

**School Desegregation, School Choice and
Changes in Residential Location Patterns by Race***

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Abstract

This paper examines the residential location and school choice responses to the desegregation of large urban public school districts. We demonstrate that the estimated 12 percent decline in white public enrollment following desegregation orders primarily manifested itself as migration to suburban districts in the South and increased private school enrollment in other regions. Desegregation caused black public enrollment to increase by an estimated 20 percent outside of the South mostly by slowing decentralization of black households to the suburbs. Desegregation orders also caused large declines in private school enrollment for blacks living in southern central districts.

1. Introduction

A literature going back to Tiebout (1956) examines the impact of local public goods on the equilibrium allocation of people across space and jurisdictions in metropolitan areas. A number of recent papers on the topic, including Nechyba (1997), Epple and Sieg (1999), Hoxby (2000), and Rothstein (2006), leverage multi-community sorting models inspired by Tiebout's hypothesis to investigate topics including local taxation policies, how the spatial configuration of local jurisdictions generates variation in the quality of local public goods, and the willingness to pay for local public goods. However, there exists little direct quasi-experimental empirical evidence on the extent to which the residential location equilibrium in a metropolitan area changes with an exogenous shock to the quality of a local public good in one jurisdiction.¹

In this paper, we use the experience of school desegregation in central city school districts to examine, among other things, the response of the residential location equilibrium to a shock to school quality in the central jurisdiction. Variation across metropolitan areas in the timing of court-ordered school desegregation facilitates our empirical evaluation of the importance of Tiebout sorting for generating residential location patterns by race, both between central school districts and suburbs and over space within central school districts. We examine how the sharp decline in white public school enrollment in central districts caused by desegregation manifested itself as relocation to suburban public school districts versus enrollment in private schools. We perform a similar decomposition of the black enrollment increase in central districts that we find was caused by school desegregation. Our construction of a unique data set on the evolution over time of population and enrollment counts by race, school type and detailed spatial location is an essential input into our analysis.

¹ Banzhaf and Walsh (2008), who examine the impact of air quality on residential location choices within a metropolitan area, is a recent exception.

In addition to facilitating an empirical evaluation of Tiebout sorting theory, the empirical estimates presented in this paper also inform the debate on the causes of urban decentralization. Population decentralization within urban areas has been a stark feature of the landscape in the United States since World War Two. Baum-Snow (2007) documents that between 1950 and 1990 the aggregate population living in the 139 largest central cities declined by 17 percent despite large gains in overall population. Boustan (2010), Collins and Margo (2007) and others document that whites in particular make up a disproportionate fraction of this aggregate decline. Indeed, among the 92 large urban school districts examined in this paper, the aggregate white population fell by 13 percent between 1960 and 1990 while the aggregate black population grew by 54 percent over the same period. Mieszkowski and Mills (1993) cite reductions in the quality of local public goods in central cities relative to suburbs as a potentially important explanation for suburbanization. However, other than Cullen and Levitt (1999) and this paper, there is little direct empirical evidence on the extent to which changes in local public goods in central cities have generated population decentralization in urban areas.

Our analysis also contributes to the literature on the effects of school desegregation and informs the current debate on the efficacy of school district integration policies. With the 2007 Supreme Court decision striking down public school desegregation policies in Seattle, WA, and Louisville, KY, understanding the effects of school resegregation has considerable contemporary policy relevance. Indeed, Orfield and Eaton (1996), Clotfelter et al. (2006) and Lutz (2005) demonstrate that the release of school districts from court supervision that started in the early 1990s has led to resegregation in many cases. Furthermore, Weinstein (2009) provides evidence that recent redistricting in the Charlotte-Mecklenburg, North Carolina public school district following the end of court-ordered desegregation induced sizable responses in residential

location choices. Understanding the mechanisms by which the original orders of the 1960s and 1970s led to declines in white public school enrollment and increases in black enrollment may be useful in understanding the effects of changes in school assignment policies currently under consideration.

Our analysis of central district enrollment and population data generates a host of new empirical results. We find that the 6 to 12 percent decline in white public school enrollment due to desegregation, also documented using a different data set by Reber (2005), primarily manifested itself as migration to suburban districts in the South. Outside of the South, the decline occurred primarily through increased rates of private school attendance.

Moreover, consistent with Guryan (2004), Lutz (2005) and Reber's (2007a, 2007b) evidence that desegregation improved public school quality for black students, we demonstrate that black public enrollment significantly increased by 13 to 20 percent outside the South as a result of desegregation. This coincided with a 6 to 12 percent increase in the black populations of non-southern districts. In addition, private school enrollment of black central district residents declined by more than 40 percent in the South as a result of desegregation. Our estimates are the first of the causal connection between court-ordered school desegregation and total central district population flows by race and private school enrollment by race produced using a national sample.² In addition, our evidence demonstrates the importance of evaluating the effects of desegregation on districts in the South separately from districts elsewhere in the country.

Using census tract data, we demonstrate that the population shifts produced by desegregation largely occurred in the outer portions of central districts while shifts in private

² Numerous previous studies have examined the impact of desegregation on public school enrollment by race using a national sample, e.g. Welch and Light (1987), Rossell and Armor (1996) and Reber (2005).

school enrollment primarily occurred in the more inner regions of central districts. Taken together, our results indicate that even though the magnitudes of population shifts due to desegregation are not sufficiently large to be responsible for a large fraction of aggregate population decentralization, they are essential for understanding observed changes in the spatial distribution of the population by race. Had desegregation not occurred, central cities would have populations with a larger fraction of white residents, especially in their more peripheral regions.

This paper proceeds as follows. Section 2 presents some descriptive facts about the evolution of the spatial distribution of the population by race and income. Section 3 presents relevant background information on school desegregation and describes the data. Section 4 decomposes the effect of school desegregation on central district public enrollment by race into private enrollment and migration responses by region. Section 5 empirically examines the spatial distribution of responses to school desegregation within central school districts. Finally, Section 6 concludes.

2. Historical Patterns in the Data

Table 1 presents data showing the extent of urban population decentralization that occurred between 1960 and 1990. Panel A presents population counts by race in central areas (columns 1 – 3), suburbs (columns 4 – 6) and the entire United States (columns 7 – 9). Panel B shows analogous counts of enrolled pupils in public and private elementary and high schools. In parentheses we show the fraction of the overall population that is of each race. In order to be consistent with the analysis to come, we present statistics using central city school districts, henceforth “central districts,” to represent central urban areas and areas within the central districts’ metropolitan areas, but located outside of central districts, to represent suburbs. We

only include the 92 metropolitan areas with central districts that experienced major court-ordered school desegregation between 1960 and 1990.

One broad trend seen in Table 1 has not received much attention in the economics literature and is thus of particular note. The higher U.S. population growth rate of blacks shows up as increases in *both* city and suburban black populations.³ While the aggregate central district black population in our sample increased by 3.9 million between 1960 and 1990, it grew by a 3.5 million in suburban areas, representing a much larger percentage increase for the suburbs. Meanwhile, the central district white population declined by 4.2 million and the suburban white population grew by 24.8 million. As a result, the fraction of the aggregate central district population that was black increased by 7 percentage points from 1960 to 1990 and the fraction white decreased by 18 percentage points during the same period. The fraction of the suburban population that was black also grew, from 5 percent to 8 percent while that for whites declined from 94 percent to 85 percent. The rapid increase in the population of other racial groups makes up the remainder. The more rapid growth in total metropolitan area black population explains how black shares grew in both central and suburban areas.⁴

Data on school enrollment counts in Panel B tell a more dramatic version of the same story. Just 6 percent of suburban students were black in 1960, rising to 10 percent by 1990. In central districts this fraction rose from 0.22 to 0.35 over the same period. Meanwhile, the fraction of students that were white declined from 0.94 to 0.80 in suburbs and 0.77 to 0.49 in central districts. The more extreme changes in the racial composition of school enrollment

³ Frey (1992) summarizes evidence from the demography literature on urban decentralization by race between 1960 and 1990.

⁴ Similar data from a more complete sample of 164 metropolitan areas exhibits the same pattern. In this sample, aggregate central district white fraction declined by 0.19 between 1960 and 1990 while black central district fraction increased by 0.08 over this period. During the same period, suburban white fraction decreased by 0.09 and suburban black fraction increased by 0.02.

compared to total population reflect the fact that the black age distribution is relatively younger.⁵ Patterns for the overall U.S. population (columns 7 – 9) closely resemble those for the suburbs in our sample.

Although total suburban population grew much more rapidly than did central district population between 1960 and 1990 (78 percent versus 11 percent, respectively), Table 1 reveals that this decentralization is not easily explained by racial differences in location patterns. The population fraction black grew, and the population fraction white declined, in both central districts and suburbs. The failure of race-specific factors to explain urban decentralization is confirmed by Figure 1, which plots the fraction of total population by race residing in the central district. The similar slopes for whites and blacks suggest almost identical rates of suburbanization, though decentralization of blacks did not begin until after 1970.

Figure 2 shows the evolution of the ratio of whites to whites plus blacks by residential location between 1960 and 1990. In order to compare areas of different sizes, we index space to be between 0 and 1 in central districts and 1 and 2 in suburbs. Our central district location index is the cumulative distribution function of population with respect to distance to the central business district built using census tract data from 1990. We assign index values in previous years using the 1990 cumulative distribution function expressed as a step function. Therefore, 0 represents the tract closest to the central business district and 1 represents the tract furthest from the central business district in each year. The suburban index is built the same way except that it runs from 1 to 2 instead of 0 to 1. The sample only includes census tracts from the 64 metropolitan areas which had a major court-ordered desegregation plan and for which we have

⁵ These numbers change very little when examining public school students only. Among this group, the white fraction declined by 0.29 in central districts and 0.13 in suburbs. Meanwhile, black fraction increased by 0.13 in central districts and 0.03 in suburbs.

census tract data for both central districts and suburbs in all census years 1960-1990. Each point on the graph weights each metropolitan area equally.

While race-neutral factors are probably the most important determinants of population decentralization in U.S. metropolitan areas since 1960, inspection of the spatially disaggregated data in Figure 2 reveals that race-specific factors did likely influence shifting residential location patterns. Fraction white is increasing in distance from the central business district (CBD) within central districts in all years but is relatively flat in the suburbs. The fraction white declined monotonically over time at all locations in central districts and suburbs located near central district borders, with this decline much more rapid in central districts. Thus, racial sorting at the border between central districts and suburban districts strengthened over time (i.e. the jump in the fraction white at location 1 increased with time). The data in Figure 2 imply a rough “difference-in-difference” relationship between the decline in the fraction white in central districts relative to the decline in the inner suburbs from 1960 to 1990 of about 10 percentage points.⁶

This increased sorting may reflect changes in location incentives for blacks and whites because of race or some other variable correlated with race. To evaluate whether this increased racial sorting could be generated by socio-economic background instead, Figure 3 depicts average income levels by residential location for each race in each census year 1960 to 1990. Panel A shows results for whites while Panel B shows results for blacks. Because of data limitations, we use median family income in 1960 and per-capita income for those over 14 or 15

⁶ The gap in fraction white at location 1 in Figure 1 may understate the gap over central district-suburban borders. Because central districts are not perfectly circular, location 1.01 is on average closer to CBDs than is location 0.99, meaning that the more relevant comparison point to location 1.01 is well below 1.

in later years. Unlike Figure 2, there are no large discontinuities at the border in Figure 3.⁷ Furthermore, the income profiles for whites and blacks are remarkably similar in shape and evolve in a similar manner over time. Thus, the patterns in Figure 2 are unlikely to have been generated by differences in socio-economic background correlated with race. Of additional note in Figure 3 is that within central districts, average incomes conditional on race are roughly upward sloping. This fact will be important for conceptualizing the within-central district analysis performed in Section 5.

3. Historical Context and Data

3.1 School Desegregation

In 1954, the Supreme Court's ruling in *Brown vs. Board of Education of Topeka* (347 US 483) stated that segregated schools were unconstitutional. However, the ruling did not impose a mechanism for desegregating the nation's schools and only limited integration occurred in the 1950s. Many smaller school districts, particularly in the South, desegregated in the 1960s after the Federal government threatened to withhold Title I financial assistance to districts that continued to discriminate by race (Cascio et al., 2008, 2010). However, large school districts, including those located in central cities, were much slower to engage in more than token desegregation. Most large districts did not engage in significant desegregation until forced to do so by separate federal court orders. Heterogeneity across districts in when desegregation court cases were first filed and in the length of time it took these cases to proceed through the judicial system represents plausibly exogenous variation in the timing of school desegregation. It is this

⁷ In 1990, it is evident that both whites and blacks living at the edges of central districts had slightly higher income than those in the near suburbs. Because this gap is apparent only in 1990 and it emerges simultaneously for both blacks and whites, it is unlikely to explain the patterns visible in Figure 2.

variation that we employ to examine the effects of desegregation on residential location patterns and private school choice.

Our assumption of exogeneity is supported by the fact that following the *Brown* decision, the NAACP pursued a legal strategy of filing cases where they were most likely to succeed in order to build up a set of legal precedents favorable to desegregation, rather than filing them where the benefit to blacks would be the greatest (Greenberg, 1994). This reduces the likelihood that the timing of desegregation is correlated with factors, such as attitudes toward racial integration, which might be correlated with location patterns by race. See Weiner, Lutz and Ludwig (2009) for a more extended discussion of this point and Guryan (2004) for a formal model.

