

Education and Wages in the 1980s and 1990s: Are All Groups Moving Up Together?

A considerable body of economics research has described and investigated the educational wage premium—the degree to which highly educated workers are paid more than less-educated workers. Much of the interest revolves around two related facts: (1) The payoff to education has risen steeply in recent decades, and (2) the rise in the payoff accounts for a significant fraction of the increase in overall wage inequality. These facts have led many to conclude that, at least from an individual perspective, higher educational attainment is a passport out of the lower end of the income distribution.

This prescription appears to have taken hold; U.S. residents today obtain more education than earlier cohorts. The fraction of the population who are high school dropouts has fallen, and today's high school graduates are more likely to continue on to college than those of the 1960s, 1970s, or 1980s. However, given the time and resources that both individuals and society are investing, it seems useful to ask if everyone sees the same payoff to such educational upgrading. In particular, does the typical payoff to educational upgrading vary among demographic groups, defined by sex, race, or Hispanic origin? Do such groups see the same premium paid for additional years of schooling, and did that premium rise at the same pace for all these groups in the 1980s and 1990s? If not, further research is needed on the sources of the differences in payoff and what might be done to ensure that no group finds itself at a disadvantage.

This article describes median earnings by sex, race, Hispanic origin, and educational attainment during the 1980s and 1990s and then seeks out the sources of wage differences at each education level. Some disparities are attributable to differences in non-education worker qualifications

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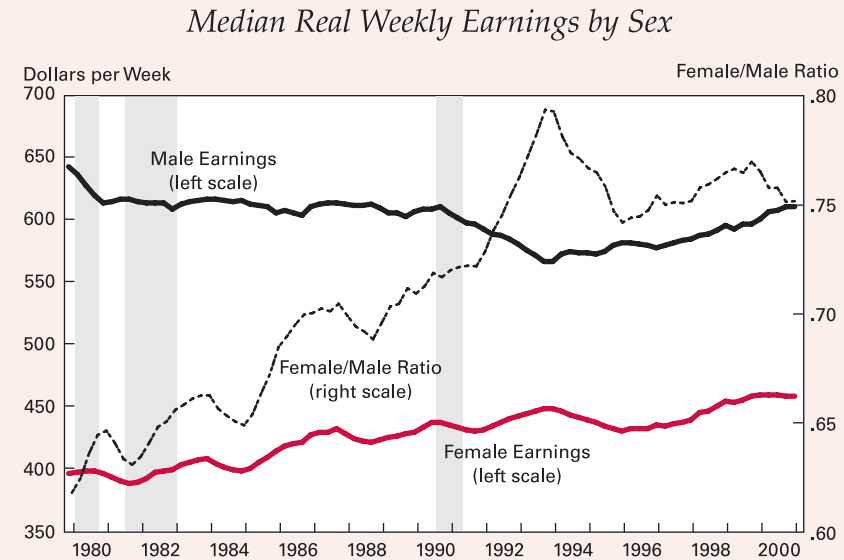
such as work experience, or job characteristics such as occupation. But after controlling for a variety of observable differences, wage disparities by race, Hispanic origin, and sex remain. Most notably, black men, black women, and Hispanic women did not see as steep an increase in the educational wage premium as their nonblack or non-Hispanic counterparts. At the end of the 1990s, blacks not only earned lower wages at each education level, but also realized less of a payoff for additional education (graduating from high school or earning a college degree) than otherwise similar nonblacks. Hispanics, too, earned below-average wages at each education level. But for Hispanics, a more significant source of overall wage disparities was lower educational attainment.

I. Intergroup Wage Disparities in the 1980s and 1990s

The past two decades have seen considerable change in wage disparities by race, Hispanic origin, and sex. The trends in female–male, black–white, or Hispanic–non-Hispanic wage differences have varied by educational attainment, and overall disparities have been affected by differential shifts in educational attainment.

During the 1979–92 period, women’s wages rose gradually in real terms, while men’s wages declined (Figure 1). After 1992, men’s real wages picked up. Thus, the female–male ratio of wages

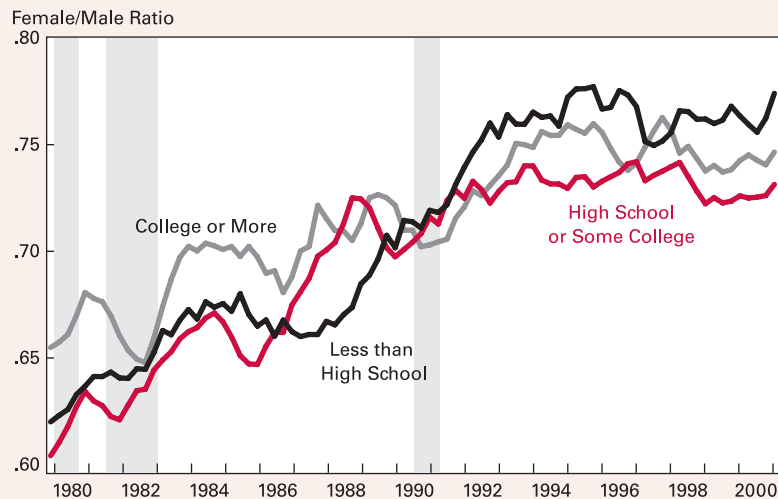
Figure 1



Note: Data are quarterly medians of weekly wages for full-time workers. Lines plot four-quarter moving averages. Shadings indicate recessions. Wages are converted to 1999 dollars using the CPI-U-X1, a historical series consistent with current CPI methodology. Source: U.S. Census Bureau and U.S. Bureau of Labor Statistics, Current Population Survey, Outgoing Rotation series.

Figure 2

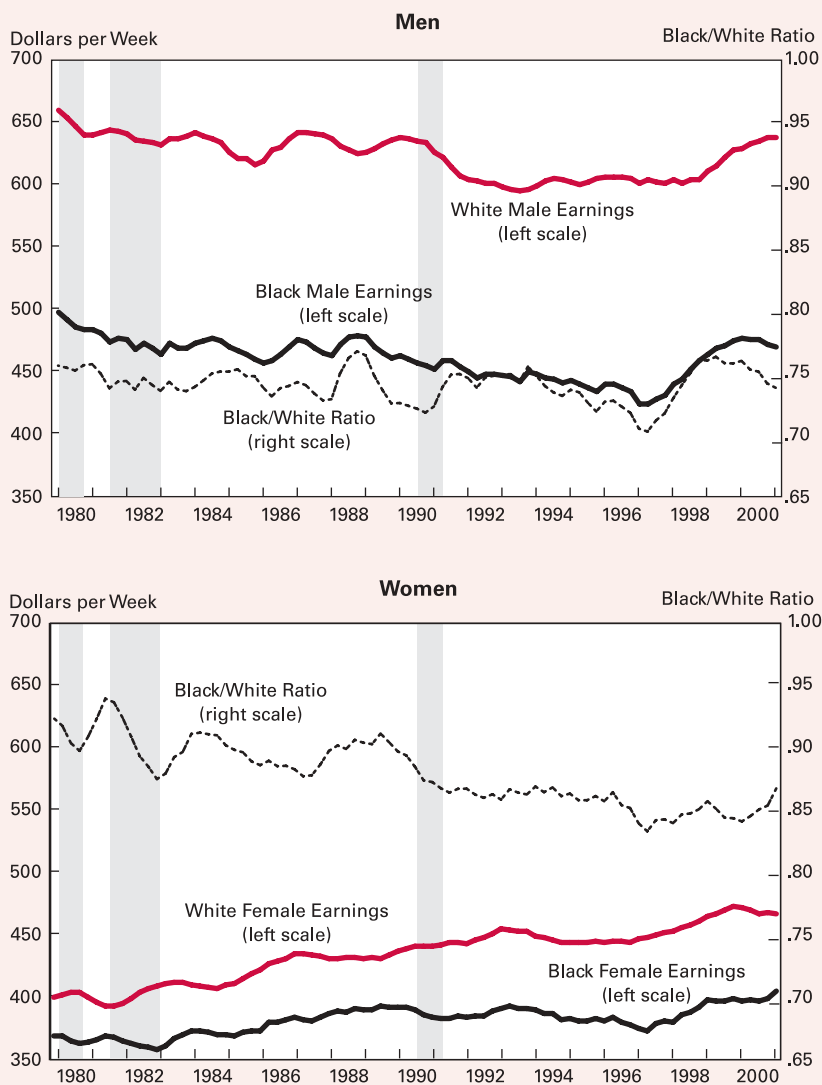
Female/Male Ratio of Median Weekly Earnings by Educational Attainment



