



QUCHEH WORKING PAPER SERIES
<http://www.quceh.org.uk/working-papers>

THE LONG-RUN EFFECTS OF TEMPORARILY CLOSING SCHOOLS:
EVIDENCE FROM VIRGINIA, 1870s-1910s

Paul Winfree (Queen's University Belfast)

Working Paper 23-02

QUEEN'S UNIVERSITY CENTRE FOR ECONOMIC HISTORY
Queen's University Belfast
185 Stranmillis Road
Belfast BT9 5EE

January 2023

The Long-Run Effects of Temporarily Closing Schools: Evidence from Virginia, 1870s-1910s*

Paul Winfree[†]

Abstract

New hand-collected school administrative data from 1870s Virginia, alongside linked individual US Census records, reveals that temporary school closures had lasting effects on literacy and income in adulthood. Those affected by the closures had lower intergenerational economic mobility, particularly those from low-income backgrounds. The age at which the closures occurred also played a role with younger cohorts more affected by early developmental disruptions and older cohorts more affected by prolonged closures.

Keywords: returns to education; school closures; literacy; economic mobility; wage inequality.

JEL Classification: H75, I21, I24, I26, I28, J62, N31, N91

* I am grateful to Chris Colvin, John Turner, and Arcangelo Dimico for feedback on earlier drafts of this paper. Thanks also to Neil Cummins, Eric Schneider, Matthew Purcell, Ziming Zhu, Philip Fliers, as well as the seminar participants at Queen's University Belfast and the London School of Economics for many helpful comments.

[†] Queen's Management School, Queen's University Belfast, United Kingdom. ORCID: <https://orcid.org/0000-0003-2078-3914>. Email: pwinfree01@qub.ac.uk.

1. Introduction

What are the effects of school closures on economic outcomes in adulthood? In this paper, I examine an episode where school closures affected a large portion of the student population for a prolonged period. Specifically, I examine the effects resulting from an event whereby schools unexpectedly closed for at least one year in Virginia during the 1870s. The existing literature on school closures has studied the loss of summer instruction (Kuhfeld et al., 2020), weather related closures (Marcotte and Hemelt, 2008; Hansen, 2011; Goodman, 2014), differences in instructional timing (Lavy, 2015), teacher strikes (Johnson, 2011; Jaume and Willén, 2019), student absences (Liu et al., 2021; Cattán et al., 2022), and previous pandemics (Ager et al., 2020; Meyers and Thomasson, 2020). However, most of the school closures examined by the existing literature were relatively short-term compared to episode examined in this paper or the closures experienced during the Covid-19 pandemic.¹

In this paper, I examine the long-run effects of school closures lasting at least one year using hand-collected administrative school records from every county and city in Virginia during the late-1870s. I also use linked records from the 1880 and 1910 US Censuses which allows me track individuals who were eligible for school around the time when the closures occurred into adulthood. My analysis focuses on student population cohorts that were most likely affected by the funding reduction (i.e., those who were between the ages of 5 and 21 when the school closures occurred) compared with those who were both younger and older as well as those living in counties bordering Virginia. I find that the school closures likely lowered occupational income scores by around 5 percent (equivalent to 0.09 standard deviations) for those affected. I also find higher illiteracy rates in adulthood for those who grew up in a county that closed schools.

I find evidence school closures reduced literacy and income in adulthood through two mechanisms. First, the school closures temporarily disrupted access to schools during critical periods of development when student cohorts were first learning to read and write (i.e., those who were between the ages of 5 and 9 when the school closures occurred). Second, the school closures affected older student cohorts (i.e., those between the ages of 10 and 14) by disrupting school enrollment for periods longer than the school closure. This was true for both Black and White students. However, I show evidence that the school closures only had persistent effects

¹ Previous pandemic related school closures in the US that have been studied were relatively short-lived. For example, Ager et al. (2020) find that the average length of school closures in 171 cities was 36 days for the 1918-19 pandemic. Meyers and Thomasson (2020) do not have data on the average length of school closures.

on enrollment for Black student cohorts. These results are robust to differences in school quality.²

Interestingly, I find that the school closures had an effect on income score in adulthood for White but not Black student populations. I find that if schools had not closed during the 1870s, the Black-White gap in income score may have been as much as 5 percentage points higher in 1910 for the student population cohort of the 1870s.

I also find that those children who lived in counties that did not close schools had higher levels of upward intergenerational mobility compared to children of similarly ranked fathers who lived in counties that closed schools. White school-aged children who lived in counties that did not close schools and grew up at the twenty-fifth percentile of the state income distribution were 4.5 percentile rank points higher than children at the same income rank but in counties that closed schools. For most cohorts, I find that the effect of schooling on upward intergenerational mobility was larger for those growing up at the bottom of the income distribution but had a small or no effect for those growing up at the top.

I also find that Black school-aged children who lived in a county that closed schools were no more likely to be upwardly economically mobile than those who lived in a county where schools remained open. These findings are robust to controlling for differences in school quality and school district segregation at the time when the schools initially closed.

Examining the long-run effects of school closures is relevant considering schools were temporarily closed to in-person instruction in many countries as a public health strategy to mitigate the spread of Covid-19 (Hale et al., 2021; OECD, 2021).³ Due to obstacles associated with the transition to remote learning, these decisions resulted in lost access to educational resources, including instruction, that did not affect populations equally.⁴ Several studies have suggested that the immediate effects of lost access on educational outcomes have been negative (Maldonado and De Witte, 2020; Egnzell et al., 2021; Halloran et al., 2021; Tomasik et al., 2021; Agostinelli et al., 2022; Goldhaber et al., 2022; Blanden et al., 2022). It will be years before the long-run effects of school closures associated with the pandemic are fully understood. Therefore, examining this historical experience of prolonged school closure may

² See Figure A1 in the appendix for correlation coefficients between school closures and school quality for both Black and White schools.

³ Students in West Africa were also affected by school closures that lasted many months during the Ebola epidemic that began in 2013 (Meyers and Thomasson, 2020).

⁴ “Covid learning loss has been a global disaster,” *The Economist*, July 7, 2022, at <https://www.economist.com/international/2022/07/07/covid-learning-loss-has-been-a-global-disaster>.

be a useful guide for policymakers considering the persistent effects of losing access to schooling.

My main analysis follows male student cohorts into adulthood by linking the 1880 and 1910 US Censuses using name, year of birth, birthplace, and race.⁵ In addition, I link sons with their fathers to compare the average occupational income rank of children exposed to differing levels of school resources conditional on their father's occupational income rank. I also use administrative data collected by local school districts pursuant reporting requirements mandated by Virginia state law. Each county superintendent was required to administer a school census, to collect information on the student population, and to prepare financial statements that were sent to the Virginia Department of Public Instruction for each school year beginning with 1870-71. These financial statements contain an immense amount of information on the organization of schools including the number of schools opened, the number of teachers hired, students enrolled, the number of potential students not enrolled, and school funding from different levels of government and private charity. This information allows me to observe county level variation in school resources over time.

My empirical strategy exploits the heterogenous response of counties to an unanticipated veto of a funding bill by the state governor that had the effect of reducing state funding per student population by 60 percent for the 1878-79 school year. By the 1879-80 school year, state funding had been restored to a level above that prior to the veto-induced reduction. During the affected school year, more than 45 percent of White schools and more than 40 percent of Black schools closed across the state. On average, student enrollment fell by about 50 percent. However, because schools were locally administered, not all counties responded equally to the loss in state funding. Some counties responded by closing schools entirely, others closing only a portion of their schools, and still others relied on local revenues to supplement the loss in state funds to keep schools open. I also exploit the fact that not all students were eligible for school when the closures occurred. Some were too young and some were too old to have been affected by the closures even if they lived in a county where the schools closed.

The paper contributes to our understanding of the effects of schooling on intergenerational mobility. I find that certain cohorts of Black and White children were more likely to be upwardly mobile if they lived in a county that did not close schools in response to the funding reduction. This supports the finding using contemporary data that access to educational

⁵ I use the linking algorithm developed by Abramitzky et al. (2014) and dataset described by Abramitzky et al. (2020).

resources is important to economic mobility (Chetty et al., 2014). The difference in upward mobility associated with children who lived in counties where schools remained open was especially profound for students who grew up at the bottom of the income distribution. However, the effects of schooling were larger for White students than Black students.

Other studies have found a contemporary Black-White gap in upward mobility for those living in the Southeastern United States of about 10 percentile rank points (Chetty et al., 2020).⁶ I find that among the White student population with fathers in the 25th percentile of income, those who grew up in counties that closed schools had a mean rank of 45.7, compared to 50.2 for those who grew up in counties that did not close schools after controlling for differences in school quality. Among the Black student population with fathers in the 25th percentile, those who grew up in counties that closed schools had a mean rank of 40.2, which was no different for those who grew up in a county that did not close schools. This implies that the school closures had no effects on the overall mobility of Black students. In the absence of an effect and given what we know about the poor social mobility of Black students, this points towards other mechanisms such as discriminatory policies in the labor market that the cohorts would have experienced in adulthood.

The findings support another prominent conclusion in the literature that the Black-White income differential after the Civil War was related to access to educational resources (Margo, 1985; Whatley and Wright, 1994; Card and Krueger, 1992; Aaronson and Mazumder, 2011; Carruthers and Wannamaker, 2017a, 2017b). However, I only find a negative effect of school closures on the occupational income scores of White workers after controlling for differences in school quality and school district segregation. This finding alongside the intergenerational mobility estimates provide evidence that mechanisms besides access to quality schooling are important in explaining Black-White differences in economic outcomes.⁷

2. The 1878 school closure

In 1871, the Virginia legislature enacted the Funding Act which replaced debt issued by the state prior to the Civil War with bonds worth two-thirds of the original amounts (Cooper et al., 2016). The Funding Act also allowed these interest-bearing coupons to be used to pay state

⁶ Chetty et al. (2020) calculate the difference in mobility at the twenty-fifth percentile of fathers.

⁷ There are two hypotheses commonly used to explain the Black-White earnings gap (Margo, 1990). The human capital hypothesis suggests that Blacks were far less likely to attend school and, when they did, those schools would have lower quality. The institutionalist hypothesis suggests that the real problem was not lower quality or quantity of schooling, but rather historical patterns of employment segregation.

taxes. These coupons accounted for about half of the state's tax receipts during the 1870s (Dailey, 2000; Tarter, 2016). However, these coupons could not be used to fund government services. By 1878, the state had an annual budget deficit that the state auditor estimated would require a 75-percent tax increase to close (Dailey, 2000).

In response to the budget deficit, the state legislature passed a bill prohibiting the payment of a portion of taxes using the coupons and earmarking money collected for public schools. The state funds for public education were tied to the student population in a school district, which was determined by a school census of the population between the ages of 5 and 21 living in a school district (not the number of enrolled students). The governor vetoed the bill in February 1878. The veto initiated a funding reduction that would not be resolved until March 1879. State funding for schools was thus immediately reduced by about 60 percent, or from \$0.64 to \$0.26 per the student population.

There were four sources of funding for public schools: state, county, and district funds, as well as private donations. The schools were governed locally through a county superintendent and a board of trustees. School trustees and county governments had the ability to raise additional revenue to supplement state funding conditional on local support and the existence of a tax base. However, counties and school districts did not have time to plan for a tax increase given the abruptness of the veto. Many school districts opted to close existing schools rather than to replace lost revenue. The result of this decision was a heterogenous response to the funding reduction. Figure 1 shows the percent of Black and White schools that closed in each county during the 1878-1879 school year.

[Insert Figure 1 about here]

Immediately prior to the funding reduction, about 50 percent of the White and 32 percent of the Black student populations were enrolled in school. After state funding was reduced, total enrollment fell by 46 percent with nearly half of all White schools and 40 percent of all Black schools closing across the state. By the 1879-80 school year, state funding had been restored, two-thirds of counties had reopened schools, and enrollment rebounded to near pre-reduction levels as a percent of the student population (see Table A1 in the appendix). Nearly 90 percent of counties had reopened schools within two years of the funding restoration.

3. Hypotheses

My hypothesis is that school closures affected long-run economic outcomes by reducing access to educational resources. I identify two mechanisms: a reduction in instructional time during the 1878-79 school year, and delayed enrollment or re-enrollment. The effects would likely be larger in counties that closed a higher percentage of schools, as well as for student populations that did not have access to resources that might have supplemented lost instructional time. This would include those with lower incomes or those without exposure to literacy at home. The effects would also be larger for younger student population cohorts who were just learning to read and write as well as for cohorts that were more likely to have been enrolled when the initial disruption occurred.

The school closures in Virginia during the late-1870s were prolonged (i.e., lasted at least a year), widespread (i.e., schools closed in nearly every county), and affected access for student populations differently depending on whether they were Black or White and where they lived when the closures occurred. The differences in access were because local governments ultimately managed public education which provided for segregated schools. This led to variation in local responses within both the state and counties to the state funding reduction. Further, children were eligible for school only in their school district and county of residence.

There is a substantial literature on the effects of present-day school closures on educational outcomes. However, most of the literature examines relatively short closures, ranging from a few days to a few months, that are confined to specific age groups (Blanden et al., 2022). This literature predominantly examines short-run educational outcomes, such as test scores or other measures of subject matter aptitude, given limited data that tracks student outcomes over long periods of time (Blanden et al., 2022). The preponderance of this evidence suggests that school closures have negative effects on educational outcomes that are larger for low-income students and other disadvantaged groups.

The few works which examine school closure in a historical setting focus on the 1918-19 flu pandemic. Ager et al. (2020) track students that were affected by school closures associated with the 1918-19 pandemic and found little evidence that they were negatively affected in terms of educational attainment or labor market outcomes in adulthood. This may not be surprising given that many factors can ultimately influence economic outcomes in adulthood and students who missed instruction may be able to eventually make up lost benefits by the time they reach adulthood. However, Ager et al. (2020) acknowledge important distinctions associated with the 1918-19 pandemic, including high absentee rates for students enrolled in schools that

remained open, the lack of remote learning options that can disproportionately affect high income students, and that schools closed for relatively short periods (the average length of a school closure was 36 days).

Another difference with the 1918-19 pandemic is that it is difficult to distinguish between the long-term effects of illness and the school closures. The 1918-19 pandemic had a significant effect on children (Luk et al., 2001). Therefore, children who missed school may have also experienced a debilitating illness that may have affected economic outcomes later in life. However, children not enrolled in school during the 1870s were likely working. For instance, about 85 percent of White males between the ages of 10 and 14 in 1878, and 90 percent of Black males of the same age cohort, were working if they were not enrolled in school.⁸ It was even the case that 20 percent of school age children between 5 and 9 were working, but even those who were not officially assigned to a job in the census likely spent time laboring in less formal ways such as in agriculture or within the household.

There is also a growing literature on the intergenerational transmission of educational advantages (e.g., Braun and Stuhler, 2018; Adermon et al., 2021; Collado et al., 2022) as well as how education affects economic inequality and mobility (Hällsten and Kolk, 2020; Chetty et al., 2020). This literature shows that access to schooling and educational quality are important to intergenerational mobility and that educational advantages (or disadvantages) can be persistent across generations and within communities. Therefore, the characteristics of one's family and community are likely important determinants in outcomes.

Literacy during the period has been linked to accumulated wealth during adulthood (Higgs, 1982; Margo, 1984). Literacy may also effect cognition leading to “psychological and social changes” that, according to Henrich (2020), “may have fostered speedier innovation, new institutions, and – in the long run – greater economic prosperity.” In essence, literacy is likely related to economic outcomes at both individual and aggregate levels.

One assumption may be that school attendance increases literacy, but recent evidence suggests that school quality can have significant consequences for language development (Nestour et al., 2021). The age at which children learn to read may also be related with literacy, as well as general reading comprehension, later in life (Cunningham and Stanovich, 1997). This suggests that the association between attendance and literacy is not straightforward. It also necessitates measuring outcomes for Black and White student populations separately given likely differences in quality of education.

⁸ Author's calculations of individuals who had an occupation using data from the 1880 US Census.

There is also a substantial literature on how differences in access to education affected the Black-White gap in economic outcomes from the late-nineteenth through the mid-twentieth centuries. There is a strong association between the convergence in the quantity and the quality of schooling and Black-White wages during the twentieth century (Orazem, 1987; Card and Krueger, 1992; Whatley and Wright, 1994, Carruthers and Wanamaker, 2017a). Furthermore, funding for schools reduced the Black-White gap in educational attainment (Aaronson and Mazumder 2011; Carruthers and Wanamaker, 2017b).

Based on the existing literature, the predicted long-run effects of the school closures would include higher rates of illiteracy in adulthood, lower incomes, and lower levels of economic mobility for the affected populations. They would also include larger effects for student populations that grew up with lower incomes, those with family members with lower levels of educational attainment or were illiterate, or those who were disadvantaged in other ways. The differences in the effects for Black and White student populations are more ambiguous. The existing literature clearly finds that differences in access to education between Black and White populations affected economic opportunities. However, the Black student population was less likely to be enrolled immediately before schools were closed. The school closures may have also affected the unenrolled population through lower levels of literacy within the local community or lower levels of income.⁹

4. Data

I examine the long-run effects of school closures using new administrative data from Virginian school districts as well as linked US Census records. These data allow me to observe how student populations who were recorded in the 1880 and the 1910 censuses were likely affected in adulthood by school closures that were initiated during the 1878-79 school year. The census years 1880 and 1910 were chosen because they reflect the census nearest to the funding reduction (i.e., 1880) and the first census year where the entire population alive during the 1878-1879 school year would have been aged out of the school population for at least a few years (i.e., 1910). I exclude later census years because it becomes difficult to match individuals due to mortality which also reduces the sample size in such a way that may not be random (i.e., mortality is likely correlated with income and education).

⁹ Margo (1987) finds that income and literacy of parents can explain racial differences in schooling attendance in addition to the enforcement of “separate but equal” following the US Supreme Court decision in Plessy v. Ferguson.

I examine the effects associated with only male student populations given that females cannot be accurately matched across the censuses given the reliance of the linking procedure on the consistency of names used. I also link sons in 1910 with their fathers in 1880 to examine how the school closures may have influenced intergenerational mobility.

School Closures.— The administrative data is hand-collected from annual reports produced by school districts in Virginia beginning with the 1870-71 school year (i.e., the first year in which the public schools were in operation pursuant the state constitution). An 1870 law required that school districts prepare financial statements and administer a school census that included a record of the school population. The school population was all persons eligible for school, or those between the ages of 5 and 21 living within a school district. The reports were generated by the county superintendents and collected by the Department of Public Instruction which produced its own report aggregating the local records.

The school records are incredibly rich. They include the number of schools opened in each year, the months of instruction per school year, the number of teachers and their pay, the amount of funding and the sources of funding, the number of enrolled students and attendance, and the student population. The school records also include school population and enrollment in each school district at the subcounty level for certain years.