Nonetheless, it remains possible that the timing of desegregation was influenced by factors which also affect location patterns by race. For instance, if areas with more intense housing discrimination tended to desegregate earlier than other areas and also had different location patterns by race, we might spuriously attribute the location pattern to desegregation. To account for such fixed factors that differ across metropolitan areas and may be associated with the timing of school desegregation, we control for metropolitan area fixed effects in all empirical work performed in this paper. In addition, we provide robustness checks in which we control for MSA-specific linear trends and pre-desegregation MSA attributes.

Another important aspect of the timing of desegregation which we are careful to address in our empirical work is regional clustering produced by the evolution of legal doctrine. The 1968 *Green* decision (*Green vs. New Kent County, Virginia*, 391 U.S. 430, 1968), which established specific factors with which to judge a district's compliance with the *Brown* decision, produced a surge of litigation in the South. The *Keyes* decision (*Keyes v. Denver School*

District, 413 U.S. 189), issued in 1973, stipulated that court-ordered desegregation could proceed in areas that had *de facto* segregation resulting from past state action. As a result, desegregation began on a large scale outside the South, where school segregation largely arose from residential housing patterns, not legal mandate. Given these two decisions, southern districts were more likely to desegregate early in our sample period, whereas non-southern districts were more likely to desegregate later in the period. Figure 4 presents a histogram of the timing of central district school desegregation by region. Because of this region-specific pattern in the timing of desegregation, our empirical model controls for regional differences in secular trends in outcomes of interest.⁸

We observe the year in which a major court-ordered school desegregation plan was implemented in each central district and use this information to form an indicator variable for being desegregated. Usually the court-ordered plan was implemented in September, though in some cases implementation may have occurred before then (the month of implementation is not observed). In the decennial census we observe location and enrollment outcomes as of April 1st. Therefore, there is some question as to when we should count a district as being desegregated: starting in the year of implementation or in the following year. Because we do not want to miss the response to plans implemented early in the year of implementation, we consider the central district residents exposed to desegregation as of April 1st in the year of implementation. Specification checks on the regression results presented below reveal very similar estimated effects of desegregation when central district residents are instead counted as being exposed as of April 1st in the year after implementation (unreported).

⁸ In all of our regression models, we include a set of south census region-year effects. We also experimented with a larger set of census region-year effects and border state-year effects given the historical differences between these states and the remainder of the South. Our results are insensitive to this expansion of the set of region-year interaction terms.

Our indicator measure of desegregation is not comprehensive. First, in almost all instances, desegregation began on a voluntary basis prior to court intervention. Virtually all southern districts had engaged in at least some desegregation by 1966 (Casico et al. 2008), but only 2 percent of the southern districts in our sample had experienced court-ordered desegregation by that time. Second, the amount of desegregation achieved by the courts varied from school district to school district. Nevertheless, we believe that our indicator measure is the best available to us for three reasons. First, and most importantly, court-ordered desegregation was clearly initiated and enforced by an outside body and it is therefore more plausibly exogenous than other more voluntary forms of desegregation. Second, the date of court-ordered desegregation is well measured. Third, for the large districts in our sample, court-ordered desegregation typically induced the single largest decline in racial segregation that the district experienced. In acknowledgement of the drawbacks of our primary desegregation measure, Section 4.4 presents estimates of the effects of changes in racial contact due to school desegregation on outcomes of interest.

Court-ordered desegregation in central districts was effective at increasing racial integration. We regress the dissimilarity index on MSA fixed effects, year fixed effects interacted with a South fixed effect and an indicator for whether a district was desegregated at each point in time using our sample of central districts in 1970, 1980 and 1990. The dissimilarity index ranges from 0 to 1, with 1 denoting complete segregation.⁹ The index can be

⁹ The dissimilarity index is defined as:

$$D_t = \frac{1}{2} * \sum_{i=1}^n \left| \frac{b_{it}}{B_t} - \frac{w_{it}}{W_t} \right|,$$

where b_{it} and w_{it} refer to the number of black and white students at school i at time t and B_t and W_t refer to the total number of black and white students in the school district. See the Data Appendix for information on the construction of this variable, including the use of imputation.

interpreted as the fraction of black students who would need to be reassigned to a different school for perfect integration to be achieved given a district's overall racial composition. An increase in racial integration causes a decrease in the dissimilarity index. Similar to Reber (2005), we find that desegregation significantly reduced the dissimilarity index an average of 15 points, a bit less than one standard deviation and equal to 21 percent of the index's mean (where the mean and standard deviation are based on the 1970 cross section). Analogous results are produced by using the white-black exposure index as an alternative outcome. The exposure index gives the percent of black students in the average white student's school and is thus a measure of interracial contact.¹⁰ Desegregation significantly increased the exposure of whites to blacks by 0.09, equal to around half a standard deviation and one-third of the index's mean.

The spatial structure and desegregation environment of suburban districts are likely to influence the benefit to households from moving to or from the suburbs after desegregation is implemented in central districts. Unfortunately, we do not observe the desegregation histories of the suburbs which surround the central districts in our sample. The analysis in Cascio et. al. (2008) suggests that virtually all suburban districts in the South underwent meaningful desegregation by 1970, either voluntarily or by court-order. Although we are unaware of any data on the subject, meaningful desegregation activity was likely less intense in non-southern suburban districts because they are much smaller and numerous than southern districts and are more likely to be overwhelmingly white.

¹⁰ The exposure index is defined as:

$$E_i = \frac{1}{W_i} \sum_{i=1}^n w_{it} * \frac{b_{it}}{t_{it}},$$

where t_{it} is the total number of students in school i . For a given district, it ranges from 0 to the percent of black students in the district as a whole. See the Data Appendix for information on the construction of this variable, including the use of imputation.

We do observe the racial composition of publicly enrolled students in most suburban districts as of 1970. Using these data, we calculate the exposure of whites to blacks in the suburbs of each metropolitan area in our sample which both contain a suburban region and have sufficient suburban data in 1970. We make the very conservative assumption that each suburban district is perfectly integrated, or that its dissimilarity index is 0, and therefore that the suburban exposure index for whites to blacks equals the average percent of enrollment which is black across suburban districts weighted by the number of white public school students in each district. The results of this exercise indicate that in 1970, only 8 of the 77 MSAs for which we could build data had greater exposure of whites to blacks in the suburbs than the central district. San Jose which was only 2 percent black, was the only one outside the South. By this conservative measure, whites could reduce their exposure to blacks on average by 0.15 in the South and 0.26 outside the South by moving from a desegregated central district to the suburbs. Because these numbers almost certainly understate the reduction in exposure (given the assumption of perfect suburban integration), it is safe to assume that in most metro areas in the South and Non-South alike, relocation to the suburbs was an avenue for whites to avoid meaningful desegregation.

3.2 Data

Our empirical analysis benefits from a unique data set that includes information from the decennial Censuses of Population 1960-1990. The data set includes information on school enrollment by school type and additional demographic information by race for those living in central school districts and remainders of metropolitan areas (i.e. suburbs). Our sample is comprised of 48 metropolitan areas in the South census region and 44 in other regions with central school districts identified by Welch and Light (1987) as having experienced a major

court-ordered desegregation plan between 1960 and 1990.¹¹ We define central districts as those school districts that included the central business districts of the largest census defined central city as of 1960 in each metropolitan area nationwide. The sample includes all 56 central districts of over 50,000 students with minority enrollment between 20 and 80 percent in 1968 other than New York City, which did not have a major desegregation order. The remaining 36 districts, which had enrollment over 15,000 and were between 10 and 90 percent minority in 1968, were randomly sampled with enrollment and region sampling weights.¹²

In order to limit the possibility that school district boundaries were drawn in response to pressure for desegregation, we utilize 1970 school district geographies.¹³ The “69-70 School District Geographic Reference File” (Bureau of Census, 1970) relates census tract and school district geographies. For each census tract in the country, it provides the fraction of the population that is in each school district. Using this information, we aggregate census tracts to 1970 district geographies with Geographic Information Systems (GIS) software. We assign census tracts from 1960, 1980 and 1990 to school districts using this resulting digital map based on their centroid locations.

We use census tract and county tabulations from 1960 to 1990 to build census tract, central district and 1999-definition metropolitan area demographic data over time. We only observe spatially disaggregated data for 78 districts in 1960 and 89 districts in 1970. The

¹¹ Our small sample of metropolitan areas outside of the South means that we do not have the statistical power to precisely estimate separate effects of desegregation for other census regions.

¹² Table A2 lists all the districts in our sample and has census enrollment counts for 1970 definition districts.

¹³ In practice, the majority of changes to school district boundaries between 1970 and 2000 have been minor. The *Milliken v. Bradley*, 418 U.S. 717 (1974) Supreme Court decision ended the possibility that school districts could be forced to merge in order to achieve racial integration. In this case, the Court ruled that suburban districts surrounding Detroit could not be forced to merge with the Detroit school district.

spatially disaggregated tract level geography allows us to analyze the extent to which effects of desegregation differ across space within central districts. We define each metropolitan area’s central business district (CBD) as the centroid of the set of CBD census tracts reported in the 1982 Economic Census. A more complete explanation of the data construction is in the Data Appendix. Summary statistics for the district and tract data sets are in Table A1.

4. Central District Level Results

In this section, we present regression results using central district level data. We demonstrate that the central district white public enrollment losses resulting from desegregation are primarily driven by migration out of central cities in the South and by increased rates of private school attendance in other regions. We also show that desegregation increased black central district public enrollment as the result of both migration and reductions in private school enrollment.

Our base regression specification is

$$(1) \quad y_{jt} = \alpha_j + \beta_r + cD_{jt} + \varepsilon_{jt}$$

where j indexes metropolitan area, t indexes time and r indexes region. D_{jt} is an indicator for the central school district being desegregated by the courts at time t , and y_{jt} is the outcome of interest. We examine the effects of desegregation on public school enrollment by race, private school enrollment by race and population by race in central districts. As discussed in Section 3, we include metropolitan area fixed effects α_j to account for the possibility that fixed differences across metropolitan areas may have influenced the timing of desegregation orders. Our sample is restricted to urban areas which experienced desegregation. As a result, identification of the parameter of interest, c , requires only that the timing of desegregation be uncorrelated with

trends in the outcome variable not related to school desegregation. (If the sample included districts which were not desegregated, the identifying assumption would be more restrictive and require that both when and if an area was desegregated be uncorrelated with trends in the outcome variable.)

It is possible that southern and non-southern urban areas decentralized at different times or at different paces in a way that was correlated with the timing of desegregation orders. Underlying predictors of decentralization potentially correlated with region include the size of central district geography, the availability of outside options including private schools and suburban districts, income levels, and the extent of housing market discrimination and residential segregation. As such, we allow the year effects in Equation (1), β_{rt} , to differ for the South census region.

We estimate additional specifications as robustness checks that include MSA-specific linear trends or a set of baseline MSA and central district characteristics interacted with year as additional controls. Although these are important checks on the validity of our estimates, it is unsurprising that the estimates are sometimes imprecise given our sample size. In particular, the specifications with linear trends are intensely saturated given we are using a four-period panel and include both fixed-effects and trend terms. In addition, if the effect of desegregation is not only instantaneous but also evolves over time, the trend terms may partially capture the treatment effect and bias the estimated effect of desegregation downward. Therefore, we view estimated coefficients on desegregation indicators in the specification with MSA-specific trends as likely to represent a lower bound on the average causal effect of desegregation on districts in our sample.

4.1 White Results

Table 2, Panel A, presents our estimates of the effects of desegregation on white public school enrollment in central districts. Consistent with Reber's (2005) results using district reported enrollment data, our preferred specification (1) indicates that desegregation orders decreased white enrollment by 12 percent on average in central districts. Specifications 2 and 3 show that this result is robust to inclusion of MSA-specific time trends and a set of metropolitan and central district characteristics measured in 1960 or 1970 interacted with year effects.¹⁴ As might be expected, the specification with linear trends attenuates the coefficient to 0.06. We include baseline characteristics interacted with year to control for the possibility that white enrollment trends may be driven by initial factors, such as percent black enrollment in the central district or central district size, that were correlated with the timing of desegregation orders. For instance, higher 1960 black enrollment shares may have hastened the outflow of whites while the longer commute times associated with larger central districts may have impeded this outflow.¹⁵ Given that the coefficient of interest does not change much with the inclusion of these additional characteristics, they appear to have a low correlation with the timing of desegregation orders conditional on MSA and year-south fixed effects.

Specification 4 allows the effect of desegregation to vary by the length of time a district has been desegregated. The point estimates suggest that the long-run impact of desegregation is a bit smaller than the short-run impact. The long-run impact is defined as exposure to

¹⁴ The number of districts in the MSA and central district area are measured as of 1970. MSA area is measured as of 1999, given that we use 1999 MSA definitions.