Note: See Figure 1 for notes and source.

Figure 3

Median Real Weekly Earnings by Race



Note: See Figure 1 for notes and source.

period, but men lost faster than women, so the female-male ratio for high school dropouts rose. (Appendix Figure A1 plots the median wage data by sex and educational attainment that underlie these comparisons.) Among those with high school or some college, women's real wages were steady while men's fell.² Men and women with college degrees experienced real wage gains over the 20-plus years, with women gaining gradually on men until the mid 1990s. The female-male ratio for those with a college degree or more began higher (67 percent in 1979-80) than that for dropouts but rose only to 75 percent in 1999-00.³ Because the patterns differ so markedly by sex, the ensuing examination of wage disparities by race and Hispanic origin is carried out separately for men and women.

Examining race (Figure 3), black men's full-time weekly wages average three-quarters those of white men working full-time. Black and white men lost ground roughly in parallel, so the black-white ratio shows virtually no trend. By contrast,

¹ Blau (1998) similarly reports "women in all...education groups substantially narrowed the [weekly wage] gap with their male counterparts" over the 1969-95 period (p. 130).

² The Current Population Survey altered their survey questions and hence categories for educational attainment beginning with 1992 data. Appendix B defines how this study categorized individuals in the pre-1992 data and from 1992 on; these definitions are those that most researchers use but they are not strictly consistent pre- and post-1992. As discussed further in Appendix B, the regressions reported in Section V below include education-specific dummy variables for the pre-1992 observations to adjust for the changes in definition.

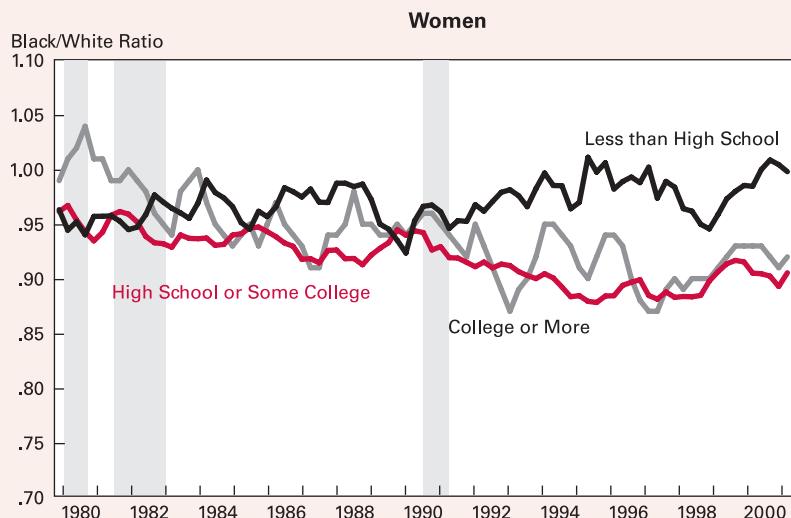
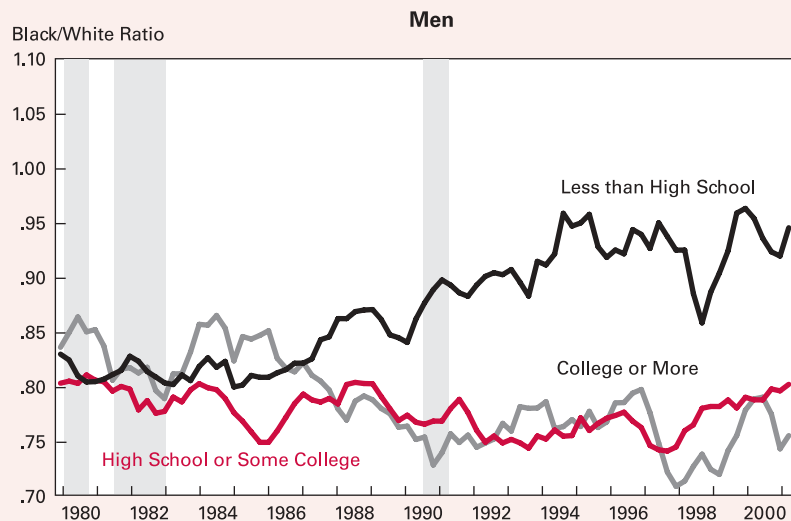
³ To smooth the fluctuations that are visible even in these four-quarter moving averages of quarterly median data, the text discussion and summary statistics usually focus on the two-year periods that begin and end the available data: 1979-80 and 1999-00.

generally rose for the first 13 years under study, declined from 1992 to 1995, and then more or less leveled out.

When the same comparisons are made controlling for education, the general pattern of relative female gains holds across education groups,¹ but women's gains were more pronounced among less-educated workers (Figure 2). Both men and women without a high school diploma lost ground in real terms over this

Figure 4

Black/White Ratios of Median Weekly Earnings by Educational Attainment



Note: See Figure 1 for notes and source.

wages for both black and white women rose in real terms in the 1980s and 1990s. However, white women made greater gains, so the black–white ratio of wages fell (lower panel of Figure 3).

Examination of the race comparisons by educational attainment (Figure 4) indicates that Figure 3’s steady black–white wage ratio for men masks divergent trends by education level. Black men lacking a high

school diploma saw real wages decline in the 1980s and 1990s, but the declines were less steep than those for white male high school dropouts. By contrast, black men with a high school education or more lost ground relative to similarly educated white men. And white male college graduates enjoyed sizable real wage gains, while black men with a college degree or more saw stagnant real wages.⁴ (See Appendix A Figure A2 for median wage levels by education, sex, and race.)

For women, the black–white differences are smaller but the patterns by educational attainment are similar to those for men. Black women with high school diplomas or with college degrees lost ground, in terms of real wages, relative to similarly educated white women.

Figure 5 compares median weekly earnings of Hispanics and non-Hispanics, indicating that Hispanic men and women generally lost ground relative to non-Hispanics. Hispanic women’s real wages were stagnant while non-Hispanic women made real wage gains. Hispanic men started the period with much lower wages than non-Hispanic men and saw steeper declines in real wages.