The records contain all 109 independent counties and cities in Virginia. Figure A2 in the appendix shows the average school population per school for counties and cities, the average number of students enrolled per school, the average number of schools, and local revenue per person in the county raised to fund schools.¹⁰ There was a significant decline in the number of Black and White schools during the 1878-79 school year, as well as an increase in the student population per schools opened. There was also a slight increase in the number of enrolled Black students suggesting that enrollment, as a percent of the student population, fell less for the Black student population than the White population. There was no meaningful change in the number of White students enrolled per opened schools suggesting that when schools closed the students did not enroll in a new school. Local funds were consistently lower in counties that closed most of their schools compared with counties that closed fewer or no schools. However,

¹⁰ The difference between the average number of months of instruction during the period was indistinguishable from zero. Immediately before, during, and after the funding reduction it was between 5.3 and 5.6 months per year on average for both Black and White schools. Source: Author's calculation using Virginia Superintendents Reports.

differences in the means are indistinguishable from zero and there was no significant change in local revenue associated with the funding reduction.¹¹

On average, 47 percent of White schools were closed (standard deviation of 32 percent) and 40 percent of Black schools were closed (standard deviation of 36 percent) after the state funding reduction. Resources available for Black students were noticeably lower. Before the closures, there were 163 potential students for every Black school (standard deviation of 65), and 86 potential students for every White school (standard deviation of 35).¹² However, the number of students enrolled per school was 49 Black students per school (standard deviation of 19) and 40 White students per school (standard deviation of 11).

Linked Census Records.— The linked sample is created by matching males in both the 1880 and 1910 US Censuses using their name, year of birth, state of birth, and race. Only males living in Virginia, or a state that was bordering Virginia, during the 1880 census year were included. Specifically, I use the linking algorithm developed by Abramitzky et al. (2014) and dataset described by Abramitzky et al. (2020) to link full count census data from IPUMS.¹³ The sample is further restricted to only those children who were between the ages of 2 and 26 when the schools were closed during the 1878-79 school year.¹⁴ The entire sample includes 90,821 individuals living in Virginia during 1880 (20 percent of the entire population within the same age cohort).¹⁵ I also include 39,923 individuals who grew up in counties bordering Virginia (20 percent of the entire population within the same age cohort).¹⁶

[Insert Table 1 about here]

Table 1 compares the summary statistics for key variables for the linked sample of the Virginian population under 26 in 1878, as well as the same population in Virginian border counties and counties bordering Virginia. Compared with the entire Black student population,

¹¹ In comparing the average local revenue per person during the entire period from 1870-71 until 1879-80 school years, the t-value associated with White schools is 0.67 (p-value of 0.51) whereas for Black schools it is 1.44 (p-value of 0.15). This suggests that I cannot reject the null hypothesis of there being no difference in the level of funding during the 1870s between counties that closed schools versus counties that did not close schools.

¹² A potential student is equivalent to the student population or the entire population of eligible students between the ages of 5 and 21 in the school district.

¹³ Furthermore, I use the conservative version of the ABE algorithm with NYSIIS names requiring that the individual be unique within a 5-year age range. Abramitzky et al. (2019) and Abramitzky et al. (2022) provide further details of this method.

¹⁴ Children under the age of 0 in 1878 were included in the 1880 US Census but were not yet born when the schools closed.

¹⁵ Abramitzky et al. (2019) explains how these are standard matching rates given a variety of factors that would make it difficult (e.g., transcription error) or impossible (e.g., mortality) to match individuals.

¹⁶ These states include North Carolina, Tennessee, Kentucky, West Virginia, Maryland, and Washington, DC.

Black students in the linked sample were more likely to have lived in a county that closed schools. White students in the sample were just as likely to live in a county that closed White schools. There was general similarity in the populations living in counties on both sides of the Virginian border. Those living in border counties were slightly more likely to have been living on a farm in 1880 than the general population in Virginia, and less likely to live in an urban area. The percent of schools that closed in border counties was also higher than the general population, which likely reflects higher closure rates in rural areas. However, the student population per schools prior to the 1878-79 school year was similar in both Virginian border counties and in the general population. I do not have detailed data on schools in border counties outside of Virginia and, therefore, this data is not included.

5. Methodology

I am interested in examining the effects of the school closures on student populations. I hypothesize that school closures would have had both short- and long-term consequences for student cohorts living in counties that closed schools. These effects would have put them at a disadvantage relative to similar student cohorts who lived in counties where schools remained open. As described above, much of the existing literature has focused on short-run effects of school closures.

The empirical strategy exploits heterogenous county-level responses to the unanticipated veto of a bill that led to a reduction in state funding for education. However, it is possible that the county responses were motivated by other factors associated with support for schools. This includes many observable characteristics such as the local economy, local school funding over the educational lifetime of the students, measures of school quality, political representation, and local networks developed in support of schools.¹⁷ It also includes unobservable characteristics such as having better teachers. Individual characteristics, such as exposure to literacy in the household or family income, also may have affected outcomes in adulthood. The following sections consider short- and long-term effects of the school closures controlling for as many of these additional factors as possible.

¹⁷ Religion had a central connection with the public education movement during Reconstruction (McAfee, 1988). Church buildings were used as schools and church leaders recruited teachers. Church communities were especially important for Black schools where Black religious leaders both recruited and helped place teachers. For example, the 1867 Freedmen's Bureau report noted "colored preachers are exhorting their race to push forward the work of education," and highlighted the work of Rev. Robinson, a Black Baptist church pastor from Alexandria, Virginia, who promised to provide a "good teacher" to a school in a neighboring county (pp. 17 and 82).

Short-term effects.— The closing of schools may have affected the probability of attendance once the schools reopened. Most counties had reopened all their closed schools within one school year of the funding reduction. However, not all counties immediately reopened schools when state funding was restored. Furthermore, it is possible that the closing of schools delayed, deferred, or disrupted enrollment. To examine whether short-term effects on school enrollment, I use the following estimating equation:

$$Pr(\text{SchoolEnrolled}_{ic,1880}) = \alpha + \beta \text{SchoolsClosed}_{c,1879} + \theta X'_{ic,1880} + \varepsilon_{ic,1880} \quad (1)$$

where *SchoolEnrolled* indicates whether an individual “i” in county “c” was enrolled in school in 1880, or one year after the restoration of state funding. *SchoolsClosed* is the percent of schools closed in a county during the 1878-79 school year. *SchoolsClosed* is the percent of schools closed. *X* represents a series of demographic and economic characteristics including race, age (and age squared), the occupational income score for the father in 1880, an indicator representing if they lived on a farm in 1880, sibling literacy in 1880, an indicator representing if they lived in a county with Black political representation during the 1870s, total county farm values and manufacturing wages, total value of wealth for the county, water and railroad access, the percent of sharecroppers, urban population percentage, school population per number of schools before 1878-79 school year, local funding for schools over the time the cohort was eligible for school, county literacy rates in 1870, measures of school quality both before and after the funding reduction, a measure of segregation of the school districts, census enumeration district, an indicator for the state of residence in 1910 if the individual had moved to another state, as well as interactions thereof.¹⁸

Long-term effects.— This paper is primarily focused on the long-run effects of school closures. In other words, whether the likelihood of being exposed to school closures (i.e., living in a county during 1880 that closed schools during the 1878-79 school year) was associated with illiteracy or economic outcomes in adulthood. The main specification to examine literacy in adulthood takes the form of the estimating equation:

¹⁸ The local funding per cohort was calculated by adding district and county funding per student for each county and then averaging over the cohort’s student lifetime. For example, for a student who was 5 years old in 1878, I average local funding for the entire time that they would be expected to be enrolled in public school from 1878 until 1899. Measures of school quality include teacher pay (both male and female average teacher pay), the student teacher ratio, and the average number of months of instructional time. The level of segregation of the school districts is the dissimilarity index value which measures the evenness at which White and Black student populations are distributed across school districts within a county and it is calculated using school population data from the 1879-1880 school year (see Appendix B for details).

$$Pr(Literacy_{ic,1910}) = \alpha + \beta SchoolsClosed_{c,1879} + \theta X'_{ict} + \varepsilon_{ict} \quad (2)$$

where *Literacy* indicates whether an individual “i” living in county “c” in 1880 was illiterate in 1910. In this case, illiteracy is defined as unable to both read and write. *SchoolsClosed* is the percent of schools closed in a county during the 1878-79 school year corresponding with the individuals’ race. *X* represents a series of characteristics similar to equation (1) and their interactions.¹⁹

The main specification to examine income in adulthood takes the form of the estimating equation:

$$IncomeScore_{ic,1910} = \alpha + \beta SchoolsClosed_{c,1879} + \theta X'_{ict} + \varepsilon_{ict} \quad (3)$$

where *IncomeScore* indicates the log of an individual’s occupational income score in 1910. Before 1960, the census does not include individual income data. As a proxy, I use the occupational income score computed by the Minnesota Population Center. The occupational income score is an index based on the median income in 1950 for occupations reflected in the US Census’s occupational classifications for 1950.²⁰ In the index, a value of 1 is equivalent to \$1,000 in 1950. The score does not account for variation within occupation, including variation associated with race. It also does not account for cost-of-living differences (i.e., in all cases it assumes everyone with the same occupation was paid the same). Therefore, estimates using occupational income score will likely understate differences in pay between urban and rural areas and between White and Black workers within the same occupation.

Furthermore, I am interested in the effect of school closures by both age and exposure to school closures. This allows me to also exploit variation by age and the fact that not everyone was eligible for school even if they lived in a county that closed schools. For this specification, I denote *SchoolsClosed* as a variable recording whether school closures occurred in a county “c.” The estimating equation takes the following form:

¹⁹ In addition to the control variables referenced earlier, I also include literacy of the individual in 1880, community literacy in 1880, and school enrollment in 1880.

²⁰ See Table 19 in the 1953 US Census Report No. P-E No. 1A

$$\begin{aligned}
IncomeScore_{ic,1910} = & \alpha + \beta_1 SchoolsClosed_{c,1879} + \beta_2 age_{1878} \\
& + \beta_3 (SchoolsClosed_{c,1879} \cdot age_{1878}) + \theta X'_{ict} + \varepsilon_{ict}
\end{aligned} \tag{4}$$

where *IncomeScore* indicates the log of an individual's occupational income score in 1910. *age* is the potential student's age in 1878 that would have made them eligible for school during the 1878-79 school year. In an extension of the standard two-way fixed effects model, β_3 indicates the interaction between school closures and age. This quasi-experimental design identifies the difference between the treatment (i.e., student populations affected by the closures) and the control (i.e., student populations not affected by the closures). In this model there are two controls: students living in counties that closed schools but were too young to be affected and students who were living in counties that did not close schools regardless of their age. This method also identifies the age-based effects of the school closures.

Finally, I examine economic mobility. The main specification to examine economic mobility between sons and fathers takes the form of the estimating equation:

$$\begin{aligned}
SonRank_{ic,1910} = & \alpha + \beta_1 SchoolsClosed_{c,1879} + \beta_2 FatherRank_{ic,1880} + \\
& \beta_3 (SchoolsClosed_{c,1879} \cdot FatherRank_{ic,1880}) + \theta X'_{ict} + \varepsilon_{ict}
\end{aligned} \tag{5}$$

where *SonRank* is a son's occupational income rank in 1910 and *FatherRank* is the father's rank in 1880 (or when their son was growing up). The rankings for both the fathers and the sons are based on their position in the state income distribution. The estimating equation allows both the slopes and intercepts to differ for student population cohorts that grew up in counties that closed schools and did not close schools.²¹ α indicates the absolute mobility of the student population. β_1 is the degree to which the expected rank of sons is different for those who lived in a county in 1880 that closed a certain percentage of their schools during the 1878-79 school year. β_2 is the relative mobility of sons compared to their fathers. β_3 is the degree to which relative mobility is different for sons who lived in a county that closed a portion of the schools.

²¹ The estimating equation takes a similar form used by Abramitzky et al. (2021) to study the intergenerational mobility of immigrants in the US.

6. Results

6A. School Enrollment

I estimate the probability of different age cohorts being enrolled in school in 1880 conditional on the percent of schools that closed in the county where they lived. There are two reasons to be interested in the relatively short-term effects of enrollment in a study examining the long-run effects of school closures. If the decline in enrollment lasted only a brief period (e.g., one year), but was associated with persistent long-term effects, it may suggest that even a temporary loss of access to education can change long-run outcomes apart from altering the enrollment trajectory for a student population cohort. However, if the school closures led to persistent effects on enrollment which affected outcomes, this might be consistent with a finding that students who reenrolled in schools once they opened were able to make up lost learning. In essence, the long-run effects of temporary school closures may have been driven by persistent declines in enrollment even though the school closures were temporary.

[Insert Figure 2 about here]

Figure 2 plots the regression coefficients corresponding with equation (1) for each age cohort.²² When the schools were initially closed during the 1878-79 school year, those under the age of 5 would not have been eligible for public school.²³ We would expect that the school closures would not affect younger cohorts if the effects of the closures were not persistent. However, the school closures may have affected cohorts eligible for school by disrupting their education.

I find no evidence that school closures influenced enrollment for the White student population. White students were just as likely to be enrolled in 1880 independent of whether schools were closed. The White student population was also more likely to be enrolled in school both before, during, and after the funding reduction relative to the Black student population. This suggests that educational access for the White student population recovered quickly while initial declines in enrollment were not persistent.

It was a different story for the Black student population. I find that children who were not eligible for school in 1878 were no less likely to be enrolled two years later regardless of the

²² Standard errors are clustered by the county of residence in 1880 given that is the level at which the treatment (i.e., the school closures) occurred.

²³ Figure A3 shows the distribution of school enrollment in 1880 based on age in 1878 for both White and Black student populations.

percent of schools closed during the state funding reduction. This can be seen by comparing students who were exactly 4-years-old with those who were exactly 5-years-old in 1878. Those who were 5-years-old were less likely to be enrolled in 1880 if their county closed schools. However, there was no association between the percent of school closures in 1878 and enrollment in 1880 for those who were not eligible for school when the funding reduction occurred because they were 4-years-old. I cannot rule out that low overall enrollment, and thus a lack of heterogeneity, is responsible for the absence of a relationship between enrollment and school closures for 4-year-olds.²⁴ Nevertheless, there is evidence of persistence in enrollment associated with those living in counties that closed schools for only the Black student population.²⁵

6B. Literacy

In the next few sections, I examine the relationship between school closures and long-run outcomes beginning with literacy in adulthood.

[Insert Table 2 about here]

Table 2 shows the results from estimating equation (2) for the entire sample. The results suggest that school closures in 1878-79 were associated with higher levels of illiteracy in 1910. They also show that certain measures of school quality, in particular the average months of instruction, and the level of school district segregation were important factors in determining illiteracy in adulthood. For students who were eligible for school when the closures occurred, the probability of being illiterate was 38 percent higher in counties that closed schools relative to counties that did not close schools (e.g., 8.0 percent relative to 5.8 percent). However, there was no difference for Black students.

²⁴ The average probability of enrollment in 1880 for this cohort was 8 percent, with a standard deviation of 27 percent.

²⁵ As discussed in the methodology, it is possible that religious organizations supported education both directly and indirectly by providing schoolhouses, recruiting teachers, and encouraging literacy. To examine this effect, I estimate county-level church membership using information on denominational sittings and organizations in the 1870 US Census based on a method by Finke and Stark (1986). I do not have information on religious affiliation of individuals. I find that county-level Lutheran and Presbyterian membership was positively associated with being enrolled in school, and Methodist and Episcopalian membership was negatively associated with being enrolled in school, for White student populations. I find that Baptist, Lutheran, and Presbyterian membership was positively associated with being enrolled in school for Black student populations. All other denominations had no effect on enrollment. The coefficients associated with the school closures were not substantially affected by including denominational membership or the number of churches in the estimating equation, and therefore, these results are not reported.

[Insert Figure 3 about here]

Figure 3 shows the probability of being illiterate by age in 1878. Those eligible for school when the closures occurred were to the right of the red vertical line. Panel (A) shows the estimated probability of illiteracy for potential Whites students by age when the closures initially occurred, while Panel (B) shows the probability for potential Black students. There are two notable items in this figure. First, illiteracy rates were higher for those students who were too young to be eligible for school in 1878 but lived in a county that closed schools even after controlling for a variety of individual and local characteristics including school quality. In fact, the difference in the effect of living in a county that closed schools for those too young (under the age of 5 in 1878), too old (over the age of 21), and the entire student population (those ages 5 to 21) is statistically indistinguishable from zero. This would suggest that the closures did not have particularly significant effects on adulthood literacy for most of the population. Second, there are no differences in the literacy rates of Black students regardless of whether they lived in a county that closed schools.

However, the closures would have affected student cohorts differently. This is conveyed in Figure 3 by the growing gap in probability of illiteracy for those ages 5 to 8 in counties that closed all of their schools. Figure A4 in the appendix shows the estimated coefficients of β from equation (2) by age cohort in 1878. The results demonstrate that, for White student populations, the association between school closers and illiteracy in adulthood is larger for younger cohorts.²⁶ For example, for those between the ages of 5 and 9, the probability of being illiterate increases by 58 percent if they lived in a county that did not close schools relative to a county that closed all their schools (i.e., from 5.2 to 8.2 percent).

The larger effects for younger cohorts may be related to the students' developmental stages. It is during the early formative years when students are learning basic skills necessary for continued education, including how to read and write. Older student population cohorts would have already had these skills. Therefore, we might expect that a disruption at certain critical

²⁶ Figure A5 shows the estimated coefficients of β from equation (2) where *SchoolsClosed* indicates whether a county closed between 25 and 49 percent, or more than 50 percent, of their schools during the 1878-79 school year. The results suggest that for all White population cohorts between the ages of 0 and 14 the effect is largely being driven by counties that closed most of their schools. I do not find evidence that Black school closures affected the probability of Black illiteracy in adulthood. This result could be influenced by the quality of Black schools or by a lower probability of enrollment for the Black student population. Table A5 in the appendix shows results from equation (2) where Black student enrollment per student population is interacted with the percent of Black schools that were closed. The results show that for all cohorts, the percent of school closures conditional on Black enrollment did not influence illiteracy in adulthood, suggesting that the quality of Black schools may be a more significant factor.

stages of development (e.g., when students are first learning how to read and write) may have been especially important.²⁷

Exposure to other individuals who could read or write in the household may also have been an important factor. The baseline estimates include a control for sibling literacy to indicate exposure, which was much more prevalent for White than for Black student populations. The White student population between the ages of 5 and 14 in 1878 was 2.5 times more likely to live in a home with a sibling who was literate, and 1.7 times more likely to live in a home where anyone was literate, compared to the Black student population. I examine the potential effect of the school closures conditional to exposure to literacy in childhood by modifying equation (2) to include an interaction between sibling literacy with the percent of schools closed in county.²⁸

Figure A6 in the appendix shows the predictive margins from the augmented equation (2) for individuals in the sample who lived with a literate sibling in 1880 (“Literate”), and those who did not have a literate sibling (“No Literate”), by the percent of schools that closed in a county. Table A7 in the appendix includes the full results. The results are generally consistent with the hypothesis that living with a literate sibling was associated with higher levels of literacy. This may have been caused by either exposure to literacy or a signal that literacy was important to the family. However, living with a literate sibling this was not enough to offset the effects of school closures for many of the student cohorts.