¹⁵ Other characteristics interacted with year are central city black and white income (which may influence the ability to move out of the central district, willingness to pay for private school and may be correlated with preferences over racial integration), number of districts in the MSA (more alternative school districts would tend to increase the outflow of whites), MSA area (conditional of the number of districts in the MSA and the size of the central district, a larger MSA implies longer commute times into the central district), and percent manufacturing in the MSA (the decline of manufacturing over the period of study likely produced out migration from central cities).

desegregation for at least five years and is calculated as the sum of the two coefficients. However, the decline in the response after five years, 0.04, is not statistically significant.¹⁶

Specification 5 presents a falsification exercise. A placebo treatment variable is added to the model which equals one when a district is one or two years away from being desegregated. If school desegregation was implemented in areas where white flight was already occurring, rather than being causally related to white out-migration, the coefficient on the placebo variable should be negative and significant. Instead, the estimated placebo coefficient is -0.00 and imprecisely estimated. Moreover, the estimated parameter of interest does not change with its inclusion. This can also be interpreted as evidence that Specification 2 with the MSA-specific trends likely generates an attenuated coefficient on the desegregation indicator. If such trends are spuriously inflating the estimated effect of desegregation, the placebo coefficient should be negative.

Panel B presents estimates of the impact of desegregation on total white central district population. The estimate from our base specification, column 1, suggests that desegregation induced 6 percent of the white population to exit central districts on average. This estimate is robust to controls for baseline characteristics interacted with year effects but attenuates to a statistically insignificant -0.02 with inclusion of MSA-specific linear trends. Panel C presents estimates of the effect of desegregation on central city white private school enrollment. The estimates are positive but imprecisely estimated. Viewed jointly, the three panels of Table 2 indicate that white flight from desegregated central district public schools manifested itself partly as migration to suburban school districts and perhaps partly as increases in private school enrollment.

¹⁶ This conclusion is robust to alternate specifications of the distributed lag.

In Table 3 we allow the effects of desegregation to vary by region. There are a number of reasons why the effect of desegregation in the South may have differed from the effect in the rest of the country. The South differs from other regions along many observable dimensions: It has lower average income and a substantially higher fraction of the population which is black. As suggested by the different forms that racial segregation took – *de jure* in the south and *de facto* elsewhere – preferences over interracial contact may also have varied by region. The structure of metropolitan areas in the South is also quite different from that in other regions. The average number of school districts in southern MSAs is 12 relative to 60 in other regions and each of the 20 MSAs in our sample with fewer than 5 school districts is in the South.

The results in Table 3 indicate potentially important regional heterogeneity in the response to desegregation. Although desegregation led to a loss of white enrollment in central school districts in all regions, Panel A indicates that the magnitude of the loss may have been somewhat larger in the South than outside the South. In the South, our baseline specification indicates an enrollment decline of 14 percent whereas in other regions we estimate a decline of 8 percent, though these estimates are not statistically different. However, the estimate for the South falls by 0.10 in absolute value with inclusion of MSA-specific trends while that for other regions changes little in the robustness specifications.

The manner in which whites exited desegregated schools also differs by region. In the South, white flight largely took the form of migration to the suburbs (Panel B), while Panel C shows that outside the South desegregation caused an increase in private school enrollment. The estimated white population response in the South is -0.12 for the baseline specification and this coefficient is statistically distinguishable from the estimate of 0.04 for other regions. The South estimate falls in absolute value to a statistically insignificant -0.03 with the inclusion of MSA-

specific trends. However, with the more standard set of controls it is -0.08, significant at the 10 percent level, and not statistically different from that implied by the baseline specification. Estimated population responses outside the South range between 0.00 and 0.04 and are not statistically significant under any specification.

Our preferred specification yields a statistically significant estimate that desegregation increased private school enrollment by 16 percent in central districts outside of the South (specification 1 of Panel C), though this estimate is not significantly different from the imprecisely measured South estimate of -0.04.¹⁷ The non-southern response attenuates to 0.08 (with a large standard error) for the specification with baseline characteristics interacted with year effects.¹⁸

To the best of our knowledge, the private school estimates in Tables 2 and 3 are the first of the causal connection between court-ordered desegregation and white private school attendance produced using a national sample.¹⁹ A lack of nationwide data on private school enrollment by race at the district level likely has prevented a systematic exploration of the link between court-ordered desegregation and white private school enrollment up to this point. Our unique data set allows us to fill this gap in the literature.

The desegregation literature has generally concluded that private schools represented an important outlet for southern whites wishing to avoid desegregated schools. This conclusion is

¹⁷ In instances where private enrollment is small, the log specification is potentially problematic. The non-south result is robust, however, to replacing the log of white private enrollment with the share of total white enrollment in private school.

¹⁸ Falsification checks analogous to those in column 5 of Table 2 generate estimated coefficients on the south and non-south placebo desegregation variables that are small and imprecise for all three outcomes.

¹⁹ Many papers, including Fairlie and Resch (2002), Reardon and Yun (2002), Lankford, Lee and Wyckoff (1995), and Clotfelter (1976) document a strong correlation between the percent black (or non-white) in public schools and the propensity of whites to attend private school.

based on several facts (Clotfelter, 2004a). First, white private school enrollment has increased in the South since 1960 while it has fallen in the rest of the country.²⁰ Desegregation is often cited as an explanation for this regional divergence because it produced a much greater change in public school racial composition in the South than it did elsewhere. Second, there are several well documented cases of white flight to private school in response to desegregation in the South, for instance Mississippi's "segregation academies" and Virginia's "massive resistance." Finally, the large average size of southern school districts meant that migration to alternative public school districts was usually costly, making private schools a relatively more attractive option.

While the results of this paper lend no support to the hypothesis that whites used private schools to avoid court-ordered desegregation in the South, they do not necessarily invalidate the hypothesis either. Our point estimate for the South is sufficiently imprecise that we cannot reject a positive response of white private enrollment to desegregation in central districts: The upper bound of the white private school enrollment estimate's 95% confidence interval from Specification 1 is a sizeable 16 percent increase. Nor are we able to statistically distinguish between the private school response in the South and the private school response elsewhere. Furthermore, the sample used here is comprised of large urban centers. White flight to private school may have been more prevalent in non-urban areas of the South because the large, generally county-wide, school districts in the non-metropolitan South make avoiding desegregation through residential relocation difficult. Indeed, the most direct evidence that desegregation increased private school attendance in the South by Clotfelter (1976) on

²⁰ Seven percent of white elementary school students were enrolled in private schools in the South in 1960, rising to 10 percent by 1980. By contrast, white elementary private school enrollment fell from 18 percent to 13 percent between 1960 and 1980 outside the South.

Mississippi and Reber (2007a) on Louisiana are focused on mostly rural states. Finally, Clotfelter (2004a, 2004b) demonstrates that the contribution of private schools to overall school segregation is substantially greater in the non-metropolitan South than in the South's urban areas.

It is natural to ask whether the differing regional effects of desegregation are explained by observable differences between central districts in the South and elsewhere. We emphasize, however, that although the differing magnitude of the desegregation effect across regions is very significant in an economic sense, small sample sizes and the associated large standard errors mean that Panel B Specification 1 is the only set of results in Table 3 that exhibit statistically different effects of desegregation by region. Regressions of the three outcomes of interest for whites on the desegregation indicator interacted with baseline district and metropolitan area characteristics also generate statistically indistinguishable regional effects of desegregation for all three outcomes.²¹ In addition, this exercise generates few statistically significant coefficients on the interaction terms. Although the data used here is relatively rich compared to that used in much of the past literature, we lack the power to estimate a richer set of heterogeneous treatment effects and therefore focus on estimating average treatment effects of desegregation by region. Nevertheless, it is worth noting that the difference between the South and non-South desegregation effect is unstable in the treatment interaction specifications and the sign of the difference is often the opposite of that on Table 3. Thus, these results provide suggestive evidence that the regional variation in the response to desegregation may reflect observable differences by region.

²¹ To generate these results, we also include central district and MSA characteristics interacted with the full set of year indicators as controls, as in column 3 of Tables 2 and 3. See the note to Table 2 for a list of the characteristics used. These results are available from the authors upon request.

We have provided some evidence that at least in the South there was white flight from central districts after they desegregated. Panel A of Table A3 contains results using the entire MSA as the unit of observation. It reports small and imprecisely estimated coefficients, suggesting that the whites who departed central districts in response to desegregation moved to the suburbs within the same MSA. Estimates of the effects of central district desegregation on suburban white population and public enrollment are generally positive but with large standard errors such that none is statistically significant (unreported). Given the explosive growth of the suburbs evident in Table 1, it may be more difficult to generate precise estimates for the suburbs than it is for the central districts. We would like to estimate more spatially disaggregated results which focus on effects in inner suburbs because these areas are likely close substitutes for the central district. Unfortunately many suburbs were not tracted in 1960 and 1970 and this makes such estimates imprecise and unstable.

4.2 Black Results

Guryan (2004) and Lutz (2005) present evidence that school desegregation reduced dropout rates for blacks, suggesting that desegregation generated an improvement in school quality experienced by blacks. Moreover, Reber (2007a) documents that desegregation increased the educational resources provided to black students and Weiner, Lutz and Ludwig (2009) demonstrate that desegregation decreased rates of criminal offending by black youth. The natural implication is that blacks should seek to attend newly integrated school systems. Table 4 Panel A provides evidence to this effect. Although there is no evidence of black public enrollment increases due to desegregation when desegregation is coded as a single indicator variable equaling one in any year in which public schools were desegregated (column 1), we do find evidence of a 14 percent increase in black enrollment in the long-run, defined as at least five

years after implementation of desegregation (columns 2 and 3). This result is robust both to inclusion of MSA-specific linear trends (column 4) and 1960 MSA characteristic-year interactions (column 5). It is also robust to alternative specification of the distributed lag (unreported). Finally, the results of the placebo falsification check are encouraging.

Table 4 Panel B presents evidence that desegregation increased the total black population of central districts by 8 percent. The specification with MSA-specific trends generates a marginally significant coefficient of 0.04 that we view as a lower bound on the true causal effect. Investigation of various distributed lag specifications (unreported) reveals that the increase in black population occurred concurrently with the increase in public enrollment documented in Panel A.

Results in Table 4 Panel C indicate that desegregation dramatically reduced private school enrollment of blacks living in central public school districts. This response commenced immediately following the announcement of desegregation orders but also may have strengthened considerably with time. Our point estimates indicate a 16 percent immediate decline in black private enrollment following desegregation with an additional 18 percent decline 4 years later (column 2). These individual estimates are not precise although the total long-run effect, the sum of the two coefficients, is statistically significant. We can more precisely estimate that after five years of desegregation black private enrollment declined by 20 to 28 percent (columns 3 to 6). While these are very large responses, they come off a relatively small base of black private school students. The possibility that blacks exited private schools in order to attend desegregated public schools, while quite plausible given the documented increase in public school quality caused by desegregation, has received little consideration in the literature.

Black responses to desegregation display even more regional heterogeneity than do white responses. Table 5 Panel A shows that the increase in black enrollment in desegregated schools is almost entirely a non-southern phenomenon. Specification 2 indicates that this black enrollment increase outside the South commenced five years after desegregation orders were implemented. We estimate that black public enrollment ultimately increased by 13 to 20 percent outside the South. The southern point estimates, in contrast, are about 0 and statistically smaller in absolute value than those for the Non-South. Consistent with these results, Panel B documents that the increase in black central city population due to desegregation, estimated to be 6 to 11 percent (columns 3 to 5), also occurred only outside of the South and started about five years after desegregation plan implementation. In specification 3, the Non-South estimate is statistically different from that for the South.²²

In contrast to the public school enrollment response, results in Panel C indicate that the decrease in private school enrollment due to desegregation was much larger in the South than elsewhere. By our estimates, after 5 years of desegregation black private enrollment in the South declined by 40 to 80 percent, with the 80 percent estimate obtained by adding the two south coefficients in specification (2) together. Consistent with evidence in Table 4 Panel C, specification (2) indicates that the response started immediately after desegregation and increased with time.²³ We find weaker evidence that desegregation caused declines in black

²² It is perhaps not surprising that we find no black public enrollment or population responses to the desegregation of southern central districts. Many suburban districts in the South were desegregating during the period studied, and all experienced at least token desegregation. Suburban desegregation reduces the incentive for suburban blacks to move to central districts to take advantage of desegregated schools.

²³ While we consistently find large negative effects of desegregation on black private enrollment in the South across samples and lag specifications, statistical significance is sensitive to these choices. For example, regressions using the unbalanced panel of districts derived from aggregated tract data generate statistically significant effects of desegregation at year of

private enrollment outside the South. These point estimates are imprecise and on the order of 10 to 15 percent. In Specifications 1, 2 and 5 the south estimates are statistically different from the non-south estimates. (In specification 2 the South and Non-South $\text{deseg}(5+)$ coefficients cannot be distinguished from each other, but the long-run effects, the sums of the deseg and $\text{deseg}(5+)$ coefficients, can be distinguished.) Because so few blacks were in private schools in 1960 it is not surprising that these private school results have very little influence on the total public enrollment results in Panel A.

