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SCHOOL QUALITY AND BLACK-WHITE RELATIVE EARNINGS: A DIRECT ASSESSMENT*

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The wage differential between black and white men fell from 40 percent in 1960 to 25 percent in 1980. It has been argued that this convergence reflects improvements in the relative quality of black schools. To test this hypothesis, we assembled data on pupil-teacher ratios, annual teacher pay, and term length for black and white schools in the eighteen segregated states from 1915 to 1966. These data are linked to estimated returns to education for Southern-born men from different cohorts and states in 1960, 1970, and 1980. Improvements in the relative quality of black schools explain 20 percent of the narrowing of the black-white earnings gap between 1960 and 1980.

I. INTRODUCTION

During the 1960s and 1970s African American men made substantial progress toward earnings equality with whites. The differential in average weekly wages between black and white men narrowed from 40 percent in 1960 to 25 percent in 1980. By comparison, black-white relative wages were remarkably stable during the 1950s and 1980s.[1] Despite the singular importance of the wage gains from 1960 to 1980, economists remain divided as to their cause. Smith and Welch [1986, 1989] argue that improvements in the relative quality of black education were mainly responsible for the relative rise in black wages after 1960. Other researchers, including Freeman [1973], Vroman [1974], and Donohue and Heckman [1991], argue that federal government policies, including passage of the Civil Rights Act of 1964, were instrumental in closing the wage gap.

Nationwide trends in earnings and schooling data suggest that both hypotheses have some merit. Tabulations from the Current Population Survey show a rise in black-white relative earnings in the years immediately following passage of the Civil Rights Act.[2]

1. These and many other aspects of black economic progress since 1940 are described in Smith and Welch [1986, 1989].
2. See Freeman [1973] and Brown [1982]. Ashenfelter [1970] presents evidence that part of the rise in black-white relative earnings measured in the Current Population Survey between 1966 and 1967 is attributable to a change in sampling and processing procedures.

This change is often cited as evidence that equal employment opportunity programs led to a closing of the earnings gap. Blacks who entered the labor market in the 1960s, however, had received substantially more and better education than any previous generation of black workers. In the 1920s, for example, pupil-teacher ratios in Southern black schools were 50 percent higher than those in white schools, while the average school term was 20 percent shorter. By the late 1950s conditions in black and white schools were similar in many Southern states. Because better-educated cohorts of black workers began to enter the labor force at about the time the Civil Rights Act took effect, nationwide earnings patterns cannot easily distinguish the effects of improved school quality from the impact of federal antidiscrimination policies.

Nevertheless, aggregate trends in relative school quality mask wide differences across states in the rate of convergence of black and white school quality. In this paper we use these interstate differences to disentangle the role of school quality in the evolution of the black-white earnings gap. The key to our analysis is a set of state-specific school quality measures for the black and white schools in the eighteen segregated Southern states during the period from 1915 to 1966. To our knowledge, this is the most complete series of state-level data on the quality of Southern schools presently available. We combine these quality measures with state-specific estimates of the rate of return to schooling and the mean level of earnings for Southern-born men in the 1960, 1970, and 1980 Censuses. We then use the combined earnings and schooling data to answer two questions. What is the effect of relative school quality on the relative returns to education earned by black and white men? What fraction of the closing of the black-white earnings gap between 1960 and 1980 is explained by changes in relative school quality?

Before turning to these questions, we present a descriptive analysis of the earnings gap between black and white men in the 1960, 1970, and 1980 Censuses. Our analysis establishes the importance of intercohort changes in determining the evolution of the black-white earnings gap. We then decompose intercohort changes in the wage gap into components attributable to earnings growth among Southern-born and non-Southern-born blacks. Sixty percent of the closing of the earnings gap between cohorts born in the 1920s and cohorts born in the 1940s is attributed to the closing of the black-white wage gap for Southern-born workers.

Among Southern-born men increases in the return to educa-

tion for later cohorts of blacks can explain most of the narrowing of the relative wage gap. Cross-tabulations of rates of return to education by race and region of birth show that the return to schooling for later cohorts of Southern-born blacks rose relative to both Southern-born whites and Northern-born blacks. This pattern suggests that the rise in the return to education for Southern-born blacks was driven by improvements in the quality of black schools, and not simply by an economywide reduction in discrimination against better-educated black workers.

In Section II of the paper we present estimates of school quality by cohort, race, and state of birth, and link these quality measures to estimated rates of return to education for Southern-born workers. To control for differences in the return to education in different regions of the country, we estimate rates of return to schooling for men who were born in the South between 1910 and 1949 and who worked in a Northern metropolitan area in 1960, 1970, or 1980. We find a strong correlation between measures of school quality for black and white pupils and their rates of return to schooling. Changes in relative pupil-teacher ratios, term lengths, and teachers' salaries can explain at least one half of the intercohort growth in black-white relative returns to education, and 15–25 percent of the overall convergence in black relative returns to education between 1960 and 1980.

We conclude our study with a direct assessment of the effects of school quality on the black-white wage gap. Here, we follow a simple "reduced-form" approach and regress measures of the black-white wage gap by cohort and state of birth on measures of the corresponding gap in school quality. Again, there is a positive correlation between relative school quality and black-white relative wages. Changes in school quality explain one quarter of the decline in the black-white wage gap between earlier and later cohorts of workers, and 15–20 percent of the closing of the overall black-white wage gap for Southern-born workers between 1960 and 1980.

I. THE EVOLUTION OF BLACK-WHITE EARNINGS: 1960–1980

Table I presents estimates of average wage rates for black and white male workers in the 1960, 1970, and 1980 decennial censuses.[3] The table gives overall averages of log weekly wages for men

3. Precise descriptions of the samples used to construct these averages are provided in the Data Appendix.

TABLE I
MEAN LOG WAGES AND WAGE DIFFERENTIALS BY COHORT IN 1960, 1970, AND 1980

| | 1960 | | 1970 | | 1980 | | Log wage differential Black − White | | |
Cohort:	Whites	Blacks	Whites	Blacks	Whites	Blacks	1960	1970	1980
1900–1909									
Mean log wage	4.617	4.085					−0.532		
Std error	(0.003)	(0.008)					(0.009)		
Share	0.177	0.173							
1910–1919									
Mean log wage	4.680	4.152	5.123	4.613			−0.528	−0.510	
Std error	(0.002)	(0.007)	(0.002)	(0.006)			(0.007)	(0.006)	
Share	0.254	0.250	0.199	0.180					
1920–1929									
Mean log wage	4.667	4.170	5.209	4.726	5.921	5.548	−0.498	−0.483	−0.373
Std error	(0.002)	(0.006)	(0.001)	(0.005)	(0.002)	(0.004)	(0.006)	(0.005)	(0.005)
Share	0.297	0.301	0.248	0.243	0.177	0.146			
1930–1939									
Mean log wage	4.311	3.931	5.163	4.747	5.959	5.615	−0.379	−0.416	−0.344
Std error	(0.002)	(0.006)	(0.001)	(0.004)	(0.002)	(0.004)	(0.007)	(0.005)	(0.004)
Share	0.272	0.276	0.242	0.259	0.190	0.189			
1940–1949									
Mean log wage			4.759	4.541	5.858	5.576		−0.218	−0.282
Std error			(0.001)	(0.004)	(0.002)	(0.003)		(0.005)	(0.003)
Share			0.311	0.318	0.281	0.279			

TABLE I
(CONTINUED)

Cohort:	1960 Whites	1960 Blacks	1970 Whites	1970 Blacks	1980 Whites	1980 Blacks	Log wage differential Black − White 1960	1970	1980
1950–1959									
Mean log wage					5.416	5.213			−0.203
Std error					(0.001)	(0.003)			(0.003)
Share					0.353	0.385			
All age 21–60									
Mean log wage	4.564	4.085	5.041	4.652	5.732	5.439	−0.480	−0.388	−0.293
Std error	(0.001)	(0.003)	(0.001)	(0.002)	(0.001)	(0.002)	(0.003)	(0.003)	(0.002)
Mean wage	111.2	69.5	183.3	122.9	369.1	276.4			
Ratio of arithmetic Means of blacks/whites	0.624		0.671		0.749				

Notes. Based on tabulations of weekly earnings of men born in the 48 mainland states in Public-Use Extracts of the 1960, 1970, and 1980 Censuses. See Data Appendix for sample selection criteria. The entries in rows labeled "Share" give the relative size of the birth cohort among all men age 21–60 in the respective Census sample.

age 21–60 together with means for each ten-year birth cohort. The three right-hand columns contain estimated black-white wage gaps by cohort of birth and census year. Over all cohorts the mean log wage differential was -0.48 in 1960, -0.39 in 1970, and -0.29 in 1980. A similar trend is apparent in the ratio of average wage levels (in the bottom row of the table), which rose from 0.62 in 1960 to 0.67 in 1970, and 0.75 in 1980.

An analysis of the wage gaps in Table I suggests that much of the overall increase in black relative earnings between 1960 and 1980 came about through the replacement of older cohorts of workers by younger cohorts with smaller wage gaps. For example, between 1960 and 1970 the black-white wage gap for the 1910–1919 birth cohort fell only 1,.8 percent, while the gaps for the 1920–1929 and 1930–1939 cohorts actually increased slightly. However, the entry of the 1940–1949 cohort together with the exit of the 1900–1909 cohort reduced the overall wage gap by close to ten percentage points.

Changes in the wage gap between 1960 and 1980 are decomposed into within-cohort and between-cohort components in Table II. To understand this decomposition, write the overall wage gap between black and white workers in 1960, g_{60}, as a weighted average of the wage gaps for cohorts 1 (born 1900–1909), 2 (born 1910–1919), 3 (born 1920–1929), and 4 (born 1930–1939):

$$g_{60} = \alpha_{60}^1 g_{60}^1 + \alpha_{60}^2 g_{60}^2 + \alpha_{60}^3 g_{60}^3 + \alpha_{60}^4 g_{60}^4,$$

where α_{60}^c is the relative weight of cohort c in the labor force in 1960 (assumed to be equal for whites and blacks), and g_{60}^c is the relative

TABLE II
DECOMPOSITION OF THE CHANGE IN THE BLACK-WHITE RELATIVE WAGE GAP:
1960–1980

	1960 to 1970	1970 to 1980
1. Reduction in relative wage gap	0.091	0.095
2. Component attributable to change in wage gap of continuing cohorts	−0.002	0.025
3. Component attributable to replacement of oldest cohort with youngest cohort	0.055	0.058
4. Component attributable to reweighting of wage gaps for continuing cohorts	0.037	0.026
5. Residual component	0.001	−0.014

Note. The data are based on differences in log wages for men age 21–60 in the 1960, 1970, and 1980 Census. Cohorts are weighted by the relative size of the cohort in the combined workforce of black and white workers.

wage gap for cohort c in 1960.[4] Then the change in the wage gap between 1960 and 1970 is

$$(1) \quad g_{70} - g_{60} = \alpha_{60}^2 \cdot (g_{70}^2 - g_{60}^2) + \alpha_{60}^3 \cdot (g_{70}^3 - g_{60}^3)$$
$$+ \alpha_{60}^4 \cdot (g_{70}^4 - g_{60}^4) + \alpha_{60}^1 \cdot (g_{70}^5 - g_{60}^1)$$
$$+ (\alpha_{70}^2 - \alpha_{60}^2) \cdot (g_{70}^2 - g_{70}^5) + (\alpha_{70}^3 - \alpha_{60}^3) \cdot (g_{70}^3 - g_{70}^5)$$
$$+ (\alpha_{70}^4 - \alpha_{60}^4) \cdot (g_{70}^4 - g_{70}^5),$$

where g_{70}^5 refers to the wage gap for cohort 5 (born 1940–1949) in 1970. The first three terms of this decomposition represent the *within-cohort* changes in wage gaps for the three continuing cohorts. Between 1960 and 1970 these terms are trivial, yielding a net change in the overall wage gap of -0.002. Between 1970 and 1980, on the other hand, changes for two of the continuing cohorts are larger: 11 percent for the 1920–1929 cohort and 7.2 percent for the 1930–1939 cohort. These improvements were offset by an increase in the relative wage gap for the 1940–1949 cohort.

The next term in the decomposition captures the direct effect of replacing the oldest cohort (the 1900–1909 cohort in 1960, for example) with the youngest cohort. The effect is simply the weight of the oldest cohort in the base year, multiplied by the difference between the wage gap for the oldest cohort in the base year and the gap for the youngest cohort in the final year. This term contributes a 5.5 percent reduction in the average wage gap between 1960 and 1970, and a 5.8 percent reduction between 1970 and 1980.

The final three terms in the decomposition reflect the decreasing importance of older cohorts in later censuses. Between 1960 and 1970, for example, the relative weight of the 1910–1919 cohort declined by 0.063. This weight is shifted to the entering cohort: the net effect is the product of the change in weights for the cohort and the difference in wage gaps between the continuing cohort and the entering cohort. Reweighting of the continuing cohorts contributes a 3.7 point decline in the overall wage gap between 1960 and 1970, and a 2.6 percent decline in the overall gap between 1970 and 1980.

The results in Table II confirm that virtually all of the decline in the black-white wage gap between 1960 and 1970 was due to the entry of younger and larger cohorts (with substantially smaller wage gaps) and the exit of older and smaller cohorts (with

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4. Unless the age distributions of the white and black labor forces are identical, this equation is not strictly correct. As the population shares in Table I suggest, however, the age distributions are fairly similar. We use the age distribution of all workers (white and black) in Table II.

substantially higher wage gaps). Between 1970 and 1980, on the other hand, within-cohort changes among the two older cohorts of workers contributed about one quarter of the overall decline in the wage gap. Over the twenty-year period, within-cohort changes contributed 10 percent of the overall nineteen-point decline in the black-white relative wage gap.[5]

A. *The Importance of Southern-Born Workers for the Black-White Wage Gap*

Any explanation for the rise in relative earnings of later cohorts of black men must focus on improvements for Southern-born workers, simply because a large majority (over 80 percent) of blacks born between 1900 and 1960 were born in the South. The importance of changes among Southern-born men for the evolution of the overall wage gap is illustrated in Table III. The decomposition in this table uses the fact that the wage gap (g) for a particular cohort can be written as

$$g = \gamma^B(y_S^B - y^W) + (1 - \gamma_B) \cdot (y_N^B - y^W),$$

where γ^B represents the fraction of black workers born in the South, y^W represents the mean log wage of white workers, and y_S^B and y_N^B represent the means of log wages for blacks born inside and outside the South, respectively. If the fraction of blacks born in the South is approximately constant, then the *change* in the relative wage gap between any two cohorts, Δg, can be written as

$$(2) \qquad \Delta g = \gamma^B(\Delta y_S^B - \Delta y^W) + (1 - \gamma_B) \cdot (\Delta y_N^B - \Delta y^W),$$

where Δy^W is the intercohort change in the mean log wage for white workers, and Δy_S^B and Δy_N^B are the corresponding changes for blacks born inside and outside the South. The first of these terms measures the change in the overall wage gap attributable to the relative earnings growth of Southern-born blacks, while the second measures the change attributable to the relative earnings growth of non-Southern-born blacks. Intercohort changes in the regional distribution of black births add a third "residual" component to this breakdown.

