Desegregation and Educational Attainment for Blacks: Evidence from Louisiana

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Abstract

The desegregation of Southern schools following the Supreme Court's 1954 *Brown* decision was one of the more important innovations in U.S. education policy in the 20th century. This paper assesses the effects of desegregation of Louisiana schools on its intended beneficiaries, black students. Substantial reductions in segregation between 1965 and 1970 were accompanied by large increases in per-pupil funding in Louisiana, allowing districts to "level up" school spending in integrated schools to that previously experienced only in the white schools. Pre-existing black-white spending gaps were largest in districts with higher initial black enrollment share, so blacks in higher black enrollment share districts experienced larger increases in funding, compared to their counterparts in lower black enrollment share districts. On the other hand, blacks in high black enrollment share districts saw smaller increases in exposure to whites (who were higher-income). A one standard deviation increase in initial black enrollment share was associated with an additional increase in per-pupil funding of $290 (2003 dollars) but a 14 percentage point smaller increase in exposure to whites. Blacks in high black enrollment share districts also experienced larger improvements in educational attainment, suggesting that the increase in funding associated with desegregation was more important than the increased exposure to whites. A one standard deviation increase in initial black enrollment share was associated with an additional improvement in high school graduation rates of about 3.3 percentage points.

The Supreme Court's 1954 decision in *Brown v. Board of Education*—and the desegregation of schools that followed—was perhaps the most important development in U.S. education policy of the last century. Before *Brown*, Southern schools were explicitly and completely segregated by law, and many blacks attended schools that received fewer resources than those attended by their white counterparts.[1] Previous work has shown that desegregation policy reduced segregation and increased blacks' exposure to whites in school. In the case of Louisiana, school desegregation was also accompanied by dramatic changes in the state's system of school finance that, together with large increases in Federal funding, increased the average spending in the schools blacks attended. Desegregation in Louisiana virtually eliminated black-white gaps in student-teacher ratios within districts. Historically, those gaps had been largest in districts with high black enrollment shares, so blacks in those districts saw particularly large improvements in their school quality over the short period of desegregation. Thus, the desegregation experience in Louisiana provides a unique setting in which to study the effects of large increases in school funding over a short period, contributing both to the literature on the effects of desegregation and the lengthy literature on the effects of school resources on educational outcomes.

After years of resistance, segregation in Louisiana's schools fell dramatically between 1965 and 1970. At the same time, average per-pupil funding for schools increased by about $1,000 to more than $3,700 (constant 2003 dollars). But this new money was not distributed equally to all districts. Instead, districts with high black enrollment shares garnered substantially larger increases in funding. In Reber (2004), I show that these

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[1] The Coleman Report (1966) and Card and Krueger (1992) suggest that black-white school resource gaps had closed substantially over the first half of the 20th century, but were still present. According to Card and Krueger (1992), in 1954 the average student-teacher ratio for blacks was about 10 percent higher for blacks in Southern and Border states, compared to their white counterparts. Data for Louisiana show that in 1955 the average district's instructional spending for blacks was only about 71 percent of instructional spending for whites.

disproportionate increases in revenue for higher black enrollment share districts were necessary to prevent whites in those districts from seeing their school quality fall and were at least partly caused by desegregation policy. On the other hand, blacks in districts with higher black enrollment shares saw *smaller* increases in exposure to whites (since there were fewer whites in those districts).

In this paper, I examine the effects of these two changes—increases in black exposure to whites and increases in funding for blacks' schools—on educational attainment using variation in changes in these variables related to differences in districts' initial black enrollment share. Because changes in spending and exposure are both so closely tied to the black enrollment share (positively and negatively, respectively), I cannot separately identify the effects of these two factors. Instead, I estimate the net effect of desegregation-induced changes in funding and peers. Newly collected annual data on school registration (enrollment) by race and grade and the number of high school graduates by race for Louisiana school districts allow me to estimate the fraction of black 8th grade students continuing to 10th, 11th, and 12th grade and graduating from high school for cohorts of students before and after desegregation.

The results indicate that the rate of continuing to the 11th and 12th grade, as well as high school graduation rates, increased more in higher black enrollment share districts after desegregation, suggesting that the additional resources that came with desegregation were more important than increased exposure to whites in increasing black educational attainment. It would also be interesting to know what the effect of desegregation was for white students. Unfortunately, non-random migration of white students—in particular, "white flight" from districts with high black enrollment shares to "whiter" districts— precludes conducting a similar analysis for whites.

The paper proceeds as follows: Section II provides background on the legal history of desegregation, Louisiana's experience with desegregation, and the existing literature on the effects of desegregation; Section III discusses the effects of desegregation on funding and black exposure to whites; Section IV presents the results assessing the effects of desegregation on educational attainment; Section V concludes.

II. Background and Previous Literature

Desegregation Policy and Trends in Segregation

In 1954, the Supreme Court declared separate schools for black and white children to be "inherently unequal." But neither the 1954 *Brown* decision nor the 1955 *Brown II* decision was specific about what districts were required to do to comply with this new doctrine, and little progress was made for several years. To examine trends in segregation for Louisiana, I compiled data on segregation at the district level from Department of Health, Education and Welfare (HEW) Office of Civil Rights (OCR) surveys for 1967-1976. For 1960 to 1966, black exposure to whites was estimated based on data collected by the Southern Education Reporting Service and published in various editions of *Statistical Summary of School Segregation-Desegregation in the Southern and Border States*. Exposure of blacks to whites had to be imputed for some districts in some years. [2]

The data reveal three major turning points for segregation, corresponding to changes in legislation and the courts' interpretation of the *Brown* decision. Figure 1 shows trends in two commonly used measures of segregation: black exposure to whites and white exposure to blacks. Black exposure to whites can be interpreted as the white enrollment share of the

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[2] SERS reports the share of black students in school with any whites. When only a small share of blacks were in school with whites, exposure of blacks to whites is approximately equal to the share of blacks with any whites (since those in school with whites were in schools that were virtually 100 percent white and the remaining blacks were in schools that were virtually 100 percent black). The segregation data are described in greater detail in the Appendix.

average black's school (and vice-versa for white exposure to blacks); increases in black exposure to whites indicate that blacks are in school with more whites, indicating a decline in segregation.

Before the 1965 school year (all years refer to the fall of the school year), there was very little progress toward desegregation; in 1964, only about 1.2 percent of black students statewide were in school with any whites, and 61 of 64 counties still had completely segregated schools. The 1964 Civil Rights Act (CRA) gave the Justice Department the authority to join desegregation cases, and denied Federal funding to segregated districts, while the 1965 Elementary and Secondary Education Act expanded Federal funding for education significantly. Together, these policies are thought to have brought about the first moves towards desegregation in many Southern districts between 1965 and 1968.[3] In 1968, only 11 of 64 counties in Louisiana were still completely segregated, but the average black was still in a school that was about 8 percent white, while whites comprised over 60 percent of enrollment. Finally, following the Supreme Court's decision in *Green* (1968), more large-scale desegregation plans began to be required. By 1970, the average black Louisianan was in a school that was more than 30 percent white, and segregation stayed around that level through at least 1976.

Desegregation and Black Educational Attainment: Mechanisms

In a standard model of human capital accumulation, individuals attend an additional year of school if the return on the labor market is greater than the discount rate. Desegregation could increase the return to schooling by changing school quality for blacks through two main channels. First, desegregation clearly changed the composition of students in blacks' schools, as black exposure to whites increased. Previous work has found a negative

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[3] See, for example, Card and Krueger (1992) and Boozer, et al (1992).

relationship between the black share of enrollment and educational outcomes, but it is unclear whether this relationship is causal or if school quality on other dimensions and student background varies with black enrollment share.

Second, desegregation changed the average spending—and possibly other, less-tangible aspects of school quality—in schools blacks attended by moving them to higher-spending formerly white schools. In the case of Louisiana, desegregation also increased overall average school spending so that spending could be equalized by "leveling up" to the levels previously experienced only in the white schools, rather than "leveling down" closer to that of the formerly black schools. There was significant variation across districts in Louisiana in how much these two factors changed with desegregation, depending on the initial black enrollment share.

Previous Literature: The Effects of Desegregation on Education Outcomes

Many studies have examined the effects of desegregation in a particular district or a small number of districts, and have come to varying conclusions about the benefits of desegregation.[4] A number of larger-scale studies have examined the relationship between the racial composition of students' schools or classes and educational outcomes, but have been less able to focus on changes in the racial composition due to desegregation policy, as opposed to self-selection into districts with different racial composition. Guryan (forthcoming) is a recent exception, which I discuss further below.

The *Equality of Educational Opportunity* study, also known as the Coleman Report (1966) was the first to document a negative relationship between being in predominately black schools and lower student test scores. Boozer, et al. (1992) use the National Survey of Black Americans data from 1979-1980 to show that blacks who attended segregated high

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[4] St. John (1975), Crain and Mahard (1981), Cook (1984), and Armor (2002) (reviewed in Guryan (forthcoming)).

schools had lower educational attainment and lower wages. Rivkin (2000) similarly finds that among a cohort of students who were sophomores in 1980, those who went to schools with higher black enrollment shares had lower test scores, educational attainment, and earnings. To assess the role of desegregation policy more directly, Boozer, et al. instrument for being in a segregated high school with an interaction of the state where an individual grew up and whether they went to high school after 1964 (when there appear to have been reductions in segregation in Southern and Border states); the point estimates suggest that being in a segregated school is bad for blacks' outcomes, but the estimates are quite imprecise.