Unlike for whites, estimated effects of desegregation for blacks are often statistically distinguishable across regions. Inclusion of the desegregation treatment variable interacted with baseline MSA characteristics does not significantly reduce regional gaps in the effects of desegregation and the interaction coefficients are typically imprecisely estimated (unreported). Thus, we conclude that unobserved differences between MSAs in the South and other regions are primarily responsible for the differences in treatment effects of desegregation for blacks. Our examination of suburban black outcomes turns up similarly inconclusive evidence as that for suburban white outcomes.

4.3 Results by Age Group

The underlying process that we postulate generates the observed relationship between school desegregation, white flight and black inflows from and to central districts operates through public school quality. Therefore, we should see that responses are greater for school age children and their parents than for other age groups.²⁴ We investigate this possibility by

implementation and not five years later. In contrast, estimates for other outcomes using this smaller sample are very similar in size and significance as those reported in Tables 3 and 5.

²⁴ Other age groups may also respond through a mechanism in which households care directly about the race of their neighbors.

estimating the effects of school desegregation on population by age, using the same specifications as in column 1 of Table 2 for whites and column 3 of Table 4 for blacks.²⁵

Figure 5 depicts estimated impacts of desegregation on central district population by age and race. Panel A shows that white flight was most pronounced among those aged 5-24, roughly the age of children in school, and 35-44, roughly the age of parents with children in school. These estimates are statistically significant and are equal to about -0.10 for the young group and -0.09 for the parental group. Estimates for other age groups range from -0.05 to -0.08 but are not statistically significant.

The black estimates shown in Figure 5 Panel B indicate in-migration in response to desegregation was greatest for those aged 0-14, 25-49 and 55-74. Each of these groups has a precisely estimated population increase of around 12 percent after 5 years of desegregation. In contrast to whites, blacks in other age groups have much smaller estimated responses. The relatively large response of blacks age 55-74 may reflect the prevalence of grandparents as primary caregivers in many African-American families.

4.4 The Effects of Racial Dissimilarity on Outcomes

While the reduced form effects of school desegregation presented above are informative, it is potentially even more informative to directly measure responses to changes in the racial composition of schools. As discussed in Section 3, court-ordered desegregation boosted racial integration by different amounts across school districts because it was achieved in many different ways and was applied in many different initial school assignment environments. In particular, the extent of voluntary desegregation prior to court intervention varied. To this end, we estimate the effects of racial dissimilarity in regressions analogous to those in Tables 2 through 5 using

²⁵ Splitting the sample by region produces similar, though noisier, profiles of effects by age.

our desegregation indicator as an instrument for the dissimilarity index. Estimation of the effects of racial dissimilarity comes with some difficulties, foremost of which is that we do not observe school racial composition for many districts before the late 1960s and there is some missing data thereafter as well. The Data Appendix details how we impute some of the missing data and infer values for 1960 using information from Cascio et al. (2008). In addition, it is potentially problematic to interpret these results as strictly causal estimates of the impact of the dissimilarity index. In addition to increasing racial integration, desegregation may have induced other changes, such as increases in public school spending (Reber, 2007a) and decreases in criminal offending (Weiner, Lutz and Ludwig, 2009). The dissimilarity index coefficients from the IV specifications may partially reflect these other changes.²⁶ Nonetheless, we believe the IV specifications are useful because they force the effect of desegregation to operate through the hypothesized primary mechanism: changes in school quality resulting from abrupt shifts in racial segregation.

Table 6 presents IV estimates of the effects of racial dissimilarity on our six outcomes of interest. As in Tables 4 and 5, the treatment for blacks is lagged by 5 years. We utilize two instruments: the desegregation indicator and this indicator interacted with a West Census Region indicator. Our data suggest that court-ordered desegregation was relatively less effective at decreasing black-white dissimilarity in the West Census Region and including the interaction term results in more precise second-stage estimates.²⁷ For whites, the first-stage coefficient on

²⁶ More formally, the desegregation indicator instrument may be correlated with the second-stage error term.

²⁷ We also include a set of West-year fixed-effects in the specification. The results in Tables 2 – 5 are little changed if the West Census region is dropped from the sample. Similarly, if the effect of desegregation is allowed to vary in the West in Tables 2 - 5, the coefficient on the West term is imprecisely estimated.

the segregation indicator is -0.17 (s.e. 0.04) and the coefficient on the segregation*west term is 0.20 (s.e. 0.13). The first-stage F-statistic on this instrument set is 10.0.

Panel A displays the second-stage results for whites. For each outcome, the results of two specifications are displayed – one which does not permit regional heterogeneity and one which does, and hence has two coefficients. The estimated effects of dissimilarity are very consistent with the results on Tables 2 and 3. For instance, the upper estimate in column 1 suggests that a decrease in the dissimilarity index of -0.15 – equal to around the typical change in dissimilarity achieved by court-ordered desegregation – would reduce white public school enrollment by about 11 percent ($0.73 * -0.15 = -0.11$), similar to the estimates in Panel A of Table 2. The black IV estimates, presented in Panel B, are also generally consistent with the reduced form effects of desegregation (Tables 4 and 5) with a few differences. There is less evidence of a total black population effect and the implied increase in Non-South black public enrollment, 0.11 ($-0.76 * -0.15 = 0.11$), is smaller than that on Table 5 (around 0.20). There is also stronger evidence of a black private school response outside of the South.

5. The Spatial Distribution of Responses to Desegregation

In this section, we investigate how central district school desegregation has affected the residential location and school choices of blacks and whites as a function of location. Theories of land use and local public goods motivate this spatial analysis. Models of Tiebout (1956) sorting typically assume that the marginal utility of local public goods like school quality is increasing in income. In addition, higher income individuals are more likely to choose private school. Finally, those choosing private school are predicted to live closer to city centers than those choosing public school conditional on income. This ordering comes about because private

school attendees achieve the same utility as their public school counterparts with the same income by paying for private school tuition partly with the commuting cost savings from living closer to work.²⁸

Evidence in Figure 3 indicates that income is increasing in distance to city centers for both races. It also indicates that central districts are among the poorest school districts in most metropolitan areas. Therefore, given that the highest income individuals in the central district are most sensitive to possible changes in school quality associated with desegregation, we should expect responses in public enrollment to be greatest in the outer portions of central districts. Similarly, the magnitude of the total population response should be greater at central district peripheries. Finally, the most intense response for private school enrollment should occur closer to the CBD than does the most intense response for public enrollment and total population for a given race. This prediction arises from the fact that, conditional on income, private school students reside closer to the CBD. As we demonstrate below, these predictions are largely consistent with the patterns we see in the data.

5.1 Empirical Model

To study the spatial distribution of the impacts of desegregation, we specify an empirical model analogous to that estimated in Section 4 that flexibly captures causal responses as a function of location. We index central district location to be between 0 and 1 in order to make metropolitan areas of different structures and sizes comparable. As in Figures 2 and 3, location 0 indicates central business districts and location 1 indicates the furthest census tracts from CBDs. The index represents the point in the cumulative distribution function of 1990 black plus white population with tracts ordered by CBD distance. We use census tract data from 1960, 1970,

²⁸ Proof of this claim in the context of a model is available upon request from the authors.

1980 and 1990 to estimate parameters of this model. The census tract data set we use includes all but 17 of the MSA-year combinations used for the analysis in Section 4.²⁹

Although our spatial data permit analyzing some suburbs, we restrict our attention to central districts. Attempts to measure spatially disaggregated suburban responses to desegregation result in estimates that are sensitive to minor changes in specification or indexing scheme. Thin data in 1960 and 1970 and measurement error in tract assignment to suburban districts likely account for these unstable estimates. Furthermore, it is not clear what would be the most appropriate suburban tract indexing scheme.

Our empirical model is perfectly analogous to that estimated in Section 4 with the addition of full interaction of the treatment variable with segmented location to capture spatial profiles. Because many census tracts contained 0 counts of some outcomes of interest, we utilize a fixed-effects Poisson model.³⁰ This allows coefficients to be interpreted as partial elasticities, commensurate with the analysis in Section 4. Experimentation with specification reveals that splitting the data into four location segments of width 0.25 allows us to efficiently capture the spatial distribution of treatment effects while maintaining power.³¹ For each of four location segments s in South and Non-South regions r separately, we estimate relevant parameters of the equation

$$(2) \quad \ln E(y_{ijt}^s) = a_j^s + b_{rt}^s + \gamma_r^s D_{jt}$$

²⁹ Table A1 Panel B presents summary statistics of this tract data set.

³⁰ We use the Hausman, Hall and Griliches (1984) procedure to eliminate the MSA fixed effects. The model is then estimated by quasi-maximum likelihood, a procedure characterized by strong consistency properties (Wooldridge, 1999).

³¹ More flexible polynomial distance specifications produce qualitatively similar though somewhat wilder results. Analogous linear regressions estimated separately for each location segment generate estimated coefficients similar to those reported below for outcomes other than black private enrollment, though these estimates are generally less precisely measured.

where i indexes census tract in MSA j at time t . The 8 parameters of interest are γ_r^s : four segments each for the South and Non-South. When white outcomes are used D_{jt} equals one if the central district has been desegregated at time t . Consistent with the evidence in Tables 4 and 5, D_{jt} equals one if desegregation occurred at least five years earlier when one of the outcomes for blacks is the dependent variable. We weight by the inverse of the number of observations in each MSA/segment in order to give equal weight to each MSA and make these estimates comparable to those from Section 4. To handle potential spatial correlation in the error term, we bootstrap standard errors using 500 replications sampling MSA clusters with replacement. This bootstrapping procedure is likely to overstate standard errors because it allows the error term within each MSA across space and time to be arbitrarily correlated.

5.2 Location Specific Results

Figure 6 presents estimated impacts of school desegregation on white and black public school enrollment as functions of location. It graphs the estimated effects of desegregation in the South and other regions separately. Medium thickness portions of the plots indicate statistical significance at the 10 percent level and the thickest line portions are significant at the 5 percent level. Panel A shows that desegregation caused white enrollment in the outer fourth of central districts to fall significantly by about 22 percent outside the South and 38 percent in the South. In the third segment of Southern central districts we estimate that desegregation caused a 26 percent decline in white enrollment. Estimated enrollment effects of desegregation are not statistically significant in other region-location combinations though point estimates are monotonically decreasing in CBD distance for both regions. These results are consistent with the estimates reported in Table 2 indicating a 12 percent decline in total central district white enrollment as a result of desegregation. They also suggest that the larger enrollment decline in

the South reported in Table 3 was produced by the fact that the enrollment response extended closer to the CDB in the South than it did elsewhere.

Estimated effects for blacks outside the South, shown in Panel B, are largely a mirror image of those for southern whites. Black public school enrollment outside the South increased by an estimated 24 percent in the outer segment after exposure to desegregation for four years, monotonically decreasing to 15 percent in the first segment, roughly the same size effect as found on Table 5. The estimates for black public enrollment in the South are uniformly imprecise, consistent with the failure to find evidence of a response for this outcome with the non-spatial approach. Figure 7 shows analogous results for total white and black populations. The results are similar to those in Figure 6. While white population significantly declines as a result of desegregation in all South central district locations, estimates are greatest in absolute value in the third and fourth segments at $-.26$ and $-.33$ respectively. Though as with public enrollment, the greatest white population response to desegregation outside the South is in the outer segment at minus 10 percent, it is not statistically significant. Consistent with estimated responses in black public enrollment, black population responses to five years of desegregation outside the South are largest in the third and fourth segments at around 0.15 , though only the third segment's estimate is precise. Of the sixteen race-region-segment combinations, none have estimated public enrollment declines as a result of school desegregation that are statistically different from the associated estimated population declines. Indeed, the magnitudes of point estimates for the two outcomes are remarkably similar.

Figure 8 shows the spatial results for white and black private school enrollment. It shows that desegregation led to a statistically significant increase of 10 percent in white private school enrollment in the second segment of central districts outside the South. No other white private

enrollment estimates are statistically significant. Panel B shows that the only segment in which black private enrollment significantly declined due to desegregation is the second segment outside the South, by 17 percent. Black private enrollment is the only outcome for which the results using the spatially disaggregated data do not match those using aggregate central district data.³² Consistent with theory, our results indicate that private enrollment increases for whites and declines for blacks as results of desegregation occurred in regions closer to CBDs than did population responses.

6. Conclusions

This paper provides new evidence on the mechanisms by which school desegregation in large urban districts led to public enrollment declines for whites and increases for blacks. We demonstrate that white enrollment declines in Southern central districts were primarily the product of out-migration while enrollment declines elsewhere were primarily the product of increases in private school attendance. Black public enrollment and population increases as results of desegregation did not occur for several years, primarily occurred outside of the South, and came primarily in the form of residential relocation into central districts.

Overall, our estimates indicate that while desegregation caused whites to exit the outer regions of central districts in large numbers, and induced a corresponding in-migration of blacks, school desegregation was not one of the main forces driving urban population decentralization because these effects offset each other. Table 7 presents numbers analogous to those in Table 1

³² When desegregation is allowed to immediately affect black private enrollment rather than after the policy has been in place for four years, the only significant estimate is -0.42 for the second segment in the South. This matches the pattern in Table 5 Panel C. The untraced districts in 1960 and 1970 not observed in our spatially disaggregated data drive the results for the South in Table 5 Panel C Specifications 3-5.

which assume that school desegregation had never occurred in any of the metropolitan areas in our sample. To perform these calculations, we take estimates from Table 3 Specification 1 and add back the number of white residents and public school students estimated to be lost from central districts in the South and other regions due to school desegregation. Similarly, we take estimates from Table 5 Specification 3 to subtract off the blacks that we estimate moved to central districts because of desegregation.

