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Dividing Lines: Racial Segregation across Local Government Boundaries†

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We describe the empirical relationship between local government boundaries and residential segregation in the United States. First, we study recent changes in the distribution of segregation within and between local governments in all metropolitan areas, using census block data on residential demographics over the period 1990–2020. We find that segregation across local government boundaries explains a substantial share of racial stratification, which has changed only little over the last thirty years. Next, we use spatial regression discontinuity methods to distinguish between household sorting due to neighborhood amenities and public goods provided by local governments. The prevalence of demographic discontinuities at local government boundaries suggest that between-jurisdiction segregation patterns cannot be explained solely by proximity to neighborhood amenities. We discuss implications for policy, showing that both between-jurisdiction segregation and jurisdictional discontinuities can partly explain the correlation between total segregation and racial gaps in educational outcomes. (*JEL* H41, H75, I24, I26, J15, R23)

1. *Introduction*

Segregation on the basis of race and ethnicity is one of the most enduring and widespread social problems in American cities. A large literature has established the harms of racial segregation, especially for individuals of color (Guryan 2004; Card and Rothstein 2007; Boustan 2010; Billings, Deming, and Rockoff 2014). In economics, most research on the determinants of segregation focuses on individual choices and residential sorting behavior (Cutler, Glaeser, and Vigdor 1999; Bayer, McMillan, and Rueben 2004; Bayer, Ferreira, and McMillan 2007; Card, Mas, and Rothstein 2008; Baum-Snow and Lutz 2011; Caetano and Macartney 2021). However, a burgeoning literature both in economics and in related fields documents the historical role of government institutions and policies in determining and perpetuating segregation (Shertzer, Twinam, and Walsh 2016; Akbar et al. 2022; Li 2021).

The goal of this paper is to shed light on the role of local government boundaries in enabling segregation. Local government constitutes the central body through which

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many public goods are provided and regulatory policies are implemented. Most US metropolitan areas are broken up into dozens of subunits, both jurisdictional (e.g., city governments and school districts) and administrative (e.g., land-use zoning regulations and school attendance boundaries). At the same time, across both cities and school districts, there are often enormous differences in the quality of public goods provided by different local governments, even when they neighbor each other. For example, emergency response times are more than twice as long in Oakland, California, than in neighboring Piedmont, and average teacher salaries in its school district are more than 15 percent lower.

We provide comprehensive evidence on the contribution of local government boundaries to racial inequality across urban areas in the United States using two approaches. In the first approach, we unify and extend recent attempts to decompose segregation into variation between and within local governments (Clotfelter 1999, Trounstine 2018). Drawing together census block data for all 380 metropolitan areas (MAs) and thousands of local government boundaries for cities, school districts, and counties over thirty years, we can study the recent evolution of segregation in new light. Given the increasing racial and ethnic diversity of the US population, we compute total segregation and segregation between local government jurisdictions for Black, Hispanic, and Asian residents.[1]

This approach establishes several novel insights into the nature of segregation in urban America. First, while segregation for Black residents has fallen substantially between 1990 and 2020, this is almost entirely due to a drop in segregation within jurisdictions, as opposed to between jurisdictions. This means that while segregation today is lower than at any point in the last 30 years, access to public goods has hardly become more equitable over this period. Second, the drop in segregation of Black residents within jurisdictions is almost entirely driven by lower segregation in the most severely segregated jurisdictions; indeed, the median city and school district are no less segregated today than thirty years ago. Third, both total segregation and segregation between jurisdictions have been on the rise for both Hispanic and Asian residents. This is true despite the gradual expansion of these groups from a few large MAs across all urban areas.

In the second approach, we zero in on neighborhoods near local government boundaries to estimate to what extent demographics change discontinuously near these boundaries across space, and how these changes evolved across time. To interpret these demographic discontinuities, we develop a model of household sorting, in which households value both neighborhood amenities and public goods. This model establishes that discontinuities do not only emerge if preferences for public goods differ by group, but also if groups have differential access to public goods within a jurisdiction or if there is price discrimination in the housing market.

Empirically, we find that, on average, there are substantial discontinuities across boundaries for all three racial/ethnic groups. These discontinuities tend to be larger near city boundaries than school district boundaries, perhaps reflecting the capacity of cities to control land-use zoning. Together, the evidence presented here suggests that local government boundaries play a central role in household sorting, access to public goods, and persistent residential segregation.

[1] To be specific, we use the following census categories of minorities: non-hispanic Black residents (which we refer to as Black residents for simplicity), Hispanic residents of all races (henceforth simply Hispanic residents), as well as Asian and Pacific Islanders (henceforth simply Asians).

1.1 *The New Economic Literature on Segregation*

These findings connect to a large economics literature on segregation. The canonical literature stems from the economic tradition of studying the constrained optimization problem faced by households, in this case in their choice of residential location. Dating back to the work of Tiebout (1956) and Schelling (1971), the primitive determinant of sorting in models of location choice has been heterogeneity in the preferences of individuals. While governments are not entirely absent in some of these models, their role is passive, often one of a benign social planner concerned with maximizing a social welfare function when setting public goods provision.

Empirical work on neighborhood segregation has imposed similar assumptions when estimating structural models of residential choice. For example, the standard framework in the work by Dennis Epple and coauthors (Epple, Zelenitz, and Visscher 1978; Epple, Filimon, and Romer 1984, 1993; Epple and Platt 1998; Epple and Sieg 1999; Epple, Romer, and Sieg 2001; Calabrese, Epple, and Romano 2012) models residential location as the outcome of a second stage involving the public choice of a bundle of public goods within a jurisdiction and a first stage with households choosing which jurisdiction to live in. Government here is simply represented as a tool for aggregating preferences. Other empirical work has leveraged advances in the estimation of discrete choice models to make inferences of the same spirit (Bayer, Ferreira, and McMillan 2007). When jurisdictional differences in public good provision have been documented, they have been attributed directly to heterogeneity in "willingness to pay" across households of different characteristics (Black 1999, Boustan 2013).

While preference heterogeneity is clearly a driver of segregation, equilibrium residential segregation is also determined by constraints imposed by governments. Earlier work has looked at this issue, concluding that preferences are much more important than constraints. Barriers to access better neighborhoods and schools are seen as a phenomenon of the past, which over time were replaced by market forces. For example, Cutler, Glaeser, and Vigdor 1999 write that "[d]ecentralized racism operating through the price mechanism has replaced centralized, legally enforced racism, and racial differences in housing persist" (p. 496).

In contrast, a new economic literature on segregation establishes that government policies actively shaped segregation. Aaronson, Hartley, and Mazumder (2020) and Aaronson et al. (2021) show that the 1930s Home Owners' Loan Corporation (HOLC) "redlining" maps had important impacts on the long-run trajectories of cities, reducing homeownership rates, house values, and rents and increased racial segregation in later decades. Avenancio-Léon and Howard (2022) establish that racial inequality in governments' assessment of property values has resulted in Black and Hispanic residents facing a higher tax burden for the same bundle of public services. In an investigation of the causal drivers of segregation in Los Angeles during the 1940s, Li (2021) concludes that constraints on which neighborhoods Black households can access matter more than preferences in explaining segregation. This work signals a change in economic thought in recent years. Government is no longer neutral, instead conceptualized as controlled by a faction of the population, serving their interests and potentially exacerbating inequality.

In a similar vein, a new literature explores the impact of land use regulation on social inequality. Shertzer, Twinam, and Walsh (2016) study the causes of land use regulation in Chicago, finding that industrial zoning was disproportionately allocated to neighborhoods populated by racial minorities. Trounstine (2018) argues that the intent of land use zoning often was to create segregation by design. While land use regulation was once considered the "trick" that saved Tiebout equilibrium, economists now question whether these regulations create inefficiencies that exacerbate inequality (Hsieh and Moretti 2019, Ganong and Shoag 2017). More recent research has also established that influxes of Black residents during the Great Migration led to changes to municipal policy that was hostile to them, both in policing (Derenoncourt 2022) and land use zoning (Sahn 2021).

Our description of the empirical link between segregation and local government boundaries provides important context for the mechanisms documented by the new economic literature on segregation. Strategic boundary setting may have played a central role in enabling local governments to segregate urban spaces, and boundary changes may play an important part in policy to reduce segregation. However, boundary setting involves different procedural rules and has different implications across different types of local governments. We provide a brief description and history of relevant local government types and the processes that determine their geography in Appendix B.

2. *Decomposing Segregation across Jurisdictions*

While the new literature on segregation recognizes the role of government in shaping residential segregation throughout history, economists lack a framework to quantify the relationship of local government boundaries with segregation. Our first approach to doing so is to decompose measures of segregation into a neighborhood component and a local government component. To be clear, such a decomposition cannot speak to the causal role of government in segregation. However, it yields new facts that take stock of government policy in determining access to high-quality public goods.

We are not the first to decompose segregation into neighborhoods and local governments. Clotfelter (1999) studied school segregation within metropolitan areas in 1990, distinguishing between racial disparities within and between school districts. Trounstine (2018) investigates residential segregation between and within cities using a similar approach. We extend this decomposition idea to include cities, counties, and school attendance zones for Black, Hispanic and Asian residents and all decades between 1990 and 2020.

We use census block data for all decennial censuses between 1990-2020 for the four largest racial/ethnic groups: White, Hispanic (of all races), Black, and Asian. These demographic data are combined with all local government boundaries from Census TIGER/Line products for corresponding years. More details on the data are described in Appendix A.

