From the Field to the Classroom: The Boll Weevil's Impact on Education in Rural Georgia

ONLINE APPENDIX

APPENDIX A: DATA APPENDIX

Education Data and Sources

The Georgia Department of Education collected a variety of statistics on the quantity of schooling and measured school quality from the county superintendents on an annual basis.[1] Much of this information was published in the *Annual Report of the Department of Education to the General Assembly of the State of Georgia*. These reports for the years 1909 through 1922 provide data on enrollment, attendance, teachers, schools, term length, and receipts for this work. With the exception of receipts, all of the above statistics are provided by race. Additionally, enrollment is provided by sex and by grade.[2]

While the meaning of terms such as number of teachers, number of public schools, length of the school term in days, and school board receipts (or revenues) are straightforward, what is meant by enrollment and attendance merits clarification. Enrollment is the total number of students enrolled in school during the term. A student was considered to be enrolled in school if he or she attended at any point during the

[1] These original documents would prove valuable as a check against errors in the published reports. Unfortunately, the original reports of the county superintendents from this time period are no longer available for Georgia. They are likely among documents lost during the 1930s as the state's archives were moved from the State Capitol Building to the basement of a private home.

Statistics were also collected from the superintendents of "special systems," school systems operated independently of the counties in cities and towns. These statistics were also reported in Georgia's *Annual Report of the Department of Education*. However, unlike county superintendents, city superintendents reported irregularly, so there is significant missingness in the panel. Since this paper is concerned with rural areas, statistics for these "special systems" are not included in the county totals.

[2] While the reports include the enrollment by grade, it is not clear how grade was determined for the ungraded and one-room schools that predominated rural Georgia during the early twentieth century.

year. Attendance, or average daily attendance, is the average number of students attending school on any given school day during the term.

Where possible, care was taken to clean this data of typographical and arithmetic errors in the source document. The format of the published tables provides sufficient information to identify and correct most all typographical errors for enrollment and teachers. For the number of schools, the format provides enough information to identify errors in the published reports but not enough to correct them. However, a comparison with data from surrounding years allows for the accurate correction of larger errors. Unfortunately, the tables do not provide enough information to identify or correct for typographical errors in term length or attendance, so these are used as reported.

The ability to identify and correct for typographical and arithmetic errors in the source for enrollment and the inability to do so for attendance is a significant reason for using enrollment as the dependent variable of primary interest in this work. For the data covering 1914, for example, errors in the source for total enrollment by race were identified and corrected in 1.6 percent of observations. Moreover, there is reason to believe that there would be a greater number of arithmetic errors in the calculation of average daily attendance since it involved long division, rather than just basic addition as in the case of enrollment. These potential inaccuracies in attendance introduce noise into the regressions, increasing the standard errors. Additionally, if the potential for inaccuracy is correlated with cotton output, then the estimates would be biased.

In Georgia, the school-age population was legally defined as anyone aged 6 through 18. The state conducted a census of the school-age population every five years starting in 1888. The results from the censuses of 1908, 1918, and 1923 were published in the *Annual Report of the Department of Education to the General Assembly of the State of Georgia* in relevant years, but the results of the 1913 census was published separately in a report entitled *Census of the School Population of Georgia 1913*. These sources provide the school-age population by race and sex for each county. Typographical and calculation errors

were corrected by consulting the original consolidation of returns of enumeration.[3] The school-age population was interpolated assuming a constant growth rate between census years.

Other Data and Sources

Wealth.—The annual *Report of the Comptroller-General of the State of Georgia* provides a wealth of statistics on everything of taxable value by county. It also provides many county-level statistics on the wealth of African Americans. The reports from 1909 through 1922 provide total assessed wealth, as opposed to the appraised or market value of property, at the county level by race. White wealth is calculated as the total value of property in the county less the value of property owned by African Americans.

Cotton Ginning Data.—Annual data on cotton ginning at the county level are provided by reports of the US Bureau of the Census entitled *Cotton Production in the United States*. For more information on this source see Lange, Olmstead, and Rhode (2009).

Presence of the Boll Weevil.—The map of the boll weevil's spread appears in Hunter and Coad's (1923) report entitled *The Boll Weevil Problem*. I code the boll weevil's year of arrival as the first year it is found in any part of the county.[4] The indicator variable for the presence of the boll weevil takes the value one starting in the year after the insect's arrival date in the county.[5]

[3] Georgia Department of Education, "School Censuses," Record Group 12, Sub-Group 2, Series 60, Georgia Archives, Morrow, GA.

[4] There are nine counties in which the boll weevil was first found in 1916, yet the boll weevil was not present in 1917. After making large territorial gains in 1916 due in part to a mild winter, the front line of the boll weevil was beaten back due to unfavorable weather conditions in 1917 (US Bureau of the Census 1918). Since the boll weevil is only sparsely present along the frontier of its spread, its impact on cotton production in these nine counties in 1916 was minimal. Thus, I can safely code the boll weevil as not being found in these counties in 1916.