The first column of Table III compares the wage gap of the

TABLE III
CONTRIBUTION OF REGION OF BIRTH TO INTERCOHORT DIFFERENCES IN THE BLACK-WHITE WAGE GAP

	1930 cohort–1920 cohort		1940 cohort–1930 cohort	
	1930 cohort in 1970–1920 cohort in 1960	1930 cohort in 1980–1920 cohort in 1970	1940 cohort in 1970–1930 cohort in 1960	1940 cohort in 1980–1930 cohort in 1970
1. Intercohort difference in wage gap	0.082	0.139	0.161	0.134
2. Fraction blacks born in South (base cohort)	0.837	0.795	0.808	0.778
Wage growth relative to whites:				
3. Southern-born blacks	0.072	0.157	0.156	0.156
4. Non-Southern-born blacks	0.044	0.068	0.109	0.037
Intercohort change attributable to:				
5. Wage growth of Southern-born blacks	0.060	0.125	0.126	0.122
6. Wage growth of non-Southern-born blacks	0.007	0.014	0.021	0.008
7. Residual effects	0.015	0.000	0.014	0.004
Proportion of intercohort change attributable to Southern-born:				
8. Total Southern-born effect (Row 3/Row 1)	0.733	0.901	0.781	0.908
-Component due to narrowing of Southern-born wage gap	0.633	0.641	0.602	0.604
-Component due to relative wage growth of Southern-born whites	0.079	0.247	0.186	0.316

Notes. See equation (2) of text for decomposition. Wage gaps and changes are measured as differences in mean log wages. Black wage growth in rows 3 and 4 is measured relative to all (Northern and Southern-born) whites.

1930–1939 cohort (measured in 1970) with that of the 1920–1929 cohort (measured in 1960). The entry in row 1 shows that the black-white wage gap was 8.2 percent lower for the 1930–1939 cohort than for the 1920–1929 cohort at a similar point in their lifecycle. The entry in row 3 shows that 7.2 percentage points of this change is due to the relative earnings gains of Southern-born blacks. The share of this "Southern-born effect" in the total intercohort change is reported in row 8. An alternative comparison of the same two cohorts is presented in the second column of Table III, using data from the 1970 Census to measure the wage gap for the 1920–1929 cohort, and data from the 1980 Census to measure the wage gap for the 1930–1939 cohort. The intercohort gap is larger in the later comparison, as is the share of the change attributable to relative earnings growth for Southern-born black workers.

The relative contribution of Southern-born blacks can be further decomposed by noting that

$$\Delta y^W = \Delta y_S^W + (1 - \gamma^W) \cdot (\Delta y_N^W - \Delta y_S^W),$$

where γ^W is the fraction of whites born in the South and ΔY_N^W and ΔY_S^W represent the intercohort changes in mean log wages for Northern-born and Southern-born whites. Thus,

$$\gamma^B(\Delta y_S^B - \Delta y^W) = \gamma^B \Delta g_S + \gamma^B(1 - \gamma^W) \cdot (\Delta y_S^W - \Delta y_N^W),$$

where Δg_S is the intercohort change in the black-white wage gap among Southern-born men. The overall Southern-born effect reflects both the change in the wage gap among Southern-born workers (weighted by γ^B) and the earnings growth of Southern-born whites relative to Northern-born whites (weighted by $\gamma^B(1 - \gamma^W)$). The shares of these two components in the overall intercohort relative wage change are reported in the bottom two rows of Table III. Changes in the wage gap among Southern-born workers account for 60 percent of the intercohort change in black-white relative wages. Increases in the earnings of Southern-born whites relative to whites born elsewhere in the United States account for an additional 8–25 percent of the intercohort change.

The third and fourth columns of Table III present similar decompositions of the change in the black-white wage gap between the 1930–1939 birth cohort and the 1940–1949 birth cohort. Again, over 70 percent of the growth in the relative earnings of black workers is attributable to the earnings gains of Southern-born blacks, with most of this reflecting the narrowing of the wage

gap for Southern-born workers. In view of this fact, we turn next to a decomposition of changes in the black-white wage gap for Southern-born men.

Consider a linear regression model that expresses the logarithm of weekly earnings (y) as a function of a vector of characteristics X (education, potential experience, the square of potential experience, and indicator variables for marital status, residence in the different Census regions, and residence in an SMSA) and a person-specific error term:

$$y = X\beta + \epsilon.$$

We have estimated the coefficients β by race and cohort of birth for Southern-born whites and blacks in the 1960, 1970, and 1980 Censuses. We can then write the black-white relative wage gap for a particular age group in 1960 as

$$g_{60} = X_{60}^B \beta_{60}^B - X_{60}^W \beta_{60}^W,$$

where X_{60}^B represents the mean of the X vector for blacks in 1960 and β_{60}^B represents the vector of estimated regression coefficients for blacks in 1960. The intercohort change in the wage gap for this age group between 1960 and 1970 is

$$(3) \quad g_{70} - g_{60} = (X_{70}^B - X_{60}^B)\beta_{60}^B + (\beta_{70}^B - \beta_{60}^B)X_{70}^B$$
$$- (X_{70}^W - X_{60}^W)\beta_{60}^W - (\beta_{70}^W - \beta_{60}^W)X_{70}^W.$$

This change consists of the change in the mean characteristics for blacks (multiplied by the base-period regression coefficients for blacks); the change in the regression coefficients for blacks (multiplied by the end-period mean characteristics); and two analogous terms for whites.

Table IV presents the portions of each component of this decomposition attributable to education.[6] The second and third rows of the table present the effects of changes in the mean levels of schooling for blacks and whites, respectively, between the initial and ending years. The fourth row of the table sums these two components, giving the total change in the relative wage gap attributable to changes in the relative levels of education for the two groups. In most cases the sum is small or negative. There are two reasons for this. First, mean years of education rose quickly for both blacks *and* whites, implying only modest relative gains for

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6. Appendix 2 reports cohort-specific measures of relative earnings, schooling, and rates of return to schooling for whites and blacks born in the South.

TABLE IV

CONTRIBUTION OF EDUCATION TO CHANGES IN THE BLACK-WHITE WAGE DIFFERENTIAL AMONG SOUTHERN-BORN MEN

	1960 to 1970				1970 to 1980			
Age group:	21–30	31–40	41–50	51–60	21–30	31–40	41–50	51–60
1. Actual change in wage gap	0.120	0.062	0.007	0.000	0.007	0.104	0.112	0.079
Contribution of changes in years of schooling								
2. Change in Blk. educ × return in base year	0.101	0.083	0.054	0.025	0.096	0.121	0.087	0.066
3. Change in Wht. educ × return in base year	−0.094	−0.079	−0.071	−0.063	−0.062	−0.112	−0.086	−0.075
4. Subtotal	0.007	0.004	−0.017	−0.038	0.034	0.009	0.001	−0.009
Contribution of changes in return to schooling								
5. Change in Blk. return × educ in final year	0.237	0.155	0.074	0.084	0.005	0.145	0.150	0.021
6. Change in Wht. return × educ in final year	−0.054	−0.083	−0.049	0.002	0.318	−0.036	0.001	0.071
7. Subtotal	0.183	0.072	0.025	0.086	0.323	0.109	0.151	0.092
8. Total change attributable to education	0.190	0.076	0.008	0.048	0.357	0.118	0.152	0.082

Notes. See text for decomposition. The calculations in the first column, for example, are based on a comparison of individuals born during 1930–1939 in 1960 with those born during 1940–1949 in 1970. Returns to schooling are obtained from a linear regression of log weekly wages on schooling, experience and its square, and indicator variables for marital status, residence in an SMSA, and residence in each of four Census regions.

blacks. Second, the coefficients associated with schooling are typically lower for blacks, implying a smaller wage gain, other things equal.

By comparison, changes in the relative return to education can in principle account for *all* of the intercohort decline in the relative wage gap. The effects of changes in the returns to education for black and white workers are presented in the fifth and sixth rows of the table, respectively, and the sum of these two components is presented in row 7. In every column of the table, the effect of changes in the relative return to education is larger than the total change in the relative wage gap.[7]

These findings parallel the results presented by Smith and Welch [1989] for all black and white workers. Regardless of how the decompositions are weighted, virtually all of the intercohort changes in the black-white wage gap can be explained by increases in the relative return to education for blacks. Notice, however, that the increasing relative returns in Table IV may reflect either cohort or year effects, since the comparisons are drawn across Censuses. In fact, the analysis in Section III below suggests that an important component of the increased relative return to education for blacks between 1970 and 1980 is attributable to an economywide time effect, rather than a cohort-specific effect.

Last, it is worth pointing out that increases in the return to education for Southern-born blacks occurred relative to both Southern-born whites and Northern-born blacks. This fact is illustrated in Table V, which uses data from the 1980 Census to estimate rates of return for black and white workers by race, cohort of birth, Southern-born status, and region of residence.[8] The bottom rows of the table give the intercohort differences in the rates of return to education between the 1920–1929 birth cohort and the 1940–1949 birth cohort as of 1980.

Looking across the columns of the table, it is clear that rates of return to education vary by region of residence. As noted by Chiswick [1974] and Smith and Welch [1989], rates of return to education are generally higher in the South and lower in the North-Central region. However, a comparison of Southern-born

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7. Between 1970 and 1980 the return to education for white workers in the 21–30 age group fell dramatically, while the return to education for black workers was roughly constant. However, the change for whites was counteracted by a corresponding *increase* in the coefficient associated with the linear experience term.
    8. These rates of return are estimated from linear regressions that contain the same control variables as used in the regressions underlying Table IV. Similar results are found for 1960 and 1970.

TABLE V
RATES OF RETURN TO SCHOOLING BY REGION OF RESIDENCE AND REGION OF BIRTH
IN 1980 (ESTIMATED STANDARD ERRORS IN PARENTHESES)

	Blacks				Whites			
	Region of residence:				Region of residence:			
Region of birth:	North Central	South	West	North East	North Central	South	West	North East
1920–1929 cohort								
Southern-born	1.97	3.81	2.86	3.09	4.09	5.30	3.27	6.67
	(0.32)	(0.21)	(0.46)	(0.36)	(0.29)	(0.15)	(0.33)	(0.53)
Non-Southern born	4.88	7.91	5.60	5.22	4.91	6.74	4.18	6.28
	(0.55)	(0.85)	(1.00)	(0.56)	(0.15)	(0.27)	(0.19)	(0.16)
1930–1939 cohort								
Southern-born	4.24	5.75	5.36	4.45	5.14	6.69	5.40	7.62
	(0.32)	(0.19)	(0.43)	(0.35)	(0.28)	(0.14)	(0.34)	(0.64)
Non-Southern born	5.47	5.65	6.24	6.60	6.04	9.02	6.15	7.97
	(0.50)	(0.80)	(0.80)	(0.50)	(0.15)	(0.25)	(0.18)	(0.16)
1940–1949 cohort								
Southern-born	6.09	7.69	7.65	6.41	6.42	7.99	7.35	8.39
	(0.33)	(0.18)	(0.47)	(0.38)	(0.33)	(0.15)	(0.37)	(0.57)
Non-Southern born	6.86	9.49	7.13	7.96	6.85	10.00	7.24	8.43
	(0.42)	(0.63)	(0.59)	(0.43)	(0.15)	(0.24)	(0.18)	(0.15)
Change in rate of return 1940–1949 cohort—1920–1929 cohort								
Southern-born	4.12	3.88	4.79	3.32	2.33	2.69	4.08	1.72
	(0.46)	(0.28)	(0.66)	(0.52)	(0.44)	(0.21)	(0.50)	(0.78)
Non-Southern born	1.98	1.58	1.53	2.74	1.94	3.26	3.06	2.15
	(0.69)	(1.06)	(1.16)	(0.71)	(0.21)	(0.36)	(0.26)	(0.22)

Notes. Entries in table are rates of return to education (times 100) from linear regressions of log weekly earnings on potential experience and its square, indicators for residence in an SMSA and being married, region-of-residence indicators (for three major regions), and interactions of years of completed education with four region-of-residence indicators. Regressions are estimated separately for each cohort of birth and for Southern or non-Southern region-of-birth.

and non-Southern-born men living in the *same* region shows that Southern-born men from earlier birth cohorts earned systematically lower rates of return to education. For blacks the difference in returns between Southern-born and non-Southern born men in the 1920–1929 cohort is two–four percentage points. For whites in the same cohort the gap is a point or less. For the 1940–1949 cohort the gap in returns between Southern-born and non-Southern-born blacks is only about one percentage point, while the gap for whites averages about 0.5 percentage points. Thus, there were substantial increases in the return to education for later cohorts of Southern-born blacks relative to both Southern-born whites and non-

Southern-born blacks. The relative rise in the return to schooling for Southern-born blacks over their Northern-born counterparts suggests that the higher returns were not simply a consequence of antidiscrimination policies. Rather, we believe that the changes reflect an increase in the market value of a Southern education for black workers. To explain this increase, we turn to data on the quality of schools available to Southern-born men.

II. Two Kinds of Schools

We have collected state-level data by race on three aspects of school quality: the ratio of students to teachers, average term length, and average annual teacher salaries. These data pertain to grades K–12 in public schools and cover the period from 1915 to 1966.[9] Data by race in this time period are only available for seventeen Southern and border states and the District of Columbia.[10] Nevertheless, the analysis in the previous section suggests that individuals born in these states, who comprise more than 80 percent of blacks born in the United States, form a critical group for understanding the narrowing of the black-white earnings gap.

