender, and geography. Racial occupational segregation is also apparent when we consider both where workers are distributed across the labor market by volume and when we explore the extent to which certain occupations are especially segregated. Lastly, we explore the consequences of segregation on wages and find that Black workers, across levels of education, are channeled into lower-paying occupations with less authority compared to their white peers. This research therefore has important implications not only for understanding the consequences of promoting college as a solution to existing labor market racial inequality, but also for policymakers and business leaders seeking insight into the current employment circumstances and challenges to mobility for Black Americans with and without four-year degrees (OneTen 2020; Office of the Governor of Maryland Larry Hogan 2022).

We proceed as follows. First, we review prior research on occupational segregation over time and the consequences of this segregation for workers. Then, we discuss extant theories about the causes of this segregation. We consider both supply-side explanations—which focus on the characteristics and preferences of workers—and demand-side explanations—which attend to the preferences, behaviors, and beliefs of employers. From there, we examine occupational segregation by race and education between 1980 and 2019, and consider the consequences for wage differences. We end by discussing the implications of our findings.

3.2 The Legacy and Persistence of Occupational Segregation

Historically, occupational segregation between Black and white workers in the U.S. has been significant and persistent. After Emancipation, Black Americans were relegated to menial jobs, and in the South, they were strictly and formally segregated for nearly half a century by the draconian system of Jim Crow (Reskin and Padavic 2006). Before the 1960s, white men nearly monopolized most professional, technical, and managerial jobs. In the 1960s and 1970s, racial and ethnic minorities gained access to a wider array of occupations, largely due to civil rights legislation and the establishment of the Equal Employment Opportunity Commission (EEOC), which effectively ended *de jure* segregation. But as political pressure for racial equality weakened in subsequent years, and as EEOC policy changes and budget reductions limited the agency's ability to monitor employment practices, occupational integration stalled (Stainback, Robinson, and Tomaskovic-Devey 2005; Río and Alonso-Villar 2015; Semyonov et al. 2000).

In an analysis of data on workers in 1990, Kaufman (2002) finds that almost one-third of Black or white workers would have had to change occupations in order to achieve full racial integration. Tomaskovic-Devey et al. (2006) and Tomaskovic-Devey & Stainback (2007) showed that in 2002, workplace desegregation for Blacks remained at the same levels it had been since 1980 (although see Queneau 2009). Most recently, one study showed that there is little evidence of a decline in racial segregation across cohorts; as of 2017, millennials experience just as much racial occupational segregation as prior generations (Weeden 2019). We add to this body of existing scholarship by considering how racial occupational segregation may have changed over time among those with and without a four-year degree.

3.2.1 The Consequences of Racial Occupational Segregation

Job segregation undergirds social and economic inequality in the U.S. As Reskin and Padavic wrote, "job segregation is the linchpin in workplace inequality because the relegation of different groups to different kinds of work both facilitates and legitimates unequal treatment" (2006, 344). A number of studies have found that segregated occupations significantly depress the wages of Black workers, who are relegated to jobs that are poorly compensated by employers (Hirsch and Schumacher 1992; Gyimah-Brempong, Fichtenbaum, and Willis 1992; Kmec 2003; Browne et al. 2001; Reskin, McBrier, and Kmec 1999; King 1992; Tomaskovic-Devey 1993; Lockette and Spriggs 2016; Hamilton, Austin, and Darity 2011). For example, Browne et al. (2001) show that in Atlanta, Georgia, Blacks employed in jobs where the majority of their co-workers were also Black earned $3,740 less annually than Blacks employed in predominantly white jobs. Similarly, Kmec (2003) showed that workers employed in jobs with a large percentage of Black workers earned 18% less per hour than workers in comparable predominantly white jobs. Weeden (2019) shows that among millennials, whites earn approximately $2.40 more per hour than Blacks—a gap of which nearly 40% can be attributed to the underrepresentation of Black millennials in highly paid occupations. These features of the US labor market are striking; occupational segregation means that people of color are overrepresented in less desirable jobs relative to whites, and these jobs are in turn devalued because society devalues the people who primarily hold these positions (Petersen and Saporta 2004). And because society allows unequal pay for different work, segregation legitimates unequal treatment (Reskin and Padavic 2006).

Occupational segregation also has consequences for hierarchies of authority, contributing to the exclusion of Blacks from managerial roles and other positions of authority. This vertical segregation limits Blacks' upward mobility and access to higher wages (Kluegel 1978; Elliott

and Smith 2004). As Reskin and Padavic (2006) explain, hierarchical segregation creates both "glass ceilings," in which people of color are excluded from more desirable high-status jobs, and "sticky floors," in which people of color are confined to low-status positions. The evidence for these trends are all-too-apparent; for instance, in the history of the *Fortune 500* list, first published in 1955, there have only been 19 Black CEOs (out of 1,800 total) (Wahba 2021). In 2021, there were only four Black CEOs on the *Fortune 500*. Furthermore, a 2019 study conducted by the National Opinion Research Center at the University of Chicago in conjunction with the Center for Talent Innovation revealed that only 3.2 percent of executives and senior manager-level employees in the U.S. are Black (Center for Talent Innovation 2019). Other research has found that Black workers are overrepresented in entry-level jobs and in lower paying frontline positions such as healthcare support, transportation and material moving, and food preparation and service (Hancock et al. 2021).

3.2.2 Supply-Side Explanations for Racial Occupational Segregation

There are a number of theories that may account for occupational segregation by race. We focus first on supply-side explanations, which emphasize the preferences, skills, and qualifications workers bring to the labor market. Particularly relevant to our aims in this paper is Becker's theory of human capital, which argues that workers seek skills acquisition, including formal education, on-the-job-training, and job experience when they expect these investments will generate a positive return in wage and job prospects (Becker 1957, 1994). Education is often viewed as one of the central tools for upward mobility. Indeed, as Krymkowski and Mintz (2011:2) write, "human capital theory is the theoretical foundation for the ideological assumption that everyone should strive for a college degree."

The lower rates of college education among Black Americans relative to whites is a common explanation for occupational segregation (Reskin and Padavic 2006). The centrality of education in the popular imagination as the sole key to upward mobility has led to the pervasive argument that racial equality in the labor market can be achieved through raising rates of college education among Blacks (Krymkowski and Mintz 2011). In a seminal text, "*The Declining Significance of Race: Blacks and Changing American Institutions,*" Wilson (1980) made the argument that after the passage of civil rights legislation, Blacks should enjoy parity with whites in terms of labor market rewards, particularly if they are educated and therefore have valuable skills to offer employers.

In keeping with this argument, between 1940 and 1990, a reduction of the racial gap in educational attainment did indeed contribute to the occupational integration of Black workers (King 1992). Moreover, during the past several decades, Black Americans have made significant gains in four-year degree completion rates. Between 2011 and 2021 alone, the percentage of Black Americans aged 25 and older with a bachelor's degree rose from 20.2 percent to 28.3 percent.[11] One expectation from the supply-side perspective, therefore, is that the overall level of occupational segregation experienced by Black workers has continued to decrease commensurate with their rising levels of educational attainment. Furthermore, implicit in the hypothesis that rising levels of education among Black workers would ameliorate racial occupational segregation is the assumption that racial occupational segregation is much lower for workers with a bachelor's degree than for workers with less than a bachelor's degree.

But research from many avenues has also shown the limits of human capital theory in attenuating occupational segregation and fostering labor market equality. Analysis of Census

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[11] Analysis of data from the 2011 and 2021 Current Population Survey, Annual Social and Economic Supplement, Integrated Public Use Microdata Series.

data, for instance, reveals that after 1990, educational attainment played only a minor role in occupational segregation by race (Reskin and Padavic 2006). In another study, education levels accounted for only about half of the wage gap between Black and white men (England, Christopher, and Reid 1999). More recent work found that while occupational inequality between Blacks and whites has declined over time, education appears to have no effect on these changes (Krymkowski and Mintz 2011). Even after accounting for education, whites continue to enter attractive occupations at greater rates than people of color (Mintz and Krymkowski 2010). A 2017 meta-analysis of every available field experiment of hiring discrimination against Blacks or Latinos observed no change in the level of hiring discrimination against Blacks over the preceding 25 years (Quillian et al. 2017).

Other pernicious forms of discrimination can also place limits on human capital investment (Haggerty and Johnson 1995). For example, people of color are twice as likely as whites to live in counties with the highest levels of industrial toxins (Goldman 1992) and the externalities of pollution and subsequent health effects can reduce the ability of Black Americans to invest in human capital. Similarly, racial disparities in access to skilled teachers and quality education at the K-12 level can limit opportunities for educational attainment that may lead to greater economic mobility. Black Americans also experience greater incarceration rates than white Americans, and prior work finds stark racial disparities in the labor market among formerly incarcerated individuals. Namely, Black parolees are more concentrated in low-paying industries relative to white parolees (Harding, Morenoff, and Wyse 2019). Furthermore, the majority of the Black labor force (60 percent) is concentrated in the U.S. South where job opportunities are relatively more limited (Hancock et al. 2021) and where the prevalence and

degree of negative racial stereotypes that contribute to labor market discrimination is greater among whites (Valentino and Sears 2005; Airstrup 2011).

We also argue that the focus on human capital investment as a solution to occupational segregation and other forms of labor market inequality necessarily addresses future racial disparities, rather than ones that exist in the present. Efforts to increase college access for Black Americans have been largely successful, with the number of Black workers with bachelor's degrees more than doubling from 2.3 million to 4.8 million from 2000 to 2019. However, this shift is primarily the result of increased college attainment among young Black workers entering the workforce and overlooks an experienced talent pool of Black workers already in the labor market for whom a return to college would be impractical. As of 2019, there were 11 million Black workers without college degrees in the labor market, and they comprise the majority–almost two-thirds–of all Black workers. While there is clear evidence that the human capital gained in college can lead to higher individual and aggregate productivity (Moretti 2004), college as a solution to occupational segregation primarily works through gradual generational replacement and excludes the majority of the existing Black workforce; it is also does not account for work experience, a pathway through which almost half the U.S. workforce gains skills for higher wage work (Blair et al. 2021).

Supply side approaches to understanding occupational segregation also consider worker preferences, positing that social and cultural differences between groups create preferences for the types of positions they seek out. This argument is almost exclusively raised in the literature on sex segregation, but it is not unreasonable to speculate that workplace discrimination has supply side effects, leading Blacks to self-select into particular segments of the labor market in order to avoid discrimination. Research suggests, however, that there is little evidence that Black

workers' preferences underlie occupational segregation. On the contrary, Black Americans cast a wider net in their job search across a greater range of occupational characteristics and categories compared to similarly situated whites (Pager and Pedulla 2015).

3.2.3 Demand-Side Explanations for Racial Occupational Segregation

A more robust literature has examined demand-side explanations, which consider the characteristics of the job, employer preferences, and the workplace, for occupational segregation. Much of this work focuses on the behavior of employers, and particularly on what underlies their motivation to discriminate along racial lines. We know that regardless of its underlying cause, racial discrimination is consequential, and it offers a compelling explanation for why supply-side theories are often insufficient explanations for racial inequality in the labor market, including racial occupational segregation.

Experimental studies show that among recent college graduates, Black job-seekers received 14% fewer interview requests than whites with identical qualifications (Nunley et al. 2014; Kline, Rose, and Walters 2022). In a study of low-wage labor markets, Black applicants were half as likely as equally qualified whites to receive a job offer (Pager, Western, and Bonikowski 2009). Strikingly, this same study revealed that Black and Latino applicants with clean backgrounds did not fare any better in obtaining job offers than white applicants with recent criminal records. In addition to experimental research showing that racial discrimination pervades the labor market, there is other evidence that it is widespread. In 2017, 28,525 racial discrimination charges were filed with the EEOC—approximately one-third of all the types of workplace discrimination charges that were made with the agency that year (U.S. Equal Employment Opportunity Commission 2018).

The theory of statistical discrimination posits that employers use perceived differences between visible groups of workers to evaluate the performance potential of applicants (Arrow 1973). Hiring discrimination that can produce occupational segregation is therefore seen as a rational response by employers seeking maximum profits. Research finds that employers tend to believe that people of color and women are less productive without accurate information or evidence for these claims (Tomaskovic-Devey 1993; Bielby and Baron 1986). Employers are therefore often making hiring and promotion decisions based not on accurate assessments of real differences between different groups, but instead on their erroneous stereotypes about groups. This effect can be especially detrimental to Black employment, given pervasive and harmful stereotypes about Black Americans' work ethic and dependability (Peffley, Hurwitz, and Sniderman 1997; Schuman et al. 1985; Kinder and Sanders 1996). Indeed, a number of studies show that firms are reluctant to hire young Black men based on held stereotypes of Black men as "unreliable," "lacking in cognitive skills," "insubordinate," "lazy," and "dishonest" (Holzer 1996; Kirschenman and Neckerman 1991; Moss and Tilly 2001; Wilson 1996). The reluctance or refusal of employers to hire Blacks based on these pernicious stereotypes, or to hire them only for menial jobs, contributes to occupational segregation. Furthermore, these same stereotypes can bias employer evaluations of Black employees, limiting chances for promotion out of segregated occupations and into more high-status positions (Greenhaus, Parasuraman, and Wormley 1990; Greenhaus and Parasuraman 1993).

These stereotypes intersect with the beliefs and stereotypes employers have about the requirements of particular occupations and who is suitable for a particular job, making employers more likely to deny Blacks access to skilled positions and more likely to hire them for jobs involving manual labor or menial work. Indeed, Black and Hispanic workers are more

represented in occupations characterized by low competence (He et al. 2019), and studies have found that supervisor ratings of job complexity and skill requisites tend to be lower when jobs are held by large numbers of Blacks (J. Greenhaus, Parasuraman, and Wormley 1990; Braddock and McPartland 1987).

The intersection of racial stereotypes about employees and occupational stereotypes about who is appropriate for particular positions generates a reinforcing cyclical relationship: employers' stereotypes about Black workers' capabilities develop from their observations about where Black workers are employed and the skills they do—or do not—therefore possess. These stereotypes reinforce occupational stereotypes about who is best suited to perform particular tasks. "Black" work then becomes jobs that require physical labor, subservient tasks, and poor working conditions, while "white" work entails authority and greater skills (Kaufman 2002). There may be some speculation that the labor market is clearly divided by employers who discriminate and those who do not, which would make it possible for job seekers to avoid areas of the labor market where discrimination is prevalent (Becker 1957; Heckman 1998; Fryer and Levitt 2004). But evidence suggests that it is not practical or accurate to view the labor market as neatly divisible in this way. One reason is that stereotypes likely serve as a widespread heuristic that guide employer decisions, often without their conscious awareness (Pager, Western, and Bonikowski 2009). What is more, negative stereotypes about Blacks are not held by a small subset of white Americans; they are widely held and pervasive (Kinder and Sanders 1996; Peffley, Hurwitz, and Sniderman 1997; Jardina and Ollerenshaw 2022).

A second theory, social closure, posits that discrimination serves to maintain the status of dominant groups in society. whites and men actively seek to preserve their positions of dominance in the labor force by excluding women and people of color (Tomaskovic-Devey

1993; Wilson 1980), and employers are thought to be complicit in this process (Reskin and Roos 1990). What is more, evidence suggests that exclusionary behaviors occur more in better, more desirable jobs. Tomaskovic-Devey (1993) finds that as job desirability increases, the percentage of women or Black Americans decreases. More recent research confirms that white men are employed in occupations with the highest levels of authority and earnings (Mintz and Krymkowski 2010). Furthermore, supervisor ratings of a job's complexity and skill requisites are lower when a job is held by a large percentage of Black workers (Braddock and McPartland 1987; Greenhaus, Parasuraman, and Wormley 1990).

Social closure may also explain occupational segregation by way of white efforts to limit what they perceive as Black's encroachment into privileged labor market positions. To limit this encroachment, white employers channel Blacks into "racialized" jobs in areas like social welfare, corrections, and manual labor positions, or into positions that interface with other people of color, like community relations or affirmative action (Collins 1993). Social closure is isomorphic to the pollution theory of discrimination which has been used to describe occupational segregation by sex, in which a single woman entering a male dominated occupation reduces the prestige of the occupation (Goldin 2015). In their study of discrimination in the low-wage labor market in New York City, Pager, Western, and Bonikowski (2009) found that job applicants were sometimes encouraged to apply for different jobs than the ones for which they had initially inquired. In many cases, these recommendations reflected a channeling to job types that are race-coded and are either removed from interacting with customers (i.e., jobs "at the back of the house") or are manual labor positions instead of white-collar jobs. For example, Black men applying to be salespeople or waiters were asked to instead apply for positions as stock boys or busboys.

The researchers found that Black workers were often channeled down into lower positions, whereas whites were more often channeled up into higher-level positions. Furthermore, people of color were disproportionately channeled out of—and whites into—jobs that require greater skill or authority, consistent with research that suggests that employers view people of color as lacking a sense of responsibility or communication skills. Often, this channeling limits the upward mobility of Black workers by restricting them to jobs with low visibility and where they have only limited opportunities to acquire and demonstrate skills. Many of the positions into which Blacks are channeled have short ladders and are also outside central lines that serve as paths to management and supervisory opportunities (Collins 1993). Thus, racial occupational segregation directly reduces Black workers chances of being promoted or of transitioning into a better job (Erdreich, Slavet, and Amador 1996). Channeling also has an effect on racial wage disparities at the point of hire. For example, one study using human resource data on job openings at a firm found that Black applicants are systematically channeled into positions with lower wages relative to whites (Penner 2008) .

A related line of research argues that racial occupational segregation is associated with the relative percentage of people of color in the population. The first explanation for this phenomenon is socio-psychological. As the population of people of color increases, so does fear among whites about racial competition over jobs and resources (Blalock 1956, 1967; Allport 1954). Whites respond with greater levels of prejudice and more motivation to discriminate. The second explanation centers on the consequences of society's racial occupational hierarchy (Hodge 1973). It contends that because Blacks and other people of color are channeled into low-status positions, when their population increases, whites can abandon these less-desired jobs and concentrate in more high-status occupations (Glenn 1962, 1966).

Other aspects of racial inequality likely reinforce occupational segregation. The legacy of housing discrimination and the subsequent pervasive patterns of residential segregation have created a spatial mismatch, affecting Blacks' access to a wide range of employment opportunities, including the growing suburban employment market over the 20th century (Gabriel and Rosenthal 1996; Kain 1968). Segregated social networks also have an effect on occupational segregation. Americans' core social networks tend to be overwhelmingly composed of people of the same race or ethnic background. A 2013 PPRI study found that among white Americans, 91% of people in their social networks are also white (Cox, Navarro-Reivera, and Jones 2016). Because many individuals secure jobs through referrals and personal connections, segregated social networks may also perpetuate occupational segregation (Fernandez and Fernandez-Mateo 2006; Erickson 2003; Marsden 1999; Bayer, Ross, and Topa 2008). Despite using their networks at similar rates while job seeking, network-based methods are less likely to lead to job offers for Black workers (Pedulla and Pager 2019).

Individual racial attitudes, social distancing, and racial sorting of friend, family, and social networks have likely contributed to occupational segregation as well. If managers prefer to interact with individuals they believe share their background and life experiences, they are more likely to hire individuals of the same racial or ethnic background (Maume 1999; DiTomaso 2013). As DiTomaso (2013) argues, white Americans "opportunity hoard" in the labor market, favoring other whites in securing jobs protected from market competition. Existing racial inequality in the labor market, in which whites hold most managerial positions, means that these preferences limit occupational diversity and upward mobility.

Certain industries also have a history of exceptional opportunity hoarding. The construction industry, other building trades, and skilled manufacturing occupations have a

history of exclusionary practices that have limited Blacks', and particularly those without a college degree, access to well-paying goods-producing jobs. The industry's reliance on informal social networks for hiring, coupled with union opposition to Black employment, have significantly limited Blacks' access to these types of occupations (Waldinger and Bailey 1991; Pallais and Sands 2016).

3.2.4 Examining Racial Occupational Segregation by Education

There are only a few recent studies that examine racial occupational segregation, and like most prior research, they do not compare workers by levels of education. Here, we therefore examine differences in segregation, comparing Black and white workers with and without college degrees. We begin by examining, over time and by race, occupational segregation among workers with and without four-year degrees by calculating a dissimilarity index. We test the hypothesis that occupational segregation between Black and white workers is similar in magnitude among workers with bachelor's degrees as it is among workers with less than a bachelor's degree, i.e. STARs. Using a Monte Carlo simulation, we also calculate predicted levels of racial occupational segregation by education under race-neutral conditions. We hypothesize that observed racial occupational segregation is greater than it would be if workers were randomly distributed in the labor market as in our Monte Carlo simulation.

We then examine the occupations where Black and white workers with and without bachelor's degrees are primarily situated both by volume and by the proportion of these workers within occupations. Our hypothesis is that within education groups, not only are Black and white workers located in different occupations, but also that the median wages for these workers are

likely lower than they are for occupations where there are more whites or in which whites are overrepresented.

3.3 Data

The data we employ come from the 1980, 1990, and 2000 U.S. Decennial Censuses and the 2010 and 2019 1-year American Community Survey (ACS) accessed through the University of Minnesota Integrated Public Use Microdata Series (IPUMS). These data allow us to observe changes in the labor force by race and education levels over 39 years. We limit our analysis to employed adults aged 25 and older in the civilian, non-institutionalized labor force, excluding active-duty military and residents of nursing homes or correctional facilities.[12] In 2019, our analyzed population includes 144 million individuals, of which 39% are workers with a bachelor's degree or higher, 53% are STARs (who have a high school diploma or equivalent, but not a bachelor's degree), and 8% have less than a high school diploma or equivalent. Black workers are those who identified their race as Black alone and their ethnicity as non-Hispanic: this population includes 17 million individuals, of whom 65% are STARs.[13] In order to retain consistent occupational categories across time, we use the IPUMS 2010 harmonized occupational coding scheme which is based on the Census Bureau's 2010 ACS occupation classification scheme and included 422 occupations in 2019.[14]

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[12] We note that Black Americans, and especially Black Americans without college degrees, are over-represented in some of these excluded categories. See Appendix A3 for additional details about these populations.

[13] This definition excludes 526k workers who identified as both Black and Hispanic and 1.2 million workers who identify as multi-racial.