[5] The indicator for the presence of the boll weevil does not take the value one for the year of the insect's arrival in a given county. This is because the boll weevil migrated late in the season in search of food, so the boll weevil was not present during much of the cotton growing season in the year of its arrival, and thus its effects in that year were minimal.

Rainfall.—Data on monthly total precipitation at weather stations in the US come from the United States Historical Climatology Network (USHCN).[6] Using this data, precipitation at each county centroid was estimated from information provided by the six closest weather stations using the inverse distance weighting method. Distance was computed using Vincenty's formula with GRS 80 ellipsoid parameters. Total summer rainfall is calculated as the sum of precipitation for the months of May, June, July, and August.

Rosenwald Schools.—Data on the locations and dates of construction of Rosenwald schools in Georgia were collected from the Fisk University Rosenwald Fund Card File Database found online at http://rosenwald.fisk.edu/. However, the year of construction is not available from this source for schools built in the 1910s. Fortunately, this information is provided in the Annual Reports of the Georgia Department of Education, described above.

WWI Enlistments.—Information on the number of new military enlistments by county of residence and year was collected from the Georgia World War I Service Cards database available at Ancestry.com. These data were collected for 1917 and 1918, the years in which the United States was actively involved in WWI.

APPENDIX B: FIRST GRADE RETENTION RATE

According to Finis Welch, "if all students complete at least the second grade, and if there is no growth in total enrollment … then the ratio of enrollment of first to second graders is the time required to complete the first grade relative to the time required to complete the second" (1973, 59). Additionally, given that it takes at least one year to complete the second grade, this ratio can also be interpreted as the lower bound of the average number of years it takes to complete the first grade. Finally, under the conditions outlined by Welch, with the additional assumption that all students complete second grade in one year, the ratio is equal to one plus the first grade retention rate.

[6] The latest monthly weather data can be downloaded from ftp://ftp.ncdc.noaa.gov/pub/data/ushcn/v2.5.

The use of the first to second grade enrollment ratio as a proxy for first grade retention rate in this paper is problematic because Welch's second assumption is clearly violated. I find that the boll weevil had a significant impact on the enrollment rate of blacks. Thus, in order to use this measure to correctly proxy for the retention rate it must be adjusted. To see this more clearly, I present a simple multiperiod model of first and second grade enrollment with retention and growth in enrollment.

Suppose that in year t, N_t new students enter first grade. Of the N_t students that enter first grade, R_t are held back. All students that repeat first grade move on to second grade the following year (that is, no student spends more than two years in first grade before advancing to the second). Define $r_t \equiv \frac{R_t}{N_t}$ as the proportion of new first graders that are held back. Let $g_t \equiv \frac{N_t - N_{t-1}}{N_{t-1}}$ be the growth rate in new first grade enrollment. Let the total enrollment in grade k at time t be given by E_{kt}. Then,

$$\begin{aligned} E_{2t} &= N_{t-1} - R_{t-1} + R_{t-2} \\ &= (1 + g_{t-1})N_{t-2} - r_{t-1}(1 + g_{t-1})N_{t-2} + r_{t-2}N_{t-2} \\ &= [(1 + g_{t-1}) - r_{t-1}(1 + g_{t-1}) + r_{t-2}]N_{t-2} \\ &= [1 + g_{t-1} - r_{t-1} - r_{t-1}g_{t-1} + r_{t-2}]N_{t-2}, \end{aligned} \tag{B1}$$

and

$$\begin{aligned} E_{1t} &= N_t + R_{t-1} \\ &= (1 + g_t)N_{t-1} + r_{t-1}N_{t-1} \\ &= (1 + g_t + r_{t-1})N_{t-1} \\ &= (1 + g_{t-1})(1 + g_t + r_{t-1})N_{t-2}. \end{aligned} \tag{B2}$$

Since the N_{t-2}'s cancel, the ratio of first to second grade enrollment can then be written as

$$\frac{E_{1t}}{E_{2t}} = \frac{(1+g_{t-1})(1+g_t+r_{t-1})}{1+g_{t-1}-r_{t-1}-r_{t-1}g_{t-1}+r_{t-2}}. \tag{B3}$$

Making two assumptions, (1) $r_{t-1}g_{t-1} \approx 0$ and (2) $r_{t-2} - r_{t-1} \approx 0$, yields

$$\frac{E_{1t}}{E_{2t}} = \frac{(1+g_{t-1})(1+g_t+r_{t-1})}{1+g_{t-1}} = 1 + g_t + r_{t-1}. \tag{B4}$$

Which can be rewritten to solve for the first grade retention rate,

$$\frac{E_{1t}}{E_{2t}} - (1 + g_t) = r_{t-1} \, . \tag{B5}$$

Recall, however, that g_t is the growth rate in new first grade enrollments. Since, new first grade enrollments are not observed, I approximate for the growth rate in new enrollments by using $\frac{E_{1t}-E_{1t-1}}{E_{1t-1}}$.