Card and Krueger (1992, 1996) examine the effects of pre-*Brown* narrowing of black-white school quality gaps in Southern and Border states and North and South Carolina on wages. They conclude that improvements in resources in the black schools relative to white schools improved wages for blacks and contributed to the subsequent narrowing of the black-white wage gap. This paper shows that black-white school quality gaps persisted in Louisiana after the period examined by Card and Krueger and examines the effects of the virtual elimination of these gaps due to desegregation in the late 1960s.

Guryan (forthcoming) provides the best-identified effects of desegregation *plans*. He exploits variation in the timing of implementation of desegregation plans across districts, using Census data to assess the effects of desegregation on black high school drop-out rates for a national sample of large school districts implementing major court-ordered desegregation plans. He compares changes in dropout rates between the 1970 and 1980 Censuses for districts that implemented a plan during that decade to changes for those that implemented plans before 1970 and after 1980. He estimates that implementation of a desegregation plan reduced dropout rates for blacks by about 3 percentage points. This paper complements Guryan's by using a different methodology and source of variation to

examine the effects of desegregation on educational outcomes. In addition, I am able to examine the mechanisms—namely changes in funding and peers—by which desegregation may affect outcomes.

III. The Effects of Desegregation on Funding and Black Exposure to Whites

Before turning to the analysis of educational attainment, I first outline how desegregation policy affected the funding of Louisiana schools and changes in blacks' exposure to whites. Annual data on revenue by source, teachers by race, registration by race and grade and the number of high school graduates by race were compiled from the *Annual Financial and Statistical Report* of the Louisiana Department of Education.[5] This section draws heavily on Reber (2004), which documents changes in student-teacher ratios and school finance in greater detail.

Race and School Finance before Desegregation: the Importance of Black Enrollment Share

In order to understand the changes in districts' finances, one must first understand the pre-desegregation school finance regime in the South, in particular the importance of a district's black share of enrollment in its finances. Despite the requirement set out in the Supreme Court's *Plessy* decision that black and white schools be "separate but equal," large gaps between spending on black and white schools were present throughout the South in the first half of the 20th century and in Louisiana persisted into the 1960s. Before *Brown*, black-white spending gaps were largest in states, counties, and school districts with higher black enrollment shares. Research on school finance in the South during this period[6] suggests an explanation for this relationship: Southern state governments generally distributed aid on a

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[5] Louisiana has 64 school districts that correspond to counties (which are called parishes in Louisiana); at the beginning of the period, there were also 3 city school districts, one of which consolidated with its county in the late 1960s. I aggregate to the county level for all years, leaving 64 observations. I exclude Cameron Parish from the analysis, because it has unusually high revenue from oil wells on school property (see Reber (2004)).

[6] See Bond (1934), Margo (1990), and Card and Krueger (1992).

per-pupil basis, but local school officials had discretion over how to distribute aid among black and white schools. Under this system, whites in districts with large black populations could satisfy their increasing demand for school quality by directing state money allocated for black students to white schools, resulting in a significant within-district black-white spending gap. From the perspective of whites in local school districts, black students had positive "fiscal externalities," since the white schools could "skim" some of the state revenue allocated to the black children.

Data for Louisiana suggest that this system still operated into the 1960s.[7] The persistence of black-white school quality gaps in Louisiana and the relationship between a district's black share of enrollment and black-white school quality gaps is striking. Despite the "separate but equal" requirement of *Plessy* (never mind the desegregation requirements of *Brown*), in 1965, the average student-teacher ratio for blacks was 27 compared to 23 for whites,[8] and gaps were larger in districts with higher black enrollment shares. Figure 2 shows the relationship between the 1960[9] black enrollment share and the black-white gap in student-teacher ratios (black student-teacher ratio less white student-teacher ratio) for 1965, before significant desegregation had occurred. The slope of the regression line in Figure 2 is

[7] There is a political economy explanation for the persistence of this system of school finance. Representatives to the state legislature were allocated based on total population, but blacks were generally not permitted to vote. Whites in districts with high black enrollment shares were over-represented in the legislature relative to whites in low black enrollment share districts. This may account for the between-district inequality of funding across districts among whites that the system perpetuated.

[8] Normally, school-level data would be required to calculate the average student-teacher ratio separately for blacks and whites. When students and teachers are completely segregated by race (black teachers only teach black students), the student-teacher ratio for blacks in the district can be calculated using the total number of black students and black teachers (and similarly for whites). According to the Southern Education Reporting Service, students and teachers in Louisiana were still completely segregated through at least 1966, with the exception of the Orleans Parish school district. The Louisiana Department of Education's *Annual Financial and Statistical Report*, from which these data were collected, also published instructional spending separately for blacks and whites through 1959-60, when the average district spent 72 cents per pupil in the black schools for every dollar in the white schools. According to Margo (1990), this ratio was less than 20 cents per dollar around 1910.

[9] Throughout the analysis, I use the black enrollment share for 1960 because 1960 is early enough that the black enrollment share was plausibly unaffected by desegregation policy. In fact, districts' black enrollment share is very stable over time, and the results are very similar if the black enrollment share from another year is used.

7.5 with a t-statistic of 3.4, indicating that a 10 percentage point increase in black enrollment share was associated with an increase in the black-white student-teacher ratio gap of about three-quarters of a student.

By requiring blacks and whites to attend the same schools, desegregation reduced whites' ability to divert funding for black children to their own schools.[10] Without increases in funding, whites would see larger increases in student-teacher ratios when their schools combined and whites moved towards the district average student-teacher ratio. These declines would have been larger in high black enrollment share districts because the gap between the white student-teacher ratio and the average student-teacher ratio was larger in those districts. However, this did not happen, as overall per-pupil spending increased during the period of desegregation. Further, the increases in funding were significantly larger for districts with higher black enrollment shares—*the same districts where whites would have seen their school quality fall more without new money*—preventing substantial student-teacher ratio increases for whites.

Figure 3 shows the relationship between 1960 black enrollment share and the black-white student-teacher ratio gap for 1970 on the same scale as that for Figure 2 (showing the same relationship for 1965). The black-white gap in student-teacher ratios was virtually eliminated and the relationship between the black-white gap and black enrollment share disappeared.[11] This meant that blacks in higher black enrollment share districts saw significantly larger reductions in student-teacher ratios, compared to blacks in lower black enrollment share districts, as the pre-desegregation school finance system unraveled. Figure

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[10] Some ability to direct resources within schools to whites, especially through tracking in high school, most likely offset some of the reduction in between-school inequality.

[11] Black and white student-teacher ratios were calculated for the 1970 school year based on school-level OCR data. The student-teacher ratio was calculated for each school. For the black student-teacher ratio at the district-level, the school-level ratios were weighted by black enrollment; the white student-teacher ratio was constructed similarly.

4 shows how the student-teacher ratio for blacks changed between 1965 and 1970 for districts with different initial black enrollment shares. The slope of the regression line is -8 (with a t-statistic of 3.15), indicating that blacks in districts with a 10 percentage point higher initial black enrollment share saw a 0.8 student larger decline in student-teacher ratios, on average, during those five years.[12] I examine whether these substantial differential changes in student-teacher ratios, and the large changes in black exposure to whites that accompanied desegregation, corresponded to differential changes in educational attainment for blacks in higher black enrollment share districts.[13]

The Effects of Desegregation on School Funding and Black Exposure to Whites

The analysis of the effects of desegregation on school resources has so far focused on student-teacher ratios by race. The student-teacher ratio is a useful measure because—unlike per-pupil spending, which is measured only at the district level and is not reported separately by race—the student-teacher ratio is a race-specific measure of school resources. However, race-specific student-teacher ratios cannot be constructed for all of the years of interest;[14] annual data on per-pupil revenue are available and provide a more complete picture of how resources changed differentially in high and low black enrollment share

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[12] To calculate race-specific student-teacher ratios for 1970, I use school-level data on students and teachers by race collected by the Office of Civil Rights (OCR). I calculate the student-teacher ratio for each school, and weight each school's student-teacher ratio by the number of black students in the school (for the black student-teacher ratio). The district-level data on the number of students and teacher by race cannot be used to calculate race-specific student teacher ratios after 1965, but I can calculate the student-teacher ratio for blacks and whites together using both datasets for 1970. The OCR data indicate that the average student-teacher ratio was 23, while the average based on the *Annual Report* data (used to estimate the 1965 student teacher ratios) was 21.4. This suggests that the reduction in student-teacher ratios from 1965 to 1970 is likely underestimated due to the change in data source. It is less clear how the change of data source would affect the measurement of student-teacher ratios for districts with different black enrollment shares.

[13] Cameron Parish is excluded from the analysis, as it had unusually large local revenues from oil wells on school property. See Reber (2004) for more information.