[14] Although this coding scheme has 493 occupations, not all of these occupation codes are used in a given year. There are 351 occupations in the 1980 and 1990 Decennial Censuses, 447 occupations in the 2000 Decennial Census, 449 occupations in the 2010 1-year ACS and 422 occupations in the 2019 1-year ACS.

3.4 Measuring Occupational Segregation Across Time using a Dissimilarity Index

We begin by examining the degree of occupational segregation in the labor market by race and education. We follow the literature in using the index of dissimilarity (D), which measures how evenly individuals are distributed among units (e.g., neighborhoods, schools, occupations), as our measure of occupational segregation. Duncan and Duncan (1955) formulate the index, which is bounded by 0 (no segregation) and 1 (perfect segregation), as:

$$D = \frac{1}{2} \sum_{j=1}^{J} \left| \frac{n_j^1}{n^1} - \frac{n_j^0}{n^0} \right|$$

where there are $j = 1, ..., J$ occupations in the labor market and all individuals $i = 1, ..., n$ are in either group, $g = \{0, 1\}$. Although this measure has some limitations–namely small unit bias–it is a well understood and easy to interpret measure of segregation between two groups. In the context of the labor market, the dissimilarity index D represents the proportion of one group that would need to change occupations in order for the two groups to be evenly represented across each occupation.

In Table 3.1, we make four comparisons, calculating the dissimilarity index by degree status (STARs and workers with a bachelor's degree), race, and race within degree status in 1980, 1990, 2000, 2010, and 2019. First, we make comparisons by education. The dissimilarity index between STARs and workers with a bachelor's degree or higher in 2019 was 0.543. Therefore, 54.3% of STARs (or workers with a bachelor's degree) would need to change occupations for these two groups of workers to be evenly distributed across all occupations. We also find that this value has remained near constant over time: it has not fluctuated by more than

	Dissimilarity Index (*D*)				
	1980	*1990*	*2000*	*2010*	*2019*
STARs - Bachelor's degree	0.543	0.532	0.547	0.543	0.543
Black - White	0.306	0.270	0.269	0.259	0.276
STARs: Black - White	0.307	0.268	0.249	0.256	0.278
Bachelor's degree: Black - White	0.279	0.234	0.217	0.210	0.221

Table 3.1. Occupational Segregation Over Time by Race and Degree Status. The index of dissimilarity measures how evenly workers are distributed within the 422 occupations in the 2010 harmonized occupations codes created by University of Minnesota Integrated Public Use Microdata Series (IPUMS). The population of interest is workers who are aged 25 or older and active in the labor force. Workers skilled through alternative routes (STARs) have a high school diploma or equivalent and have developed their skills through routes other than a four-year diploma such as community college, apprenticeships, bootcamps, and, most commonly, on-the-job work experience. Data are from the 1980, 1990, and 2000 U.S. Decennial Censuses and the 2010 and 2019 1-year American Community Surveys (ACS) accessed through IPUMS.

0.011 over the time period, and educational occupational segregation in 2019 is identical to what it was in 1980.

Next, we make comparisons by race. The dissimilarity index in 2019 was 0.276. Therefore 27.6% of Black workers (or white workers) would need to change occupations for the two groups of workers to be evenly distributed across all occupations. Over the period from 1980 to 2019, the dissimilarity index dropped from 0.306 to 0.270 and has remained at this level for the following three decades, varying by 1 percentage point from this baseline in 2000, 2010 and 2019. This result stands in contrast to the substantial reductions in the dissimilarity index between white workers and Black workers from 1960-1980 (Spriggs and Williams 1996).[15]

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[15] From 1960-1980, the dissimilarity index between white and black women fell by 31 p.p., while the dissimilarity index between black men and white men fell by 11 p.p.

As highlighted in our discussion about the supply-side causes of occupational segregation, there is a widespread conjecture that occupational segregation by race is largely the result of differences in college attainment between Black and white workers. According to this argument, measures of segregation between Black and white workers are not capturing racial difference alone. Because white workers are more likely than Black workers to have a bachelor's degree or higher, these measures are, at least in part, capturing differences in the occupations of Black STARs and white workers with a bachelor's degree or higher. This claim suggests that racial occupational segregation should be significantly smaller between Black and white workers with the same level of education than between Black and white workers at large. Additionally, we might expect that racial occupational segregation should be smaller among workers with four-year college degrees than STARs because the bachelor's degree provides employers a clearer or more frequently recognized signal of skill (Arcidiacono, Bayer, and Hizmo 2010).[16] We investigate these hypotheses directly in the second half of Table 3.1 in which we present the dissimilarity index between Black and white workers separately among STARs and workers with bachelor's degrees or higher.

For both STARs and workers with a bachelor's degree or higher, the dissimilarity index declined from 1980 to 2000 by about 6 percentage points and then, in the two decades since, it has remained relatively constant or increased slightly. There is little evidence to suggest that racial occupational segregation between Black and white workers is primarily due to differences in educational attainment. In every decade since 1980, racial occupational segregation between Black and White STARs is no different from the level of racial occupational segregation among all workers. We find that compared to STARs, Black and white workers with bachelor's degrees

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[16] Lang and Manove (2011) show that Blacks obtain more education than whites conditional on having the same AFQT scores, which is taken as a measure of cognitive ability.

are somewhat more integrated, but not by much. In 2019, nearly one-quarter (22.1%) of Black (or white) workers with a bachelor's degree or more would need to change occupations for full integration between these groups. College does appear to reduce racial occupational segregation, but our analysis shows that the effects are limited: racial occupational segregation is 3 to 5 percentage points (10 to 20 percent) lower among workers with a bachelor's degree than it is between Black and white STARs.[17]

3.5 Monte Carlo Simulations of Racial Occupational Segregation

In order to understand how much of the observed occupational segregation would occur under race-neutral assignment to occupations, conditional on a worker's educational attainment, we use Monte Carlo simulation to estimate the distribution of the dissimilarity index over time (1980 - 2019). Comparing the dissimilarity indices from our simulations to the dissimilarity indices from the naturally occuring data, and doing these pairwise comparisons across education groups, offers a non-parametric approach for bounding the marginal impact of education in reducing occupational segregation by race that is complementary to the parametric approach pioneered in Spriggs and Williams (1996).

For each year, we conduct 10,000 Monte Carlo realizations in which respondents are first assigned occupations based on probability distributions generated from similarly-educated workers of the same gender in their geographic region. To account for geographic variation in demographics and job availability and high levels of occupational segregation by educational

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[17] While there is variation in educational attainment within the two education categories used here, occupational segregation by race is stable over time using more detailed education subcategories within the categories of STARs and workers with a bachelor's degree or more. See Appendix A3 for more details.

attainment and gender, in each simulation, respondents are assigned an occupation using a probability distribution conditional on their educational attainment, sex, and geographic region.

For STARs, the probability of respondent i of gender g in region r being assigned to any occupation $j = 1, ..., J$ is equal to:

$$Pr(j) = \frac{n^{STAR}_{j,g,r}}{n^{STAR}_{g,r}}$$

where $n^{STAR}_{j,g,r}$ is equal to the weighted total number of STARs in occupation j of gender g in region r and $n^{STAR}_{g,r}$ is the weighted total number of STARs of gender g in region r. For workers with a bachelor's degree or higher, the probability of respondent i of gender g in region r being assigned to any occupation $j = 1, ..., J$ is equal to:

$$Pr(j) = \frac{n^{BD}_{j,g,r}}{n^{BD}_{g,r}}$$

where $n^{BD}_{j,g,r}$ is equal to the weighted total number of workers with a bachelor's degree or higher in occupation j of gender g in region r and $n^{BD}_{g,r}$ is the weighted total number of workers with a bachelor's degree or higher of gender g in region r.

After all respondents have been assigned an occupation, we use the person-level survey weights to calculate the total number of Black STARs, white STARS, Black workers with a bachelor's degree, and white workers with a bachelor's degree in each occupation. Finally, we use these simulated occupation-level totals to recalculate the dissimilarity index, D. For an example of the resulting distributions of D, Figure 3.1 shows the distribution of the simulated dissimilarity index separately for STARs and workers with a bachelor's degree in 2019.
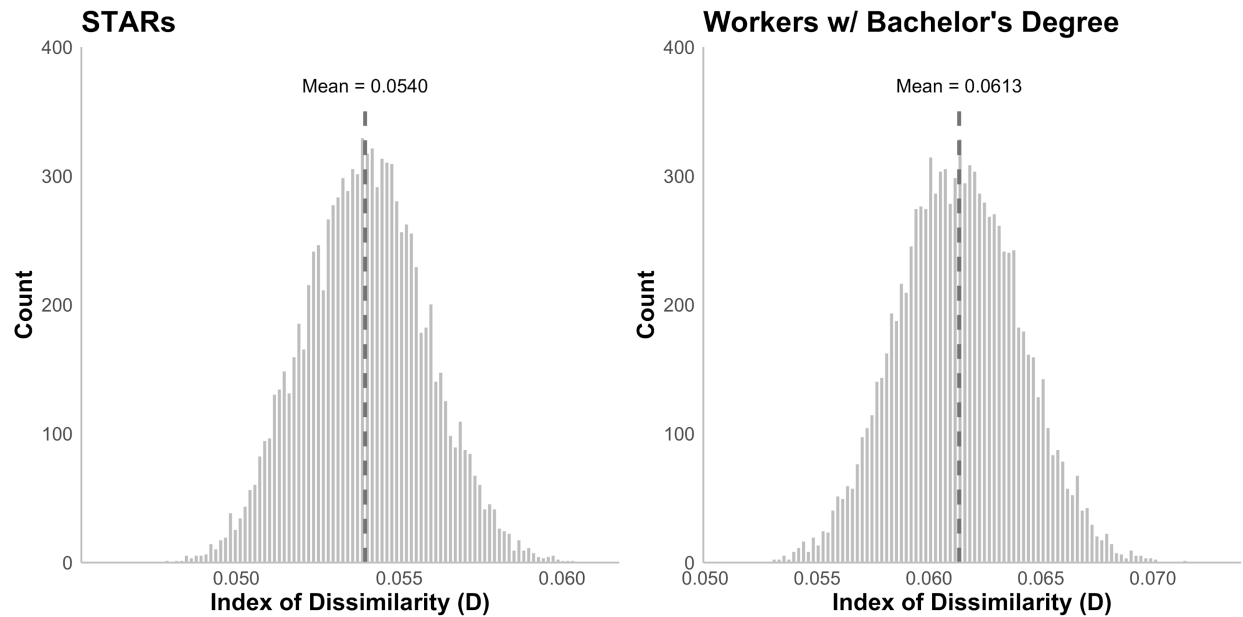
Figure 3.1. Distribution of Simulated Dissimilarity Index, 2019. Dissimilarity indices between Black and white workers by educational attainment over 10,000 Monte Carlo simulations. Occupational assignment probabilities are conditional on a worker's education, gender, and geographic region. The index of dissimilarity measures how evenly workers are distributed within the 422 occupations in the 2010 harmonized occupations codes created by University of Minnesota Integrated Public Use Microdata Series (IPUMS). Data are from the 2019 1-year American Community Surveys (ACS) accessed through IPUMS.

In Table 3.2, we present the results from our Monte Carlo simulation. Since we condition on gender and educational status but not race, our simulation results for the levels of occupational segregation by education and gender should match what we find in the observational data. Indeed, we find a close match to within one percentage point between the simulated and observed dissimilarity indices for these two groups. In our simulation, we do not constrain a worker's probability of assignment to an occupation by race within education category, hence the simulated values of the dissimilarity index between Black and white STARs and Black and white workers with bachelor's degrees reflect the extent of occupational segregation under conditions of a race-neutral labor market. It is important to note that by taking

the racial distribution of workers by education level within a region to be fixed, in our simulation results, we are not asserting a race-neutral education market.

There are two surprising findings from our simulation. The first is that the level of occupational segregation for both STARs and workers with bachelor's degrees is substantially lower in a race blind neutral market. The dissimilarity index for STARs falls by 20-25 percentage points relative to the observed value and the dissimilarity index for workers with bachelor's degrees fall by 14 to 18 percentage points. Decreases in the dissimilarity index of these magnitudes are comparable to the precipitous drops in the dissimilarity index that occurred naturally in the observational data reported by Spriggs and Williams (1996) from 1940-1980. Indeed, racial considerations, or at least factors correlated with race other than a worker's education, geography or gender, are substantially important for understanding occupational segregation between Black and white workers.

The signaling model of human capital would suggest that there would be less occupational segregation between Black workers and white workers with college degrees than Black and white STARs since the education credential would reduce the need for firms to engage in statistical discrimination on the basis of race (Arcidiacono, Bayer, and Hizmo 2010). Our second finding, however, which is perhaps more surprising than the first, is that the simulated level of occupational segregation by race is lower for STARs (0.042 to 0.056) than it is for workers with bachelor's degrees (0.063 to 0.110). In the observational data, the reverse was true, with there being a higher level of occupational segregation by race for STARs than for workers with bachelor's degrees. Because the confidence intervals from our simulation are tight, we can reject the null hypothesis that the level of occupational segregation faced by STARs is the same as that faced by workers with bachelor's degrees. Moreover, for STARs, the drop in the level of

Index of Dissimilarity (*D*)

		1980	*1990*	*2000*	*2010*	*2019*
Observed	STARs - Bachelor's	0.543	0.532	0.547	0.543	0.543
	Women - Men	0.585	0.524	0.515	0.505	0.483
	STARs: Black - White	0.307	0.268	0.249	0.256	0.278
	Bachelor's: Black - White	0.279	0.234	0.217	0.210	0.221
Simulated	STARs - Bachelor's	0.546 [0.545, 0.547]	0.532 [0.531, 0.533]	0.550 [0.549, 0.551]	0.543 [0.541, 0.545]	0.541 [0.539, 0.543]
	Women - Men	0.588 [0.588, 0.589]	0.529 [0.528, 0.530]	0.522 [0.521, 0.523]	0.512 [0.510, 0.514]	0.487 [0.485, 0.489]
	STARs: Black - White	0.056 [0.054, 0.057]	0.042 [0.041, 0.044]	0.044 [0.043, 0.046]	0.054 [0.051, 0.057]	0.054 [0.050, 0.058]
	Bachelor's: Black - White	0.110 [0.107, 0.114]	0.073 [0.070, 0.077]	0.063 [0.060, 0.066]	0.070 [0.064, 0.075]	0.061 [0.056, 0.067]

Table 3.2. Monte Carlo Simulations of Racial Occupational Segregation by Educational Attainment. Reported values are the average dissimilarity index over 10,000 Monte Carlo simulations, with 95 percent confidence intervals included in brackets. The index of dissimilarity measures how evenly workers are distributed within the occupations in the 2010 harmonized occupations codes created by University of Minnesota Integrated Public Use Microdata Series (IPUMS). The population of interest is workers who are aged 25 or older and active in the labor force. Workers skilled through alternative routes (STARs) have a high school diploma or equivalent and have developed their skills through routes other than a four-year diploma such as community college, apprenticeships, bootcamps, and, most commonly, on-the-job work experience. Data are from the 1980, 1990, and 2000 U.S. Decennial Censuses and the 2010 and 2019 1-year American Community Surveys (ACS) accessed through IPUMS.

occupational segregation that occurs from removing considerations for race in the simulations is several times larger than the reduction in the level of occupational segregation in the observational data that occurs between STARs and workers with bachelor's degrees (3 p.p. versus 20 p.p.).

3.6 The Occupations and Wages of Black and White Workers

Having demonstrated that racial occupational segregation remains significant in the contemporary U.S. labor market across levels of education, and is much higher than one would predict by random chance, we next consider the landscape of this segregation. We both examine the types of occupations in which Black and white STARs and workers with a bachelor's degree are primarily employed, and we illuminate the occupations in which segregation is the greatest. We also explore the implications of this segregation on wage disparities between Black and white workers.

We begin by comparing the highest volume occupations for Black and white STARs and Blacks and whites with college degrees. Figure 3.2 presents the distribution of Black and white STARs, as well as Black and white workers with bachelor's degrees, in the top 10 occupation categories by volume sorted in descending order by the number of workers in each category. We find that Black STARs are predominantly employed as nursing and home health aides, delivery truck drivers, customer service representatives, janitors, and laborers and freight movers. By contrast, white STARs are principally employed as supervisors of sales workers and other managers, a pattern consistent with prior research on racial occupational segregation, which showed evidence that Black workers were often precluded from positions of authority in the US labor market (Aizer et. al. 2020).

When we compare Black and white workers with a bachelor's degree by volume, we see more overlap in the types of occupations where many of these workers are employed. Both groups have positions as elementary and middle school teachers, as registered nurses, and as accountants and auditors. But the figure also reveals some notable differences. For one, a sizable number of Black workers with bachelor's degrees have positions as social workers or counselors.

A

Occupation	Wage
Nursing & Home Health Aides	$13.52
Delivery & Truck Drivers	$18.50
Customer Service Reps	$17.04
Janitors & Building Cleaners	$13.63
Laborers & Freight Movers	$14.60
Chefs & Cooks	$12.17
Personal Care Aides	$11.88
Security Guards	$15.16
Supervisors of Sales Workers	$20.49
Cashiers	$11.14

# of Black STARs

B

Occupation	Wage
Supervisors of Sales Workers	$20.49
Delivery & Truck Drivers	$18.50
Managers, Other	$36.16
Administrative Assistants	$19.47
Retail Salespersons	$15.38
Customer Service Reps	$17.04
Janitors & Building Cleaners	$13.63
Registered Nurses	$34.61
Laborers & Freight Movers	$14.60
Cashiers	$11.14

# of White STARs

C

Occupation	Wage
Elementary & Middle School Teachers	$24.34
Registered Nurses	$34.61
Managers, Other	$36.16
Social Workers	$22.05
Accountants & Auditors	$31.64
Computer Scientists & Systems Analysts	$35.45
Counselors	$22.39
Education Administrators	$30.77
Customer Service Reps	$17.04
HR & Training Specialists	$28.05

# of Black Workers w/ BD+

D

Occupation	Wage
Managers, Other	$36.16
Elementary & Middle School Teachers	$24.34
Registered Nurses	$34.61
Accountants & Auditors	$31.64
Lawyers & Judges	$51.92
High School Teachers	$25.96
Postsecondary Teachers	$30.57
Supervisors of Sales Workers	$20.49
Chief Executives & Legislators	$58.41
Software Developers	$50.62

# of White Workers w/ BD+

Legend: < $14.60 | $14.60 - $21.90 | $21.90 - $32.85 | > $32.85

Figure 3.2. Top 10 Largest Occupations by Race and Education. Occupations are classified into wage groups using the OECD wage level thresholds such that workers in low wage occupations earn less than

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two-thirds of national median hourly wages (less than $14.42), workers in middle wage occupations earn between two-thirds and one-and-a-half times median hourly wages ($14.42 - $32.45), and workers in high wage occupations earn more than one-and-a-half times median hourly wages (more than $32.45). Wages are reported in 2020 dollars. Data are from the 2019 1-year American Community Survey (ACS) accessed through the University of Minnesota Integrated Public Use Microdata Series (IPUMS)

Neither social worker nor counselor, in contrast, appear in the top 10 list of positions for white workers with a bachelor's degree. Whites with a bachelor's degree are also more frequently employed as lawyers and judges, as high school teachers, as postsecondary teachers, as supervisors of sales workers, and as chief executives and legislators—all positions of greater authority and none of which appear on the top 10 list of jobs by volume for Blacks with a college degree.

Sorting occupations by the number of Black and white STARs employed also provides important insight into wage differences. We first classify each occupation into wage groups using the Organization for Economic Co-operation and Development (OECD) wage level thresholds, such that workers in low wage occupations are those that earn less than two-thirds of national median hourly wages (less than $14.42), workers in middle wage occupations earn between two-thirds and one-and-a-half times median hourly wages ($14.42 - $32.45), and workers in high wage occupations earn more than one-and-a-half times median hourly wages (more than $32.45). Because of the distribution of occupational median wages and the width of the middle wage category, this classification scheme classifies 293 occupations, or 63%, as middle wage. As a result, we split this category such that workers in lower-middle wage occupations earn between two-thirds times median and median hourly wages ($14.42 - $21.90) and workers in

upper-middle wage occupations earn between median and one-and-a-half time median hourly wages ($21.90 - $32.45).[18] We report wages in 2020 dollars.

As we can see from Figure 3.2, none of the top ten jobs in which Black STARs are employed by volume are considered high wage. Meanwhile, five out of the ten are low wage and all ten pay less than the national median. By comparison, among the top ten jobs for white STARs by volume, only two are low wage, six are lower-middle wage, and two are high wage. Most strikingly, we find that 76.9% of Black STARs work in occupations with hourly wages less than the national median wage and 29.3% of Black STARs are in low wage occupations. In contrast, 62.8% of white STARs work in occupations that pay less than the national median wage and 16.8% of white STARs are in low wage occupations.

Although both Black and white workers with bachelor's degrees are significantly more likely than STARs to be in upper-middle or high wage occupations, occupational segregation and wage disparity between racial groups persists at this higher level of education. 70.4% of Blacks with a bachelor's degree or higher are in occupations that earn more than the national median wage and 29.3% are in high wage occupations. In contrast, 78.5% of whites with a bachelor's degree or higher are in occupations earning more than the national median wage and 39% are in high wage occupations. Of the top ten jobs by volume for Blacks with a college degree, only three are high wage. Among the top ten occupations by volume for whites with college degrees, we can see that five of the ten occupations are high wage, four are upper-middle wage, and one is lower-middle wage.

Examining occupational segregation by volume of workers provides important insight into how racial groups by education levels are distributed across the entire labor market. But this

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[18] Based on this classification, 17% of occupations are classified as low wage, 35% as lower-middle wage, 27% as upper-middle wage, and 21% as high wage.

approach also limits our insight into the landscape of occupational segregation; namely, it does not reveal whether there are some jobs where Blacks or whites are markedly over-represented or if there are occupations from which Black workers may be overwhelmingly excluded. Thus, we next examine occupations by the proportion of workers who are Black or white STARs or Black or white workers with college degrees. As we did in the previous analysis, we sort these occupations in descending order by the percent of each type of worker in the occupation and present the results in Figure 3.3. For each panel in Figure 3.3, the vertical dashed line represents the share of the group in the overall population. The extent to which the bars extend beyond that line therefore indicates the degree to which a group is over-represented in each occupation.