APPENDIX C: DETAILS ON THE CASE OF HANCOCK COUNTY

Hancock County, situated just northeast of the center of Georgia, was fairly representative of the rural population of the state as a whole. Table C1 compares population statistics of the county to those of the rural population of Georgia in 1910. At 36.2 persons per square mile, population density was just slightly higher in Hancock than the state average of 35.3 for the rural population. In terms of literacy and school attendance, the citizens of Hancock performed just a bit better than their rural counterparts in the rest of the state after controlling for race. The one aspect in which Hancock truly differs from the state average is in terms of racial mix. Whereas rural Georgia was 46 percent black, 74.4 percent of Hancock residents were black. In this aspect, however, Hancock is similar to many other cotton-centric counties in the state.

While the census figures indicate that Hancock was an average rural county, the annual reports of the Georgia Department of Education suggest that Hancock had some unique advantages. First, the site of Georgia's first normal school, Milledgeville, was located nearby. Second, in 1905 Hancock became the 5th county in Georgia to raise local taxes in support of schools (Georgia Department of Education 1905, 1906). Third, through 1914, Hancock was the home of M. L. Duggan, then State School Supervisor and former Hancock County Superintendent of Schools (Georgia Department of Education 1914). Finally, one of eleven state agricultural high schools was located in Hancock County. These educational advantages should, if anything, diminish the impact of the cotton economy on attendance and enrollment. Therefore, the daily attendance information presented may in fact understate the impact of cotton.

Table C2 shows statistics on cotton production in Hancock County for the agricultural seasons of 1913 and 1914, the two periods for which daily attendance data are available. In comparison to 1913, these figures suggest that cotton production in 1914 differed significantly in at least two ways. First, it is

evident that 1914 was a much better year for cotton growers. In 1914, Hancock produced 24,561 bales of cotton (just shy of the county record), while only 18,259 bales were produced in 1913; that amounts to a year-to-year increase of 34.5 percent.[7] The second noticeable difference between these two years is the timing of the cotton harvest. In particular, the cotton harvest concluded much earlier in Hancock in 1913, possibly because of the smaller size of the harvest in that year.[8] The boll weevil did not enter Hancock until 1916, and thus I am not able to examine its effects on schooling through cotton production in this case. However, it is fortunate that the level and timing of the harvest differs substantially between these two years allowing for an examination of the effects of changes in cotton production on daily school attendance.

The daily school attendance data were collected from a ledger likely kept by James L. McCleskey, Hancock County Superintendent of Schools.[9] Each page of the ledger allowed the superintendent to track the male, female, and total daily attendance for each of twenty schools over a month (20 weekdays). The ledger records daily attendance for 36 black schools and 22 white schools over the 1913-14 school term. During the 1914-15 school term, the ledger provides statistics for 23 black schools and 20 white schools.

[7] While it is not clear why so much more cotton was produced in 1914, this amount of seasonal variation was not unusual for Hancock or other cotton-producing counties. In the 10 years preceding 1913, the amount of cotton produced in Hancock varied from 13,870 bales in 1906 to 25,933 bales in 1911. Additionally, the price of cotton fails to explain this year-to-year variation, assuming there was not a backward bending supply curve, as the price of cotton in Georgia fell from 12.9 cents per pound in 1913 to 7.44 cents in 1914 (US Bureau of the Census 1915, 19).

[8] The percent of cotton ginned is a good proxy for the percent of cotton picked, or the progress of the harvest, since ginning occurred contemporaneously with the harvest. Raw cotton was ginned directly after picking for several reasons, the most important of which was cash. For the cotton farmer, ginning meant income and thus the ability to pay off high interest lines of credit that had been extended throughout the year. Additionally, the presence of 35 active ginneries in Hancock suggests that the distance from farm to gin was small and there was plenty of ginning capacity, implying minimal delay between picking and ginning (US Bureau of the Census 1915, 35).

[9] Hancock County School Superintendent, "Daily Attendance Record," Record Group 170, Sub-Group 8, Series 100, Georgia Archives, Morrow, GA. An exhaustive search of school records from the early twentieth century at both the Georgia Archives and the University of Georgia Library yielded no additional sources of intra-annual attendance.

However, since there are gaps in the data for some schools, Figure C1 was produced with information from 8 white schools and 21 black schools in 1913-14 and 14 white schools and 6 black schools in 1914-15.[10] One additional problem with the data, which is evident in Figure C1(d), is that the daily attendance information for whites was only recorded through December 18, 1914, during the 1914-15 school term. However, this is only a minor issue since attendance trends during the fall harvest are still observable.

Panels (a) and (c) of Figure C1 present the daily attendance data by race and sex for the 1913-14 school year, and panels (b) and (d) present the same for the 1914-15 term. Several features of these graphs of daily school attendance are suggestive of the impact of cotton production on schooling. Perhaps the most obvious feature of the daily attendance graphs is that attendance in the fall starts out much lower than the winter average for all terms, races, and sexes, suggesting that the cotton harvest suppressed school attendance in the fall.