2.1 *Measuring Segregation*

There is a long tradition in the social sciences of quantifying segregation. We rely primarily on the "eta-squared" index, which has become widely used in economics since Kremer and Maskin (1996), with a much longer history in other social sciences (e.g., Duncan and Duncan 1955). Graham (2018) discusses many of the convenient features of this index. We show below that it can be decomposed into neighborhood variation within and variation between jurisdictions, which allows us to separately quantify the role of local government divisions and neighborhood sorting. This refinement of the eta-squared index provides a rich picture of how the spatial distribution of groups across neighborhoods more generally relates to the location of jurisdictional boundaries.

Consider a metro area divided into J *jurisdictions*, such as school districts or cities. Each jurisdiction $j = 1, \ldots, J$ has I_j *neighborhoods* indexed by $i = 1, \ldots, I_j$. Neighborhood i of jurisdiction j has population N_{ij}, of which M_{ij} are minorities, such as Black or Hispanic people. Let $m_{ij} = M_{ij}/N_{ij}$ be the corresponding minority share. Total and minority populations aggregate to jurisdiction j as $N_j = \sum_{i=1}^{I_j} N_{ij}$ and $M_j = \sum_{i=1}^{I_j} M_{ij}$, respectively, with jurisdiction minority share $m_j = M_j/N_j$. Altogether, the metro area is home to $N = \sum_{j=1}^{J} N_j$ people, of which $M = \sum_{j=1}^{J} M_j$ are minorities, such that the MA minority share is $m = M/N$.

2.2 *Neighborhood Segregation within Jurisdictions*

The *isolation index* θ_j *of jurisdiction* j is a minority's average neighborhood minority share in j. Unlike the minority share m_j, it captures the minority share not for all people in j, but only for minorities. In this sense, it measures how isolated a minority group is from other groups. It is defined as

$$\theta_j = \sum_{i=1}^{I_j} \frac{M_{ij}}{M_J} m_{ij},$$

where weights M_{ij}/M_j are the share of minorities in j that live in neighborhood i with $\sum_{i=1}^{I_j} M_{ij}/M_j = 1$. If the jurisdiction were perfectly integrated and minorities were evenly distributed across neighborhoods, then isolation would equal the minority share: $\theta_j = m_j$. In contrast, if the jurisdiction were perfectly segregated such that minorities lived in neighborhoods that were entirely minority, then would have an isolation index of $\theta_j = 1$: minorities would be completely isolated from other people, with every minority living in a 100 percent minority neighborhood.

While the isolation index is bounded from above by one, it can only be as low as the minority share in the jurisdiction, and so jurisdictions with a higher minority share automatically have a higher isolation index. It is thus convenient to rescale the isolation index to account for this mechanical relationship between minority share m_j and isolation index θ_j. This is exactly what the *segregation index of jurisdiction* j does:

$$\eta_j^2 = \frac{\theta_j - m_j}{1 - m_j},$$

which is bounded between zero and one. This index measures how much more isolated minorities are in jurisdiction j than they would be if they were perfectly integrated (the numerator), relative to how much more isolated they would be in a counterfactual world of perfect segregation (the denominator).

We use the example of New York City (NYC) to illustrate these concepts. About 22 percent of residents of NYC are Black, with most residing in and handful of neighborhoods across the city, as shown in figure 1. If they were perfectly integrated by being evenly distributed across all neighborhoods, Black residents (and everyone else) would be exposed to a Black neighborhood share of 22 percent everywhere, eliminating shade variation in figure A.1. In this case, the isolation index would be $\theta_{NYC} = 0.22$, and segregation would be $\eta_{NYC}^2 = 0$. In contrast, if NYC were perfectly segregated such that Black residents lived in neighborhoods that were entirely Black, then the share of Black residents in those neighborhoods would be 100 percent. Black residents would be completely isolated from other races (i.e., $\theta_{NYC} = 1$) and consequently the segregation of Black residents would be $\eta_{NYC}^2 = 1$.

In reality, Black isolation in NYC is 53 percent ($\theta_{NYC} = 0.53$) and segregation is $\eta_{NYC}^2 = 0.40$. NYC is moderately segregated for Black residents. While Black residents of NYC live in neighborhoods that are 33 percent more Black than the Black share in the

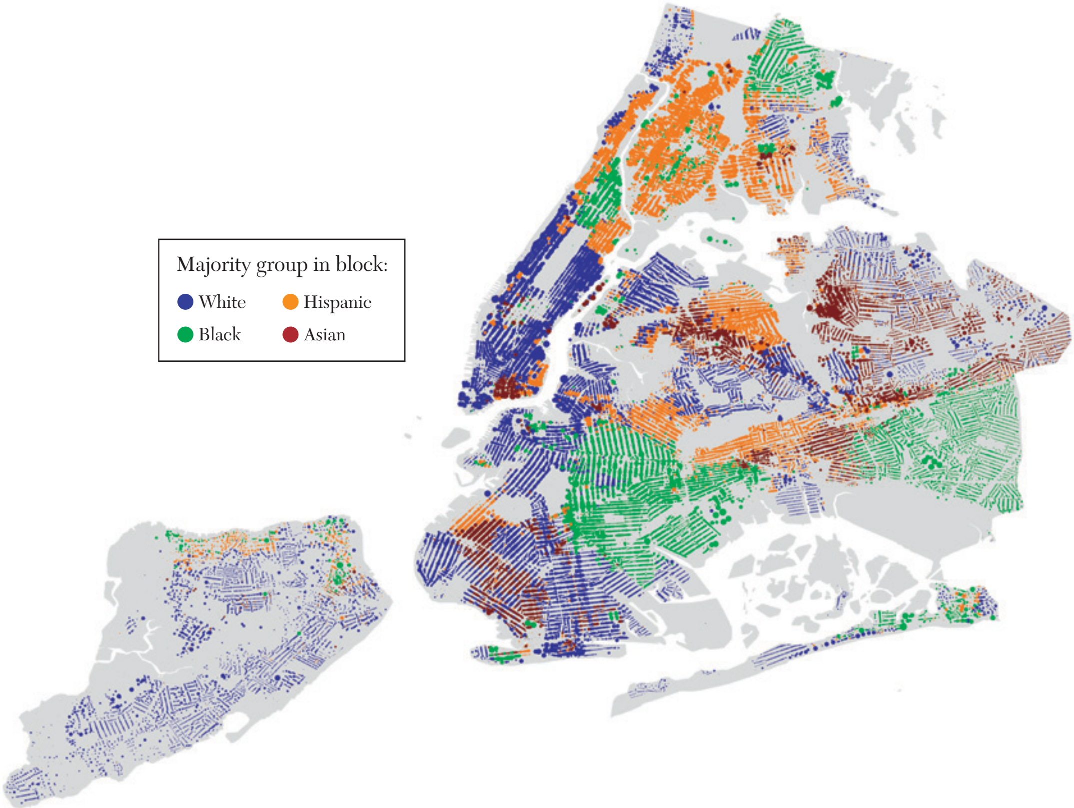

Figure 1. Spatial Distribution of Racial Groups, New York City, 2020

Notes: Map of the census blocks making up New York City. Population-weighted scatter dots correspond to the average latitude-longitude location of each block.

Sources: Population demographic estimates based on 2020 census data. Majority population is determined using only the four racial and ethnic groups reported.

city overall, they are still slightly closer to a state of perfect integration ($\eta^2_{NYC} = 0$) than perfect segregation ($\eta^2_{NYC} = 1$). We can compute the same statistics for Hispanic and Asian populations. Hispanics make up about 28 percent of NYC, whereas their average neighborhood is 48 percent Hispanic, resulting in segregation $\eta^2_{NYC} = 0.27$. Asians make up about 16 percent, living on average in neighborhoods that are 39 percent Asian, and their segregation is also $\eta^2_{NYC} = 0.27$.

Table 1 summarizes the 2020 distribution of segregation of the four major racial and ethnic groups and for three types of local governments: incorporated cities, school districts, and counties. Because these distributions have long right tails, the table reports the tenth, fiftieth, and ninetieth percentiles of each. Black, Hispanic, and Asian populations had median isolation levels of 0.14, 0.17, and 0.09 (respectively) in both cities and school districts. Median segregation

TABLE 1
Segregation within Cities, School Districts, and Counties in 2020

	Cities			School districts			Counties		
	P(10)	P(50)	P(90)	P(10)	P(50)	P(90)	P(10)	P(50)	P(90)
Panel A. Black residents									
Population share m_j	0.002	0.02	0.257	0.003	0.018	0.178	0.006	0.059	0.297
Isolation θ_j	0.05	0.136	0.518	0.059	0.128	0.423	0.089	0.243	0.602
Within-segregation η_j^2	0.038	0.1	0.311	0.045	0.101	0.29	0.073	0.186	0.427
Panel B. Hispanic residents									
Population share m_j	0.014	0.05	0.282	0.017	0.06	0.354	0.019	0.063	0.254
Isolation θ_j	0.084	0.172	0.446	0.099	0.187	0.511	0.119	0.198	0.451
Within-segregation η_j^2	0.05	0.108	0.239	0.06	0.118	0.252	0.085	0.144	0.262
Panel C. Asian residents									
Population share m_j	0	0.009	0.063	0.002	0.012	0.083	0.003	0.014	0.062
Isolation θ_j	0.045	0.094	0.226	0.061	0.107	0.246	0.074	0.111	0.22
Within-segregation η_j^2	0.035	0.073	0.17	0.047	0.083	0.181	0.06	0.095	0.178
Panel D. General statistics									
Jurisdiction population N_j	0.3	3.7	58.3	1.1	12.1	79	15.3	99.6	585.7
Number of jurisdictions	10,693	—	—	7,429	—	—	1,165	—	—

Notes: Jurisdiction population in thousands. Estimates based on 2020 census block data. Population share based on total population in the jurisdiction. P(10), P(50), and P(90) refer to the tenth percentile, the median, and the ninetieth percentile, respectively. Isolation index defined in section 4.3. Within-jurisdiction segregation based on the variance ratio index, defined in section 4.3.

levels range between 0.07 and 0.12 for all race groups and across both cities and districts. The median US city and school district has meaningful but modest levels of segregation, driven largely by the numerous cities and districts in the country with really few minorities (at the median, 2 percent Black, 5 percent Hispanic, and 1 percent Asian).