⁴ One might hypothesize that the gains of white male college graduates compared to blacks are explained by relative gains for whites in the fraction of college graduates attaining a post-college degree. However, while this fraction was consistently higher for whites than for blacks throughout the 1979–00 period, it declined for both blacks and whites (as higher fractions of the population attended college). And the black–white difference in the post-college fraction became increasingly negative in the first decade but then moved back up toward zero in the second.

Figure 6 plots Hispanic–non-Hispanic wage ratios by educational attainment (and Appendix A Figure A3 displays wage levels). While small sample sizes cause these ratios to be quite volatile, they generally trend downward except for high school dropouts, where the ratios show no clear trend. Patterns for Hispanics over the two decades reflect significant changes in the U.S. working-age Hispanic population, which more than doubled in size, in large part through immigration.

II. Educational Wage Premiums in the '80s and '90s: Large and Rising (but Varying by Group)

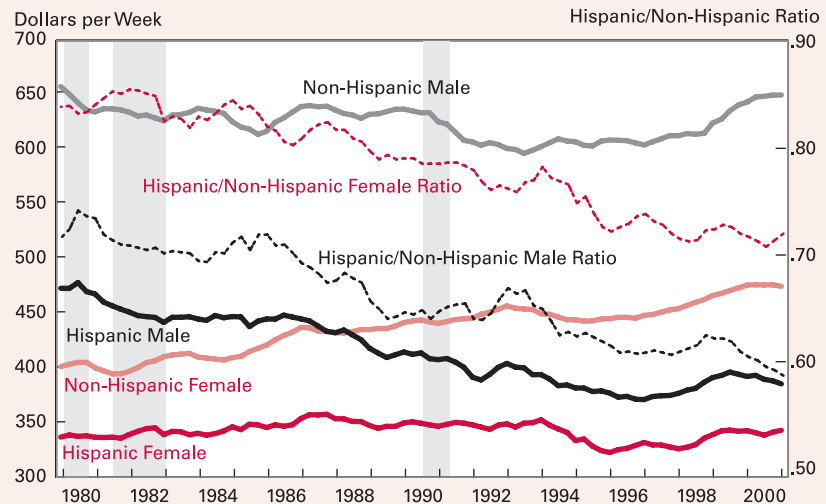
The wage differentials associated with differences in educational attainment expanded during the 1980s and 1990s. Figure 7 shows the much-discussed overall pattern of growing gaps in real wages between more-educated and less-educated people. The real wages of high school dropouts and high school graduates declined over the two decades, while weekly earnings of college graduates and those with post-college education rose in real terms.

Figure 8 plots the payoff to completing high school and the payoff to completing college, with the payoff measured as the percentage increase in weekly wages. In 1979–80, the median high school graduate (someone who had completed high school or some college but did not have a college degree) earned 20 percent higher weekly wages than the median full-time worker lacking a high school diploma; by 1997, this premium had risen to 49 percent, where it more or less stayed through 2000. Similarly, in 1979–80, the median weekly earnings of a college graduate (college degree or more) were 43 percent higher than those of someone with a high school diploma or some college; by 1992, this differential was 71 percent, a level to which it returned at the end of the 1990s.

As Figure 2 made clear, men and women with the same educational attainment did not consistently experience the same earnings growth over time.⁵ The payoff to completing high school rose more steeply for men than for

Figure 5

Median Real Weekly Earnings of Hispanics and Non-Hispanics



Note: See Figure 1 for notes and source.

women in the early 1990s and stayed higher throughout the decade (Figure 9). By contrast, women saw a greater payoff than men to obtaining a college degree, although the female advantage shrank over the two decades.

Some blacks and Hispanics did not gain as much from additional schooling as did non-Hispanic whites. For example, even as women in general saw a smaller payoff to completing high school than men, black women gained noticeably less than white women from obtaining their diplomas (top panel of Figure 10). And Hispanic men (lower panel of Figure 10) saw higher payoffs to high school graduation (from a lower base wage, as Figures 5 and 6 showed) than non-Hispanic men until the mid 1990s, when their advantage disappeared.

III. Shifts in Educational Mix

As the payoff to obtaining additional education rose over the last couple of decades, the number and fraction of people achieving each educational level also rose. Among the U.S. working-age population as a

⁵ Recall that these data refer to full-time workers; hence the differences shown here between men and women are not attributable predominantly to differences in work hours. Among full-time workers, while women averaged fewer work hours per week than men (41 as compared with 43), women's average work hours rose only slightly more between 1979 and 2000 than men's (increasing by 1 hour per week as compared with about 40 minutes for men).

Table 1

Educational Mix of the Working-Age Population

	Total (Working-Age) Population		Men		Women		Memo: All Full- Time Workers	
	1979-80	1999-00	1979-80	1999-00	1979-80	1999-00	1979-80	1999-00
Percentage of Population:								
Less than high school	32.9	19.8	33.1	20.3	32.7	19.4	20.2	10.5
High school, no college	36.8	31.8	33.2	30.7	40.0	32.7	41.9	32.2
Some college	16.0	25.9	16.4	24.9	15.6	26.8	18.1	28.1
College degree, no more	8.6	15.2	9.5	15.7	7.7	14.9	11.6	19.6
More than college	5.8	7.3	7.7	8.4	4.0	6.2	8.2	9.6
Number (000)								
	166,304	208,726	78,699	100,227	87,605	108,500	72,167	109,854
Growth from 1979-80 to 1999-00 (percent):								
All	25.5		27.4		23.9		52.2	
Less than high school	-24.5		-22.1		-26.7		-20.8	
High school or some college	37.2		42.8		32.8		52.9	
College degree or more	97.0		78.0		122.1		124.7	
Percentage of Population:								
	Black Men		Hispanic Men		Black Women		Hispanic Women	
	1979-80	1999-00	1979-80	1999-00	1979-80	1999-00	1979-80	1999-00
Percentage of Population:								
Less than high school	50.3	26.4	56.8	46.7	47.0	25.1	56.8	44.6
High school, no college	29.6	35.4	24.9	27.0	32.7	32.8	28.9	27.0
Some college	13.2	25.2	11.6	17.4	13.3	28.0	9.4	19.3
College degree, no more	4.1	9.1	3.8	6.1	4.5	9.9	3.1	6.6
More than college	2.8	3.9	2.8	2.8	2.5	4.1	1.8	2.4
Number (000)								
	7,858	11,232	4,019	10,889	9,769	13,805	4,376	11,129
Growth from 1979-80 to 1999-00 (percent):								
All	42.9		170.9		41.3		154.3	
Less than high school	-25.0		122.9		-24.4		100.0	
High school or some college	102.4		228.6		86.8		207.6	
College degree or more	168.8		263.2		184.7		366.8	

Source: Data from U.S. Census Bureau, Current Population Survey, Outgoing Rotation series.

whole, the fraction who had not completed high school fell from about one-third in 1979-80 to one-fifth in 1999-00; meanwhile, the fraction with a college degree or more rose from 14 percent to 22 percent (Figure 11). Because of selection, educational attainment was and is higher for individuals in the labor force than for those not in the labor force; the same is true for the employed compared with the unemployed and for those employed full-time compared with part-time workers. High school dropouts declined from one-fifth to one-tenth of full-time workers, while college graduates increased from one-fifth to almost 30 percent (Table 1).