There are several important insights we can glean from viewing occupations in this way. First, we can see that Black STARs are especially over-represented in some occupations. Despite making up about 7.6% of the U.S. labor force in 2019, in the ten occupations in the first panel of Figure 3.3, Black STARs compose more than 20% of workers. Nursing and home health aides, security guards, postal sorters and clerks, barbers, and licensed practical nurses are disproportionately Black STARs. What is more, three out of ten of these positions are considered low wage and five are lower-middle wage. There are two upper-middle wage occupations, but the roles are directly related to the United States Postal Service.

By comparison, white STARs are over-represented in jobs as tool and die makers, millwrights, surveying and mapping technicians, electrical power-line workers, and machinists. In most of these positions, white STARs compose more than 60%--and in some cases, more than 80%--of the workforce. Notably, the majority of these positions in which white STARs are over-represented are skilled blue-collar trade jobs, all of which are lower-middle wage jobs or higher. Eight of the jobs pay higher than the national median. This pattern is consistent with prior

A

Black STARs are 7.6%
of the U.S. labor force

Occupation	Wage	% Black STARs
Nursing & Home Health Aides	$13.52	
Security Guards	$15.16	
Postal Service Sorters & Processors	$22.69	
Postal Service Clerks	$25.06	
Barbers	$12.33	
Licensed Practical Nurses	$20.44	
Bus & Ambulance Drivers	$16.23	
Parking Lot Attendants	$13.15	
Industrial Truck & Tractor Operators	$16.06	
Baggage Porters, Bellhops, & Concierges	$16.53	

% Black STARs

B

White STARs are 32.9%
of the U.S. labor force

Occupation	Wage	% White STARs
Tool & Die Makers	$25.32	
Millwrights	$29.21	
Surveying & Mapping Technicians	$24.51	
Electrical Power-Line Workers	$38.60	
Machinists	$21.90	
Water Treatment Plant Operators	$23.96	
Parts Salespersons	$17.46	
Heavy Vehicle & Mobile Equipment Technicians	$24.34	
Industrial & Refractory Machinery Mechanics	$24.34	
Highway Maintenance Workers	$19.47	

% White STARs

C

Black workers with a bachelor's degree
are 3.4% of the U.S. labor force

Occupation	Wage	% Black Workers w/ BD+
Social Workers	$22.05	
Community & Social Service Specialists	$21.90	
Counselors	$22.39	
Budget Analysts	$37.83	
Therapists, Other	$24.34	
Tax Examiners & Collectors	$26.42	
Financial Specialists, Other	$32.62	
Education & Library Workers, Other	$26.77	
Eligibility Interviewers, Government	$21.17	
Education Administrators	$30.77	

% Black Workers w/ BD+

D

White workers with a bachelor's degree
are 26.8% of the U.S. labor force

Occupation	Wage	% White Workers w/ BD+
Veterinarians	$43.23	
Chiropractors	$32.10	
Environmental Scientists & Geoscientists	$37.72	
Speech Language Pathologists	$33.83	
Psychologists	$37.88	
Lawyers & Judges	$51.92	
Secondary School Teachers	$25.96	
Occupational Therapists	$35.55	
Librarians	$24.59	
Physical Therapists	$38.24	

% White Workers w/ BD+

Legend: ■ < $14.60   ■ $14.60 - $21.90   ■ $21.90 - $32.85   □ > $32.85

Figure 3.3. Top 10 Overrepresented Occupations by Race and Education. For each group of workers by race and degree status, we show the ten occupations with at least 50 thousand workers for which that

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group makes up the largest share. Occupations are classified into wage groups using the OECD wage level thresholds such that workers in low wage occupations earn le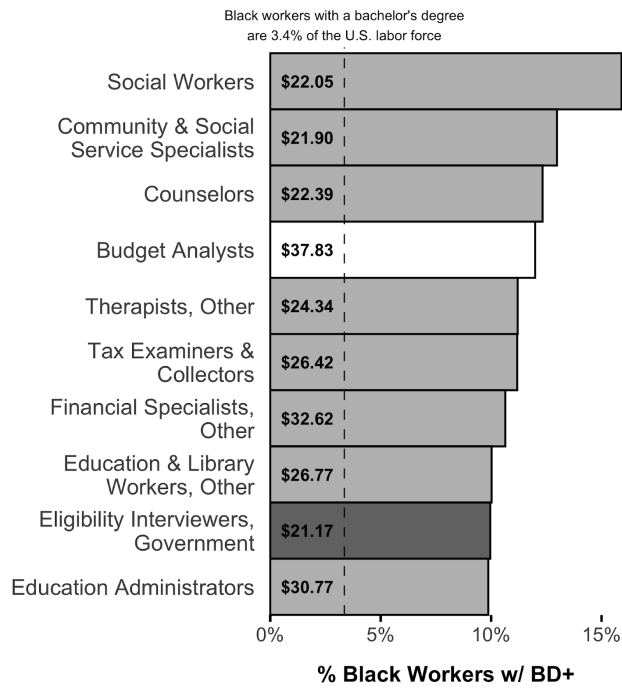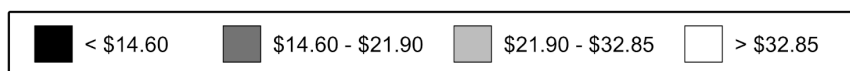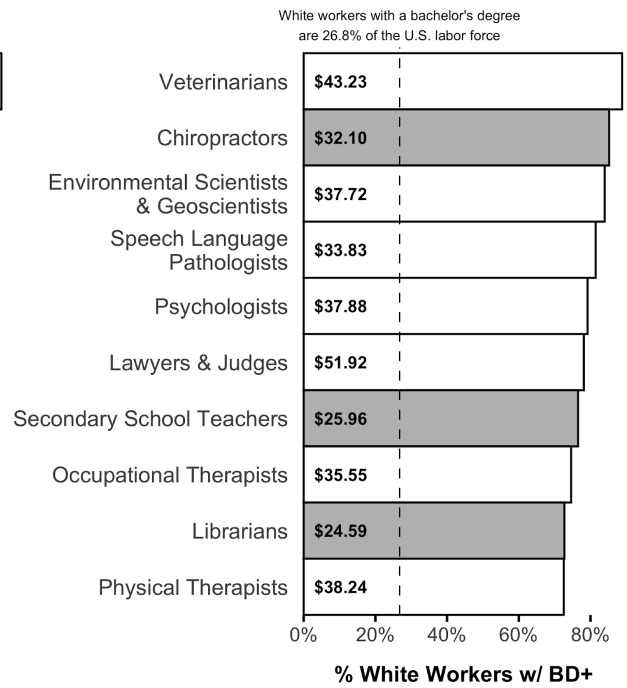ss than two-thirds of national median hourly wages (less than $14.42), workers in middle wage occupations earn between two-thirds and one-and-a-half times median hourly wages ($14.42 - $32.45), and workers in high wage occupations earn more than one-and-a-half times median hourly wages (more than $32.45). Wages are reported in 2020 dollars. Data are from the 2019 1-year American Community Survey (ACS) accessed through the University of Minnesota Integrated Public Use Microdata Series (IPUMS).

work, which documents how Black workers have been systematically and deliberately barred from these relatively well-paying blue-collar occupations (Bonacich 1976, Foner 1982).

As we can see from the bottom two panels in Figure 3.3, Black and white workers with a college degree are also distinctly over-represented in some occupations. Blacks with a college degree comprise a disproportionate share of those employed as social workers, community and social service specialists, counselors, budget analysts, therapists, and tax collectors. Despite their higher levels of education, the jobs in which Blacks with a college degree are over-represented are primarily upper-middle wage. Only one out of the top ten occupations is high wage.

Whites with a bachelor's degree are over-represented in occupations like veterinarians, chiropractors, environmental scientists and geoscientists, and speech language pathologists. When it comes to wages, there is a stark contrast in these occupations relative to the ones where Blacks with a college degree are over-represented. Out of the top ten jobs in which whites with a college degree are over-represented, all but three are high wage. In contrast, as we mentioned above, only two of the top ten jobs in which Blacks with a college degree are over-represented are high wage.

While Figure 3.3 presents the occupations in which each group of workers are most over-represented, high levels of occupational segregation by education suggest that we should not always expect the proportion of a group of workers (e.g., Black STARs) in an occupation to

align with that group's share of the labor market as a whole. For example, although Black STARs are 7.6% of the U.S. labor force, we do not expect Black STARs to make up 7.6% of roles which typically require a bachelor's degree or higher such as dentists, lawyers, or chemical engineers. However, if racial occupational segregation were primarily the result of differences in human capital and degree attainment between Black and white workers, it is plausible to anticipate that Black and white STARs are under- and overrepresented in the same set of occupations. The same logic extends to workers with a bachelor's degree or higher. To investigate this hypothesis directly, we standardize each group's share of all occupations to create a measure of relative representation. In Figure 3.4, we plot the occupations with the largest absolute difference in relative representation, separately for STARs and workers with a bachelor's degree or higher.[19] The 45-degree angle dashed line identifies occupations in which Black and white workers have similar levels of relative representation, occupations in the bottom right of each figure are ones in which Black workers are overrepresented relative to similarly educated White workers, and occupations in the top left of each figure are ones in which Black workers are underrepresented relative to similarly educated White workers.

Figure 3.4A makes clear that many occupations in which Black STARs are overrepresented do not have commensurate levels of white STARs. Found in the bottom right of the figure, tend to be low or lower-middle wage occupations. In comparison, occupations in which white STARs are overrepresented and Black STARs are underrepresented can be found in the top left of the figure and are much more likely to be upper-middle or even high wage occupations. While the degree of overrepresentation is somewhat smaller for workers with a bachelor's degree than for STARs, similar wage stratification patterns emerge for Black and

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[19] To aid the eye in identifying wage differences between occupations in which Black and white workers are overrepresented, we include the 50 occupations with the largest absolute difference in standardized group share in Figure 3.3. For reference, all 422 occupations are included in Figure A1.1 in the appendix.
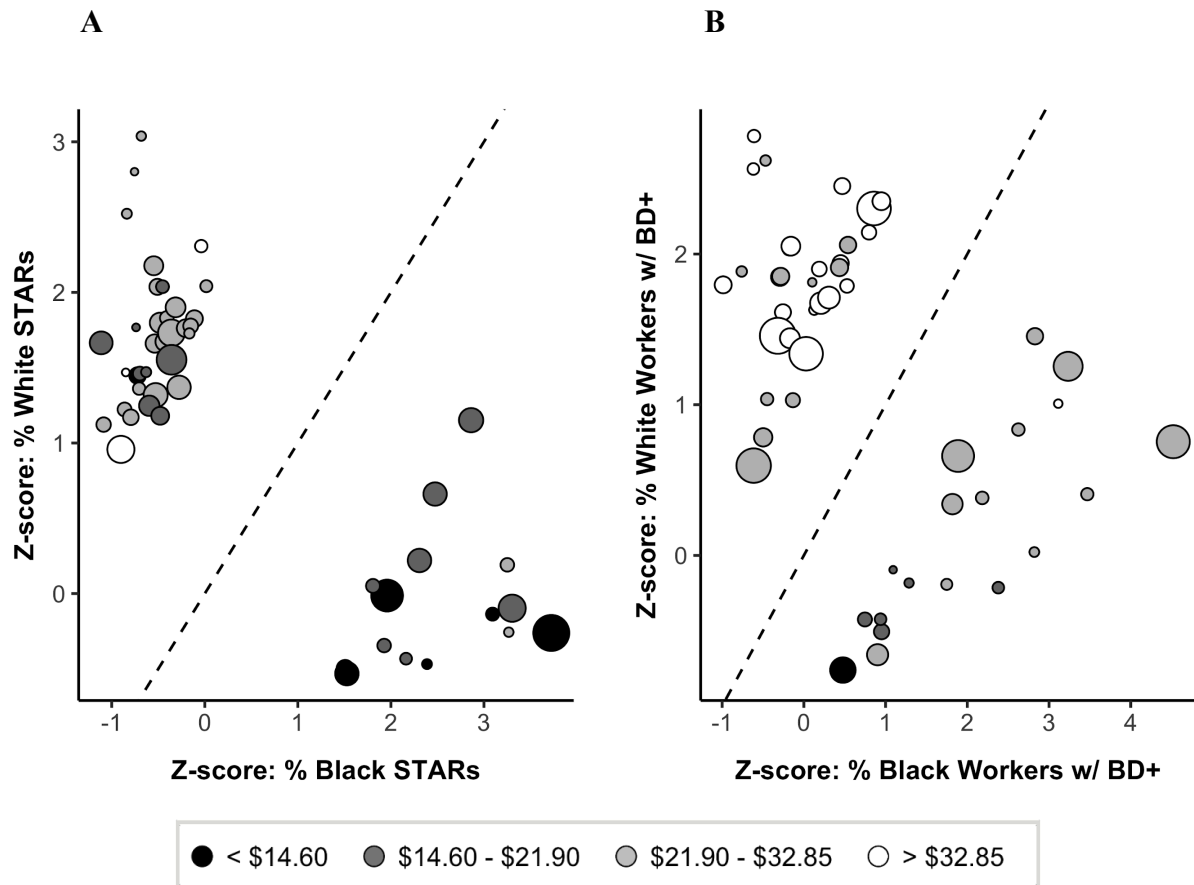
Figure 3.4. Top 50 Occupations with Largest Difference in Representation by Race Within Degree Status. Each point represents an occupation and is sized by the total number of workers. Occupations are limited to those with at least 50k workers. Data are from the 2019 1-year American Community Survey (ACS) accessed through the University of Minnesota Integrated Public Use Microdata Series (IPUMS).

white workers with a bachelor's degree or higher as can be seen in Figure 3.4B. Black workers with a bachelor's degree are overrepresented in relative proportions unmet by their white peers in occupations which are typically lower-middle or upper-middle wage. In comparison, occupations in which white workers with a bachelor's degree are uniquely overrepresented are much more likely to be high wage occupations.

To further unpack the relationship between the over-representation of workers from each of our four groups and wages, in Figure 3.5, we present the relationship between an occupation's

median hourly wages and its worker composition by race and education. The vertical line marks a group's share of the entire labor market such that points to the right indicate occupations in which a group is overrepresented. In order to aid the eye in identifying patterns in the data, we also plot the smoothed conditional means using linear regression, separately for occupations in which a group is under- or overrepresented.

Several patterns are worth noting. First, the share of Black STARs in an occupation is negatively related to that occupation's median hourly wages. This relationship flattens somewhat for occupations in which Black STARs are overrepresented, largely due to floor effects, but it is clear that Black STARs are often relegated to jobs that are poorly compensated by employers. Although the association between group share and wages is similarly negative for occupations in which white STARs are underrepresented, the relationship takes a sharp turn among the occupations for which white STARs are overrepresented. STARs across racial groups lack access to many of the highest paying occupations, but white STARs have considerably more access than Black STARs to good-paying jobs.

Consistent with previous findings, occupations with a larger share of workers with bachelor's degrees or higher tend to be more highly compensated. Considering this pool of workers without regard to race, however, masks considerable variation. We can see in the bottom two panels of Figure 3.5, which compare Black and white workers with a bachelor's degree or more, that as the share of whites with a bachelor's degree in an occupation increases, median wages consistently increase. In contrast, the relationship between group share and wages does *not* linearly increase for Blacks with a bachelor's degree. In fact, among the occupations for which Black workers with a bachelor's degree or more are most overrepresented, the relationship between group share and wages is negative, suggesting that a four-year degree does not provide

A

Black STARs are 7.6%
of the U.S. labor force

% Black STARs

Median Hourly Wages (2020 dollars)

B

White STARs are 32.9%
of the U.S. labor force

% White STARs

Median Hourly Wages (2020 dollars)

C

Black workers with a
bachelor's degree are
3.4% of the U.S. labor force

% Black Workers w/ BD+

Median Hourly Wages (2020 dollars)

D

White workers with a
bachelor's degree are
26.8% of the U.S. labor force

% White Workers w/ BD+

Median Hourly Wages (2020 dollars)

Figure 3.5. Relationship Between Wages and Worker Share by Race and Education. Each point represents an occupation and is sized by the total number of workers in the occupation. The vertical line marks a group's share of the entire labor market such that points to the right indicate occupations in which a group is overrepresented. The two black lines represent the smoothed conditional means using weighted linear regression, calculated separately for under- and overrepresented occupations; the shaded area represents the 95% confidence area. Data are from the 2019 1-year American Community Survey (ACS) accessed through the University of Minnesota Integrated Public Use Microdata Series (IPUMS).

Black workers access to the same set of occupations as it does for white workers.

To account for the distinct patterns in Figure 3.6, we adopt a threshold regression model to allow the relationship between median hourly wages and a group's occupation share to vary as the group shifts from underrepresentation to overrepresentation (Hansen 2000; Fong et al. 2017). A sample-split model, which is a special case of the threshold regression model assumes the following form:

$$y_i = \beta_1 x_i + \epsilon_i, \qquad q_i \leq \gamma,$$

$$y_i = \beta_2 x_i + \epsilon_i, \qquad q_i > \gamma,$$

where q_i refers to the threshold variable and is used to split the sample into two groups. In the context of occupational segregation, y_i is an occupation's median hourly wages and x_i and q_i are a group's share of the occupation.

For each group of workers, $j = 1, ..., 4$, we estimate the following three models where the indicator, $D_j = I(X \leq \frac{n_j}{n})$ represents the threshold between occupations in which a group is under- or overrepresented.[20] In models II and III, we include matrix Z to control for additional covariates which may impact an occupation's median hourly wage including median age, median experience, percent female, percent of workers who are government employees, and percent of workers in the South. In model III, we allow the relationship between the median hourly wages and these control variables to vary on each side of the threshold. In Table 3.3, below, we outline the three specifications that we use to estimate the relationship between an occupation's median

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[20] In addition to being theory-driven thresholds which allow for a clear interpretation in terms of group over- and underrepresentation, these thresholds also maximize the R^2 for these models. See Appendix A2 for results using alternative threshold values..

Model	Specification
Model I: Threshold Parameter	$Y = \alpha + \tau D + \beta_1 X + \beta_2 DX + \epsilon$
Model II: Threshold Parameter + Additional Control Variables	$Y = \alpha + \tau D + \beta_1 X + \beta_2 DX + \beta_3 Z + \epsilon$
Model III: Threshold Parameter + Additional Control Variables w/ Potential Threshold	$Y = \alpha + \tau D + \beta_1 X + \beta_2 DX + \beta_3 Z + \beta_4 DZ + \epsilon$

Table 3.3. Summary of Threshold Regression Model Specifications. The dependent variable Y is an occupation's median hourly wages, X is a a group's share of an occupation, D is an indicator function of whether a group is under- or overrepresented in an occupation, and Z controls for additional covariates which may impact an occupation's median hourly wage including median age, median experience, percent female, percent of workers who are government employees, and percent of workers in the South.

hourly wages and a group's share of the occupation. All models are weighted by occupation size.

Table 3.4 presents the estimates of the regression coefficient of a group's share of an occupation in which the group is underrepresented, overrepresented, and the difference between the two. Full model results are presented in Appendix A2. Regardless of model specification, there is a significant negative relationship between an occupation's median hourly wages and a group's share of the occupation for Black and white STARs for occupations in which the group is underrepresented. For occupations in which Black STARs are underrepresented, each percentage point increase of Black STARs is associated with a loss of wages of $2.44 to $3.45 per hour, depending on model specification. In comparison to an occupation with zero percent Black STARs, an occupation in which Black STARs are perfectly represented, making up 7.6% of the occupation, pays between $18.51 and $26.20 less per hour. For occupations in which white

STARs are underrepresented, each percentage point increase is correlated with hourly wage losses of between $0.37 and $0.66. Occupations in which white STARs are perfectly represented pay between $12.21 and $21.65 less per hour compared to occupations in which there are no white STARs. Across the threshold, as these groups become overrepresented, the relationship is indistinguishable from zero for both Black and white STARs, though the relationship is weakly positive for white STARs and weakly negative for Black STARs.

For both Black and white workers with a bachelor's degree or higher, there is a significant positive relationship between an occupation's median hourly wages and the group's share of the occupation for occupations in which the group is underrepresented. For these occupations, each additional percentage point of Black workers with a bachelor's degree or more is associated with hourly wage gains of $2.89 to $3.12. In comparison to an occupation with zero percent Black workers with a bachelor's degree, an occupation in which Black STARs are perfectly represented pays between $9.83 and $10.61 more per hour. For white workers with a bachelor's degree or more, a one percentage point increase in the group's share is associated with hourly wage gains of between $0.19 and $0.35. This translates to hourly wage gains of between $5.15 and $9.33 for occupations in which white workers with a bachelor's degree are perfectly represented in comparison to occupations with no white workers with a bachelor's degree.

In comparison to Black and white STARs, the results of the threshold regression model diverge more significantly for Black and white workers with a bachelor's degree among occupations in which these workers are overrepresented. For each additional percentage point of Black workers with a bachelor's degree in an occupation beyond the national share of this group, hourly wages decrease by $0.49 to $0.70. In comparison to occupations in which Black workers with a bachelor's degree are perfectly represented, occupations with the largest share of Black

	Black STARs			White STARs			Black Workers w/ Bachelor's Degree			White Workers w/ Bachelor's Degree		
	I	II	III	I	II	III	I	II	III	I	II	III
Under Representation	-3.448*** (0.227)	-2.569*** (0.242)	-2.435*** (0.251)	-0.658*** (0.067)	-0.371*** (0.075)	-0.584*** (0.079)	3.118*** (0.695)	2.890*** (0.681)	3.116*** (0.783)	0.192*** (0.074)	0.348*** (0.070)	0.228*** (0.069)
Over Representation	-0.087 (0.126)	-0.127 (0.115)	-0.082 (0.114)	0.162* (0.083)	0.021 (0.070)	0.088 (0.065)	-0.700** (0.319)	-0.488* (0.283)	-0.508* (0.317)	0.240*** (0.045)	0.251*** (0.044)	0.308*** (0.045)
Difference	3.361*** (0.260)	2.442*** (0.273)	2.352*** (0.275)	0.820*** (0.106)	0.392*** (0.102)	0.672*** (0.102)	-3.818*** (0.765)	-3.377*** (0.679)	-3.625*** (0.844)	0.048 (0.087)	-0.097 (0.076)	0.081 (0.082)
Controls	No	Yes	Yes + Threshold	No	Yes	Yes + Threshold	No	Yes	Yes + Threshold	No	Yes	Yes + Threshold
Adjusted R^2	0.549	0.631	0.648	0.349	0.552	0.628	0.249	0.533	0.530	0.528	0.656	0.710

Note: $^{*}p < 0.1$; $^{**}p < 0.05$; $^{***}p < 0.01$

Table 3.4. Threshold Regression Model of Occupational Median Hourly Wages and Group Share. Relationship between occupational median hourly wages and a group's share of the occupation. Estimates of the regression coefficient of a group's share of an occupation in which the group is underrepresented, overrepresented, and the difference between the two are presented here. Full model results are in Appendix A3. Model I is a pure threshold model in which both the intercept and slope are allowed to vary. Model II includes additional covariates which may impact an occupation's median hourly wage including median age, median experience, percent female, percent of workers who are government employees, and percent of workers in the South. Model III allows for the relationship between median hourly wages and the control variates to vary across the threshold. All models are weighted by occupation size.

workers with a bachelor's degree pay between $6.10 to $8.75 less per hour. In contrast, for white workers with a bachelor's degree or higher, increased representation continues to lead to increased wages. For each additional percentage point of white workers with a bachelor's degree or higher beyond the group's share of the national labor force, hourly wages increase by $0.24 to $0.31. This translates to hourly wage gains of between $15.00 and $19.25 when comparing occupations with the largest share of white workers with a bachelor's degree to those in which white workers with a bachelor's degree are perfectly represented.