[14] To construct race-specific student-teacher ratios after desegregation, one can no longer divide the number of black students by the number of black teachers in the whole district (and similarly for whites) because white teachers were teaching black students and vice-versa. Instead, school-level (or ideally classroom-level) data are necessary. I was able to obtain these data only for 1970; data from that year indicate a substantial narrowing of black-white gaps in student-teacher ratios and show that the relationship between black student-teacher ratio and 1960 black enrollment share was negative; that is, blacks in higher black enrollment share districts attended schools with smaller classes in 1970, compared to blacks in whiter districts.

districts over time, showing that changes in financing were closely times with desegregation and not simply trending continuously over the period. To show the changing relationship between per-pupil revenue and black enrollment share, I estimate simple regressions of the following form (I will estimate similar equations for educational outcomes below):

$$(1) \quad Outcome_{it} = \theta_t + 1960\%black_i \times \beta_t + \varepsilon_{it},$$

where $Outcome_{it}$ is the outcome of interest for district i in year t, and $1960\%black_i$ is the black share of enrollment in 1960 for district i.[15] Separate intercepts (θ_t) and coefficients (β_t) are estimated for each year. This is equivalent to estimating univariate regressions of outcome on $1960\%black$ percent black separately for each year (the constant and main $1960\%black$ effect are excluded in favor of a full set of year effects and interactions). I present results from estimating equation (1) graphically to show how the relationship between black enrollment share and funding changed sharply during the period of desegregation. The diamonds in Figure 5 (left scale) plot the coefficients on $1960\%black$ by year from the regression with per-pupil revenue (in constant 2003 dollars) on the left-hand side. The fact that the coefficient increased dramatically between 1965 and 1970 indicates that high black enrollment share districts saw substantially larger increases in per-pupil revenue during that time.[16] Between 1965 and 1970, the coefficient on $1960\%black$ rose by $1,437, implying that a district at the 90th percentile of the distribution (64 percent black) would expect to see an increase in per-

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[15] I use the black enrollment share for 1960 because it is early enough to have been plausibly unaffected by desegregation. The black enrollment share is quite persistent over time, and using the share from other years before 1965 yields similar results.

[16] In Reber (2004), I show that these disproportionate increases in revenue came about equally from new Federal funding through the Elementary and Secondary Education Act and from the state through the Minimum Foundation Program. I also show that controlling for other pre-existing characteristics of districts, such as percent urban, percent with low income, percent with complete plumbing, and population does not affect the change in the coefficient on percent black between 1965 and 1970. For purposes of this paper, it is less important where the additional revenue came from than the size and sharpness of the differential increase for high black enrollment share districts.

pupil reevenue that was \$647 more than a district at the 10th percentile of the *1960%black* distribution (19 percent black).

Black exposure to whites also changed differentially in high black enrollment share districts. The circles in Figure 5 (right scale) show similar results for equation (1) with black exposure to whites on the left hand side. Before desegregation, blacks in all districts had the same level of exposure to blacks—none. But after desegregation, whites in districts that initially had low black enrollment shares had significantly higher exposure to whites. This is expected, as even if schools within districts are integrated, blacks cannot be exposed to many whites if there are not many whites in their district.

Whether blacks in higher enrollment share districts are expected to have more or less improvement in educational outcomes as a result of desegregation depends on whether exposure to whites (who probably also had higher achievement) *per se* or exposure to more resources is more important. Because changes in both spending and revenue are so closely tied to the initial black enrollment share, their effects cannot be separately identified, and the estimated differential change in educational attainment represents the net effect of changes in peers and changes in funding.

Three clear periods emerge in both Figure 1 (trends in average segregation) and Figure 5: "Before" desegregation, from 1960-1965; the "transition", from 1966-1969; and "after" desegregation, from 1970-1975. I therefore estimate a version of equation (1) allowing the coefficient on *1960%black* to vary only with these three periods, rather than every year:

$$(2)\ Outcome_{it} = \theta_t + \beta_1 1960\%bl_i + \beta_2 1960\%bl_i \times transition + \beta_3 1960\%bl_i \times after + \varepsilon_{it},$$

where *transition* is an indicator variable for 1966 to 1969, and *after* is and indicator variable for 1970 to 1975. Results of estimating equation (2) for per-pupil revenue and white exposure to

blacks are reported in Table 1. The coefficient of interest is β_3, indicating the change in the

coefficient on *1960%black* after desegregation, relative to the pre-desegregation period. The

results confirm the large and statistically significant differential increases in per-pupil revenue

and differential declines in black exposure to whites. The coefficients suggest that a district

with a 10 percentage point higher initial black enrollment share expected to see an additional

increase in per-pupil revenue between the pre- and post-desegregation periods of $168 per

pupil and an 8.7 percentage point smaller increase in black exposure to whites.

IV. Results: Desegregation and Black Educational Attainment

State-Wide Trends in Educational Attainment

I first present estimates of state-wide trends in the educational attainment variables

for 1960-1975 based on the administrative data on enrollment by grade (including

enrollment in public and nonpublic schools) from the Department of Education and

compare these to trends estimated from the 1980 Census. I will apply a similar methodology

to estimate educational attainment variables at the district-level, using the administrative

data, below. Ideally, I would observe 10th, 11th, and 12th grade registration and high school

graduation decisions *at the individual level* directly, allowing me to construct the share of

individuals in the relevant age group achieving each outcome over time. Individual-level data

are not available, but the *Annual Financial and Statistical Report* lists the number of students in

each grade and graduating high school for both public and private schools. If families did

not move into or out of the state (and there were no mortality), I could infer these shares by

following a cohort through its entire school career, estimating dropout rates at every grade.

For example, for the cohort entering 1st grade in the Fall of 1961, 1st grade data would be

taken from the 1961 report, 2nd grade data from the 1962 report, and so on; the share of the

cohort reaching at least 12th grade would be the ratio of 12th grade registration in 1972 to 1st grade registration in 1961.[17]

Of course, in practice, the change in a cohort's size between 1st and 12th grade also reflects movements of families into and out of the state. In order to reduce the scope for such movements to affect the estimated 12th grade enrollment rates, I divide 12th grade registration by 8th grade registration 4 years prior (rather than 1st grade), assuming that there is no "true" dropping out before 9th grade. Further, if migration of families with older and younger children is similar, changes in cohort size for younger grades can be used to net out the effects of migration. Thus, I construct the 12th grade registration rate, net of the average 4-year change for cohorts in 5th-8th grades in the same year as follows:

$$regrate_t^{12} = \frac{reg_t^{12}}{reg_{t-4}^8} - \frac{1}{4}\sum_{g=5}^{8}\frac{reg_t^g}{reg_{t-4}^{g-4}}$$, where reg_t^g is total black registration for grade g in year t.

Registration rates for 10th and 11th grade and high school graduation rates are constructed similarly.[18]

For comparison, I estimate trends in the fraction of blacks born in Louisiana who attended *at least some* 10th, 11th, and 12th grade[19] or graduated from high school using the 1980 Census IPUMS.[20] If the estimates based on the Department of Education administrative data are not contaminated by differential migration of families with younger and older children,

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[17] This also assumes that patterns of grade repetition are not changing over time.

[18] Calculations for 10th and 11th grade ratios and high school graduates are as follows:

$$regrate_t^{10} = \frac{reg_t^{10}}{reg_{t-2}^8} - \frac{1}{4}\sum_{g=5}^{8}\frac{reg_t^g}{reg_{t-2}^{g-2}}, \ regrate_t^{11} = \frac{reg_t^{11}}{reg_{t-3}^8} - \frac{1}{4}\sum_{g=5}^{8}\frac{reg_t^g}{reg_{t-3}^{g-3}}, \ gradrate_t = \frac{grads_t}{reg_{t-4}^8} - \frac{1}{4}\sum_{g=5}^{8}\frac{reg_t^g}{reg_{t-2}^{g-2}}.$$

[19] The category "did not finish 10th grade" and higher indicates that an individual started, but did not finish, 10th grade and most closely corresponds to the 10th grade registration rate, which measures the number of students registered for 10th grade in the fall (and similarly for 11th and 12th grade).

[20] Cohorts are identified by the school year in which they are expected to have been in the relevant grade. For example, an individual who is expected to have entered 12th grade in the 1965-66 school year is assigned to the 1965 cohort for 12th grade ratio, 1964 for the 11th grade ratio, and 1963 for the 10th grade ratio. Individuals are assigned to a cohort based on their quarter and year of birth, assuming they enter 1st grade if they will be 6 at the end of the 3rd quarter (individuals born in the 4th quarter are assigned to the following school year) and assuming they do not repeat grades.

these two series should track each other. Figure 6 presents the series based on the Census and the administrative data from Louisiana for each of the outcomes. To better compare the trends (and because only the trends and not the levels of *regrate*^{g} are meaningful), I rescale *regrate*^{g} from the administrative data to equal the estimate from the Census for 1960. Trends from the two sources track reasonably well, especially for 12th grade registration rate and high school graduation rate.

Recall that increases in black exposure to whites and the accompanying increases in funding were concentrated in 1965-1970, especially 1968-1970 (Figure 1). The state-wide average trends in educational attainment for blacks in Louisiana do not appear to be well-explained by the timing of desegregation policy. Attainment rose through about 1968, leveling off or declining slightly in the early 1970s. Other factors may have influenced these trends, however, potentially masking improvements due to desegregation.

There is no readily available control group, but comparisons to trends for blacks in other regions (where desegregation did not occur or took a different form) and whites are suggestive of improvements in educational attainment in the post-desegregation period. Figure 7 shows trends in the fraction of individuals born in Louisiana, the states of the former Confederacy, the Border states, and the rest of the country[21] separately for blacks and whites.

Graduation rates for whites in all regions and blacks outside the Confederate states were declining after 1970, while graduation rates were flat or increasing for blacks in

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[21] The usual Census region "South" is subdivided into Confederate and Border states due to their slightly different history with desegregation. The Census Bureau also classifies Missouri as in the Midwest region; I have reclassified it as part of the Border region here. Trends for the three non-Southern regions (West, Midwest, and Northeast) are similar, so they are combined in "Non-South".

Louisiana and the Confederate states as a whole.[22] While far from definitive, this is suggestive that desegregation may have improved educational attainment for Southern blacks. On the other hand, the largest improvements in Louisiana-born blacks' graduation rates (absolutely and relative to other groups) occurred around 1964 or 1965, before the effects of desegregation policy on spending and black exposure to whites kicked in. Ashenfelter and Collins (2004) pursue this approach more systematically, comparing educational attainment and wages for different cohorts of blacks and whites born in different regions. They conclude that the desegregation effort did contribute to improvements in educational attainment and wages for blacks.

