NEW EVIDENCE ON RACE DISCRIMINATION UNDER "SEPARATE BUT EQUAL"

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Recently uncovered data on teachers' salaries in Virginia in 1906 allow for more precise and consistent estimations of marginal returns to certification and formal education than had been available in previous studies. Virginia's "separate but equal" educational system paid black teachers in rural counties lower wages than it paid white teachers and on average paid a lower premium to blacks for certification and formal education than it paid to whites. In incorporated cities, returns to certification and normal school education were about the same for black teachers and white teachers, although average salaries were lower for black teachers.

In "Teacher Salaries in Black and White" Robert Margo estimates the magnitude of wage discrimination against black teachers in three southern states under the "separate but equal" doctrine. Marginal returns to passing certification exams and to completing a normal school or a four-year college were not consistent across the three states Margo examined or across the different measures of human capital.[1] We use data on teacher salaries in Virginia in 1906 to estimate marginal returns to certification and formal education. The data for Virginia include detailed information on salaries by race, certification, and education that allowed us to estimate a fixed-effects model of the marginal returns to certification and education that are consistent across specifications.

Our estimates reveal a previously unknown geographic pattern in marginal returns to certification and education. The few black teachers hired in incorporated cities in Virginia earned the same marginal returns to certification and education as white teachers, but most black teachers taught in rural counties where their returns fell below those awarded their white peers.

MARGINAL RETURNS TO HUMAN CAPITAL IN THE SOUTH

Previous studies of the relationship between formal education and income have shown that inequalities in the incomes of black and white workers are

attributable to different levels of human capital and to different marginal returns to the acquisition of more human capital. James Smith and Finis Welch show that white workers receive higher returns on investments in education and the difference in returns is larger at higher levels of education.[2]

Most studies of marginal returns to formal education target the second half of the twentieth century because there is little suitable data for years before 1940. Studies of the relationship between race and human capital in the first half of the twentieth century are limited to occupations that did not require formal education. Robert Higgs used Virginia Bureau of Labor Statistics Reports to examine racial discrimination in firms. He found that firms employing black workers and white workers in the same job paid the same wage to both but black workers were frequently excluded from high-skill jobs, and wage discrimination was more evident in high-skill jobs. Consequently, average salaries for blacks were lower: "In 1900, whites received an apparent premium in 20 of 33 contracts for skilled jobs but in only 20 of 77 contracts for unskilled jobs."[3] Warren Whatley and Gavin Wright extended Higgs's study of wages in Virginia to the 1920s.[4] They observed a similar exclusion of blacks from high-wage jobs. William Sundstrom documented the existence of a "color line" between occupations in urban areas, both North and South, that excluded blacks from high-wage occupations.[5] These recent studies by economists echo those published by the U.S. Department of Labor in the 1930s which found that blacks concentrated in unskilled jobs in industries such as lumber.[6] These studies all point in the same direction: before World War II, the low incomes of blacks in the South were traceable more to lack of opportunity than to wage discrimination.

Margo's analysis of the salaries paid to teachers in the South under "separate but equal" pointed in the other direction.[7] When blacks were admitted to the teaching profession, their average monthly wages were between 49 and 59 percent of those paid white teachers. The annual salaries of black teachers were even lower than those of white teachers because black schools were not open as many days per year as white schools. Although black teachers may have received some in-kind payments from black parents, it is clear that the base salary of a black teacher was lower than the base salary of a white teacher. It is less clear whether a black teacher was likely to receive an equal percentage raise for demonstrating more than the minimum level of competence.

Teachers can demonstrate competence by scoring well on certification examinations. Margo used ordinary least squares regression to assess the

determinants of the average teacher salaries in 1910 across counties in Louisiana, Florida, and North Carolina.[8] While some specifications of the equations support the conclusion that marginal returns to certification were the same for black and white teachers, other specifications show white returns to certification exceeded black returns, and a third set of specifications show black returns exceeded white returns.