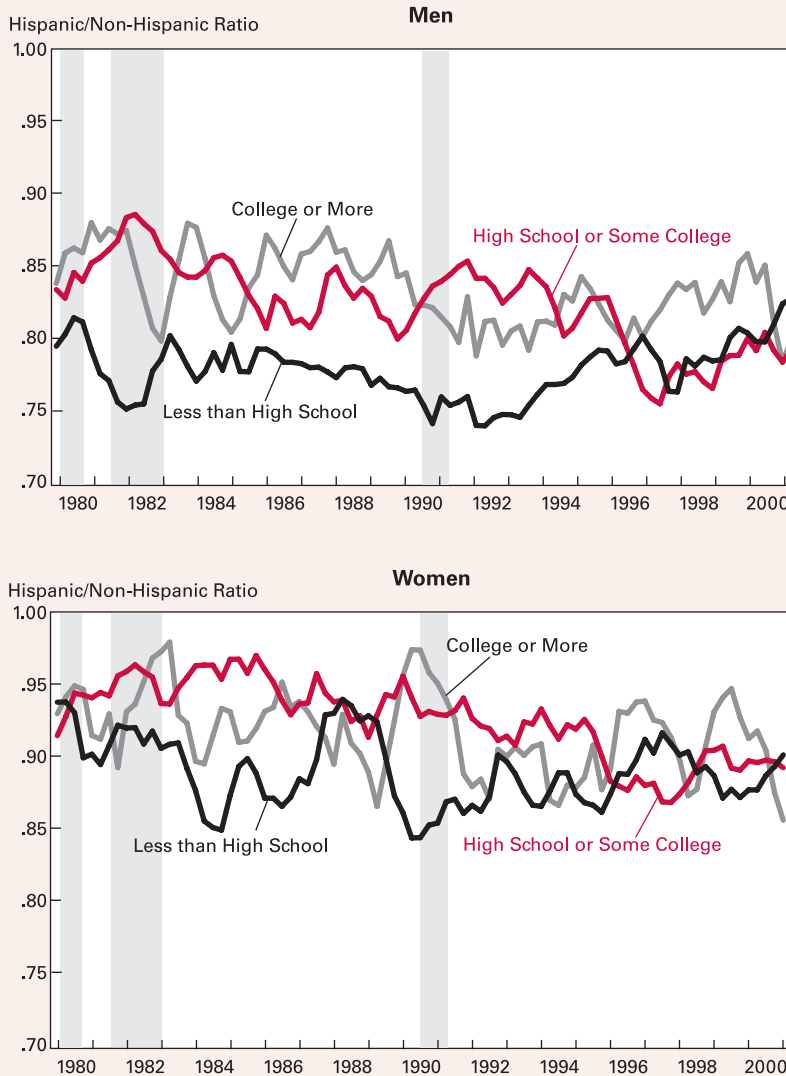
Women's educational attainment rose more than men's over the two decades. Having begun the 1980s with the same fraction of high school dropouts as

men but considerably fewer college graduates (12 percent as compared to men's 17 percent), women saw their number of college graduates in the working-age population rise faster than that of men (growth rates in Table 1). Furthermore, in the full-time workforce, the number of college graduates rose even faster. By 1999-00, individuals with a college degree constituted the same percentage of the full-time workforce for men and for women. By contrast, women working full-time were less likely to be high school dropouts than their male counterparts in 1999-00.

Blacks improved their educational attainment dramatically over the two decades. Approximately one-half of working-age black men and women had not completed high school in 1979-80. Twenty years

Figure 6

Hispanic/Non-Hispanic Ratio of Median Weekly Earnings by Educational Attainment



Note: See Figure 1 for notes and source.

later, this fraction had fallen to about one-quarter. At the upper end of the educational scale, the improvement was less pronounced. College graduates represented 13 to 14 percent of working-age blacks in 1999–00, up from 7 percent in 1979–80.

The educational attainment of Hispanics did not improve as much. Among Hispanics of working age, the fraction lacking a high school diploma fell from 57 percent in 1979–80 to 45 or 47 percent in 1999–00. The

fraction with a high school diploma but not a college degree increased from 37 or 38 percent at the beginning of the 1980s to 45 or 46 percent at the end of the 1990s. And the fraction with a college degree remained well behind the rest of the population, rising only to 9 percent in 1999–00. However, because the Hispanic working-age population grew so fast over the two decades (more than doubling, from 8 million to 22 million), the number of Hispanic college graduates, male and female, expanded much faster than the college graduate population as a whole.

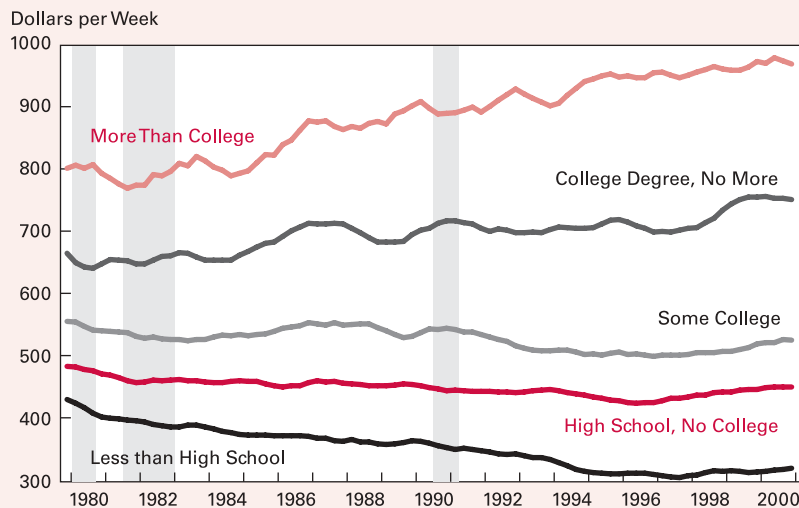
IV. The Educational Wage Premium in the Context of Individual Wage Determination

An extensive literature in economics examines the determinants of wages for individuals, positing that at any particular time, the operation of labor markets yields wage profiles that vary with individual characteristics and job characteristics. Moreover, the relationship between characteristics and wages evolves over time as a result of shifts in the supply of and demand for each characteristic.

Regarding education, on the demand side, employers are willing to pay more for more highly educated workers in proportion to the incremental output (productivity) they expect to realize based on additions to the workers' education. On the supply side, workers with more education hold out for higher wages to provide a return on the investment they have made in acquiring that additional education; furthermore, fewer investments will be made by ensuing cohorts if no payoff is seen.

Figure 7

*Median Real Weekly Earnings of Full-Time Workers
by Detailed Educational Attainment*



Note: See Figure 1 for notes and source.

Levy and Murnane (1992) summarize the combinations of shifts in supply and demand that are necessary to explain historical trends in wages among educational attainment groups. The most important factor in the 1970s decline in the educational wage premium was the entrance of the large and well-educated baby boom generation into the labor force. The 1980s (and now the 1990s) are more complicated, with a slowdown in the rate of increase in the labor force (as younger baby boomers followed the crest of the wave) and therefore in the rate of increase in the number of highly educated workers, accompanied by demand shifts that have proved difficult to quantify.

Researchers have observed that increases in the fraction of the labor force with a college degree accompanied by wage increases for college-educated workers, such as occurred in the 1980s and 1990s, must imply that the demand for college-educated workers rose faster than the supply. Similarly, declines in real wages for high school dropouts even as their numbers shrank imply that the demand for less-educated workers declined faster than the supply. A variety of explanations have been offered for these demand shifts, including the rising value of the dollar, which shifted demand away from U.S. manufacturing and other less-educated workers, and the non-neutral technological change that increased the productivity of highly

educated workers more than that of the less educated. Thus, any model of wages should include both supply and demand factors in the labor market.