Several sources were canvassed to derive the final compilation of school quality data. Most of the data from 1915 through 1920 are taken from either state reports of education or the U. S. Office of Education's *Biennial Survey of Education.* Unfortunately, these sources are incomplete, and several states lack data on term length or teacher pay before 1920. Between 1922 and 1954, most of the data are available in the *Biennial Survey of Education.*[11] Missing data were supplemented by the state education reports, whenever possible.[12]

9. Starting in 1918, the data are available biennially. As noted in Anderson [1988], many counties in the deep South did not provide public high schools for black students until the mid-1920s: thus, our quality indicators, which pertain to publicly supported schools, may be mismeasured for higher-educated blacks born before 1915.

10. The eighteen states with available data are Alabama, Arkansas, Delaware, D. C., Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, Missouri, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia, and West Virginia. With the exception of Missouri these states comprise the Southern region as defined by the Bureau of the Census.

11. Data for some years are taken from periodic reports on black and white schools compiled by the Office of Education, e.g., Blose and Caliver [1936]. A complete catalog of the sources used to collect the school quality data is available from the authors on request.

12. There is some reason for concern about the accuracy of the data in the early part of our sample. We have tried to eliminate obvious errors in individual reports and have cross-checked the data whenever possible. We have also compared reported teacher salaries with mean annual earnings by state and race for teachers

After the *Brown v. Board of Education* decision in 1954, the federal government and most states ceased publication of schooling data by race. Despite the *Brown* decision, however, most Southern states continued to operate segregated schools until well into the 1960s. The table below shows the percent of Southern-born blacks (men and women) who attended all-black schools, by birth cohort and level of schooling, based on retrospective responses in two household surveys.[13] The fraction of Southern-born black students attending all-black schools was remarkably stable at approximately 90 percent for cohorts born before 1949.

	Birth cohort:						
	1900–1909	1910–1919	1920–1929	1930–1939	1940–1949	1950–1959	1960–1969
Survey: National Survey of Black Americans (sample size = 1,536)							
1. Grade school	93.5	98.3	95.7	96.1	93.4	77.8	47.8
2. Junior high	90.6	92.6	93.3	94.3	90.0	48.4	18.2
3. High school	93.6	92.3	90.7	88.8	85.7	29.9	11.5
4. Any school	94.2	98.9	96.7	96.6	94.6	79.2	50.7
Survey: General Social Survey (sample size = 305)							
5. High school	88.0	93.9	89.1	90.2	80.8	23.4	9.5

In light of this fact we have used data on the numbers of black and white students and teachers in each state, along with average salaries by race, to estimate relative school quality for 1955–1966.[14] These data are derived from annual reports issued by the Southern Education Reporting Service (SERS), a civil rights monitoring group set up by a board of Southern newspaper editors after the

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in the 1940, 1950, and 1960 Censuses, and found very high correlations between the two series (e.g., 0.95 in 1940).
    13. The estimates in the table are based on data from the National Survey of Black Americans (NSBA) and the General Social Survey (GSS). The NSBA survey is described in Jackson and Gurin [1987], and the GSS survey is described in Davis and Smith [1990]. These tabulations are based on Southern-born men with the relevant level of schooling.
    14. In the later years of our sample, some border states show substantial levels of racial integration. In these cases we have assigned white and black schools the same (overall) quality averages. Some states, including Mississippi and Louisiana, continued to publish school data by race until the mid-1960s. Whenever possible, we have used data from the state reports. Term lengths for black and white students were essentially equal by 1954; so we use the overall term length figures for whites and blacks.

Brown decision.[15] SERS obtained data on white and black enroll-
ment, teacher salaries, and numbers of teachers directly from the
state education agencies. Although there are some gaps in the
available data, we have been able to assemble a complete series on
the pupil-teacher ratio by state and race, and fairly complete series
on teacher pay for states other than Missouri, Kentucky, and
Tennessee.

Figure I shows the relative ratios of the three school quality
variables in the white and black schools of the South from 1915 to
1966.[16] Inspection of the relative school quality data suggests three
conclusions. First, during most of the twentieth century the
quality of education for black students lagged far behind that for
whites. As recently as 1940 pupil-teacher ratios were 25 percent
higher in black schools, the average term length was 10 percent
shorter in the black schools, and average annual salaries were 45
percent lower for black teachers.

Second, there were notable gains in the relative quality of
black schools during this century. The convergence in black-white
school quality began well before the 1954 *Brown v. Board of
Education* decision, and in fact, there is little evidence of a break in
the series around the time of the desegregation order.[17] The gap in
pupil-teacher ratios between black and white schools, for example,
fell in almost every year of our sample period. In 1915 the average
pupil-teacher ratio in Southern black schools was 61, compared
with 38 in white schools. By 1966 the pupil-teacher ratio was 26 for
black students and 24 for white students. The difference in term
lengths between black and white schools and the gap in salaries
between black and white teachers were virtually eliminated by the
mid-1950s.

Third, as noted by Smith [1984], the rate of improvement in
the relative quality of black schools varied from decade to decade.
During the first ten years of our sample period (1915–1925), black
relative teacher salaries and pupil-teacher ratios showed substan-
tial gains. Relative conditions for black pupils showed compara-
tively little change in the late 1920s and early 1930s. After 1932

15. Data for 1955–1957 are reported in SERS [1959]. Data for later years
appear in various issues of "Status of School Segregation and Desegregation in the
Southern and Border States."
16. The underlying state-level data are weighted by enrollments to obtain the
overall averages used in Figure I.
17. There is a noticeable break in the relative teacher wage series for
Mississippi in 1955. For other states, however, there is little indication of a trend
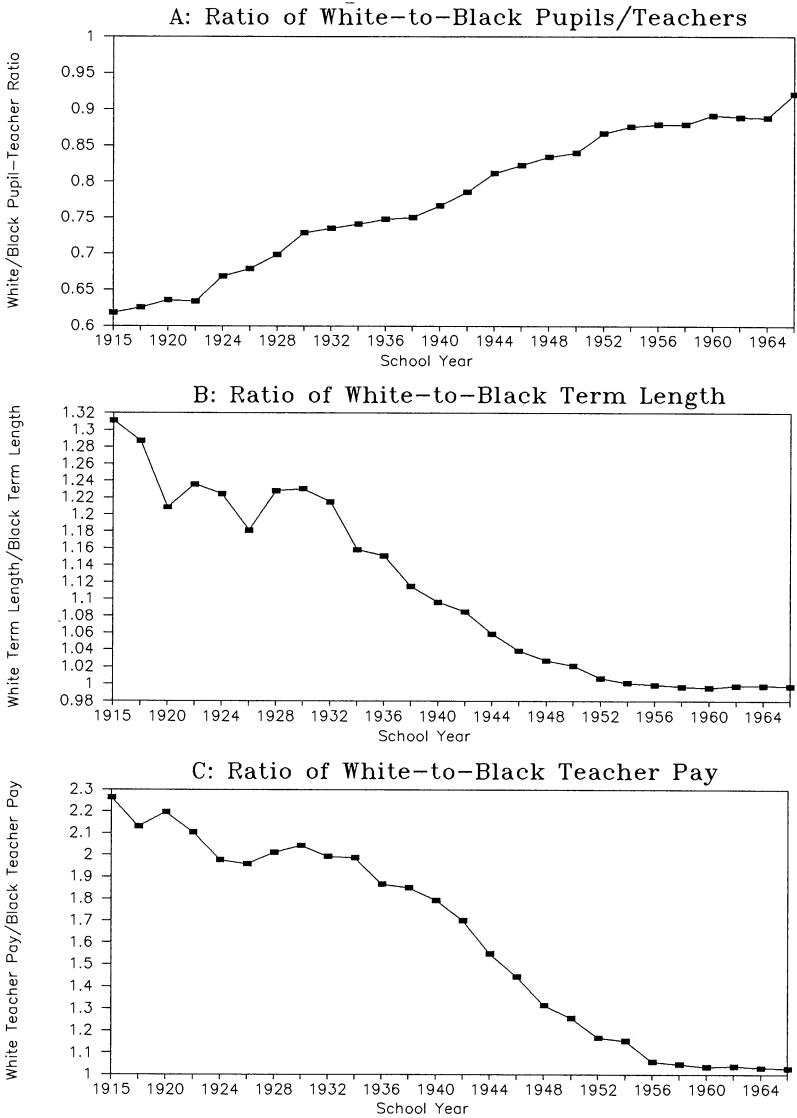shift after 1954.

A: Ratio of White–to–Black Pupils/Teachers

B: Ratio of White–to–Black Term Length

C: Ratio of White–to–Black Teacher Pay

FIGURE I
Relative School Quality in Eighteen Segregated States, 1915–1966

there was a marked acceleration in the rate of convergence of teacher salaries and the length of the school term.[18]

A. Interstate Differences in Relative Black-White School Quality

The aggregate data in Figure I mask wide differences across the Southern states in the relative quality of black schools, and in the timing of changes in the relative quality of black education. Interstate differences in relative school quality were especially large in the early part of the twentieth century. In 1920, for example, pupil-teacher ratios in the black schools of Mississippi were twice as high as those in the white schools. In Kentucky, Missouri, West Virginia, and Washington, D.C., pupil-teacher ratios were comparable for white and black students. Similarly, black-white relative term lengths ranged from 0.55 in South Carolina to 1.0 in many border states. Perhaps most dramatically, the ratio of black to white teacher salaries ranged from one third in Mississippi and South Carolina to one in West Virginia and Washington, D.C.[19]

A key determinant of the relative quality of black schools in a state was the fraction of blacks in the population. Throughout most of our sample period black schools had more meager resources (both in absolute terms and relative to white schools) in states with a higher fraction of blacks.[20] This relationship is illustrated in Figure II, which graphs the relative pupil-teacher ratio in the white and black schools in each state in 1920 against the fraction of blacks in the 1920 Census. Over 70 percent of the interstate variation in the relative quality of black schools is accounted for by the relative size of the black population.

States also differed in the timing of relative improvements in the quality of black schools. In the border states the NAACP's legal campaign against unequal salaries for black teachers led to rapid

18. It should be stressed that other dimensions of relative school quality may have lagged behind the measures that we concentrate on. Bond [1934, pp. 151–71] notes that expenditures on schoolhouses, equipment, and school buses for white students rose very quickly in the early 1930s, while similar expenditures for black students lagged.

19. West Virginia and Washington, D. C. were unusual for the quality of schools provided to blacks early in the twentieth century. The unique circumstances of the federal district (including the availability of federal funds) clearly affected the situation in D. C. See United States Commissioner of Education [1871, reprinted 1969] for a detailed survey of black schools in D. C. on the eve of the Civil War.

20. The same relationship was true across different counties within the Southern states: see Bond [1934, pp. 238–45] and Margo [1990, p. 40].
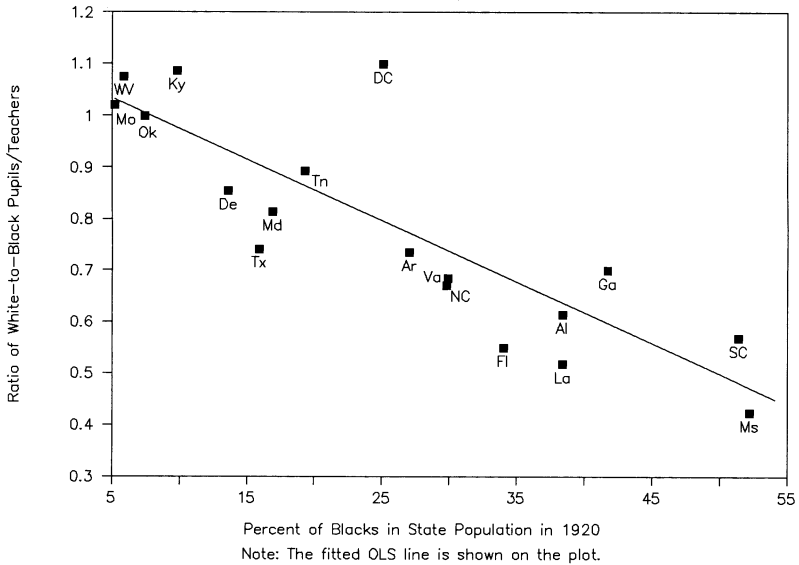
FIGURE II
White-Black Pupil-Teacher Ratio versus Percent of Blacks in State Population
in 1920

wage increases in the late 1930s and early 1940s.[21] Similar changes
followed more than a decade later in the deep-Southern states,
spurred by expanding legal pressure and the hope that more equal
school expenditures might forestall a Supreme Court challenge to
the segregated school systems.[22]

Some indication of the differences in timing of relative improve-
ments in black school quality is provided in Figure III. This figure
shows pupil-teacher ratios for the black and white schools in two
groups of states: those with over 30 percent black population in the
1920 Census, and those with less.[23] Throughout most of the
1915–1966 period, the two groups of states had very similar
pupil-teacher ratios in the white schools. In states with a higher

21. The NAACP campaign was launched in 1934. In anticipation of a more
favorable judicial reception in the border states, the first of these lawsuits were filed
in Maryland and Virginia. See Bullock [1967] and Margo [1990, Ch. 4].
22. See, for example, the discussions by Griffith [1969, pp. 658–59] and Kirk
[1969, p. 1129] of legislative actions in Mississippi and South Carolina to improve
black schools in the early 1950s.
23. The states with over 30 percent black population in 1920 are Alabama,
Florida, Georgia, Louisiana, Mississippi, and South Carolina.
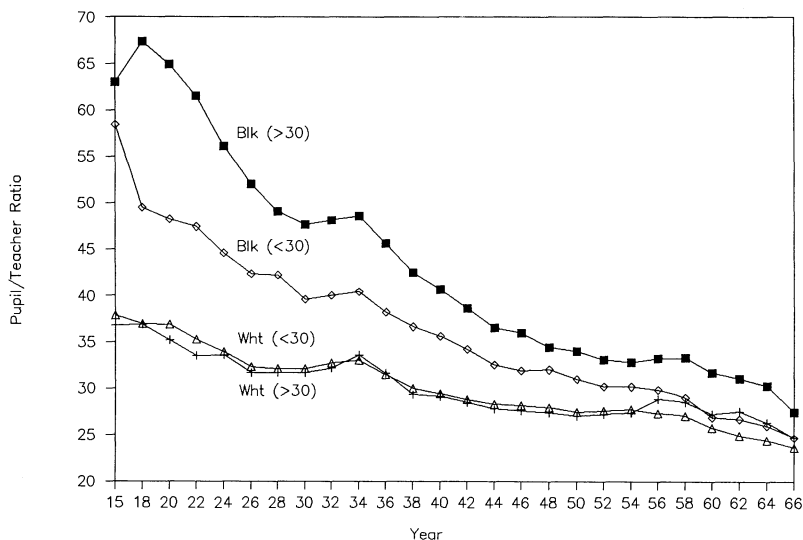
FIGURE III
Pupil-Teacher Ratio in Black and White Schools by Proportion of Blacks in State
Population
The figures in parentheses indicate whether the proportion of blacks in the
state in 1920 was more than or less than 30 percent.

concentration of blacks, however, pupil-teacher ratios for black students were uniformly higher. Only in the late 1950s did pupil-teacher ratios in the black schools of Alabama, Mississippi, and South Carolina reach levels achieved in the white schools in the 1920s.