Teachers can also demonstrate competence by completing a course of formal education at college or normal school. Margo's evidence on marginal returns to completion of normal school or college is not consistent across states or robust to specification.[9] His evidence on marginal returns to experience is the most consistent. In every case where experience is a statistically significant determinant of teachers' salaries, white teachers have the advantage.

Multicolinearity in Margo's data (like most data used to estimate wage regressions) prevents unequivocal estimation of the marginal returns to certification and formal education in the salary data; low levels of statistical significance almost always leave room for doubt. Moreover, pervasive discrimination in the administration of exams for certification and in opportunities for higher education may create biases in any results. But the impediments to documenting the degree of discrimination against blacks in the South ought not to prevent continued effort. Additional work may allow for conclusions for the region based upon a preponderance of evidence.

NEW EVIDENCE FROM VIRGINIA

A report published by the Virginia Superintendent of Public Instruction for the 1905–06 and 1906–07 school years provides an opportunity to consider differences in marginal returns to human capital for black and white teachers. Beyond adding another state to the set of observations on teacher salaries in the South, the information published by the Virginia superintendent is particularly well-suited for examination of the differences in the marginal returns to certification and education for blacks and whites. The report provides, for each county, an observation of average salary paid by race for three levels of certification, for teachers with normal school degrees, for teachers with college degrees, for teachers hired for special instruction (such as in language, drawing, or music), and for teachers hired on an emergency basis.[10]

First, second, and third grade certificates were awarded on the basis of performance on a standard state exam; anyone over the age of eighteen

was eligible to take the exam. A third grade certificate was awarded to persons who had passed the exam with scores no lower than 50 percent on any section of the exam and at least 65 percent on the core sections. A second grade certificate was awarded for minimum scores of 60 percent on all sections and 75 percent on the core, and a first grade certificate for minimum scores of 70 percent and 85 percent on the core sections.

Some scholars question teaching certificates as a measure of human capital. Morgan Kousser argued that the grading of certification exams varied across counties within a state and there may have been racial and personal discrimination in the awarding of certificates.[11] But he showed that it is unlikely that discrimination in certification in Louisiana, Florida, and North Carolina invalidates his results, for where alternative measures of human capital existed, they were correlated with certification. In Virginia, the potential for abuse or inconsistency in the awarding of teaching certificates was officially recognized. A state Board of Examiners was established to prevent nepotism and to establish uniform grading of certification exams.[12] Each of the five members of the board supervised a circuit of contiguous counties and incorporated cities, and each member administered and graded the certification exams in his circuit twice a year. Any discrimination in administration or grading by a member of the board should be consistent within his circuit, and within each county in the circuit. Because for each county the Virginia reports disaggregate the average salary data by certification and education, we can employ a fixed-effects regression model to remove this—and any other county-specific biases—from the estimate of marginal returns to certification.

The emergency certificate was intended to alleviate shortages of certified teachers. It is not clear whether those granted such certificates had failed to pass the exams or simply had not yet had the opportunity to take them.

A weakness of the data for Virginia is that age and teaching experience are omitted from the superintendent's report. If the experience of Virginia teachers was similar to the experience of the teachers in Florida and North Carolina, then black teachers were on average more experienced than white teachers. If teachers in Virginia earned returns to experience that were similar to those earned by the teachers in Margo's study, there would be an upward bias of wages for black teachers.

In the top panel of Table 1 we show the number of graduates and certificates issued, and the percentage of black teachers in each category. In

1905 about 8 of every 9 teachers in Virginia worked in a rural county, and 39 percent of those 821 teachers were black. Of the 112 teachers working in incorporated cities, 35 percent were black. While the number of urban black teachers who were graduates of normal school is about proportional to the number of black teachers in the population, black college graduates were underrepresented. Of the 17 urban teachers with college degrees, only 2 were black. Black college graduates were not quite so badly underrepresented in rural counties. Not one of the 7 teachers with special certificates was black.

City teachers earned high scores on the certification exams so more than half of them who certified by exam held first grade certificates, and only a few white or black teachers held a third grade certificate. By contrast, 14 percent of rural teachers held the third grade certificate, and 36 percent of them were black. Black teachers represented just over one-third of city teachers with a second grade certificate and nearly half of rural teachers with a second grade certificate. Fifty percent of city teachers holding first grade certificates were black; 45 percent of rural teachers holding first grade certificates were black.