District-Level Analysis

As documented above, desegregation had differential effects on blacks in districts with different initial black enrollment shares: the increase in exposure to whites was smaller and the increase in funding larger for higher black enrollment share districts (Figure 5). In this section, I exploit this variation to assess the net effect of these two changes by looking for differential changes in outcomes for districts with higher black enrollment shares. Registration and graduation rates can be estimated at the district level by applying the method described above separately for each district.

Migration is potentially more problematic for estimates at the district level, as migration between districts within Louisiana is averaged out in the state-wide figures.[23] However, if those movements are *not correlated with initial black enrollment* share, migration will not bias estimates of the coefficients on *1960%black*, but will simply introduce classical

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[22] The downward trend in the early 1970s could result from the acquisition of GEDs for earlier cohorts, while later dropouts have not had as much time to acquire a GED. Estimates of trends in dropouts for these cohorts based on the 1990 Census are similar, but do show a slightly smaller decline in the early 1970s.

[23] Note that the enrollment data employed in the analysis include private school enrollment, so movements from public to private school or vice versa are not problematic for the construction of registration rates by district. Black private enrollment is quite small however.

measurement error to the dependent variables. Fortunately, I can assess the plausibility of this assumption by examining trends in the relationship between black enrollment share and registration rates for *younger* grades. If there is no true dropping out before 8th grade, the analysis of registration rates for younger grades should reveal no trend in the coefficients on *1960%black* over time. Trends in registration rates would suggest that migration among districts was related to *1960%black*. I therefore first analyze the registration rates for younger and older grades separately, rather than netting out changes for younger grades from changes for older grades as for the statewide trends presented above (Figure 6).

Indeed, the analysis of registration rate for younger grades shows no trend in the coefficients, suggesting that changes for upper grades are likely to reflect differential changes in the true rate of dropping out.[24] The first three columns of Table 2 shows the results of estimating equation (2) for 6th, 7th, and 8th grade registration divided by 4th grade registration 2, 3, and 4 years prior, respectively (I refer to these at the 6th, 7th, and 8th grade registration rates; they can be compared to results for 10th, 11th, and 12th grade registration rates, respectively). The interactions of initial black enrollment share with the *transition* indicator (1966-1969) and the *after* indicator (1970-1975) are not significantly different from 0 for any of the grades, indicating that changes in the registration rates for younger grades was not related to initial black enrollment share.[25] I show the results estimating equation (1) for the 6th, 7th and 8th grade registration rates graphically , together with the results for the upper grades discussed below. These also show no differential trend in registration rates for lower grades for districts with higher initial black enrollment shares. Note that this is not the case for white registration rates (not reported). There were significantly larger declines in

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[24] This still requires the assumption that families with older and younger children do not migrate differentially in a way that is correlated with districts' initial black enrollment share.
[25]

enrollment for all grades in districts with higher *1960%black*, compared to those with lower *1960%black.* This precludes conducting a similar analysis of registration rates for whites.

To reduce noise in the registration rates, I take advantage of data for a larger number of lower grades, estimating equation (2) for the average 2-, 3-, and 4-year "lagged" registration rates for 5th-8th grade (again, for comparison to 10th, 11th, and 12th grade registration rates). The average lagged registration rate is $avgrate_t^l = \frac{1}{4}\sum_{g=5}^{8}\frac{reg_t^g}{reg_{t-l}^{g-l}}$, where l indexes the number of years lagged and g indexes grade. The results with *avgrate* as the dependent variable are presented in columns (4)-(6) of Table 2. Again, the interactions of *1960%black* with the *transition* and *after* indicators are insignificant, and the standard errors are smaller than when a single grade's registration rate is analyzed alone.

Registration rates for lower grades show no significant trends, providing support for the assumption that mobility is unrelated to *1960%black*. I therefore turn to the analysis of registration rates for higher grades. To estimate registration rates for 10th, 11th, and 12th grade and high school graduation rates, registration in the relevant grade (or number of high school graduates) is divided by 8th grade registration (the closest year unaffected by true dropping out) for the same cohort; thus $regrate_t^{10} = \frac{reg_t^{10}}{reg_{t-2}^{8}}$,

$regrate_t^{11} = \frac{reg_t^{11}}{reg_{t-3}^{8}}, regrate_t^{12} = \frac{reg_t^{12}}{reg_{t-4}^{8}}$, and $regrate_t^{HS} = \frac{grads_t^{HS}}{reg_{t-4}^{8}}$. I compare those with 6th, 7th, and 8th grade registration divided by 4th grade registration for the same cohort, respectively, as well as the 2-, 3-, and 4-year lagged *avgrate* described above.

The first panel of Figure 8 shows the results of estimating equation (1) for the 10th grade registration rate and plotting the interactions of *1960%black* with the year dummies. (Recall that this is equivalent to estimating year-by-year univariate regressions of 10th grade

registration rate on *1960%black*.) For comparison, I also plot the results for the 6th grade registration rate (6th grade registration divided by 4th grade registration two years prior) and the average 5th-8th grade 2-year lagged registration rate. The remaining panels of Figure 8 show the results for the 11th and 12th grade registration and high school graduation rates, with the relevant comparison groups. These graphs could allow the identification of turning points in the relationship between registration rates and *1960%black*, although the estimates are somewhat imprecise. The coefficient for the 10th grade registration regressions increased around 1972, and for 11th grade registration, it increased around 1969 or 1970. The coefficient for the 12th grade registration and high school graduation rate regressions rose slightly earlier around 1968. The results are consistent with a differential increase in black's registration rates for high *1960%black* districts around the time of desegregation, when those districts experienced differential increases in per-pupil funding but smaller increases in exposure to whites.

Because the results for younger grades show no evidence of differential migration, I also estimate equation (1) for the upper grades, *controlling* for the average 5th-8th grade lagged enrollment rate interacted with the year effects to improve the precision of the estimates. The results are similar to those shown in Figure 8 and are presented in Figure 9. Estimates of the coefficient on black enrollment share for the 10th and 11th grade registration rates began rising around 1969 and were higher on average in the post-desegregation period (left panel). The estimates for 12th grade registration and high school graduation rates increased substantially around 1968 and continued to rise thereafter (right panel).

To test the hypothesis that the coefficient on percent black was larger in the post-desegregation period, I estimate equation (2) for the upper grades, dividing the years into three periods—before desegregation, during the transition, and after desegregation—and

allowing the coefficient on *1960%black* share to vary only by period rather than by individual year.[26] The results, with and without controlling for average 5th-8th grade lagged registration rates, are presented in Table 2. The interaction of *after* with *1960%black* is significant at the 1 percent level for 11th and 12th grade registration and high school graduation rates, and controls for lower grade lagged registration rates do not affect the results substantially. The point estimates indicate that compared to the period before desegregation, blacks in districts with higher *1960%black* had larger increases in educational attainment than districts with lower black enrollment share.[27] For example, for the high school graduation rate, the coefficient on *after×1960%black* is about 0.21 (controlling for registration rates for younger grades), indicating that a 10 percentage point increase in *1960%black* was associated with a 2.1 percentage point larger change in the high school graduation rate between the pre- and post-desegregation periods. (The 1960 black enrollment share ranges from about 10 to 70 percent, with a mean and median both around 40 percent; the standard deviation of this variable is 0.16.) A 10 percentage point increase in 1960 black enrollment share was associated with a 0.6, 1.4, and 2.1 percentage point increase in the 10th, 11th, and 12th grade registration rates, although the coefficient for 10th grade is not significantly different from 0. Most of the increase in educational attainment, therefore, was attributable to increased attendance of 11th and 12th grade.

V. Conclusion

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[26] Alternatively, I test the hypothesis that the average interaction with 1960 black enrollment share in equation (1) is the same as the average interaction for the transition and after desegregation periods; this yields similar results.

[27] Another way to capture the differential change in the educational attainment variables for high and low black enrollment share districts is to construct the average of the outcome variable of interest before (1960-1965) and after (1970-1975) desegregation (leaving out the transition period) and regressing the change in the average on *1960%black*. This method yields coefficients on black enrollment share that are very similar to the interaction with *after* presented in Table 2.

The analysis presented above shows that, during the five years of most intensive desegregation activity in Louisiana, districts with higher black enrollment shares saw substantially larger increases in per-pupil funding. Blacks in those districts saw large reductions in student-teacher ratios as black-white school quality gaps closed but also smaller increases in exposure to whites. The finding that blacks in higher black enrollment share districts had significantly larger increases in measures of educational attainment suggests that the increased funding that came with desegregation was more important than the increased exposure to whites.

Estimating equation (2) with per-pupil revenue as the dependent variable yields a coefficient on the interaction *after×1960 % black* of 1.7 (thousands of 2003 dollars), indicating that a 10 percentage point increase in *1960%black* is associated with an additional increase in per-pupil revenue of $170 (Table 1).[28] Dividing the coefficient on the *after×1960 % black* interaction from the high school graduation rate regression by that from the per-pupil revenue regression yields an estimate of 0.12 per $1,000 in per-pupil revenue. Thus a $1,000 differential increase in funding during the period of desegregation was associated with a 12 percentage point increase in the black high school graduation rate. Average per-pupil spending in the pre-desegregation period (1960-1965) was $2,400, and based on the Census data, the average high school graduation rate was 68 percent. The estimates suggest, therefore, that a 42 percent desegregation-induced increase in per-pupil revenue resulted in a 17 percent increase in high school graduation rates. This is likely an underestimate of the effect of spending on educational attainment, however, as the differential increase in

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[28] This is similar to an instrumental variables approach, regressing the educational attainment variables on per-pupil revenue, using initial black enrollment share interacted with the three periods to instrument for per-pupil revenue. Because there are other channels through which black enrollment share may have affected outcomes—most important, changes in black exposure to whites depended on initial black enrollment share—I do not present the as an IV.

educational attainment for high black enrollment share districts reflects that effect of additional revenue *net of* the effect increased exposure to whites.