A particularly revealing comparison is between South Carolina and North Carolina. Data on pupil-teacher ratios for these two states are plotted in Figure IV.[24] Despite their geographic proximity, the Carolinas had very different policies regarding black education. Whereas North Carolina was among the most progressive of the nonborder Southern states vis-à-vis black schooling; South Carolina was among the least progressive.[25] At the beginning

24. Data in these figures were extended back to 1901 using information from the North Carolina and South Carolina State Reports of Education.
25. See, for example, Harlan [1958]. This difference is perhaps partially a reflection of the higher fraction of blacks in South Carolina (58 percent in 1900 versus 33 percent in North Carolina), which itself is a legacy of the greater use of slave labor in cotton than tobacco farming (see Fogel and Engerman [1974], pp. 44–45).
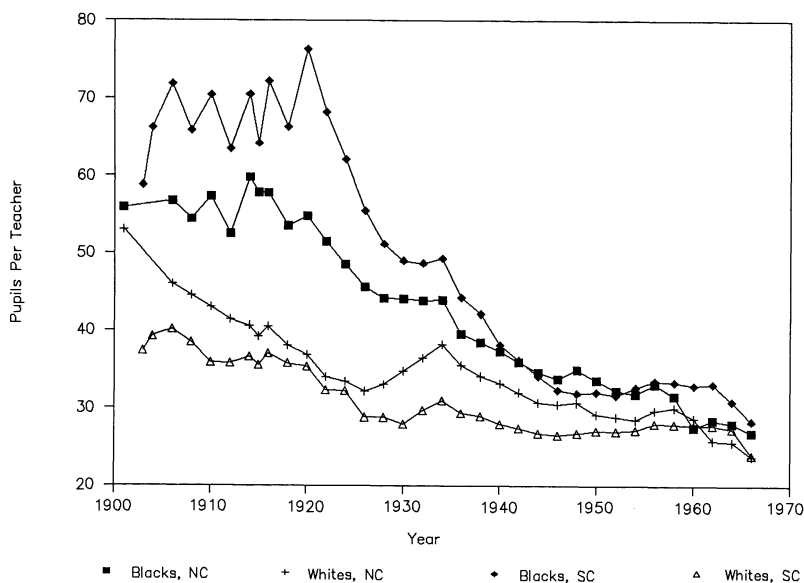
FIGURE IV
Pupil-Teacher Ratio by Race, North Carolina versus South Carolina

of our sample period, the quality of black schools in South Carolina ranked near the bottom of the entire country. On the other hand, schools for whites were actually better in South Carolina than in many Southern states, including North Carolina. This pattern provides a natural comparison that is explored below.

The schooling data presented so far pertain to individual school years. In the next section we examine rates of return to schooling for men born in ten-year cohorts. Consequently, we need to construct average quality measures for individuals born during a particular decade in a particular state. Our method is to assign to each individual an average of the quality variables during the time he attended school, assuming that each child began his schooling at age six and attended continuously for as many years as his completed education (up to twelve). We then take averages of the quality variables across individuals in a given cohort from a given state. This procedure abstracts from such important consider-ations as repeated grades and delayed age of school entry. Neverthe-less, averaging the school inputs in this way tends to smooth any short-term fluctuations in the school quality variables. In fact, the

average assigned to a particular cohort is a weighted average of twenty years of school quality data.[26]

School quality measures for men born in the 1910s, 1920s, 1930s, and 1940s are reported in Appendix 3. As expected, Appendix 3 shows considerable variation in the levels of the school quality variables across states, and in the rate at which the gap between black and white school quality was reduced. This variation provides the basis for our analysis of school quality effects in the closing of the black-white wage gap.

III. SCHOOL QUALITY AND THE RETURN TO EDUCATION

How much of the improved economic position of black workers can be explained by advances in relative school quality? In light of the evidence in Section I relating the earnings gains of black workers to relative increases in the rate of return to education, we provide a first answer to this question by analyzing the connection between school quality and returns to education. We estimate rates of return to education by state of birth and cohort from a simple log-linear regression that includes interactions between state of birth and years of completed education. Specifically, we estimate the following wage equation separately by race, Census year, and ten-year birth cohort:

$$(4) \qquad y_{ijs} = \rho_s E_{ijs} + X_{ijs}\beta + \alpha_j + \mu_s + \epsilon_{ijs},$$

where y_{ijs} is the logarithm of the weekly wage earned by individual i living in state j and born in state s, E_{ijs} represents years of education of individual i, ρ_s is the return to education for workers born in state s, X_{ijs} is a vector consisting of potential labor market experience and its square and a current marital status dummy, α_j is a state-of-residence effect, μ_s is a state-of-birth effect, and ϵ_{ijs} is stochastic error term.[27] The equation is estimated separately for

26. We use state-of-birth and cohort-specific distributions of completed education among workers in the 1970 Census to form these weighted averages. In much of the analysis in Section III, we limit the sample to individuals who were born in the South and moved North. Here we use distributions of completed education among workers who are observed in the relevant labor markets in 1970. The state-level quality averages differ very little between the entire sample of Southern-born workers and the subsample of Northern migrants.

27. In other work [Card and Krueger, 1990] we have noted that the return to education is virtually zero until the grade attained by the second percentile of the education distribution, and is linear thereafter. Equation (4) ignores this nonlinearity. Nevertheless, the specification is approximately correct given the low levels of educational attainment among the cohorts of Southern-born men analyzed here.

the 1910–1919, 1920–1929, and 1930–1939 cohorts using data from the 1960 Census, for the 1910–1929, 1920–1929, 1930–1939, and 1940–1949 cohorts using data from the 1970 Census, and for the 1920–1929, 1930–1939, and 1940–1949 cohorts using data from the 1980 Census.[28] These samples yield a set of 360 estimated rates of return to education for eighteen states of birth, two race groups, and five cohorts in three Censuses.

An important feature of our analysis is that the returns to education are estimated for the subset of Southern-born men living in the metropolitan areas of nine Northern states (Illinois, Michigan, Indiana, Wisconsin, Ohio, Pennsylvania, New York, New Jersey, California). Together, residents of metropolitan areas in these states account for 30 percent of all Southern-born blacks, and 83 percent of all Southern-born blacks living outside the South.[29] There are two important advantages to analyzing returns to education for Southern-born workers who have moved to the North. First, we abstract from any changes over time in discrimination against better-educated black workers in the South (although we still capture any similar changes that occurred in the North). Second, as noted in Table V, returns to education vary across regions, and particularly between the South and the rest of the country. By limiting the sample to individuals in Northern metropolitan areas, we eliminate most of this regional variation.[30]

In the second step of our analysis, we relate the percentage return to education for each cohort-race-state-year cell to the quality of education received by men born in the corresponding cohort, state, and race group. Specifically, we estimate

$$(5) \qquad \rho^c_{str} = bQ^c_{sr} + a^c_r + u_s + v_{tr},$$

where ρ^c_{str} is the estimated return to education (times 100) for individuals in race group r born in cohort c and state s, measured in year t ($t = 1960, 1970, 1980$), and Q^c_{sr} is a measure of average school

28. The sample restrictions imposed on individuals with allocated data or extreme values of wages described in Appendix 1 are also employed here.
29. These percentages are calculated for black men born 1910–1949, as of 1970. The sample sizes are presented in Appendix 1.
30. On the other hand, we are aware that an objection could be raised that migrants are a nonrandom sample. Any bias from this nonrandomness must stem from a correlation between the propensity to migrate, unobserved school quality, and measured school quality in the state. Most research suggests that Southern out-migrants were better educated than nonmigrants (e.g., Margo [1990]). Thus, the most likely scenario would imply a downward bias in the estimated effect of school quality because, given a fixed school quality threshold for migration, the unobserved component of school quality for individuals in our sample will be negatively correlated with measured school quality in the state.

quality for this race-cohort-state group. We include race-specific cohort effects (a_r^c) as well as state effects (u_s) and race-specific year effects (v_{tr}).[31] Differences between the cohort effects for blacks and whites measure the black-white gap in the return to education. Similarly, the difference-in-differences of the black and white cohort effects between earlier and later cohorts measures the intercohort convergence in black-white returns. A comparison of this difference-in-differences with and without the school quality variables included in the regression indicates how much of the intercohort convergence in black-white relative returns can be explained by changes in school quality.

The specification of equation (5) assumes that each worker is educated in his state of birth. Although this is not always the case, we believe that it is not a bad approximation. To check this, we used microdata from the 1940 Census to calculate the probability that five–fifteen year-old children were living in their state of birth. The estimates show that over 90 percent of school-age children in 1940 were living in the state where they were born. We also used information from the National Survey of Black Americans to compare respondents' state of birth with the state where they grew up.[32] For blacks born between 1900 and 1949, 82 percent report they grew up in their state of birth.[33] On the basis of these results we conclude that education quality in an individual's state of birth is a reasonable indicator of true education quality.[34]

A. *The Returns to Education by Race*

Table VI illustrates the wide variation across states in the rates of return to education for black and white men. The rates of return are pooled estimates for cohorts born in the South between

31. Notice that some of the parameters in the model could be freed up even further. For example, the state fixed effects could be allowed to differ by race. When we relax these restrictions, however, none of the main conclusions of the paper is altered.

32. The survey asks respondents to identify the place they lived the most between age six and sixteen; we use this as a measure of where they grew up.

33. Although the sample size is relatively small, we also computed the fraction of Southern-born blacks observed living in the North at the time of the survey who report that they grew up in their state of birth. This fraction is 68 percent for individuals born between 1900 and 1949.

34. Assigning an individual the school quality in his state of birth leads to estimated state-specific returns that are weighted averages of the returns to education in the various states where an individual actually attended school, with weights equal to the probabilities of attending school in a state conditional on the state of birth. This then leads to a downward measurement-error bias in the estimated quality effects in the second-stage regression. Our analysis of returns to education for white men [Card and Krueger, 1992] suggests that the bias is on the order of 10 percent.

TABLE VI
PERCENTAGE RETURN TO EDUCATION BY STATE OF BIRTH FOR MEN LIVING IN
METROPOLITAN AREAS OF NINE STATES (STANDARD ERRORS IN PARENTHESES)

State of birth:	Whites (1)	Blacks (2)	Difference (1) − (2)
Louisiana	5.72	2.65	3.07
	(0.69)	(0.54)	(0.88)
Mississippi	6.44	2.80	3.64
	(0.66)	(0.38)	(0.77)
South Carolina	6.55	2.07	4.47
	(0.88)	(0.46)	(0.99)
Georgia	7.19	2.68	4.51
	(0.61)	(0.41)	(0.74)
Alabama	6.24	2.69	3.55
	(0.51)	(0.40)	(0.65)
Arkansas	5.32	3.72	1.60
	(0.41)	(0.56)	(0.70)
Texas	6.47	3.71	2.76
	(0.25)	(0.59)	(0.64)
North Carolina	6.03	4.01	2.02
	(0.55)	(0.49)	(0.74)
Virginia	6.42	4.40	2.02
	(0.46)	(0.55)	(0.72)
Florida	5.22	3.23	2.00
	(0.80)	(0.90)	(1.20)
Oklahoma	5.49	6.61	−1.13
	(0.35)	(1.27)	(1.31)
Tennessee	4.55	3.16	1.39
	(0.35)	(0.61)	(0.70)
Maryland	7.33	5.11	2.22
	(0.61)	(1.18)	(1.33)
Delaware	7.96	5.64	2.31
	(1.37)	(4.12)	(4.34)
West Virginia	5.91	6.40	−0.49
	(0.35)	(1.37)	(1.41)
Kentucky	4.99	3.28	1.71
	(0.26)	(0.92)	(0.95)
Missouri	6.21	7.17	−0.96
	(0.31)	(1.24)	(1.28)
D.C.	7.19	6.71	0.49
	(1.11)	(3.09)	(3.28)

Note. Entries in columns (1) and (2) are coefficients of education (times 100) from a regression of log weekly wages on education, potential experience and its square, an indicator for marital status, nine state-of-residence dummies, and eighteen state-of-birth dummies. Regressions are fit separately by race for men born 1910–1939 and living in one of nine Northern states. Data are from the 1970 Census.

1910 and 1939 and observed living in Northern metropolitan areas in 1970. The states are listed in order of the quality of black schools in the state, from worst to best, according to an index of school quality as of 1940.[35] With the exception of Delaware and D.C., the rates of return are estimated with reasonable precision. The racial gap in the return to education (in column (3)) ranges from 4.5 percentage points for men born in South Carolina and Georgia, to a negative (although statistically insignificant) gap for men born in Missouri and West Virginia. Reading down column (2), the pattern of increasing returns is consistent with the notion that better schools lead to higher returns: black men born in states like Delaware, West Virginia, and Missouri earned roughly 3 percent higher earnings *per year of schooling* than those born in states with lower quality schools, such as Mississippi, Georgia, and South Carolina.

The contrast between South Carolina and North Carolina is especially interesting because, as shown in Figure IV, the quality of black schools was higher in North Carolina than in South Carolina in the 1915–1940 period, while the reverse was true for white schools. The estimated returns reflect these differences. Blacks from North Carolina earned much higher rates of return to schooling than those from South Carolina, while whites from South Carolina earned slightly higher returns than those from North Carolina. It should be stressed that these returns are estimated for samples of men from the two states who were working in the same set of Northern labor markets.