Even without court-ordered desegregation, our calculations indicate that aggregate central district white population would have fallen by 10 percent between 1960 and 1990 rather than the decline of 13 percent actually observed. These changes should be viewed relative to the 26 percent increase in white population nationwide during this period. Our estimates also indicate that aggregate central district black population would have increased by 44 percent rather than the 54 percent increase actually experienced in central districts. Put together, these changes imply a counterfactual increase in central district population of 12 percent relative to the 11 percent increase actually experienced. It is clear from these numbers that school desegregation was not a particularly important force in generating observed changes in overall urban residential location patterns over the past 50 years. We emphasize, however, that school desegregation was quite important in generating changes in the racial composition of central districts, particularly in outlying central district neighborhoods, and also heavily influenced patterns of private school attendance.

Data Appendix

Our sample is comprised of the 92 metropolitan areas with central school districts identified by Welch and Light (1987) as having a major court-ordered desegregation plan implemented between 1960 and 1990. We define central districts as those school districts that included the central business districts of the largest census defined central city as of 1960 in each metropolitan area nationwide. The sample includes all 56 central districts of over 50,000 students with minority enrollment between 20 and 80 percent in 1968 other than New York City, which did not have a major desegregation order. The remaining 36 central districts in our sample, which had enrollment over 15,000 and were between 10 and 90 percent minority in 1968, were randomly sampled with sampling weights proportional to enrollment and stratified by census region. Welch and Light investigated desegregation histories of 33 additional districts that we do not use because they do not contain the central business district of a metropolitan area. We have merged this information on major plan implementation year with district level enrollment data from the Common Core of Data and as collected by Welch and Light for the Office of Civil Rights. The enrollment data is used to calculate dissimilarity and exposure indices.

Welch and Light (1987) report the year in which school desegregation was implemented for each school district. We observe only the year, not the month, of desegregation and must therefore make an assumption as to when in the year desegregation begins. Typically desegregation would have begun in the fall of the implementation year, meaning a desegregation plan implemented in 1970 would have been taken force at the start of the 1970-1971 school year, though in some cases implementation may have begun earlier. In order to be conservative, we assume that desegregation begins at the start of the year. The census is mostly completed in late March with questions about school enrollment asking whether the individual has attended school at any time since February 1st. Therefore, implementations occurring in the same year as a census year would have had up to three months to have an effect on studied outcomes. In addition, outcomes may have been influenced by the announcement of impending desegregation (i.e. whites may have left the central district in response to the announcement by the Federal court that desegregation would start in a few months time, at the start of the next school year). We choose this timing so as to capture the full potential response to desegregation. However, results are very similar if implementation is counted as taking hold beginning in the fall of the implementation year. To match the census timing, we count dissimilarity and exposure indices for the $t-1$ to t school years as being affected by implementation in year t . Estimated effects of desegregation on dissimilarity and exposure are even greater if we count them as responding starting in the t to $t+1$ school years. IV estimates from Table 6 are similar when done both ways.

The data we use on dissimilarity and exposure indices start in 1967 for most districts with missing years scattered idiosyncratically across districts throughout the 1970s and 1980s. Reber (2005) demonstrates that these objects are persistent over time given the desegregation regime. To fill in some of the missing data we impute missing observations using the following procedure. We first assign each district/year to a desegregation regime based on implementation year. The school year starting in the implementation year and beyond is assigned to one category, the previous year to a second category and earlier years to a third category. Within desegregation category, we assign missing values to adjacent observations up to 3 years away. Missing observations equidistant from two non-missing observations are imputed as the mean of the non-missing observations. This still leaves almost no data on the indices before the mid-

1960s. However, based on evidence in Cascio et al. (2008), we assign school districts in the Confederacy a dissimilarity index of 1 in 1960. These adjustments to the data significantly increase the sample size for the IV specifications in Table 6.

To construct demographic information on 1970-definition school districts, we compile census data from the tract, place, school district and county levels of aggregation for 1960, 1970, 1980 and 1990. We construct digital (GIS) maps of 1970 geography school districts using the 1969-1970 School District Geographic Reference File from the Census. This file indicates the fraction by population of each census tract that fell in each school district in the country. Those tracts split across school districts we allocated to the school district comprising the largest fraction of the tract's population. In 50 of our sampled central districts, there is no such allocation necessary. Using the resulting 1970 central school district digital maps, we allocate tracts in 1960, 1980 and 1990 to central school districts or suburbs based on the locations of their centroids. The 1970 definition central districts located in regions not tracted in 1970 all coincide with county geography which we use instead.

Accurate allocation of tracts in 1960, 1980 and 1990 to 1970 district geographies, built as amalgamations of 1970 definition census tracts, that did not coincide with counties required several steps. The reason is that tract geographies in periods other than 1970 sometimes include water that was not in the 1970 tract geography. Therefore, some tract centroids from other years are in regions that were not in a 1970 tract only because they are on the water. To handle this issue, we clip 1960, 1980 and 1990 tract geographies to the polygon formed by aggregating 1970 tract geography and recalculate centroids constrained to be within tracts before assigning tracts to 1970 definition central school districts. Tract data for suburban regions utilize this same clipped geography unless the clipping process reduces tract area by more than 90% in which case we use the original unclipped geography to calculate centroids.

Central district aggregate demographic data is built by aggregating tract data in each year except for two circumstances. If tract data did not exist or incompletely covered a district in 1960 or 1970 and it was a county district, we use census county aggregate data instead. The Lawton, OK and Amarillo, TX districts are the only two that were not fully tracted in 1960 and did not conform to county boundaries. 1960 demographic information for these districts are hand-entered from the printed 1960 census volume place data. Information on 1999 definition metropolitan areas was built using county aggregates and New England County Metropolitan Areas for New England.

Census data from 1960 was the most challenging to compile and process. We obtain some census tract and county information from the National Historical Geographical Information Systems (NHGIS, nhgis.org) which compiles data from various electronic sources and has high quality geospatial information. The 1960 census broke out most variables of interest for whites and nonwhites but not blacks. Because blacks represented 92 percent of nonwhites in 1960 nationwide, we found it to be a reasonable approximation to measure black counts simply by rescaling nonwhite counts by the fraction of total nonwhite population in the tract or county that was black. The 1960 tract data, used for the spatial analysis, requires additional adjustments because this data set does not include school enrollment broken out by race. Instead it reports total enrollment and total public enrollment for elementary and high school separately. As an example, we impute tract elementary enrollment counts for blacks as

$$(\text{total public elementary enrollment}) \left[\frac{\text{nonwhite population 5 - 14}}{\text{total population 5 - 14}} \right] \left[\frac{\text{total black population}}{\text{total nonwhite population}} \right]$$

To build white enrollment counts we replace nonwhite and black populations with white population in the above expression. High school enrollment counts are calculated analogously using the 15-19 year old age group. (Census aggregate data from 1960 only includes age by race for 5 year intervals.) Because of the high levels of residential segregation in 1960, the assumption that each race in a census tract has the same propensity to send children to public and private school is not strong. Indeed, corroboration with county based enrollment counts by race reveals county estimates of public enrollment counts that are on average 5 percent greater than tract based estimates for blacks likely because of lower private enrollment rates for blacks than whites. Central district median family income for 1960 is derived by assuming a uniform distribution within \$1,000 intervals for whites and nonwhites separately. We assign blacks the median nonwhite income. Districts not tracted in 1960 received median family income as reported in printed census volumes.

County aggregates from 1960 on age by white/nonwhite we took from the NHGIS. County aggregate information on school enrollment by white/nonwhite and public/private we collected from published census tables. As with the 1960 tract data, we rescale all nonwhite counts by the ratio of total black population to nonwhite population to generate estimated black counts.

Census aggregates from other decades are taken from the Summary Tape File 4 tabulations. In each year after 1960, tract information is from STF4a. County information is from STF4c in 1970 and 1990 and STF4b in 1980. STF4 breaks out all counts by race such that no imputation adjustments are necessary as they were in 1960.

We use the census school district tabulation file to calculate the number of districts in each metropolitan area in 1970.

Central business districts are taken from the 1982 Economic Census. The 1982 economic census reports the set of census tracts that local business people conceive of as being the central business district in each metropolitan area. We take the centroid of the spatial aggregate of these tracts, which checks reveal corresponds to what is typically considered to be the downtown location in most cities.

Summary statistics for the district level and tract data sets are in Table A1 while Table A2 has a detailed description of each central district in our sample.

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Table 1: Trends in Metropolitan Area Residential Location Patterns by Race

Year	1970 Geography of Central School Districts			Suburbs			Entire United States		
	White	Black	All	White	Black	All	White	Black	All
	1	2	3	4	5	6	7	8	9
Panel A: Population Totals									
1960	31.0 (0.80)	7.3 (0.19)	38.6	41.0 (0.94)	2.3 (0.05)	43.5	158.8 (0.89)	18.9 (0.11)	179.3
1970	29.4 (0.75)	9.1 (0.23)	39.1	51.7 (0.94)	2.8 (0.05)	55.0	173.1 (0.88)	21.7 (0.11)	197.2
1980	27.0 (0.67)	10.6 (0.26)	40.5	59.2 (0.89)	4.3 (0.06)	66.2	189.0 (0.84)	26.5 (0.12)	226.2
1990	26.9 (0.63)	11.2 (0.26)	42.9	65.8 (0.85)	5.8 (0.08)	77.4	199.8 (0.80)	29.9 (0.12)	248.7
60-90 Change	-4.2	3.9	4.3	24.8	3.5	34.0	41.0	11.1	69.4
60-90 %Change	-13%	54%	11%	61%	155%	78%	26%	59%	39%
60-90 ΔFraction	(-0.18)	(0.07)		(-0.09)	(0.02)		(-0.08)	(0.02)	
Panel B: Children Enrolled in School									
1960	5.8 (0.77)	1.6 (0.22)	7.5	9.0 (0.94)	0.6 (0.06)	9.6	38.3 (0.87)	5.0 (0.11)	43.8
1970	6.0 (0.68)	2.6 (0.30)	8.8	13.0 (0.93)	0.8 (0.06)	13.9	40.7 (0.85)	6.4 (0.13)	47.7
1980	3.8 (0.53)	2.5 (0.34)	7.2	11.8 (0.88)	1.2 (0.09)	13.4	34.9 (0.79)	6.5 (0.15)	44.0
1990	3.4 (0.49)	2.5 (0.35)	7.0	10.6 (0.80)	1.3 (0.10)	13.2	31.5 (0.74)	6.6 (0.16)	42.6
60-90 Change	-2.4	0.8	-0.5	1.6	0.7	3.6	-6.8	1.6	-1.2
60-90 %Change	-41%	49%	-7%	17%	131%	37%	-18%	33%	-3%
60-90 ΔFraction	(-0.28)	(0.13)		(-0.14)	(0.04)		(-0.13)	(0.04)	

Note: Cells contain population counts in millions. Entries in parentheses express these counts as a fraction of total population of the area. Numbers are constructed by the authors using counts reported in decennial censuses. The sample in columns 1-6 includes the 92 metro areas with central districts that experienced major school desegregation orders between 1960 and 1990. MSA definitions are from 1999.

Table 2: Impacts of School Desegregation on Outcomes for Whites

	1	2	3	4	5
Panel A: ln(white public enrollment in central district)					
Desegregated	-0.12** (0.05)	-0.06* (0.03)	-0.10*** (0.04)	-0.12*** (0.05)	-0.12* (0.07)
Desegregated (5+)				0.04 (0.05)	
Placebo Desegregated					-0.00 (0.08)
Panel B: ln(white population of central district)					
Desegregated	-0.06* (0.03)	-0.02 (0.02)	-0.05* (0.03)	-0.07** (0.03)	-0.06 (0.05)
Desegregated (5+)				0.06 (0.04)	
Placebo Desegregated					0.01 (0.07)
Panel C: ln(white private enrollment in central district)					
Desegregated	0.03 (0.07)	0.08 (0.07)	0.05 (0.08)	0.03 (0.07)	0.06 (0.09)
Desegregated (5+)				0.01 (0.09)	
Placebo Desegregated					0.06 (0.10)
MSA & Year-South FE	X	X	X	X	X
MSA Specific Linear Trends		X			
MSA Characteristics * Year Effects			X		

Note: The sample includes the 92 central school districts with a major desegregation order between 1960 and 1990. Each regression has 368 observations. Dependent variables are in panel headings. Desegregated is an indicator equaling one in years in which the district is under a desegregation plan. Placebo Desegregated equals one if the district was to be desegregated in one or two years. Desegregated (5+) equals one in the 5th year of desegregation and beyond. For Specification 3, MSA characteristics measured as of 1960 are percent black public enrollment in the central district, log median black income in the central district, log median white income in the central district and percent of MSA employment in manufacturing. MSA characteristics measured as of 1970 are number of districts in the MSA and log central district area. Log MSA area is also included and measured as of 1999 given the use of 1999 MSA definitions. Standard errors are clustered at the MSA level.