The results in Table A7 also suggest that if Black students between the ages of 5 and 14 in 1878 were enrolled in 1880, there was no effect of sibling literacy or the school closures on the probability of illiteracy in adulthood. When these results are combined with the finding that school closures led to persistent short-term enrollment effects on Black students it suggests that the school closures may have increased the probability of Black illiteracy through a prolonged reduction in the likelihood that the potential students would attend school.

[Insert Tables 3 and 4 about here]

I also examine whether a delay in the reopening of the schools after state funding was restored had any meaningful effects on illiteracy in adulthood by augmenting equation (2) to

²⁷ As with the examination of school enrollment, I also included estimates of religious membership in another version of the estimating equation. Including estimates of church membership and the number of churches in 1870 did not have any meaningful effect on the coefficients of interest and are unreported.

²⁸ I also ran an identical analysis substituting sibling literacy with exposure to anyone else in the household that was literate. I found no statistically meaningful effects associated with household literacy.

include an interaction for the percent of school closures during the 1878-79 school year and counties that did not reopen all their schools until the 1880-81 school year. The results in Table 3 suggest that the effects on illiteracy were driven by the initial closures, and not the prolonged reopening, for the youngest White student population (i.e., between the ages of 5 and 9). However, for older student populations (i.e., between the ages of 10 and 21), the negative effects of the closures were associated with the delayed reopening. Table 4 shows the results for Black student populations that support earlier findings that reduction in enrollment, likely through delayed reopening, increased the probability of illiteracy for Black student populations affected by the closures.²⁹

6C. Income

Table 5 shows the estimates from equation (3) for the entire sample. The effect of the school closures on the income of Whites was about 4.9 percent after controlling for school quality and segregation. Similar to the results on adulthood literacy, there was no effect of the school closures on incomes for Black student populations. Figure 4 shows the effect sizes by age for White students. Living in a county that did not close schools was associated with a higher income for every age including those who were too young to be eligible for school during the 1878-79 school year. However, there is a significant decrease in predicted income between ages 7 and 9 for those living in a county that closed all schools.

[Insert Table 5 and Figure 4 about here]

Figure 5 shows the estimates of β from equation (3) by age cohort where the dependent variable is occupational income score in 1910. The results indicate that, for White student populations, there was an association between living in a county that experienced school closures and income score in adulthood. There is no effect of school closures on student population cohorts that were too young (i.e., between the ages of 0 and 4) or too old (i.e., between the ages of 22 and 26) to have been enrolled in school during the 1878-79 school year. The largest effect is for the student population between the ages of 10 and 14 as their income

²⁹ I also compare outcomes for student populations in Virginian border counties with student populations in counties located in states that border Virginia. I compare border counties because it was likely that the characteristics were similar for individuals living in counties bordering each other but in different states.²⁹ Tables A3 and A6 show estimates of β from equation (2) for the sample including only Virginian counties and the sample that includes only border counties in Virginia as well as states bordering Virginia. The coefficients associated with the border county sample are slightly higher. This may be because I do not have school closure data for schools in border counties outside Virginia and, therefore, assume that the school closer rate is zero.

was 6 percent lower if they lived in a county that closed all schools compared to living in a county that closed no schools (i.e., 21.4 compared with 22.8). Similar to the results on adulthood illiteracy, there is no effect of school closures on income score for Black student populations.³⁰

[Insert Figure 5 about here]

The difference in wages paid to Black and White workers (i.e., wage gap) during the twentieth century has been studied extensively. The results in this paper imply that the Black-White wage gap would have been even larger in 1910 had schools not closed during the 1870s. Based on estimates in Figure 5, if White schools had not closed in the 1870s, the average occupational income score for the entire White student population cohort would have been about 0.9 points higher. Given that the Black-White gap in occupational income score for the student population was 24 percent, this change is equivalent to increasing the gap by about 5 percentage points, or to 29 percent.³¹

[Insert Figure 6 about here]

Figure 6 shows the results from the quasi-experimental design reflected by estimating equation (4) for White student populations in Virginian counties where the dependent variable is the occupational income score. Panel (A) shows the difference in the predicted effect for each age in counties that closed all schools compared to counties that closed no schools (β_3 in equation (4)). There is no statistically meaningful difference for student populations that were too young to be eligible for the closures when they occurred (i.e., those under the age of 5 in 1878). The most significant differences are for those students who were older than 8 years old. This supports the findings represented in Figure 5. Panel (B) shows the differences in the predicted effects for those who lived in counties that closed all schools compared to counties that just closed some (but not all) of their schools during the 1878-79 school year. The difference is not statistically meaningful at any age. However, the effect does change from

³⁰ Table A12 in the appendix includes results from the full sample, including both White and Black student populations, and all interactions between school closures and race. Interestingly, there was a positive association between being Black and White school closures on income in adulthood for the Black student population cohort between 5 and 9 in 1878.

³¹ The observed average income score for the 1878-79 student population in 1910 was 17.6 for Blacks and 21.8 for Whites. A 0.9 increase in occupational income score would have increased the score of Whites to 22.7 which reflects an increase of 5 percentage points in the Black-White income gap.

positive to consistently negative suggesting that closing all schools may have had larger effects than closing some schools. These results also suggest that, generally, the closures did not have prolonged effects on White populations who lived in the counties that closed schools but were ineligible for school at the time of the closures.

6D. Intergenerational Economic Mobility

Table 6 reports the estimated values from equation (5) for the entire sample. The results suggest that the school closures had a negative effect on the income rank of sons. Further, the results suggest that that higher levels of school district segregation were associated with lower income ranks in adulthood. However, I do not find an association with income rank in adulthood and the quality of schools when the school closures occurred. They also show that the sample generally experienced upward absolute economic mobility (reflected by a positive and statistically significant α).

[Insert Table 6 and Figure 7 about here]

Figure 7 plots the estimated values of sons' ranks based on fathers' ranks for White student population cohorts from equation (5) allowing the slope and intercept of the father-son rank relationship to differ for counties that did not close schools versus counties that closed at least one school. Furthermore, I compare student population cohorts affected by the closures (i.e., ages 5 to 21 in 1878) with those who were too young (i.e., ages 0 to 4) or too old (i.e., ages 22 to 26) to be eligible for school during the 1878-79 school year. For the student population cohort affected by the closures, I find that intergenerational mobility of the White student population was higher in counties that did not close schools. I find no statistically meaningful difference in the mobility related to the closures for sons who were too young or too old to be eligible for school when the closures occurred.

[Insert Figure 8 about here]

Figure 8 plots the estimated rank of White sons whose fathers were in the 25th percentile of income (Panel A) and the 50th percentile of income (Panel B) in 1880 based on age and residence in a county that closed schools. The figures show that there is no statistically meaningful difference in the estimated rank of sons who were too young or too old to be eligible for school during the 1878-79 school year. However, they show a divergence in estimated

income rank after age 5 and a consistent gap in income rank for most of the school eligible population between those exposed to school closures and those not exposed to the closures. Although the difference in income rank is not statistically significant at every age between 5 and 21, the statistical significance for certain ages alongside the growing gap after age 5 is a strong indication that the school closures had an effect on economic mobility in adulthood.

6. Discussion

I use new administrative data from Virginian schools, alongside linked census data of student population cohorts, to study the long-run effects of school closures in Virginia in 1878-79. I find evidence that disruptions in access to public schooling caused by an unanticipated reduction in state funding had important consequences on student outcomes associated with education later in life. School-age children growing up in counties that closed a higher percentage of schools had lower incomes and experienced lower levels of intergenerational mobility compared to their peers, including their neighbors who were too young or too old to be affected by the school closures. Students growing up in counties that closed schools were also more likely to be illiterate in adulthood.

It is remarkable that White student population cohorts who were exposed to the closures were just as likely to be enrolled in school a year after the state funding reduction, but had income scores that were as much as 5 percent lower than their peers who were not exposed to the closures more than 30 years later. We might expect that students who experienced a temporary loss in access to public schooling would have been able to make up any differences by adulthood. That the effects of the school closures were so persistent demonstrates how these events can be permanently scarring when they affect children at critical stages of development. Overall, my findings suggest that this was especially true for younger student cohorts (e.g., under the age of 10 when the closures occurred) who are just learning to read and write.

It is, perhaps, not surprising that the long-run effects of closures were different for White and Black populations. There were significant differences in the quality of Black and White schools. Black enrollment in schools was more likely to have experienced a prolonged disruption following the school closures and Black student populations were less likely to have been exposed to literacy in their households which could have helped to offset the effects of lost instruction time. In essence, Black students were more likely to face additional barriers to consolidating gains in education. This adds nuance to the finding that Black literacy improved after 1870 because of an increase in the quantity of schools (Collins and Margo, 2006). Although Black literacy was improving in the decades following emancipation, it would likely

have improved more if educational resources and population characteristics were equivalent to those available to White student populations.³²

I also find evidence that children benefited from schools remaining open. Chetty et al. (2014) have shown that economic status can persist between generations, but education can close those gaps. Indeed, I find that White children growing up at the bottom of the income distribution, and who lived in counties that did not close schools, were more likely to be upwardly mobile relative to their peers in counties that closed schools. Children were also less likely to be upwardly mobile relative to other children who grew up in the same county if they were eligible for school when the schools closed. This offers an important observation supporting the significance of educational access in studying patterns of historical mobility.

My results have important policy implications following the prolonged school closures due to the Covid-19 pandemic. In many rich countries, students with adequate resources were able to continue with remote instruction or by transferring to a new school.³³ Students in less developed countries, or those who had fewer resources in developed countries, did not experience the same opportunities and lost access to instruction for many months in some cases. My findings are consistent with the idea that the closures could widen economic inequality between countries and between advantaged and disadvantaged students within the same country.

References

- Aaronson, Daniel and Bhashkar Mazumder. 2011. "The Impact of Rosenwald Schools on Black Achievement." *Journal of Political Economy*, 119(5), 821-88.
- Abramitzky, Ran; Leah Platt Boustan, and Katherine Eriksson. "A Nation of Immigrants: Assimilation and Economic Outcomes in the Age of Mass Migration." *Journal of Political Economy* 122(3): 467-506.
- Abramitzky, Ran; Leah Boustan; Katherine Eriksson; James Feigenbaum and Santiago Pérez. 2019. "Automated Linking of Historical Data," *NBER Working Paper No. 25825*.
- Abramitzky, Ran; Leah Boustan; Katherine Eriksson; Myera Rashid and Santiago Pérez. 2022. "Census Linking Project: 1880-1910 Crosswalk." <https://Censuslinkingproject.org>.
- Abramitzky, Ran; Leah Boustan; Katherine Eriksson and Santiago Pérez. 2020. Census Linking Project: Version 2.0 [dataset]. <https://Censuslinkingproject.org>.
- Abramitzky, Ran; Leah Boustan; Elisa Jácome and Santiago Pérez. 2021. "Intergenerational Mobility of Immigrants in the United States over Two Centuries." *American Economic Review*, 111(2), 580-608.

³² The same comparison might be made today between developing and developed countries where the impact of loss instruction may be lower in less developed countries or in areas where the quality of schooling remains low (Lavy, 2015; Nestour et al., 2021)

³³ In the United States, private schools were more likely to reopen earlier than public schools. For example, in February 2021, about 90 percent of private schools were open to grade 4 students whereas 51 percent of public schools were open (US Department of Education, 2021).

- Adermon, Adrian; Mikael Lindahl and Mårten Palme. 2021. "Dynastic Human Capital, Inequality, and Intergenerational Mobility." *American Economic Review* 111 (5): 1523-48.
- Ager, Philipp; Katherine Eriksson; Ezra Karger; Peter Nencka and Melissa A. Thomasson. 2020. "School Closures During the 1918 Flu Pandemic," *NBER Working Paper No. 28246*.
- Agostinelli, Francesco; Matthias Doepke; Giuseppe Sorrenti and Fabrizio Zilibotti. 2021. "When the Great Equalizer Shuts Down: Schools, Peers, and Parents in Pandemic Times." *Journal of Public Economics*, 206: 104574.
- Blanden, Jo; Matthias Doepke and Jan Stuhler. 2022. "Educational Inequality*," *NBER Working Paper 29979*.
- Braun, Sebastian Till and Jan Stuhler. 2018. "The Transmission of Inequality Across Multiple Generations: Testing Recent Theories with Evidence from Germany." *Economic Journal* 128 (609): 576–611.
- Card, David and Alan B. Krueger. 1992. "School Quality and Black-White Relative Earnings: A Direct Assessment." *The Quarterly Journal of Economics*, 107(1), 151-200.
- Carruthers, Celeste K. and Marianne H. Wanamaker. 2017a. "Separate and Unequal in the Labor Market: Human Capital and the Jim Crow Wage Gap." *Journal of Labor Economics*, 35(3), 655-96.
- _____. 2017b. "Returns to School Resources in the Jim Crow South." *Explorations in Economic History*, 64, 104-10.
- Cattan, Sarah; Daniel A. Kamhöfer; Martin Karlsson and Therese Nilsson. 2022. "The Long-Term Effects of Student Absence: Evidence from Sweden," *DICE Discussion Paper No. 383*.
- Chetty, Raj; Nathaniel Hendren; Maggie R. Jones and Sonya R. Porter. 2020. "Race and Economic Opportunity in the United States: An Intergenerational Perspective." *The Quarterly Journal of Economics*, 135(2), 711-83.
- Chetty, Raj; Nathaniel Hendren; Patrick Kline and Emmanuel Saez. 2014. "Where is the Land of Opportunity? The Geography of Intergenerational Mobility in the United States." *Quarterly Journal of Economics* 129 (4): 1553–1623.
- Collado, M. Dolores; Ignacio Ortuño-Ortín and Jan Stuhler. 2022. "Estimating Intergenerational and Assortative Processes in Extended Family Data." *CEPR Discussion Paper No. 17492*.
- Collins, William J. and Robert A. Margo. 2006. "Historical Perspectives on Racial Differences in Schooling in the United States," E. A. Hanushek and F. Welch, *Handbook of the Economics of Education*. Amsterdam: Elsevier.
- Cooper, William J., Jr.; Thomas E. Terrill and Christopher Childers. 2016. *The American South: A History, Volume 2, from Reconstruction to the Present*. New York, NY: Rowan & Littlefield.
- Cunningham, Anne E. and Keith E. Stanovich. 1997. "Early Reading Acquisition and Its Relation to Reading Experience and Ability 10 Years Later." *Developmental Psychology*, 33(6), 934-45.
- Curry, Richard O. 1964. *A House Divided: A Study of Statehood Politics and the Copperhead Movement in West Virginia*. Pittsburgh, PA: University of Pittsburgh Press.
- Dailey, Jane. 2000. *Before Jim Crow: The Politics of Race in Post Emancipation Virginia*. Chapel Hill, NC: University of North Carolina Press.
- Engzell, Per; Arun Frey and Mark D. Verhagen. 2021. "Learning Loss due to School Closures during the COVID-19 Pandemic." *Proceedings of the National Academy of Sciences* 118, no. 17.

- Finke, Roger and Rodney Stark. 1986. "Turning Pews into People: Estimating 19th Century Church Membership." *Journal for the Scientific Study of Religion* 25(2): 180-92.
- Gershenson, Seth; Alison Jacknowitz, and Andrew Brannegan. 2017. "Are Student Absences Worth the Worry in US Primary Schools?" *Education Finance and Policy* 12 (2): 137–165.
- Goldhaber, Dan; Thomas J. Kane; Andrew McEachin; Emily Morton; Tyler Patterson and Douglas O. Staiger. 2022. "The Consequences of Remote and Hybrid Instruction During the Pandemic," Cambridge, MA: Center for Education Policy Research, Harvard University,
- Goodman, Joshua. 2014. "Flaking Out: Student Absences and Snow Days as Disruptions of Instructional Time," *NBER Working Paper No. 20221*.
- Gunderson, Morley and Philip Oreopolous. 2020. "Returns to Education in Developed Countries," S. Bradley and C. Green, *The Economics of Education: A Comprehensive Review*. Academic Press, 39-51.
- Hale, Thomas; Noam Angrist; Rafael Goldszmidt; Beatriz Kira; Anna Petherick; Toby Phillips; Samuel Webster; Emily Cameron-Blake; Laura Hallas and Saptarshi Majumdar. 2021. "A Global Panel Database of Pandemic Policies (Oxford Covid-19 Government Response Tracker)." *Nature Human Behaviour*, 5(4), 529-38.
- Halloran, Clare; Rebecca Jack; James C. Okun and Emily Oster. 2021. "Pandemic Schooling Mode and Student Test Scores: Evidence from Us States," *NBER Working Paper No. 29497*.
- Hansen, Benjamin. 2011. "School Year Length and Student Performance: Quasi-Experimental Evidence," SSRN Working Paper.
- Henrich, Joseph. 2020. *The Weirdest People in the World*. New York, NY: Farrar, Straus and Giroux.
- Higgs, Robert. 1982. "Accumulation of Property by Southern Blacks before World War One." *American Economic Review*, 72(4), 725-37.
- Jackson, Luther Porter. 1945. *Negro Office-Holders in Virginia, 1865-1895*. Norfolk, VA: Guide Quality Press.
- Jaume, David and Alexander Willén. 2019. "The Long-Run Effects of Teacher Strikes: Evidence from Argentina." *Journal of Labor Economics*, 37(4), 1097-139.
- Johnson, David R. 2011. "Do Strikes and Work-to-Rule Campaigns Change Elementary School Assessment Results?" *Canadian Public Policy*, 37(4), 479-94.
- Kuhfeld, Megan; Beth Tarasawa; Angela Johnson; Erik Ruzek and Karyn Lewis. 2020. "Learning During Covid-19: Initial Findings on Student's Reading and Math Achievement and Growth," NWEA Working Paper.
- Lavy, Victor. 2015. "Do Differences in Schools' Instruction Time Explain International Achievement Gaps? Evidence from Developed and Developing Countries." *Economic Journal*, 125(588), 232-65.
- Lleras-Muney, Adriana. 2002. "Were Compulsory Attendance and Child Labor Laws Effective? An Analysis from 1915 to 1939." *The Journal of Law and Economics*, 45(2), 401-35.
- Liu, Jing; Monica Lee and Seth Gershenson. 2021. "The Short-and Long-run Impacts of Secondary School Absences." *Journal of Public Economics* 199:104441.
- Logan, Trevor D. 2020. "Do Black Politicians Matter? Evidence from Reconstruction." *The Journal of Economic History*, 80(1), 1-35.
- Luk, Jeffrey; Peter Gross and William W. Thompson. 2001. "Observations on Mortality during the 1918 Influenza Pandemic." *Clinical Infectious Diseases* 33(8): 1375-78.