Looking at cities and districts in the ninetieth percentile of the segregation distribution tells quite a different story. Relative to the median, they are an order of magnitude larger. They are also about three times as segregated compared to the median. Black segregation in the ninetieth percentile is about 0.30 in both cities and school districts. For Hispanic and Asian residents it is about 0.24 and 0.17, respectively. It is clear that within-jurisdiction segregation is a particularly pernicious issue for large and urbanized cities and school districts.

Figure B.1 of the online appendix explores the extent to which within-jurisdiction segregation has changed over the last thirty years for each of the racial groups and jurisdictional types. With the exception of counties, median levels of segregation have changed relatively little since 1990. Notwithstanding, the long right tail of the segregation distribution for Black residents has decreased substantially, while for Hispanic and Asian households it has increased.

2.2.1 *Metropolitan Area Segregation*

We can extend our measure of segregation to the scale of a metropolitan area

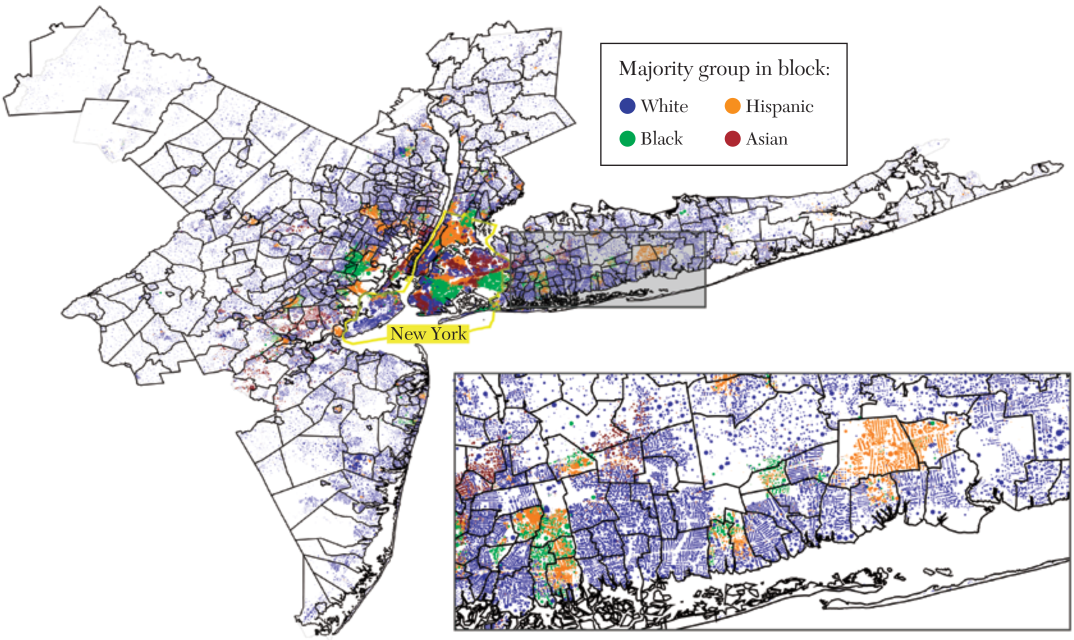

Figure 2. Spatial Distribution of Racial Groups by Blocks across School Districts, New York Metropolitan Area, 2020

Notes: Population-weighted scatter plot shows the latitude/longitude location of census block centroids, with colors corresponding to the majority racial group of block residents. Figure shows a zoomed-in section of western Long Island.

Sources: New York Metropolitan Statisical Area (MSA) and 499 independent school districts (local education agencies) according to 2020 census definitions.

encompassing many jurisdictions. To this end, we define the *metropolitan isolation index* as:

$$\theta = \sum_{j=1}^{J} \sum_{i=1}^{I_j} \frac{M_{ij}}{M} m_{ij} = \sum_{j=1}^{J} \frac{M_j}{M} \theta_j.$$

Metropolitan isolation equals the weighted sum of jurisdiction-specific isolation indices with weights given by jurisdictions' minority population share. We can then define the *total segregation index* as:

$$\eta^2 = \frac{\theta - m}{1 - m}.$$

Figure 2 shows a map of the school districts that make up the New York metropolitan area, consisting of 499 independent districts, including the New York City Department of Education and many more across the suburbs of the tristate area. The map includes a scatter plot corresponding to population-weighted census block centroids, colored in terms of the block's majority racial group. From this scale, the segregation of the New York metropolitan area is visually more striking than that of the city proper, largely due to the numerous suburban districts whose majority populations by block are nearly 100 percent White. In particular, a number of districts in Long Island are nearly entirely majority White and geographically adjacent to districts that are nearly 100 percent majority Black or Hispanic, suggesting a role for district boundaries in driving metropolitan segregation.

The total share of Black residents in the New York metropolitan area is 16 percent, but their isolation is 49 percent. Black isolation is high in the New York metropolitan area since there are a handful of districts that are majority Black, and many that have almost no Black residents. Figure A.2 in the appendix demonstrates this point by showing a heat map of districts' Black population share across the area. The resulting metropolitan Black segregation is $\eta^2 = 0.40$. Hispanic residents make up 25 percent of the metro area and tend to live in neighborhoods that are 47 percent Hispanic, resulting in $\eta^2 = 0.29$, which is slightly higher than their segregation index in NYC.

How does segregation vary across metropolitan areas? Figure B.2 presents US heat maps of metropolitan areas and their level of Black segregation. Geographic heterogeneity in both segregation levels and changes is substantial across the country's urban clusters. Across this 30-year period, Black households were least segregated in the West, relative to the rest of the country. Moreover, the most Black-segregated metropolitan areas in 1990 have become increasingly integrated, including Chicago, Detroit, and New York. Black segregation has also decreased substantially in the South.

Table 2 digs deeper into these descriptive results, by showing a list of the 20 most and least Black-segregated cities in the country. The five most Black-segregated metropolitan areas are in the Midwest (Detroit, Michigan; Milwaukee, Wisconsin; Chicago, Illinois; Cleveland, Ohio; and St. Louis, Missouri), followed by many in the South, including Birmingham, Alabama; Jackson, Mississippi; Baton Rouge, Louisinana; and Mobile, Alabama. Detroit is still the most segregated city in the country, even though it has become increasingly less so. In the appendix, we provide a list of the most and least segregated metropolitan areas for Hispanic and Asian households (tables A.2 and A.3). Table 3 shows mean levels of metropolitan segregation for all groups and years, summarizing the broad trends we have described until now.

2.3 *Segregation between Jurisdictions*

So far, we have focused on the demographic breakdown of census blocks as the basic unit of interest. However, the metropolitan segregation findings above suggest that it is important to think of jurisdictions themselves as the unit of interest. For example, we may be interested in how segregated Hispanic residents are across school districts within the New York metro area. To this end, we define a *between-jurisdiction isolation index*

$$\bar{\theta} = \sum_{j=1}^{J} \frac{M_j}{M} m_j,$$

which is bounded between the metropolitan minority population share m and total metropolitan isolation θ. If minorities are evenly distributed across jurisdictions, then every jurisdiction is perfectly representative of the metro population demographics and $\bar{\theta} = m$. At the other extreme, perfect segregation requires that each jurisdiction be either 0 percent or 100 percent minority. In such a case neighborhood segregation within jurisdictions would also be perfect, making total segregation equal to 1. Generally, between-jurisdiction segregation is bounded from above by the total level neighborhood segregation in the metropolitan area, θ. As before, it is convenient to rescale this index so that it is bounded from below by zero, independently

TABLE 2
Twenty Most Segregated and Most Integrated Metropolitan Areas for Black Households, 2020