Table 3: Impacts of School Desegregation on Outcomes for Whites by Region

	1	2	3	4
Panel A: ln(white public enrollment in central district)				
(Deseg)*(South)	-0.14** (0.07)	-0.04 (0.05)	-0.10 (0.06)	-0.14** (0.07)
(Deseg)*(Non-South)	-0.08* (0.05)	-0.10*** (0.04)	-0.10* (0.05)	-0.08 (0.05)
(Deseg 5+)*(South)				0.08 (0.11)
(Deseg 5+)*(Non-South)				0.00 (0.06)
Panel B: ln(white population of central district)				
(Deseg)*(South)	-0.12*** (0.04)	-0.03 (0.03)	-0.08* (0.04)	-0.13*** (0.04)
(Deseg)*(Non-South)	0.04 (0.04)	-0.00 (0.01)	(0.01) (0.03)	0.04 (0.05)
(Deseg 5+)*(South)				0.11 (0.07)
(Deseg 5+)*(Non-South)				0.01 (0.04)
Panel C: ln(white private enrollment in central district)				
(Deseg)*(South)	-0.04 (0.10)	0.07 (0.10)	0.04 (0.13)	-0.04 (0.10)
(Deseg)*(Non-South)	0.16** (0.08)	0.11** (0.05)	0.07 (0.07)	0.17** (0.09)
(Deseg 5+)*(South)				0.03 (0.22)
(Deseg 5+)*(Non-South)				-0.04 (0.07)
MSA & Year-South FE	X	X	X	X
MSA Specific Linear Trends		X		
MSA Characteristics * Year Effects			X	

Note: Specifications are the same as those in Table 2 with the addition of the interaction of the desegregation treatments with region. See note to Table 2 for an explanation of the sample and variables.

Table 4: Impacts of School Desegregation on Outcomes for Blacks

	1	2	3	4	5	6
Panel A: ln(black public enrollment in central district)						
Desegregated	0.02 (0.03)	-0.00 (0.03)				
Desegregated (5+)		0.14*** (0.03)	0.14*** (0.03)	0.09*** (0.03)	0.12*** (0.03)	0.14*** (0.04)
Placebo Desegregated						0.02 (0.03)
Panel B: ln(black population of central district)						
Desegregated	0.01 (0.03)	-0.01 (0.03)				
Desegregated (5+)		0.08*** (0.03)	0.08*** (0.03)	0.04* (0.02)	0.06** (0.02)	0.08*** (0.03)
Placebo Desegregated						0.02 (0.03)
Panel C: ln(black private enrollment in central district)						
Desegregated	-0.20 (0.14)	-0.16 (0.13)				
Desegregated (5+)		-0.18* (0.10)	-0.22** (0.10)	-0.24** (0.09)	-0.28** (0.11)	-0.20** (0.10)
Placebo Desegregated						0.06 (0.16)
MSA & Year-South FE	X	X	X	X	X	X
MSA Specific Linear Trends				X		
MSA Characteristics * Year Effects					X	

Note: See note to Table 2 for an explanation of the sample and variables. Sample size is 368 in Panels A and B and 367 in Panel C because San Jose had 0 black private school students in 1970.

Table 5: Impacts of School Desegregation on Outcomes for Blacks by Region

	1	2	3	4	5
Panel A: ln(black public enrollment in central district)					
(Deseg)*(South)	-0.03 (0.04)	-0.03 (0.04)			
(Deseg)*(Non-South)	0.11** (0.05)	0.02 (0.04)			
(Deseg 5+)*(South)		0.00 (0.04)	0.00 (0.04)	0.01 (0.05)	0.02 (0.05)
(Deseg 5+)*(Non-South)		0.20*** (0.04)	0.20*** (0.04)	0.13*** (0.04)	0.17*** (0.04)
Panel B: ln(black population of central district)					
(Deseg)*(South)	-0.01 (0.03)	-0.01 (0.03)			
(Deseg)*(Non-South)	0.04 (0.04)	-0.02 (0.04)			
(Deseg 5+)*(South)		-0.00 (0.05)	-0.01 (0.05)	-0.01 (0.04)	-0.02 (0.06)
(Deseg 5+)*(Non-South)		0.12*** (0.03)	0.11*** (0.03)	0.06** (0.02)	0.09*** (0.02)
Panel C: ln(black private enrollment in central district)					
(Deseg)*(South)	-0.40** (0.18)	-0.38** (0.17)			
(Deseg)*(Non-South)	0.13 (0.18)	0.21 (0.16)			
(Deseg 5+)*(South)		-0.42* (0.22)	-0.45** (0.23)	-0.42** (0.19)	-0.62*** (0.22)
(Deseg 5+)*(Non-South)		-0.16* (0.09)	-0.10 (0.10)	-0.15 (0.09)	-0.11 (0.12)
MSA & Year-South FE	X	X	X	X	X
MSA Specific Linear Trends				X	
MSA Characteristics * Year Effects					X

Note: Specifications are the same as those in Table 4 with the addition of the interaction of the desegregation treatments with region. See note to Table 2 for an explanation of the sample and variables.

Table 6: IV Impacts of the Dissimilarity Index

	<u>log(Public Enrollment)</u>	<u>log(Pop- ulation)</u>	<u>log(Private Enrollment)</u>
	1	2	3
Panel A: Whites			
Dissimilarity Index	0.73** (0.33)	0.49* (0.28)	0.19 (0.50)
Dissimilarity Index * South	0.99* (0.52)	0.96** (0.43)	0.86 (0.67)
Dissimilarity Index * Non-South	0.30 (0.25)	-0.33 (0.26)	-0.97*** (0.33)
Panel B: Blacks			
Dissimilarity Index (5+)	-0.40** (0.17)	-0.14 (0.13)	1.63*** (0.46)
Dissimilarity Index (5+) * South	-0.03 (0.14)	0.01 (0.19)	2.02*** (0.75)
Dissimilarity Index (5+) * Non-South	-0.76*** (0.24)	-0.28 (0.19)	1.31*** (0.48)
MSA & Year-South & West FE	X	X	X

Note: Entries give coefficients and standard errors from IV regressions of central district outcomes listed in the column headings on the dissimilarity index. Within each column-panel combination, the results of two regressions are displayed: one which does not allow for regional heterogeneity and one that does permit regional heterogeneity. The desegregation indicator and the desegregation indicator interacted with an indicator for the West Census region enter as instruments for the dissimilarity index in the first-stage (not shown). In Panel B, the dissimilarity index is measured 4 years prior to outcomes and is instrumented with the desegregation (5+) indicator used in Tables 4 and 5 and the desegregation (5+) indicator interacted with an indicator for the West Census region. For the regressions allowing regional heterogeneity, the segregation indicator is interacted with a South and Non-south indicator. (The West interaction is also included and there are therefore three instruments and two first-stages in these specifications.) Standard errors are clustered at the MSA level. There are 313 observations in Panel A and 305 observations in Panel B. See the data appendix for information on the construction of the dissimilarity index variable. The first-stage F-statistics are 10.0 (Panel A, no regional heterogeneity), 9.08 (Panel A, South), 11.7 (Panel A, Non-South), 16.8 (Panel B, no regional heterogeneity), 5.4 (Panel B, South) and 11.7 (Panel B, Non-South).

Table 7: Counterfactual Trends in Central District Population by Race

Year	1970 Geography of Central School Districts		
	White	Black	All
Panel A: Population Totals			
1960	31.0 (0.80)	7.3 (0.19)	38.6
1970	30.0 (0.76)	9.0 (0.23)	39.6
1980	27.9 (0.68)	10.3 (0.25)	41.2
1990	27.9 (0.65)	10.5 (0.24)	43.3
60-90 Change	-3.1	3.2	4.6
60-90 % Change	-10%	44%	12%
60-90 ΔFraction	(-0.16)	(0.05)	
Panel B: Children Enrolled in School			
1960	5.8 (0.77)	1.6 (0.22)	7.5
1970	6.1 (0.69)	2.6 (0.29)	8.9
1980	4.1 (0.55)	2.4 (0.33)	7.4
1990	3.7 (0.52)	2.3 (0.32)	7.1
60-90 Change	-2.1	0.6	-0.5
60-90 % Change	-0.37	0.37	-0.06
60-90 ΔFraction	(-0.25)	(0.10)	

Note: Cells contain population counts in millions. Entries in parentheses express these counts as a fraction of all population (Panel A) and all children enrolled in school (Panel B). All numbers are constructed by taking data used to build the numbers in Table 1 and adding back or subtracting off white and black population and public and private enrollment using coefficients reported in Table 3 column 1 and Table 5 column 3.

Table A1: Summary Statistics

	1960	1970	1980	1990
Panel A: Central Districts (means with standard deviations in parentheses)				
Log (White Public Enrollment)	10.52 (0.72)	10.59 (0.71)	10.07 (0.75)	9.94 (0.82)
Log (White Private Enrollment)	8.66 (1.40)	8.67 (1.28)	8.60 (1.05)	8.47 (0.96)
Log (Black Public Enrollment)	9.00 (1.20)	9.53 (1.16)	9.52 (1.10)	9.59 (1.03)
Log (Black Private Enrollment)	6.05 (1.75)	6.02 (1.58)	6.40 (1.51)	6.49 (1.43)
Log(Total White Population)	12.35 (0.82)	12.34 (0.76)	12.28 (0.74)	12.25 (0.78)
Log(Total Black Population)	10.56 (1.20)	10.78 (1.18)	11.00 (1.11)	11.13 (1.05)
Fraction of Metropolitan Land Area in the Central District	0.20 (0.29)	0.20 (0.29)	0.20 (0.29)	0.20 (0.29)
Number of Districts in the Metropolitan Area		35.21 (46.04)	34.25 (43.23)	33.97 (42.56)
Desegregated Districts	0	28	88	92
Desegregated Districts (4+)	0	4	69	92

Panel B: Census Tract Aggregate Counts by Location Index
(millions)

Total White Population	0 to 0.25	9.6	8.1	6.5	5.8
	0.25 to 0.5	7.9	7.6	6.7	6.3
	0.5 to 0.75	6.6	7.2	7.0	7.1
	0.75 to 1	5.1	6.4	6.8	7.7
Total Black Population	0 to 0.25	4.3	4.3	3.9	3.5
	0.25 to 0.5	1.6	2.5	3.0	3.1
	0.5 to 0.75	0.6	1.3	2.0	2.4
	0.75 to 1	0.4	0.9	1.6	2.1
Total Tracts		8,044	9,555	10,293	10,758
Desegregated Tracts		0	1,802	9,328	10,758
Desegregated Tracts (4+)		0	416	6,543	10,758
Central Districts With Tract Data		78	89	92	92
Desegregated Central Districts		0	25	88	92
Desegregated Central Districts (4+)		0	4	69	92

Note: Panel A shows summary statistics of the data set used to generate Tables 1-7 while Panel B shows summary statistics of the data set used to generate Figures 6-8. Figures 2-3 are generated using a subset of the sample described in Panel B.

Table A2: Sample Districts and Attributes

City of Central District	State of Central School District	1970 MSA Enrollment	1970 Central District Enrollment	1970 CD Public Enrollment	1970 CD District Public % Black	Desegregation Year	County District
Panel A: Large Central School Districts in Sample							
Birmingham	AL	178	69	65	52%	1970	No
Mobile	AL	99	84	72	42%	1971	Yes
Tucson	AZ	83	56	53	4%	1978	No
Fresno	CA	115	59	57	9%	1978	No
Los Angeles	CA	1,538	698	614	23%	1978	No
Oakland	CA	377	69	60	56%	1966	No
Sacramento	CA	189	53	48	12%	1976	No
San Diego	CA	299	132	122	12%	1977	No
San Francisco	CA	279	108	84	26%	1971	Yes
Denver	CO	270	104	89	14%	1974	Yes ^C
Wilmington*	DE	110	18	14	73%	1978	No
Fort Lauderdale	FL	122	122	110	21%	1970	Yes
Jacksonville	FL	151	129	120	28%	1971	Yes
Lakeland	FL	53	53	51	23%	1969	Yes
Miami	FL	263	263	233	23%	1970	Yes
Orlando	FL	126	84	79	18%	1972	Yes
Tampa	FL	213	112	102	18%	1971	Yes
Titusville	FL	63	62	58	11%	1969	Yes
West Palm Beach	FL	72	72	64	27%	1970	Yes
Atlanta	GA	411	95	88	64%	1973	No
Chicago	IL	1,674	724	542	54%	1982	No
Indianapolis	IN	305	110	98	35%	1973	No
Wichita	KS	101	67	61	13%	1971	No
Louisville*	KY	226	60	50	45%	1975	No
Baton Rouge	LA	97	72	65	34%	1970	Yes
New Orleans	LA	293	141	105	66%	1961	Yes
Shreveport	LA	84	57	53	45%	1969	Yes
Boston	MA	943	118	85	30%	1974	No
Baltimore	MD	498	208	178	65%	1974	Yes
Detroit	MI	1,131	322	261	63%	1975	No
Minneapolis	MN	502	77	63	8%	1974	No
Kansas City	MO	329	75	65	47%	1977	No
St. Louis	MO	604	134	106	64%	1980	Yes
Charlotte	NC	197	86	82	29%	1970	Yes
Omaha	NE	143	78	58	18%	1976	No
Newark	NJ	455	90	78	71%	1961	No
Las Vegas	NV	71	64	61	12%	1972	Yes
Buffalo	NY	326	97	69	37%	1976	No
Akron	OH	166	63	54	26%	1977	No
Cincinnati	OH	352	102	77	43%	1973	No
Cleveland	OH	582	169	138	56%	1979	No
Columbus	OH	263	110	96	27%	1979	No
Dayton	OH	236	63	54	36%	1976	No
Toledo	OH	144	75	57	26%	1980	No
Oklahoma City	OK	168	74	69	21%	1972	No
Tulsa	OK	125	77	73	13%	1971	No
Portland	OR	251	81	70	8%	1974	No
Philadelphia	PA	1,134	411	265	60%	1978	Yes
Pittsburgh	PA	622	107	70	39%	1980	No
Charleston	SC	88	63	56	45%	1970	Yes
Greenville	SC	141	58	55	21%	1970	Yes