These results demonstrate that occupational segregation has significant consequences for racial wage disparities. Across and within levels of education, Black workers are consistently segregated into jobs that pay less than those in which their white counterparts are employed. The median hourly wage for the positions in which Black STARs are overrepresented is $15.50, compared to the $31.80 for occupations in which they are underrepresented. Unlike Black STARs, Black Workers with a bachelor's degree are, on average, compensated more in the jobs in which they are overrepresented compared to where they are underrepresented. Nevertheless, we note that they still remain relegated to very different occupations than their white peers–often to positions in which they have less authority and are more likely to interface primarily with people of color. Furthermore, independent of their degree of over or underrepresentation, Black workers with and without college degrees still make less than equally educated whites. In 2019, the median hourly wage for Black STARs was $15.94 compared to $19.47 for white STARs. For Black workers with a bachelor's degree, the median hourly wage was $26.29, compared to $32.45 for whites with a college degree.

3.7 Discussion and Conclusion

Our analysis demonstrates that regardless of educational attainment, considerable occupational segregation between Black and white workers persists in today's labor market. Our findings are also consistent with prior work, which demonstrates that even as college attendance has increased among people of color, high levels of racial stratification across programs and fields of study limit the potential impact that college could have on occupational segregation, with Black students highly concentrated in college majors that have historically led to lower-wages (Carnevale et al. 2016; Monarrez and Washington 2020; Palacios et al. 2022). We note, of course, that Black workers with four-year college degrees are situated in different, and generally more high-paying jobs than Black STARs. Nevertheless, across and within levels of education, Black workers are concentrated in a smaller range of positions relative to whites, and routinely in occupations that pay less well than those in which their white peers are more concentrated. Most surprisingly, the results of our simulation suggest that a race neutral labor market would yield substantially less occupational segregation for Black workers and that the reduction in occupational segregation would be larger for Black STARs than Black workers with bachelor's degrees.

Many of the implications of this segregation are clear. Occupational segregation means that Black workers are systematically compensated more poorly relative to white workers. Black STARs in particular are excluded from skilled, blue-collar, goods-producing jobs. While here we principally compare wages, differences in the wages and types of jobs in which Black and white workers are situated also mean that racial disparities also manifest in other forms of compensation that are positively associated with wages such as retirement benefits and health insurance. We show descriptively, for example, that Black STARs are disproportionately

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represented in jobs without significant leadership responsibilities even when compared to white STARs.

In keeping with research suggesting that workers are channeled up or down into positions depending on their race, we also find that Black workers with and without college degrees are under-represented in positions of authority relative to their white peers. As prior work indicates, they are more likely to be relegated to lower quality jobs or positions. What is more, because Black workers are concentrated in lower quality jobs and generally underrepresented in positions of authority, they are likely to experience limited upward mobility. Black workers are therefore more likely to be situated in jobs that have little to no opportunity for advancement. This trend both reinforces long standing stereotypes about Black workers' capabilities and precludes them from accessing better-compensated occupations. Occupational segregation therefore likely perpetuates negative racial stereotypes and contributes to enduring racial wealth inequality in the United States (Shapiro 2004).

Not only do we learn that investment in human capital does not necessarily eliminate occupational segregation and its negative consequences, but our efforts here pointedly demonstrate the stark differences in the quality and wage compensation of jobs between Black and white STARs, both of whom compose a sizable share of today's labor force. As we argued above, while greater educational attainment may attenuate some occupational segregation and its effects, obtaining a college degree remains an impractical solution for a huge proportion of workers currently in the labor market who currently do not possess one. Better policy solutions would therefore instead focus on improving opportunities for STARs and would pay special attention to reducing disparities between Black and white STARs. As our work demonstrates, while both groups would benefit from policies that increase their status and compensation in the

labor market, white STARs are already more likely to have access to better-paying quality jobs than Black STARs.

We also acknowledge that our approach provides a limited view of labor market disparities between Black and white Americans. We necessarily focus only on racial differences between workers in the labor market, but because of racial discrimination in the criminal justice system (Du 2021), a large and disproportionate percentage of Black Americans, especially Black men, are incarcerated at any point in time, removing them from the workforce (Holzer 2021; Bayer and Charles 2018). Formerly incarcerated individuals, a population in which Black Americans are overrepresented, are more likely to experience unemployment as well (Couloute and Kopf 2018). Incarceration rates are also correlated with levels of education; individuals who have been incarcerated are less likely to have a college degree–a relationship further exacerbated by race (Ewert, Sykes, and Pettit 2014). By one estimate, nearly 60 percent of Black male high school drop-outs are imprisoned at some point in their lives (Pettit and Western 2004). Thus, our approach does obscure some greater racial inequality in the labor market by examining racial disparities between workers, and we acknowledge that our findings must be considered in conjunction with the disproportionate percentage of Black workers–including the disproportionate number without college degrees–who are missing entirely from the labor market.

Our work provides clear paths for future research. We have focused here on segregation between Black and white workers, but as the racial and ethnic composition of the country continues to shift and become even more diverse, studying differences across a broader array of groups, including Asian and Hispanic Americans, is essential. We suspect that while members of these groups, like Black Americans, are subject to labor market discrimination, that differences

in longstanding group stereotypes, relative levels of educational attainment, access to social networks that provide job opportunities, and more, may mean that segregation for these groups, if it is prevalent, does not reflect the same patterns we observe in our analysis here.

We also recommend that future work build on past studies by exploring the intersection of race and gender segregation. Historically, women have been relegated to different occupations than men, and therefore an intersectional approach that considers occupational segregation by both race and segregation is important. Given our findings here, we advocate that any effort also consider race-gender differences by levels of education, particularly given the gains women have made in education over the past several decades and potential racial disparities in the consequences of these gains for employment opportunities.

Greater integration of workers is a critical goal for our pursuit of equity in the U.S. labor market. The emerging insight from this work suggests that racial occupational desegregation has in fact stalled in the past two decades, and that further study of discrimination across the intersection of race and educational attainment in the labor market is needed to better understand the mechanisms driving the lack of progress.

CHAPTER 4

Public-Sector Employment and Occupational Segregation

4.1 Introduction

On his first day in office, President Biden signed Executive Order 13985 with the declared intention of addressing racial inequality and historically underserved communities by "[a]ffirmatively advancing equity, civil rights, racial justice, and equal opportunity." The executive order went on to direct executive agencies to reflect about whether their policies and programs created barriers to equal opportunity. Two years later, almost to the day, Biden signed another executive order documenting his administration's commitment and efforts to improve racial equity and inclusion in the economy (Exec. Order No. 14091).

Biden's efforts are likely, in part, a reaction to growing demand within the Democratic Party for increased government action on behalf of Black Americans and other racial minorities: 74 percent of Democrats agree that a lot more needs to be done to achieve racial equality (Pew 2021a). Arguments on behalf of government intervention in pursuit of racial equality, particularly economic equality, are rooted in the fact that government actions played a significant role in creating wealth and income inequality between Black and white workers. At its core, the United States is a country made powerful and rich through the "commodification and suffering and forced labor of African Americans" (Baptist 2014, 20). Government action, and in some cases intentional inaction, led to the denial of Black public schooling of the same quality as that available to white students (Carruthers and Wanamaker 2017), the reduction of Black wealth

during the Jim Crow era (Darity Jr. and Frank 2007), the creation of affordable and exclusively

white spaces (Jackson 1985; Massey and Denton 1993; Nall 2015) and the devaluation of

disproportionately Black spaces (Rothstein 2017), and hollowed out bureaucratic capacity and

reduced social spending in the American South (Suryanarayan and White 2021). The millions of

Blacks who fled the South during the Great Migration were met by formal and informal

discrimination in employment, housing, and education (Derenoncourt 2022). Although many of

the most explicitly racist laws and policies have either been repealed or replaced, the legacies of

government action and continued government inaction have resulted in vastly different economic

opportunities for Black and white Americans.

　　While significant scholarly attention has been given to the role the government plays in

reducing racial inequality and discrimination, less work has addressed the degree to which

government efforts have impacted the occupational distribution of Black and white workers.

Previous work has demonstrated that occupational segregation is directly linked to the earnings

gap between Black and white workers. Although Black workers regularly earn less than white

workers in the same occupation, whether due to the intersection of segregated social networks

and the racial wealth gap (Grodsky and Pager 2002), statistical discrimination, or racial

discrimination such as manager perceptions that Black workers possess less "soft skills" (Moss

and Tilly 1996), the majority of the Black-white wage gap can be attributed to occupational

sorting or occupational segregation (del Río and Alonso-Villar 2015). In Chapter 3, I presented

evidence that persistent levels of occupational segregation between Black and white workers are

not a function of differences in human capital in the form of educational attainment. This

segregation is not merely a matter of horizontal segregation (Charles and Bradley 2009) in which

Black and white workers are in separate, but relatively equal occupations; when compared to

their similarly educated white peers, Blacks are regularly relegated to a set of occupations which offer less compensation, authority, and mobility.

In this chapter, I investigate how the federal, state, and local governments in the United States may shape the occupational distribution of Black and white workers through their roles as employers, making comparisons between the occupational segregation observed in the public and private sectors. Since the 1960s, the public sector has historically provided increased economic opportunities for members of historically disadvantaged groups, notably women and Blacks (Zipp 1994; Laird 2017). Because public sector employment typically pays less than employment in the private sector for any specific occupation, any group-based economic advantages resulting from public sector employment are likely to be due to the relative availability and accessibility of occupations. In the section to follow, I explore the existing literature on the role of public sector employment on Black economic mobility in more detail.

4.2 Public Sector Employment and Black Mobility

Substantial scholarly attention has been dedicated to the study of the information asymmetries involved in the principal-agent relationship between Congress and the bureaucratic agents it oversees (McCubbins and Schwartz 1984; Kiewiet and McCubbins 1991), the development of bureaucratic autonomy (Carpenter 2001), bureaucratic drift (McCubbins, Noll, and Weingast 1987), and the role of street-level bureaucrats as policy implementers and mediators between citizens and the state (Lipsky 1980). Formal models of bureaucratic policymaking assume that bureaucrats are maximizing policy preferences derived from ideological primitives in much the same way as other political actors (Gailmard and Patty 2012). While a useful framework to study

concepts such as bureaucratic drift or efficient provision of public services, it critically overlooks a primary motivator which brings bureaucrats to work each morning: compensation and benefits.

In addition to their expanding role as "providers of social services and income supplements, producers of goods, managers of the economy, and investors of capital" (Cameron 1978, 1243), governments serve as employers to over 15 percent of the U.S. labor force. As of 2019, 3.9 million workers were employed by the federal government, 6.3 million people by state governments, and 10.0 million by local governments (U.S. Census Bureau 2023). Although workers are spread across numerous agencies, the federal government is the single largest employer in the United States.[21]

As an employer of Black workers, the federal government's track record is decidedly mixed. Prior to the emancipation of enslaved Blacks and the adoption of the 13th Amendment in 1865, the federal government spent sizable funds on the labor of enslaved people, both through "payments to federal contractors who used slave labor and payments to slaveholders for the use of their slaves as federal employees" (Ericson 2005, 115). For example, much of the stone used to build the White House and U.S. Capitol came from a sandstone quarry which used a great deal of slave labor; enslaved laborers were also intricately involved in the construction of these buildings (Allen 2001).

In the decades following the Civil War, Black workers made notable economic progress in the federal civil service. After the passage of the Pendleton Act of 1883, federal jobs became a realistic source of employment for Black workers, perhaps in part due to their political support for the Republican Party (King 1995). The implementation of merit-based practices and civil service exams also reduced the impact of racial discrimination as Black Americans found

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[21] While the true size of the federal government is difficult to estimate, this value is a lower bound and excludes 1.3 million active-duty military personnel and roughly 5 million contract and grant employees (Light 2017).

opportunities for advancement in every department of the government (Van Riper 1954; Yellin 2013).

Much of this progress was halted and reversed after the election of Woodrow Wilson (King 1996). With the expressed goals of improving bureaucratic efficiency by reducing frictions between Black and white federal employees (Lunardini 1979), Wilson and his cabinet approved the implementation of segregation in government offices in 1913 which included the creation of separate cafeterias, the construction of basement toilets for Black workers, and the demotion of Black supervisors to "ensure that no African American oversaw a white employee" (Rothstein 2017; 43). The adoption of "Jim Crow-style norms of racial hierarchy" in the federal government had significant economic costs for Black workers over the next five decades in terms of earnings, wealth, and intergenerational wealth (Aneja and Xu 2022, 912). Although some of these costs were due to wage differentials between Black and white workers doing similar work, between 1914 and the passage of the Civil Rights Act of 1964, Black federal employees "rarely achieved positions in the professional or senior administrative classes, and were disproportionately confined to clerical, janitorial, or custodial positions" (King 1995, 205). During this period, racial discrimination in the federal government primarily took the form of "a ceiling above black employees that capped their economic and social mobility" (Yellin 2013, 114).

It was not until the latter half of the 20th century that public sector employment again became a viable path to upward mobility for Black workers due, in part, to executive orders and court decisions which established equal opportunity employment procedures for government workers (Blank 1985; Laird 2017). Increased demand for government labor during World War II also allowed government hiring managers to reshape the composition of government workers without displacing white men and provoking a racial backlash (Krislov 1967). The Civil Rights

Act of 1964 empowered the Department of Justice to more forcefully investigate and prosecute discrimination, particularly that within the federal workforce, and created the U.S. Equal Employment Opportunity Commission which had its enforcement powers further strengthened by the passage of the Equal Employment Opportunities Enforcement Act in 1972 (King 1995). Within the federal government, the Civil Service Commission was given the task of pursuing integration through affirmative action along with the authority to monitor and enforce their implementation (Rose and Chia 1978).

In the decades since the passage of the Civil Rights Act of 1964, some scholarship has focused on the degree to which historically disadvantaged groups, notably women and Black workers, are represented in federal agencies (Zipp 1994; Sabharwal 2015) and state and local governments (Eisenger 1982; Lewis and Nice 1994; Miller, Kerr, and Reid 2010) with an emphasis on wage parity and representation in managerial roles. In general, the public sector has provided opportunities for Black workers to experience good employment including retirement benefits, job security, and systematized opportunities for upward mobility (Lewis and Frank 2002; Laird 2017). Although Black workers make up 11.0 percent of the U.S. labor force, 18.8 percent of public sector employees are Black.

Perera and King (2021) highlight several factors which have allowed for public sector employment to serve as an occupational niche in which Black workers experienced fairer treatment and greater wage parity. First, there is significant geographic overlap of government jobs and Black workers. The geographic pairing of high concentrations of both federal jobs and Black residents in Washington D.C. is a significant example. In 1965, one in eight federal employees were Black nationally; in the Washington metropolitan area, one in four federal employees were Black (Krislov 1967). In other northern cities (e.g., Chicago), large Black

populations were practical and politically efficacious sources of public sector talent (Eisenger 1982). Black workers have been and continue to be overrepresented in clerking roles within the U.S. Postal Service in part due to the placement of postal processing facilities in central cities which are also proximate to clusters of Black neighborhoods (Boustan and Margo 2009).

Second, the American state has adopted a role as a "model employer." Due to high levels of visibility and political pressure, the government has opted for standardized and transparent employment practices to avoid the reputational costs of biased or opaque procedures (Walker and Bennett 2015). Additionally, the government has greater autonomy to act, set, and self-enforce inclusionary practices in its own hiring. For example, the government implemented the standardized wage schedule which limited wage negotiations and prevented manager discretion from being used to distribute wage increases indiscriminately. Replicating such practices in the private sector would likely require strong legislation and enforcement (Perera and King 2021).

Third, despite the general trend of declining unionization rates, public sector unions have remained relatively strong, especially relative to those in the private sector (Walker 2014; Anzia and Moe 2016). For example, in 1973, 23 percent of workers in the public sector and 24 percent of workers in the private sector were union members. By 2020, the union membership rate in the public sector had risen to 34 percent; in comparison, only 6 percent of workers were union members (Perera and King 2021, 183). As a result, Black workers have retained greater job security and wage parity in the public sector than in the private sector.

There is a long history of racial exclusion in the labor movement. Although White workers recognized that Black exclusion from labor unions weakened their bargaining position by allowing employers to turn to lower-cost Black workers, they "accepted this vulnerability because the alternative of sharing their organizations with African Americans seemed even

worse" (Bernstein 2001, 47). Because the Wagner Act included provisions which allowed unions to discriminate against Black workers, Black workers who sought employment in union jobs in the following years were limited to jobs with fewer benefits and less wages (Frymer 2011). Although it is difficult to categorize racism within the labor movement in its totality, with some unions being explicitly segregationary and others actively partnering with civil rights causes, national unions only began participating in affirmative action programs in earnest because of the ballooning litigation costs as federal courts took on an increasing load of Title VII cases in the 1970s and 1980s (Frymer 2007). Although racism has not been absent in public sector unions as they have expanded over the past five decades (King 1995), racial discrimination has been less of a problem in public sector unions because public employers had no economic motivation to resist unionization and the public sector unions themselves had less incentive to limit the labor supply.

Despite the scholarly attention to the relative levels of racial discrimination in the public and private sectors, less attention has been given to the impact of public sector employment on racial occupational segregation, particularly in the contemporary era. The most comprehensive analysis of segregation by race and sex in the public sector was conducted by Lewis and Nice (1994) on data from 1981 and 1987. The authors find evidence of a strong relationship between state-level conservatism and higher levels of occupational segregation in state and local governments in line with the argument that conservatives are more skeptical about the value of pursuing policies designed to foster racial equality. Additionally, public sector segregation was somewhat lower in states where higher percentages of their populations resided in metropolitan areas and held high school diplomas.

Collectively, the existing literature suggests two primary hypotheses about the differences in occupational segregation in the private versus public sectors. First, there is reason to suspect

that the public sector is more integrated than the private sector. As noted above, the increased

opportunities for good employment that Black workers have experienced in the public sector in

the last five decades are likely a function of the geographic overlap of Black workers and

government jobs (Krislov 1969), the government's ability to self-enforce standardized hiring

practices as a model employer (Walker and Bennett 2015), and the continued strength of public

unions (Perera and King 2021).

Particularly among federal workers, there is evidence that similar workers, in terms of

race, sex, education, and experience, earn much more than their peers in the private sector

(Langbein and Lewis 1998). However, on average, public sector jobs pay less than their

occupational equivalent in the private sector. This suggests that public sector employment does

not offer workers better paying jobs within an occupation, but rather, greater access to a set of

better paying occupations. This yields the following hypothesis:

> **H1:** There is less occupational segregation between Black and white workers employed
>
> in the public sector, particularly those employed by the federal government, in
>
> comparison to workers in the private sector.

Second, despite the fact that the public sector has traditionally been an avenue to

economic mobility for Black workers, decreased public spending has put that at risk. The

emergence of the Tea Party and its vocal opposition to public spending and public sector

employee benefits (Skocpol and Williamson 2012) led to significant budget cuts and state and

local government layoffs. Following the Great Recession, state and local governments eliminated

approximately 765,000 jobs, which were disproportionately filled by women and people of color

(Cooper, Gable, and Austin 2012). As some government functions have shifted toward

privatization in an era of "new governance," there has been an increase in onsite managerial

discretion in regards to job displacement which has disadvantaged Black workers relative to similarly positioned white workers (Wilson, Roscigno, and Huffman 2013). These shifts towards privatization in education, prisons, and the military have also reduced the relative racial parity in wages once present between Black and white workers in the public sector (Wilson, Roscigno, and Huffman 2015). As a result, there is reason to suspect that, over time, either the absolute level of occupational segregation in the public sector has increased or the gap between the public and private sectors has decreased.

In the past decade in particular, conservative opposition to public sector employment has been grounded in populist rhetoric with distinct racial undertones (Cramer 2016). Whereas private sector unions are criticized as distortions of the cost of production, opponents of public sector spending frame working class whites as the victims of public unions who have been left with the bill for overly generous union compensation. As Walker and Bennett (2015) note, "The link to blackness is silent and efficient" (185). This leads to the following hypothesis:

H2: Over time, the difference in occupational segregation between the public and private sectors is decreasing, especially from 2010 to 2019.

4.3 State-Level Variation in Occupational Segregation by Sector

In addition, the political environment and political attitudes of a region may shape the way that Black workers are able to navigate the labor market. At the time of the 1900 Decennial Census, 90 percent of the Black population lived in the U.S. South (Pew 2021b). Although the Great Migration saw a significant number of Black Americans move to other regions across the United States, the majority of Blacks, and an increasing share since 1970, remain in the South, a region in which negative racial stereotypes are more frequently and more strongly held by whites

(Valentino and Sears 2005; Airstrup 2011). Additionally, 77 percent of Republican voters believe that little or nothing needs to be done to ensure equal rights for all Americans, regardless of their racial or ethnic backgrounds (Pew 2021a).