	2020					Change 1990–2020		
	Rank	m	η^2	$\bar{\eta}^2$	$\bar{\eta}^2/\eta^2$	Δm	$\Delta\eta^2$	$\Delta\bar{\eta}^2$
Panel A. Most segregated metro areas								
Detroit–Warren–Dearborn, MI	1	0.219	0.597	0.434	0.727	0.993	0.748	0.727
Milwaukee–Waukesha, WI	2	0.163	0.587	0.222	0.379	1.193	0.853	1.223
Chicago–Naperville–Elgin, IL–IN–WI	3	0.164	0.579	0.215	0.372	0.877	0.745	0.824
Cleveland–Elyria,OH	4	0.197	0.567	0.339	0.598	1.104	0.745	1.009
St. Louis, MO–IL	5	0.18	0.664	0.374	0.663	1.086	0.781	1.048
Birmingham–Hoover, AL	6	0.294	0.557	0.277	0.496	1.055	0.724	0.809
Flint, MI	7	0.197	0.534	0.305	0.571	1.012	0.724	0.972
Jackson, MS	8	0.478	0.53	0.241	0.455	1.078	0.721	1.863
Baton Rouge, LA	9	0.347	0.511	0.113	0.222	1.08	0.748	1.992
Mobile, AL	10	0.348	0.509	0.016	0.032	1.124	0.7	10
New Orleans–Metairie, LA	11	0.333	0.506	0.118	0.234	0.967	0.743	0.535
Tuscaloosa, AL	12	0.339	0.498	0.079	0.159	1.024	0.737	0.637
Memphis, TN–MS–AR	13	0.458	0.493	0.162	0.328	1.116	0.704	1.049
Shreveport–Bossier City, LA	14	0.394	0.489	0.056	0.115	1.112	0.738	1.731
Dayton–Kettering, OH	15	0.157	0.489	0.232	0.474	1.12	0.73	0.943
Baltimore–Columbia–Towson, MD	16	0.285	0.465	0.135	0.29	1.11	0.678	0.516
Beaumont–Port Arthur, TX	17	0.241	0.464	0.206	0.444	1.039	0.678	1.087
Philadelphia–Camden–Wilmington, PA–NJ–DE–MD	18	0.204	0.456	0.175	0.384	1.11	0.666	0.907
Montgomery, AL	19	0.433	0.452	0.144	0.319	1.158	0.673	2.326
Atlanta–Sandy Springs, Alpharetta, GA	20	0.336	0.446	0.13	0.292	1.339	0.68	0.583
Median of most segregated MAs	10.5	0.29	0.508	0.19	0.375	1.095	0.727	0.99
Panel B. Most integrated metro areas								
Colorado Springs, CO	140	0.058	0.082	0.022	0.263	0.863	0.657	0.61
Riverside–San Bernardino–Ontario, CA	139	0.074	0.097	0.022	0.225	1.135	0.604	0.577
Phoenix–Mesa–Chandler, AZ	138	0.058	0.099	0.022	0.222	1.756	0.518	0.404
Stockton, CA	137	0.077	0.107	0.009	0.086	1.501	0.579	0.341
Reading, PA	136	0.051	0.109	0.028	0.252	1.873	0.576	0.637
Austin–Round Rock–Georgetown, TX	135	0.07	0.116	0.021	0.183	0.774	0.351	0.953
Vallejo, CA	134	0.137	0.117	0.026	0.224	1.064	0.702	0.623
Providence–Warwick, RI–MA	133	0.052	0.119	0.036	0.3	1.906	0.565	0.73
Bakersfield, CA	132	0.055	0.121	0.025	0.205	1.039	0.458	0.795
Sacramento–Roseville–Folsom, CA	131	0.07	0.121	0.033	0.272	1.05	0.632	0.565
San Antonio–New Braunfels, TX	130	0.071	0.122	0.029	0.241	1.162	0.412	0.878
Las Vegas–Henderson–Paradise, NV	129	0.127	0.129	0	0	1.363	0.381	2.077
Norwich–New London, CT	128	0.06	0.134	0.052	0.388	1.312	0.895	1.113
Worcester, MA–CT	127	0.052	0.137	0.057	0.414	2.887	1.334	2.683
Allentown–Bethlehem–Easton, PA–NJ	126	0.063	0.138	0.033	0.238	3.47	0.966	1.842
Seattle–Tacoma–Bellevue, WA	125	0.061	0.138	0.027	0.197	1.305	0.601	0.636
Naples–Marco Island, FL	124	0.062	0.17	0	0	1.636	0.416	10
San Francisco–Oakland-Berkeley, CA	123	0.071	0.17	0.062	0.363	0.629	0.417	0.387
Denver–Aurora–Lakewood, CO	122	0.056	0.171	0.05	0.291	1.01	0.457	0.854
Crestview–Fort Walton Beach–Destin, FL	121	0.08	0.172	0.006	0.036	0.934	0.517	7.679
Median of most integrated MAs	130.5	0.063	0.122	0.027	0.231	1.234	0.57	0.762

Notes: Rank: Most segregated metropolitan areas among 140 large metropolitan areas with at least 5 percent Black share of total population. m: is the population share Black; η^2 is the metro-area segregation index; $\bar{\eta}^2$ is the within-district segregation index. Changes between 1990–2020 denoted by $\Delta x = x_{2020}/x_{1990}$. Values of 10 and -10 indicate more than 10-fold increases and decreases, respectively.

TABLE 3
Average Segregation in US Metropolitan Statistical Areas

	Black				Hispanic				Asian			
	1990	2000	2010	2020	1990	2000	2010	2020	1990	2000	2010	2020
Population share	0.125	0.129	0.13	0.132	0.101	0.139	0.179	0.203	0.03	0.041	0.053	0.068
Isolation	0.523	0.462	0.412	0.373	0.275	0.336	0.372	0.373	0.136	0.159	0.187	0.209
Segregation	0.47	0.398	0.338	0.289	0.207	0.242	0.247	0.223	0.111	0.125	0144	0.153
Panel A. County segregation												
Between counties	0.049	0.049	0.044	0.038	0.017	0.02	0.021	0.02	0.005	0.007	0.01	0.013
Within counties	0.421	0.348	0.294	0.251	0.19	0.222	0.227	0.203	0.107	0.118	0.134	0.14
Panel B. City segregation												
Between cities	0.12	0.116	0.102	0.089	0.045	0.057	0.059	0.057	0.012	0.019	0.025	0.032
Within cities	0.35	0.282	0.235	0.199	0.162	0.186	0.188	0.165	0.099	0.107	0.119	0.121
Panel C. School district segregation												
Between school districts	0.117	0.112	0.097	0.084	0.047	0.059	0.063	0.062	0.013	0.02	0.027	0.036
Within school districts	0.353	0.286	0.24	0.204	0.161	0.183	0.185	0.161	0.099	0.105	0.117	0.117
Between SAZs	—	—	—	0.061	—	—	—	0.042	—	—	—	0.026
Within SAZs	—	—	—	0.138	—	—	—	0.124	—	—	—	0.095

Notes: Estimates based on census block data. Isolation is the mean share of minority group residents, conditional on being a minority. Segregation is the variance ratio index of segregation, an isolation index adjusted for the group's population share. Between-local government segregation decompositions is based on the discussion in section 3.5. SAZ = School Attendance Zone. Between-SAZ segregation decomposition based on private data from Precisely for the school year 2020–21.

of the metro area's minority share. Define the *between-jurisdiction segregation index*

$$\bar{\eta}^2 = \frac{\bar{\theta} - m}{1 - m}.$$

For the New York area, between-district Black isolation is 25 percent ($\bar{\theta} = 0.25$), which is lower than total isolation across blocks (49 percent), but higher than the Black population share in the area (16 percent). The resulting between-district segregation η index is $\bar{\eta}^2 = 0.11$, reflecting that segregation of Black households across jurisdictions is low relative to total segregation. Specifically, the ratio of between segregation to total segregation $\bar{\eta}^2/\eta^2$ is 0.28, indicating that about a quarter of segregation in the New York metro area takes place between jurisdictions as opposed to within jurisdictions.

2.4 *Decomposing Metropolitan Segregation*

Using between segregation, we can decompose total metropolitan segregation into between- and within-jurisdiction components. Total segregation can be written as between-jurisdiction segregation plus a weighted mean of within-jurisdiction segregation across all the jurisdictions in the area:

$$\eta^2 = \bar{\eta}^2 + \sum_{j=1}^{J} \lambda_j \eta_j^2,$$

with

$$\lambda_j = \frac{m_j(1 - m_j)n_j}{m(1 - m)},$$

where $n_j = N_j/N$ is the share of the MA-wide population living in j. We call the term $\sum_{j=1}^{J} \lambda_j \eta_j^2$ *within-jurisdiction segregation*, capturing a weighted mean of neighborhood segregation within jurisdictions. Larger population jurisdictions and those with a minority share closer to 50 percent receive more weight in this average.

Figure B.3 explains the intuition of the decomposition, using a simulated dataset. The square represents a metropolitan area consisting of two jurisdictions (left and right), with each scatter dot corresponding to a neighborhood (census block). In the first panel, all of the area's segregation is due to within-jurisdiction segregation, since the minority population share of both jurisdictions is similar. In the middle panel, segregation is entirely due to between-jurisdiction stratification; within each jurisdiction there is no variation in neighborhood demographics, but the left jurisdiction has a much lower minority share than the right one. In the rightmost panel, both between- and within-jurisdiction are at play; there is some imbalance in the racial composition of neighborhoods within jurisdictions, and there is a large gap in the minority population share across the two jurisdictions.

We can use this intuition to understand the national decomposition statistics of metropolitan segregation over the period 1990–2020, shown in figure A.3. Mean Black segregation has been in steady decline since 1990, when it was about 0.48, to less than 0.30 in 2020. In 1990, between-district segregation drove about one-fourth of Black–White segregation. It is apparent that the large decrease in segregation is due to increased Black–White exposure *within* school districts, and to a much lesser extent to reductions in segregation *between* districts. In 2020, between-district segregation explained a third of average Black metropolitan stratification. On the other hand, the segregation of both the Hispanic and Asian populations, while considerably lower than that of Black residents, has increased during the period 1990–2020. Total segregation for Hispanic households peaked in 2010, decreasing slightly in 2020. Asian segregation, while still the lowest of the three, is increasing at a fast rate, due to both within- and between-jurisdiction stratification.