In incorporated cities, only two emergency certificates were issued to teachers, neither of whom was black. In rural counties, over 15 percent of teachers were hired on an emergency basis. Black teachers represented a slightly larger percentage of emergency teachers (42 percent) than black teachers represented in the population of rural teachers (39 percent).

In incorporated cities, teachers' salaries were increased to attract the required number of qualified and certified teachers, but in rural counties, the shortage of qualified and certified teachers, indicated by the widespread use of emergency certificates, did not lead to an increase in salaries. In the bottom panel of Table 1 we show the average monthly salaries of teachers (and standard deviations) by education, certification, race, and location. The averages are weighted by the number of teachers in each category in each county. Not surprisingly, black teachers earned less, regardless of education, certification, or location. The differences in averages are most pro nounced for college graduates in incorporated cities and least pronounced for teachers holding third grade certificates.

From the Virginia data we used a fixed-effect model to estimate determinants of the average wages of teachers with different levels of certification and education—we removed county-specific determinants of average wages

TABLE 1

NUMBER OF CERTIFICATES AND AVERAGE MONTHLY SALARIES BY RACE

NUMBER OF CERTIFICATES ISSUED (PERCENTAGE BLACK):

	INCORPORATED CITY		RURAL COUNTY		TOTAL	
	N	*% Black*	*N*	*% Black*	*N*	*% Black*
COLLEGE GRADUATE	17	12	75	22	92	21
NORMAL SCHOOL GRADUATE	24	33	99	26	123	28
SPECIAL CERTIFICATE	7	0	32	28	39	23
FIRST GRADE CERTIFICATE	35	51	178	45	213	46
SECOND GRADE CERTIFICATE	23	39	183	47	206	46
THIRD GRADE CERTIFICATE	4	50	118	36	122	37
EMERGENCY CERTIFICATE	2	0	136	42	138	41
TOTAL	112	35	821	39	933	38

WEIGHTED AVERAGE OF MONTHLY SALARIES, IN DOLLARS (STANDARD DEVIATIONS):

	INCORPORATED CITY		RURAL COUNTY	
	Black	White	Black	White
COLLEGE GRADUATE	30.00 (7.1)	84.10 (38.7)	28.78 (7.0)	61.83 (20.5)
NORMAL SCHOOL GRADUATE	45.90 (9.2)	54.45 (16.5)	28.67 (7.0)	42.45 (12.6)
SPECIAL CERTIFICATE	—	48.65 (13.2)	25.38 (4.8)	37.24 (10.6)
FIRST GRADE CERTIFICATE	36.14 (5.7)	43.30 (9.1)	27.48 (4.3)	33.93 (5.3)
SECOND GRADE CERTIFICATE	27.87 (6.1)	32.28 (7.1)	23.55 (3.1)	27.94 (4.3)
THIRD GRADE CERTIFICATE	19.38 (7.9)	19.37 (7.9)	20.91 (2.7)	20.90 (2.7)
EMERGENCY CERTIFICATE	—	55.50 (28.9)	20.9 (2.7)	27.17 (7.5)
TOTAL	35.06 (9.6)	52.33 (27.1)	24.47 (5.0)	34.92 (14.9)

Source: Authors' calculation from Virginia State Board of Education, Biennial Report.

from the estimate of marginal returns to certification and education. We estimate a model of the form

$$w_{ci} = a + \mathbf{b}x_{ci} + v_c + e_{ci},$$

where w is the logarithm of the average wage, c denotes the county of observation, and i denotes the type of certificate or level of education. The residual is $v_c + e_{ci}$, where v_c is the county-specific residual, and e_{ci} is usual residual. The type of certificate or level of education, x, is captured by a series of dichotomous variables. The coefficient **b** measures the contribution of certification or education to the log wage; it is the estimate of interest. The model is applied separately to the wages of black teachers and white teachers.[13]