The findings here are also consistent with Guryan's results that implementation of a court-ordered desegregation plan reduced black dropout rates. It is difficult to compare the magnitudes from the two studies, as Guryan examines the reduced-form effect of plan implementation, whereas I use variation across districts with different initial black enrollment shares—and different changes in funding and exposure to whites—to estimate the effects of the increased revenue that desegregation brought. In addition, little is known about how desegregation affected school finances in other states, so it is difficult to assess whether the mechanism that operated in Louisiana to bring up school spending and black educational attainment after desegregation operated in other parts of the country. Margo (1990) estimates that Louisiana had one of the largest state-wide black-white school spending gaps among Southern states in 1950. This suggests that by the time of desegregation, other states may not have had as large a black-white quality gap to close, so there may have been less scope for improvement in blacks' outcomes through the mechanisms shown here.

Using a different methodology and different source of variation than that employed in earlier studies, I also find evidence that desegregation improved educational attainment for blacks. Together with previous research, this paper suggests that additional school spending can improve educational attainment, and increases in spending for blacks' schools associated school desegregation did, indeed, benefit black students.

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Appendix: Estimating Segregation Measures

I use data from the Southern Education Reporting Service's (SERS) *Statistical Summary, State by State, of School Segregation-Desegregation in the Southern and Border Area from 1954 to the Present* and surveys conducted by the Office of Civil Rights (OCR) of the Office of Education to estimate the measures of segregation for Louisiana school districts from 1960-1976. The exposure of blacks to whites is the percent white in schools, weighted by black enrollment and vice-versa for exposure of whites to blacks; data on racial composition at the *school level* are required to calculate these indexes. The OCR survey included such data, and the original school-level enrollment by race were entered for the 1967, 1968 and 1970 school years; for these years, the exposure indexes were computed from the school-level data directly. Exposure indexes for 1969, 1971-1975 and 1976 were taken from Office of Education summary files. The school-level data for these years were not available, but I was able to obtain the segregation measures at the district level, calculated by OCR based on the school-level data. The OCR surveys were not comprehensive in all years, but the large size of Louisiana's school districts and the heavy involvement of the courts in desegregating its schools ensured that most Louisiana districts were included in the data in most years. Of the 66 districts in Louisiana, 45 were included in the 1967 survey, 61 in the 1969 survey, and all of the districts were included in the remaining years.

Before the 1967 school year, no school-level data on enrollment by race are available, but the Southern Education Reporting Service monitored desegregation efforts in Southern and Border states including Louisiana and reported on their findings in the *Statistical Summaries*. In some issues, the percent of blacks in school with any whites is listed at the district level for districts *with any desegregation activity*. Desegregation in this period generally took the form of a small number of black students enrolling in white schools. At low levels

of desegregation of this form, the percent of blacks in school with whites provides an *upper bound* of exposure of blacks to whites. For example, consider a district that has one black school and one white school, each with half the total enrollment in the district. If 1 percent of blacks are moved to the white school, 1 percent of blacks are in a school that is 50/51 or 98 percent white, while 99 percent of blacks are in school with 0 percent white. Thus, the exposure of blacks to whites is $(0.98 \times .01) + (0.99 \times 0) = 0.0098$ or 0.98 percent. My method assumes that black exposure to whites is 1 percent; as the percent of blacks in school with any whites increases and the percent black in the district increases, this method will overestimate exposure of blacks to whites more. The highest percent of blacks in school with any whites reported in the data is 5.5 percent. The small increase in black exposure to whites before 1966 represents an upper bound on the true increase in exposure.

The SERS publication only listed the percent of blacks in school with any whites for districts where there was at least some desegregation activity. The publication covering the 1964-65 school year appears to have complete coverage for districts with any desegregation; the Office of Education contracted with SERS to conduct a more complete accounting of the status of desegregation in that year, following the passage of the Civil Rights Act (CRA). I therefore assume that any district that is not listed as having any blacks in school with whites in 1964 had no desegregation in earlier years and set exposure of blacks to whites to 0 for those years. In Louisiana, only 3 districts had any blacks in school with whites, with an average of about 2 percent of blacks in school with any whites. For 1966, SERS reported the *number* of blacks in school with whites; to estimate the percent in school with whites, I divided this by the number of blacks reported in the district in the 1967 OCR data if available. If a district is not listed as having any blacks in school with whites in 1966, black exposure to whites is set to 0 for 1966 and all previous years.

White exposure to blacks is not estimated from the SERS data, but the small numbers of blacks in school with whites indicates that this was also quite low before 1967. The trends presented in Figure 1 look similar if the sample is limited to districts that had data available in all years.

Table 1. Per-Pupil Revenue and Black Exposure to Whites vs. Initial Black Enrollment Share

	PP Revenue	Black Exposure to Whites
1960 % Black	-0.430	0.003
	(0.094)***	(0.001)*
Transition x 1960 % Black	0.650	-40.744
	(0.193)***	(7.258)***
After x 1960 % Black	1.676	-87.611
	(0.187)***	(4.005)***
Year Fixed Effects	Yes	Yes
N	945	945

Robust standard errors in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%

Table 2. Registration Rates vs. 1960 Black Enrollment Share, Early Grades

	Registration Rate: Relative to 4th Grade			Average 5th-8th Grade Registration Rate		
	6th Grade	7th Grade	8th Grade	Lagged 2 yrs	Lagged 3 yrs	Lagged 4 yrs
1960 % Black	0.019	-0.026	0.037	-0.005	-0.021	-0.018
	(0.028)	(0.037)	(0.034)	(0.015)	(0.018)	(0.022)
Transition x 1960 % Black	-0.009	0.012	0.026	0.017	0.025	0.013
	(0.048)	(0.061)	(0.053)	(0.027)	(0.030)	(0.031)
After x 1960 % Black	-0.025	-0.009	-0.065	-0.014	-0.016	-0.042
	(0.043)	(0.053)	(0.051)	(0.024)	(0.027)	(0.031)
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
N	945	945	945	945	945	945

Robust standard errors in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%

Table 3. Registration Rates vs. 1960 Black Enrollment Share, 10th Grade Registration - High School Graduation Rates

	10th Grade	10th Grade	11th Grade	11th Grade	12th Grade	12th Grade	HS Grad	HS Grad
1960 % Black	0.061	0.062	0.068	0.085	-0.013	-0.007	-0.010	-0.007
	(0.039)	(0.038)	(0.037)*	(0.037)**	(0.037)	(0.037)	(0.034)	(0.034)
Transition x 1960 % Black	0.003	-0.006	0.016	-0.003	0.018	0.019	0.039	0.040
	(0.064)	(0.062)	(0.067)	(0.065)	(0.068)	(0.066)	(0.061)	(0.060)
After x 1960 % Black	0.045	0.058	0.130	0.136	0.177	0.206	0.179	0.204
	(0.054)	(0.054)	(0.051)**	(0.051)***	(0.049)***	(0.049)***	(0.047)***	(0.047)***
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Lower Grade Avg Reg Rate	No	Yes	No	Yes	No	Yes	No	Yes
Observations	945	945	945	945	945	945	945	945