The wage literature documents an important caveat regarding the measurement of racial wage disparities using data like those used in this article from the Current Population Survey. Wages are observed only for individuals who are employed. Individuals who are unemployed or not in the labor force are selected into those statuses partially on the basis of wages. That is, the wages that non-workers would earn if employed are typically lower, other things equal, than the wages of workers who have jobs. Since blacks display higher

unemployment rates and lower rates of labor force participation than whites, on average, the measured black–white wage gap understates the racial disparity in (potential) wages for the entire working-age population. The medians shown in the earlier charts suffer from this bias, and in the analysis that follows, the relationship between a specific characteristic and wages will be underestimated to the degree that the characteristic is also associated with unemployment or labor force participation. Furthermore, as labor force participation has declined more steeply for black men than white men over the last several decades, the estimates below of the less positive trend in the educational wage premium for blacks as compared to whites understate the actual deterioration in blacks' relative position.⁶

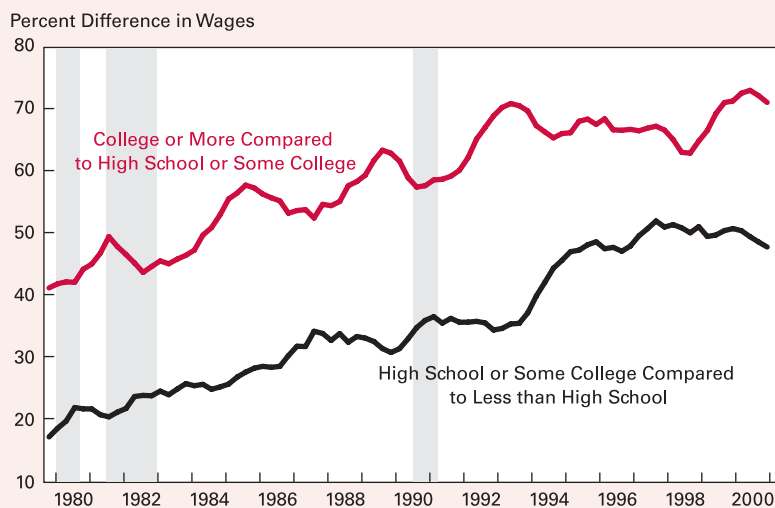
V. Individual Wages: Accounting for Individual Characteristics and Structural Influences

Multiple regression analyses explaining the earnings of individuals can be used to examine the returns

⁶ Chandra (2001), for example, finds that the true black–white wage gap expanded for male low-skill workers, while observed wages converged. He estimates that 60 percent of the convergence between 1960 and 1990 is driven by selective withdrawal.

Figure 8

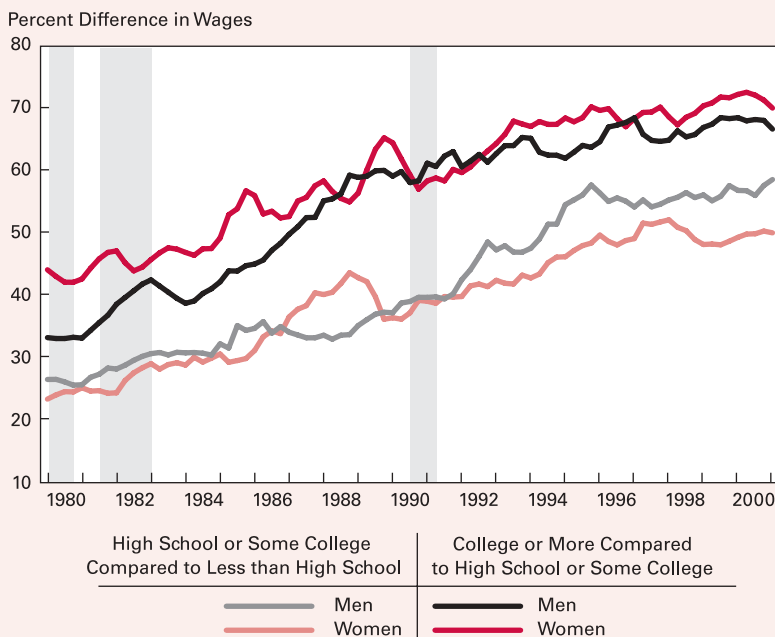
Educational Wage Premium



Note: See Figure 1 for notes and source.

Figure 9

Educational Wage Premium by Sex



Note: See Figure 1 for notes and source.

to education when other characteristics and time-varying factors are controlled for. The regressions reported below are estimated using individual observations on the log of weekly wages over the 1979 to 2000 period, for men and women separately. Observations are drawn from the Outgoing Rotation group of the Current Population Survey for individual full-time workers; those with allocated wages are excluded.⁷

Explanatory variables reflect supply and demand factors. In addition to educational attainment, they include race, Hispanic origin, family and marital status, potential work experience (reflecting age and education), weekly work hours, regional dummy variables, business cycle indicators, seasonal (quarter) dummies, and a time trend. As discussed below, some versions of the equations include industry and occupation and others do not. The business cycle indicators and trend are measured at a quarterly frequency (Outgoing Rotation group observations occur monthly).

Tables 2 and 3 report key coefficient estimates for men and women, respectively. The first column reports estimates that account for race and Hispanic origin only with dummy variables; that is, the wages of blacks, other races,

⁷ For some members of the Outgoing Rotation group, the U.S. Census Bureau lacks wage information and estimates weekly wages on the basis of an individual's characteristics. These observations "with allocated wages" are not included here when estimating equations with weekly wages as the dependent variable.

Table 2

Selected Regression Results—Men

Full-time workers with weekly wages

Dependent variable: log of weekly wages

Explanatory Variables	(1) Education Trends	(2) Dropping Occupation and Industry	(3) Black Interactions and Trends	(4) Hispanic Interactions and Trends
Race and Ethnicity:				
Black	-.136*** (.001)	-.173*** (.001)	-.185*** (.027)	-.138*** (.001)
Other race	-.113*** (.002)	-.142*** (.002)	-.112*** (.002)	-.113*** (.002)
Hispanic	-.166*** (.001)	-.212*** (.001)	-.165*** (.001)	-.436*** (.026)
Black Hispanic	.120*** (.008)	.145*** (.009)	.0907*** (.0083)	.120*** (.008)
Trend (quarterly)	-.00934*** (.00026)	-.0108*** (.0003)	-.00966*** (.00028)	-.00883*** (.00030)
Trend x Black (or x Hispanic)			.00257*** (.00079)	.00138** (.00070)
Educational Attainment:				
High school, no college	.189*** (.005)	.226*** (.006)	.192*** (.006)	.173*** (.006)
Some college	.200*** (.006)	.269*** (.006)	.202*** (.006)	.182*** (.007)
College degree, no more	.336*** (.007)	.467*** (.007)	.337*** (.007)	.322*** (.007)
More than college	.424*** (.008)	.549*** (.008)	.421*** (.008)	.408*** (.008)
Educational Attainment x Black (or x Hispanic):				
High school, no college			-.0312* (.0165)	.101*** (.016)
Some college			-.0204 (.0191)	.145*** (.020)
College degree, no more			-.00388 (.02451)	.0949*** (.0292)
More than college			.104*** (.032)	.127*** (.039)
Educational Attainment x Trend:				
High school, no college	.000847*** (.000296)	.00101*** (.00031)	.00113*** (.00032)	.000225 (.000330)
Some college	.00698*** (.00033)	.00732*** (.00035)	.00734*** (.00035)	.00635*** (.00036)
College degree, no more	.0111*** (.0004)	.0121*** (.0004)	.0116*** (.0004)	.0105*** (.0004)
More than college	.0159*** (.0004)	.0174*** (.0004)	.0166*** (.0004)	.0152*** (.0004)
Educational Attainment x Trend x Black (or x Hispanic):				
High school, no college			-.00205** (.00091)	-.00222** (.00089)
Some college			-.00284*** (.00105)	-.00270** (.00110)
College degree, no more			-.00470*** (.00136)	-.00220 (.00160)
More than college			-.0114*** (.0018)	-.00153 (.00211)
Also Included:				
Black (or Hispanic) x other variables ^a	no	no	yes	yes
Occupation and industry ^b	yes	no	yes	yes
Adjusted R-squared	.458	.393	.459	.459