A few additional features of Figure C1 lend support to this interpretation. First, school attendance reached the winter average later in 1914-15 than in 1913-14, possibly reflecting the longer cotton harvest of 1914. Second, the pattern for whites is relatively flat in 1913-14 in comparison to 1914-15, suggesting a greater demand for child labor in the cotton harvest in 1914. Furthermore, the depressed fall attendance for whites in 1914 is primarily driven by the behavior of white males, who were perhaps more likely to respond to an increase in the demand for labor in the cotton harvest than were white females. Both of these observations could be explained by the significantly larger harvest in 1914.

Beyond observations that are suggestive of the impact of the cotton harvest, there are a few additional features of these figures that warrant explanation. The most obvious feature of the 1914-15 graphs is a significant drop in the attendance of whites on November 20. While only one school was actually closed on this day, the explanation for that school's closing, simply "cold," provides the cause of low attendance at schools across the county. In the 1913-14 graphs for both blacks and whites, males and females, there

[10] While the records for 1914-15 are dated, the 1913-14 records are not. However, I was able to use school closings for holidays and significant weather events to determine the dates.

are noticeable drops in attendance on February 6, 13, and 20. Not coincidentally, these are also the only weekdays in February 1914 on which rain was recorded at the closest weather station.[11] Finally, the sharp drop-off in attendance of both races at the end of February 1914 is the result of nine inches of snow fall on the 26th.

[11] The closest active weather station to Sparta, the county seat, in the United States Historical Climatology Network (USHCN) was in Milledgeville, just over 20 miles away.