In Table 2 we report results for two specifications of the fixed-effects model. The specification in column (1) is the most basic of specifications. Differences in education and certification explain 68 to 74 percent of the variations in average wages. Marginal returns to a college or normal school education and returns to first grade certification to black teachers are statistically significantly lower than marginal returns to white teachers. White teachers hired with special certificates earned a higher premium than their black counterparts. Teachers of any race with a second grade certificate earned between 12 and 14 percent more than teachers with a third grade certificate. Interestingly, white teachers hired on an emergency basis earned more than white teachers with third grade certificates. School boards may have expected them to pass with high scores on the next available exam, or higher wages may have been required to bring additional white teachers of any quality into the labor market. Black teachers with emergency certificates earned about the same wages as black teachers with third grade certificates.

The specification of the model in column (2) adds a control for average age of teachers in the county. In the Virginia reports, teachers' ages are not recorded. We estimated the average age of teachers by exploiting the Public Use Micro Sample (PUMS) of the 1910 census of population.[14] We extracted the records for the 53 teachers in Virginia that appear in the PUMS and calculated the average ages of teachers by county. The effect of age is unexpected: the coefficient on average age has a negative sign in the regression for black teachers and average age is not statistically significant in the regression for white teachers. The unexpected effect of age could indicate that the more highly qualified teachers were younger. We do not place much weight in specification (2) because the number of observations is limited by the small

TABLE 2

FIXED-EFFECTS REGRESSION RESULTS

DEPENDENT VARIABLE: LOG OF AVERAGE MONTHLY SALARY

	(1)		(2)	
	BLACK			
COLLEGE GRADUATE	0.303**	(0.041)	0.481**	(0.058)
NORMAL SCHOOL GRADUATE	0.337**	(0.033)	0.296**	(0.048)
SPECIAL CERTIFICATE	0.199**	(0.053)	0.081**	(0.072)
FIRST GRADE CERTIFICATE	0.287**	(0.025)	0.286**	(0.035)
SECOND GRADE CERTIFICATE	0.122**	(0.025)	0.108**	(0.035)
EMERGENCY CERTIFICATE	0.034	(0.028)	0.024	(0.038)
AVERAGE AGE			-0.008**	(0.003)
N	359		106	
R^2	0.68		0.74	
	WHITE			
COLLEGE GRADUATE	0.904**	(0.037)	0.879**	(0.060)
NORMAL SCHOOL GRADUATE	0.543**	(0.035)	0.515**	(0.057)
SPECIAL CERTIFICATE	0.408**	(0.050)	0.367**	(0.089)
FIRST GRADE CERTIFICATE	0.348**	(0.033)	0.343**	(0.053)
SECOND GRADE CERTIFICATE	0.137**	(0.033)	0.129*	(0.053)
EMERGENCY CERTIFICATE	0.114**	(0.036)	0.073	(0.056)
AVERAGE AGE			0.006	(0.005)
N	574		154	
R^2	0.74		0.73	

Notes: Standard errors in ( )

Omitted level of certification: third grade certificate

*$p < 0.10$

**$p < 0.01$

Sources: Virginia State Board of Education, *Biennial Report,* and 1910 PUMS.

number of teachers that appear in the PUMS. The coefficients on education and certification are unchanged by the addition of average age to the model: the marginal earnings of white college and normal school graduates are significantly above the earnings of black graduates, and white first grade certificate holders have marginal earnings significantly higher than black first grade certificate holders.

Descriptive statistics presented in Table 1 suggest systematic differences between salaries paid in incorporated cities and salaries paid in rural counties. In Table 3 we show the results of estimating the model separately for black teachers and white teachers in cities and rural counties.

In incorporated cities, the marginal returns to normal school education and first grade certification were the same for blacks and whites. The only exception is for the two black teachers holding college degrees, whose marginal returns are small compared to those earned by white college graduates. Because of the small numbers, and because we do not know the ages of the teachers, it is hard to place a meaningful interpretation on the small coefficient on college graduation for black teachers. Quite possibly the college educated teachers were younger; this interpretation would be consistent with the effect of average age of teachers in Table 2.