Note: There are 1,500,082 observations. Standard errors are in parentheses below estimated coefficients.

All equations also include usual work hours per week, dummy variables for marital and family status, potential experience ranges, year quarter, and geographic region, plus education category shift terms pre-1992.

^aEquations with "yes" include black (or Hispanic) interactions with experience dummies, family and marital status, business cycle indicators, usual weekly hours, Southern region, and pre-1992 education shifts.^bEquations with "yes" include dummies for occupation and industry.

* Significantly different from zero with 90 percent or better confidence.

** Significantly different from zero with 95 percent or better confidence.

*** Significantly different from zero with 99 percent or better confidence.

Table 3

Selected Regression Results—Women

Full-time workers with weekly wages

Dependent variable: log of weekly wages

Explanatory Variables	(1) Education Trends	(2) Dropping Occupation and Industry	(3) Black Interactions and Trends	(4) Hispanic Interactions and Trends
Race and Ethnicity:				
Black	-.0255*** (.0012)	-.0531*** (.0013)	-.0560** (.0280)	-.0261*** (.0012)
Other race	-.0465*** (.0020)	-.0750*** (.0022)	-.0457*** (.0020)	-.0472*** (.0020)
Hispanic	-.0732*** (.0015)	-.106*** (.002)	-.0728*** (.0015)	-.190*** (.034)
Black Hispanic	.0247*** (.0086)	.0451*** (.0093)	.00502 (.00865)	.0226*** (.0086)
Trend (quarterly)	-.00657*** (.00034)	-.00619*** (.00037)	-.00634*** (.00037)	-.00641*** (.00038)
Trend x Black (or x Hispanic)			-.000980 (.000915)	.00187** (.00094)
Educational Attainment:				
High school, no college	.0829*** (.0067)	.184*** (.007)	.0916*** (.0073)	.0711*** (.0074)
Some college	.124*** (.007)	.284*** (.008)	.133*** (.008)	.110*** (.008)
College degree, no more	.247*** (.008)	.495*** (.009)	.251*** (.009)	.234*** (.009)
More than college	.395*** (.009)	.672*** (.010)	.395*** (.010)	.378*** (.010)
Educational Attainment x Black (or x Hispanic):				
High school, no college			-.0312* (.0184)	.0887*** (.0202)
Some college			-.0532*** (.0199)	.122*** (.024)
College degree, no more			.0222 (.0238)	.134*** (.033)
More than college			.0879*** (.0297)	.282*** (.045)
Educational Attainment x Trend:				
High school, no college	.00469*** (.00037)	.00465*** (.00040)	.00471*** (.00040)	.00448*** (.00040)
Some college	.00906*** (.00040)	.00958*** (.00043)	.00896*** (.00044)	.00896*** (.00044)
College degree, no more	.0140*** (.0004)	.0146*** (.0005)	.0142*** (.0005)	.0139*** (.0005)
More than college	.0168*** (.0005)	.0170*** (.0005)	.0172*** (.0005)	.0168*** (.0005)
Educational Attainment x Trend x Black (or x Hispanic):				
High school, no college			-.00104 (.00101)	-.00225** (.00110)
Some college			.000543 (.001097)	-.00431*** (.00130)
College degree, no more			-.00343*** (.00131)	-.00530*** (.00178)
More than college			-.00736*** (.00163)	-.0114*** (.0024)
Also Included:				
Black (or Hispanic) x other variables ^a	no	no	yes	yes
Occupation and industry ^b	yes	no	yes	yes
Adjusted R-squared	.436	.342	.437	.436

Note: There are 1,128,751 observations. Standard errors are in parentheses below estimated coefficients.

All equations also include usual work hours per week, dummy variables for marital and family status, potential experience ranges, year quarter, and geographic region, plus education category shift terms pre-1992.

^aEquations with "yes" include black (or Hispanic) interactions with experience dummies, family and marital status, business cycle indicators, usual weekly hours, Southern region, and pre-1992 education shifts.^bEquations with "yes" include dummies for occupation and industry.

* Significantly different from zero with 90 percent or better confidence.

** Significantly different from zero with 95 percent or better confidence.

*** Significantly different from zero with 99 percent or better confidence.

Table 4

Lower-Bound Payoffs to Attaining Educational Thresholds, by Race

Estimates of weekly earnings differentials in log points

	High School Graduate Compared with Dropout		College Graduate Compared with High School Graduate	
	1979–80	1999–00	1979–80	1999–00
All Men	.190	.207	.158	.364
All Women	.088	.182	.174	.362
Nonblack Men	.193	.215	.156	.366
Black Men	.159	.141	.181	.337
Nonblack Women	.097	.191	.170	.360
Black Women	.064	.138	.221	.363

Source: Author's calculations, based on estimated coefficients reported in columns 1 (sex) and 3 (race) of Tables 2 and 3. These are lower-bound estimates because equations include dummy variables for occupation and industry.

and Hispanics are assumed to reflect the same wage increments associated with individual, job, and time-specific characteristics as those of non-Hispanic whites, but they may differ by a shift term. The estimates in the right-hand columns allow coefficients on other variables, including education, to differ for blacks (column 3) and Hispanics (column 4).

According to the estimates in Table 2, column 1, black men suffer about a 14 percent (0.14 log points) wage disadvantage, on average, controlling for a wide variety of individual and job characteristics. Other nonwhite men experience a slightly smaller wage disadvantage and Hispanic men a somewhat larger one (0.17 log points), controlling for other characteristics. For women, the wages of blacks, other nonwhite races, and Hispanics are lower than those of non-Hispanic whites, but to a lesser degree than for men. (The black Hispanic variable allows the wages of black Hispanics to be lower or higher than the sum of the black and Hispanic disadvantages. For both men and women, the wages of black Hispanics are only slightly lower than those of nonblack Hispanics, other things equal.⁸)

Educational attainment is a key determinant of wages. The regression estimates reported in all four columns of both tables show large and highly significant additions to wages associated with each increment to education, compared with the omitted category of not completing high school. The very small standard errors on the estimated coefficients imply that the wage addition associated with each education

Table 5

Upper-Bound Payoffs to Attaining Educational Thresholds, by Race

Estimates of weekly earnings differentials in log points

	High School Graduate Compared with Dropout		College Graduate Compared with High School Graduate	
	1979–80	1999–00	1979–80	1999–00
All Men	.228	.248	.253	.475
All Women	.189	.282	.322	.521
Nonblack Men	.229	.258	.250	.475
Black Men	.202	.166	.282	.456
Nonblack Women	.194	.294	.313	.514
Black Women	.167	.214	.402	.559

Source: Author's calculations, based on estimated coefficients reported in column 2 of Tables 2 and 3 and other equations (not shown) that also exclude occupation and industry.

level is not only significantly greater than that realized by high school dropouts (the omitted category), but also, in most cases, significantly higher than that associated with the educational level immediately below.⁹ Because trend variables are also included for education categories (as discussed in the next paragraph), the education level coefficients shown refer to 1979, the beginning of the period when the trend variable is at zero.