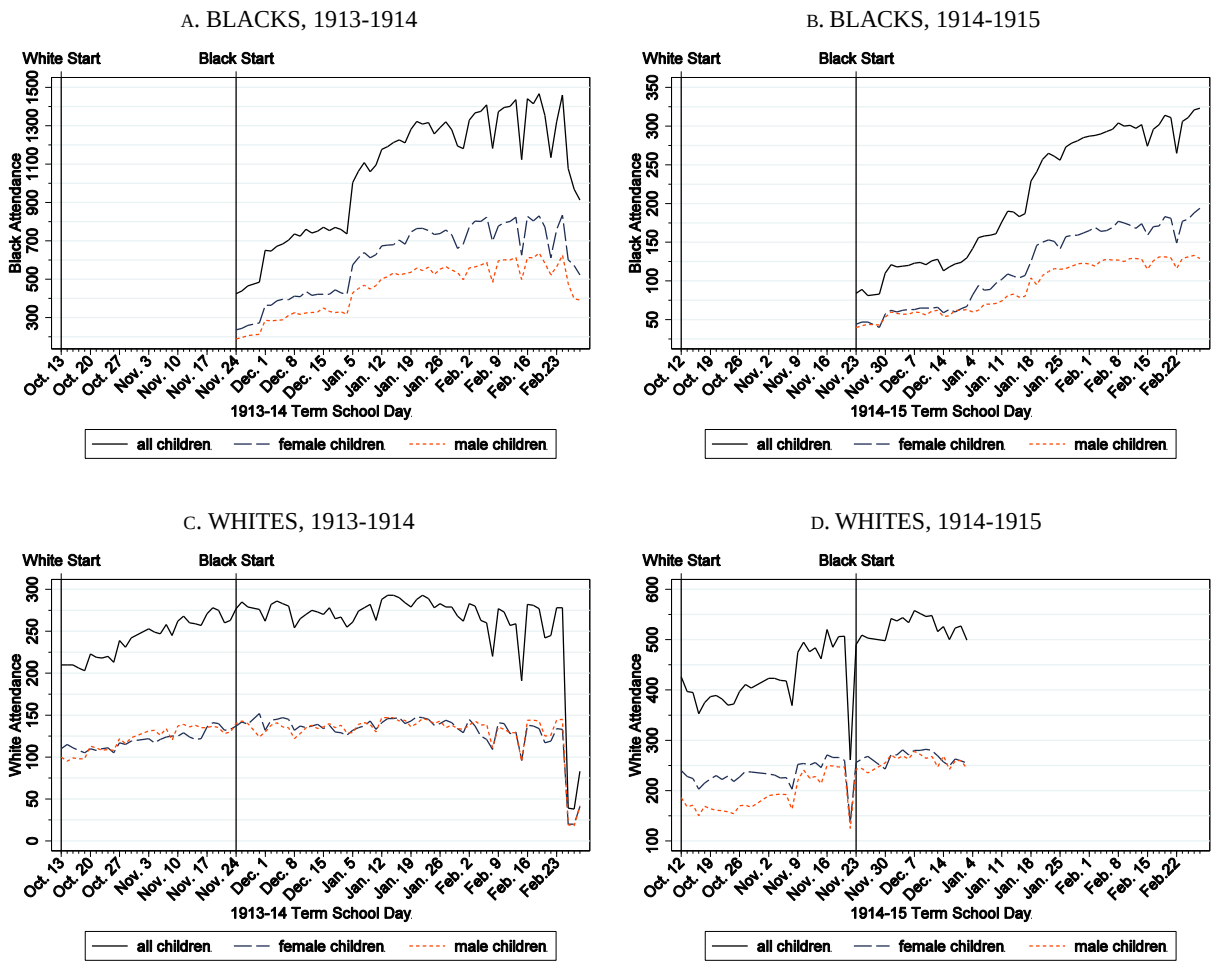

FIGURE C1
DAILY SCHOOL ATTENDANCE IN HANCOCK COUNTY, 1913-14 AND 1914-15

Notes: Weekdays (Monday to Friday) for weeks during which school was in session are displayed on the x-axis. The total number of students attending is shown on the y-axis. The vertical line labeled "White Start" indicates the start of the school year for whites, while the line labeled "Black Start" indicates the start of the school year for blacks. For two school holidays, the school fair (white schools only) on October 30 and 31, 1913, and October 29 and 30, 1914, and Thanksgiving on November 27, 1913, and November 26, 1914, attendance is treated as missing. For these dates, the lines represent the average of attendance on the school days preceding and following the holiday. As school was closed for winter break for the weeks of December 22 and 29, 1913, and December 21 and 28, 1914, these two weeks are omitted from the x-axis. The samples consist of all schools for which both male and female attendance was regularly reported throughout the school year. Unfortunately, daily attendance was not recorded for white schools after winter break during the 1914-15 term, even though school was in session.
Source: Hancock County School Superintendent, "Daily Attendance Record," Record Group 170, Sub-Group 8, Series 100, Georgia Archives, Morrow, GA.

TABLE C1
POPULATION STATISTICS FOR RURAL GEORGIA AND HANCOCK COUNTY, 1910

	Rural Georgia			Hancock County		
	Total	White	Black	Total	White	Black
Population						
Total	2,070,471	1,118,196	952,161	19,189	4,917	14,268
Race percent of total		54.0%	46.0%		25.6%	74.4%
Percent male	50.5%	50.9%	50.1%	49.9%	49.9%	49.9%
Illiteracy						
Population 10+	1,454,567	790,853	663,631	13,459	3,661	9,794
Percent illiterate	23.2%	9.5%	39.7%	26.1%	3.0%	34.8%
School attendance						
Population 6 to 14	497,893	254,723	243,147	5,005	1,065	3,940
Percent attending	64.0%	74.0%	53.5%	59.7%	78.2%	54.7%
Land area (sq. miles)	58,725			530		
Rural pop. per sq. mile	35.3			36.2		

Notes: The sum of the reported figures for blacks and whites does not necessarily equal the total, due to the presence of other races.
Source: US Bureau of the Census, *Thirteenth Census of the United States: 1910*, 1913.

TABLE C2
COTTON GINNED BY DATE IN HANCOCK COUNTY, 1913 AND 1914

	1913		1914	
Date	Number of Bales	Percent of Total	Number of Bales	Percent of Total
Sept. 1	31	0.17%	168	0.68%
Sept. 25	3,784	20.72	6,655	27.10
Oct. 18	10,892	59.65	12,587	51.25
Nov. 1	13,311	72.90	16,071	65.43
Nov. 14	14,699	80.50	18,340	74.67
Dec. 1	16,721	91.58	20,090	81.80
Dec. 13	17,997	98.57	22,199	90.38
Jan. 1	18,204	99.70	23,628	96.20
Jan. 16	18,254	99.97	23,793	96.87
Total	18,259		24,561	

Notes: The cumulative number of bales of cotton ginned in Hancock County prior to the specified dates is given for the seasons of 1913 and 1914.
Source: US Bureau of the Census, *Cotton Production in the United States*, 1914-1915.