As can be seen in Figure 4.1, Black workers are overrepresented in the South, and to a lesser extent, the Midwest and Northeast. In comparison, real GDP growth has been largest in the West, in states like New Mexico, Utah, and Arizona, which all have a notably smaller Black population. Similarly, a higher proportion of workers are in high wage occupations, defined nationally as occupations paying more than four thirds the national median, in states like Colorado, Washington, and California. The places where the majority of Black workers live are experiencing markedly less economic growth and provide workers less access to high-wage occupations. As a result, it may be the case that occupational segregation can be explained, in part, by regional residential racial patterns.

Existing research is somewhat ambivalent about whether a labor market with a larger Black population would be more or less segregated. Some research suggests that a larger Black population could be viewed as a greater threat to the dominant labor market position of white workers (Allport 1954; Bobo and Hutchings 1996). Social closure theory argues that dominant groups in the labor market "try to monopolize advantages and maximize their rewards by closing off opportunities to outsiders they define as inferior or ineligible" (Weeden 2002, 58). Social closure may take the form of discrimination against women and people of color by whites and men seeking to preserve their positions of dominance (Tomaskovic-Devey 1993; Wilson 1980).[22] Social closure theory would suggest the following hypothesis:

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[22] More formal social closure mechanisms include licensing, credentialing through the formal education system, and unionization. Hostility, exclusion, and discrimination by white labor unions led to Black underrepresentation in unions and Black exclusion from traditionally good-paying manufacturing jobs (Bonacich 1976).
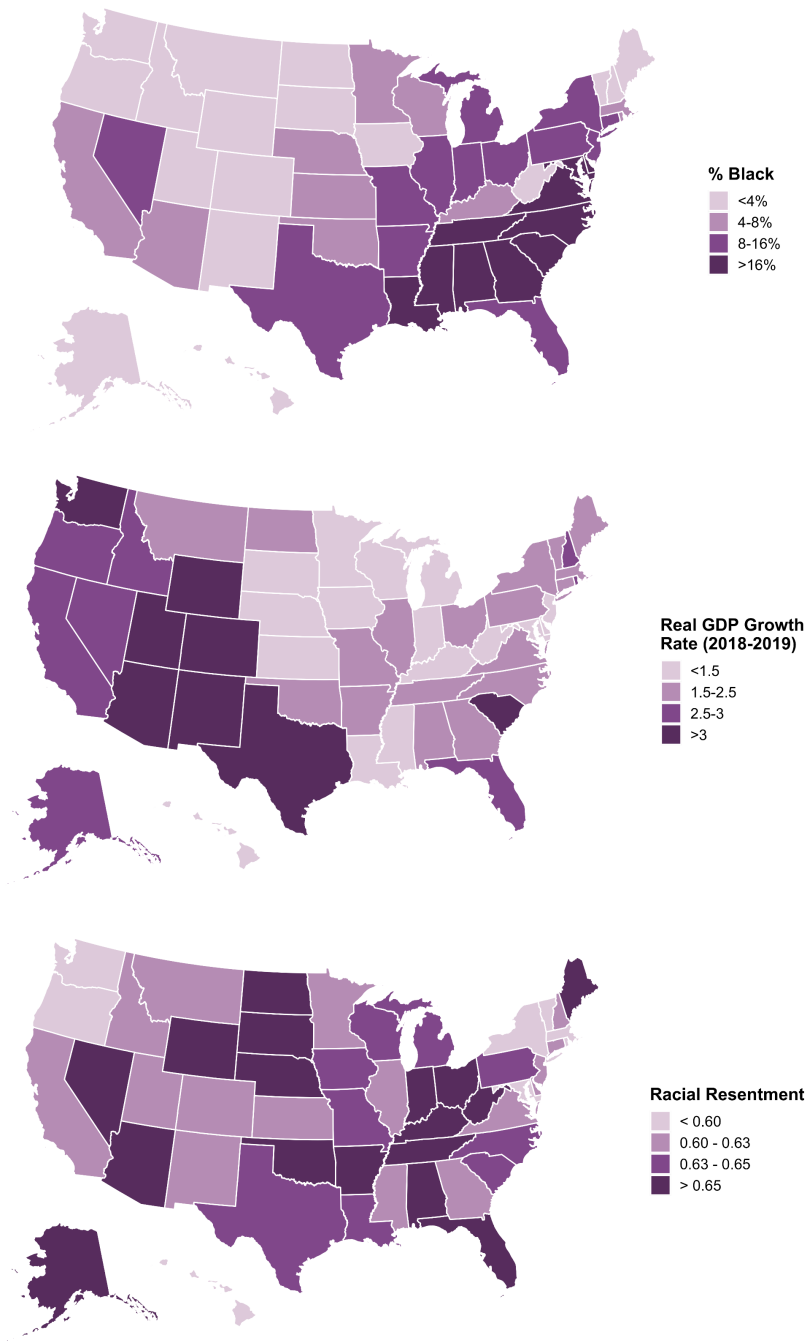
Figure 4.1. Geographic Distribution of Black Workers, Economic Growth, and Racial Resentment. The population of interest is workers who are aged 25 or older and active in the civilian labor force. Percent Black represents the percent of workers who are non-Hispanic and Black or African American alone. Real GDP growth rates from 2018 to 2019 are from the U.S. Bureau of Economic Analysis. State-level scores of racial resentment are from Kreitzer, Smith, and Suo (2019), which are estimated using multilevel regression and poststratification weighting to link survey data from the American National Election Studies with demographic and state-level factors from the U.S. Census. Data are from the U.S. Bureau of Economic Analysis, the 2019 5-year American Community Survey (ACS) accessed through IPUMS, and Kreitzer, Smith, and Suo (2019).

H3a: Due to increased racial threat and social closure by dominant groups, geographies with a larger share of Black workers will be more occupationally segregated than geographies with a smaller share of Black workers.

However, an alternative literature suggests that a larger Black population might lead to reduced occupational segregation in two key ways. First, a larger Black population offers a larger Black labor pool for employers to draw from and functionally limits the non-Black share of the labor pool (Eisinger 1982). As a result, discrimination becomes more costly for employers. A second reason is that, in the presence of a sufficiently large Black population, Black workers are able to "queue jump" and gain access to otherwise restricted occupations (Hout 1986). For example, many high-wage occupations like real estate managers, lawyers, actuaries, and physicians rely on developing a client portfolio (Grodsky and Pager 2002). A sizable Black population, coupled with sufficient social segregation, generates the need and opportunity for in-group members to fill these types of roles. This produces the following alternative hypothesis:

H3b: Due to the increased size of the Black talent pool and the potential for Black workers to "queue jump" into higher wage roles, geographies with a larger share of Black workers will be less occupationally segregated than geographies with a smaller share of Black workers.

Finally, occupational segregation may be shaped by the racial and political attitudes of employers in a region. Black employment can be limited by widely held negative stereotypes about Black Americans' work ethic and dependability (Peffley, Hurwitz, and Sniderman 1997; Kinder and Sanders 1996). Higher levels of racial resentment and prejudice may result in increased levels of discrimination which limit Black occupational mobility. This may take the

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form of channeling, in which white employers redirect Blacks into race-coded jobs with lower wages, less authority, and limited opportunities for upward mobility (Collins 1993; Pager, Western, and Bonikowski 2009) Although negative stereotypes about Blacks are widely held (Jardina and Ollerenshaw 2022), there is still significant geographic variation in levels of racial resentment (Smith, Kreitzer, and Suo 2020).

Although Republican party identification and racial resentment are highly correlated (Abramowitz and McCoy 2019), there is reason to suspect higher levels of occupational segregation in more Republican geographies. Conservatives are more skeptical about the value of pursuing policies which address racial equality (Lewis and Nice 1994). Additionally, almost four out of five Republican voters believe that little or nothing needs to be done to ensure racial equality (Pew 2021a). As a result, I propose the two following hypotheses:

H4a: Geographies with higher levels of racial resentment are more likely to have higher levels of occupational segregation.

H4b: Geographies with a larger share of Republican voters are more likely to have higher levels of occupational segregation.

4.4 Data and Methods

4.4.1 Data

The primary data I use comes from the 1980, 1990, and 2000 U.S. Decennial Censuses and the 2010 and 2019 5-year American Community Survey (ACS) accessed through the University of Minnesota Integrated Public Use Microdata Series (IPUMS) (Ruggles et al. 2022). Although the

5-year sample of the ACS has less temporal precision than the 1-year sample, it allows for more accurate estimates of occupational distributions for increasingly small subgroups, for example within a specific sector and geography. For the same methodological reasons as described in Chapter 3, I limit the analysis to employed adults aged 25 and older in the civilian, non-institutionalized labor force, which excludes active-duty military and residents of nursing homes or correctional facilities.[23] In 2019, the analyzed population includes 6,766,995 respondents who represent 140.2 million workers.

Table 4.1 shows the size of each sector of the labor force over these four decades along with the Black share of the labor force. Over the course of these four decades, the size of the private sector has nearly doubled. While there was comparable growth in state government employment, there was more modest growth in local government employment and almost no growth in federal employment. The lack of growth in the size of the federal labor force is almost certainly due to the increasing prevalence of contract and grant workers hired for government work (Light 2017).

Black workers are consistently overrepresented across all levels of government relative to the private sector; this is a persistent feature of the American labor force since 1980. The federal government in particular stands out in terms of Black overrepresentation. As of 2019, 18.8 of federal employees were Black. In comparison, only 11.0 percent of workers in the private sector were Black.

In addition to the individual-level data available through the Decennial Censuses and the ACS, I incorporate three additional datasets in order to understand state-level variation in occupational segregation by sector. In order to estimate the partisanship of each state, I use

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[23] I note that Black Americans, and especially Black Americans without college degrees, are over-represented in some of these excluded categories.

Sector		*1980*	*1990*	*2000*	*2010*	*2019*
Private	Total	65.7M	85.5M	97.4M	110.9M	119.9M
	% Black	8.7%	9.1%	9.3%	10.2%	11.0%
Federal Government	Total	3.4M	4.5M	3.9M	3.9M	3.9M
	% Black	17.6%	17.9%	18.0%	18.5%	18.8%
State Government	Total	3.7M	4.9M	5.6M	5.8M	6.3M
	% Black	13.5%	14.3%	13.8%	14.8%	14.6%
Local Government	Total	7.6M	7.8M	8.8M	10.5M	10.0M
	% Black	14.0%	14.8%	13.9%	13.9%	13.7%
TOTAL	Total	80.4M	102.7M	115.7M	131.1M	140.2M
	% Black	9.8%	10.1%	10.2%	10.9%	11.6%

Table 4.1. Descriptive Statistics Over Time by Sector. The index of dissimilarity measures how evenly workers are distributed within the 422 occupations in the 2010 harmonized occupations codes created by University of Minnesota Integrated Public Use Microdata Series (IPUMS). The population of interest is workers who are aged 25 or older and active in the labor force. Data are from the 1980, 1990, and 2000 U.S. Decennial Censuses and the 2010 and 2019 1-year American Community Surveys (ACS) accessed through IPUMS.

presidential election returns from the CQ Voting and Elections Collection for the most recent election. I use state-level scores of racial resentment from Kreitzer, Smith, and Suo (2019), which are estimated using multilevel regression and poststratification weighting to link survey data from the American National Election Studies with demographic and state-level factors from the U.S. Census. In order to estimate the state-level unionization rates, I use data from the 1980, 1990, 2000, 2010, and 2019 Current Population Survey's (CPS) Annual Social and Economic Supplement (ASEC), also accessed through IPUMS.[24]

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[24] Questions about union membership were not asked in the 1980 CPS ASEC. As a result, I estimate the 1980 state-level unionizations using linear interpolation based on the values in 1990 and 2000.

4.4.2 Measures of Segregation

Following the literature and reasoning discussed in the previous chapter, I first adopt Duncan and Duncan's (1955) index of dissimilarity (D), which measures how evenly individuals are distributed among units (e.g., neighborhoods, schools, occupations) as my measure of occupational segregation. The index is bounded by 0 (perfect integration) and 1 (perfect segregation) and is formulated as:

$$D \;=\; \frac{1}{2}\sum_{j=1}^{J}\left|\frac{n^{1}_{j}}{n^{1}} - \frac{n^{0}_{j}}{n^{0}}\right|$$

where there are $j \;=\; 1, ..., J$ occupations in the labor market and all individuals $i \;=\; 1, ..., n$ are in either group, $g \;=\; \{0, 1\}$.

The dissimilarity index provides a useful summary statistic to describe the level of segregation in a system as a whole (i.e. at the labor market level), but it provides little guidance about which occupations are driving that segregation. To address that concern, I incorporate an additional measure which captures an occupation's contribution to the overall level of dissimilarity and the relationship between occupational dissimilarity and wage inequality, respectively.

Borrowing from the school segregation literature, I adopt an index introduced by Monarrez, Kisida, and Chingos (2019) to understand an individual school's contribution to a school system's level of segregation. In the context of the labor market, this measure reflects the following thought experiment: how much would segregation decrease if an occupation were changed to perfectly reflect the labor market's racial composition and everything else was held equal? To implement the measure, I first measure segregation in a labor market (either nationally

or in a regional context) using the dissimilarity index. Then, for each occupation, I artificially adjust its racial composition to that of the labor market as a whole before recalculating the dissimilarity index. In this scenario, the share of Black workers in occupation j is set to

$p^1 = \frac{n^1}{n^1 + n^0}$ and the share of White workers is set to $p^0 = \frac{n^0}{n^1 + n^0}$ such that the counterfactual

dissimilarity index would equal:

$$D_j^o = \frac{1}{2} \sum_{-j} \left| \frac{n^1_{-j}}{n^1} - \frac{n^0_{-j}}{n^0} \right|$$

The percentage change in segregation that results from changing the racial composition of occupation j is then:

$$\phi_j = \frac{D - D_j^o}{D}$$

By comparing hypothetical and actual segregation in proportional terms, ϕ_j represents the percentage decrease in segregation that would take place if occupation j became perfectly integrated or its proportional contribution to labor market segregation. Values of ϕ_j are bounded between 0 and 1 and, by definition, sum to 1.

This measure functionally simplifies the practical reality of any actual integration efforts. In the same way that a school cannot be integrated in a vacuum, changing the racial composition of any one occupation will change the racial composition of potentially many other occupations. A rich literature has highlighted the fact that the perceived threat of this displacement is central to white opposition to integration efforts (e.g., Hannah-Jones 2014; Sugrue 2014). However, for theoretical purposes, the measure does quite well to identify the occupations for which integration would have the greatest impact on the occupational distribution of Black workers relative to their white peers.

An occupation's contribution to labor market segregation is a combination of an occupation's deviation from the labor market's racial composition and the occupation's size. Unlike schools in a district, which vary somewhat in terms of student enrollment totals, there is quite substantial variation in the size of occupations in the United States. For example, the occupation of conservation scientists and foresters is racially skewed, with 92.3% of these workers being white. However, in a labor market of 140 million workers, only 20 thousand workers are in this role. Though this occupation is segregated, it only contributes a small portion to the segregation observed in the labor market as a whole and, additionally, integrating this role to give greater access to Black (and Hispanic) workers would do little to reduce overall.

In comparison, there are 4.5 million managers[25] in the U.S., of whom 75.1% are white. While the racial composition of this occupation is not as skewed from the national composition as conservation scientists and foresters, the reduced access impacts a far greater number of Black (and Hispanic) workers. ϕ_j provides a useful measure to identify which are contributing most to Black-white occupational segregation.

4.5 Results

4.5.1 Occupational Segregation in Private and Public Sectors

In Table 4.2, I first present the dissimilarity index between Black and white workers by employment sector for each decade from 1980 to 2019. As of 2019, the dissimilarity index between Black and white workers in the private sector was 0.288. Therefore, 28.8% of Black (or white) workers would need to change occupations for these two groups to be evenly distributed

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[25] This number refers to the IPUMs harmonized occupation code 430, "managers, nec (including postmasters)." For brevity and clarity, I refer to workers in this occupation as managers in the text.

across all occupations in the private sector. In comparison, occupational segregation is distinctly lower among workers in all levels of government, with a value of 0.227 among workers employed by the federal government, 0.256 among workers in state governments, and 0.228 among workers in local governments. In line with previous findings about the role the public

Dissimilarity Index (*D*)

Sector	*1980*	*1990*	*2000*	*2010*	*2019*
Private	0.352	0.309	0.284	0.284	0.288
Public	0.268	0.240	0.239	0.238	0.243
Federal Government	0.281	0.234	0.240	0.237	0.227
State Government	0.302	0.257	0.268	0.258	0.256
Local Government	0.263	0.249	0.239	0.238	0.228

Table 4.2. Occupational Segregation Over Time by Employment Sector and Race. The index of dissimilarity measures how evenly workers are distributed within the 422 occupations in the 2010 harmonized occupations codes created by University of Minnesota Integrated Public Use Microdata Series (IPUMS). The population of interest is workers who are aged 25 or older and active in the labor force. Data are from the 1980, 1990, and 2000 U.S. Decennial Censuses and the 2010 and 2019 1-year American Community Surveys (ACS) accessed through IPUMS.

sector has played as a source of economic opportunity for Black workers, these results provide clear support for **H1** and suggest that at least a portion of the higher levels of economic opportunity in the public sector relative to the private sector have taken the form of increased access for Black workers to the occupations of their white peers.

The positioning of these four sectors in terms of the relative levels of occupational segregation by race has remained notably constant over time. Since 1980, the private sector has clearly been the most segregated, followed by state governments. The level of occupational

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segregation in the federal and local governments, while distinctly lower than that of the private sector and state governments, has been quite similar, especially since 2000. In line with the results presented in Chapter 3, there is a notable decline in occupational segregation from 1980 to 1990 across employment sectors. While occupational segregation declined somewhat more from 1990 to 2000 for workers in the private sector or local governments, in general, occupational segregation has been stagnant for the last two to three decades.

In 1980, the dissimilarity index among Black and white workers in the private sector was 0.050 points higher than in state government and 0.071 points higher than among federal employees. **H2** suggested that the privatization of many government functions, especially by state governments, may reduce the difference in occupational segregation between the public and private sectors over time. There is some evidence that the difference in occupational segregation in the public and private sectors decreased from 1980 to 2000, with the gap shrinking to 0.016 between the private sector and state governments and 0.044 between the private sector and federal government. However, in the last two decades, during which the gap might have been expected to close most dramatically, the gap in occupational segregation has increased somewhat. As a result, it does not seem that the privatization of government functions has had a significant impact on occupational segregation.

There is reason to suspect that education, notably bachelor's degree attainment, may be playing a role in the reduced levels of segregation found in the public sector. A higher proportion of workers in the public sector have a bachelor's degree than in the private sector. As of 2019, 35 percent of workers in the private sector had a bachelor's degree or higher. In comparison, 48 percent of workers employed by the federal government, 52 percent of workers employed by

local governments, and 60 percent of workers employed by state governments have a bachelor's degree or higher.[26]

Some of this difference may be due to systematized hiring and promotion processes used for federal and state agency positions. For example, the majority of the federal workforce is hired in the competitive civil service, in which applicants participate in open competition for roles under a merit system administered by the Office of Personnel Management, which includes the General Schedule classification and pay system. All occupations on the General Schedule receive a grade from GS-1 (lowest) to GS-15 (highest) with increasing levels of difficulty, responsibility, and wages; a bachelor's degree or higher is required for positions of a GS-5 or higher. As a result, highly educated workers may be more attracted to the stability, security, and compensation that comes with these opportunities in the public sector.

Additionally, it may be the case that governments, particularly state and local governments, tend to hire for a set of occupations which more frequently require a bachelor's degree or higher. For example, a significant proportion of state and local government employees work in public education. As of 2019, 23.2 percent of all workers employed by either state or local governments were elementary and middle school teachers, secondary teachers, or postsecondary teachers. Over 96 percent of these roles were filled by a worker with a bachelor's degree or higher. A similar story can be told for roles including registered nurses, social workers, counselors, and managers.

The results in Chapter 3 demonstrated that there is somewhat less occupational segregation between Black and white workers with a bachelor's degree or higher than between Black and white STARs. As a result, it may be the case that lower levels of occupational

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[26] As of 2022, some state governments, including Maryland, Utah, Pennsylvania, and Alaska have begun eliminating degree requirements from positions for which skills, knowledge, and experience can be developed in ways other than a bachelor's degree.

segregation in the public sector are due to the higher level of education in the public sector. I

consider this hypothesis directly in Table 4.3 by separately measuring occupational segregation

by sector between Black and white workers with four-year degrees or more and between workers

with high school diplomas but not bachelor's degrees. Following prior research on the second

group (Blair et al. 2020; Blair, Debroy, and Heck 2021), I refer to workers without a four-year

degree as those "skilled through alternative routes" (STARs).[27]

Among STARs, the patterns of occupational segregation over time and across sectors

look markedly similar to those found in Table 4.2. Occupational sector between Black and white

STARs is highest in the private sector and has been since 1980. There was a modest decline in

occupational segregation from 1980 to 1990, though it has been stagnant for the last three

decades. In comparison, the relative levels of occupational segregation by sector look very

different for workers with a bachelor's degree or more. In 1980 and 1990, occupational

segregation between Black and white workers with a four-year degree looked similar in the

private sector, federal government, and state governments. However, since 2000, occupational

segregation has actually been higher in the federal government and state governments than in the

private sector. The greatest outlier are workers with a four-year degree in local governments: in

1980, the dissimilarity index was 0.104, about 40 percent as large as the level of occupational

segregation between Black and white STARs in local government. This value has been trending

upward for the past 39 years.

Taken as a whole, Table 4.3 refutes the notion that lower levels of occupational

segregation in the public sector are due to either differences in the educational composition of the

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[27] This terminology was created, in part, to shift away from marginalizing deficit-based rhetoric (Baldridge 2014) and instead use asset-based language to describe this population of workers. STARs are aged 25 or older, active in the labor force, have a high school diploma or equivalent, and have developed their skills through routes other than a four-year diploma such as community college, apprenticeships, bootcamps, and, most commonly, on-the-job work experience (Blair et al. 2020).