The relationship between relative school quality and the black-white gap in the return to education is illustrated in Figure V, which graphs the differences in returns to education from column (3) of Table VI against the average difference in the pupil-teacher ratio for men in the 1910–1919, 1920–1929, and 1930–1939 cohorts.[36] Racial differences in school quality are highly correlated with the difference in returns to education: variation in the relative pupil-teacher ratio explains over 60 percent of interstate differences in the relative return to education for men in these cohorts.

35. The quality index is the product of coefficient estimates of the effects of pupil-teacher ratio, term length, and teacher wage on the return to education for white men reported in Card and Krueger [1992], and the corresponding measures of school quality for black schools in each state.
36. We formed an estimate of the average pupil-teacher ratio for men from each state and race group using a simple average of the data for each of the three cohorts reported in Appendix 3.
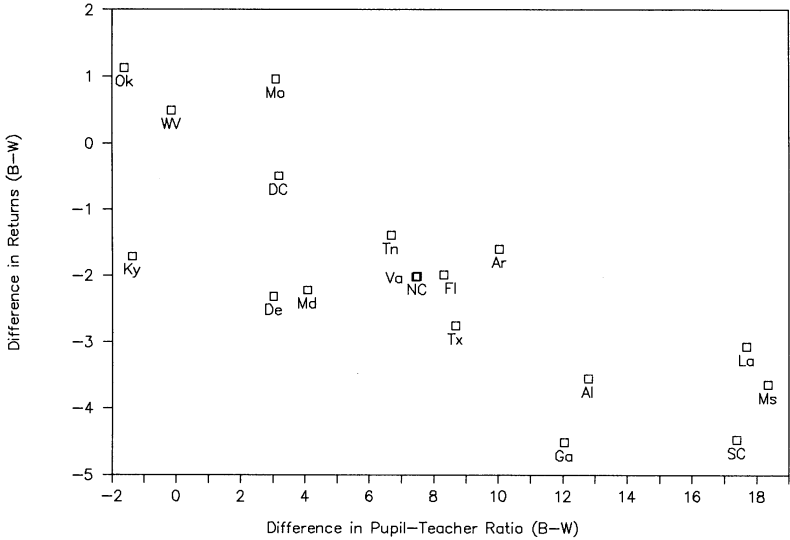
FIGURE V
Difference in Returns versus Difference in Pupil-Teacher Ratio

Differences over time in the return to education for Southern-born blacks and whites living in Northern cities are illustrated in the table below, which is formed from weighted averages of the cohort-and-state-specific estimated rates of return from equation (4). The relative trends shown by these estimates are similar to the trends in returns for *all* Southern-born men (reported in Appendix 2), although the rates of return are uniformly lower for the Northern urban residents. The black-white difference in returns to education fell by 1.53 points between 1960 and 1980, from an initial gap of 3.0 percentage points in 1960 to 1.47 points in 1980.

	Average return to education (standard errors)		
	Blacks	Whites	Difference
1960 Census	3.04	6.04	−3.00
	(0.20)	(0.15)	(0.25)
1970 Census	3.91	6.58	−2.67
	(0.15)	(0.10)	(0.18)
1980 Census	4.33	5.80	−1.47
	(0.12)	(0.08)	(0.14)

TABLE VII
THE EFFECT OF THE PUPIL-TEACHER RATIO ON THE RETURN TO EDUCATION
(STANDARD ERRORS IN PARENTHESES)

Variable	Blacks and Whites 1960–1980			Blacks 1960–1980		Whites 1960–1980		Blacks 1960	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1. Intercept	5.58	8.08	8.04	5.47	5.81	8.81	6.86	4.38	8.40
	(0.25)	(0.64)	(0.91)	(1.06)	(2.47)	(1.13)	(2.06)	(2.05)	(5.94)
2. Pupil-teacher ratio ($\div 100$)	—	−7.45	−5.91	−6.38	−5.85	−9.62	−3.13	−4.15	−10.42
		(1.77)	(2.39)	(2.03)	(4.96)	(3.26)	(5.56)	(4.02)	(12.12)
3. Dummy for born 1920–1929	0.22	0.03	0.08	0.33	0.36	−0.03	0.16	0.60	0.14
	(0.26)	(0.26)	(0.25)	(0.35)	(0.50)	(0.28)	(0.29)	(0.59)	(1.11)
4. Dummy for born 1930–1939	1.57	1.17	1.27	1.92	1.98	1.05	1.42	1.71	0.75
	(0.27)	(0.28)	(0.28)	(0.45)	(0.83)	(0.33)	(0.40)	(0.92)	(2.03)
5. Dummy for born 1940–1949	3.80	3.31	3.37	3.59	3.69	3.16	3.54	—	—
	(0.29)	(0.31)	(0.32)	(0.54)	(0.99)	(0.37)	(0.46)		
6. Black × born 1910–1919	−3.31	−2.08	−2.38	—	—	—	—	—	—
	(0.41)	(0.49)	(0.53)						
7. Black × born 1920–1929	−2.73	−1.86	−2.09	—	—	—	—	—	—
	(0.37)	(0.41)	(0.42)						
8. Black × born 1930–1939	−2.02	−1.49	−1.66	—	—	—	—	—	—
	(0.42)	(0.43)	(0.42)						
9. Black × born 1940–1949	−2.37	−1.99	−2.06	—	—	—	—	—	—
	(0.49)	(0.48)	(0.47)						
10. Dummy for 1970	−0.18	−0.18	−0.20	0.01	−0.00	−0.18	−0.20	—	—
	(0.23)	(0.22)	(0.22)	(0.29)	(0.29)	(0.24)	(0.22)		
11. Dummy for 1980	−1.74	−1.74	−1.75	−0.62	−0.64	−1.73	−1.75	—	—
	(0.23)	(0.23)	(0.22)	(0.31)	(0.31)	(0.24)	(0.23)		
12. Black × 1970	0.20	0.19	0.19	—	—	—	—	—	—
	(0.40)	(0.39)	(0.37)						
13. Black × 1980	1.12	1.09	1.12	—	—	—	—	—	—
	(0.41)	(0.40)	(0.39)						
14. 17 state dummies	No	No	Yes	No	Yes	No	Yes	No	Yes
15. R^2	0.71	0.72	0.75	0.59	0.64	0.67	0.74	0.20	0.44

Notes. Sample sizes are 360 for columns (1)–(3), 180 for columns (4)–(7), and 54 for columns (8)–(9). Equations are estimated by weighted least squares, with weights equal to the inverse sampling variances of the estimated returns. The mean and standard deviation of the dependent variable in columns (1)–(3) are 5.663 and 3.671, respectively.

B. Estimation Results

Table VII reports regression estimates of equation (5), using the set of 360 estimated rates of return to education by cohort, race, state of birth, and Census year.[37] We begin by examining the

37. The dependent variables in Tables VII and VIII differ from the returns reported in Table VI only in that they are estimated separately for each ten-year birth group in the 1960, 1970, and 1980 Censuses. The second-step regressions are estimated by weighted least squares, using the inverse sampling variances of the estimated returns to education as weights.

effect of the pupil-teacher ratio because, unlike the other two school quality measures, this variable is available for all states in all years. The first three columns pool together the returns to education for blacks and whites, while columns (4)–(7) present separate estimates by race. Columns (8) and (9) contain results using only the estimated returns for black men in 1960.

The model in the first column excludes the pupil-teacher ratio and state effects. The coefficients on the interaction terms between the black dummy and the cohort effects (rows 6–9) indicate the racial gap in the return to education for each cohort of workers, controlling for race-specific year effects. Between the 1910–1919 cohort and the 1930–1939 cohort, the black-white gap in the return to education closed by nearly 40 percent, from a 3.31 percentage point deficit per year of schooling for the 1910–1919 cohort to a 2.02 percentage point deficit for the 1930–1939 cohort. The estimated cohort effects indicate a slight widening in the gap in relative returns between the 1930–1939 and 1940–1949 cohorts, although this difference is not statistically significant.[38] Assuming ten years of education, the 0.94 point decline in the racial gap in the return to education between the 1910–1919 cohort and 1940–1949 cohort implies a 9.4 percentage point reduction in the black-white earnings gap: about one half of the decline in the earnings gap actually observed between these cohorts of Southern-born workers (see Appendix 2).

The coefficient of -7.45 ($t = 4.2$) on the pupil-teacher ratio in column (2) indicates that a higher pupil-teacher ratio is associated with a lower return to education.[39] To interpret the magnitude of this coefficient, suppose that average class size declined by ten pupils. This would lead to a 0.75 percentage point increase in the rate of return for each year of education, or a 9 percent increase in earnings for a high school graduate. Column (3) adds state effects to the model and thus identifies the effect of the pupil-teacher ratio from changes in class-size that occurred within states over time. In

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38. We suspect that this apparent widening arises from the fact that we impose the same year effects on the return to education for all age groups. Relative returns to education for older cohorts of blacks rose between 1970 and 1980, but not for the youngest (1940–1949) cohort (see Appendix 2). The regression model thus underpredicts the rate of return for blacks in the 1940–1949 cohort in 1980 and attributes part of the underprediction to a permanent cohort effect.

39. Although we believe that it is safe to take the pupil-teacher ratio as exogenously determined for blacks in the South for these cohorts, we have experimented with using the fraction of blacks in the state's population as an instrument for the pupil-teacher ratio. The instrumental variables estimates are very close to the OLS estimates reported in Table VII.

this specification the impact of the pupil-teacher ratio is smaller, but still sizable and statistically significant ($t = 2.5$).[40]

The pupil-teacher ratio also has a negative effect on the return to education in the models in columns (4)–(7), which are estimated separately by race. The estimated coefficient is somewhat larger for whites than blacks when the state effects are excluded (compare columns (4) and (6)), whereas the opposite holds when state effects are included (columns (5) and (7)). In either case, the difference between the coefficients of the pupil-teacher ratio for blacks and whites is statistically insignificant. Thus, there is no evidence against the (more precise) pooled specifications in columns (2)–(3).

A comparison of the estimated cohort-race interactions in columns (1) and (2) shows that the addition of the pupil-teacher ratio can explain much of the intercohort convergence in black-white returns to education. For example, when the pupil-teacher ratio is included in column (2), the unexplained change in the black-white return gap between the 1910–1919 cohort and the 1930–1939 cohort falls from 1.29 points (in column (1)) to 0.59 points. Similarly, the unexplained change between the 1910–1919 and 1940–1949 cohorts falls from 0.94 points to 0.09 points. Changes in the relative pupil-teacher ratio therefore explain 54 percent of the convergence in the return to education between the 1910–1919 cohort and the 1930–1939 cohort, and over 90 percent of the convergence between the 1910–1919 and 1940–1949 cohorts.

These shares are only slightly lower when state effects are added to the model. A comparison of the race-cohort interactions in column (3) to those in a model that includes state effects but excludes the pupil-teacher ratio (not reported in the table) indicates that changes in the pupil-teacher ratio account for 44 percent of the convergence in black-white returns between the 1910–1919 cohort and the 1930–1939 cohort, and 68 percent of the convergence between the 1910–1919 cohort and the 1940–1949 cohort.

While the estimates in Table VII indicate important intercohort effects in the relative return to education, they also imply a sizable role for the year effects, particularly between 1970 an d 1980. For example, the estimated year effects in columns (4) and (6) suggest that rates of return to schooling for blacks were constant between 1960 and 1970, and fell only slightly for whites. However, rates of return for blacks fell by 0.6 points between 1970

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40. The F-statistic for a test of the joint significance of the state effects in column (3) is 2.29, with a probability value of 0.007.

and 1980, and by 1.7 points for whites. Thus, changes in the year effects contributed a 1.1 percentage point increase in the relative return to education for blacks between 1960 and 1980. This is about 70 percent of the overall 1.53 percentage point increase in relative rates of return observed in our data—virtually all of it occurring between 1970 and 1980.

Closer examination of the returns for individual cohorts indicates that the rise in relative returns in the 1970s was concentrated among older workers. For whites born in the 1920s and 1930s, rates of return to education fell by almost two percentage points between 1970 and 1980. Yet blacks in the same cohorts experienced less than a point decline. In contrast, there was little change in relative rates of return between 1970 and 1980 for men born in the 1940s.

One explanation for this pattern is that the relative value of "skill" in the labor market fell between 1970 and 1980.[41] If, as the school quality hypothesis suggests, older blacks have acquired less human capital per year of schooling than whites or younger blacks, a general decline in the price of "skill" will lower the return to education more for whites and younger blacks than for older blacks. One way to verify this hypothesis is to allow for a different coefficient on the pupil-teacher ratio in 1980. If students who attended schools with lower pupil-teacher ratios have more human capital per year of schooling, and if the price of "skill" declined from 1970 to 1980, then the pupil-teacher ratio should have a smaller effect (in absolute magnitude) in 1980. Furthermore, allowing for a change in the effect of the pupil-teacher ratio in 1980 should reduce the magnitude of the 1980 year effect for black returns to education.

Both these predictions are correct. When an interaction of the pupil-teacher ratio and the 1980 year effect is added to the model in column (3) of Table VII, the pupil-teacher coefficient for 1960 and 1970 rises to −7.11 (with a standard error of 2.51), while the estimated interaction term is 4.36 (with a standard error of 2.89). These estimates suggest a substantial reduction in the market value of higher quality education between 1970 and 1980. Allowing for this effect, the 1980 year effect for black relative returns to education is 0.71: 40 percent smaller than the year effect reported in Table VII.

These results are consistent with the hypotheses that the market value of higher quality education fell between 1970 and 1980. We believe that further investigation of this hypothesis is warranted—perhaps using larger samples of workers from all states. In any case, it is clear that relative rates of return to education increased sharply for older black workers in the 1970s and that this increase contributed substantially to the reduction in the black-white gap in returns to education between 1970 and 1980.

C. The Effect of School Quality Before the Civil Rights Act

The results in columns (1)–(7) suggest that school quality, as measured by the pupil-teacher ratio, is associated with higher returns to education. Nevertheless, it is interesting to ask whether higher quality education had any return for blacks prior to enactment of the Civil Rights Act in 1964. To examine this question, we fit equation (5) using the estimated returns to education for black men in 1960.[42] The results are summarized in columns (8) and (9) of Table VII.

Unfortunately, the resulting estimates of the effect of the pupil-teacher ratio are imprecise, presumably because of the small sample size. The point estimates indicate that even in 1960 a higher pupil-teacher ratio was associated with a lower return to education for black workers, with about the same size of effect as in the pooled sample. However, the t-ratio for the pupil-teacher ratio is only slightly greater than one in column (8) and is slightly less than one in column (9). In view of the imprecision of these estimates, it is difficult to draw any firm conclusions regarding a structural change in the value of higher quality schooling for blacks after passage of the Civil Rights Act.