APPENDIX D: ROBUSTNESS TABLES

TABLE D1
REDUCED-FORM REGRESSIONS OF LOG ENROLLMENT RATE ON BOLL WEEVIL PRESENCE BY RACE

	Black				
	(1)	(2)	(3)	(4)	(5)
boll weevil	0.039**	0.039**	0.042**	0.035**	0.043***
	(0.019)	(0.017)	(0.016)	(0.017)	(0.016)
ln(teachers)		0.314***	0.264***	0.351***	0.314***
		(0.056)	(0.051)	(0.060)	(0.056)
ln(schools)		0.241***	0.285***	0.213***	0.257***
		(0.080)	(0.072)	(0.077)	(0.071)
ln(term length)		0.093***	0.055	0.131***	0.078*
		(0.032)	(0.037)	(0.043)	(0.042)
ln(receipts)		-0.012	-0.015	-0.004	-0.023
		(0.017)	(0.016)	(0.020)	(0.017)
ln(wealth)		0.013	0.038	0.018	0.043*
		(0.026)	(0.024)	(0.026)	(0.024)
Observations	1692	1657	1657	1657	1657
No. of counties	121	121	121	121	121
R-squared	0.584	0.692	0.764	0.696	0.765
Time trends	NO	NO	YES	NO	YES
Interactions	NO	NO	NO	YES	YES
	White				
	(6)	(7)	(8)	(9)	(10)
boll weevil	0.009	0.008	0.002	0.006	0.002
	(0.012)	(0.012)	(0.012)	(0.012)	(0.011)
ln(teachers)		0.266***	0.236***	0.259***	0.243***
		(0.045)	(0.049)	(0.047)	(0.051)
ln(schools)		0.074**	0.099**	0.092**	0.112**
		(0.034)	(0.042)	(0.041)	(0.049)
ln(term length)		0.078**	0.083***	0.132***	0.080**
		(0.031)	(0.029)	(0.034)	(0.032)
ln(receipts)		0.026*	0.026**	0.040**	0.032**
		(0.013)	(0.013)	(0.015)	(0.014)
ln(wealth)		-0.034	0.058	-0.031	0.057
		(0.037)	(0.035)	(0.036)	(0.036)
Observations	1693	1665	1665	1665	1665
No. of counties	121	121	121	121	121
R-squared	0.468	0.564	0.666	0.570	0.668
Time trends	NO	NO	YES	NO	YES
Interactions	NO	NO	NO	YES	YES

* = Significant at the 10 percent level.
** = Significant at the 5 percent level.
*** = Significant at the 1 percent level.
Notes: Standard errors adjusted for clustering by county in parentheses. All regressions include county and year fixed effects. Columns (3), (5), (8), and (10) include county-specific linear time trends. Columns (4), (5), (9), and (10) include interaction terms between the indicator for the presence of the boll weevil and each school quality and wealth control.

TABLE D2
POOLED REDUCED-FORM REGRESSIONS OF LOG ENROLLMENT RATE ON BOLL WEEVIL

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
boll weevil	0.002	-0.002	-0.002	-0.001	-0.005	-0.004	-0.004
	(0.014)	(0.014)	(0.013)	(0.013)	(0.014)	(0.014)	(0.014)
black	-0.217***	-0.217***	-0.177***	-0.165***	-0.194***	-0.185***	-0.185***
	(0.014)	(0.014)	(0.047)	(0.047)	(0.049)	(0.051)	(0.051)
black X weevil	0.043***	0.043***	0.051***	0.049***	0.057***	0.055***	0.056***
	(0.013)	(0.013)	(0.012)	(0.011)	(0.016)	(0.016)	(0.016)
Observations	3385	3385	3322	3322	3322	3322	3322
No. of counties	121	121	121	121	121	121	121
R-squared	0.545	0.601	0.641	0.684	0.660	0.702	0.702
County controls	NO	NO	YES	YES	YES	YES	YES
Time trends	NO	YES	NO	YES	NO	YES	YES
Interactions	NO	NO	NO	NO	YES	YES	YES
Proportion black	NO	NO	NO	NO	NO	NO	YES

* = Significant at the 10 percent level.
** = Significant at the 5 percent level.
*** = Significant at the 1 percent level.
Notes: Standard errors adjusted for clustering by county in parentheses. All regressions include county and year fixed effects. Columns (3) through (7) include race-specific school quality and wealth controls. Columns (5) through (7) include interaction terms between the indicator for blacks and each school quality and wealth control. Column (7) includes a control for the proportion of all school-age children who are black. Columns (2), (4), (6), and (7) include county-specific linear time trends.

TABLE D3
REDUCED-FORM REGRESSIONS OF LOG ENROLLMENT RATE ON LOG SUMMER RAIN BY RACE

	Black				
	(1)	(2)	(3)	(4)	(5)
ln(summer rain)	0.064**	0.051**	0.042*	0.055**	0.049**
	(0.028)	(0.025)	(0.025)	(0.025)	(0.024)
ln(teachers)		0.317***	0.266***	0.314***	0.266***
		(0.056)	(0.052)	(0.054)	(0.051)
ln(schools)		0.236***	0.277***	0.239***	0.278***
		(0.081)	(0.072)	(0.077)	(0.070)
ln(term length)		0.094***	0.057	0.092***	0.055
		(0.032)	(0.036)	(0.032)	(0.036)
ln(receipts)		-0.012	-0.015	-0.012	-0.015
		(0.017)	(0.016)	(0.017)	(0.016)
ln(wealth)		0.016	0.043*	0.015	0.040*
		(0.026)	(0.025)	(0.026)	(0.024)
Observations	1692	1657	1657	1657	1657
No. of counties	121	121	121	121	121
R-squared	0.584	0.692	0.763	0.693	0.764
Time trends	NO	NO	YES	NO	YES
Interactions	NO	NO	NO	YES	YES
	White				
	(6)	(7)	(8)	(9)	(10)
ln(summer rain)	-0.004	-0.009	-0.013	-0.010	-0.012
	(0.019)	(0.018)	(0.017)	(0.018)	(0.018)
ln(teachers)		0.266***	0.236***	0.263***	0.235***
		(0.044)	(0.049)	(0.043)	(0.049)
ln(schools)		0.074**	0.099**	0.076**	0.099**
		(0.034)	(0.041)	(0.034)	(0.042)
ln(term length)		0.077**	0.083***	0.079**	0.084***
		(0.031)	(0.029)	(0.031)	(0.029)
ln(receipts)		0.026**	0.026**	0.025*	0.025**
		(0.013)	(0.012)	(0.013)	(0.012)
ln(wealth)		-0.033	0.061*	-0.032	0.060*
		(0.038)	(0.036)	(0.038)	(0.036)
Observations	1693	1665	1665	1665	1665
No. of counties	121	121	121	121	121
R-squared	0.468	0.564	0.667	0.565	0.667
Time trends	NO	NO	YES	NO	YES
Interactions	NO	NO	NO	YES	YES