The estimated coefficients on education interacted with trend (*educational attainment x trend*) measure the degree to which the education payoffs rose over time; they indicate that higher levels of education saw steeper increases than lower levels. Table 4 summarizes the estimated effects on weekly wages of attaining two key educational thresholds—graduation from high school (compared with having less than a high school degree) and graduation from college (compared with being a high school graduate and no more) at the beginning of the period and at

⁸ That is, the wages of black Hispanics are lower or higher (in log points) than those of white non-Hispanics by the amount indicated by the sum of the black, Hispanic, and black Hispanic coefficients.

⁹ Alternative equations including the “less than high school” category and omitting the “high school, no college” category yield estimates identical to those shown for all coefficients except the education-related variables. The estimated coefficients on the education variables in the alternative versions are arithmetically equal to the coefficients shown minus the corresponding “high school, no college” coefficient. The estimated coefficient for college graduation, for example, is arithmetically equal to the difference between the Table 2, column 3 coefficient on college degree, no more, and that for high school, no college.

the end.¹⁰ For men, the payoff to high school graduation rose very little over the two decades. By contrast, the payoff to a college degree more than doubled; in 1999–00, a man with a college degree had about 36 percent (0.36 log points) higher weekly wages than an otherwise-similar male high school graduate working full time.

Unlike for men, the payoff to high school graduation for women rose markedly over the 20 years, although even in 1999–00, the wage payoff to a diploma was smaller for women than for men, other things equal.¹¹ Like men's, women's payoff to college graduation rose very substantially.

The estimated coefficients on the educational attainment variables reported in column 1 of Tables 2 and 3 understate the full impact of education on wages, because they explicitly control for other characteristics that result, in part, from educational attainment. In particular, the column 1 regressions include variables indicating the occupation and industry in which an individual wage earner works,¹² and educational attainment clearly influences an individual's job possibilities. Column 2 reports regression estimates when occupation and industry are excluded from the equation. These estimates overstate the impact of education because an additional correlation exists between education and occupation/industry (beyond that which occurs because of education's direct influence on occupational and industry outcomes), presumably attributable to other factors not included in the analysis. The wage effects of these other factors are incorrectly attributed entirely to education when occupation and industry are omitted. Thus, the coefficients in column 1 might be viewed as lower-bound estimates of the effects of educational attainment on wages and the coefficients in column 2 as upper-bound estimates.

As would be expected, the estimates of education's impact on wages are larger when occupation and industry are excluded (column 2 of Tables 2 and 3). And the educational attainment payoffs implied by these estimates (shown in Table 5) are also higher—obtaining a college degree could add up to 45 or 55 percent to a high school graduate's wages.

Do Blacks See Different Payoffs to Individual, Job, and Time Characteristics?

The equations shown in column 3 of Tables 2 and 3 allow the estimated wage payoff for a variety of characteristics, including education, to differ for blacks.

The additional variables included in these equations are additive race-interaction terms; thus, their coefficients indicate the *difference* between the black effect on wages of a given variable and the nonblack effect.¹³ The estimated coefficients on the *educational attainment x trend x black* variables are significant and negative; that is, black men saw a considerably smaller increase between 1979 and 2000 in the payoff to additional education—a smaller rise in the educational wage premium—than did nonblack men. The estimated racial differences, including education trend variables, are smaller for women, in general, than for men.

Figure 12 summarizes the estimated race differences in education coefficients and education time trends, plotting “simulated” wages by education in 1979–80 and 1999–00. These simulated wages reflect estimated black–nonblack differences in the rewards to education (coefficients) for identical (in terms of all other included variables) black and nonblack men (upper panel) and women (lower panel).¹⁴ For men, the estimates indicate blacks earn less than similar nonblacks at every education level. In 1979–80, the race disadvantage was largest for those with a high school degree and smallest for men with more than college (black high school grads with no college earned 18 percent less than similar nonblack men earned, while black men with post-college degrees earned 8 percent less). By 1999–00, the race gap was largest for the most educated men and smallest for high school dropouts (blacks earned from 21 percent to 10 percent less than similar nonblacks).

¹⁰ Note that all of these “threshold” comparisons of payoffs are based on estimates that distinguish between those with a high school diploma and those with some college, and similarly between those with a college degree and those with a post-college degree. The high school graduation payoff compares those with a high school degree (but no more) with high school dropouts. Similarly, the college graduation payoff compares those with no education beyond college to those with no education beyond high school. These comparisons differ from those made in Figures 2, 4, 6, 8, 9, and 10, in which high school and some college are combined, and college graduates are combined with post-college degree-holders.

¹¹ And since women's wages are lower than men's at each education level, this smaller percentage payoff for women translates into an even smaller relative payoff in dollars.

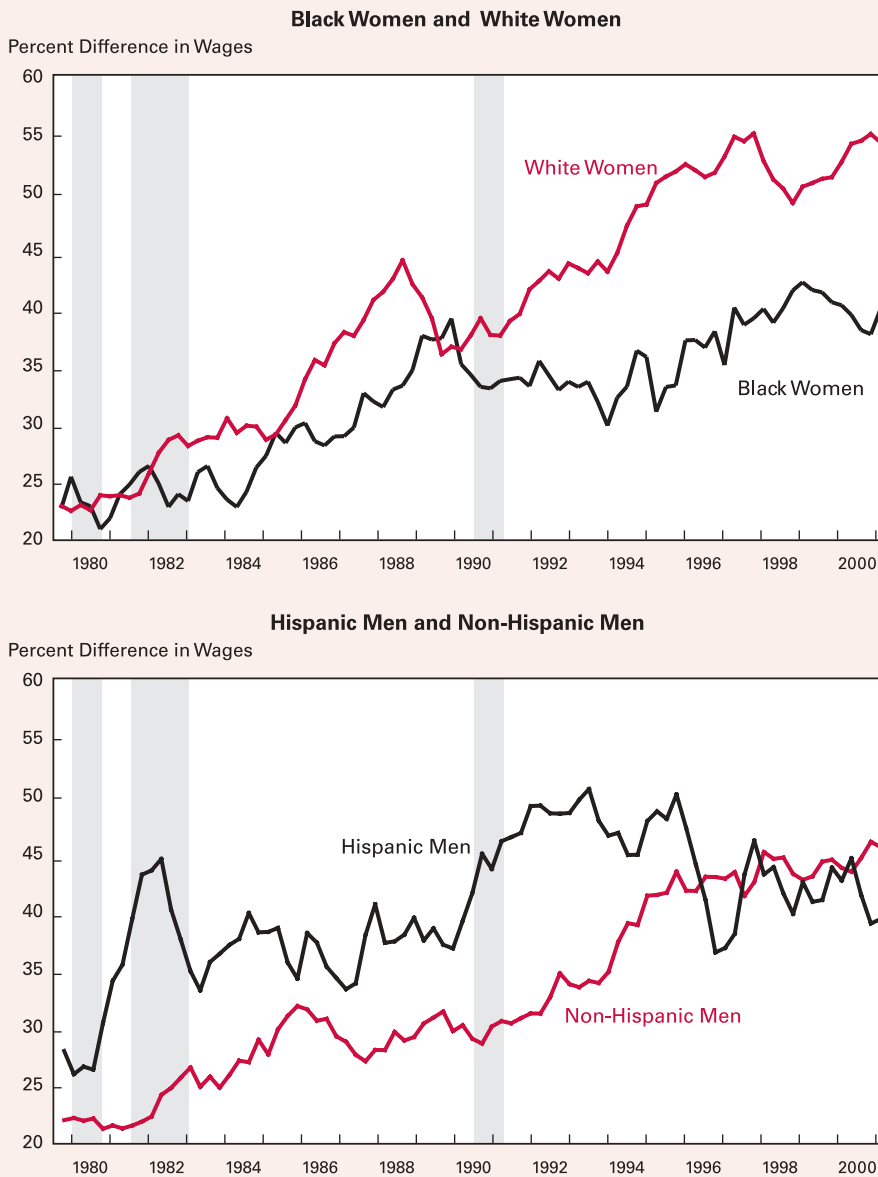
¹² They are dummy variables for seven broad industry groups and eight broad occupation groups.