- Maldonado, Joana Elisa, and Kristof De Witte. 2020. "The Effect of School Closures on Standardized Student Test Outcomes." *British Educational Research Journal* 48 (1): 49–94.
- Marcotte, Dave E. and Steven W. Hemelt. 2008. "Unscheduled School Closings and Student Performance." *Education Finance and Policy*, 3(3), 316-38.
- Margo, Robert A. 1984. "Accumulation of Property by Southern Blacks before World War I: Comment and Further Evidence." *American Economic Review*, 74(4), 768-76.
- _____. 1985. *Disenfranchisement, School Finance, and the Economics of Segregated Schools in the U.S. South, 1890-1910*. New York, NY: Garland Press.
- _____. 1986. "Race, Educational Attainment, and the 1940 Census." *The Journal of Economic History*, 46(1), 189-98.
- _____. 1987. "Accounting for Racial Differences in School Attendance in the American South, 1900: The Role of Separate-But-Equal." *Review of Economics and Statistics*, 47(December), 661-66.
- _____. 1990. *Race and Schooling in the South, 1880-1950: An Economic History*. Chicago, IL: University of Chicago Press.
- McAfee, Ward M. 1998. *Religion, Race, and Reconstruction: The Public School in the Politics of the 1870s*. Albany, New York: State University of New York Press.
- Meyers, Keith and Melissa A. Thomasson. 2020. "Can Pandemics Affect Educational Attainment? Evidence from the Polio Epidemic of 1916." *Cliometrica*, 15(2), 231-65.
- Nestour, Alexis Le; Laura Moscoviz and Justin Sandefur. 2021. "The Long-Term Decline of School Quality in the Developing World," *Center for Global Development Consultation Draft*.
- OECD. 2021. "The State of Global Education: 18 Months into the Pandemic," Paris, FR: OECD.
- Orazem, Peter F. 1987. "Black-White Differences in Schooling Investment and Human Capital Production in Segregated Schools." *American Economic Review*, 77(4), 714-23.
- Parman, John M. 2018. "Education and Human Capital in American Economic History," L. P. Cain, P. V. Fishback and P. W. Rhode, *The Oxford Handbook of American Economic History*. Oxford University Press, 401-402.
- Pischke, Jörn-Steffen. 2007. "The Impact of Length of the School Year on Student Performance and Earnings: Evidence from the German Short School Years." *Economic Journal* 117 (523): 1216–1242.
- Tomasik, Martin J, Laura A Helbling, and Urs Moser. 2021. "Educational Gains of In-person vs. Distance Learning in Primary and Secondary Schools: A Natural Experiment during the COVID-19 Pandemic School Closures in Switzerland." *International Journal of Psychology* 56 (4): 566–576.
- US Department of Education, National Center for Education Statistics. 2021. *Measure Up for Private Schools*. Washington, DC: US Department of Education.
- Whatley, Warren and Gavin Wright. 1994. "Race, Human Capital, and Labour Markets in American History," G. Grantham and M. MacKinnon, *Labour Market Evolution*. London, UK: Routledge.
- White, Michael J. 1986. "Segregation and Diversity Measures in Population Distribution." *Population Index* 52: 198-221.

Table 1: Summary Statistics

<u>Dependent Variables</u>	All Virginian Counties		Virginian Border Counties		Other Border Counties	
	<u>Mean</u>	<u>Std. Dev.</u>	<u>Mean</u>	<u>Std. Dev.</u>	<u>Mean</u>	<u>Std. Dev.</u>
School Enrollment (1880)	0.21	0.41	0.18	0.39	0.19	0.39
Illiteracy Rate (1910)	0.12	0.33	0.14	0.34	0.12	0.33
Occupational Income Score (1910)	20.4	12.0	18.8	11.9	18.6	11.7
Son Rank (1910)	46.0	31.8	40.4	31.5	39.9	31.9
<u>Independent Variables</u>						
White Schools Closed (% in '78-79)	46.3	30.0	54.6	32.4	**	**
Black Schools Closed (% in '78-79)	50.3	32.4	59.6	37.7	**	**
Occupational Income Score of Father	16.8	10.7	16.0	9.7	16.0	9.6
Perc. Black Population	29.5	45.6	21.5	41.1	18.6	38.9
Age (1910)	41.4	8.2	46.3	13.0	46.3	12.9
Perc. Urban Population (1880)	0.12	0.23	0.06	0.15	0.06	0.14
Perc. Living on a Farm (1880)	0.51	0.50	58.0	49.4	58.4	49.3
Perc. Black Political Representation	13.8	34.5	6.8	25.2	***	***
Real Local Funding Per Capita (\$)	0.22	0.14	0.24	0.18	**	**
White School Pop. Per Schools ¹	80.7	16.2	82.4	17.9	**	**
Black School Pop. Per Schools ¹	204.6	79.2	156.5	86.4	**	**
Average Male Teacher Pay (\$) ¹	27.7	11.0	25.5	5.4	**	**
Average Female Teacher Pay (\$) ¹	23.8	4.3	23.1	4.8	**	**
Average Term Length (Months) ¹	5.4	0.8	5.3	0.9	**	**
Student-Teacher Ratio ¹	45.6	8.9	48.2	9.4	**	**
Segregation (Dissimilarity Index) ²	0.20	0.12	0.27	0.13	**	**
Observations	90,821		34,943		39,923	
Counties or Cities	109		37		36	

Notes: Border counties include counties bordering Virginia in North Carolina, Tennessee, Kentucky, West Virginia, Maryland, and Washington, DC. ¹ Denotes value before the school closures. ² Denotes value during 1879-80 school year (see Appendix B for computation). ** Denotes absence of data. In counties bordering Virginia, I assume that no schools were closed during the 1878-79 school year. *** Denotes only the inclusion of Black political representation in Virginia where Black representation is determined by county representation to the Virginia General Assembly (i.e., the State House) from Jackson (1945). I do compare Black representation to the State House in border counties using data from Logan (2020). However, Logan (2020) includes only representatives from North Carolina (NC) and Tennessee (TN). I find that Black representation was higher in border counties in NC and TN (mean of 0.31, standard deviation of 0.46) compared with Virginian counties bordering NC and TN (mean of 0.08, standard deviation of 0.27). The NC and TN counties also had slightly larger Black populations in 1880 as a percent of the total population (mean of 0.29, standard deviation of 0.46) compared to the Virginian counties bordering NC and TN (mean of 0.21, standard deviation of 0.41).

Source: Author's calculations based on 1880 and 1910 linked US Census data.

Table 2: The relationship between school closures in childhood and illiteracy in adulthood for entire student populations sample in Virginia

Estimation Method: Logit	Dependent Variable: Illiteracy in 1910		
	(1)	(2)	(3)
Schools Closed (%)	0.58** (0.25)	0.57** (0.25)	0.47* (0.25)
Black (0 or 1)	1.70*** (0.25)	1.71*** (0.25)	1.83*** (0.25)
Student-Teacher Ratio		-0.01* (0.00)	-0.01* (0.00)
Black Student-Black Teacher Ratio		0.00 (0.00)	0.00 (0.00)
Average Male Teacher Pay (\$)		0.00 (0.00)	0.00 (0.00)
Average Female Teacher Pay (\$)		0.00 (0.00)	0.00 (0.00)
Average Months of Instruction		-0.10*** (0.04)	-0.10*** (0.03)
School District Segregation			0.77*** (0.18)
Economic and Demographic Controls	Y	Y	Y
<i>Pseudo-R</i> ²	0.17	0.17	0.17
Observations	90,821	90,821	90,821
Counties	109	109	109

Notes: The table reports coefficients from equation (2). Standard errors clustered by county of residence in 1880 in parentheses, *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Estimating equation controls for demographic and economic variables including age, age squared, whether they lived on a farm in 1880, sibling literacy in 1880, urban population, whether they lived in county with Black political representation during the 1870s, school population per number of schools before 1878-79 school year, average local funding for schools over individual's school lifetime assuming they remained in the county of residence in 1880, local economic characteristics (i.e., farm values, manufacturing wages, wealth, rail and water access), school enrollment in 1880, measures of school quality before and after school closures (i.e., teacher pay, average number of months of instruction per school year, student-teacher ratio), a measure of school district segregation within the county of residence in 1880, enumeration district, and indicators for states where they lived in 1910.

Table 3: The relationship between school closures in childhood and illiteracy in adulthood for White student populations in Virginia

Estimation Method: Logit	Dependent Variable: Illiteracy in 1910, based on age in 1878			
	Age 5 to 9	Age 10 to 14	Age 15 to 21	Age 18 to 21
	(2)	(3)	(4)	(5)
White Schools Closed (%) x Did Not Reopen Immediately	-0.18 (0.49)	0.65** (0.33)	0.58* (0.32)	0.54 (0.51)
White Schools Closed (%)	0.62*** (0.20)	0.22 (0.19)	0.17 (0.17)	0.13 (0.23)
Did Not Reopen Immediately	0.01 (0.21)	-0.42 (0.19)	-0.29 (0.20)	0.54 (0.51)
Demographic and economic controls	Y	Y	Y	Y
R^2	0.07	0.11	0.11	0.10
Observations	12,553	9,557	11,627	6,625

Notes: Standard errors clustered by county of residence in 1880 in parentheses, ***p < 0.01, **p < 0.05, *p < 0.1. Estimating equation controls for demographic and economic variables including age, age squared, whether they lived on a farm in 1880, sibling literacy in 1880, urban population, whether they lived in county with Black political representation during the 1870s, school population per number of schools before 1878-79 school year, enumeration district, average local funding for schools over individual's school lifetime assuming they remained in the county of residence in 1880, measures of school quality before and after school closures (i.e., teacher pay, average number of months of instruction per school year, student-teacher ratio), a measure of school district segregation within the county of residence in 1880, and indicators for states where they lived in 1910.

Source: Author's calculation using data from the 1880 and 1910 US Censuses.

Table 4: The relationship between school closures in childhood and illiteracy in adulthood for Black student populations in Virginia

Estimation Method: Logit	Dependent Variable: Illiteracy in 1910, based on age in 1878			
	Age 5 to 9	Age 10 to 14	Age 15 to 21	Age 18 to 21
	(2)	(3)	(4)	(5)
Black Schools Closed (%) x Did Not Reopen Immediately	-0.04 (0.35)	0.66* (0.34)	0.04 (0.26)	-0.43 (0.44)
Black Schools Closed (%)	-0.03 (0.13)	0.21 (0.13)	-0.02 (0.14)	0.09 (0.18)
Did Not Reopen Immediately	0.08 (0.20)	-0.27 (0.21)	0.06 (0.13)	0.29 (0.25)
Demographic and economic controls	Y	Y	Y	Y
R^2	0.07	0.08	0.07	0.08
Observations	5,513	4,589	5,006	2,721

Notes: Standard errors clustered by county of residence in 1880 in parentheses, ***p < 0.01, **p < 0.05, *p < 0.1. Estimating equation controls for demographic and economic variables including age, age squared, whether they lived on a farm in 1880, sibling literacy in 1880, urban population, whether they lived in county with Black political representation during the 1870s, school population per number of schools before 1878-79 school year, enumeration district, average local funding for schools over individual's school lifetime assuming they remained in the county of residence in 1880, measures of school quality before and after school closures (i.e., teacher pay, average number of months of instruction per school year, student-teacher ratio), a measure of school district segregation within the county of residence in 1880, and indicators for states where they lived in 1910.

Source: Author's calculation using data from the 1880 and 1910 US Censuses.

Table 5: The relationship between school closures in childhood and income in adulthood for entire student populations sample in Virginia

Estimation Method: OLS	Dependent Variable: Log Occupational Income Score in 1910		
	(1)	(2)	(3)
Schools Closed (%)	-0.10*** (0.03)	-0.09*** (0.03)	-0.08*** (0.03)
Black (0 or 1)	-0.31*** (0.03)	-0.31*** (0.03)	-0.33*** (0.03)
Student-Teacher Ratio		-0.02*** (0.00)	-0.02*** (0.00)
Black Student-Black Teacher Ratio		0.00 (0.00)	0.00 (0.00)
Average Male Teacher Pay (\$)		-0.001** (0.000)	-0.001** (0.000)
Average Female Teacher Pay (\$)		0.002*** (0.000)	0.002*** (0.000)
Average Months of Instruction		0.02*** (0.00)	0.02*** (0.00)
School District Segregation			-0.11*** (0.02)
Economic and Demographic Controls	Y	Y	Y
R ²	0.22	0.22	0.22
Observations	90,821	90,821	90,821
Counties	109	109	109

Notes: The table reports coefficients from equation (2). Standard errors clustered by county of residence in 1880 in parentheses, ***p < 0.01, **p < 0.05, *p < 0.1. Estimating equation controls for demographic and economic variables including age, age squared, whether they lived on a farm in 1880, sibling literacy in 1880, urban population, whether they lived in county with Black political representation during the 1870s, school population per number of schools before 1878-79 school year, average local funding for schools over individual's school lifetime assuming they remained in the county of residence in 1880, local economic characteristics (i.e., farm values, manufacturing wages, wealth, rail and water access), school enrollment in 1880, measures of school quality before and after school closures (i.e., teacher pay, average number of months of instruction per school year, student-teacher ratio), a measure of school district segregation within the county of residence in 1880, enumeration district, and indicators for states where they lived in 1910.

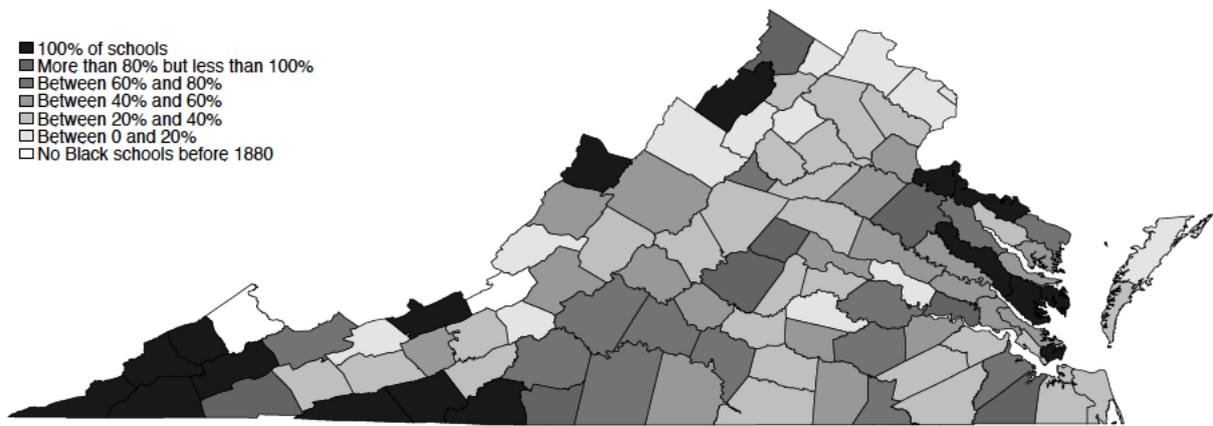
Table 6: Intergenerational mobility estimates, 1880 to 1910

	Dependent Variable: Son Rank, 1910		
	(1)	(2)	(3)
Closed Schools (%)	-7.02*** (1.61)	-5.86*** (1.66)	-4.85*** (1.54)
Father Rank, 1880	0.05** (0.02)	0.06** (0.02)	0.06** (0.02)
Closed Schools (%) x Father Rank	0.02 (0.03)	0.02 (0.03)	0.02 (0.03)
Black (0 or 1)	-8.41*** (1.16)	-8.62*** (1.15)	-10.11*** (1.13)
Student-Teacher Ratio		0.02 (0.07)	-0.01 (0.07)
Black Student- Black Teacher Ratio		0.00 (0.00)	0.00 (0.00)
Average Male Teacher Pay (\$)		0.00 (0.02)	0.00 (0.02)
Average Female Teacher Pay (\$)		0.09 (0.08)	0.08 (0.08)
Average Months of Instruction		0.75 (0.50)	0.77 (0.27)
School District Segregation			-8.23*** (2.74)
Intercept	68.90*** (13.43)	57.68*** (15.00)	57.38*** (15.06)
Economic and Demographic Controls	Y	Y	Y
R^2	0.22	0.22	0.22
Observations	90,821	90,821	90,821

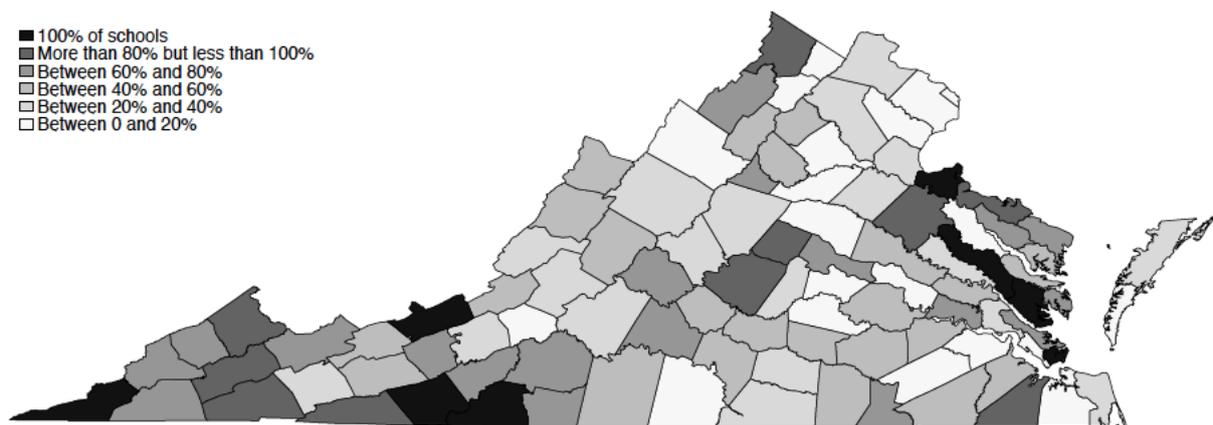
Notes: The table reports coefficients from equation (4). Standard errors clustered by county of residence in 1880 in parentheses, *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Estimating equation controls for demographic and economic variables including age, age squared, whether they lived on a farm in 1880, sibling literacy in 1880, urban population, whether they lived in county with Black political representation during the 1870s, school population per number of schools before 1878-79 school year, average local funding for schools over individual's school lifetime assuming they remained in the county of residence in 1880, local economic characteristics (i.e., farm values, manufacturing wages, wealth, rail and water access), school enrollment in 1880, measures of school quality before and after school closures (i.e., teacher pay, average number of months of instruction per school year, student-teacher ratio), a measure of school district segregation within the county of residence in 1880, enumeration district, and indicators for states where they lived in 1910.