The statistics above provide a summary of national segregation patterns, but they mask rich heterogeneity in the role of between-jurisdiction stratification across metropolitan areas. The scatter plots in figure 3 explore this by plotting between-district segregation against within-district segregation of metropolitan areas. The diagonal lines are "iso-segregation" lines, corresponding to equal levels of total segregation. It is evident that metro areas differ substantially in the decomposition. For instance, both Detroit and Chicago have similar levels of total segregation, but Detroit's segregation is driven largely by between-district stratification, whereas Chicago's is mostly due to within-district segregation across neighborhoods. Moreover, figure A.7 shows the time trajectory of a selected sample of metro areas in the iso-segregation plots. Detroit has substantially decreased its segregation, largely due to big gains in between-district integration during the period 2000–2020.

2.4.1 *Extending to Administrative Boundaries*

As mentioned above, most local governments draw administrative boundaries with important implications for public good provision. For the case of public schooling, we can further decompose segregation within school districts into a component reflecting within-district segregation between school attendance zones (SAZs) and a component reflecting block segregation within SAZs. To this end, let $k = 1, \ldots, K_j$ index SAZs within school district j, which are composed of blocks $i = 1, \ldots, I_k$. We can decompose metropolitan segregation into three parts:

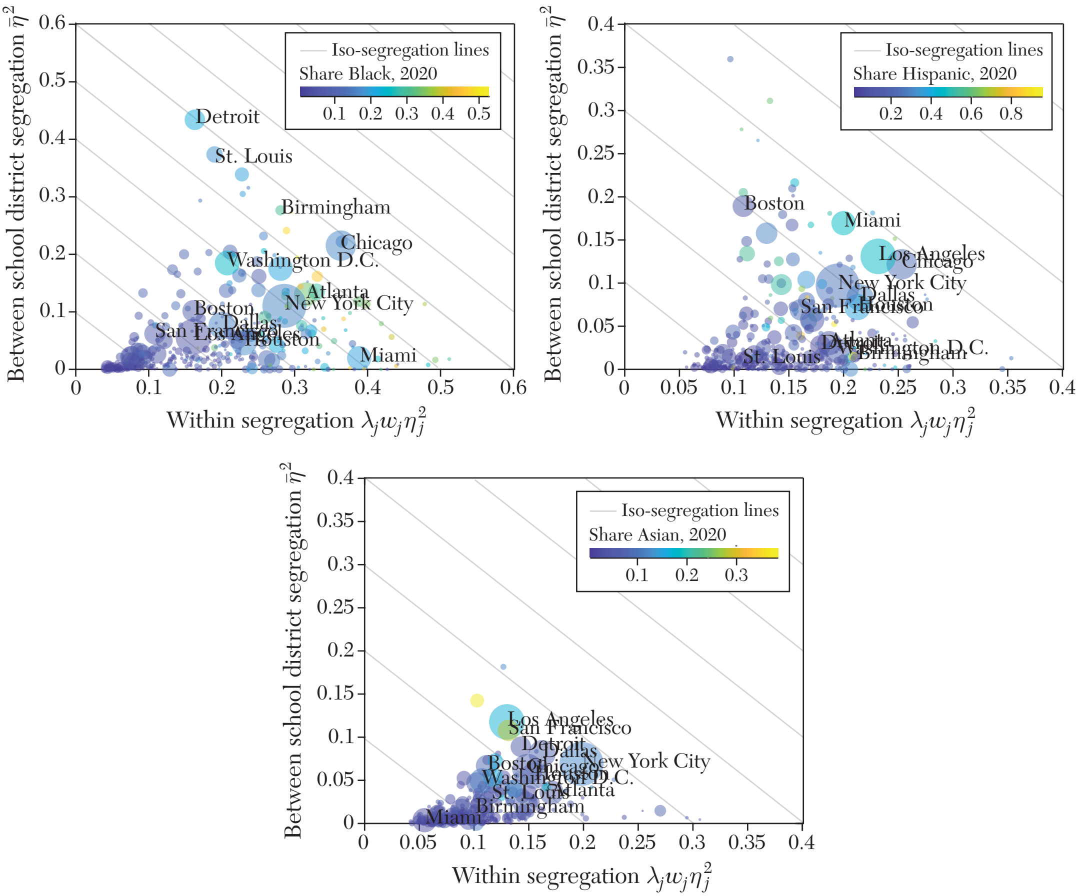

Figure 3. Between- and Within-School District Segregation across Metropolitan Areas in 2020

Notes: Population-weighted scatter plot of metropolitan areas, plotting between-district and within-district segregation. Heat coloring denotes the racial group's share of the population. Diagonal lines correspond to an "iso-segregation" locus of equal levels of total segregation.

$$
\begin{aligned}
\eta^2 &= \bar{\eta}^2 + \sum_{j=1}^{J} \lambda_j \eta_j^2 \\
&= \underbrace{\bar{\eta}^2}_{\text{Between district}} + \underbrace{\sum_{j=1}^{J} \lambda_j \bar{\eta}_j^2}_{\text{Between SAZ}} \\
&\quad + \underbrace{\sum_{j=1}^{J} \lambda_j \sum_{k=1}^{K_j} \lambda_{kj} \eta_{kj}^2}_{\text{Within SAZ}},
\end{aligned}
$$

where $\bar{\eta}_j^2$ measures the between-SAZ segregation in district j, η_{kj}^2 is the within-SAZ segregation in SAZ k of district j, and λ_{ky} is the corresponding weight defined analogousy to λ_j above.

In figure 4, we show this decomposition for average metropolitan segregation across the four major US census regions. For Black residents, segregation is highest in the Midwest, about 0.41. Nearly half of the total

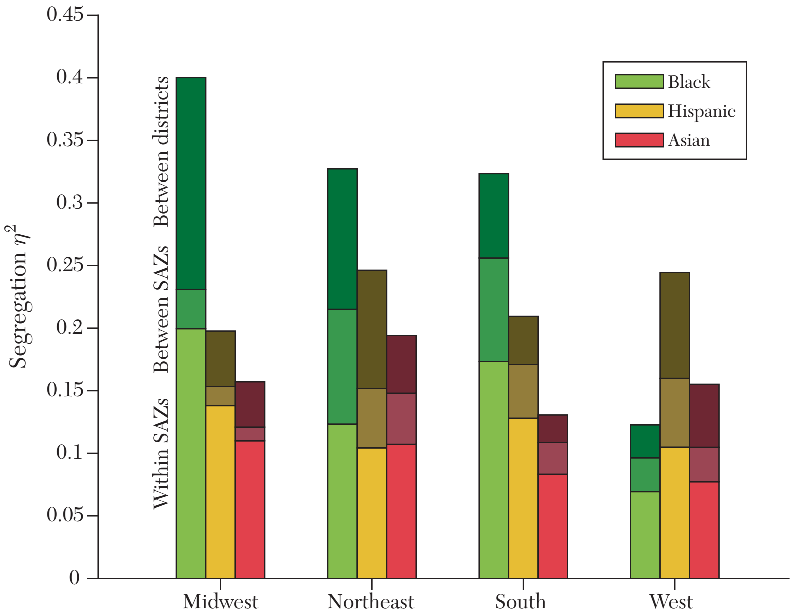

Figure 4. Decomposition of Mean Metropolitan Segregation across US Census Regions, 2020

Notes: SAZ = School Attendance Zones. Average metropolitan segregation by US Census region, based on 2020 census block data. Decomposition terms shown in different color shades, according to the description in section 4.5.1. SAZ data for school year 2020–21 obtained from data services firm Precisely.

segregation of Midwest cities is due to stratification across school district boundaries, and only a small share can be attributed to stratification across SAZs within school districts. These results contrast with the south and the northeast, where the role of between catchment zone segregation within districts is larger—in the northeast, driving one-third of total metro segregation—and between-district segregation contributes slightly less, although still an important driver of observed stratification patterns. In the west, Black residential segregation is much lower, but relatively high for Hispanic residents. Slightly less than one-third of Hispanic segregation in the west is due to between-district sorting, and about one-quarter is due to within-district sorting across SAZs. Across all groups and regions, a significant portion of total segregation takes place at the microgeographic level between the census blocks within SAZs.

3. *Demographic Discontinuities at Local Government Boundaries*

Our descriptive analysis has established that jurisdictional stratification can explain an important share of segregation in US metropolitan areas. However, this evidence on its own cannot tell us whether the geography of local governments is an important driver of segregation. It is possible that segregation between jurisdictions is the result of household sorting based on neighborhood amenities like elevation and proximity to bodies of water. In such a case, segregation would be due to the location of amenities, and only spuriously correlated with the geography of local governments. Normative implications about the arrangement of boundaries would differ if instead segregation was the result of sorting on jurisdictions, above and beyond the role of amenities.

3.1 *A Model of Household Sorting across Space*

To make these ideas more precise, we now develop a residential sorting model near a local government boundary with smoothly varying neighborhood amenities but a discontinuous change in the quality of public goods as we cross from one side of the boundary to the other.[2] A unit mass of households is divided into two types $t \in \{M, W\}$: minorities and Whites, of which minorities make up a fraction m. Each type of household draws income $y \in [\underline{y}, \bar{y}]$ from a separate distribution $F_t(y)$, as illustrated in panel A of figure 5.

Households sort across locations on the unit interval $\ell \in [0,1]$, with continuous and strictly increasing neighborhood amenities $a(\ell)$. A boundary at $\ell = 0.5$ divides locations into two jurisdictions $j \in \{L, R\}$: the jurisdiction to the left provides a low-quality public good x_L, and the one to the right provides a high-quality public good $x_R > x_L$.[3] Households value locations according to $v_t(\ell) = \lambda_t x_j + a(\ell)$, as shown in panel B of figure 5, where λ_t can be interpreted either as a preference for the public good, or equivalently as differential access to the public good, as we elaborate below. Given a price function $p(\ell)$, households then trade off the value of a residential location against private consumption c (the numeraire good):

$$(1) \qquad \max_{c,\ell} \log c + \phi v_t(\ell)$$

$$\text{s.t.} \quad c + (1 + \pi_t) p(\ell) \leq y,$$

where $\pi_M \geq \pi_W = 0$ is a premium minorities may have to pay for housing, as we explain in more detail below. This household problem yields optimal consumption decisions $c_t^*(y)$ and location decisions $\ell_t^*(y)$ as a function of household type and income.