The interpretation of the coefficients on college and normal school education and first grade certification in rural counties is straightforward. Marginal returns to college education were three times larger for white teachers as for their black counterparts. The marginal returns to black normal school graduates were 60 percent of the returns to white normal school graduates. The marginal returns to black teachers for first grade certification were 20 percent below those for white teachers. Average age does not have a statistically significant effect in the specifications in Table 3.

CONCLUSION

There is no ambiguity or inconsistency in the data on teachers' salaries in Virginia in 1905: black teachers received lower marginal returns to education and certification. However, black teachers in urban areas received about the same marginal return. It was black teachers in rural areas that received the lowest marginal returns.

Rural black teachers may have felt the brunt of wage discrimination because their mobility was limited. If black rural women were tied to their families' farms, the monopsonistic hiring practices of local school boards may have made them vulnerable.

The political economy of school segregation may help explain why black teachers in rural areas had lower wages. The inherently unequal nature of "separate but equal" may have enabled school boards to reduce funding to black schools and transfer the funds to white schools within the district. Recent research on the variation in per student spending within modern

TABLE 3

MARGINAL RETURNS BY RACE AND LOCATION

DEPENDENT VARIABLE: LOG OF AVERAGE MONTHLY SALARY

	Black		White	
INCORPORATED CITIES				
COLLEGE GRADUATE	0.494**	(0.195)	1.169**	(0.238)
NORMAL SCHOOL GRADUATE	0.888**	(0.152)	0.883**	(0.237)
SPECIAL CERTIFICATE			0.681**	(0.254)
FIRST GRADE CERTIFICATE	0.607**	(0.144)	0.602*	(0.237)
SECOND GRADE CERTIFICATE	0.388*	(0.150)	0.299	(0.239)
EMERGENCY CERTIFICATE			0.865**	(0.318)
N	39		73	
R^2	0.55		0.49	
RURAL COUNTIES				
	Black		White	
COLLEGE GRADUATE	0.304**	(0.044)	0.880**	(0.040)
NORMAL SCHOOL GRADUATE	0.299**	(0.038)	0.525**	(0.038)
SPECIAL CERTIFICATE	0.187**	(0.056)	0.400**	(0.055)
FIRST GRADE CERTIFICATE	0.269**	(0.029)	0.333**	(0.036)
SECOND GRADE CERTIFICATE	0.118**	(0.029)	0.139**	(0.036)
EMERGENCY CERTIFICATE	0.003	(0.031)	0.090*	(0.037)
N	320		501	
R^2	0.68		0.58	
COLLEGE GRADUATE	0.536**	(0.066)	0.897**	(0.064)
NORMAL SCHOOL GRADUATE	0.299**	(0.056)	0.527**	(0.062)
SPECIAL CERTIFICATE	0.122	(0.080)	0.371**	(0.093)
FIRST GRADE CERTIFICATE	0.275**	(0.042)	0.338**	(0.058)
SECOND GRADE CERTIFICATE	0.100*	(0.042)	0.132*	(0.058)
EMERGENCY CERTIFICATE	0.024	(0.043)	0.068	(0.060)
AVERAGE AGE	-0.002	(0.002)	-0.001	(0.002)
N	106		154	
R^2	0.55		0.67	

Notes: Standard errors in ( )

Omitted level certification: third grade certificate

*p < 0.10

**p < 0.01

Sources: Virginia State Board of Education, *Biennial Report*, and 1910 PUMS.

school districts shows that schools in poorer neighborhoods have lower teacher salaries than schools in more affluent neighborhoods.[15]

NOTES

Helpful research assistance was provided by Felicity Brown. The authors thank participants at the Virginia Social Sciences Association Annual Meetings for their comments. Additional thanks go to Amos Golan, Tom Hertz, Robert Margo, David O. Whitten, and an anonymous referee. All remaining errors are the property of the authors. Partial funding for this project was provided by a Faculty Development Grant from the University of Mary Washington.