Figure 1: Percent of schools closed in a county between 1877 and 1879

Black Schools

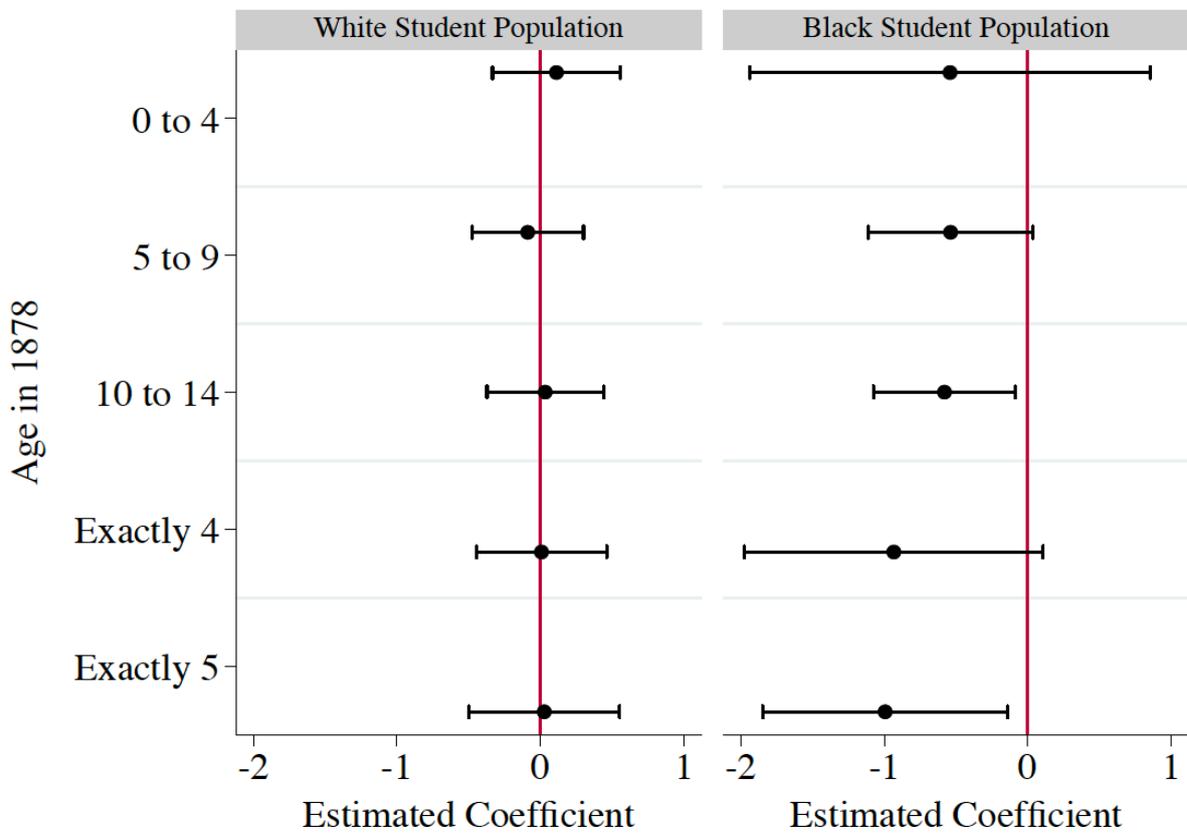


White Schools



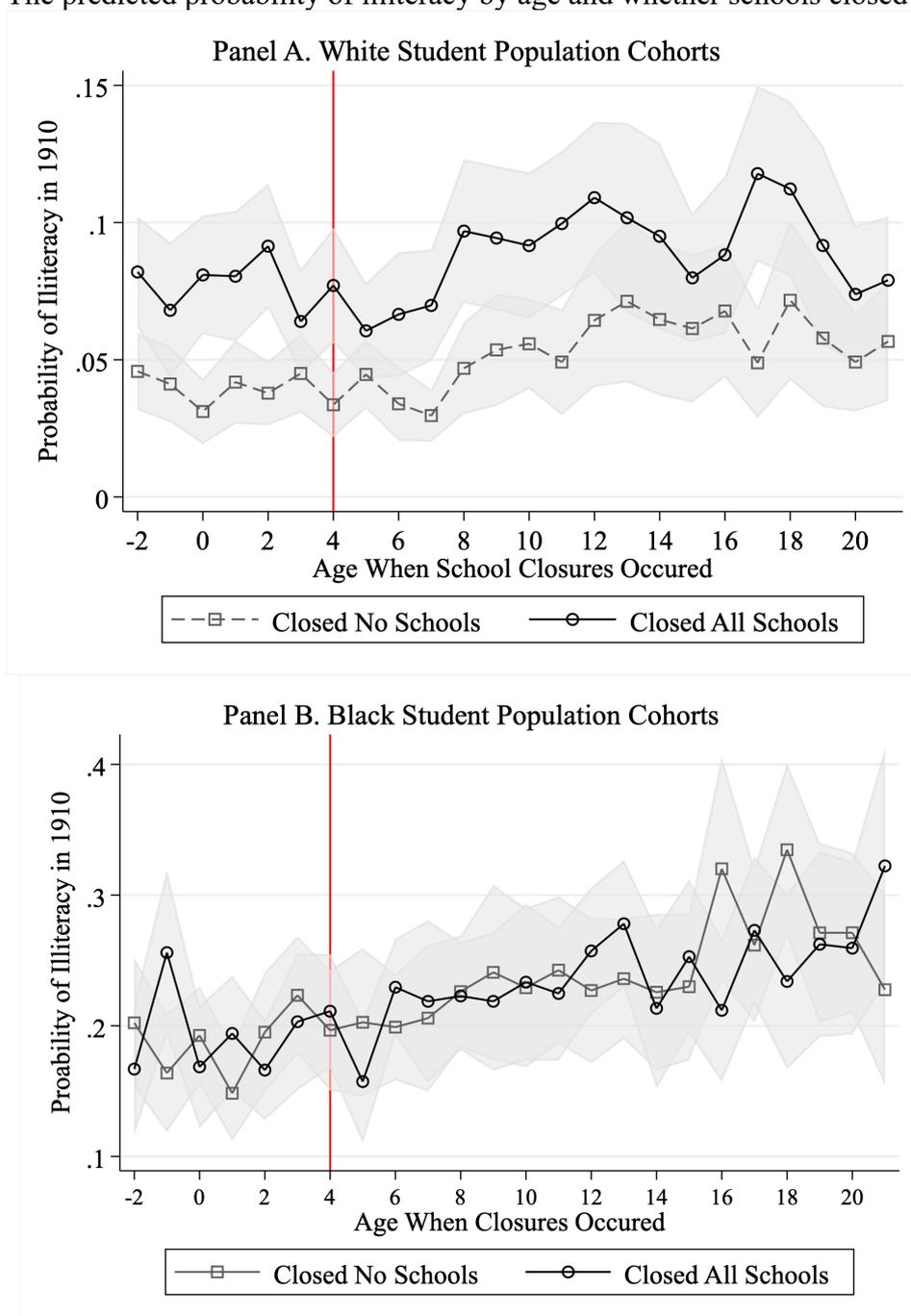
Source: Author's calculations using data from the Virginia Superintendent Reports.

Figure 2: The relationship between school closures in 1878 and the likelihood of school enrollment in 1880



Notes: The figure reports coefficients from equation (1) along with the 95-percent confidence intervals where the dependent variable is school enrollment in 1880. The estimating equation includes controls for demographic and economic characteristics including age (and age squared), the occupational income score for the father in 1880, an indicator representing if they lived on a farm in 1880, sibling literacy in 1880, an indicator representing if they lived in a county with Black political representation during the 1870s, urban population, school population per number of schools before 1878-79 school year, and census enumeration district. Corresponds with Table A2 in the appendix.

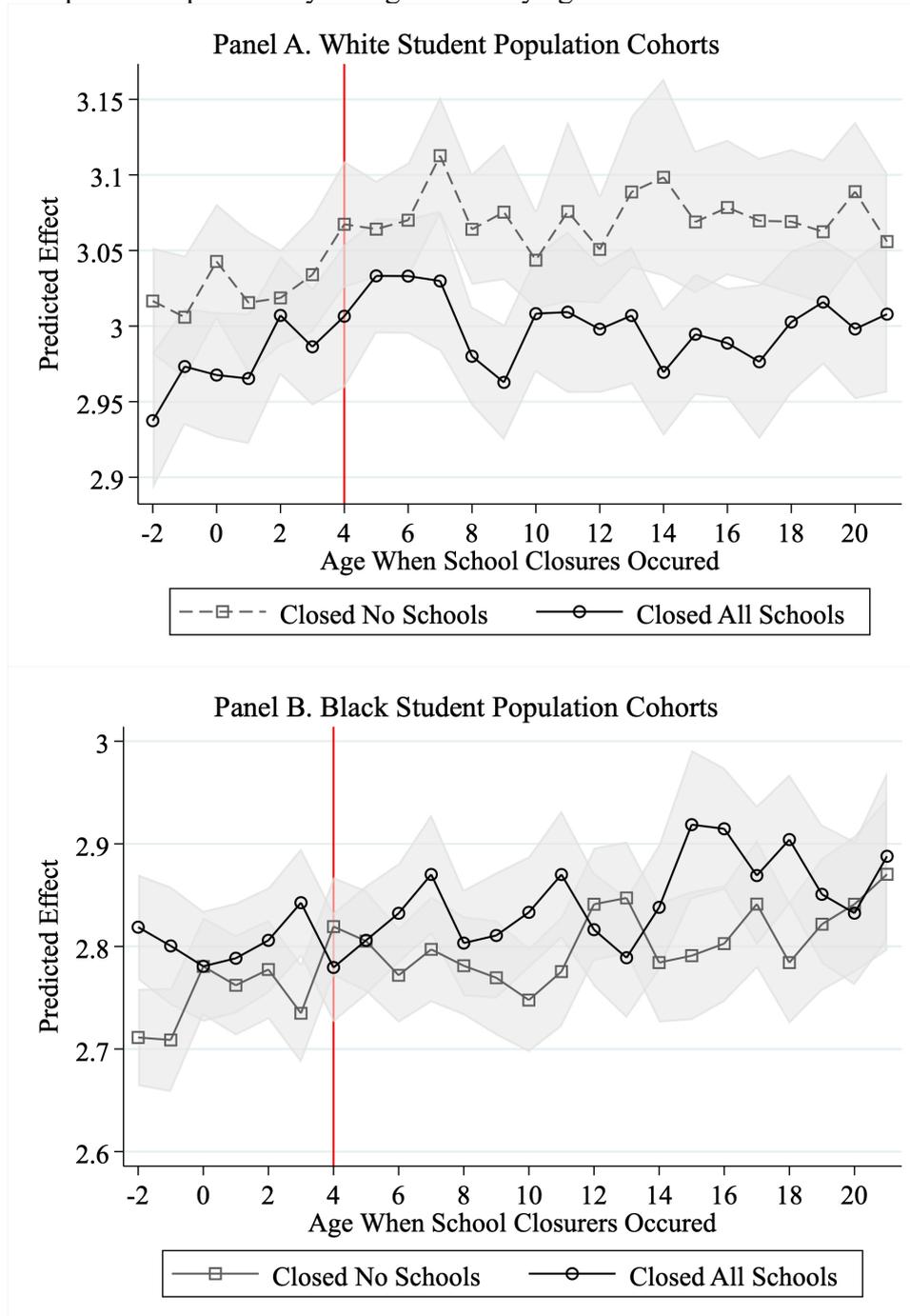
Figure 3: The predicted probability of illiteracy by age and whether schools closed



Notes: Figures plot the differences in predicted probability of being illiterate in 1910 by age based on equation (2) for counties that closed all schools and counties that closed no schools for those who were White (Panel A) and Black (Panel B). 95 percent confidence intervals are represented by shading. Those to the right of the vertical line were eligible for school when the schools initially closed during the 1878-79 school year. Estimating equation controls for demographic and economic variables including age, age squared, whether they lived on a farm in 1880, sibling literacy in 1880, urban population, whether they lived in county with Black political representation during the 1870s, school population per number of schools before 1878-79 school year, average local funding for schools over individual's school lifetime assuming they remained in the county of residence in 1880, local economic characteristics (i.e., farm values, manufacturing wages, wealth, rail and water access), school enrollment in 1880, measures of school quality before and after school closures (i.e., teacher pay, average number of months of instruction per school year, student-teacher ratio), a measure of school district segregation within the county of residence in 1880, enumeration district, and indicators for states where they lived in 1910.

Source: Author's calculation using census matched records 1880 and 1910.

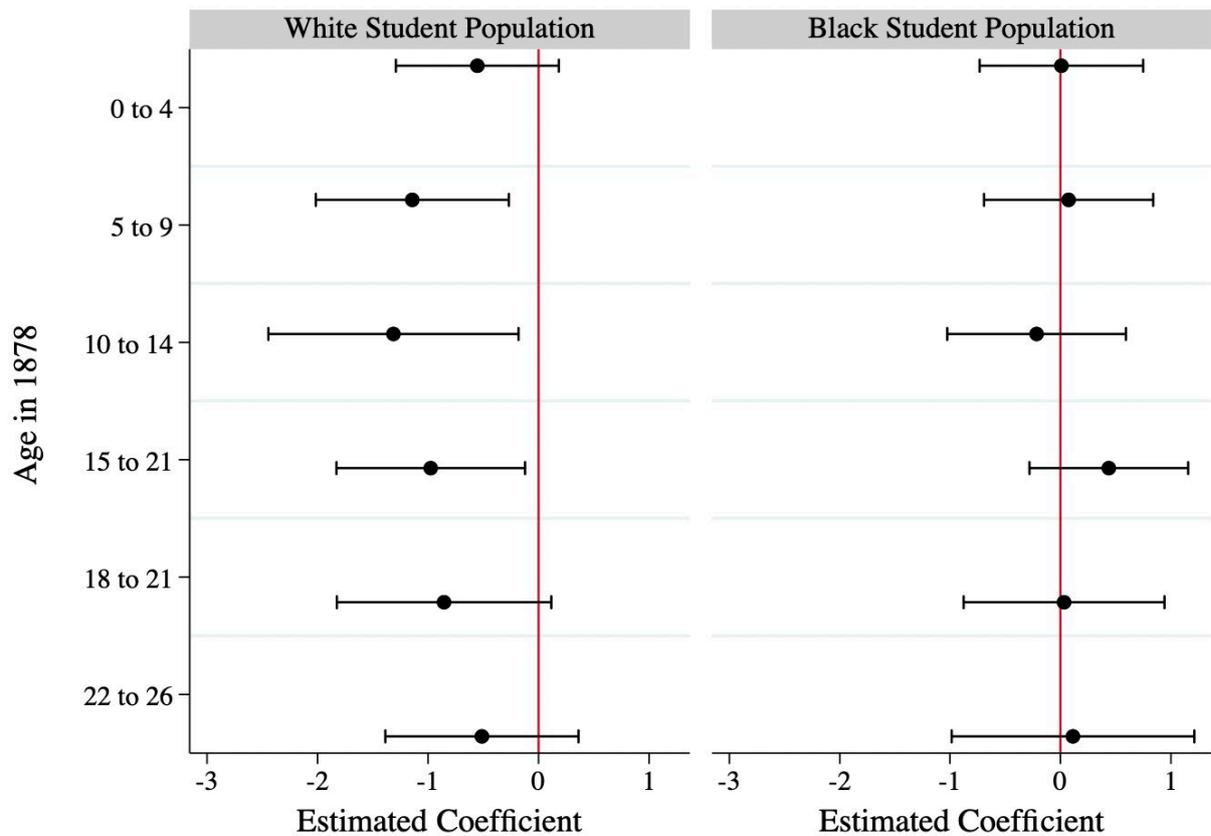
Figure 4: The predicted probability of log income by age and whether schools closed



Notes: Figures plot the differences in predicted log income in 1910 by age based on equation (3) for counties that closed all schools and counties that closed no schools for those were White (Panel A) and Black (Panel B). 95 percent confidence intervals are represented by shading. Those to the right of the vertical line were eligible for school when the schools initially closed during the 1878-79 school year. Estimating equation controls for demographic and economic variables including age, age squared, whether they lived on a farm in 1880, sibling literacy in 1880, urban population, whether they lived in county with Black political representation during the 1870s, school population per number of schools before 1878-79 school year, average local funding for schools over individual's school lifetime assuming they remained in the county of residence in 1880, local economic characteristics (i.e., farm values, manufacturing wages, wealth, rail and water access), school enrollment in 1880, measures of school quality before and after school closures (i.e., teacher pay, average number of months of instruction per school year, student-teacher ratio), a measure of school district segregation within the county of residence in 1880, enumeration district, and indicators for states where they lived in 1910.

Source: Author's calculation using census matched records 1880 and 1910.