	Sector	Dissimilarity Index (*D*)				
		1980	*1990*	*2000*	*2010*	*2019*
STARs	Private	0.318	0.279	0.259	0.266	0.279
	Federal Government	0.243	0.206	0.211	0.217	0.218
	State Government	0.281	0.228	0.220	0.218	0.227
	Local Government	0.253	0.216	0.219	0.226	0.244
Workers w/ bachelor's degree or more	Private	0.257	0.221	0.209	0.219	0.217
	Federal Government	0.260	0.227	0.249	0.254	0.244
	State Government	0.263	0.212	0.227	0.234	0.228
	Local Government	0.104	0.149	0.178	0.195	0.210

Table 4.3. Occupational Segregation Over Time by Employment Sector, Race, and Degree Status. The index of dissimilarity measures how evenly workers are distributed within the 422 occupations in the 2010 harmonized occupations codes created by University of Minnesota Integrated Public Use Microdata Series (IPUMS). The population of interest is workers who are aged 25 or older and active in the labor force. Workers skilled through alternative routes (STARs) have a high school diploma or equivalent and have developed their skills through routes other than a four-year diploma such as community college, apprenticeships, bootcamps, and, most commonly, on-the-job work experience. Data are from the 1980, 1990, and 2000 U.S. Decennial Censuses and the 2010 and 2019 1-year American Community Surveys (ACS) accessed through IPUMS.

respective workforces by sector or differences in the typical education requirements of the most common occupations by sector. Even among similarly educated Black and white workers, high levels of occupational segregation persists.

As noted in section 4.4.2, ϕ_j measures the contribution of occupation *j* to the total amount of occupational segregation in a labor market. Alternatively, it can be interpreted as the percentage change in segregation that would result from the changing the racial composition of

occupation j to the racial composition of the labor market as a whole. To better understand the occupations contributing the most to existing levels of occupational segregation in each sector of the labor market, Table 4.4 presents the five occupations with the largest values of ϕ separately by sector. For example, in the private sector, the occupation contributing the most to occupational segregation is nursing, psychiatric, and home health aides. This is in part due to the size of the occupation; there are over 1.6 million nursing, psychiatric, and home health aides in the private sector. However, it is also due to the fact that Black workers are vastly overrepresented in this role. While 11 percent of all workers in the private sector are Black, 37 percent of nursing, psychiatric, and home health aides are Black. If this occupation were integrated to reflect the racial composition of the labor market, occupational segregation in the private sector would be 6.6 percent lower.

In the private sector, a clear pattern emerges among these five roles: the roles in which Black workers are overrepresented pay significantly less than those in which Black workers are underrepresented. In addition to nursing aides, Black workers are overrepresented in the private sector among chefs and cooks, personal care aides, and security guards and gaming surveillance officers, all roles with national median hourly wages less than $15.00. In contrast, Black workers are under-represented in the role of managers, other, which pays well above the national median. The same pattern is loosely present among workers in state and local governments, though social workers and sheriffs, bailiffs, and correctional officers are disproportionately Black and pay relatively good wages. The federal government emerges as an outlier here, with Black overrepresentation in middle wage occupations including postal service clerks, postal service mail sorters and processors, and human resources specialists. This finding is aligned with earlier work that found an overlap in the placement of United States Postal Service processing centers

	ϕ_j	Median Hourly Wages	# of Workers (k)	% Black
Nursing, Psychiatric, & Home Health Aides	.066	$13.13	1,639	37.0%
Managers, Other	.034	$35.68	3,976	6.3%
Chefs & Cooks	.026	$11.85	2,044	16.4%
Personal Care Aides	.025	$11.41	1,063	25.4%
Security Guards & Gaming Surveillance Officers	.025	$14.42	760	32.3%
PRIVATE SECTOR	**1**	**$23.41**	**119,874**	**11.0%**
Postal Service Clerks	.045	$26.83	105	29.2%
Managers, Other	.039	$45.12	249	15.8%
Postal Service Mail Sorters & Processors	.034	$26.26	54	34.4%
Lawyers, Judges, & Other Judicial Workers	.030	$56.50	74	10.2%
Human Resources Specialists	.030	$31.11	92	27.6%
FEDERAL	**1**	**$33.20**	**3,948**	**18.8%**
Postsecondary Teachers	.115	$30.97	583	6.2%
Elementary & Middle School Teachers	.109	$24.37	728	9.7%
Social Workers	.070	$21.80	212	27.7%
Sheriffs, Bailiffs, & Correctional Officers	.045	$21.90	196	23.8%
Nursing, Psychiatric, & Home Health Aides	.042	$14.07	74	36.1%
STATE	**1**	**$24.85**	**6,336**	**14.6%**
Elementary & Middle School Teachers	.170	$25.38	1,761	9.3%
Secondary School Teachers	.063	$26.53	467	7.1%.
Bus & Ambulance Drivers	.048	$15.97	217	26.8%
Social Workers	.046	$24.34	239	23.3%
Janitors & Building Cleaners	.039	$15.23	293	19.4%
LOCAL	**1**	**$23.94**	**10,007**	**13.7%**

Table 4.4. Occupations Contributing Most to Occupational Segregation by Employment Sector. To account for the difference in the total volume of Black and White STARs, we standardize a group's share of each occupation by subtracting the group's mean share (i.e. its share of the entire labor market) and then dividing by the standard deviation of the group's share across the 422 occupations. This z-score gives a comparable measure of how well Black and White STARs are represented in any given occupation. This table presents the fifteen occupations with at least 50 thousand workers with the largest absolute difference between these standardized values. Occupations are then sorted by median hourly wages. Data are from the 2019 1-year American Community Survey (ACS) accessed through the University of Minnesota Integrated Public Use Microdata Series (IPUMS).

and centralized Black neighborhoods during a period of time in which many firms were moving their businesses to the suburbs (Boustan and Margo 2008).

4.5.2 State-Level Variation in Occupational Segregation by Sector

To improve occupation-level sample size within increasingly small subsets (e.g., Black workers in Iowa), I aggregate federal, state, and local government jobs and make state-level comparisons between the public and private sectors. Additionally, to improve the validity of the dissimilarity index, I limit state-year observations to those with labor forces that are at least 5 percent Black and 5 percent white.[28] As a result, I am able to estimate the level of occupational segregation between Black and white workers in the public and private sectors in 31 states, including Washington D.C., and 140 state-years from 1980 to 2019.

To understand regional patterns, Figure 4.2 shows the level of occupational segregation between Black and white workers in the public and private sectors by state in 2019. Three noteworthy patterns emerge. First, perhaps surprisingly, occupational segregation is not concentrated or limited to the American South. States with the highest levels of private-sector occupational segregation include Washington D.C., Minnesota, Kansas, Connecticut, and Mississippi. On the opposite end of the spectrum, Georgia and Tennessee even have some of the lowest levels of private sector occupational segregation. Second, although occupational segregation is lower in the public sector at the national level, this is not always the case within states. For example, states like Nevada, Oklahoma, Indiana, and California have higher levels of occupational segregation in the public sector than in the private sector.

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[28] Among too small populations, occupational distributions can begin to vary widely due to random chance and artificially inflate segregation measures.
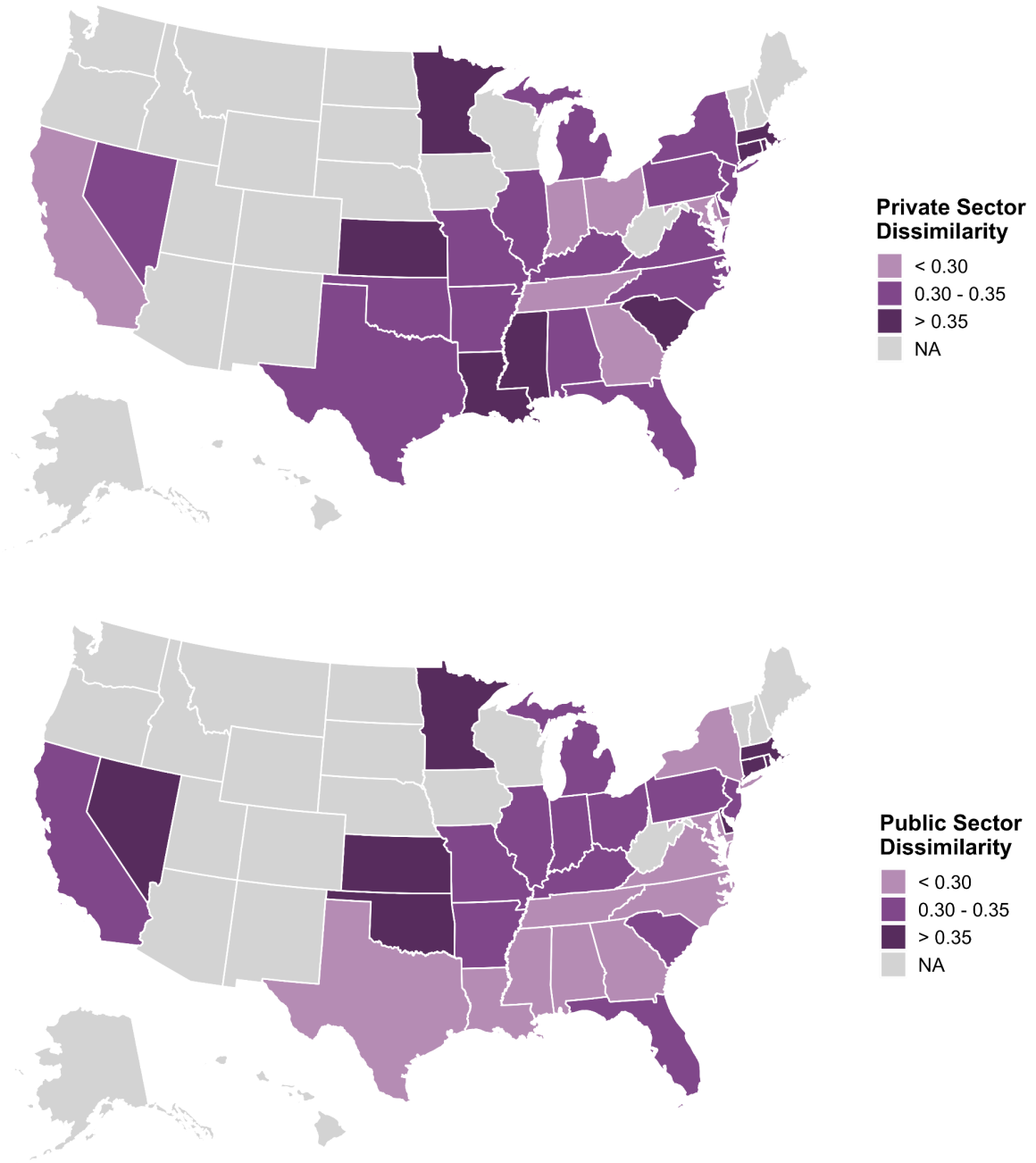
Figure 4.2. State-Level Occupational Segregation: Private v. Public Sectors. The index of dissimilarity measures how evenly workers are distributed within the 422 occupations in the 2010 harmonized occupations codes created by University of Minnesota Integrated Public Use Microdata Series (IPUMS). The population of interest is workers who are aged 25 or older and active in the civilian labor force. States are limited to those in which the labor force is at least 5 percent Black and 5 percent white. Data are from the 2019 1-year American Community Surveys (ACS) accessed through IPUMS.

Third, and perhaps most notably, public sector occupational segregation is distinctly lower than private sector occupational segregation in the American South. This pattern is visually apparent in Figure 4.2 by the light purple shading throughout states like Louisiana, Mississippi, Alabama, North Carolina, and Virginia. For example, the dissimilarity index in the private sector in Alabama was 0.333; in the public sector, it was only 0.264. This finding suggests that public sector employment is a particularly powerful force for integration in the South.

This pattern can be explored more extensively and longitudinally in Figure 4.3 which shows a scatterplot of private and public sector dissimilarity for all 140 state-years. The dashed line has a slope of 1 and intercept of 0 and represents parity of occupational segregation in public and private sectors. Points are sized by the number of workers in each state's labor force and color coded based on whether states are located in the American South.

With the exception of Washington D.C., which has had exceptionally high and persistent levels of occupational segregation regardless of government sector, state-level occupational segregation tends to follow national trends and declined from 1980 to 1990 before stabilizing through the next three decades. However, the color coding scheme in Figure 4.3 reveals clear differences between states in the South and states outside of the South. Southern state-years almost uniformly have lower levels of occupational segregation in the public sector than in the private sector. In comparison, non-Southern state-years are much more likely to have similar levels of occupational segregation in the public and private sectors, or even for there to be higher levels of occupational segregation in the public sector than in the private sector. These findings reinforce the third takeaway from Figure 4.2: government employment is especially important as a tool for integration in the South.
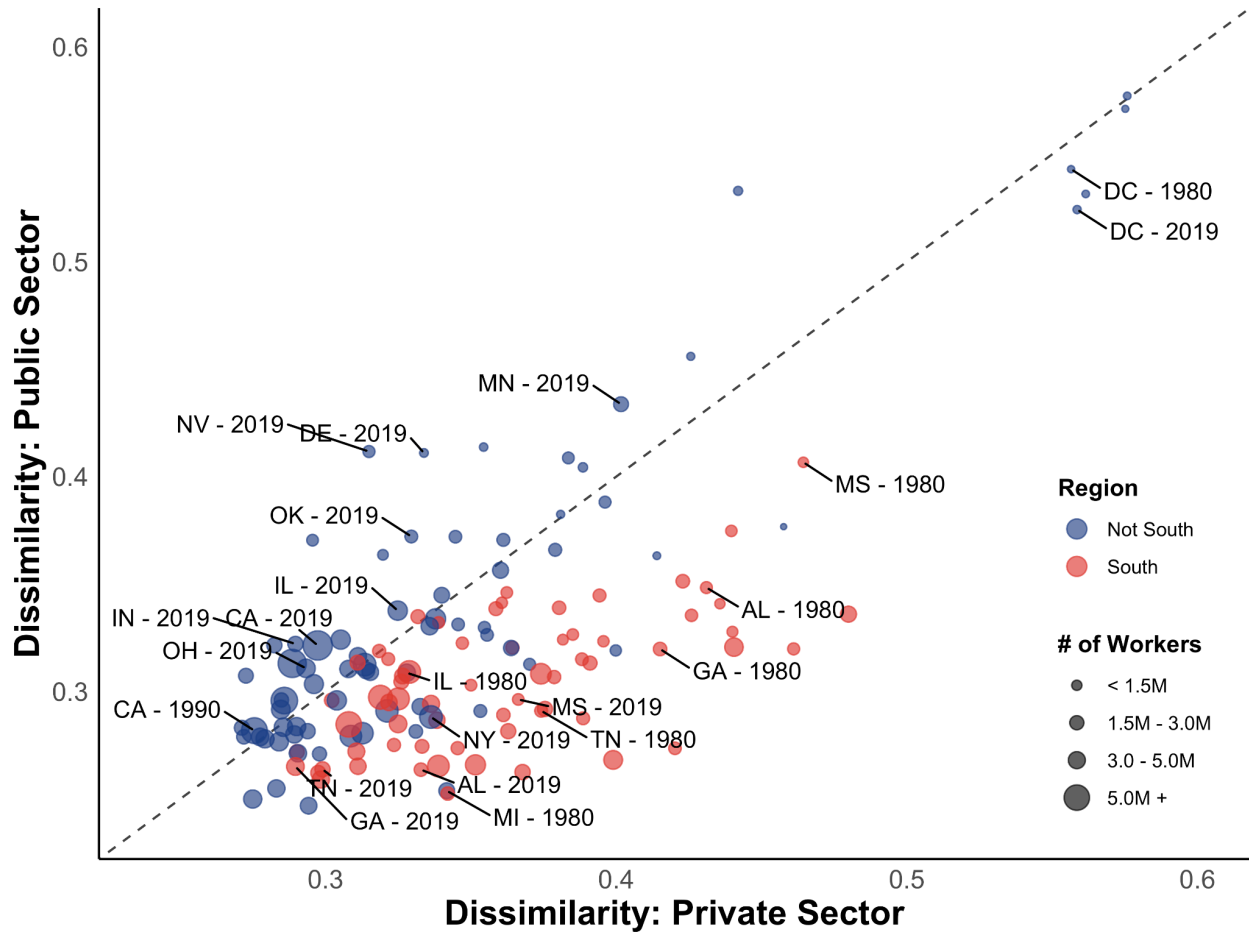
Figure 4.3. Relationship Between Occupational Segregation in the Public and Private Sectors by State-Year. Each point represents a state-year in which the labor force is at least 5 percent Black and 5 percent white.The index of dissimilarity measures how evenly workers are distributed within the 422 occupations in the 2010 harmonized occupations codes created by University of Minnesota Integrated Public Use Microdata Series (IPUMS). The population of interest is workers who are aged 25 or older and active in the civilian labor force. Data are from the 1980, 1990, and 2000 U.S. Decennial Censuses and the 2010 and 2019 1-year American Community Surveys (ACS) accessed through IPUMS.

To better understand the factors which contribute to state-level variation in occupational segregation, I consider three longitudinal multivariate linear regression models with varying outcome variables: the dissimilarity index among private sector workers, the dissimilarity index among public sector workers, and the difference between the two.

The primary independent variable of interest is the Black share of a state's workforce. The coefficient on this variable allows us to directly test **H3a** and **H3b**. Considering the high level of segregation between STARs and workers with bachelor's degrees measured in Chapter 3, I control for the Black-white gap in college attainment. I also control for the Black-white gap in public sector employment and the share of a state's workforce who are unionized. To test **H4a** and **H4b**, I include a measure of state-level racial resentment and the Democratic two party vote share in the most recent presidential election. I also include a dummy variable for whether a state is in the South and year fixed effects.

Table 4.5 presents the results from estimating these three models. Despite limited sample size, all three models have relatively strong goodness of fit. In the private sector, the coefficient on Black share of workers is positive and statistically significant. This provides support for **H3a** over **H3b**. States with larger Black populations are more likely to have higher levels of occupational segregation in the private sector. This is true even after controlling for a state's Democratic vote share, the level of racial resentment in a state, and whether a state is in the South. The literature would suggest that larger shares of Black workers in a state increase the perception of racial threat and social closure by white workers, which then limits Black mobility and occupational attainment.

However, the same is not true among public sector workers: there is no distinguishable relationship between the share of Black workers and occupational segregation in government work. The difference in the coefficients for private and public sector workers is statistically significant which suggests that something about public-sector employment, such as the more standardized hiring process or the lack of managerial discretion in hiring and promotion, limits the impact of racial threat or social closure on Black employment outcomes.

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	Dissimilarity Index (D)		
	Private	Public	Private - Public
% Black	.092**	-.012	.105**
	(.040)	(.047)	(.041)
% BD+: White - Black	.416***	.434***	-.017
	(.056)	(.067)	(.057)
% Public Sector: White - Black	.814***	.957***	-.142
	(.120)	(.141)	(.121)
% Union	-.760***	-.572**	-.187
	(.225)	(.265)	(.227)
Democratic Vote Share	.005	.035	-.030
	(.046)	(.054)	(.046)
Racial Resentment	.492***	.478***	.014
	(.142)	(.168)	(.144)
South	-.001	-.043***	.042***
	(.008)	(.009)	(.008)
Constant	.110	.088	.022
	(.104)	(.122)	(.105)
Fixed Effects	Year	Year	Year
N	140	140	140
R-squared	.788	.697	.585
Adj. R-squared	.770	.671	.550

***$p < .01$; **$p < .05$; *$p < .1$

Table 4.5. State-level Variation in Occupational Segregation by Employment Sector. The index of dissimilarity measures how evenly workers are distributed within the 422 occupations in the 2010 harmonized occupations codes created by University of Minnesota Integrated Public Use Microdata Series (IPUMS). The population of interest is workers who are aged 25 or older and active in the labor force. State-years are limited to those with populations that are at least 5 percent Black and 5 percent white. Democratic vote share represents the state-level two party vote share in the most recent presidential election using data from the CQ Voting and Elections Collection. State-level scores of racial resentment are from Kreitzer, Smith, and Suo (2019), which are estimated using multilevel regression and poststratification weighting to link survey data from the American National Election Studies with demographic and state-level factors from the U.S. Census. Unionization rates are estimated using the 1980, 1990, 2000, 2010, and 2010 Annual Social and Economic Supplement of the Current Population Survey accessed through IPUMS. Remaining data are from the 1980, 1990, and 2000 U.S. Decennial Censuses and the 2010 and 2019 1-year American Community Surveys (ACS) accessed through IPUMS.

Many of the control variables are directionally consistent with the theoretical expectations suggested by the literature. For example, states with a larger Black-white college attainment gap are significantly more likely to have higher levels of occupational segregation in both the public and private sectors. That is, when there is a larger gap in Black-white college attainment, Black and white workers are sorted into different occupations because of the differences in their knowledge and skills acquired through postsecondary education or their ability to signal that knowledge and skill to employers through the reliable source of a degree. Similarly, states with higher levels of racial resentment are associated with higher levels of occupational segregation in both public and private sector work, providing support for **H4a**. In comparison, states with higher unionization rates are associated with lower levels of occupational segregation in both sectors. There is no significant relationship between Democratic vote share and the level of occupational segregation in a state.

Lastly, it is worth commenting on the coefficients for the dummy variable for whether a state is in the South. Among private sector workers, the coefficient is statistically insignificant, however, in the public sector, the coefficient is statistically significant and negative. Like the coefficients on Black share of the labor force, the difference in coefficients between the public and private sectors is also significantly different from zero and suggests that public sector employment is significantly more integrated than the private sector in the South. This comports with the findings in Figures 2 and 3, even after controlling for relevant variables including Democratic vote share, racial resentment, unionization rates, and the Black-white college attainment gap.

4.6 Conclusion

The government has played a significant role in shaping economic outcomes for Black Americans and, particularly from the 1960s to 1990s, provided unprecedented opportunities for Black economic mobility, security, and stability. In this chapter, I demonstrated that much of this economic benefit took the form of greater integration across occupations. Over time, the public sector is consistently somewhat less segregated than the private sector and that this finding is not solely due to educational differences in the private and public sector workforces. Particularly in the federal government, Black workers are more likely to be overrepresented in good-paying occupations than they are in the private sector.

Additionally, this chapter contributes to our understanding of the factors that contribute to state-level variation in occupational segregation by sector. In both the public and private sectors, segregation is positively associated with the Black-white college attainment gap and racial resentment and negatively associated with unionization rates. The sharpest differences in occupational segregation between the private and public sectors emerge in terms of the Black share of the labor force and whether a state is in the South. Occupational segregation in the private sector is higher in states with larger Black populations, likely due to increased racial threat and social closure; the same is not true in the public sector. Additionally, public sector employment is distinctly more integrated in the South than in other regions of the United States.