* = Significant at the 10 percent level.
** = Significant at the 5 percent level.
*** = Significant at the 1 percent level.
Notes: Standard errors adjusted for clustering by county in parentheses. All regressions include county and year fixed effects. Columns (3), (5), (8), and (10) include county-specific linear time trends. Columns (4), (5), (9), and (10) include interaction terms between log total summer rain and each school quality and wealth control.

TABLE D4
2SLS ESTIMATES OF THE IMPACT OF COTTON PRODUCTION ON ENROLLMENT RATES, ALTERNATIVE FIRST STAGE SPECIFICATIONS

	First Stage				Second Stage			
	Black		White		Black		White	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
(a) Quadratic in log summer rain								
ln(summer rain)	12.934***	12.669***	12.990***	13.174***				
	(2.625)	(2.696)	(2.596)	(2.674)				
ln(summer rain)^2	-0.791***	-0.776***	-0.795***	-0.807***				
	(0.154)	(0.159)	(0.153)	(0.157)				
ln(cotton bales)					-0.135***	-0.102**	-0.015	0.004
					(0.051)	(0.045)	(0.033)	(0.032)
R-squared	0.874	0.875	0.874	0.874	0.522	0.649	0.474	0.569
Kleibergen-Paap F-stat	40.22	37.62	41.13	41.41				
Hansen J-stat	0.108	0.079	0.010	0.138				
	[0.742]	[0.778]	[0.922]	[0.710]				
(b) Log summer rain and boll weevil								
ln(summer rain)	-0.464***	-0.463***	-0.465***	-0.487***				
	(0.070)	(0.069)	(0.070)	(0.070)				
boll weevil	-0.176***	-0.184***	-0.176***	-0.174***				
	(0.044)	(0.045)	(0.044)	(0.044)				
ln(cotton bales)					-0.159***	-0.131**	-0.022	-0.004
					(0.058)	(0.052)	(0.037)	(0.035)
R-squared	0.874	0.875	0.874	0.874	0.499	0.623	0.471	0.569
Kleibergen-Paap F-stat	27.12	27.57	27.36	28.13				
Hansen J-stat	0.219	0.587	0.264	0.825				
	[0.640]	[0.443]	[0.608]	[0.364]				
(c) Log summer rain, boll weevil, and their interaction								
ln(summer rain)	-0.292***	-0.302***	-0.292***	-0.323***				
	(0.077)	(0.076)	(0.077)	(0.079)				
ln(rain) X weevil	-0.383***	-0.348***	-0.384***	-0.353***				
	(0.084)	(0.084)	(0.083)	(0.085)				
boll weevil	-0.163***	-0.172***	-0.163***	-0.162***				
	(0.044)	(0.045)	(0.044)	(0.044)				
ln(cotton bales)					-0.140***	-0.118***	-0.024	-0.015
					(0.047)	(0.045)	(0.033)	(0.032)
R-squared	0.875	0.875	0.875	0.874	0.518	0.635	0.469	0.566
Kleibergen-Paap F-stat	28.54	27.07	29.05	27.77				
Hansen J-stat	0.863	1.080	0.274	1.668				
	[0.650]	[0.583]	[0.872]	[0.434]				
Observations	1667	1632	1668	1640	1667	1632	1668	1640
No. of counties	121	121	121	121	121	121	121	121
County-level controls	NO	YES	NO	YES	NO	YES	NO	YES

* Significant at the 10 percent level.
** Significant at the 5 percent level.
*** Significant at the 1 percent level.
Notes: Standard errors adjusted for clustering by county in parentheses. p-value for Hansen J-statistic in brackets. All regressions include county and year fixed effects. Even numbered columns include county-level controls for wealth and school quality.