D. Additional Aspects of School Quality

Table VIII presents estimates of the effect of additional dimensions of school quality for the subset of states that have sufficient data to calculate the average term length and teacher wage by race.[43] Column (1) presents the same model as reported in the first column of Table VII, estimated on the subsample of

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42. The sample contains eighteen states and three cohorts (1910–1919, 1920–1929, and 1930–1939), for a total of fifty-four observations.
43. In this subsample the average black-white gap in the return to education closed by 1.61 percent between 1960 and 1980 (slightly more than in the overall sample).

TABLE VIII

THE EFFECT OF SCHOOL QUALITY ON THE RETURN TO EDUCATION (STANDARD ERRORS IN PARENTHESES)

Variable	Excluding state effects					Including 14 state effects				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
1. Pupil–teacher ratio ($\div 100$)	—	−8.50 (2.28)	—	—	2.36 (3.55)	—	−7.34 (3.15)	—	—	−3.27 (5.00)
2. Term length ($\div 100$)	—	—	3.21 (0.69)	—	0.44 (1.27)	—	—	1.95 (1.07)	—	−1.34 (1.77)
3. ln teacher wage	—	—	—	1.45 (0.25)	1.51 (0.45)	—	—	—	1.65 (0.56)	1.76 (0.88)
4. Dummy for born 1920–1929	0.02 (0.42)	−0.28 (0.42)	−0.32 (0.41)	−0.45 (0.41)	−0.44 (0.41)	0.06 (0.41)	−0.08 (0.41)	−0.14 (0.43)	−0.33 (0.43)	−0.28 (0.43)
5. Dummy for born 1930–1939	1.19 (0.43)	0.65 (0.45)	0.63 (0.43)	0.27 (0.44)	0.30 (0.44)	1.22 (0.42)	0.88 (0.44)	0.89 (0.46)	0.33 (0.51)	0.35 (0.52)
6. Dummy for born 1940–1949	3.43 (0.45)	2.79 (0.47)	2.80 (0.45)	1.97 (0.49)	2.00 (0.51)	3.39 (0.44)	2.97 (0.47)	3.30 (0.48)	1.92 (0.66)	1.89 (0.72)
7. Black × born 1910–1919	−3.76 (0.57)	−2.23 (0.69)	−2.72 (0.59)	−2.54 (0.58)	−2.77 (0.68)	−3.67 (0.55)	−2.37 (0.78)	−3.07 (0.64)	−2.34 (0.70)	−2.09 (0.80)
8. Black × born 1920–1929	−2.87 (0.42)	−1.81 (0.50)	−1.99 (0.44)	−1.65 (0.45)	−1.77 (0.49)	−2.72 (0.41)	−1.94 (0.52)	−2.27 (0.48)	−1.58 (0.55)	−1.48 (0.57)
9. Black × born 1930–1939	−2.00 (0.47)	−1.33 (0.49)	−1.62 (0.46)	−1.23 (0.46)	−1.33 (0.49)	−1.83 (0.46)	−1.41 (0.49)	−1.70 (0.46)	−1.24 (0.49)	−1.11 (0.52)
10. Black × born 1940–1949	−2.23 (0.55)	−1.76 (0.55)	−2.19 (0.53)	−1.91 (0.52)	−2.02 (0.55)	−1.99 (0.53)	−1.74 (0.53)	−2.07 (0.53)	−1.93 (0.52)	−1.76 (0.56)
11. Dummy for 1970	0.07 (0.30)	−0.07 (0.30)	−0.09 (0.29)	−0.09 (0.29)	−0.09 (0.29)	−0.10 (0.29)	−0.10 (0.29)	−0.10 (0.29)	−0.11 (0.28)	−0.09 (0.29)

TABLE VIII
(CONTINUED)

Variable	Excluding state effects					Including 14 state effects				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
12. Dummy for 1980	-1.67	-1.67	-1.69	-1.69	-1.69	-1.70	-1.70	-1.70	-1.70	-1.70
	(0.30)	(0.29)	(0.29)	(0.28)	(0.28)	(0.28)	(0.28)	(0.28)	(0.28)	(0.28)
13. Black × 1970	0.05	0.04	0.05	0.05	0.05	0.06	0.05	0.06	0.05	0.05
	(0.47)	(0.45)	(0.45)	(0.44)	(0.44)	(0.44)	(0.44)	(0.44)	(0.44)	(0.44)
14. Black × 1980	1.08	1.08	1.10	1.09	1.10	1.12	1.10	1.11	1.11	1.10
	(0.47)	(0.46)	(0.45)	(0.44)	(0.44)	(0.45)	(0.44)	(0.44)	(0.44)	(0.44)
15. Prob-value for state effects	—	—	—	—	—	0.001	0.001	0.066	0.260	0.261
16. R^2	0.72	0.73	0.74	0.75	0.75	0.75	0.76	0.76	0.77	0.77

Notes. Sample size is 272. Equations are estimated by weighted least squares, with weights equal to the inverse sampling variances of the estimated returns. The mean and standard deviation of the dependent variable are 5.436 and 2.154, respectively.

state-year-cohort observations with complete school quality data. In this subsample the black-white gap in the return to education is somewhat larger for the two oldest cohorts of workers. This arises from having to drop early observations on several states that historically maintained relatively high-quality black schools (e.g., Missouri and Kentucky).

The remaining models in the table add the three school quality variables, individually and jointly, and with and without state effects. As is the case for the full sample, the pupil-teacher ratio has a negative and statistically significant effect on the return to education, regardless of whether state effects are included or excluded. Similarly, term length and the log of the teacher wage each have a statistically significant, positive effect on the return to education when they are included individually (columns (3)–(4) and (8)–(9)). Indeed, the estimated coefficients suggest that these aspects of school quality have sizable impacts on earnings. The coefficient of 1.95 on the term length variable in column (8), for example, implies that a twenty-day increase in the school term increases a high school graduate's weekly wages by 4.7 percent. The coefficient of the log of the teacher wage in column (9) implies that a 20 percent increase in real teacher wages will lead to a 0.33 percentage point increase in the return to education, or about 4 percent higher earnings for a worker with twelve years of education.

Models that include all three quality measures are presented in columns (5) and (10). The schooling quality variables are highly collinear: the correlation between the pupil-teacher ratio and average term length is -0.91, while the correlation between the pupil-teacher ratio and the log of the average teacher wage is -0.77. As a result, the regression model has difficulty parsing out the individual contributions of the three quality indicators. Only the teacher wage is statistically significant when the three variables are included in the same equation. Nevertheless, the quality measures are highly jointly significant, and when they are included together, the state effects become statistically insignificant, suggesting that unobserved components of state-level school quality are *not* omitted from the equation.[44]

The inclusion of the school quality variables reduces the black-white gap in the return to education for each cohort, and also accounts for a sizable share of the intercohort convergence in

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44. Notice that the inclusion of the teacher wage variable by itself renders the state effects statistically insignificant.

relative returns. Together, the three measures of school quality account for half of the convergence in relative returns that occurred between the 1910–1919 and 1940–1949 cohorts (compare rows 7 and 10 of columns (1) and (5). The addition of state effects to the model increases the explained fraction of the change in the black-white returns gap to nearly 80 percent.

We conclude that school quality, as measured by the relatively crude indicators available to us, can potentially explain 50 to 80 percent of the change in the black-white gap in the return to education between cohorts born in the 1910s and those born in the 1940s. These intercohort differences, in turn, explain about 30 percent of the total increase in the relative return to education for blacks between 1960 and 1980. The remainder is explained by year effects, which indicate a one percentage point increase in the relative return for black workers between 1970 and 1980. Preliminary evidence suggests that the increase in the relative return to education for black workers in the 1970s is partially due to a decline in the price of "skill," which is reflected in a smaller effect of the pupil-teacher ratio in 1980. In summary, school quality measures can account for 15–25 percent of the total increase in the relative return to education for Southern-born black men between 1960 and 1980.

IV. SCHOOL QUALITY AND THE BLACK-WHITE WAGE GAP: REDUCED-FORM ESTIMATES

We conclude our analysis by presenting some very simple "reduced-form" evidence on the correlation between relative school quality and black-white earnings differences within states. Specifically, we consider estimates of the effect of relative school quality on the gap in earnings between blacks and whites born in the same cohort and in the same state. We also consider the effects of relative school quality on the relative schooling attainments of black and white students.

There are several reasons to estimate the reduced-form relationship between relative school quality and relative wages. First, although the evidence in the previous section suggests that relative school quality is an important determinant of relative rates of return to education, it is nevertheless possible that changes in the return to education simply alter the within-group distribution of income, with little or no effect on overall mean earnings. Depending on the substitutability of skill groups, higher quality schools

may actually *reduce* the earnings of less educated workers. Thus, it is important to check that relative quality is directly correlated with relative earnings, and not simply with relative rates of return to education.

Second, increases in school quality potentially affect not only the rates of return to a given level of education, but also the educational attainments of black and white workers. Although our analysis suggests that increases in relative years of schooling were not responsible for the closing of the black-white wage gap between 1960 and 1980, it is still true that education levels of later cohorts of black workers rose sharply. To the extent that these increases were driven by improvements in the quality of schools available to black students, they constitute an important benefit of improved school quality.

Finally, our analysis of returns to education in the previous section is limited to the subsample of Southern-born workers who moved to Northern urban areas. Although this sample restriction provides a convenient way to control for regional variation in the return to education, the estimates may not be representative of the effect of school quality on earnings for Southern-born workers who stayed in the South. Furthermore, the quality of schools may affect the probability of out-migration. Estimates of the reduced-form relation between earnings and school quality using *all* Southern-born workers capture both of these effects.

A simple summary of the relation between school quality and relative earnings is provided by fitting models of the form,

$$(6) \qquad y_{bts}^c - y_{wts}^c = \beta(Q_{bs}^c - Q_{ws}^c) + \mu^c + \nu_t + \epsilon_{ts}^c,$$

where y_{bts}^c is the mean of log weekly earnings of black workers born in cohort c in state s and measured in year t ($t = 1960, 1970, 1980$), y_{wts}^c is the log of mean weekly wages of white workers from the same cohort and state, $Q_{bs}^c - Q_{ws}^c$ is the black-white gap in the quality of education for students in cohort c and state s, μ^c is a cohort effect, and ν_t is a year effect.[45] We have fit this equation to cohort-level data on relative earnings and relative school quality for observations on eighteen states and four cohorts in three Census years. The earnings data are averages of log weekly wages for all Southern-born men, while the school quality data are weighted

TABLE IX
AVERAGE BLACK-WHITE WAGE GAP BY STATE-OF-BIRTH MEN BORN 1910–1949
(STANDARD ERRORS IN PARENTHESES)

Average Black-White wage gap (× 100):			
Alabama	27.78	Missouri	22.62
	(0.58)		(1.08)
Arkansas	23.29	North Carolina	28.11
	(0.82)		(0.53)
Delaware	38.53	Oklahoma	27.80
	(2.67)		(1.23)
Florida	35.58	South Carolina	31.27
	(0.84)		(0.64)
Georgia	32.75	Tennessee	20.24
	(0.55)		(0.79)
Kentucky	22.63	Texas	32.31
	(1.18)		(0.57)
Louisiana	38.01	Virginia	29.30
	(0.65)		(0.63)
Maryland	33.53	West Virginia	17.73
	(0.91)		(1.52)
Mississippi	28.75	District of Columbia	34.22
	(0.65)		(1.34)

Overall wage gaps by year:					
1960:	36.19	1970:	31.90	1980:	26.36
	(0.45)		(0.31)		(0.25)

Note. The data are based on differences in log wages for men age 20–59 in the 1960, 1970, and 1980 Census. Entries represent weighted averages of black-white wage gaps for cohort and Census observations.

averages of the state-level data, using the race-specific educational distribution of all workers born in each Southern state as weights.[46] Before turning to the estimates, it is worth considering the pattern of black-white relative earnings differentials across the Southern states. These differentials are displayed in Table IX.[47] In general, the wage gap is lower for states with higher relative quality black schools, such as Kentucky, Missouri, Tennessee, and West Virginia. Nonetheless, black relative earnings are surprisingly low for several states that maintained relatively good black schools, including Maryland, the District of Columbia, and Delaware. Thus, the correlation between relative school quality and the

46. None of the conclusions from this analysis is qualitatively altered if the underlying data are limited to the sample of men who moved to the nine Northern labor markets considered earlier.
47. The entries in Table IX are formed as weighted averages of the cohort-year wage gaps for each state, using the inverse sampling variances of the cohort-year observations as weights.

relative wage gap is negative (−0.32), but weaker than the correlation between school quality and the return to education. It is interesting to note that the wage gap is larger for South Carolina than for North Carolina, consistent with the pattern of relative returns to education for these two states, and with the pattern of lower quality black schools in South Carolina. The bottom row of Table IX indicates that the weighted average of the state-level wage gaps fell by 9.8 log points between 1960 and 1980. In spite of the different weighting scheme used to construct the time averages in Table IX, the decline in the average state-level gap is extremely close to the decline in the overall wage gap for all Southern-born men in these cohorts.

Estimates of equation (6) are presented in Table X. The models in columns (1)–(7) are fitted to measures of relative earnings, while in columns (8) and (9) the dependent variable is the difference in mean education for black and white men born in the same state and cohort. These models are included to assess the effect that higher quality black schools may have had in increasing the relative educational attainment of black students during our sample period.

The benchmark model in column (1) includes only cohort and year effects. The estimated cohort effects in rows 5–8 indicate the black-white earnings gap for each ten-year birth cohort, relative to the black-white wage gap for the 1910–1919 cohort. For example, the coefficient of 0.066 in row 6 indicates that the black-white relative wages were 6.6 percentage points higher for the 1930–1939 cohort than for the 1910–1919 cohort. Between the 1910–1919 and 1940–1949 cohort, the black-white earnings gap for all Southern-born men closed by 13.7 percentage points. Notice also that the year effect for 1980 is positive and significant, implying that black-white relative wages closed by some 3.7 percentage points between 1960 and 1980, holding constant cohort effects. Thus, slightly more than one third of the overall 9.8 percentage point decline in the black-white wage gap between 1960 and 1980 is attributed to year effects, while the remainder is attributed to cohort effects.