To close the model, we assume that each location has a fixed supply of one unit of housing. We can then define a *sorting equilibrium* as consumption and location decisions as well as a price function such that (a) households behave optimally in (1), and (b) the housing market clears in every location $\ell \in [0,1]$:

$$m \int_{\underline{y}}^{\bar{y}} \mathbf{1}\{\ell_M^*(y) \leq \ell\} dF_M(y) + (1-m) \int_{\underline{y}}^{\bar{y}} \mathbf{1}\{\ell_W^*(y) \leq \ell\} dF_W(y) = \ell,$$

where the left-hand side is the share of households that demands housing in locations up to ℓ, and the right-hand side is the share of housing supplied in these locations. The budget set constraining a household's

[2] This model adapts Bilal and Rossi-Hansberg (2021) to the boundary neighborhood setting. See also Schönholzer (2023) for a closely related model. Public goods with spatial externalities such as air quality vary smoothly across local government boundaries as well. But many of the core functions of local government—access to schools, emergency safety provision, land-use regulation, and others—change discontinuously at boundaries.

[3] For simplicity, we treat the quality of the public good as exogenous to the sorting problem. This is consistent with the case in which the unit interval of locations only makes up a small share of neighborhoods of the two jurisdictions, as is the case in our empirical application. However, if public goods were endogenously determined by the sorting behavior (through the resulting equilibrium house prices and corresponding property taxes), this would simply exacerbate the sorting dynamics illustrated here. Similarly, strategic complementarities in public goods consumption may explain why the levels of public goods differ on either side of the boundary without changing the general assessment of the driving forces underlying a discontinuity in minority shares at the boundary.

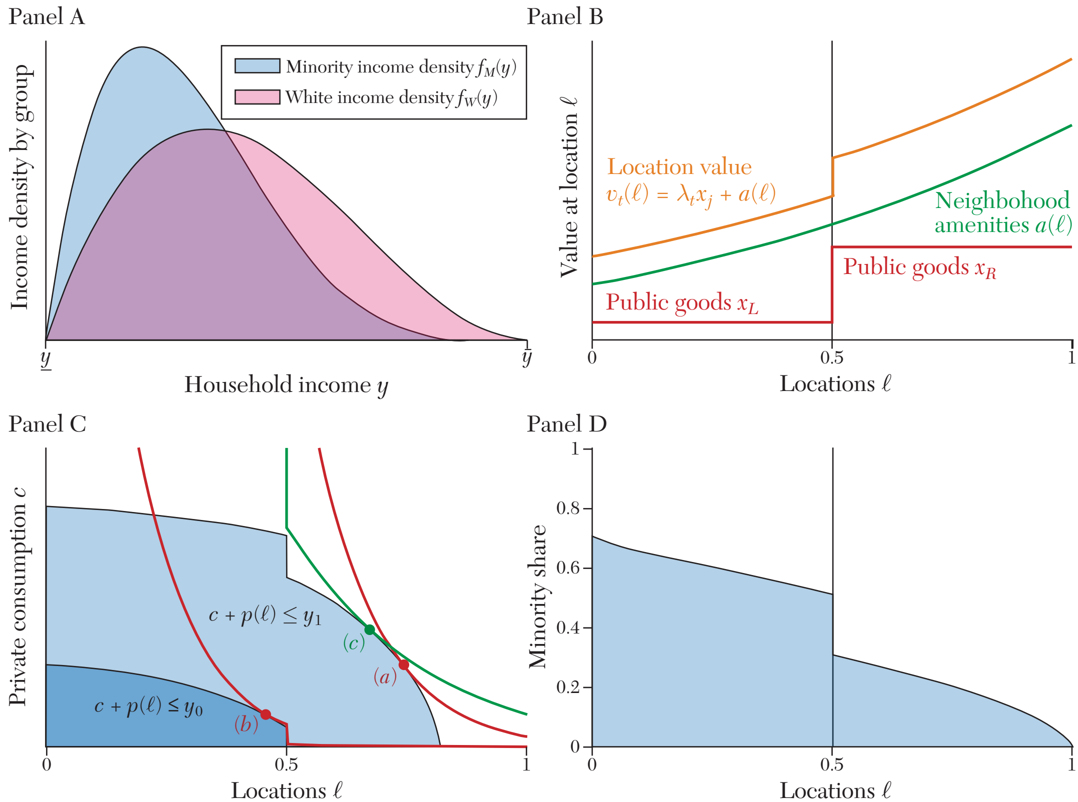

Figure 5. Illustration of Spatial Sorting Model

Notes: Panel A: densities of household income by type. Panel B: value of location $v_t(\ell)$ for a household with a given income y, as a function of: λ_t, the quality of the public good x_j, and neighborhood amenities $a(\ell)$. Panel C: equilibrium budget sets for different incomes $y_1 > y_0$ and public good valuations; high valuation in red, low in green. Panel D: distribution of minority share near boundary with discontinuity.

consumption-location tradeoff in equilibrium takes on whatever shape is necessary to evenly allocate households across all locations, as illustrated in panel C of figure 5: Points (a) and (b) are optimal decisions for households with the same valuation for public goods but with different incomes, whereas points (a) and (c) have different preferences but the same income. Hence, the equilibrium price function that clears all local housing markets may be discontinuous at the boundary and convex in the location index.

Model predictions.—This model predicts that there can only be a discontinuity in the minority share at the boundary as illustrated in panel D of figure 5 if at least one of two conditions holds: Either minority households benefit less from public goods, due to lower valuation or restricted access: $\lambda_M < \lambda_W$; or there is some form of price discrimination against minority households: $\pi_M > 0$.[4] In the standard sorting framework, preference heterogeneity is often the only channel through which household sorting by race takes place. But alternatively, minority households may not receive the same service quality or level as White households. For example, minority households may expect the quality of police services to be lower (Ang et al. 2021), or they may receive fewer city services than mostly White, affluent neighborhoods (Feigenbaum and Hall 2015). Minorities may also face price discrimination through restricted access to mortgages (Hanson et al. 2016), racial assessment gaps (Avenancio-Léon and Howard 2022), or other forms of housing discrimination (Christensen and Timmins 2022; Christensen, Sarmiento-Barbieri, and Timmins 2021).

In contrast, three explanations commonly believed to be driving segregation across local government boundaries are not borne out in the context of this model. First, neighborhood amenities vary smoothly across space unless they are interrupted by a barrier such as a highway. While these types of barriers are common, we show that discontinuities also exist in places without such barriers. Second, different income distributions between minorities and White households do *not* generate a discontinuity at the boundary. In this model, households sort perfectly by income such that the mass of households with median income (across both groups) locates exactly at the median location, that is, at the boundary. But there is no reason to believe that the minority share in the income distribution would fall discontinuously exactly at the median, and hence there cannot be a discontinuity at the boundary. Finally, strategic complementarities in amenities—valuing living near other households of a certain type—would again be smooth in space, just like other neighborhood amenities.

[4] A proof of predictions is in appendix C.

3.2 *Estimating Boundary Discontinuities*

Figure 6 provides intuition for an empirical examination of boundary discontinuities using simulated data. The two panels at the top represent two metropolitan areas (composed of two districts each), both with the same degree of between-district segregation. The two scatter plots below show simulated block minority population shares against distance to the jurisdictional boundary. They also fit the following regression specification:

$$m_{ij} = \alpha + \beta D_{ij} + f\left(d_{ij}\right) + \epsilon_{ij},$$

where $D_{ij} = \mathbf{1}\left\{d_{ij} > 0\right\}$ is an indicator for the side of the boundary with a higher minority resident share, and d_{ij} measures the perpendicular distance between the centroid of census block i and the nearest boundary line of jurisdiction j. Negative values of d_{ij} denote the left side of a pair of jurisdictions, which we define as the one with a lower minority share of residents. The model controls for a flexible function of distance to the boundary $f\left(d_{ij}\right)$, in this case a separate quadratic on each side.

For the left simulation in figure 5, the data generating process (DGP) for neighborhood composition is determined by a linear function with a discontinuous jump at the district boundary. In the right simulation, the DGP is a continuous linear function of distance to the jurisdictional boundary. These two scenarios tell clearly different stories about the drivers of segregation, even though they have the same level of both total and between-district segregation. On the left, segregation is driven by the jurisdictional boundary dividing the metropolitan area; on the right, segregation is a smooth function of geography, perhaps due to a desirable amenity located in the rightmost edge of the metro area.