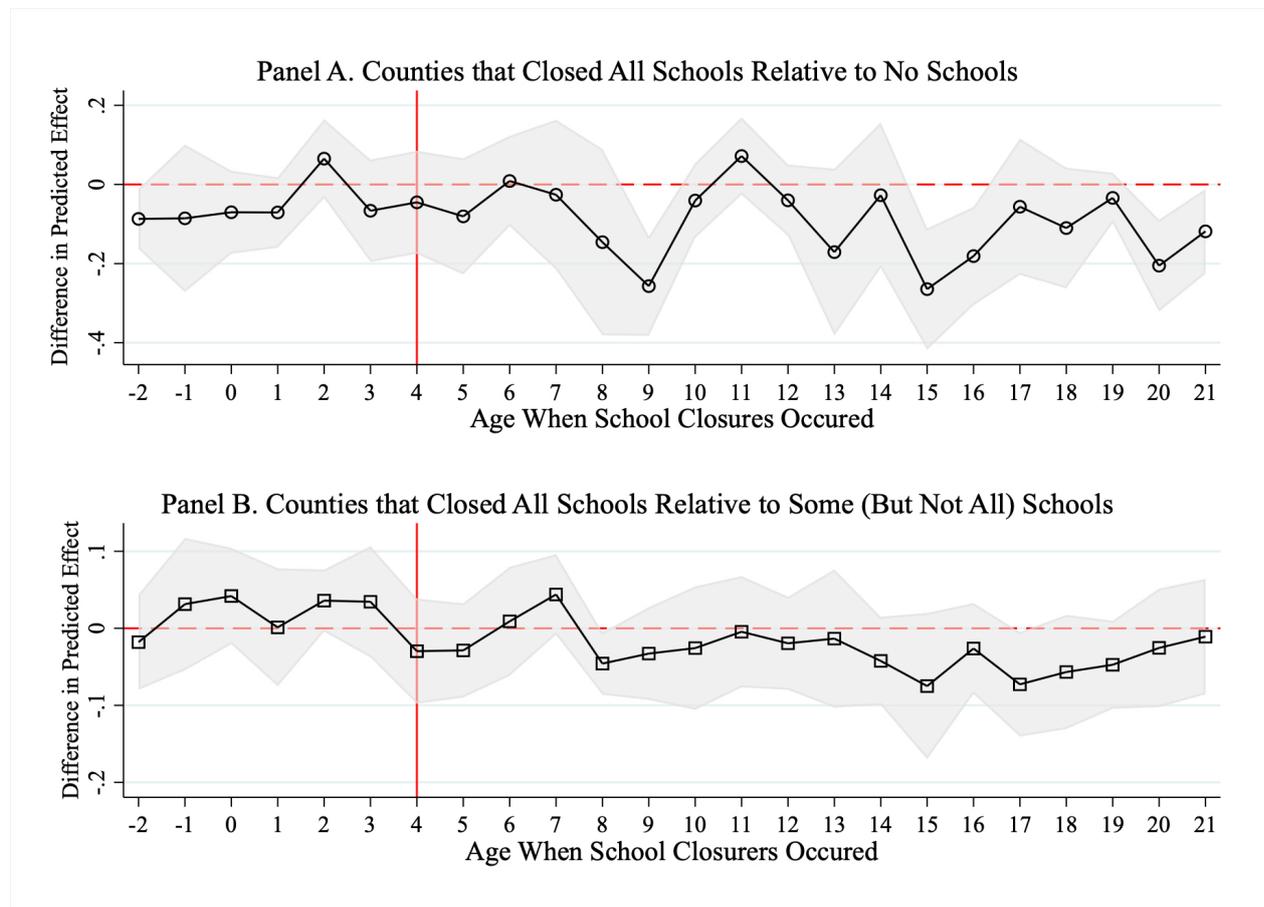
Figure 5: The relationship between school closures and occupational income score in adulthood



Notes: The figure reports coefficients from equation (3) and the 95-percent confidence intervals where the dependent variable is occupational income score in 1910. The y-axis represents the age of the potential student in 1878. The estimating equation includes controls for demographic and economic characteristics including age (and age squared), the occupational income score for the father in 1880, whether they lived on a farm in 1880, sibling literacy in 1880, whether they lived in a county with Black political representation during the 1870s, urban population, school population per number of schools before 1878-79 school year, census enumeration district, and indicators for state where they lived in 1910. Corresponds with Tables A8 and A10 in the appendix. Tables A9 and A10 in the appendix show sensitivity of the estimates to differences in school quality.

Source: Author's calculation using census matched records 1880 and 1910.

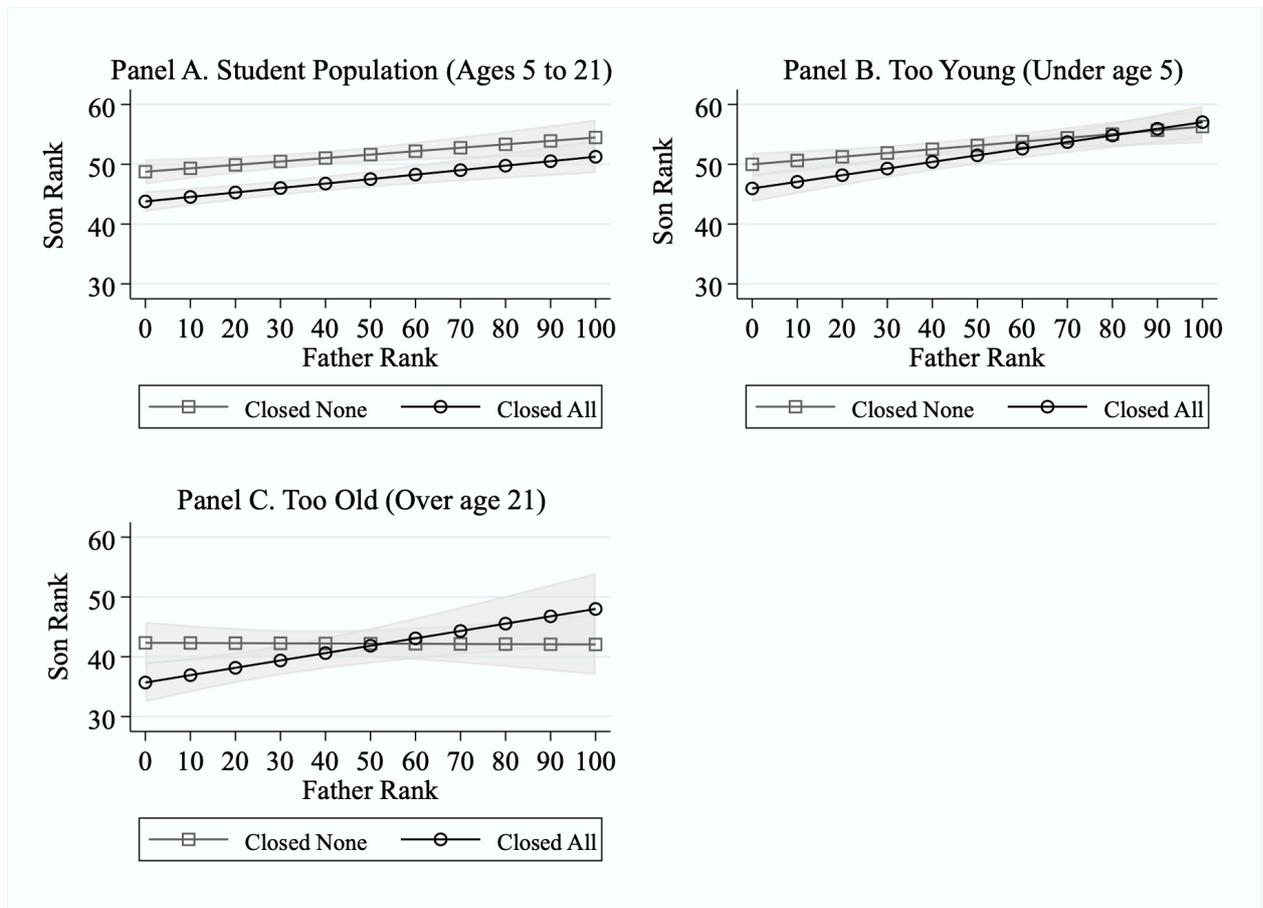
Figure 6: Difference in the effect of school closures on income in adulthood by age for White students



Notes: Figures plot the differences in predicted value of the log occupational income score based on equation (4) between counties that closed all schools relative to counties that closed no schools (Panel A) and between counties that closed all schools relative to counties that closed some (but not all) schools during the 1878-79 school year. 95 percent confidence intervals are represented by shading. Those to the right of the vertical line were eligible for school when the schools initially closed during the 1878-79 school year. Estimating equation controls for demographic and economic variables including age, age squared, whether they lived on a farm in 1880, sibling literacy in 1880, urban population, whether they lived in county with Black political representation during the 1870s, school population per number of schools before 1878-79 school year, average local funding for schools over individual's school lifetime assuming they remained in the county of residence in 1880, local economic characteristics (i.e., farm values, manufacturing wages, wealth, rail and water access), school enrollment in 1880, measures of school quality before and after school closures (i.e., teacher pay, average number of months of instruction per school year, student-teacher ratio), a measure of school district segregation within the county of residence in 1880, enumeration district, and indicators for states where they lived in 1910.

Source: Author's calculation using census matched records 1880 and 1910.

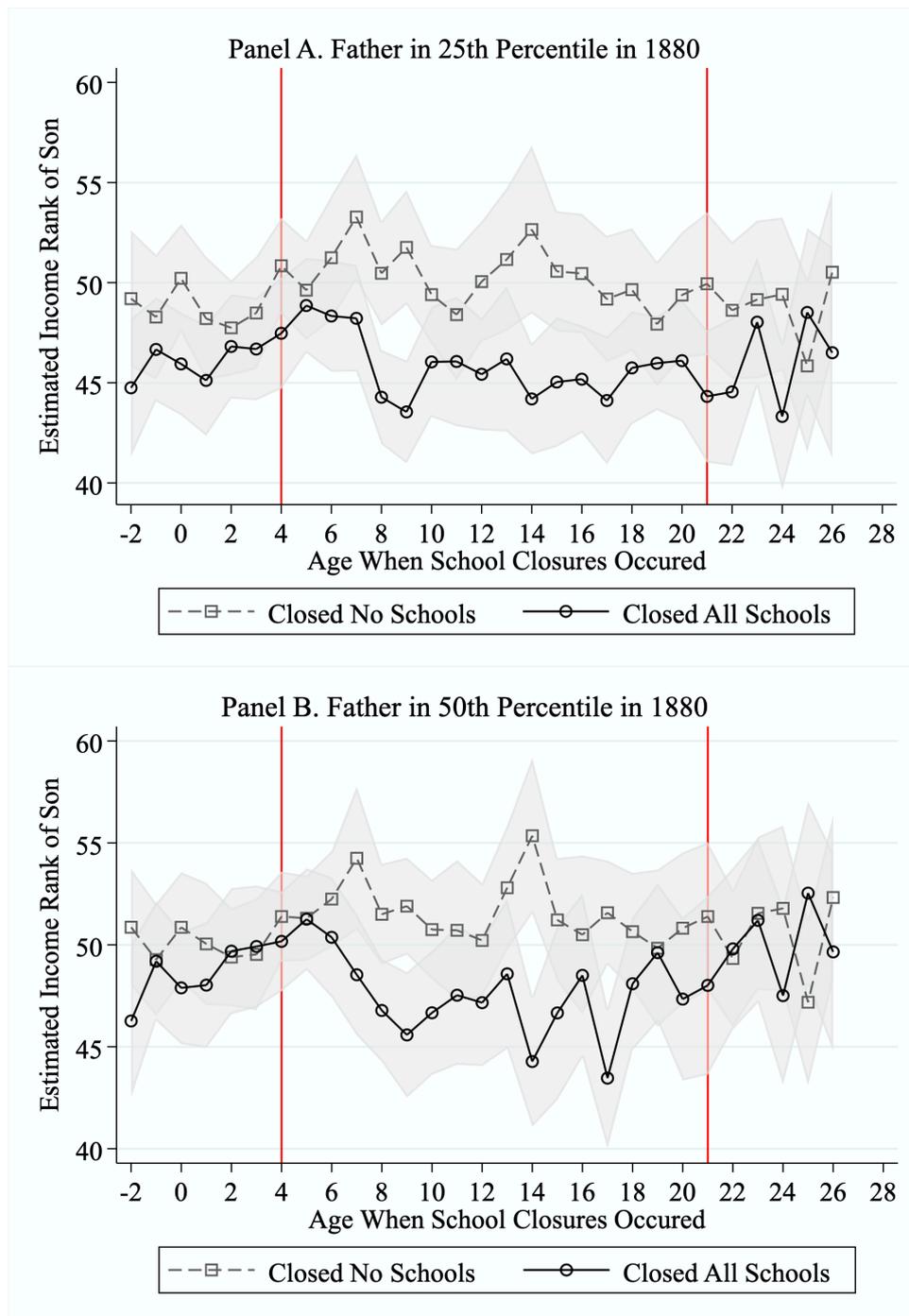
Figure 7: Intergenerational mobility of the White student population in Virginia, 1880-1910



Notes: Figures plot the predicted value of the income score rank for sons as a function of the father's income score rank based on equation (5). 95 percent confidence intervals are represented by shading. Figures correspond with Table 6. Estimating equation controls for demographic and economic variables including age, age squared, whether they lived on a farm in 1880, sibling literacy in 1880, urban population, whether they lived in county with Black political representation during the 1870s, school population per number of schools before 1878-79 school year, average local funding for schools over individual's school lifetime assuming they remained in the county of residence in 1880, local economic characteristics (i.e., farm values, manufacturing wages, wealth, rail and water access), school enrollment in 1880, measures of school quality before and after school closures (i.e., teacher pay, average number of months of instruction per school year, student-teacher ratio), a measure of school district segregation within the county of residence in 1880, enumeration district, and indicators for states where they lived in 1910.

Source: Author's calculation using census matched records 1880 and 1910.

Figure 8: Predicted income rank of White sons in adulthood dependent on age, fathers' income rank in 1880, and whether schools closed



Notes: Figures plot the differences in predicted rank of sons by age based on equation (5) between counties that closed all schools relative to counties that closed no schools. Panel (A) shows the predicted rank for sons whose fathers were in the 25th percentile of income in 1880. Panel (B) shows the predicted rank for sons whose fathers were in the 50th percentile of income in 1880. 95 percent confidence intervals are represented by shading. Those in between the red vertical lines were eligible for school when the schools initially closed during the 1878-79 school year. Estimating equation controls for demographic and economic variables including age, age squared, whether they lived on a farm in 1880, sibling literacy in 1880, urban population, whether they lived in county with Black political representation during the 1870s, school population per number of schools before 1878-79 school year, average local funding for schools over individual's school lifetime assuming they remained in the county of residence in 1880, local economic characteristics (i.e., farm values, manufacturing wages, wealth, rail and water

access), school enrollment in 1880, measures of school quality before and after school closures (i.e., teacher pay, average number of months of instruction per school year, student-teacher ratio), a measure of school district segregation within the county of residence in 1880, enumeration district, and indicators for states where they lived in 1910.

Source: Author's calculation using census matched records 1880 and 1910.

Appendix A.

Table A1: Number of counties or independent cities with schools opened during 1879-1880 and 1880-1881 school years relative to schools opened during 1876-1877

	1879-1880		1880-1881	
	White Schools	Black Schools	White Schools	Black Schools
Less than 100% of 1876-1877 Total*	35	39	15	14
Exactly 100%	13	20	9	21
Between 100% and 105%	6	2	4	2
More than 105%	50	43	76	67
Total Number of Counties or Cities	104	104	104	104

Note: *1876-1877 school year comparison applies to the entire column.

Source: Author's calculation using data from the *Virginia Superintendent Reports*.

Table A2: Effect of school closers on school enrollment in 1880

Estimation Method: Logit	Dependent Variable: Illiteracy in 1910, based on age in 1878									
	Age 0 to 4		Age 5 to 9		Age 10 to 14		Exactly 4 Years Old		Exactly 5 Years Old	
	White (1)	Black (2)	White (3)	Black (4)	White (5)	Black (6)	White (7)	Black (8)	White (9)	Black (10)
White Schools Closed (%)	0.09 (0.22)		-0.11 (0.20)		0.03 (0.21)		-0.01 (0.23)		0.01 (0.26)	
Black Schools Closed (%)		-0.54 (0.71)		-0.54* (0.29)		-0.58** (0.25)		-0.92 (0.53)		-1.00** (0.43)
Demographic and economic controls	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
<i>Pseudo R</i> ²	0.23	0.14	0.05	0.06	0.07	0.11	0.01	0.03	0.01	0.03
Observations	15,219	6,353	13,283	5,612	10,293	4,667	2,914	1,249	2,825	1,181

Notes: Standard errors clustered by county of residence in 1880 in parentheses, ***p < 0.01, **p < 0.05, *p < 0.1. Demographic and economic variables include age, father's occupational score in 1880, whether they lived on a farm in 1880, sibling literacy in 1880, urban population, whether they lived in county with Black political representation during the 1870s, and enumeration district.

Source: Author's calculation using data from the 1880 and 1910 US Censuses.

Table A3: Effect of school closers on illiteracy in adulthood for student populations in Virginia

Estimation Method:	Dependent Variable: Illiteracy in 1910, based on age in 1878									
	Age 0 to 4		Age 5 to 9		Age 10 to 14		Age 15 to 21		Age 18 to 21	
	White (1)	Black (2)	White (3)	Black (4)	White (5)	Black (6)	White (7)	Black (8)	White (9)	Black (10)
White Schools Closed (%)	0.63*** (0.12)		0.59*** (0.14)		0.20 (0.18)		0.32** (0.14)		0.30 (0.22)	
Black Schools Closed (%)		0.05 (0.12)		-0.02 (0.12)		0.28* (0.13)		-0.05 (0.12)		0.06 (0.16)
Demographic and economic controls	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
<i>Pseudo R</i> ²	0.07	0.07	0.07	0.07	0.11	0.08	0.11	0.07	0.10	0.08
Observations	14,457	6,298	12,543	5,519	9,562	4,602	11,635	5,014	6,330	2,726

Notes: Standard errors clustered by county of residence in 1880 in parentheses, ***p < 0.01, **p < 0.05, *p < 0.1. Demographic and economic variables include age, father's occupational score in 1880, whether they lived on a farm in 1880, sibling literacy in 1880, urban population, whether they lived in county with Black political representation during the 1870s, school population per number of schools before 1878-79 school year, enumeration district, and indicators for states where they lived in 1910.

Source: Author's calculation using data from the 1880 and 1910 US Censuses.

Table A4: Effect of school closers on illiteracy in adulthood for student populations in Virginia

Estimation Method:	Dependent Variable: Illiteracy in 1910, based on age in 1878									
	Age 0 to 4		Age 5 to 9		Age 10 to 14		Age 15 to 21		Age 18 to 21	
	White	Black	White	Black	White	Black	White	Black	White	Black
Logit	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Closed 26 to 49% of White Schools	0.21*		0.08		0.26**		0.12		0.07	
	(0.11)		(0.12)		(0.13)		(0.10)		(0.13)	
Closed 50 to 100% of White Schools	0.45***		0.30***		0.32***		0.18**		0.11	
	(0.11)		(0.10)		(0.11)		(0.08)		(0.11)	
Closed 26 to 49% of Black Schools		0.01		-0.06		0.11		0.08		0.14
		(0.10)		(0.10)		(0.11)		(0.09)		(0.13)
Closed 50 to 100% of Black Schools		0.01		0.03		0.11		0.01		0.01
		(0.08)		(0.08)		(0.09)		(0.07)		(0.10)
Demographic and economic controls	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
<i>Pseudo R</i> ²	0.07	0.07	0.07	0.07	0.11	0.08	0.11	0.07	0.10	0.08
Observations	14,457	6,298	12,543	5,519	9,562	4,602	11,635	5,014	6,330	2,726

Notes: Standard errors clustered by county of residence in 1880 in parentheses, ***p < 0.01, **p < 0.05, *p < 0.1. Demographic and economic variables include age, father's occupational score in 1880, whether they lived on a farm in 1880, sibling literacy in 1880, urban population, whether they lived in county with Black political representation during the 1870s, school population per number of schools before 1878-79 school year, enumeration district, and indicators for states where they lived in 1910.