TABLE D5
2SLS ESTIMATES OF THE IMPACT OF COTTON PRODUCTION ON LOG ATTENDANCE RATE

	Boll Weevil				Summer Rain			
	Black		White		Black		White	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
ln(cotton bales)	-0.106	-0.095	0.014	0.022	-0.134*	-0.093	0.001	0.029
	(0.131)	(0.120)	(0.096)	(0.094)	(0.078)	(0.068)	(0.054)	(0.048)
ln(teachers)		0.289***		0.293***		0.289***		0.292***
		(0.072)		(0.061)		(0.071)		(0.060)
ln(schools)		0.299***		0.123**		0.300***		0.123**
		(0.101)		(0.058)		(0.100)		(0.058)
ln(term length)		0.105*		0.079*		0.105*		0.080*
		(0.055)		(0.042)		(0.054)		(0.042)
ln(receipts)		-0.039*		0.000		-0.039*		-0.000
		(0.023)		(0.020)		(0.021)		(0.019)
ln(wealth)		0.032		-0.012		0.032		-0.013
		(0.034)		(0.048)		(0.033)		(0.047)
Observations	1663	1629	1665	1638	1663	1629	1665	1638
No. of counties	121	121	121	121	121	121	121	121
R-squared	0.555	0.643	0.529	0.587	0.544	0.643	0.528	0.586

* Significant at the 10 percent level.
** Significant at the 5 percent level.
*** Significant at the 1 percent level.
Notes: Standard errors adjusted for clustering by county in parentheses. All regressions include county and year fixed effects. Second-stage results are presented with log attendance rate (the natural log of average daily attendance over school-age population) as the dependent variable. First stage results are identical to those presented in Tables 3 and 6.

TABLE D6
2SLS ESTIMATES OF THE IMPACT OF COTTON PRODUCTION ON LOG ENROLLMENT

	Boll Weevil				Summer Rain			
	Black		White		Black		White	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
ln(cotton bales)	-0.183**	-0.141*	-0.044	-0.026	-0.143**	-0.099*	-0.013	0.013
	(0.091)	(0.079)	(0.056)	(0.053)	(0.060)	(0.052)	(0.037)	(0.034)
ln(school-age pop.)	1.077***	1.305***	0.978***	1.153***	1.045***	1.266***	0.968***	1.129***
	(0.124)	(0.102)	(0.086)	(0.093)	(0.100)	(0.086)	(0.084)	(0.084)
ln(teachers)		0.305***		0.266***		0.310***		0.261***
		(0.060)		(0.047)		(0.059)		(0.045)
ln(schools)		0.259***		0.112***		0.262***		0.110***
		(0.086)		(0.036)		(0.087)		(0.037)
ln(term length)		0.118***		0.067**		0.108***		0.069**
		(0.045)		(0.031)		(0.041)		(0.030)
ln(receipts)		0.000		0.029**		-0.003		0.026*
		(0.019)		(0.014)		(0.018)		(0.014)
ln(wealth)		0.065**		-0.002		0.055**		-0.013
		(0.029)		(0.038)		(0.026)		(0.035)
Observations	1667	1632	1668	1640	1667	1632	1668	1640
No. of counties	121	121	121	121	121	121	121	121
R-squared	0.970	0.978	0.983	0.986	0.973	0.980	0.983	0.986

* Significant at the 10 percent level.
** Significant at the 5 percent level.
*** Significant at the 1 percent level.
Notes: Standard errors adjusted for clustering by county in parentheses. All regressions include county and year fixed effects. Second-stage results are presented with log enrollment as the dependent variable. The log of race-specific school-age population is included as an additional regressor.

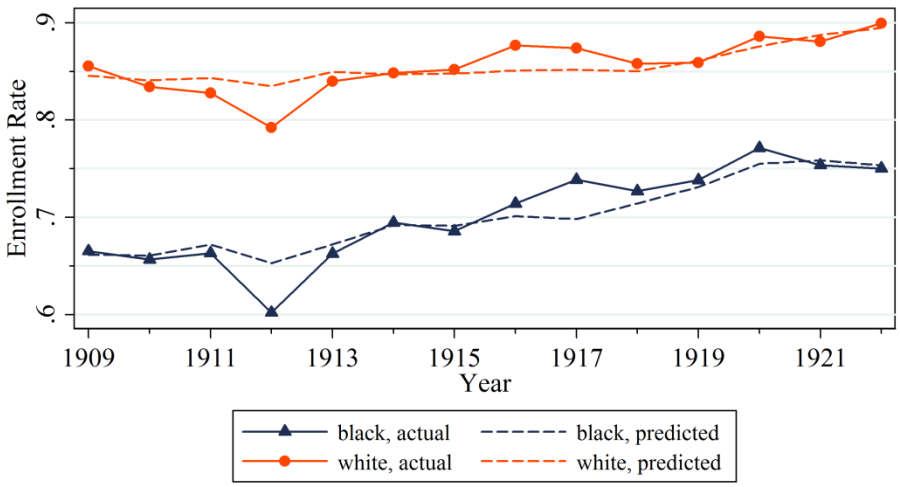

FIGURE D1
MEAN ACTUAL AND PREDICTED ENROLLMENT RATES BY RACE AND YEAR

Notes: Predicted enrollment rates were computed using the coefficients from race-specific regressions of enrollment rate on wealth and school quality controls and county fixed effects, but excluding year fixed effects.
Source: Author's calculations using the data on wealth and schooling described in the text.