In column (2) we add the relative pupil-teacher ratio to the model. This variable has a negative and statistically significant ($t = 2.8$) coefficient, implying that the black-white wage gap is greater for states and cohorts with a larger gap between the quality of black and white schools. The addition of the relative school quality measure reduces the estimated cohort effects in column (2) relative to those in column (1). Forty percent of the decline in the

TABLE X
THE EFFECT OF SCHOOL QUALITY ON THE BLACK/WHITE GAP IN WAGES AND EDUCATION: REDUCED-FORM ESTIMATES FOR ALL SOUTHERN BORN MEN (STANDARD ERRORS IN PARENTHESES)

Variable	Wage gap full sample		Wage gap subsample with complete data					Education gap full sample	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1. Intercept	-0.388	-0.345	-0.390	-0.360	-0.373	-0.373	-0.361	-2.407	-0.727
	(0.016)	(0.022)	(0.019)	(0.028)	(0.023)	(0.026)	(0.030)	(0.176)	(0.164)
2. Pupil-teacher ratio gap (÷100)	—	-0.278	—	-0.169	—	—	-0.239	—	-0.107
		(0.099)		(0.117)			(0.264)		(0.007)
3. Term length gap (÷100)	—	—	—	—	0.056	—	0.017	—	—
					(0.045)		(0.086)		
4. Log teacher wage gap	—	—	—	—	—	0.020	-0.023	—	—
						(0.021)	(0.041)		
5. Dummy for born 1920–1929	0.013	-0.004	0.006	-0.006	0.002	0.004	-0.009	0.430	-0.205
	(0.017)	(0.018)	(0.020)	(0.020)	(0.020)	(0.020)	(0.024)	(0.187)	(0.132)
6. Dummy for born 1930–1939	0.066	0.038	0.059	0.039	0.047	0.050	0.038	0.996	-0.069
	(0.017)	(0.020)	(0.020)	(0.024)	(0.022)	(0.022)	(0.025)	(0.186)	(0.144)
7. Dummy for born 1940–1949	0.137	0.103	0.131	0.107	0.115	0.116	0.109	1.269	-0.056
	(0.018)	(0.021)	(0.021)	(0.026)	(0.024)	(0.026)	(0.027)	(0.194)	(0.158)
8. Dummy for 1970	0.007	0.007	0.008	0.008	0.008	0.008	0.008	0.073	0.069
	(0.014)	(0.014)	(0.015)	(0.015)	(0.015)	(0.015)	(0.015)	(0.154)	(0.103)
9. Dummy for 1980	0.037	0.038	0.035	0.035	0.035	0.035	0.035	0.242	0.249
	(0.015)	(0.014)	(0.015)	(0.015)	(0.015)	(0.015)	(0.015)	(0.157)	(0.105)
10. R^2	0.517	0.538	0.546	0.553	0.551	0.549	0.554	0.358	0.713

Notes. Sample size is 180 for columns (1), (2) and (8), (9), and 136 for columns (3)–(7). The dependent variable in columns (1)–(7) is the difference in mean log wages between black and white men born in the same ten-year interval and state. The dependent variable in columns (8), (9) is the difference in mean years of education between black and white men born in the same ten-year interval in the same state. The mean and standard deviation of the dependent variable in columns (1) and (2) are −29.723 and 8.556, respectively. The mean and standard deviation of the dependent variable in columns (3) and (7) are −30.338 and 8.001, respectively. The mean and standard deviation of the dependent variable in columns (8) and (9) are −1.419 and 0.801, respectively.

black-white wage gap between the 1910–1919 and 1930–1939 cohorts is explained by the convergence in relative pupil-teacher ratios. By comparison, less than 10 percent of the decline in the wage gap between the 1930–1939 and 1940–1949 cohorts can be attributed to changes in relative school quality. Comparing the 1910–1919 and 1940–1949 cohorts, changes in the relative pupil-teacher ratio account for 25 percent of the closing of the black-white wage gap.

Columns (3) and (4) estimate the same models for the subset of observations that have complete information on the other school quality measures. Column (5) replaces the pupil-teacher gap with the gap in average school term lengths, while column (6) uses the difference in the log of mean teacher wages. The quality variables are statistically insignificant in the smaller sample of data, although they all have their expected signs.[48] Interestingly, when the school quality variables are included, individually the pupil-teacher ratio tends to account for the greatest share of the decline in the black-white wage gap for different cohorts. For example, comparing the 1910–1919 and 1940–1949 cohorts, the black-white earnings gap is reduced by 18 percent when the pupil-teacher ratio gap is included, by 12 percent when the term length gap is included, and by 11 percent when the gap in log teacher pay is included. Column (6) includes all three school quality measures in the regression model. Although the variables are statistically insignificant, both individually and jointly, their inclusion reduces the cohort effects by about the same amount as the inclusion of the pupil-teacher ratio variable in Column (4).

Finally, in columns (8) and (9) we regress the gap in years of completed education between blacks and whites on the gap in pupil-teacher ratios. The cohort effects in rows 5–8 of column (8) show a sizable 1.3 year increase in relative years of education for blacks between the 1910–1919 cohort and the 1940–1949 cohort. None of the cohort effects in column (9), on the other hand, is different from zero. Thus, virtually all of the increase in relative schooling of blacks is explainable by increases in relative school quality.[49] These results suggest that improvements in school

48. The absence of teacher wage data forces us to drop all the observations from Kentucky, Missouri, and Tennessee in columns (3)–(7). The deletion of these states significantly curtails the range of variation in the relative school quality variables.

49. It is interesting to note that simultaneity effects might have been expected to create a positive bias in the estimated effect of the pupil-teacher variable. Holding constant the number of teachers, an increase in enrollment leads to an increase in the pupil-teacher ratio.

quality were an important stimulus to increased school attendance and completion among black students. Given the lower returns to education earned by black than by white men, however, these increases in relative schooling had relatively small net effects on the convergence in relative earnings of black and white workers.

In summary, the reduced-form evidence suggests that changes in relative school quality (as measured by the pupil-teacher ratio) can explain about one quarter of intercohort changes in the black-white relative wage gap between men born in the 1910s and those born in the 1940s. Since intercohort changes account for two thirds of the increase in the overall relative wage gap between 1960 and 1980, the reduced-form estimates imply that measured school quality can account for 15–20 percent of the convergence in black-white earnings in the two decades after 1960. This is similar to the share of the overall increase in the relative return to education attributable to school quality.

V. Summary and Conclusions

This paper presents direct evidence on the role of school quality in explaining the growth of black-white relative earnings between 1960 and 1980. We find a strong relationship between school quality and the economic return to additional years of schooling for black and white workers. Changes in school quality can explain from 50 to 80 percent of the relative increase in the return to education for black workers born in 1940–1949 over those born in 1910–1919. These intercohort changes, in turn, account for some 30 percent of the overall increase in the relative return to schooling for Southern-born blacks between 1960 and 1980. Thus, our estimates suggest that measures of school quality can explain 15 to 25 percent of the convergence in relative rates of return to schooling for Southern-born black workers between 1960 and 1980.

The remainder of the convergence in black-white relative returns to education is attributed to an economywide increase in the relative value of black education between 1970 and 1980. While returns to education for white workers fell sharply during the 1970s, returns for older cohorts of black workers were relatively stable. One explanation for this pattern is that the market price of acquired human capital (including higher quality education) fell between 1970 and 1980. We find some initial support for this hypothesis. In addition, increased demand for skilled black workers, stimulated by government legislation and judicial pressure,

may have contributed to the relative rise in the return to education for black workers in the 1970s.[50] More evidence on the nature of these changes, and on the determinants of earnings for older cohorts of black workers, should be a priority for future research.

We also find a direct relationship between the relative quality of schools for black and white students from a particular state and cohort and their relative earnings later in life. Measures of school quality can explain roughly 25 percent of the convergence in black-white relative earnings between cohorts born in 1910–1919 and those born in 1940–1949, and 15–20 percent of the overall growth in black-white relative earnings between 1960 and 1980.

In our view, the evidence suggests that changes in school quality are responsible for some, but by no means all, of the narrowing of the black-white earnings gap between 1960 and 1980. Given the limited nature of the school quality information currently available, and measurement errors induced by interstate mobility of children, our estimates may well understate the role of school quality. Data on other dimensions of school quality, such as teacher education or experience, could possibly increase the explanatory power of measured school quality. Nevertheless, a significant share of the earnings gains made by black workers between 1970 and 1980 arose through increases in the relative earnings of continuing cohorts of older black workers. If the quality of education is a permanent attribute of individuals (as we have assumed), these changes cannot be explained by school quality effects.

APPENDIX 1: DESCRIPTION OF CENSUS DATA

Results in Tables I–X and Appendix 2 use data from the 1960, 1970, and 1980 Censuses. The 1980 Census sample is taken from the Public-Use A Sample, which is a self-weighting sample of 5 percent of the U. S. population. The 1970 Census sample is taken from two 1 percent Public-Use samples: the 1 percent State Sample (5 percent Form) and the 1 percent State Sample (15 percent Form). Thus, in 1970 we have a self-weighting 2 percent sample of the population. The 1960 Census sample is taken from the 1 percent Public-Use Sample, and is a self-weighting sample of 1 percent of the U. S. population.

50. See Heckman and Payner [1989] for a study of changes in the racial composition of employment in the South Carolina textile industry.

To the extent possible, we constructed the extracts from each Census in a similar fashion. Year of birth is derived from information on current age and quarter of birth. The extracts only include men born in the 48 continental states whose race is identified as "white" or "black," and who worked at least one week in the previous year. In 1970 and 1980 individuals with imputed information on age, race, sex, education, weeks worked, or annual earnings are excluded from the sample. The imputation flags available in the 1960 Census are limited; our extract of the 1960 Census excludes individuals with imputed age. In each Census extract the weekly wage is calculated as the ratio of annual earnings to weeks worked in the preceding year. We exclude individuals whose real weekly wage (in 1979 dollars) is less than $35 or greater than $2,501. The 1960 and 1970 Censuses report weeks of work and annual earnings in several intervals. We converted the interval estimates of weeks worked to continuous amounts by assigning the mean of each interval, which we estimated from the 1980 Census. Interval estimates of annual earnings were converted to continuous dollars by taking the midpoint of each interval.

The samples used in Table I, II, III, and V use men born in all 48 states. The samples used in Tables IV are based on men born in the Southern region (using the Census Bureau's definition of the Southern region). The data underlying the estimates in Tables VI–VIII consist of men born in the eighteen segregated states who resided in a metropolitan area of one of nine states (Illinois, Michigan, Indiana, Wisconsin, Ohio, Pennsylvania, New York, New Jersey, California) when the Census took place. The data in Tables IX and X are based on men born in the eighteen segregated states, regardless of their residence. Table VI is estimated from a sample of 9,677 blacks and 18,778 whites. The sample sizes for the first-step estimates used in Tables VII–VIII and Tables IX–X are below.

Sample size Tables VII–VIII			Sample size Tables IX–X		
Year	Blacks	Whites	Year	Blacks	Whites
1960	5,826	9,884	1960	19,731	75,561
1970	12,793	25,600	1970	42,683	193,182
1980	21,467	41,120	1980	67,432	329,695

APPENDIX 2: DECOMPOSITION OF AVERAGE WAGES: SOUTHERN-BORN MEN
(ESTIMATED STANDARD ERRORS IN PARENTHESES)

	1960		1970		1980		Black − White		
	Whites	Blacks	Whites	Blacks	Whites	Blacks	1960	1970	1980
1900–1909									
Number	14,055	4,331							
Mn log wage	4.461	4.057					−0.404		
Std dev	0.603	0.586					(0.010)		
Mean ed	8.808	6.106					−2.702		
Beta-ed	0.057	0.020					−0.037		
Std(beta)	(0.002)	(0.004)					(0.004)		
Weight	0.170	0.182							
1910–1919									
Number	20,136	6,171	32,811	8,288					
Mn log wage	4.534	4.119	4.972	4.568			−0.414	−0.404	
Std dev	0.567	0.561	0.604	0.578			(0.008)	(0.007)	
Mean ed	9.608	7.069	9.910	7.342			−2.540	−2.568	
Beta-ed	0.060	0.032	0.057	0.032			−0.028	−0.025	
Std(beta)	(0.002)	(0.003)	(0.001)	(0.003)			(0.003)	(0.003)	
Weight	0.243	0.260	0.186	0.198					
1920–1929									
Number	24,813	7,025	43,456	10,376	78,749	16,460			
Mn log wage	4.539	4.125	5.079	4.672	5.832	5.507	−0.414	−0.407	−0.326
Std dev	0.511	0.533	0.565	0.554	0.595	0.601	(0.007)	(0.006)	(0.005)
Mean ed	10.397	8.356	10.787	8.773	11.233	9.432	−2.041	−2.013	−1.800
Beta-ed	0.068	0.046	0.065	0.040	0.051	0.034	−0.022	−0.025	−0.017
Std(beta)	(0.001)	(0.003)	(0.001)	(0.002)	(0.001)	(0.002)	(0.003)	(0.002)	(0.002)
Weight	0.300	0.296	0.247	0.248	0.173	0.164			
1930–1939									
Number	23,705	6,210	44,811	10,822	92,427	20,823			
Mn log wage	4.208	3.888	5.045	4.693	5.874	5.580	−0.320	−0.352	−0.295
Std dev	0.549	0.544	0.510	0.532	0.557	0.577	(0.008)	(0.006)	(0.004)
Mean ed	11.027	9.453	11.553	10.155	12.117	10.948	−1.574	−1.398	−1.169
Beta-ed	0.087	0.063	0.075	0.062	0.064	0.054	−0.025	−0.014	−0.011
Std(beta)	(0.002)	(0.003)	(0.001)	(0.002)	(0.001)	(0.002)	(0.003)	(0.002)	(0.002)
Weight	0.287	0.262	0.255	0.258	0.203	0.207			
1940–1949									
Number			54,879	12,400	130,661	28,728			
Mn log wage			4.692	4.492	5.792	5.544		−0.200	−0.248
Std dev			0.563	0.567	0.530	0.558		(0.006)	(0.004)
Mean ed			12.107	11.074	13.033	12.119		−1.033	−0.914
Beta-ed			0.092	0.084	0.078	0.074		−0.008	−0.005
Std(beta)			(0.001)	(0.003)	(0.001)	(0.002)		(0.003)	(0.002)
Weight			0.312	0.296	0.287	0.286			
1950–1959									
Number					153,048	34,561			
Mn log wage					5.380	5.188			−0.193
Std dev					0.555	0.571			(0.003)
Mean ed					12.781	12.217			−0.563
Beta-ed					0.067	0.084			0.017
Std(beta)					(0.001)	(0.002)			(0.002)
Weight					0.336	0.344			
All									
Mean log wage	4.430	4.049	4.930	4.604	5.677	5.423	−0.380	−0.326	−0.253
	(0.002)	(0.004)	(0.001)	(0.003)	(0.001)	(0.002)	(0.004)	(0.003)	(0.002)

Notes. "Number" refers to number of workers in cohort. "Mn log wage" refers to the mean of log average weekly earnings in the cohort. "Std dev" refers to the standard deviation of log weekly earnings in the cohort. Beta-ed refers to the estimated return to education in a regression that controls for potential experience and its square, marital status, region of residence, and residence in an SMSA. Std(beta) refers to the estimated standard error of the return to education. Entries in the columns labeled "Black − White" refer to differences between means for blacks and whites in the same cohort. "Weight" refers to the ratio of the number of workers in the cohort to the total number of male workers age 21–60 in the relevant Census.