Source: Author's calculation using data from the 1880 and 1910 US Censuses.

Table A5: The relationship between school closures in childhood and illiteracy in adulthood for Black student populations in Virginia

Estimation Method:	Dependent Variable: Illiteracy in 1910, based on age in 1878					
	Age 0 to 4	Age 5 to 9	Age 10 to 14	Age 15 to 21	Age 18 to 21	Age 22 to 26
Logit	(1)	(2)	(3)	(4)	(5)	(6)
Black Schools Closed (%) x Black Enrollment (%)	-0.30 (1.41)	1.84 (1.42)	0.53 (1.32)	-0.50 (1.08)	0.12 (1.74)	-0.55 (1.82)
Black Schools Closed (%)	0.12 (0.42)	-0.60 (0.40)	0.11 (0.39)	0.13 (0.38)	0.03 (0.58)	0.32 (0.54)
Black Enrollment (%)	-0.29 (0.59)	-2.16*** (0.73)	-0.85 (0.74)	-0.36 (0.55)	-0.02 (0.97)	-1.41* (0.85)
Demographic and economic controls	Y	Y	Y	Y	Y	Y
R^2	0.07	0.08	0.08	0.07	0.08	0.08
Observations	6,298	5,519	4,602	5,012	2,726	2,422

Notes: Standard errors clustered by county of residence in 1880 in parentheses, *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Demographic and economic variables include age (and age squared), father's occupational score in 1880, whether they lived on a farm in 1880, sibling literacy in 1880, urban population, whether they lived in county with Black political representation during the 1870s, school population per number of schools before 1878-79 school year, enumeration district, and state fixed effects.

Source: Author's calculation using data from the 1880 and 1910 US Censuses.

Table A6: Effect of school closers on illiteracy in adulthood for student populations in border counties

Estimation Method:	Dependent Variable: Illiteracy in 1910, based on age in 1878									
	Age 0 to 4		Age 5 to 9		Age 10 to 14		Age 15 to 21		Age 18 to 21	
	White (1)	Black (2)	White (3)	Black (4)	White (5)	Black (6)	White (7)	Black (8)	White (9)	Black (10)
Logit										
White Schools Closed (%)	0.89*** (0.17)		0.87*** (0.18)		0.20 (0.18)		0.02 (0.19)		0.04 (0.30)	
Black Schools Closed (%)		0.05 (0.12)		0.41* (0.24)		0.37* (0.22)		0.16 (0.19)		0.24 (0.22)
Demographic and economic controls	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
<i>Pseudo R</i> ²	0.07	0.06	0.07	0.06	0.11	0.07	0.12	0.09	0.11	0.09
Observations	14,154	3,733	12,463	3,416	9,808	2,664	11,561	3,060	6,175	1,739

Notes: Standard errors clustered by county of residence in 1880 in parentheses, ***p < 0.01, **p < 0.05, *p < 0.1. Demographic and economic variables include age, father's occupational score in 1880, whether they lived on a farm in 1880, sibling literacy in 1880, urban population, whether they lived in county with Black political representation during the 1870s, enumeration district, indicators for where they lived in 1880, and indicators for states where they lived in 1910.

Source: Author's calculation using data from the 1880 and 1910 US Censuses.

Table A7: Effect of school closers on illiteracy and sibling literacy in adulthood for student populations in Virginia

Estimation Method: Logit	Dependent Variable: Illiteracy in 1910, based on age in 1878			
	Age 5 to 9		Age 10 to 14	
	White (1)	Black (2)	White (3)	Black (4)
	Full Sample			
Schools Closed (%)	0.59*** (0.18)	0.00 (0.14)	0.13 (0.18)	0.32** (0.14)
Literate Sibling	-0.92 (0.18)	-0.19 (0.22)	-1.49*** (0.16)	-0.39** (0.16)
Schools Closed (%) x Literate Sibling	0.22 (0.30)	-0.18 (0.22)	0.54** (0.25)	-0.16 (0.26)
<i>Pseudo R</i> ²	0.07	0.07	0.11	0.08
Observations	12,543	5,519	9,592	4,602
	Enrolled in School in 1880			
Schools Closed (%)	1.10*** (0.27)	-0.51 (0.33)	0.04 (0.36)	0.24 (0.33)
Literate Sibling	-0.32 (0.21)	-0.05 (0.33)	-1.38*** (0.28)	0.04 (0.26)
Schools Closed (%) x Literate Sibling	-0.48 (0.35)	-0.18 (0.68)	0.86** (0.38)	-0.60 (0.50)
<i>Pseudo R</i> ²	0.07	0.08	0.08	0.07
Observations	6,541	1,383	4,999	1,195
	Not Enrolled in School in 1880			
Schools Closed (%)	0.37* (0.22)	0.08 (0.15)	0.25 (0.22)	0.35** (0.16)
Literate Sibling	-1.28*** (0.33)	-0.34 (0.30)	-1.20*** (0.22)	-0.75*** (0.21)
Schools Closed (%) x Literate Sibling	0.74* (0.44)	0.05 (0.57)	0.11 (0.34)	0.32 (0.34)
<i>Pseudo R</i> ²	0.06	0.08	0.11	0.08
Observations	5,704	4,120	4,117	3,377

Notes: Standard errors clustered by county of residence in 1880 in parentheses, ***p < 0.01, **p < 0.05, *p < 0.1. All regressions controls for demographic and economic variables including age, father's occupational score in 1880, whether they lived on a farm in 1880, sibling literacy in 1880, urban population, whether they lived in county with Black political representation during the 1870s, enumeration district, average local funding for schools over individual's school lifetime assuming they remained in the county of residence in 1880, and indicators for states where they lived in 1910.

Source: Author's calculation using data from the 1880 and 1910 US Censuses.

Table A8: The relationship between school closures in childhood and occupational income score in adulthood for white student populations in Virginia

Estimation Method:	Dependent Variable: Occupation income score in 1910, based on age in 1878					
	Age 0 to 4	Age 5 to 9	Age 10 to 14	Age 15 to 21	Age 18 to 21	Age 22 to 26
OLS	(1)	(2)	(3)	(4)	(5)	(6)
White Schools Closed (%)	-0.55 (0.37)	-1.14** (0.44)	-1.31** (0.57)	-0.97** (0.43)	-0.85* (0.49)	-0.51 (0.44)
Demographic and economic controls	Y	Y	Y	Y	Y	Y
School Quality	N	N	N	N	N	N
R^2	0.27	0.17	0.17	0.16	0.16	0.16
Observations	15,220	13,283	10,293	12,359	6,902	6,832

Notes: Standard errors clustered by county of residence in 1880 in parentheses, ***p < 0.01, **p < 0.05, *p < 0.1. Demographic and economic variables include age (and age squared), father's occupational score in 1880, whether they lived on a farm in 1880, sibling literacy in 1880, urban population, whether they lived in county with Black political representation during the 1870s, school population per number of schools before 1878-79 school year, average local funding for schools over individual's school lifetime assuming they remained in the county of residence in 1880, enumeration district, and state fixed effects.

Source: Author's calculation using data from the 1880 and 1910 US Censuses.

Table A9: The relationship between school closures in childhood and occupational income score in adulthood for white student populations in Virginia

Estimation Method:	Dependent Variable: Occupation income score in 1910, based on age in 1878					
	Age 0 to 4	Age 5 to 9	Age 10 to 14	Age 15 to 21	Age 18 to 21	Age 22 to 26
OLS	(1)	(2)	(3)	(4)	(5)	(6)
White Schools Closed (%)	-0.54 (0.53)	-1.33** (0.58)	-1.66** (0.63)	-0.95* (0.53)	-0.81 (0.60)	-0.28 (0.65)
Demographic and economic controls	Y	Y	Y	Y	Y	Y
School Quality	Y	Y	Y	Y	Y	Y
R^2	0.13	0.13	0.13	0.12	0.12	0.12
Observations	15,220	13,283	10,293	12,359	6,902	6,832

Notes: Standard errors clustered by county of residence in 1880 in parentheses, ***p < 0.01, **p < 0.05, *p < 0.1. Demographic and economic variables include age (and age squared), father's occupational score in 1880, whether they lived on a farm in 1880, sibling literacy in 1880, urban population, whether they lived in county with Black political representation during the 1870s, school population per number of schools before 1878-79 school year, average local funding for schools over individual's school lifetime assuming they remained in the county of residence in 1880, measures of school quality before and after school closures (i.e., teacher pay, average number of months of instruction per school year, student-teacher ratio), a measure of school district segregation within the county of residence in 1880, enumeration district, and indicators for states where they lived in 1910.

Source: Author's calculation using data from the 1880 and 1910 US Censuses.

Table A10: The relationship between school closures in childhood and occupational income score in adulthood for Black student populations in Virginia

Estimation Method:	Dependent Variable: Occupation income score in 1910, based on age in 1878					
	Age 0 to 4	Age 5 to 9	Age 10 to 14	Age 15 to 21	Age 18 to 21	Age 22 to 26
OLS	(1)	(2)	(3)	(4)	(5)	(6)
Black Schools Closed (%)	0.02 (0.38)	0.07 (0.40)	-0.30 (0.41)	0.40 (0.39)	0.01 (0.46)	0.03 (0.60)
Demographic and economic controls	Y	Y	Y	Y	Y	Y
R^2	0.10	0.11	0.10	0.12	0.12	0.14
Observations	6,352	5,612	4,667	5,055	2,757	2,432

Notes: Standard errors clustered by county of residence in 1880 in parentheses, *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Demographic and economic variables include age (and age squared), father's occupational score in 1880, whether they lived on a farm in 1880, sibling literacy in 1880, urban population, whether they lived in county with Black political representation during the 1870s, school population per number of schools before 1878-79 school year, enumeration district, and state fixed effects.

Source: Author's calculation using data from the 1880 and 1910 US Censuses.

Table A11: The relationship between school closures in childhood and occupational income score in adulthood for Black student populations in Virginia

Estimation Method:	Dependent Variable: Occupation income score in 1910, based on age in 1878					
	Age 0 to 4	Age 5 to 9	Age 10 to 14	Age 15 to 21	Age 18 to 21	Age 22 to 26
OLS	(1)	(2)	(3)	(4)	(5)	(6)
Black Schools Closed (%)	0.03 (0.40)	0.16 (0.43)	-0.05 (0.42)	0.50 (0.43)	0.00 (0.46)	0.07 (0.49)
Demographic and economic controls	Y	Y	Y	Y	Y	Y
School Quality	Y	Y	Y	Y	Y	Y
R^2	0.09	0.10	0.10	0.11	0.12	0.13
Observations	6,352	5,612	4,667	5,055	2,757	2,432

Notes: Standard errors clustered by county of residence in 1880 in parentheses, *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Demographic and economic variables include age (and age squared), father's occupational score in 1880, whether they lived on a farm in 1880, sibling literacy in 1880, urban population, whether they lived in county with Black political representation during the 1870s, school population per number of schools before 1878-79 school year, average local funding for schools over individual's school lifetime assuming they remained in the county of residence in 1880, measures of school quality before and after school closures (i.e., teacher pay, average number of months of instruction per school year, student-teacher ratio), a measure of school district segregation within the county of residence in 1880, enumeration district, and indicators for states where they lived in 1910.

Source: Author's calculation using data from the 1880 and 1910 US Censuses.

Table A12: The relationship between school closures in childhood and occupational income score in adulthood for student populations in Virginia

Estimation Method:	Dependent Variable: Occupation income score in 1910, based on age in 1878					
	Age 0 to 4	Age 5 to 9	Age 10 to 14	Age 15 to 21	Age 18 to 21	Age 22 to 26
OLS	(1)	(2)	(3)	(4)	(5)	(6)
White Schools Closed (%)	-0.26 (0.97)	-2.59* (1.43)	-1.44 (1.60)	-0.97 (1.17)	-0.96 (1.27)	-1.36 (1.26)
Black Schools Closed (%)	1.57 (1.61)	-0.61 (1.37)	-0.63 (1.53)	2.31* (1.19)	2.75* (1.64)	2.25 (1.61)
White Schools Closed (%) x Black Schools Closed (%)	-1.73 (1.60)	1.51 (2.21)	0.19 (2.39)	-2.25 (1.65)	-2.53 (1.98)	-1.54 (1.91)
Black	-5.31*** (0.45)	-7.28*** (0.66)	-5.60*** (0.70)	-5.94*** (0.65)	-5.38*** (0.80)	-5.03*** (0.70)
Black x Black Schools Closed (%)	-0.72 (1.30)	2.54 (1.69)	0.12 (1.55)	2.29 (3.01)	0.50 (1.99)	0.53 (1.65)
Black x White Schools Closed (%)	-0.73 (1.31)	4.12** (1.91)	2.07 (1.55)	3.10 (1.61)	3.42 (1.86)	2.56 (1.65)
Demographic and economic controls	Y	Y	Y	Y	Y	Y
School Quality	Y	Y	Y	Y	Y	Y
R^2	0.14	0.14	0.14	0.13	0.13	0.13
Observations	21,572	18,895	14,960	17,411	9,659	9,264

Notes: Standard errors clustered by county of residence in 1880 in parentheses, *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Demographic and economic variables include age (and age squared), father's occupational score in 1880, whether they lived on a farm in 1880, sibling literacy in 1880, urban population, whether they lived in county with Black political representation during the 1870s, school population per number of schools before 1878-79 school year, average local funding for schools over individual's school lifetime assuming they remained in the county of residence in 1880, measures of school quality before and after school closures (i.e., teacher pay, average number of months of instruction per school year, student-teacher ratio), a measure of school district segregation within the county of residence in 1880, enumeration district, and indicators for states where they lived in 1910.

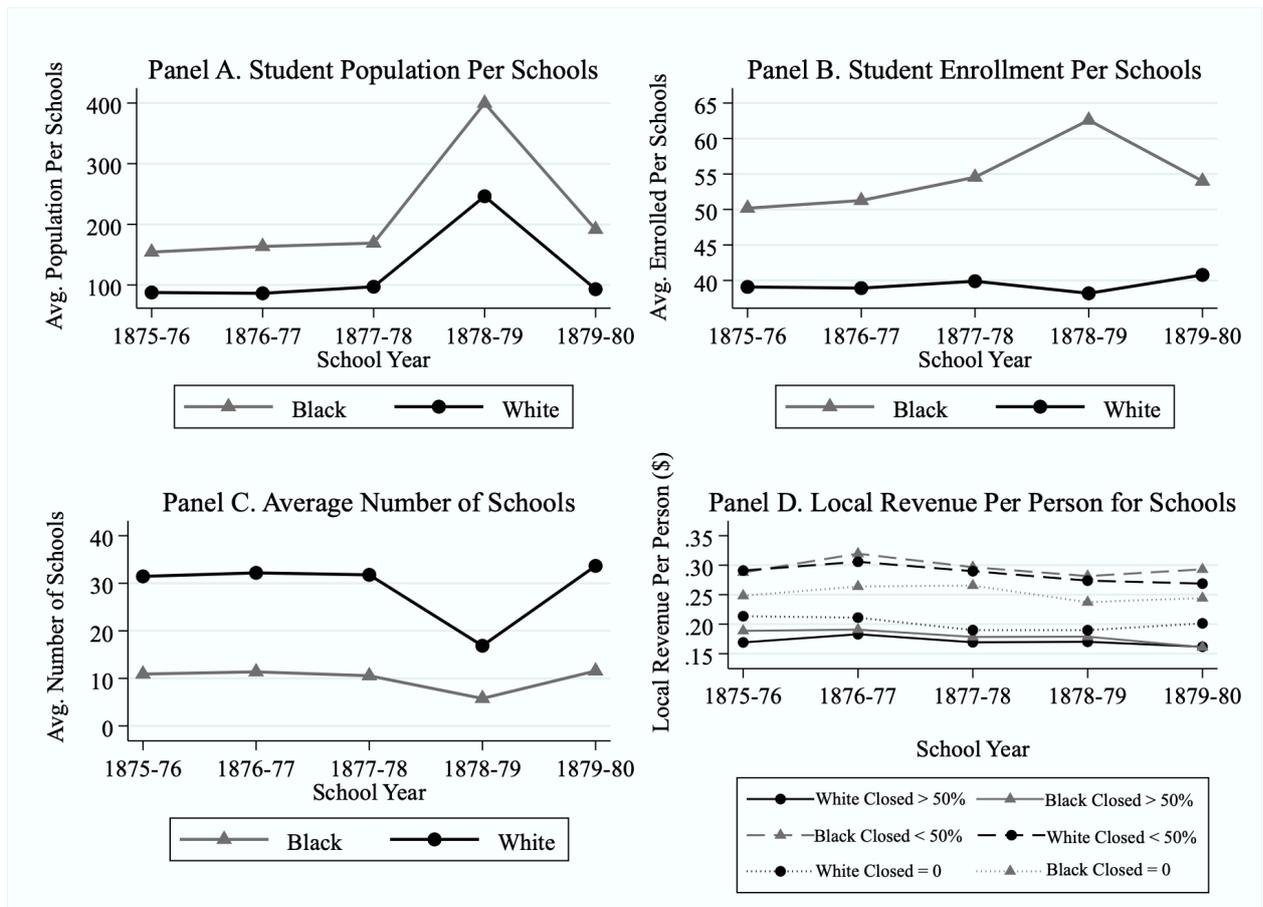
Source: Author's calculation using data from the 1880 and 1910 US Censuses.

Figure A1: Correlation Coefficients for School Closures and Measures of School Quality

Percent of White Schools Closed	1	0.78	-0.16	-0.21	-0.51	0.32
Percent of Black Schools Closed	0.78	1	-0.16	-0.26	0.11	0.13
Student Teacher Ratio	-0.16	-0.16	1	0.11	0.63	-0.13
Average Teacher Pay	-0.21	-0.26	0.11	1	0.30	-0.04
Average Term Length	-0.51	0.11	0.63	0.30	1	-0.44
Level of Segregation in School Districts	0.32	0.21	-0.13	-0.04	-0.44	1
	Percent of White Schools Closed	Percent of Black Schools Closed	Student Teacher Ratio	Average Teacher Pay	Average Term Length	Level of Segregation in School Districts

Notes: This figure shows the correlation between school closures during the 1878-79 school year and measures of school quality after the closers during the 1879-80 school year.