Memphis	TN	220	159	148	49%	1973	No
Nashville	TN	159	102	93	23%	1971	Yes
Austin	TX	84	57	55	15%	1980	No
Dallas	TX	374	177	164	32%	1971	No
El Paso	TX	101	63	60	3%	1978	No
Fort Worth	TX	187	87	83	26%	1973	No
Houston	TX	469	252	235	32%	1971	No
San Antonio	TX	231	83	73	15%	1969	No
Norfolk	VA	262	61	55	41%	1970	No
Seattle	WA	342	95	82	12%	1978	No
Milwaukee	WI	343	158	120	25%	1976	No

Panel B: Large Central School Districts Not in Sample

Washington	DC	754	153	135	93%	None	Yes
Albuquerque	NM	103	86	80	3%	None	Yes
New York	NY	1,746	1,468	1,088	35%	None	Yes

Panel C: Medium Sized Central School Districts in Sample

Little Rock	AR	87	28	26	38%	1971	No
San Bernardino	CA	277	38	36	14%	1978	No
San Jose	CA	268	37	35	2%	1986	No
Vallejo	CA	58	14	13	25%	1975	No
Hartford	CT	242	31	26	46%	1966	No
Daytona Beach	FL	33	32	30	22%	1969	Yes
Fort Myers	FL	20	20	19	18%	1969	Yes
Albany	GA	25	23	22	40%	1980	Yes
Columbus	GA	58	40	39	31%	1971	Yes
Rockford	IL	77	44	38	11%	1973	No
Fort Wayne	IN	104	51	39	14%	1971	No
South Bend	IN	58	41	34	16%	1981	No
Lexington-Fayette	KY	64	36	34	16%	1972	Yes
Alexandria	LA	30	30	28	32%	1969	Yes
Houma	LA	40	21	20	17%	1969	Yes
Lake Charles	LA	40	40	38	25%	1969	Yes
Springfield	MA	133	37	28	20%	1974	No
Grand Rapids	MI	205	48	33	21%	1968	No
Lansing	MI	88	32	29	12%	1972	No
Wilmington	NJ	25	19	18	29%	1969	Yes
Jersey	NY	121	54	35	41%	1976	No
Rochester	NC	237	56	41	33%	1970	No
Lawton	OK	23	21	20	14%	1973	Yes
Columbia	SC	74	42	40	43%	1970	No
Amarillo	TX	34	30	28	6%	1972	Yes
Lubbock	TX	42	34	33	11%	1978	No
Odessa	TX	43	24	24	6%	1982	Yes
Waco	TX	32	19	18	21%	1973	No
Roanoke	VA	44	19	18	26%	1970	Yes ^C
Tacoma	WA	95	39	35	9%	1968	No

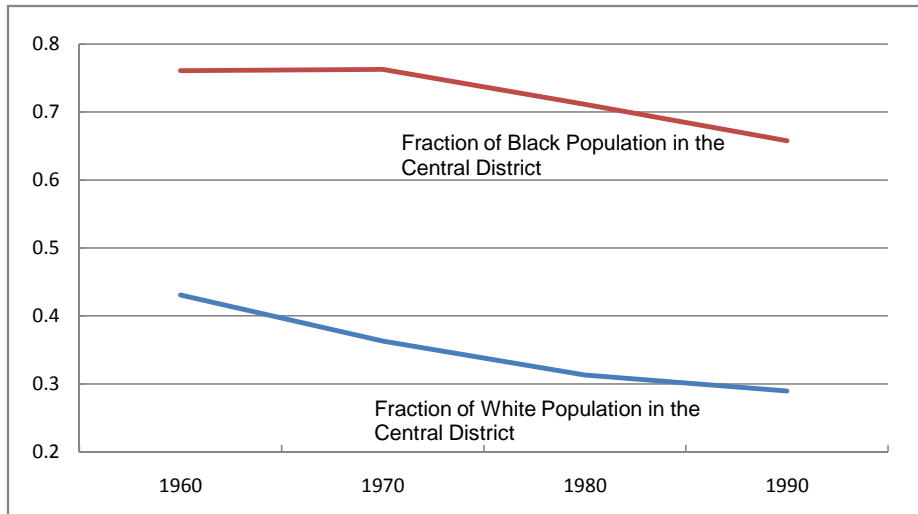
Note: Panel A lists information on central school districts that had enrollment exceeding 50,000 in 1968 as measured in Welch and Light (1987). Welch and Light use school district reported enrollments as of 1968, in contrast to the 1970 Census based enrollment measure reported here. Panel B lists information on those central districts with enrollment exceeding 50,000 in 1968 which were not included in the sample because of never having a major desegregation order or because of very high or low minority enrollment. Panel C lists all remaining central districts in the sample as investigated by Welch and Light. These districts had enrollment between 15,000 and 50,000 in 1968 and were 10 to 90 percent black. All numbers are for 1970 district geographies. ^ADistrict consolidated into one or more surrounding districts at some point after 1970. ^CThis district is or was comprised fully of one county that changed over time.

Table A3: Impacts of Desegregation on MSA Level Outcomes

	ln(public enrollment)	ln(total population)	log(private enrollment)
	1	2	3
Panel A: White			
(Deseg)*(South)	-0.02 (0.04)	-0.04 (0.03)	0.09 (0.07)
(Deseg)*(Non-South)	0.00 (0.03)	0.02 (0.03)	0.08 (0.08)
Panel B: Black			
(Deseg)*(South)	0.00 (0.02)	0.01 (0.02)	-0.43*** (0.16)
(Deseg)*(Non-South)	-0.13 (0.09)	-0.10 (0.09)	-0.01 (0.18)
(Deseg 5+)*(South)	-0.01 (0.03)	-0.01 (0.04)	-0.33 (0.24)
(Deseg 5+)*(Non-South)	0.14** (0.03)	0.08** (0.03)	-0.06 (0.08)
MSA & Year-Reg. FE	X	X	X

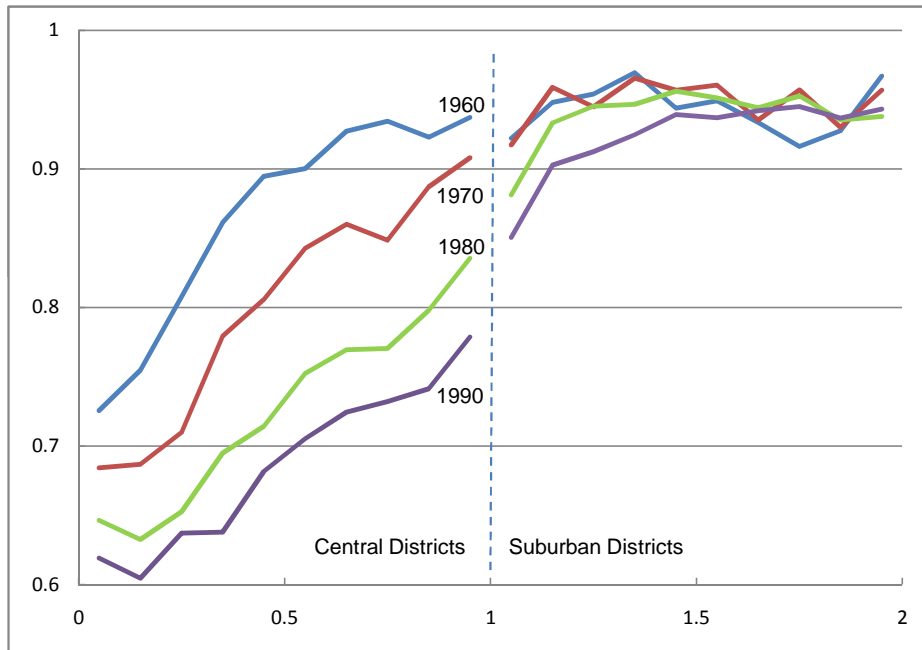
Note: The unit of observation is the MSA. Sample size is 368 in both Panels A and B.

Figure 1: Fraction of Metropolitan Population in Central Districts by Race



Note: Numbers used to construct this figure match those in Table 1 Panel A.

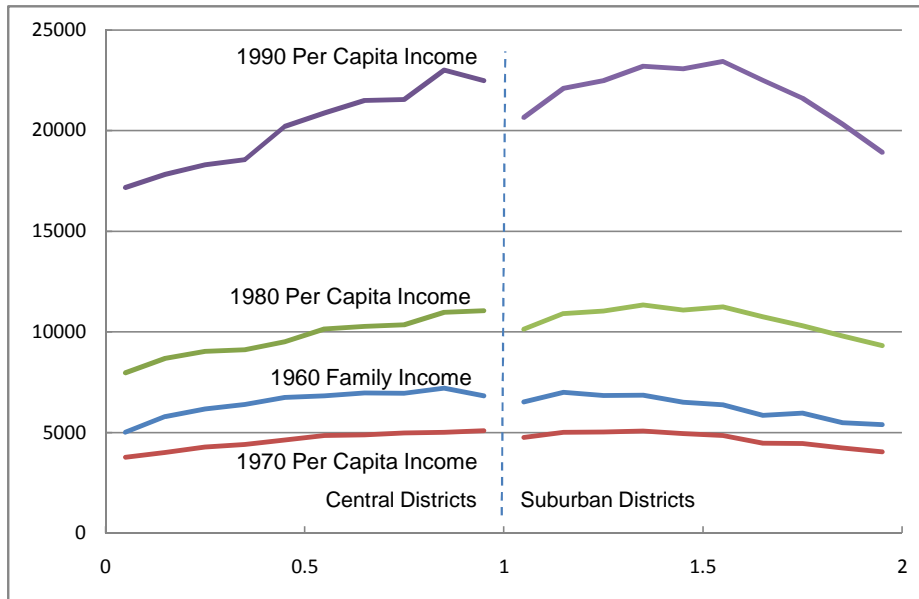
Figure 2: Fraction White by Residential Location



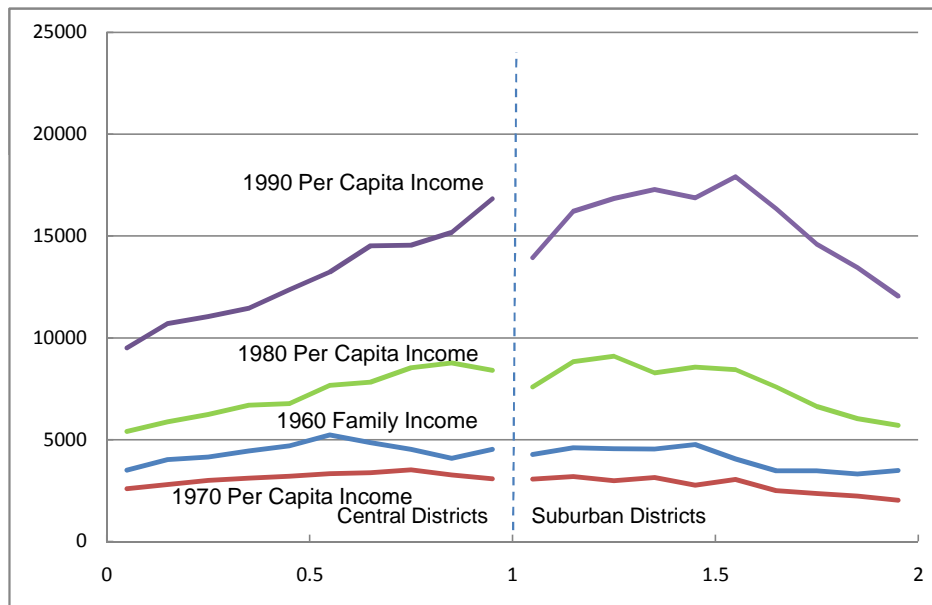
Note: Graph shows the average ratio of residential white to white plus black population as a function of CBD distance across metropolitan areas in our sample for which census tract data are available. The sample includes the 64 metropolitan areas with central districts that were tracted in 1960 and experienced major desegregation orders. Metropolitan areas with fewer than 6 suburban tracts in any year are excluded. Each metropolitan area is weighted equally at all locations on the graph. The horizontal axis shows locations indexed as the cumulative distribution functions of 1990 population with respect to CBD distance inside and outside of central districts.