Although it is unlikely to be shaping the results presented here, it is worth noting that occupational segregation is a highly gendered phenomenon. As a result, future research should consider the ways in which race and gender interact in the public and private sectors as well in varied geographic settings. Similarly, the growing share of workers in the U.S. who are Hispanic

suggests that comparisons between white and Hispanic workers or between Black and Hispanic

workers may prove to be a fruitful and necessary area of future research.

CHAPTER 5

Conclusion

Although there is considerable evidence of Black progress in the past century, Black and white Americans continue to occupy distinct social spaces. This dissertation project improves our understanding of Black-white segregation in two contexts which are particularly relevant to social and economic mobility: public schools and the workplace.

There is a robust literature documenting the persistence and reemergence of segregation in America's public schools (Orfield et al. 1994; Orfield, Kucsera, and Siegel-Hawley 2012; Reardon et al. 2012; Hannah-Jones 2014). Even as the suburbs and public school systems have diversified in recent decades, Black students and white students continue to attend schools that don't look like the nation as a whole. For example, as of 2012, 45 percent of American children were nonwhite; however, the average white student still attended a school in which at least 75 percent of students were also white. This literature is reviewed in Chapter 2.

Less work has been done to document the degree of racial separation in the workplace. Chapter 3 documents the fact that Black and white workers occupy notably different occupations even after controlling for education. As of 2019, the dissimilarity index between Black and white workers is 0.276 which means that 27.6 percent of Black workers would need to change occupations in order to have the same occupational distribution as white workers. This value is somewhat higher than it was in 1990, despite significant efforts to improve Black mobility through increased college matriculation. Even among workers with a bachelor's degree or higher,

the dissimilarity index is 0.221. The empirical results in this chapter go on to demonstrate that this segregation has significant economic costs; Black workers are regularly relegated to positions with lower wages, less authority, and fewer opportunities for upward mobility.

In addition to documenting the degree and nature of segregation in these contexts in recent decades, this dissertation begins to explore the ways in which state action at times enables, maintains, or mitigates segregation. A core conclusion across all three empirical chapters is that racial segregation is not a natural or inevitable phenomenon but rather a product of historical and contemporary processes driven by racial prejudice, racist behaviors, and political choices. This concept is demonstrated clearly through the Monte Carlo simulation deployed in Chapter 3 which shows that observed occupational segregation by race is substantially higher than would be expected at random, conditional on educational attainment, gender, and geography. That is, if the labor market were race-neutral, Black workers would have access to a broader and more valuable set of occupations.

While segregation is a collective choice often pursued through the political process, the reverse is also true: racial integration is an alternative choice that can be made through the political process. Despite the historical legacies of discriminatory government policies, contemporary government action has primarily been used to make schools and occupations more integrated. This result is both surprising and encouraging. In Chapter 2, I demonstrated that, despite the political, jurisdictional, and legal constraints that school boards face, school assignment plans are more frequently drawn in ways that are more integrated than would be expected based on patterns of racial residential segregation. These results highlight both the capacity of school boards to pursue such policies along with the observation that many school boards do. Similarly, Chapter 4 documents consistently lower levels of segregation in the public

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sector than in the private sector over the past four decades. Although the data did not allow for a causal understanding of the mechanism driving this result, the literature would suggest that government work is less segregated because it is easier for the federal government to regulate itself and other governments than it is to regulate private sector employers. Additionally, more systematized hiring and promotion procedures limit managerial discretion and associated individual biases.

Finally, this work highlights some of the limitations of the ways that state action currently shapes the experience of segregation in schools and the workplace. While Chapter 2 demonstrates that school assignment plans are an effective tool to mitigate the impact of residential segregation and increase within-district integration, it also shows that, as currently implemented, these policies place the burden of integration on Black children. That is, student assignment plans are more likely to zone Black children to schools outside of their neighborhoods and further from their homes in order to achieve higher levels of integration rather than more equitably distributing the potential travel and social costs among Black and white children.

Chapter 3 shows that education, operationalized as attainment of a four-year college degree, does little to solve occupational segregation. Although workers with bachelor's degrees are somewhat more integrated than STARs, the level of observed segregation is still more than 3.5 times higher than we would expect under race-neutral conditions. Additionally, the roles in which Black workers with a bachelor's degree or higher are most overrepresented pay significantly less than the occupations in which similarly educated whites are overrepresented. Chapter 4 demonstrates a related concept: while public-sector STARs are much more integrated

than STARs in the private sector, the government is much less successful at integrating workers with a bachelor's degree or more. This is especially true for the federal government.

In addition to making several contributions to the existing literature, this dissertation also raises questions which should guide the direction of future research. First, future work should consider segregation between a broader set of racial and ethnic groups. Because of the historical prevalence of anti-Black racism and discriminatory government policies, this dissertation focuses on understanding segregation between Black and white Americans. However, as the racial and ethnic composition of America continues to become more diverse, it is necessary to develop a stronger understanding of the degree to which segregation affects other groups, particularly Hispanic Americans, in both schools and the workplace. In addition, it is important to consider the dynamics of multigroup segregation in places in which more than two racial or ethnic groups make up a significant share. For example, some work has considered whether Black and Hispanic voters have shared interests and support one another as a coalition at the ballot box or whether the two groups compete with one another for jobs, housing, and political influence (Kaufmann 2003). Existing work suggests that these multiracial coalitions are far from guaranteed in the electoral contexts and it would be worthwhile to think through the incentives shaping school board and employer behavior in places with higher levels of multigroup diversity.

Second, the empirical results presented in Chapters 2, 3, and 4 suggest underlying mechanisms rooted in the literature, but they do not test them directly. A clear next step would be to take on this task. In Chapter 2, I find that school assignment policies are more frequently drawn in ways that increase within-district integration than would be implied by residential patterns. A longitudinal analysis of school districts that have made changes to their school attendance zones could more directly measure the effect of school board behavior on the racial

composition of schools. This type of analysis could also incorporate more district-level institutional factors that influence the types of school assignment policies that are adopted such as the number of members on the school board, term lengths, and whether members represent geographic subsections of the district or the district as a whole.

Chapter 3 tests the hypothesis that Black-white occupational segregation is the result of differences in educational attainment between the two groups. While I argue that the evidence presented in this chapter is sufficient to rule out educational attainment as the primary cause of occupational segregation, this chapter does not test an alternative hypothesis. Although occupational segregation may have less to do with the qualities of workers, it is not clear what qualities about jobs or employers contribute most to occupational segregation. For example, the barriers that Black workers face in accessing many of the higher wage occupations currently occupied by their white peers may be the result of racial discrimination by hiring managers (Bertrand and Mullainathan 2004), but it may also be the result of biases in applicant tracking systems, a spatial mismatch between job opportunities and the places Black workers live (Kain 1968), or the role that segregated social networks play in the talent acquisition process (Pedulla and Pager 2019).

Chapter 4 highlights the fact that government employees tend to be more integrated than workers in the private sector. Although the literature would suggest that lower levels of segregation are due to better regulation of discrimination complaints and more systematized hiring and promotion procedures, this chapter did not use data which could test these mechanisms directly. One path forward would be to incorporate survey data on the experience of government employees, such as the federal employee surveys conducted by the Office of Personnel Management. Alternatively, I could focus on occupational segregation among state

government employees and state-level variation in the adoption of civil service reforms such as human resource decentralization, statewide procedural requirements for hiring and recruitment, and a state's classification and compensation system.

Because racial segregation is "a matter of design pursued through the political process" (Trounstine 2018, 23), it is important to measure and document the design choices that continue to shape the experience of segregation in America. Despite the fact that state action has historically been used to establish and maintain racially exclusive social spaces, this dissertation documents instances in which contemporary government action has been effectively used to pursue racial integration. Although a significant societal commitment is necessary to fully eliminate the individual and societal costs of segregation in schools and the workplace, these initial findings are encouraging and warrant further study.

APPENDIX

A1 Occupations with Largest Differences in Relative Representation

In Figure 3.4, we plot the occupations with the largest absolute difference in relative

representation between Black and white workers, separately for STARs and workers with a

bachelor's degree or higher. To aid the eye in identifying wage differences between occupations

in which Black and white workers are overrepresented, that figure is limited to the 50

occupations with the largest absolute difference in standardized group share in Figure 3.3. In

Figure A1.1, we present the same figure with all 422 harmonized occupations in the 2019 ACS.

While standardizing the group share allows for more direct comparisons of Black and

White workers, these standardized measures of group share are still impacted by the floor effect

because a group's share in an occupation cannot assume values below 0. Because Black workers

make up a smaller proportion of the labor force, the group share of Black STARs and Black

workers with a bachelor's degree are impacted by the floor more directly. For example, the

z-score for an occupation with zero percent Black STARs is -1.24. In comparison, the z-score for

an occupation with zero percent white STARs is -2.11. When compared directly, these values

suggest that white STARs are more underrepresented than Black STARs when both groups are

fully excluded from the occupation. We see this effect in panel A of Figure A1.1 where many

occupations are clustered in the bottom-left corner of the figure. Despite this limitation of the

standardized group share as a measure of relative representation, clear wage patterns still emerge

between similarly educated Black and white workers when the two racial groups are not similarly represented in an occupation.

To gain a better sense of the types of occupations represented in Figure 3.3, Tables A1.1 and A1.2 present the fifteen occupations for which there is the largest absolute difference in the standardized group shares between Black and White STARs (Table A1.1) and Black and White workers with a bachelor's degree (Table A1.2). The rows in each table are sorted by median hourly wages. Table A1.1 demonstrates that there are a number of occupations in which White STARs are significantly overrepresented – composing the vast majority of the occupation's workforce – and where Black STARs are extraordinarily underrepresented. For example, White

A   **B**
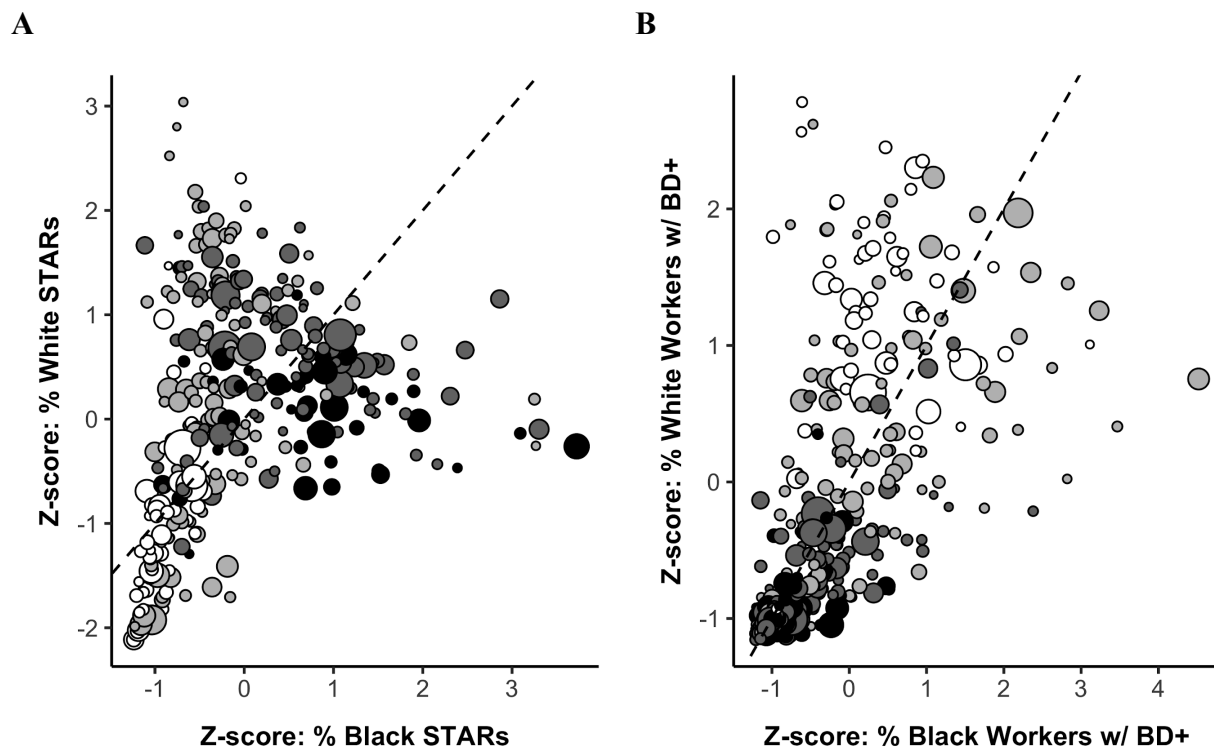
Figure A1.1. Relative Representation in All Occupations by Race Within Degree Status. Each point represents an occupation and is sized by the total number of workers. Occupations are limited to those with at least 50k workers. Data are from the 2019 1-year American Community Survey (ACS) accessed through the University of Minnesota Integrated Public Use Microdata Series (IPUMS).

STARs make up 32.9% of the overall labor force, but are 76.5% of millwrights; Black STARs, in contrast, comprise less than 3% of millwrights despite being 7.6% of the overall labor force. Similarly, more than 80% of tool and die makers are White STARs while only 3.4% are Black STARs.

Extreme racial disparities also exist within some occupations that largely employ workers with college degrees. For instance, as we can see in Table A1-2, 66.8% of aircraft pilots are White workers with a bachelor's degree, despite the fact that Whites with a bachelor's degree make up 26.8% of the overall labor force. Only 0.6% of Black workers with a bachelor's degree are employed as pilots, despite composing 3.4% of the overall labor force.

We also draw attention to the fact that among both STARs and workers with a bachelor's degree or greater, the occupations in which Black workers are disproportionately employed routinely pay their employees lower wages than those in which White workers are employed. Out of the fifteen most segregated occupations for STARs, Black workers are overrepresented in seven. In only two of those seven positions are Black STARs paid above the labor market's median hourly wage. In fact, with the exception of postal worker positions, all the jobs in which Black STARs are overrepresented pay below, and often well-below, the market's median hourly wage.

We find similar wage differences in Table A1.2 when we consider segregated occupations that employ workers with college degrees. As we mentioned above, the table is sorted by median hourly wages and almost all the positions in which Black workers with a bachelor's degree are underrepresented are at the top of the table and ones in which Blacks with a bachelor's degree are over-represented are at the bottom of the table. As the tables make evident, significant occupational segregation is also strongly tied to notable differences in median hourly wages.

Places that disproportionately employ white workers pay their employees more than those that

disproportionately employ black workers.

	Median Hourly Wages	% White STARs	% Black STARs
Millwrights	$29.21	76.5%	3.0%
Tool & Die Makers	$25.32	80.2%	3.4%
Postal Service Clerks	$25.06	35.9%	27.6%
Surveying & Mapping Technicians	$24.51	72.2%	2.5%
Heavy Vehicle & Mobile Equipment Mechanics	$24.34	64.6%	4.5%
Postal Service Mail Sorters & Processors	$22.69	28.9%	27.7%
Machinists	$21.90	66.8%	4.2%
Parts Salespersons	$17.46	64.6%	4.8%
Farmers, Ranchers, & Other Agricultural Managers	$17.04	58.8%	0.8%
Baggage Porters, Bellhops, & Concierges	$16.53	26.2%	20.9%
Cabinetmakers & Bench Carpenters	$16.33	60.4%	3.1%
Security Guards & Gaming Surveillance Officers	$15.16	31.4%	27.9%
Nursing, Psychiatric, & Home Health Aides	$13.52	28.8%	30.5%
Parking Lot Attendants	$13.15	25.6%	22.3%
Barbers	$12.33	30.8%	26.6%
ALL OCCUPATIONS	**$21.90**	**32.9%**	**7.60%**

Table A1.1. 15 Most Segregated Occupations by Race for STARs. To account for the difference in the total volume of Black and White STARs, we standardize a group's share of each occupation by subtracting the group's mean share (i.e. its share of the entire labor market) and then dividing by the standard deviation of the group's share across the 422 occupations. This z-score gives a comparable measure of how well Black and White STARs are represented in any given occupation. This table presents the fifteen occupations with at least 50 thousand workers with the largest absolute difference between these standardized values. Occupations are then sorted by median hourly wages. Data are from the 2019 1-year American Community Survey (ACS) accessed through the University of Minnesota Integrated Public Use Microdata Series (IPUMS).

	Median Hourly Wages	% White Workers w/ Bachelor's Degree	% Black Workers w/ Bachelor's Degree
Aircraft Pilots & Flight Engineers	$52.24	66.8%	0.6%
Veterinarians	$43.23	88.8%	1.7%
Physical Therapists	$38.24	72.5%	2.9%
Budget Analysts	$37.83	49.2%	12.0%
Environmental Scientists & Geoscientists	$37.72	84.0%	1.6%
Architects	$37.45	68.0%	2.5%
Speech Language Pathologists	$33.83	81.4%	4.7%
Biological Scientists	$33.76	72.1%	2.8%
Chiropractors	$32.10	85.2%	2.1%
Editors, News Analysts, & Reporters	$28.40	68.1%	2.6%
Tax Examiners, Collectors, & Revenue Agents	$26.42	27.3%	11.2%
Archivists, Curators, & Museum Technicians	$25.43	68.8%	1.2%
Social Workers	$22.05	43.6%	15.9%
Community & Social Service Specialists	$21.90	35.8%	13.0%
Eligibility Interviewers, Government Programs	$21.17	22.0%	10.0%
ALL OCCUPATIONS	**$21.90**	**26.8%**	**3.4%**

Table A1.2. 15 Most Segregated Occupations by Race for Workers with a Bachelor's Degree. To account for the difference in the total volume of Black and White workers with a bachelor's degree or more, we standardize a group's share of each occupation by subtracting the group's mean share (i.e. its share of the entire labor market) and then dividing by the standard deviation of the group's share across the 422 occupations. This z-score gives a comparable measure of how well Black and White workers with a bachelor's degree or more are represented in any given occupation. This table presents the fifteen occupations with at least 50 thousand workers with the largest absolute difference between these standardized values. Occupations are then sorted by median hourly wages. Data are from the 2019 1-year American Community Survey (ACS) accessed through the University of Minnesota Integrated Public Use Microdata Series (IPUMS)

A2 Threshold Regression Model

Table 4 presents the coefficients of group share from estimating separate threshold regression models for Black and white STARs and Black and white workers with a bachelor's degree or higher. In Table A2.1, we present the full results of estimating models I and II. The full results of model III are included in Table A2.2.

Due to differences in group size, the magnitude of the coefficients in Tables 3.4, A2.1, and A2.2 are not directly comparable across racial and educational groups. For example, because Black workers with a bachelor's degree or higher only make up 3.4% of the U.S. labor force, there is a more limited range of potential values for an occupation's share of Black workers with a bachelor's degree or higher. To account for these differences, Tables A2.3 and A2.4 reestimate models I, II, and III using the standardized group share. While the results are still impacted by floor effects, as noted in Section A1, these results allow for better comparisons across racial and educational groups, though they are less directly interpretable.

Lastly, in Table 3.4, each group's threshold is theoretically informed to separately model occupations in which that group is under- or overrepresented. For example, 7.6% of all workers are Black STARs. As a result, we categorize occupations composed of fewer than 7.6% Black STARs as occupations in which Black STARs are underrepresented and occupations composed of more than 7.6% Black STARs as occupations in which Black STARs are overrepresented. This approach mirrors the use of threshold models in longitudinal geopolitical studies in which the threshold represents a known regime change.

However, we can consider alternative thresholds informed by the goodness of fit in the data. For each group, we sequence by a half percentage point through all potential thresholds that allow for there to be at least 50 occupations on each side of the threshold. We present the

alternative threshold values and the adjusted R^2 from estimating threshold regression models in Figure A2.1.

In general, the results suggest that our theoretically-derived thresholds find support in the data. For Black and white STARs, the adjusted R^2 is maximized near to the group's share of the labor force. For workers with a bachelor's degree or higher, some higher thresholds increase the adjusted R^2, though these improvements are marginal. In the case of white workers with a bachelor's degree or higher, the alternative thresholds that improve the model's fit are particularly extreme, splitting the data by whether occupations are composed of more than 55% white workers with bachelor's degrees or higher.

		Black STARs		White STARs		Black Workers w/ Bachelor's Degree		White Workers w/ Bachelor's Degree	
		I	II	I	II	I	II	I	II
Under	Group Share	-3.448*** (0.227)	-2.569*** (0.242)	-0.658*** (0.067)	-0.371*** (0.075)	3.118*** (0.695)	2.890*** (0.681)	0.192*** (0.074)	0.348*** (0.070)
	Intercept	42.480*** (0.989)	-18.707** (8.501)	42.785*** (1.459)	-36.545*** (9.918)	15.095*** (1.299)	-44.200*** (9.384)	15.490*** (0.902)	-11.455 (8.364)
Over	Group Share	-0.087 (0.126)	-0.127 (0.115)	0.162* (0.083)	0.021 (0.070)	-0.700** (0.319)	-0.488* (0.283)	0.240*** (0.045)	0.251*** (0.044)
	Intercept	17.063*** (1.901)	-36.625*** (8.294)	12.246*** (3.766)	-53.351*** (9.620)	35.570*** (2.108)	-28.216*** (9.801)	22.169*** (2.334)	-5.185 (8.545)
Difference	Group Share	3.361*** (0.260)	2.442*** (0.273)	0.820*** (0.106)	0.392*** (0.102)	-3.818*** (0.765)	-3.377*** (0.679)	0.048 (0.087)	-0.097 (0.076)
	Intercept	-25.417*** (2.143)	-17.917*** (2.189)	-30.539*** (4.039)	-16.805*** (3.635)	20.474*** (2.476)	15.984*** (2.075)	6.679*** (2.502)	6.270*** (2.163)
Age			6.003*** (0.659)		7.704*** (0.762)		7.730*** (0.780)		3.301*** (0.735)
Experience			-5.841*** (0.656)		-7.369*** (0.769)		-7.545*** (0.781)		-3.103*** (0.733)
% Female			-0.070*** (0.014)		-0.125*** (0.015)		-0.159*** (0.016)		-0.129*** (0.013)
% Gov.			-0.064*** (0.019)		-0.095*** (0.022)		-0.085*** (0.023)		-0.096*** (0.019)
% South			-0.160* (0.092)		-0.271*** (0.099)		-0.435*** (0.099)		-0.192** (0.086)
Adjusted R^2		0.549	0.631	0.349	0.552	0.249	0.533	0.528	0.656

Note: $^{*}p < 0.1$; $^{**}p < 0.05$; $^{***}p < 0.01$

Table A2.1. Threshold Regression Model of Occupational Median Hourly Wages and Group Share, Models I and II. Relationship between occupational median hourly wages and a group's share of the occupation. All models are weighted by occupation size.