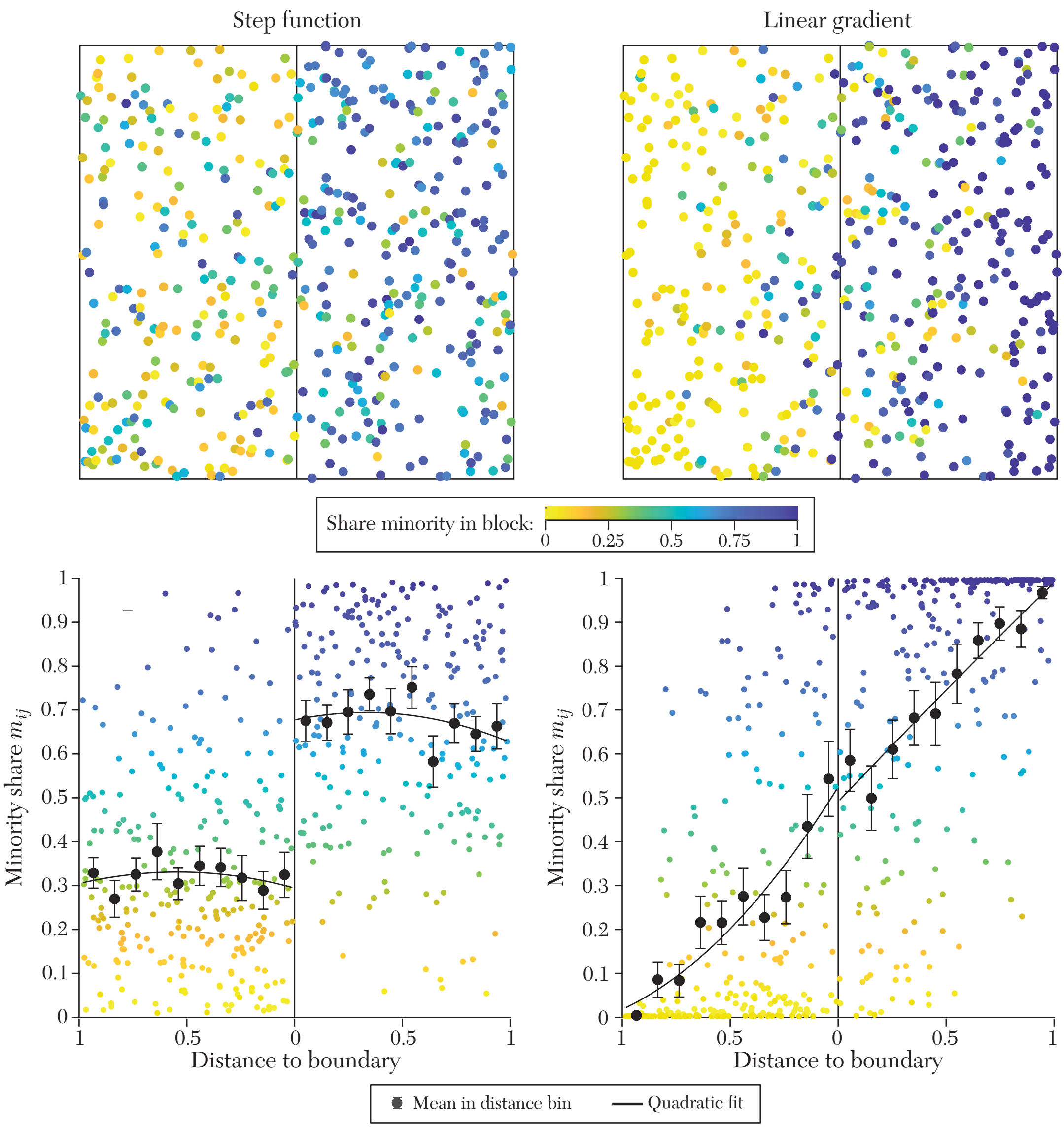

Figure 6. Spatial Gradient Near Boundary with Simulated Data

Notes: Two simulated metro areas, each with two jurisdictions. Both metro areas are generated to have the same minority share ($m = 0.5$), total segregation ($\eta^2 = 0.625$), and between-district segregation. The top panels show the hypothetical geography of these metro areas, with a heat map corresponding to blocks' (scatter dots) minority resident share. The bottom panels show spatial regression scatter plots, where the vertical axis measures the block minority share and horizontal axis measures distance to the district boundary line in kilometers. In the left panel, the data generating process (DGP) is a quadratic spline with a discontinuity at the jurisdictional boundary. In the right panel the DGP is a linear continuous function of distance to the boundary.

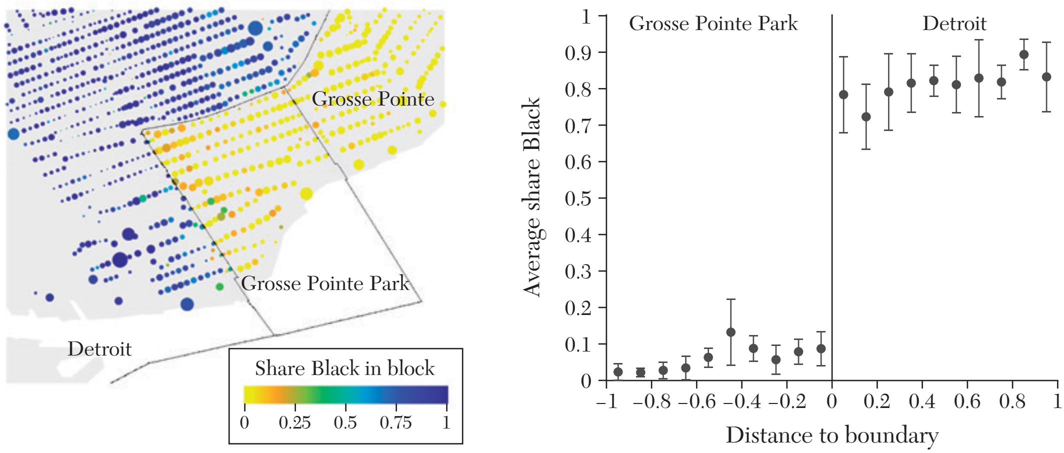

Figure 7. Example of Boundary Discontinuity in Black Residential Share: Detroit and Grosse Pointe Park, MI, 2020

Notes: The left panel shows a map of the jurisdictional boundary between Detroit and Grosse Pointe Park in the Detroit, MI metropolitan area. Population-weighted latitude/longitude location of census block centroids is shown; heat coloring corresponds to the Black share of block population. The right panel shows the spatial regression discontinuity plot of blocks near (within 1 kilometer of) the district boundary. The horizontal axis measures census blocks' perpendicular centroid distance to the boundary line. The vertical axis shows the Black share of total census block population in 2020. Scatter plot shows binned means, with bins determined by equally sized distance steps.

In figure 7, we provide an analogous spatial regression discontinuity plot for the Detroit area, the line dividing Detroit and Grosse Pointe Park, in the easternmost part of the metro area. The left panel shows a map of the area near the boundary between the two school districts, with blocks weighted by total population and with heat coloring for the Black share of residents. The right panel shows a regression discontinuity plot for these blocks. A massive discontinuity in the racial composition takes place as one crosses the boundary between the two districts. It would be difficult to argue that this discontinuity could be due to proximity to amenities. History makes clear that this jurisdictional line was set with the intention of separating the two racial groups, and over time this separation has been reinforced by household sorting.

3.3 *Discontinuities by Race and Boundary Type*

How common are cases like the boundary line between Detroit and Grosse Pointe Michigan? Using data on census blocks located near jurisdictional boundaries across all metropolitan areas in the country, we estimate average spatial regression discontinuity coefficients for Black population shares, separately by each type of jurisdiction, as shown in figure A.9. The top-left panel shows national estimates for school district boundaries using a quadratic spline specification. As one travels from the side of a district boundary with fewer Black residents to the side with higher Black population, there is a significant positive gradient, suggesting that the Black share of residences is increasing as one approaches a jurisdictional division.

At the jurisdictional boundary there is a significant discontinuous jump of about 2 percentage points, after which the Black share continues to increase, albeit at a lower rate. This overall pattern is mimicked by municipal boundaries (3.5 p.p. RD coefficient), and by stacked district and municipal boundaries (5.4 p.p.). The latter focus on jurisdictional lines that correspond to both a school district and a municipal boundary. While small relative to Grosse Pointe's massive discontinuity, these results indicate that demographic discontinuities at jurisdictional boundaries are commonplace around the country, and are typically exacerbated when lines of multiple local governments coincide.

In similar fashion, figure 8 presents national RD estimates across racial and ethnic groups across census waves. These estimates pool variation from the combination of city and district boundary lines. The top-left panel shows estimates for the Black population share of census blocks. The size of the RD coefficient is remarkably stable over time (estimates shown in figure legend). On the other hand, the gradient between distance to the boundary and the Black share gets flatter over time. Given the intuition we provide above, this may indicate that the intensity of sorting based on proximity to amenities falls over time, whereas the segregation attributable to boundaries is petrified across the last three decades. Patterns differ for Hispanic and Asian residents. Hispanic residents had stable discontinuities until 2020 when the share rises on both sides of the boundaries. For the Asian population, mean boundary discontinuities have increased over the last three decades, almost doubling between 1990–2020.

The figures above are informative, but they pool stark levels of heterogeneity across metropolitan areas. Figure B.4 shows a heat map of US metropolitan areas weighted by population, summarizing the average magnitude of jurisdictional boundary discontinuities for census block Black population shares. Significant discontinuities are colored according to their magnitude. The metropolitan areas with the largest demographic discontinuities are clustered in the Midwest, led by Detroit, Chicago, Cleveland, and Milwaukee. Jurisdictional discontinuities are also stark in some smaller northeastern metropolitan areas, including Harrisburg and York, Pennsylvania, and Atlantic City, New Jersey. In the south, discontinuities in Black residential share are largest in Virginia Beach, Virginia; Greensboro and Durham, North Carolina; and Little Rock, Arkansas.