Robust standard errors in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%

Figure 1. Average Trends in Segregation for Louisiana School Districts
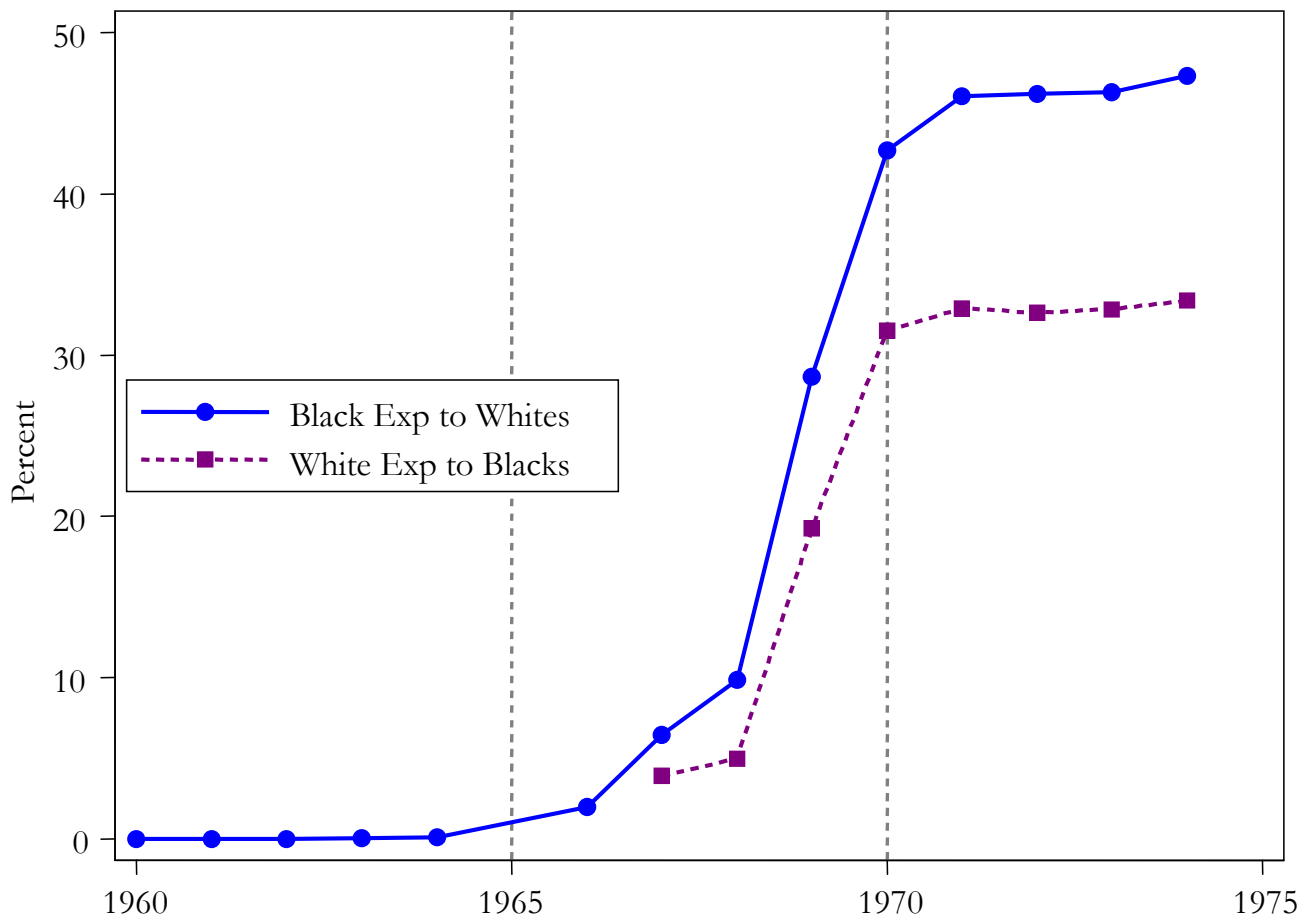
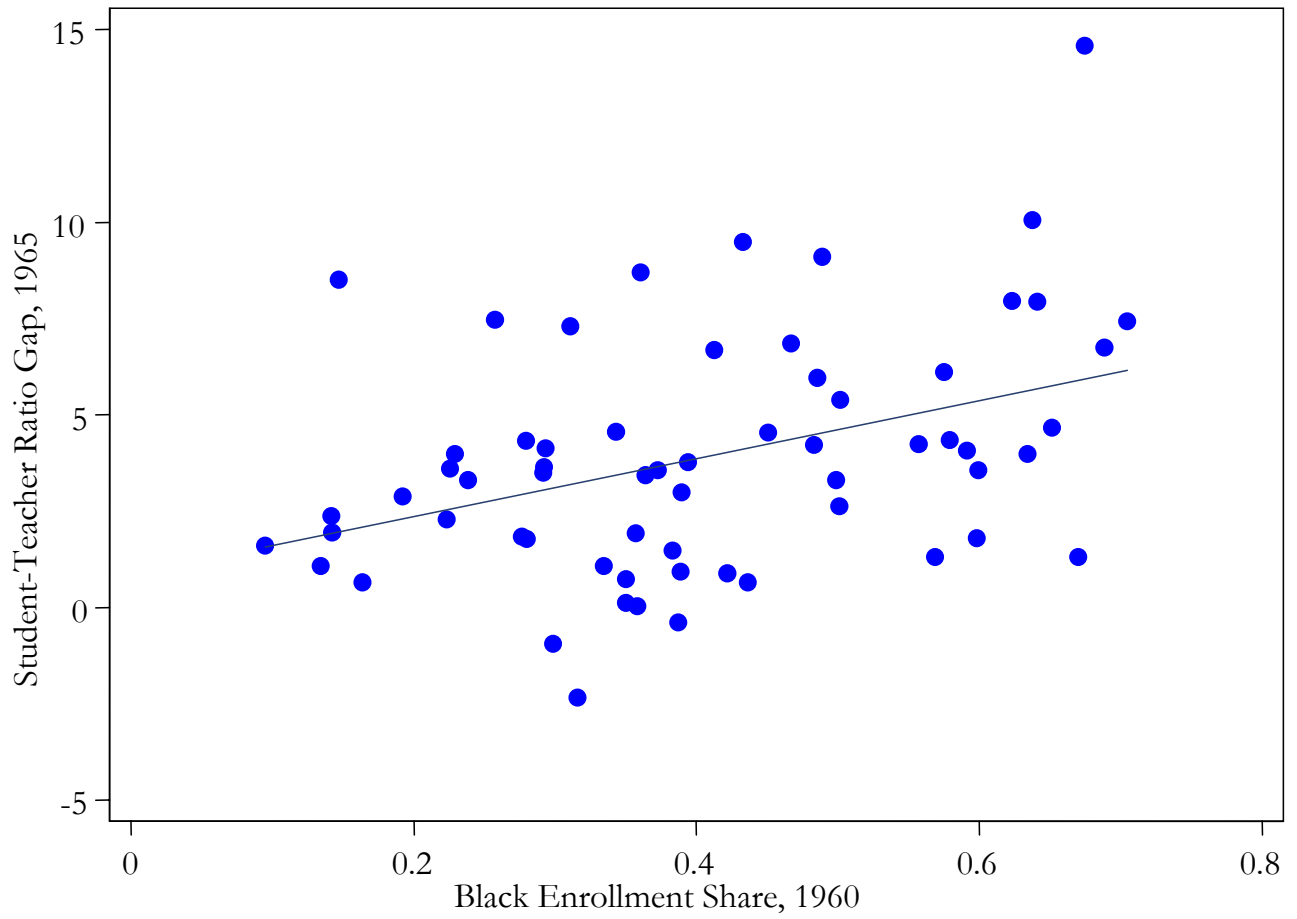**Figure 2. 1965 Black-White Student Teacher Ratio Gap vs. % Black**