Figure 3: Income by Race and Residential Location

Panel A: Whites

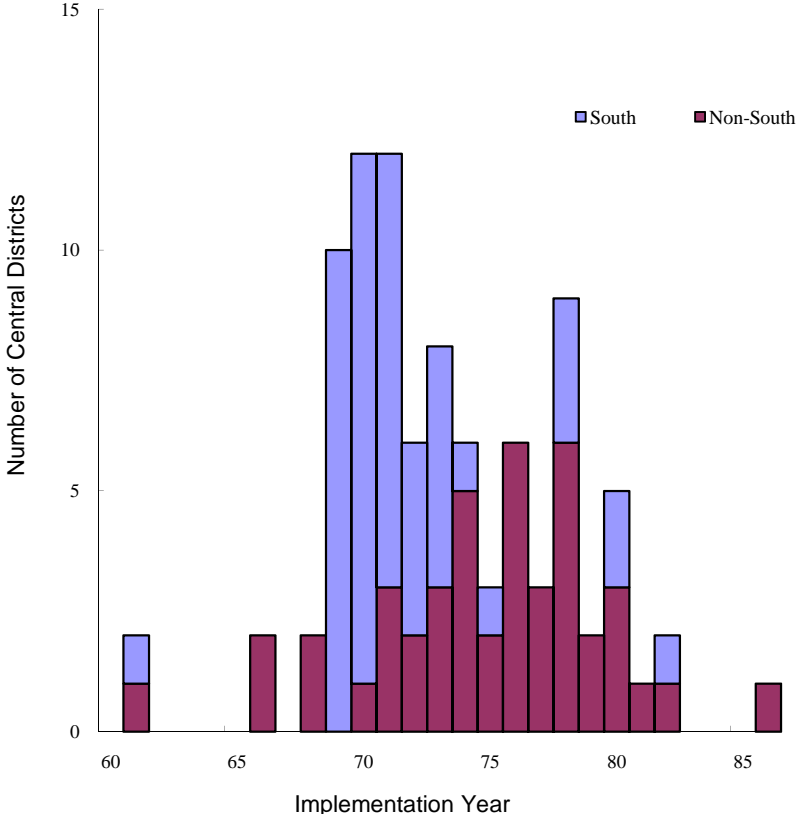


Panel B: Blacks



Note: Graphs show median family or per capita income by race as a function of CBD distance across metropolitan areas. See the notes to Figure 2 for explanations of the sample, distance metric and weighting.

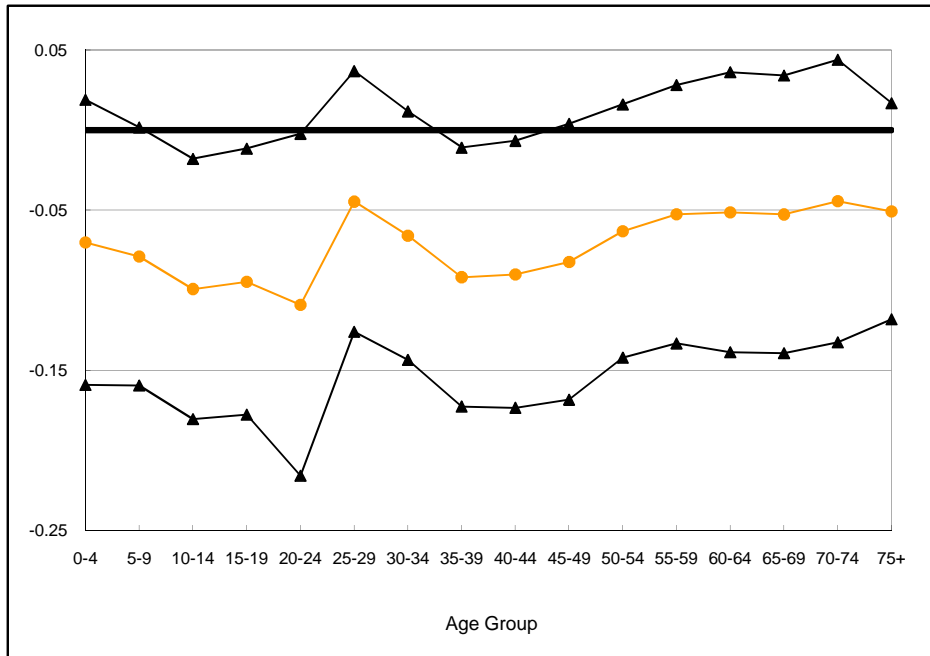
Figure 4: Timing of School Desegregation



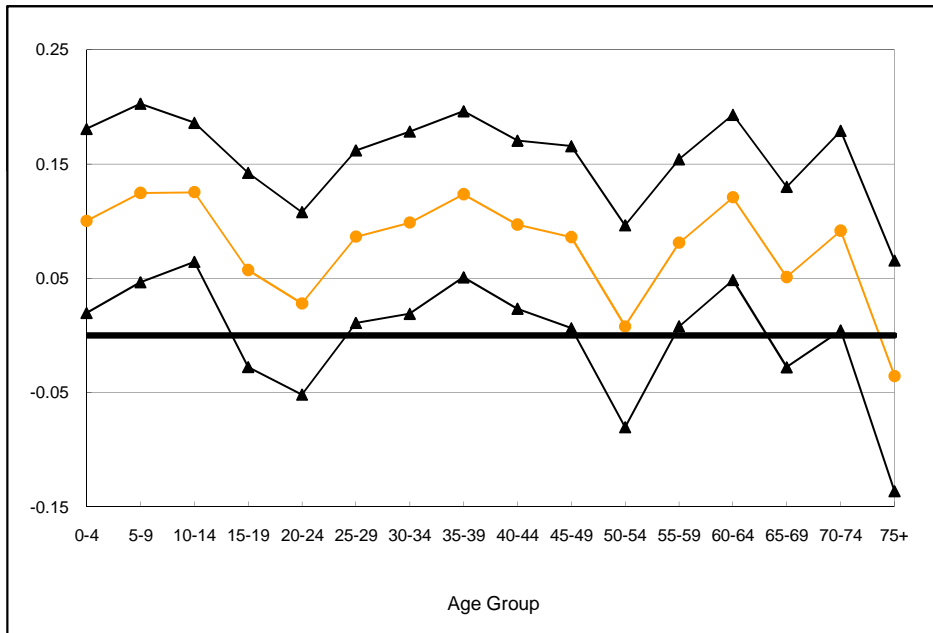
Note: The sample includes the 92 central school districts from the Welch and Light (1987) study that experienced major court-ordered desegregation between 1960 and 1990.

Figure 5: Impacts of School Desegregation on Total Population by Age

Panel A: White Population



Panel B: Black Population



Note: Graphs show 95% confidence intervals around point estimates of the effects of desegregation on population by race and age in central districts. Each point estimate is the coefficient on the desegregation dummy variable from separate regressions of log population for each age group listed on the x-axis on independent variables in Table 2 Specification 1 for whites and Table 4 Specification 3 for blacks.

Figure 6: Impacts of School Desegregation on Public School Enrollment

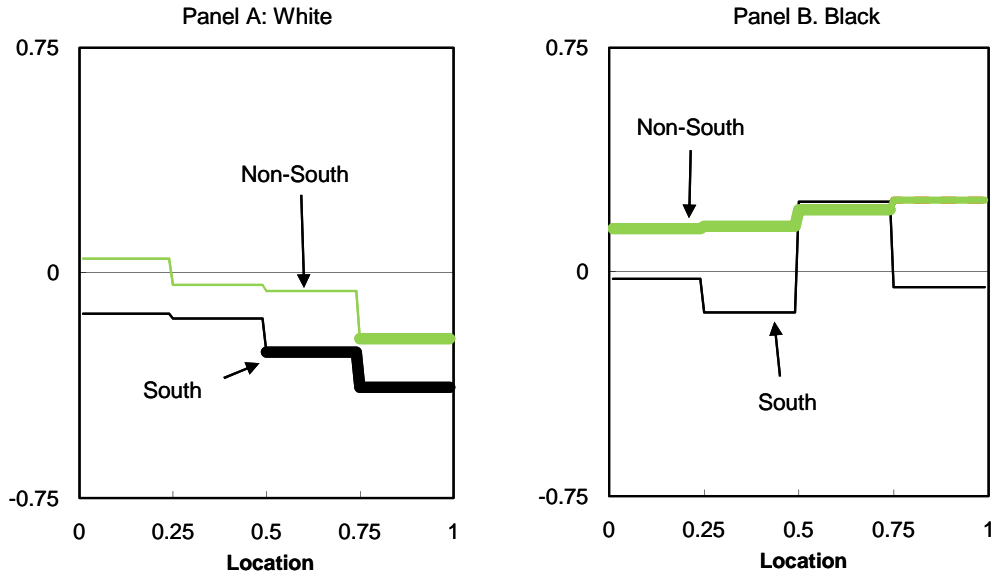
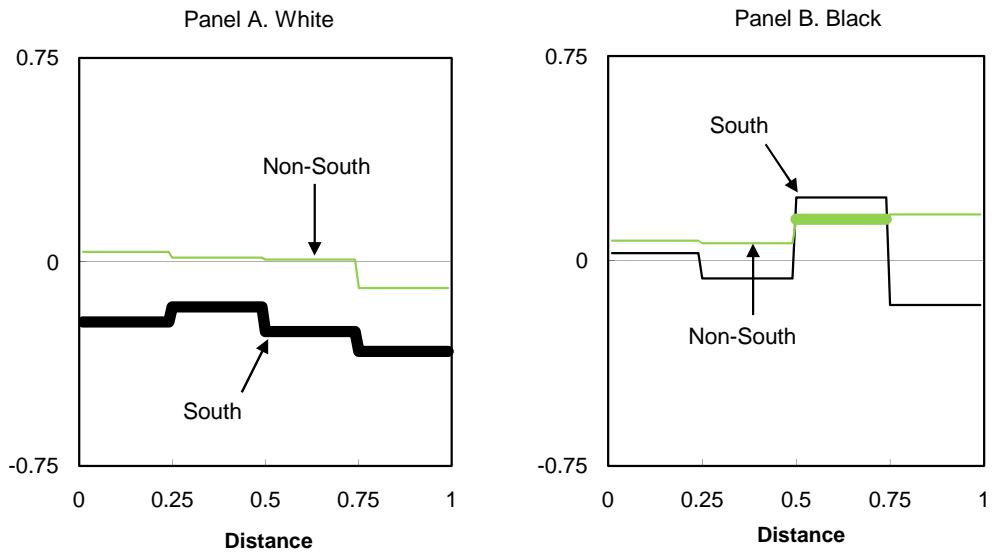
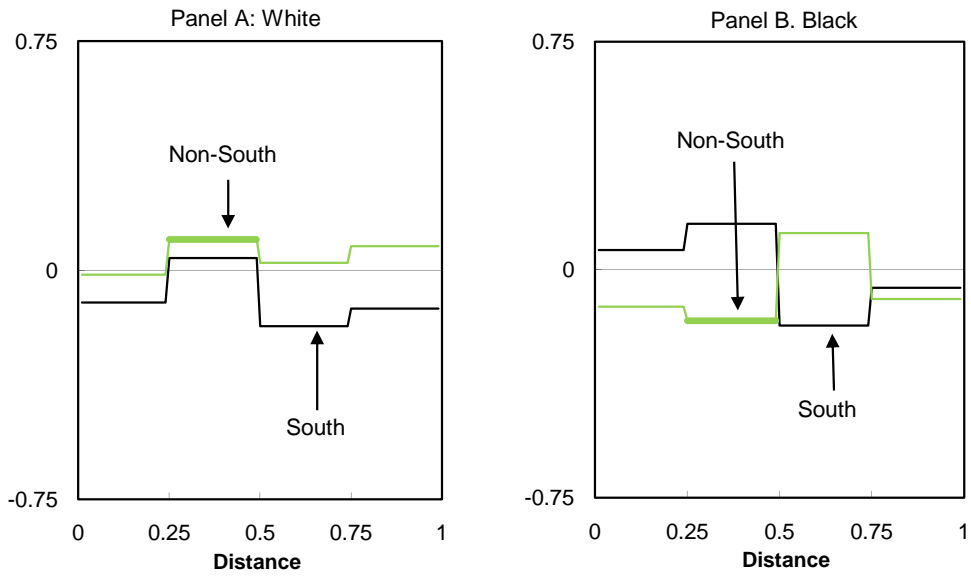


Figure 7: Impacts of School Desegregation on Total Population



Note: Each graphed line segment is a coefficient from a separate Poisson regression described in Equation (2) in the text. Samples include only the census tracts from 1960-1990 that fall within indicated distance intervals. The horizontal axis gives location within central districts using the same metric as that used for Figures 1 and 2. Thickness of the lines show statistical significance. Thin lines are not statistically different from 0, medium thickness are significant at the 10% level and bold lines are significant at the 5% level. Standard errors are calculated based on 500 bootstrap replications sampling using MSA clusters with replacement. Table A1 Panel B presents summary statistics of the census tract data.

Figure 8: Impacts of School Desegregation on Private School Enrollment



Note: See the notes to Figures 6 and 7 for an explanation of the distance metric, sample and estimation method.