The rich heterogeneity in figure B.4 is evidence that the interaction between jurisdictional boundaries and racial segregation varies across place. Most likely, these differences are due to heterogeneity in cities' history. Historical drivers include both the impact of migration flows and ensuing residential sorting during the era of suburbanization, as well as the political processes that created the jurisdictional geography of today's metropolitan areas. Disentangling the separate roles of these two factors in determining demographic discontinuities at local government boundaries is an important topic of future research.

4. *Discussion*

4.1 *Jurisdictional Segregation and Racial Inequality in Socioeconomic Outcomes*

Our study has shown that segregation is in large part a product of stratification across jurisdictional divisions. One lingering question is whether jurisdictional segregation is linked to existing inequality in socioeconomic outcomes by race. Our decomposition framework is well suited to make this assessment by estimating multivariate models of the metropolitan Black–White gap in average student achievement in standardized exams, as a function of segregation. We measure the

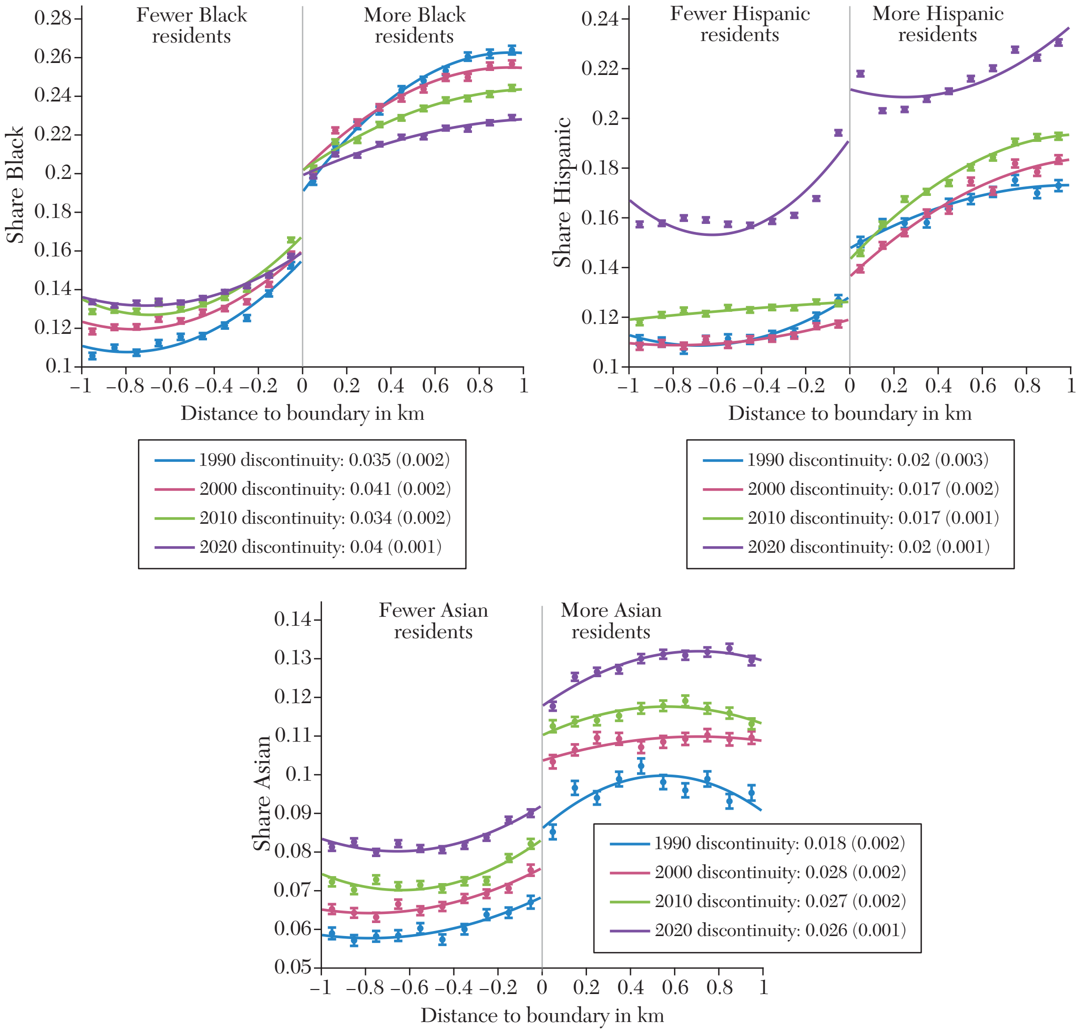

Figure 8. National Average Demographic Discontinuities at Jurisdictional Boundaries for All Years, by Racial Group

Notes: Spatial regression discontinuity (RD) plots of demographic composition against block distance to jurisdictional boundaries. The horizontal axis measures census blocks' perpendicular centroid distance to jurisdictional boundaries, where negative distance values correspond to the jurisdiction with fewer racial minority residents. The vertical axis shows the share of census block population from each racial and ethnic group, in 1990, 2000, 2010, and 2020. The scatter plot shows binned means, with bins determined by equally sized distance steps. The estimation sample is restricted to census blocks within 1 kilometer of a jurisdictional boundary and boundaries with at least one side with 5 percent racial minority residents or more, resulting in about 1.5 million census blocks across 15,000 boundaries. RD coefficient (along with robust standard error) and quadratic spline fit reported.

TABLE 4
Correlation between Racial Achievement Gap and Metropolitan Segregation Components

	(1)	(2)	(3)	(4)	(5)	(6)
Panel A. Black achievement gap						
Total segregation	−0.41	−0.23	−0.19	−0.60	−0.44	−0.41
	(0.05)	(0.07)	(0.07)	(0.11)	(0.09)	(0.09)
Share of seg. between districts		−0.31	−0.29		−0.25	−0.23
		(0.07)	(0.07)		(0.07)	(0.07)
1{significant spatial RD estimate}			−0.04			−0.03
			(0.02)			(0.01)
Covariates				X	X	X
R^2	0.31	0.44	0.48	0.53	0.60	0.61
N	379	379	379	375	375	375
Panel B. Hispanic achievement gap						
Total segregation	−0.66	−0.50	−0.44	−0.44	−0.35	−0.33
	(0.10)	(0.14)	(0.13)	(0.13)	(0.13)	(0.13)
Share of seg. between districts		−0.12	−0.12		−0.06	−0.05
		(0.05)	(0.05)		(0.06)	(0.06)
1{significant spatial RD estimate}			−0.03			−0.04
			(0.01)			(0.01)
Covariates				X	X	X
R^2	0.34	0.36	0.38	0.50	0.50	0.53
N	379	379	379	375	375	375
Panel C. Asian achievement gap						
Total segregation	0.08	−0.07	−0.12	0.29	0.29	0.29
	(0.16)	(0.26)	(0.27)	(0.11)	(0.11)	(0.11)
Share of seg. between districts		0.10	0.09		0.00	0.01
		(0.10)	(0.10)		(0.05)	(0.05)
1{significant spatial RD estimate}			0.02			−0.00
			(0.02)			(0.01)
Covariates				X	X	X
R^2	0.00	0.02	0.03	0.72	0.72	0.72
N	379	379	379	375	375	375

Notes: Robust standard errors reported in parentheses. Metropolitan area observations weighted by population. Covariates include: the gap in average free or reduced-price lunch (FRL) rates between the minority group (Black, Hispanic, or Asian) and White students, population share minority, share White, and indicators for four major census regions (omitting the South).

achievement gap using Stanford's Education Data Archive on average public school exam scores between 2009–18, which are reported separately by race for sufficiently large schools.

Column 1 in table 4 shows a negative and significant coefficient from a univariate model of the achievement gap on total metropolitan segregation, indicating that more segregated areas have greater inequality on average. Column 2 adds the share of segregation attributable to between-district sorting to the model. The coefficient on total segregation decreases almost by 50 percent with the inclusion of the between-district share, whose coefficient is also negative and highly significant. This suggests that much of the correlation between total segregation and inequality can be explained by jurisdictional segregation. Columns 4 and 5 add controls to these models, for which the results are similar.[5]

Furthermore, column 3 adds an indicator variable to the model measuring whether the metropolitan level mean regression discontinuity estimates are significant. Interestingly, the coefficient for this indicator is also significant, negative, and its addition lowers the magnitude of both the total segregation and between-district share coefficients, a pattern that is robust to the inclusion of controls (column 6). While only suggestive, one interpretation of these correlations is that segregation that is due to demographic discontinuities across local boundaries has an independent association with inequality; one that partly drives the overall link between total segregation and the achievement gap.

4.2 *Conclusion*

The findings in this paper provide new facts about the drivers of segregation in metropolitan areas, highlighting the importance of local government boundary lines. A theoretical literature on district mergers and city annexations suggests that boundaries are endogenous outcomes of political processes, which result in strategic locations of local government boundaries. Conversely, the canonical economics literature on household sorting typically views segregation across jurisdictions exclusively as the outcome of residential choice. The existing evidence cannot distinguish between these two sources of variation.

[5]Covariates include the gap in average free or reduced price (FRL) lunch rates between Black and White students, population share Black, share White, and indicators for 4 major Census regions.

More research is needed to disentangle the supply (political) and demand (sorting) mechanisms that drive the racial and socioeconomic stratification of urban areas. On the ground, anecdotal evidence suggests that local leaders are aware of the geographic inequalities driven by boundaries, but fear pushing for change, citing potential unintended consequences (such as real estate depreciation and White flight). However, we do not have a clear sense of the average causal effect of boundary changes on stratification or housing markets. Our ongoing work will try partly address this knowledge gap by studying boundary changes in school attendance boundaries, municipal annexations (Schönholzer and Zhang 2018), and school district secessions.

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