APPENDIX 3

State	Black schools			White schools			White-to-black ratio		
	Teacher salary	Pupils/ teachers	Term length	Teacher salary	Pupils/ teachers	Term length	Teacher salary	Pupils/ teachers	Term length
				1910–1919 birth cohort					
Alabama	617	55.5	117.8	1482	35.4	146.9	2.40	0.64	1.25
Arkansas	721	50.4	124.1	1278	37.8	143.8	1.77	0.75	1.16
Delaware	NA	33.2	NA	NA	29.3	NA	NA	0.88	NA
Florida	NA	45.4	NA	NA	30.4	NA	NA	0.67	NA
Georgia	597	52.9	132.0	1520	35.8	147.4	2.55	0.68	1.12
Kentucky	NA	40.1	NA	NA	39.2	NA	NA	0.98	NA
Louisiana	848	56.8	109.8	2046	31.1	170.6	2.41	0.55	1.55
Maryland	1687	37.8	171.5	2636	32.0	186.5	1.56	0.85	1.09
Mississippi	NA	55.8	NA	NA	29.7	NA	NA	0.53	NA
Missouri	NA	29.3	NA	NA	29.4	NA	NA	1.00	NA
North Carolina	837	47.8	135.4	1575	34.4	148.2	1.88	0.72	1.09
Oklahoma	NA	36.2	NA	NA	35.9	NA	NA	0.99	NA
South Carolina	509	60.1	98.0	1740	30.8	160.1	3.42	0.51	1.63
Tennessee	NA	45.9	NA	NA	37.8	NA	NA	0.82	NA
Texas	NA	45.3	NA	NA	31.2	NA	NA	0.69	NA
Virginia	896	43.0	145.7	1590	31.7	165.0	1.77	0.74	1.13
West Virginia	1759	27.7	NA	1778	27.6	NA	1.01	1.00	NA
D.C.	NA	31.1	NA	NA	29.9	NA	NA	0.96	NA
				1920–1929 birth cohort					
Alabama	869	45.3	136.8	1915	32.8	155.9	2.20	0.72	1.14
Arkansas	826	44.7	132.3	1467	34.5	156.0	1.78	0.77	1.18
Delaware	3165	31.0	182.5	3579	27.1	183.0	1.13	0.87	1.00
Florida	1201	35.9	159.0	2529	29.0	169.5	2.11	0.81	1.07
Georgia	747	43.9	139.6	1934	31.7	159.9	2.59	0.72	1.15
Kentucky	NA	32.5	NA	NA	34.5	NA	NA	1.06	NA
Louisiana	1056	47.5	131.9	2510	29.5	176.3	2.38	0.62	1.34
Maryland	2975	35.4	181.0	3709	32.2	187.6	1.25	0.91	1.04
Mississippi	630	48.5	116.2	1729	31.3	157.3	2.74	0.65	1.35
Missouri	NA	32.0	NA	NA	27.5	NA	NA	0.86	NA
North Carolina	1367	40.9	156.0	2112	34.8	162.0	1.54	0.85	1.04
Oklahoma	2032	30.6	168.9	2324	32.5	172.5	1.14	1.06	1.02
South Carolina	749	45.3	127.3	2105	29.0	173.1	2.81	0.64	1.36
Tennessee	NA	38.8	160.5	NA	31.6	165.2	NA	0.81	1.03
Texas	1553	37.8	150.5	2414	28.5	167.4	1.55	0.75	1.11
Virginia	1297	38.7	166.0	2257	31.9	172.6	1.74	0.82	1.04
West Virginia	2550	27.7	173.2	2539	27.2	172.1	1.00	0.98	0.99
D.C.	5284	33.8	177.7	5263	30.0	177.5	1.00	0.89	1.00

APPENDIX 3
(CONTINUED)

State	Black schools			White schools			White-to-Black ratio		
	Teacher salary	Pupils/ teachers	Term length	Teacher salary	Pupils/ teachers	Term length	Teacher salary	Pupils/ teachers	Term length
				1930–1939 birth cohort					
Alabama	1880	36.3	165.6	2710	29.8	169.6	1.44	0.82	1.02
Arkansas	1452	38.4	155.4	2156	30.6	168.3	1.48	0.80	1.08
Delaware	3927	27.5	181.8	4214	23.9	181.5	1.07	0.87	1.00
Florida	2582	29.0	173.7	3622	25.6	176.0	1.40	0.88	1.01
Georgia	1594	35.2	169.0	2604	27.9	175.5	1.63	0.79	1.04
Kentucky	NA	26.8	172.9	NA	29.9	164.6	NA	1.12	0.95
Louisiana	2184	37.2	162.8	3594	26.6	178.8	1.65	0.72	1.10
Maryland	4160	32.8	185.1	4501	29.8	184.7	1.08	0.91	1.00
Mississippi	852	41.8	136.7	2244	29.3	168.1	2.63	0.70	1.23
Missouri	NA	31.7	189.4	NA	26.8	179.8	NA	0.85	0.95
North Carolina	2886	34.7	175.7	3085	30.7	176.0	1.07	0.88	1.00
Oklahoma	3225	24.6	175.9	3220	27.0	176.2	1.00	1.10	1.00
South Carolina	1628	34.1	162.3	2718	27.1	177.7	1.67	0.79	1.09
Tennessee	NA	33.8	172.1	NA	29.1	169.8	NA	0.86	0.99
Texas	2776	30.0	168.8	3419	26.7	174.3	1.23	0.89	1.03
Virginia	2505	32.9	179.2	2934	28.2	179.6	1.17	0.86	1.00
West Virginia	3198	26.3	174.3	3223	27.3	173.7	1.01	1.04	1.00
D.C.	5304	31.2	176.0	5367	26.6	176.0	1.01	0.85	1.00
				1940–1949 birth cohort					
Alabama	3809	31.4	175.8	3959	28.7	175.7	1.04	0.91	1.00
Arkansas	2929	34.5	172.6	3262	28.1	173.4	1.11	0.81	1.00
Delaware	5705	24.0	181.1	5782	21.8	180.0	1.01	0.91	0.99
Florida	5038	27.8	180.0	5298	27.6	180.0	1.05	0.99	1.00
Georgia	3720	31.7	179.4	4012	28.0	179.7	1.08	0.88	1.00
Kentucky	NA	26.0	174.1	NA	27.5	172.2	NA	1.06	0.99
Louisiana	4524	32.2	178.3	5027	26.0	179.4	1.11	0.81	1.01
Maryland	5779	27.4	181.8	5828	26.3	181.6	1.01	0.96	1.00
Mississippi	2261	38.4	163.9	3286	27.2	170.1	1.45	0.71	1.04
Missouri	NA	28.3	185.7	NA	26.4	181.7	NA	0.93	0.98
North Carolina	4427	31.3	180.0	4377	28.7	180.0	0.99	0.92	1.00
Oklahoma	4729	24.7	175.2	4655	25.7	176.3	0.98	1.04	1.01
South Carolina	3380	32.6	178.3	3784	27.5	179.9	1.12	0.84	1.01
Tennessee	NA	30.4	176.6	NA	28.1	175.8	NA	0.92	1.00
Texas	4774	26.6	174.5	5010	25.8	174.6	1.05	0.97	1.00
Virginia	4160	28.8	180.1	4192	26.1	180.1	1.01	0.91	1.00
West Virginia	4113	25.9	174.0	4133	26.9	173.9	1.00	1.04	1.00
D.C.	6572	28.3	177.8	6720	27.1	178.5	1.02	0.96	1.00

Notes. Entries are weighted averages of school quality variables for men born in each state. Weights are based on the distributions of educational attainment from samples of workingmen in the 1970 Census. NA means not available.

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REFERENCES

Ashenfelter, Orley, "Changes in Labor Market Discrimination Over Time," *Journal of Human Resources*, V (1970), 403–30.

Anderson, James D., *The Education of Blacks in the South, 1860–1935* (Chapel Hill: University of North Carolina Press, 1988).

Blose, David T., and Ambrose Caliver, *Statistics of the Education of Negroes* (Washington, DC: Government Printing Office, 1936).

Bond, Horace Mann, *The Education of the Negro in the American Social Order* (New York: Prentice Hall, 1934).

Brown, Charles, "The Federal Attack on Labor Market Discrimination: The Mouse that Roared?" *Research in Labor Economics*, V (1982), 33–69.

Bullock, Henry, *A History of Negro Education in the South: From 1619 to the Present* (Cambridge, MA: Harvard University Press, 1967).

Card, David, and Alan Krueger, "Does School Quality Matter? Returns to Education and the Characteristics of Public Schools in the United States," *Journal of Political Economy*, C (1992), forthcoming.

Chiswick, Barry, *Income Inequality: Regional Analysis within a Human Capital Framework* (New York: National Bureau of Economic Research, 1974).

Davis, James A., and Tom W. Smith, *General Social Surveys, 1972–1990* (Chicago: National Opinion Research Center, producer, 1990; Storrs, CT: The Roper Center for Public Opinion Research, University of Connecticut, distributor).

Donohue, John J., and Heckman, James J., "Continuous Versus Episodic Change: The Impact of Affirmative Action and Civil Rights Policy on the Economic Status of Blacks," *Journal of Economic Literature*, XXIX (1992), 1603–43.

Duncan, Gregory J., and Saul D. Hoffman, "A New Look at the Causes of the Improved Economic Status of Black Workers," *Journal of Human Resources*, XVII (1983), 269–82.

Fogel, Robert, and Stanley Engerman, *Time on the Cross* (Boston, MA: Little Brown, 1974).

Freeman, Richard B., "Changes in the Labor Market for Black Americans," *Brookings Papers on Economic Activity*, XX (1973), 67–120.

Griffith, R. W., "Mississippi," in J. Pearson and E. Fuller, eds., *Education in the States: Historical Development and Outlook* (Washington, DC: National Education Association of the United States, 1969).

Harlan, Louis R., *Separate and Unequal: Public School Campaigns and Racism in the Southern Seaboard States 1901–1915* (Chapel Hill: University of North Carolina Press, 1958).

Heckman, James J., and Brook Payner, "Determining the Impact of Federal Antidiscrimination Policy on the Economic Status of Blacks: A Study of South Carolina," *American Economic Review*, LXXIX (1989), 138–77.

Jackson, James, and Gerald Gurin, *National Survey of Black Americans, 1979–1980* (Ann Arbor, MI: Inter-university Consortium for Political and Social Research, No. 8512, 1987).

Juhn, Chinhui, Kevin M. Murphy, and Brooks Pierce, "Accounting for the Slowdown in Black-White Wage Convergence," in *Workers and Their Wages: Changing Patterns in the United States*, Marvin H. Kosters, ed. (Washington, DC: AEI Press, 1991).

Kirk, Frank M., "South Carolina," in J. Pearson and E. Fuller, eds., *Education in the States: Historical Development and Outlook* (Washington, DC: National Education Association of the United States, 1969).

Margo, Robert, *Race and Schooling in the South, 1880–1950: An Economic History* (Chicago: University of Chicago Press, 1990).

Smith, James P., "Race and Human Capital," *American Economic Review*, LXIV (1984), 685–98.

——, and Finis Welch, *Closing the Gap: Forty Years of Economic Progress for Blacks* (Santa Monica, CA: The RAND Corporation, 1986).

——, and ——, "Black Economic Progress After Myrdal," *Journal of Economic Literature*, XXVII (1989), 519–64.

Southern Education Reporting Service, *Southern Schools: Progress and Problems* (Nashville, TN: SERS, 1959).

——, *A Statistical Summary, State by State, of School Segregation-Desegregation in the Southern and Border Area from 1954 to the Present* (Nashville, TN: SERS, December 1965).

United States Commissioner of Education, "History of Schools for the Colored Population," originally Published by United States Office of Education in *Special Report of the Commissioner of Education on the Improvement of Schools in the District of Columbia* (Washington, DC: USGPO, 1871); reprinted by New York: Arno Press, 1969.

Vroman, Wayne, "Changes in the Labor Market Position of Black Men Since 1964," *Industrial Relations Research Association,* Proceedings of the Twenty-Seventh Winter Meeting (1974), 294–301.

Welch, Finis, "Education and Racial Discrimination," in O. Ashenfelter and A. Rees, eds., *Discrimination in Labor Markets* (Princeton, NJ: Princeton University Press, 1973), pp. 43–81.

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[2] **Changes in the Labor Market for Black Americans, 1948-72**
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[2] **Changes in Labor Market Discrimination Over Time**
Orley Ashenfelter
The Journal of Human Resources, Vol. 5, No. 4. (Autumn, 1970), pp. 403-430.
Stable URL:
http://links.jstor.org/sici?sici=0022-166X%28197023%295%3A4%3C403%3ACILMDO%3E2.0.CO%3B2-A

[5] **A New Look at the Causes of the Improved Economic Status of Black Workers**
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LINKED CITATIONS

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[50] **Determining the Impact of Federal Antidiscrimination Policy on the Economic Status of Blacks: A Study of South Carolina**
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References

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Stable URL:
http://links.jstor.org/sici?sici=0022-166X%28197023%295%3A4%3C403%3ACILMDO%3E2.0.CO%3B2-A

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