1. Robert Andrew Margo, "Teacher Salaries in Black and White: The South in 1910," *Explorations in Economic History* 21 (July 1984): 306–26.
2. James P. Smith and Finis R. Welch, "Black Economic Progress After Myrdal," *Journal of Economic Literature* 28 (June 1989): 519–64.
3. Robert Higgs, "Black Progress and the Persistence of Racial Economic Inequalities, 1865–1940," in *The Question of Discrimination: Racial Inequality in the U.S. Labor Market,* ed. Steven Shulman and William Darity, Jr. (Middletown, CT: Wesleyan University Press, 1989), 19.
4. Warren Whatley and Gavin Wright, "Race, Human Capital and Labour Markets in American History," in *Labour Market Evolution: The Economic History of Market Integration, Wage Flexibility, and the Employment Relation,* ed. George Grantham and Mary MacKinnon (New York: Routledge, 1994), 270–91.
5. William Sundstrom, "Half a Career: Discrimination and Railroad Internal Labor Markets," *Industrial Relations* 29 (Fall 1990): 423–40.
6. Higgs, "Black Progress," 20.
7. Margo, "Teacher Salaries," 306–26, and *Race and Schooling in the South, 1880–1950: An Economic History* (Chicago: University of Chicago Press, 1990).
8. Margo, "Teacher Salaries," 306–26, and *Race and Schooling,* 314–15.
9. In one place, Margo shows marginal returns to certification as equal for black and white teachers (Margo, "Teacher Salaries," 314, equations 2 and 4), contradicting the specifications elsewhere in which white returns to certification exceed black returns (314, equations 6 and 8), and black returns exceed white returns (314, equations 5 and 7; 315, equations 10 and 13).

10. Virginia State Board of Education, *Biennial Report of the Superintendent of Public Instruction of the Commonwealth of Virginia, School Years 1905–06 and 1906–07* (Richmond: Davis Bottom, 1907). Some information at the level of the school district is available in the report.
11. Morgan Kousser, "Progressivism—For Middle Class Whites Only: North Carolina Education, 1880–1910," *Journal of Southern History* 46 (May 1980): 169–94.
12. For a description of the exams see Virginia State Board of Education, *Biennial Report of the Superintendent of Public Instruction of the Commonwealth of Virginia, School Years 1903–1904 and 1904–1905* (Richmond: Davis Bottom, 1906), xli. See also Virginia State Board of Education, *Biennial Report of the Superintendent of Public Instruction of the Commonwealth of Virginia, School Years 1899–1900 and 1900–1901* (Richmond: Davis Bottom, 1902), xxxvii.
13. We reported these specifications to facilitate comparison to Margo, "Teacher Salaries." An alternative to estimating the model separately for black teachers and white teachers is to pool the observations and include an indicator variable for race and interaction terms between race and all of the levels of education and certification. Respecifying the model in this way facilitates use of an F-test for differences in coefficients between the races. The Chow test of the joint significance of the interaction terms is significant at the 1 percent level. F-tests for differences in the coefficients on the college and normal school graduate and first grade certificate are significant at the 10 percent level. Note also that the fixed-effects specification relaxes the usual assumption of independence of error terms and assumes only that the error terms are independent across counties.
14. Data on age extracted from Steven Ruggles, Matthew Sobek, Trent Alexander, Catherine A. Fitch, Ronald Goeken, Patricia Kelly Hall, Miriam King, and Chad Ronnander, *Integrated Public Use Microdata Series: Version 3.0* [Machine-readable database] (Minneapolis: Minnesota Population Center, 2004) [available at http://www.ipums.umn.edu/usa/, accessed September 29, 2004].
15. Marguerite Roza and Paul Hill, "Equalizing Education Dollars," *Washington Post* (August 21, 2005): B07. See also Jonathan B. Pritchett, "The Burden of Negro Schooling: Tax Incidence and Racial Redistribution in Postbellum North Carolina," *Journal of Economic History* 49 (December 1989): 966–73; and Kenneth Ng, "Wealth Distribution, Race and

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