Figure 3. 1970 Black-White Student-Teacher Ratio Gap vs. % Black
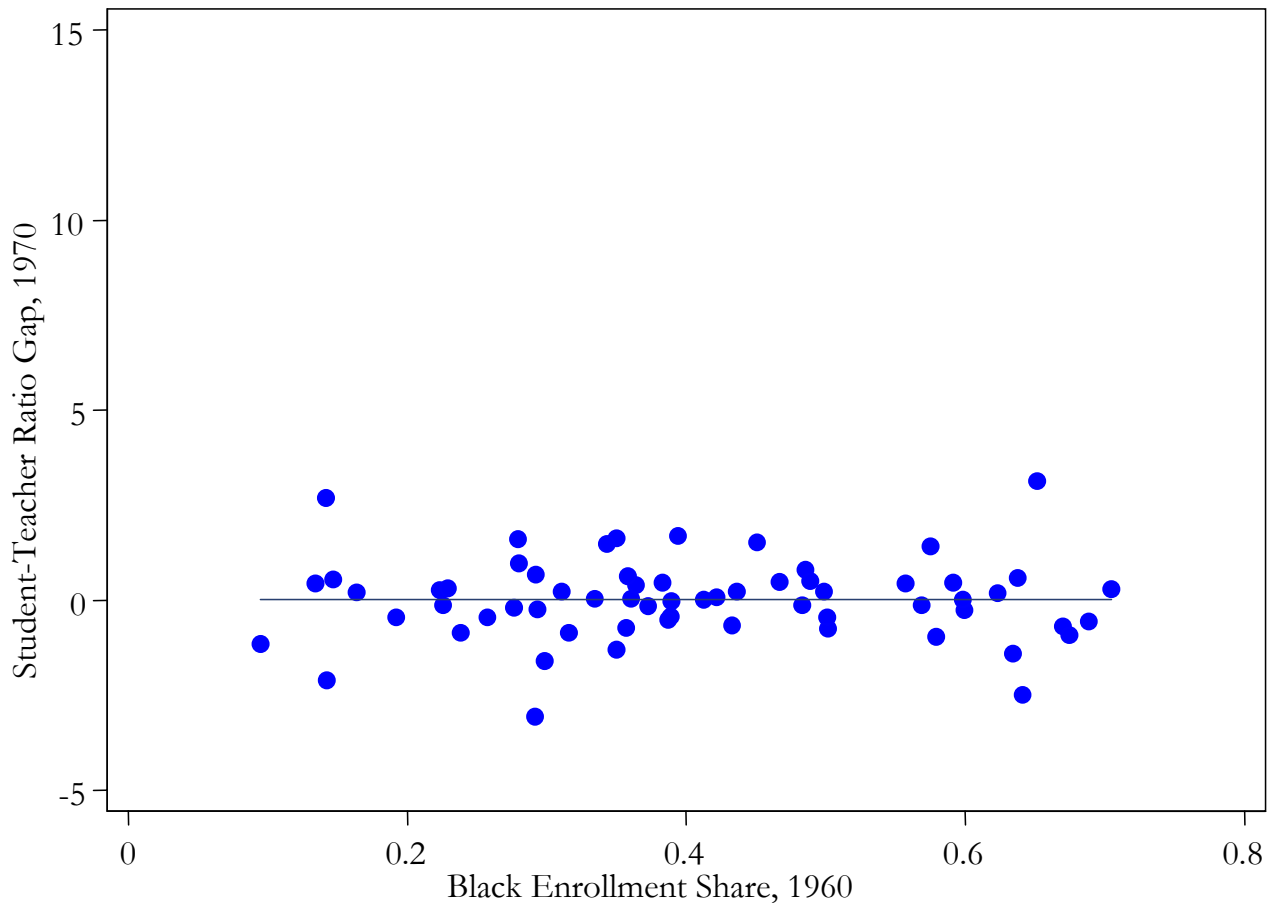
Figure 4. Change in Black Student-Teacher Ratio, 1965-1970
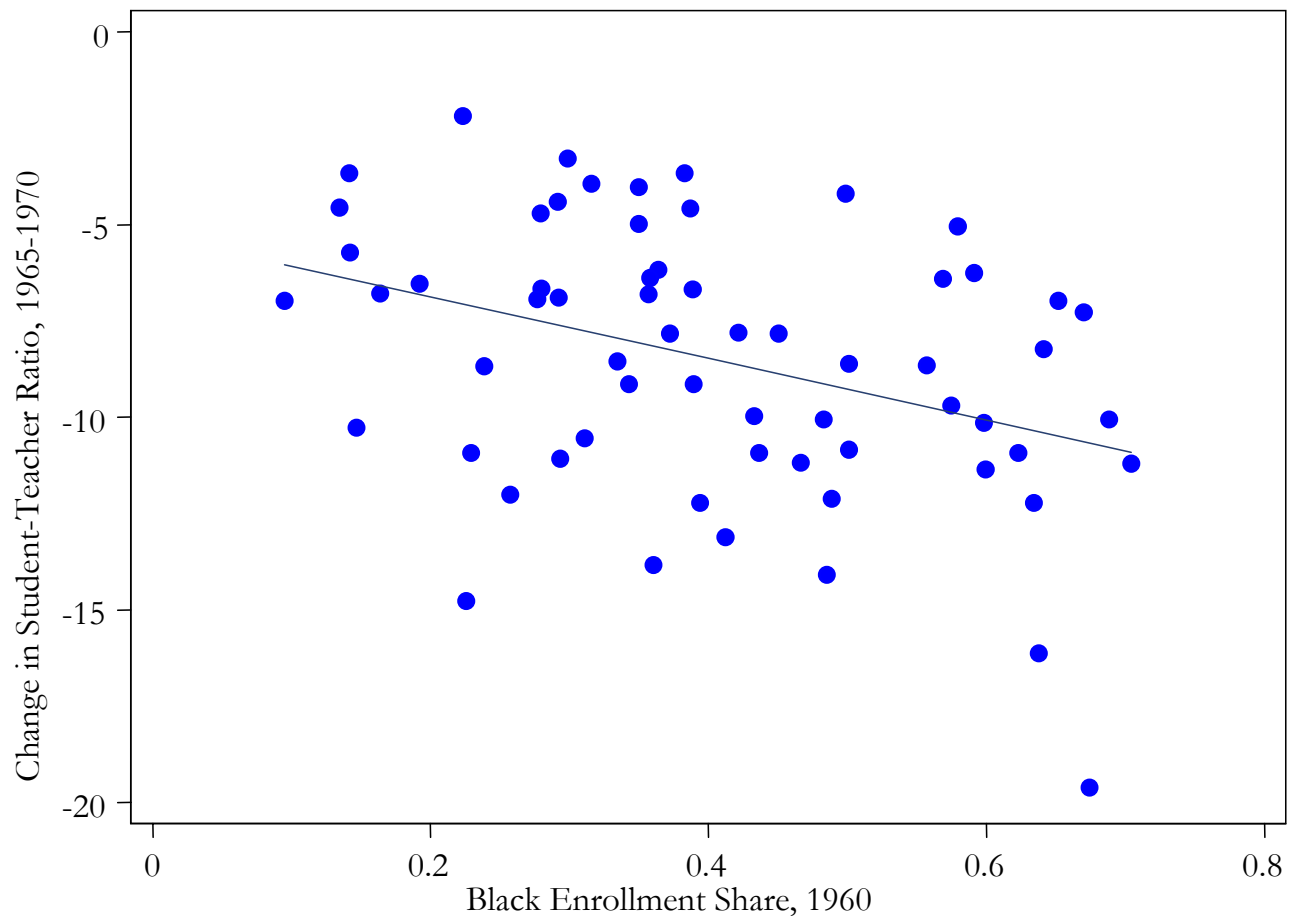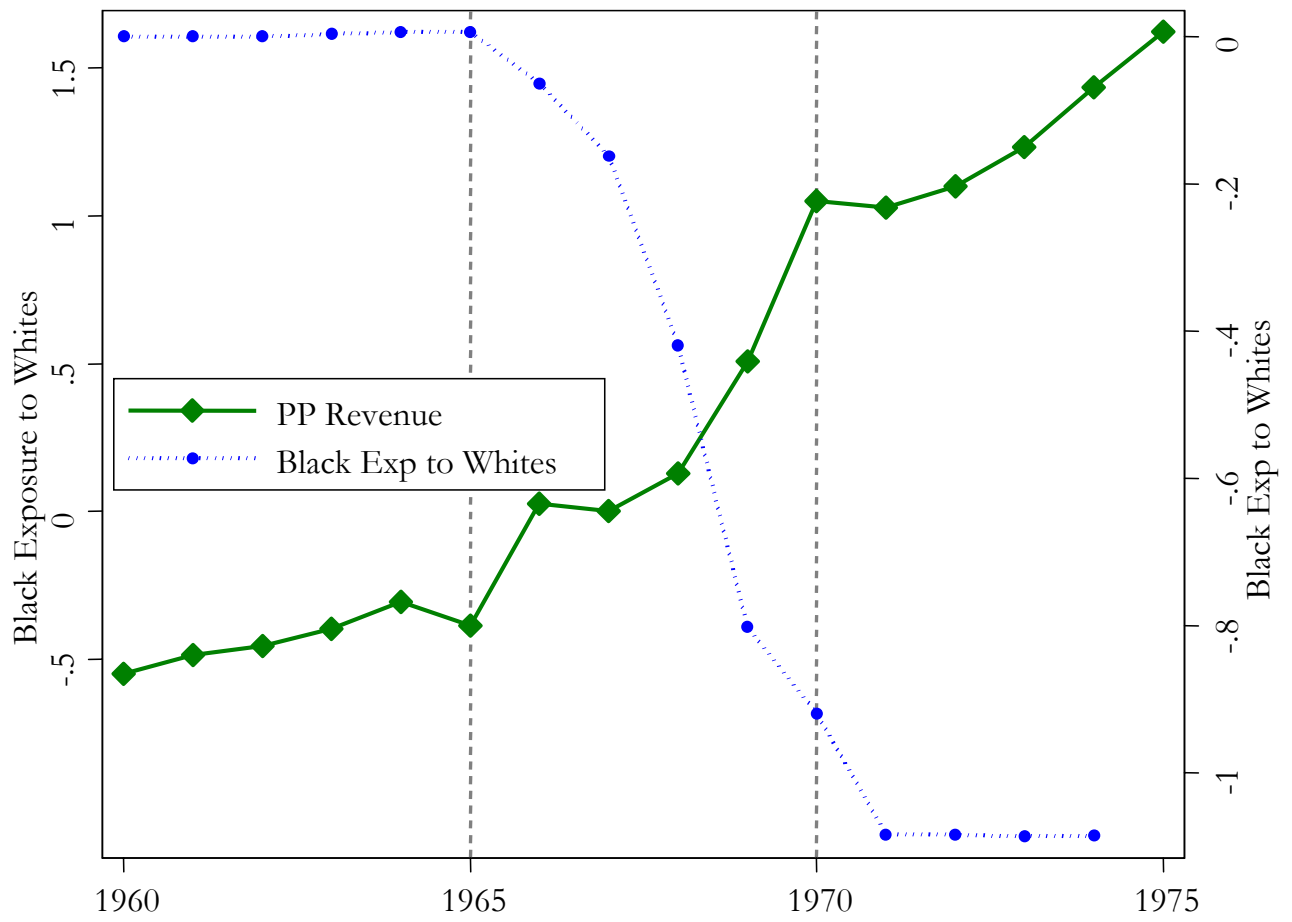
Figure 5. Coefficient on Percent Black, 1960-1975

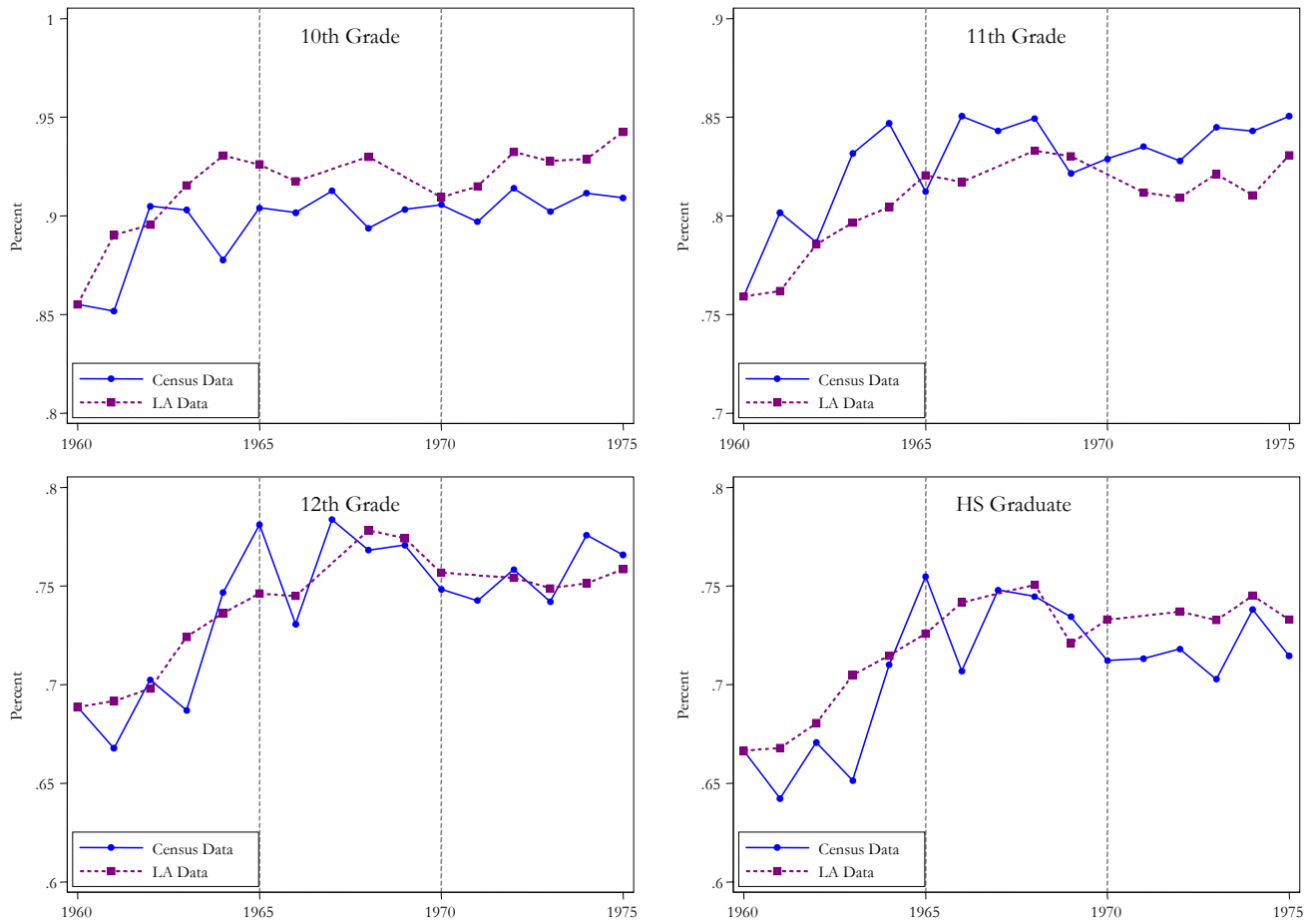# Figure 6. Black Educational Attainment, Administrative and Census Data