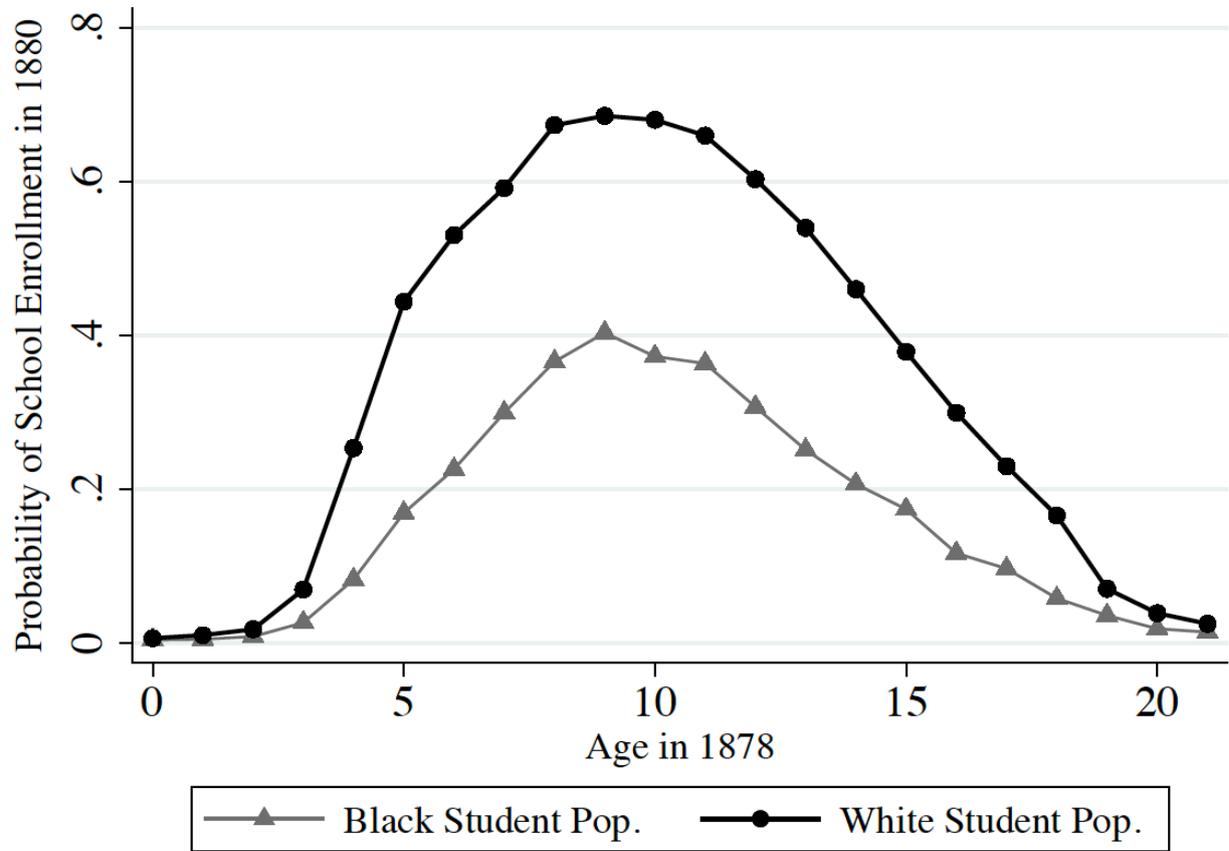
Figure A2: Characteristics of Black and White schools from 1875-76 to 1879-80 school years



Note: “Black” and “White” denote characteristics for Black and White schools in Virginia. “Closed > 50%” denotes counties that closed most of their schools, “Closed < 50%” denotes counties that closed a minority of their schools, and “Closed = 0” denotes counties that closed no schools.

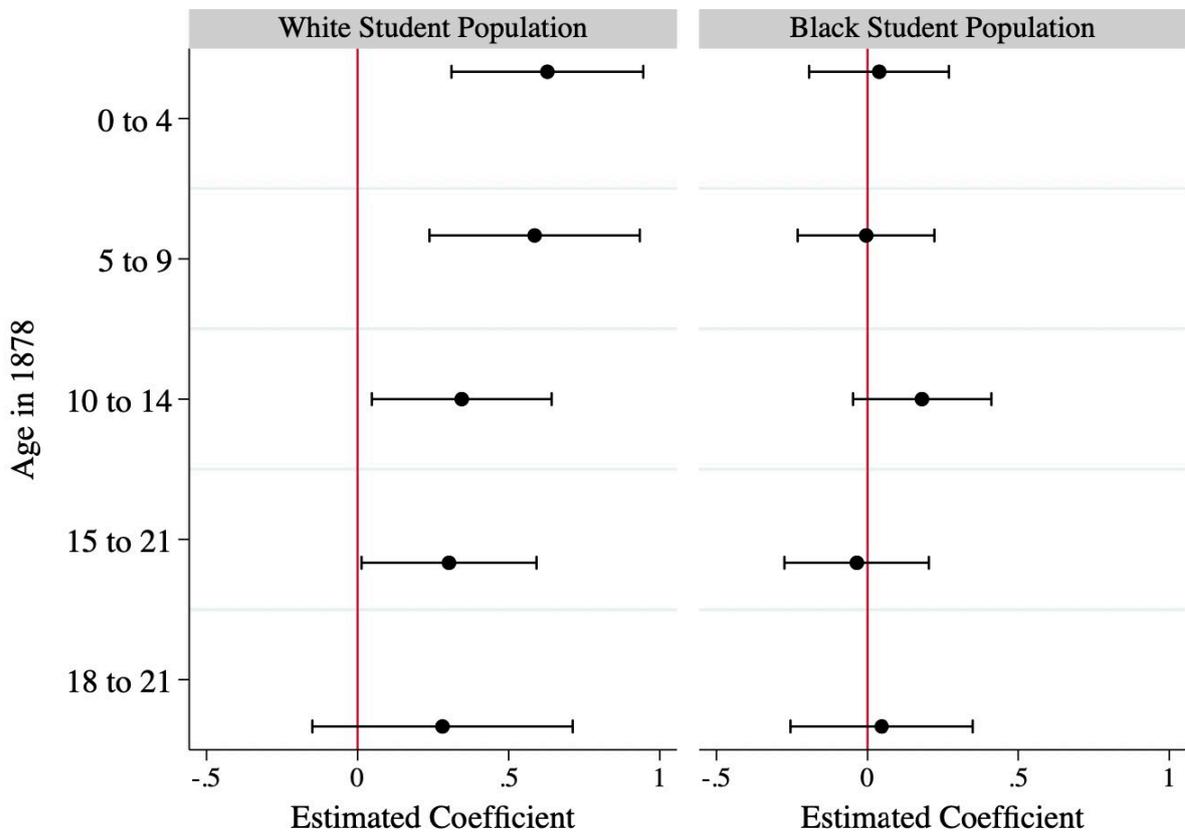
Source: Author’s calculations using data from the Virginia Superintendent Reports.

Figure A3: The probability of school enrollment in 1880



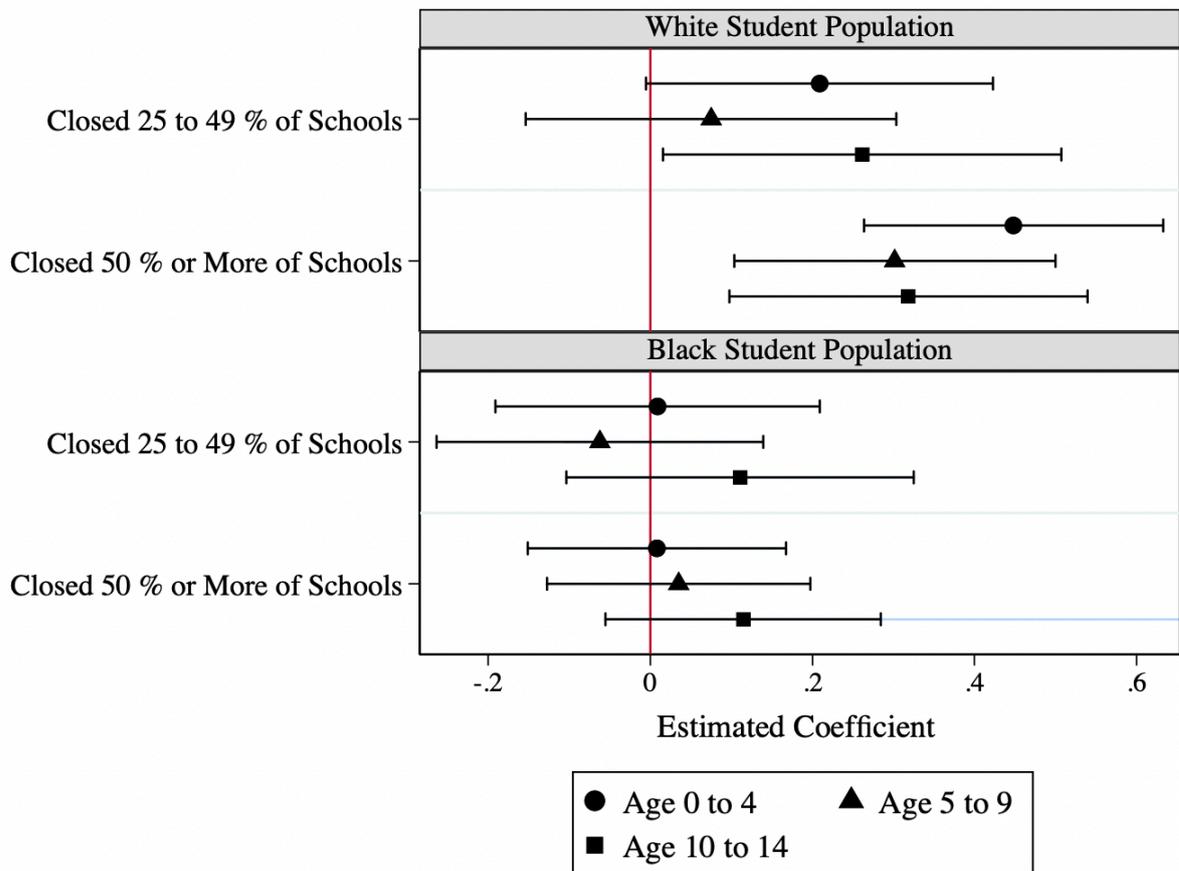
Source: Author's calculations using data from the 1880 linked US Census sample of student populations in Virginia.

Figure A4: The relationship between school closures and illiteracy in adulthood



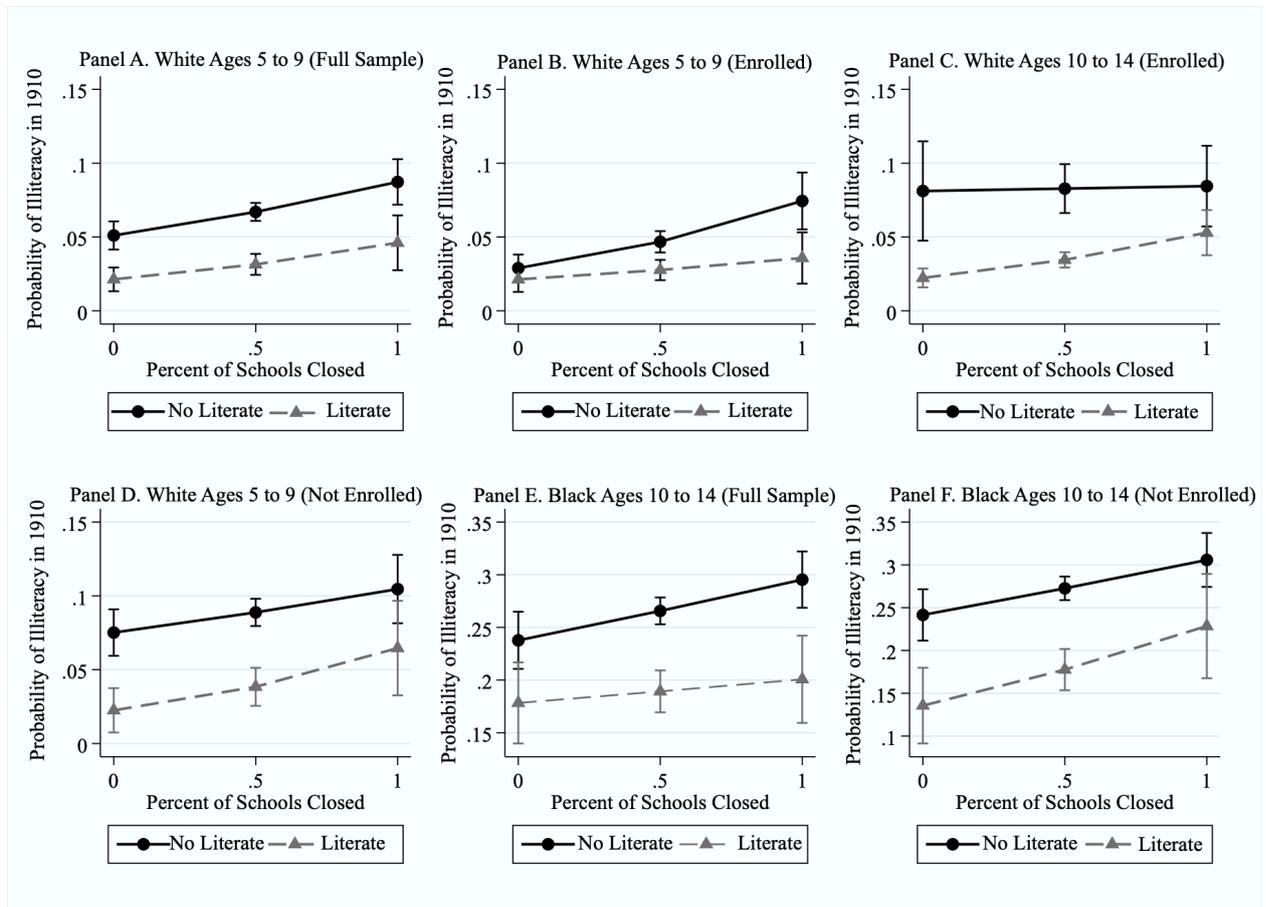
Notes: The figure reports coefficients from equation (2) and the 95-percent confidence intervals where the dependent variable is illiteracy in 1910. The estimating equation includes controls for demographic and economic characteristics including age (and age squared), the occupational income score for the father in 1880, whether they lived on a farm in 1880, sibling literacy in 1880, whether they lived in a county with Black political representation during the 1870s, urban population, school population per number of schools before 1878-79 school year, census enumeration district, and indicators for state where they lived in 1910. Corresponds with Table A3 in the appendix.
Source: Author's calculation using census matched records 1880 and 1910.

Figure A5: The relationship between school closures and illiteracy in adulthood



Notes: The figure reports coefficients from equation (2) and the 95-percent confidence intervals where the dependent variable is illiteracy in 1910. The estimating equation includes controls for demographic and economic characteristics including age (and age squared), the occupational income score for the father in 1880, whether they lived on a farm in 1880, sibling literacy in 1880, whether they lived in a county with Black political representation during the 1870s, urban population, school population per number of schools before 1878-79 school year, census enumeration district, and indicators for state where they lived in 1910. Corresponds with Table A4 in the appendix.
Source: Author's calculation using census matched records 1880 and 1910.

Figure A6: Probability of illiteracy in 1910 conditional on living with a literate sibling in 1880 and the percent of schools closed during the 1878-79 school year



Notes: The figure reports predictive margins from equation (2) and the 95-percent confidence intervals where the dependent variable is illiteracy in 1910. “No Literate” indicates that the individual did not live with a sibling who was literate in 1880 while “Literate” indicates that they did live with a literate sibling. The estimating equation includes controls for demographic and economic characteristics including age (and age squared), the occupational income score for the father in 1880, whether they lived on a farm in 1880, sibling literacy in 1880, urban population, whether they lived in county with Black political representation during the 1870s, enumeration district, average local funding for schools over individual’s school lifetime assuming they remained in the county of residence in 1880, and indicators for states where they lived in 1910. Corresponds with Table A7 in the appendix.

Source: Author’s calculation using census matched records 1880 and 1910.

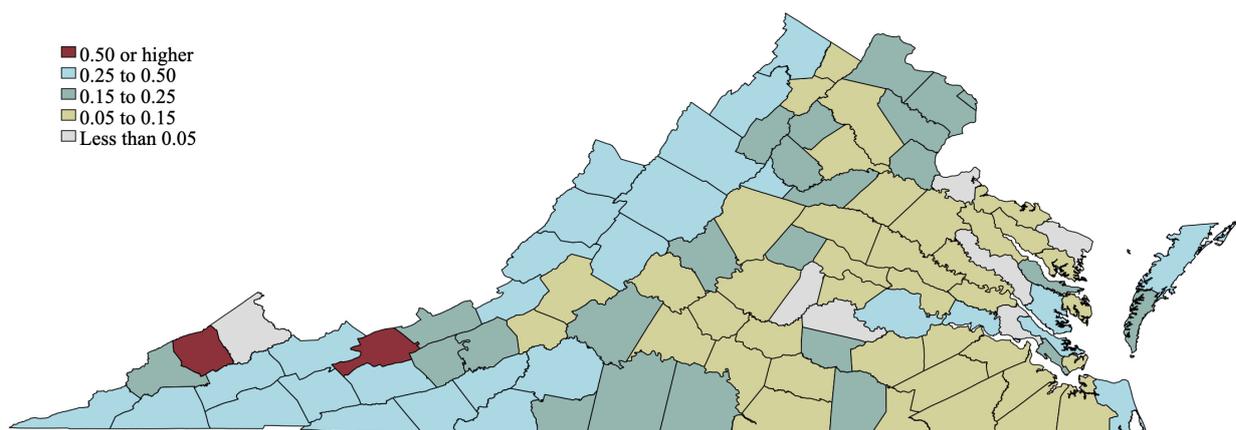
Appendix B. Calculating School District Segregation

There are several ways to calculate segregation within a geographic unit which, in this paper, constitutes a county. Every county had more than one school district while the average number of school districts when the school closures occurred was 3.2 per county (there were 505 school districts in the entire state). I estimate school district segregation using a dissimilarity index which is commonly used within the literature on segregation and is used by the US government agencies to calculate segregation within various US Census tracts (White, 1986). The dissimilarity index score itself reflects the percent of one group of people that would need to exchange places with another group to achieve an even geographic distribution. For this paper, this reflects the percent of the Black student population that would need to exchange places with the White student population. The index is calculated using the following equation:

$$D = \frac{1}{2} \sum_{i=1}^N \left| \frac{w_i}{W} - \frac{b_i}{B} \right|$$

where w_i is the White student population in a school district, b_i is the black student population in a school district, W is the total White student population in a county, and B is the total Black student population in a county. School district level (i.e., sub-county) records are available for a limited number of years. The only year the relevant district-level information is available for the period of this study is the 1879-80 school year. Figure B1 show the dissimilarity index scores by county.

Figure B1: School District Segregation Measured by Dissimilarity Index Score



Source: Author's calculations using method described in Appendix B.