		Black STARs	White STARs	Black Workers w/ Bachelor's Degree	White Workers w/ Bachelor's Degree
		III	III	III	III
Under	Group Share	-2.435*** (0.251)	-0.584*** (0.079)	3.116*** (0.783)	0.228*** (0.069)
	Age	7.221*** (0.753)	8.375*** (0.800)	7.210*** (1.170)	3.057*** (1.017)
	Experience	-7.123*** (0.758)	-7.874*** (0.838)	-6.997*** (1.167)	-2.886*** (1.009)
	% Female	-0.095*** (0.018)	-0.164*** (0.022)	-0.158*** (0.019)	-0.073*** (0.014)
	% Gov.	-0.111*** (0.023)	-0.277*** (0.033)	-0.063 (0.041)	0.031 (0.027)
	% South	-0.209* (0.113)	-0.160 (0.124)	-0.335*** (0.124)	0.129 (0.107)
	Intercept	-26.124*** (9.511)	-43.350*** (10.799)	-44.234*** (12.828)	-22.338** (11.351)
Over	Group Share	-0.082 (0.114)	0.088 (0.065)	-0.508 (0.317)	0.308*** (0.045)
	Age	4.064*** (1.484)	6.376*** (1.452)	8.110*** (1.087)	4.103*** (0.914)
	Experience	-3.912*** (1.439)	-6.137*** (1.439)	-8.063*** (1.124)	-4.189*** (0.938)
	% Female	-0.035 (0.022)	-0.067*** (0.017)	-0.164*** (0.034)	-0.242*** (0.023)
	% Gov.	0.047 (0.034)	0.048* (0.026)	-0.094*** (0.028)	-0.165*** (0.024)
	% South	0.176 (0.160)	0.117 (0.150)	-0.560*** (0.181)	-0.126 (0.141)
	Intercept	-33.094* (18.629)	-58.000*** (16.562)	-22.757 (15.217)	-2.087 (10.619)
Difference	Group Share	2.352*** (0.275)	0.672*** (0.102)	-3.625*** (0.844)	0.081 (0.082)
	Age	-3.157* (1.664)	-2.000 (1.657)	0.900 (1.597)	1.045 (1.367)
	Experience	3.210* (1.626)	1.737 (1.665)	-1.066 (1.620)	-1.304 (1.377)
	% Female	0.059** (0.028)	0.097*** (0.028)	-0.007 (0.039)	-0.169*** (0.027)
	% Gov.	0.158*** (0.041)	0.325*** (0.042)	-0.031 (0.050)	-0.196*** (0.036)
	% South	0.385* (0.196)	0.277 (0.192)	-0.225 (0.219)	-0.255 (0.177)
	Intercept	-6.971 (20.917)	-14.649 (19.772)	21.476 (19.903)	20.251 (15.543)
	Adjusted R^2	0.648	0.628	0.530	0.710

Note: $^{*}p < 0.1$; $^{**}p < 0.05$; $^{***}p < 0.01$

Table A2.2. Threshold Regression Model of Occupational Median Hourly Wages and Group Share, Model III.

		Black STARs		White STARs		Black Workers w/ Bachelor's Degree		White Workers w/ Bachelor's Degree	
		I	II	I	II	I	II	I	II
Under	Group Share	-21.161*** (1.396)	-15.769*** (1.487)	-10.239*** (1.040)	-5.776*** (1.169)	8.651*** (1.928)	8.019*** (1.891)	4.285** (1.661)	7.756*** (1.552)
	Intercept	16.296*** (0.992)	-38.220*** (8.203)	21.143*** (1.133)	-48.754*** (9.029)	25.555*** (1.358)	-34.505*** (9.985)	20.636*** (1.361)	-2.1319 (8.815)
Over	Group Share	-0.534 (0.771)	-0.782 (0.704)	2.528* (1.288)	0.331 (1.093)	-1.943** (0.886)	-1.354* (0.786)	5.362*** (1.005)	5.590*** (0.990)
	Intercept	16.403*** (1.053)	-37.593*** (8.158)	17.590*** (1.177)	-52.651*** (9.246)	33.220*** (1.189)	-29.854*** (9.885)	28.610*** (1.210)	1.530 (8.670)
Difference	Group Share	20.627*** (1.595)	14.987*** (1.675)	12.767*** (1.656)	6.107*** (1.585)	-10.595*** (2.122)	-9.373*** (1.885)	1.077 (1.941)	-2.165 (1.704)
	Intercept	0.107 (1.447)	0.628 (1.317)	-3.553** (1.634)	-3.897 (1.408)	7.665*** (1.805)	4.651 (1.494)	7.973*** (1.822)	3.669 (1.613)
	Age		6.003*** (0.659)		7.704*** (0.762)		7.730*** (0.780)		3.301*** (0.735)
	Experience		-5.841*** (0.656)		-7.369*** (0.769)		-7.545*** (0.781)		-3.103*** (0.733)
	% Female		-0.070*** (0.014)		-0.125*** (0.015)		-0.159*** (0.016)		-0.129*** (0.013)
	% Gov.		-0.064*** (0.019)		-0.095*** (0.022)		-0.085*** (0.023)		-0.096*** (0.019)
	% South		-0.160* (0.092)		-0.271*** (0.099)		-0.435*** (0.099)		-0.192** (0.086)
	Adjusted R^2	0.549	0.631	0.349	0.552	0.249	0.533	0.528	0.656

Note: $^*p < 0.1$; $^{**}p < 0.05$; $^{***}p < 0.01$

Table A2.3. Threshold Regression Model of Occupational Median Hourly Wages and Standardized Group Share, Models I and II. Relationship between occupational median hourly wages and a group's share of the occupation. All models are weighted by occupation size.

		Black STARs	White STARs	Black Workers w/ Bachelor's Degree	White Workers w/ Bachelor's Degree
		III	III	III	III
Under	Group Share	-14.943*** (1.540)	-9.086*** (1.234)	8.648*** (2.173)	5.083*** (1.532)
	Age	7.221*** (0.753)	8.375*** (0.800)	7.210*** (1.170)	3.057*** (1.017)
	Experience	-7.123*** (0.758)	-7.874*** (0.838)	-6.997*** (1.167)	-2.886*** (1.009)
	% Female	-0.095*** (0.018)	-0.164*** (0.022)	-0.158*** (0.019)	-0.073*** (0.014)
	% Gov.	-0.111*** (0.023)	-0.277*** (0.033)	-0.063 (0.041)	0.021 (0.027)
	% South	-0.209* (0.113)	-0.160 (0.120)	-0.335*** (0.124)	0.129 (0.107)
	Intercept	-44.615*** (9.221)	-62.555*** (10.211)	-33.778** (13.942)	-16.233 (11.990)
Over	Group Share	-0.505 (0.698)	1.368 (1.010)	-1.411 (0.878)	6.878*** (1.015)
	Age	4.064*** (1.484)	6.376*** (1.452)	8.110*** (1.087)	4.103*** (0.914)
	Experience	-3.912*** (1.439)	-6.137*** (1.439)	-8.063*** (1.124)	-4.189*** (0.938)
	% Female	-0.035 (0.022)	-0.067*** (0.017)	-0.164*** (0.034)	-0.242*** (0.023)
	% Gov.	0.047 (0.034)	0.048* (0.026)	-0.094*** (0.028)	-0.165*** (0.024)
	% South	0.176 (0.160)	0.117 (0.150)	-0.560*** (0.181)	-0.126 (0.141)
	Intercept	-33.719* (18.582)	-55.107*** (16.435)	-24.463 (15.294)	6.174 (10.831)
Difference	Group Share	14.438*** (1.690)	10.454*** (1.595)	-10.059*** (2.344)	1.795 (1.838)
	Age	-3.157* (1.664)	-2.000 (1.657)	0.900 (1.597)	1.045 (1.367)
	Experience	3.210** (1.626)	1.737 (1.665)	-1.066 (1.620)	-1.304 (1.377)
	% Female	0.059** (0.028)	0.097*** (0.028)	-0.007 (0.039)	-0.169*** (0.023)
	% Gov.	0.158*** (0.041)	0.325*** (0.042)	-0.031 (0.050)	-0.196*** (0.036)
	% South	0.385* (0.196)	0.277 (0.192)	-0.225 (0.219)	-0.255 (0.177)
	Intercept	10.895 (20.745)	7.447 (19.349)	9.315 (20.695)	22.408 (16.157)
	Adjusted R^2	0.648	0.628	0.530	0.710

Note: $^{*}p < 0.1$; $^{**}p < 0.05$; $^{***}p < 0.01$

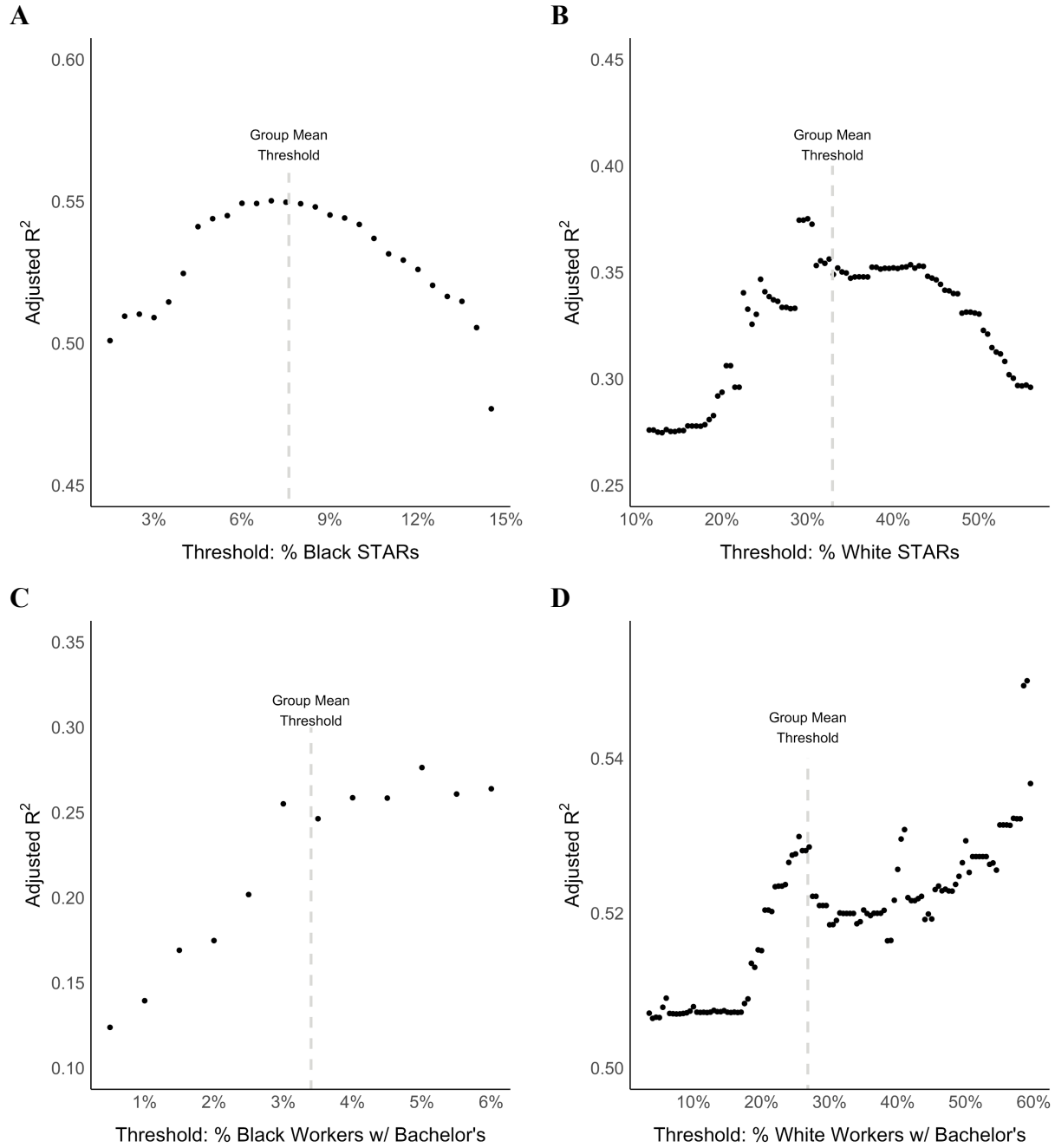**Table A2.4. Threshold Regression Model of Occupational Median Hourly Wages and Standardized Group Share.**

A — Adjusted R² vs Threshold: % Black STARs, with Group Mean Threshold line.

B — Adjusted R² vs Threshold: % White STARs, with Group Mean Threshold line.

C — Adjusted R² vs Threshold: % Black Workers w/ Bachelor's, with Group Mean Threshold line.

D — Adjusted R² vs Threshold: % White Workers w/ Bachelor's, with Group Mean Threshold line.

Figure A2.1. Alternative Thresholds and Model Goodness of Fit. Model I in Table 3.4 is estimated with alternative thresholds for each group. Potential thresholds are limited to those which have at least 50 occupations on each side of the threshold.

A3 Racial Differences in Educational Attainment

By definition, STARs include workers with a high school diploma or its equivalent, workers with some college but no degree, and workers with an associate's degree. If there are significant racial differences in the educational attainment of STARs, some of the persistent racial occupational segregation between STARs may be due to unmeasured differences in human capital, particularly attainment of an associate's degree which may be viewed by employers as reliable signal of skill, ability, or potential productivity. The same confounding factor may emerge for workers with a bachelor's degree or more. If white workers are significantly more likely to have an additional degree beyond the bachelor's degree, racial differences in educational attainment may explain the occupational segregation we identify between Black and white workers with a four-year degree or more.

In order to investigate differences in educational attainment within the broader categories of STARs and workers with a bachelor's degree or more, we use the detailed educational categories in the Decennial Census and ACS. Since 1990, these detailed educational categories in the Census and ACS have been based on degree attainment, however, in 1980, the categories instead denote the number of years of college, which make direct comparison less precise. For example, it is a relatively safe assumption that the vast majority of workers with four or more years of college have a bachelor's degree or higher, but it is less clear whether a worker with five years of college completed a degree beyond the bachelor's degree. Similarly, we can assume that workers with one year or less of college are unlikely to have completed a degree, but workers with two to three years of college may have completed an associate's degree or they may have run into barriers before completing a bachelor's degree program. As a result, we exclude 1980

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from the main tables to follow and present a separate analysis of 1980 by number of years of education in Tables A3.1 and A3.2.

We test the hypothesis that there are racial differences in educational attainment within the broader categories of STARs and workers with a four-year degree or higher in two ways. First, in Table A3.1, we present the share of STARs with a high school diploma or its equivalent, with some college but no degree, and with an associate's degree for Black and white workers over time. Similarly, we present the share of workers with a bachelor's degree or more who have a bachelor's degree alone, a master's degree, a professional degree, and a doctorate degree. Second, in Table A3.2, we measure the dissimilarity index between Black and White workers using more detailed educational categories than appear in the main paper.

In general, Black and white STARs have similar levels of educational attainment. As can be seen in Table A3.1, about 45 percent of STARs have a high school diploma or its equivalent, about 40 percent have some college, but no degree, and the remaining 15 percent have an associate's degree. There are minor differences between Black and White STARs, with the largest differences emerging in 2019 among workers with an associate's degree. As of 2019, 19.1% of white STARs have an associate's degree in comparison to 15.7% of Black STARs.

Over 60 percent of workers with a bachelor's degree or higher have a bachelor's degree alone and about a quarter of workers with a bachelor's degree or higher have a master's degree. This is consistent for both Black and white workers. Some of the largest racial differences occur in the share of workers with a professional degree, such as a law degree or medical degree. In 2019, over 48 percent of workers with a professional degree were in two occupations: lawyers, judges, magistrates, and other judicial workers and physicians and surgeons.

While racial differences in professional degree attainment certainly explain racial differences in access to these occupations, it is unlikely that observed occupational segregation between Black and white workers with a bachelor's degree across all 422 occupations in our analysis is driven by these occupations. For example, in 2019, the dissimilarity index between Black and white workers with a bachelor's degree was 0.221. If we exclude these two occupations, the dissimilarity index would be 0.220.

		1990		*2000*		*2010*		*2019*	
		Black	White	Black	White	Black	White	Black	White
STARs	High school diploma, or equivalent	50.8%	51.1%	46.7%	46.5%	44.8%	44.6%	45.0%	42.9%
	Some college, no degree	37.8%	36.0%	41.9%	39.8%	41.9%	39.0%	39.3%	38.0%
	Associate's degree	11.4%	12.9%	11.5%	13.7%	13.3%	16.4%	15.7%	19.1%
Bachelor's degree or more	Bachelor's degree	66.3%	63.5%	67.0%	63.2%	65.4%	62.6%	61.2%	61.8%
	Master's degree	25.5%	23.7%	24.3%	24.6%	26.6%	26.0%	30.6%	26.9%
	Professional degree	5.6%	8.8%	5.8%	8.2%	4.6%	7.2%	4.7%	6.9%
	Doctoral Degree	2.7%	3.9%	2.9%	3.9%	3.3%	4.2%	3.5%	4.4%

Table A3.1. Detailed Educational Attainment by Race. The population of interest is workers who are aged 25 or older and active in the labor force. Workers skilled through alternative routes (STARs) have a high school diploma or equivalent and have developed their skills through routes other than a four-year diploma such as community college, apprenticeships, bootcamps, and, most commonly, on-the-job work experience. Data are from the 1990 and 2000 U.S. Decennial Censuses and the 2010 and 2019 1-year American Community Surveys (ACS) accessed through the University of Minnesota Integrated Public Use Microdata Series (IPUMS).

Despite minor racial differences in the educational attainment within the categories of STARs and workers with a bachelor's degree or higher, Table A3-2 confirms that the occupational segregation by race and education that we identify is not the result of our choice of educational categories. If we measure the dissimilarity index between Black and white workers with highly detailed education categories, we find consistent levels of occupational segregation within educational subcategories. That is, occupational segregation between Black and white STARs is not the result of differences in educational attainment between Black and white STARs. Similarly, occupational segregation between Black and white workers with a bachelor's degree or higher is not the result of differences in educational attainment beyond the bachelor's degree.

| | | Dissimilarity Index (*D*) | | | |
		1990	*2000*	*2010*	*2019*
STARs	High school diploma, or equivalent	0.284	0.266	0.275	0.296
	Some college, no degree	0.272	0.251	0.259	0.281
	Associate's degree	0.238	0.227	0.234	0.268
Bachelor's degree or more	Bachelor's degree	0.235	0.219	0.225	0.234
	Master's degree	0.236	0.204	0.198	0.217
	Professional degree	0.203	0.192	0.207	0.246
	Doctoral Degree	0.246	0.254	0.229	0.284

Table A3.2. Occupational Segregation Over Time by Race and Detailed Degree Status. The index of dissimilarity measures how evenly workers are distributed within the 422 occupations in the 2010

harmonized occupations codes created by University of Minnesota Integrated Public Use Microdata Series (IPUMS). The population of interest is workers who are aged 25 or older and active in the labor force. Workers skilled through alternative routes (STARs) have a high school diploma or equivalent and have developed their skills through routes other than a four-year diploma such as community college, apprenticeships, bootcamps, and, most commonly, on-the-job work experience. Data are from the 1990 and 2000 U.S. Decennial Censuses and the 2010 and 2019 1-year American Community Surveys (ACS) accessed through IPUMS.

		Dissimilarity Index (*D*)
		1980
STARs	High school diploma, or equivalent	0.315
	One year or less, college	0.314
	Two years, college	0.312
	Three years, college	0.313
Bachelor's degree or more	Four years, college	0.298
	Five years, college	0.239
	Six years, college	0.252
	Seven years, college	0.301
	Eight years, college	0.310

Table A3.3. Occupational Segregation Over Time by Race and Years of College, 1980. The index of dissimilarity measures how evenly workers are distributed within the 351 occupations in the 2010 harmonized occupations codes created by University of Minnesota Integrated Public Use Microdata Series (IPUMS). The population of interest is workers who are aged 25 or older and active in the labor force. Workers skilled through alternative routes (STARs) have a high school diploma or equivalent and have developed their skills through routes other than a four-year diploma such as community college, apprenticeships, bootcamps, and, most commonly, on-the-job work experience. Data are from the 1980 2000 U.S. Decennial Censuses accessed through IPUMS.

A4 Alternative Hypotheses

Because of high-levels of occupational segregation by gender, in Tables A4.1 and A4.2, we calculate the dissimilarity indices in Table 3.1 separately for men and women. The results suggest that the bachelor's degree is even less effective at reducing racial occupational segregation among men.

	Dissimilarity Index (D)				
	1980	*1990*	*2000*	*2010*	*2019*
STARs - Bachelor's degree	0.561	0.522	0.539	0.533	0.533
Black - White	0.273	0.242	0.229	0.232	0.257
STARs: Black - White	0.303	0.260	0.235	0.239	0.263
Bachelor's degree: Black - White	0.187	0.175	0.163	0.182	0.193

Table A4.1. Occupational Segregation of Women Over Time by Race and Degree Status. The index of dissimilarity measures how evenly workers are distributed within the 422 occupations in the 2010 harmonized occupations codes created by University of Minnesota Integrated Public Use Microdata Series (IPUMS). Data are from the 1980, 1990, and 2000 U.S. Decennial Censuses and the 2010 and 2019 1-year American Community Surveys (ACS) accessed through IPUMS.

Dissimilarity Index (*D*)

	1980	*1990*	*2000*	*2010*	*2019*
STARs - Bachelor's degree	0.539	0.543	0.564	0.560	0.559
Black - White	0.327	0.300	0.290	0.295	0.308
STARs: Black - White	0.318	0.287	0.277	0.286	0.302
Bachelor's degree: Black - White	0.277	0.247	0.241	0.253	0.272

Table A4.2. Occupational Segregation of Men Over Time by Race and Degree Status. The index of dissimilarity measures how evenly workers are distributed within the 422 occupations in the 2010 harmonized occupations codes created by University of Minnesota Integrated Public Use Microdata Series (IPUMS). Data are from the 1980, 1990, and 2000 U.S. Decennial Censuses and the 2010 and 2019 1-year American Community Surveys (ACS) accessed through IPUMS.

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