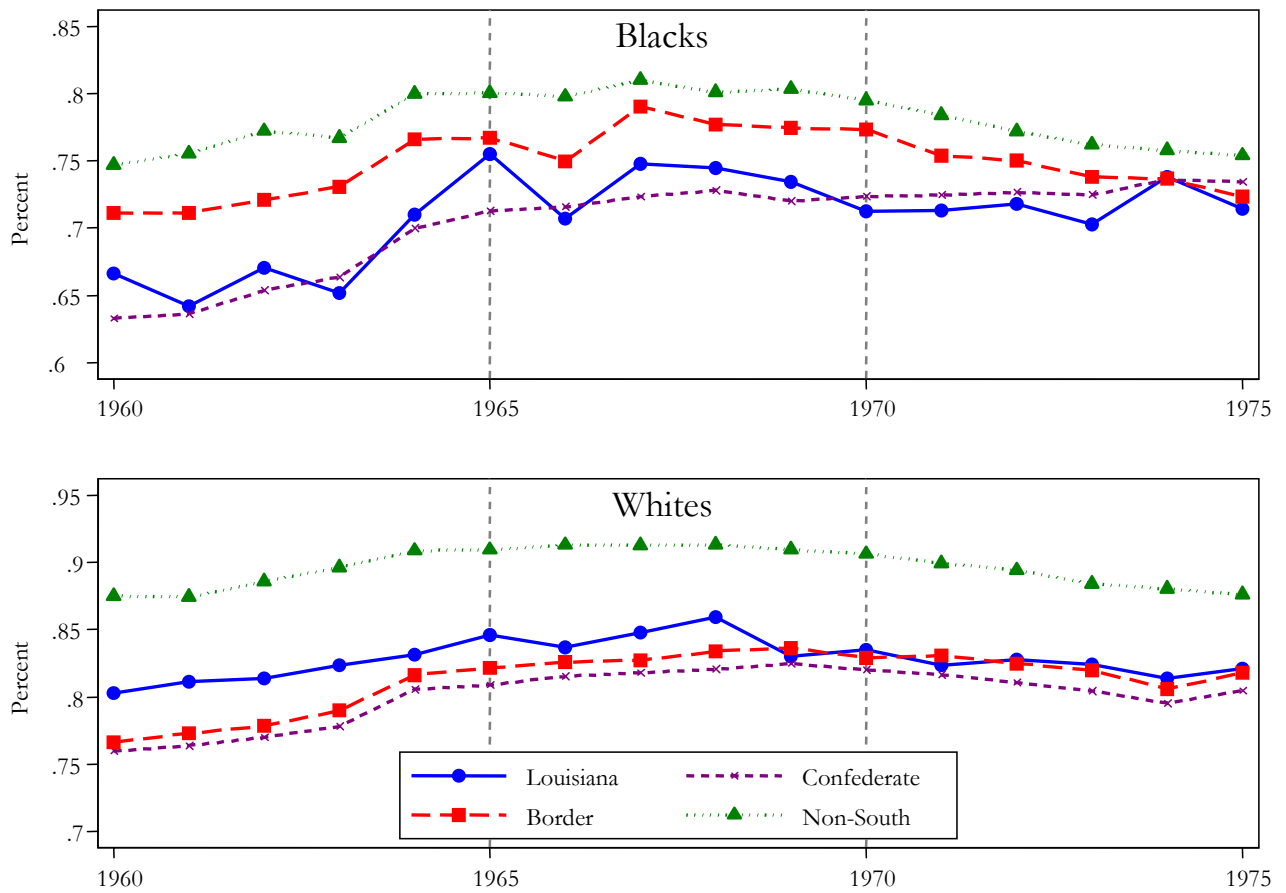# Figure 7. Percent with High School Degree, by Region

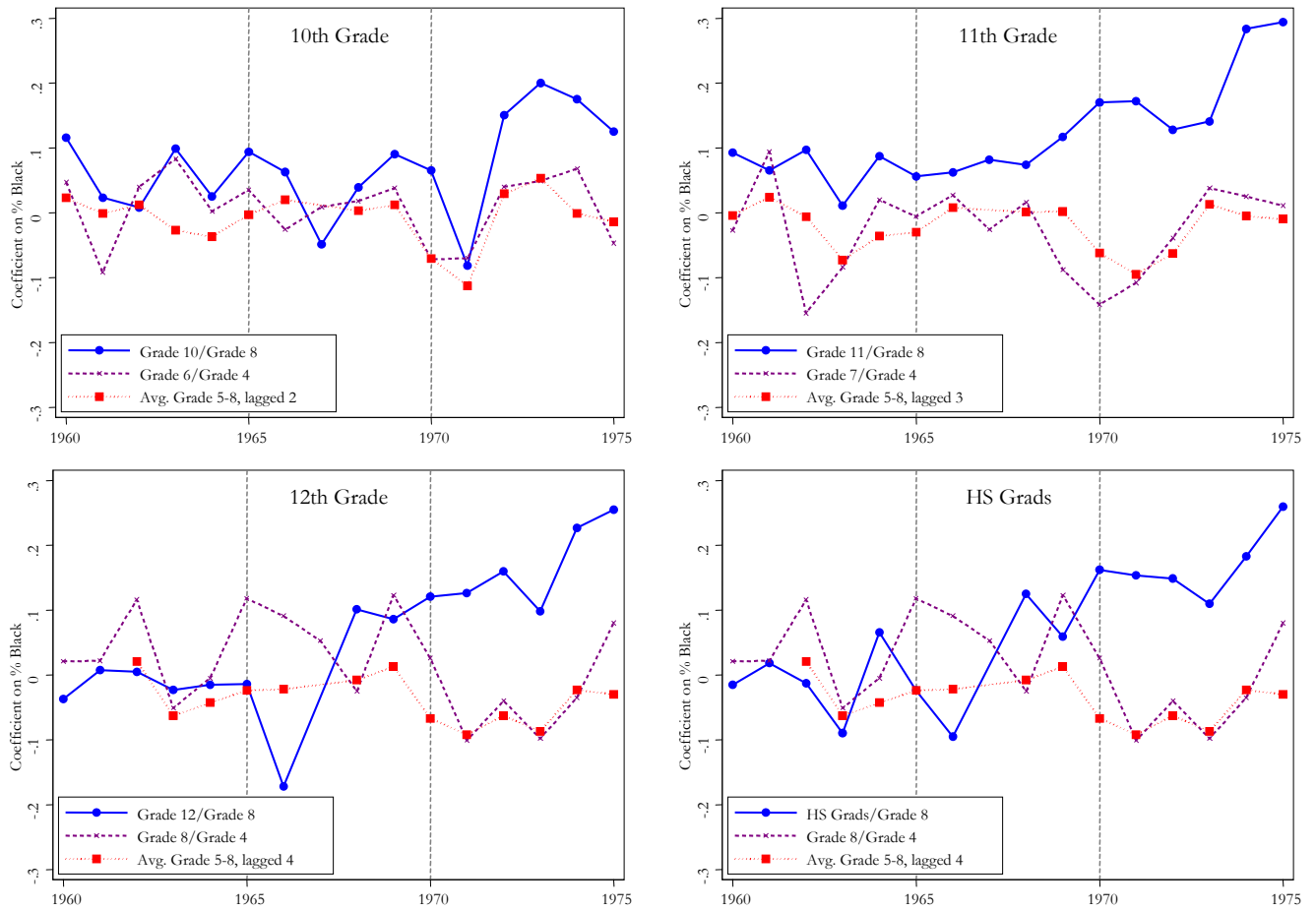# Figure 8. Coefficient on 1960 Black Enrollment Share

Figure 9. Coefficient on 1960 Black Enrollment Rate, Controlling 5th – 8th Grade Registration Rates