¹³ The tests of statistical significance marked with asterisks in the table, when applied to black interaction terms (“*x black*”), test the hypothesis that the difference between the nonblack and black effect of that variable is statistically distinguishable from zero; that is, whether the black effect is different from the nonblack effect.

¹⁴ That is, the simulated wages multiply coefficient estimates by mean characteristics and sum across all the variables in the equation *assuming* that all characteristics except race are equal for blacks and nonblacks (at the overall sample means in 1979–80 and 1999–00) and all coefficients are equal for blacks and nonblacks except those for black dummy, trend, education levels, and education trends.

Figure 10

Educational Wage Premium
 Difference between High School or Some College
 and Less than High School



Notwithstanding lower wages at each education level, black men entered the 1980s with slightly higher wage payoffs (percentage increase) than nonblack men to graduating from college (middle panel of Table 4).¹⁵ By the end of the 1990s, their attainment returns had fallen behind. The payoff to completing high school actually declined for black men;

it rose slightly for nonblack men. The payoff to college graduation rose substantially for both black and nonblack men. However, given a high school diploma, earning a college degree added somewhat less to black men's wages than to nonblacks' in 1999–00.

Black women, like black men, earned less at each education level (except post-college in 1979–80) than similar nonblack women (Figure 12, lower panel). As in the case of black men, the wage disadvantage black women faced compared with nonblack women rose over the two decades and shifted more strongly against those with the most education. In 1999–00, black women with more than college suffered the largest disadvantage and high school dropouts the least (black women earned 13 percent to 6 percent less than nonblack women with the same education and other characteristics).

Black women, unlike black men, saw the payoff to a high school diploma rise over the 20-year period (Table 4, lower panel).¹⁶ However, like black men, black women saw their payoff remain lower than that of their nonblack counterparts. Black women began the period with a higher payoff to college graduation than nonblack women; in 1999–00, their payoff was roughly equal to that

of nonblack women, as both rose substantially.

Upper-bound estimates by race for high school and college graduation payoffs are reported in the

¹⁵ The dollar payoff, just over \$100 per week, was similar for blacks and nonblacks.

¹⁶ Even in 1999–00, however, black women's payoff to a high school diploma was lower than black men's.

middle and lower panels of Table 5. Even though these estimated payoffs are considerably higher than those obtained when occupation and industry are controlled for (Table 4), the *relative* payoffs for blacks and nonblacks are virtually the same whether occupation and industry are included or excluded. And the earnings payoff for both high school graduation and college graduation rose less over the 20 years for black men and women than for nonblack men and women according to the upper- and lower-bound sets of estimates.¹⁷

How Do Patterns Differ for Hispanics?

Hispanics receive lower wages than otherwise similar non-Hispanics. Column 1 of Table 2 indicates that Hispanic men earn about 17 percent (0.17 log points) less per week than non-Hispanic men, other things equal; Table 3 shows a smaller (0.07 log points) wage disadvantage for Hispanic women. Column 4 in each table reports regression estimates from equations that allow a variety of coefficients to differ for Hispanics. Figure 13 summarizes the education-related wage differentials between Hispanics and non-Hispanics.¹⁸

The wages associated with each education level are two-thirds to three-quarters as large for Hispanic men as for non-Hispanic men at the beginning and the end of the period, controlling for all the other individual and job characteristics included in the equation (Figure 13, top panel). While the wage levels of Hispanic men are lower than those of non-Hispanics, the increment or payoff to graduating from high school is markedly greater than for non-Hispanics, at least in percentage terms (Table 6). The Hispanic male college graduation payoff, by contrast, is slightly lower than that of non-Hispanic men, and they rose roughly in parallel over the 20 years.

Hispanic women do not suffer as large a wage disadvantage as Hispanic men do, compared with non-Hispanics (Figure 13). However, the Hispanic educational trend coefficients in column 4 of Table 3 indicate that Hispanic women lost ground steeply over the 1979–00 period relative to non-Hispanic women. Hispanic women began the period with much higher payoffs to high school graduation and college graduation than non-Hispanic women (Table 6). Seeing less of a rise over the 20 years, they ended the period with a higher payoff to a high school diploma than non-Hispanic women, but a somewhat lower payoff to graduating from college.¹⁹ Some of these shifts are undoubtedly attributable to the substantial augmenta-

Table 6

Lower-Bound Payoffs to Attaining Educational Thresholds, by Hispanic Origin

Estimates of weekly earnings differentials in log points

	High School Graduate Compared with Dropout		College Graduate Compared with High School Graduate	
	1979–80	1999–00	1979–80	1999–00
Non-Hispanic Men	.173	.178	.160	.365
Hispanic Men	.272	.232	.153	.359
Non-Hispanic Women	.076	.165	.173	.362
Hispanic Women	.162	.207	.215	.343

Source: Author's calculations, based on estimated coefficients reported in column 4 of Tables 2 and 3. These are lower-bound estimates because equations include dummy variables for occupation and industry. Upper-bound estimates are reported in Appendix A Table A1.

tion of the Hispanic population through immigration during the 1980s and 1990s. Blau (1998) reports that “labor market outcomes of immigrants have been declining relative to natives, even compared to natives with the same measured characteristics” (p. 115).

VI. Combining and Comparing Education-Related Sources of Change in Wages

The wage trends plotted in Figures 1, 3, and 5 (wage medians by sex, race, and Hispanic origin) reflect the whole set of changes described in Sections II through V of the paper. In particular, one group’s wages may rise or fall relative to another’s either because their characteristics change relative to the other group’s characteristics or because the returns (wage payoff) to their characteristics shift relative to those of the other group. Smith and Welch (1989) proposed a decomposition of the change over time in the between-group difference in the log of wages that helps sort out the sources of change. In the current context, such a decomposition

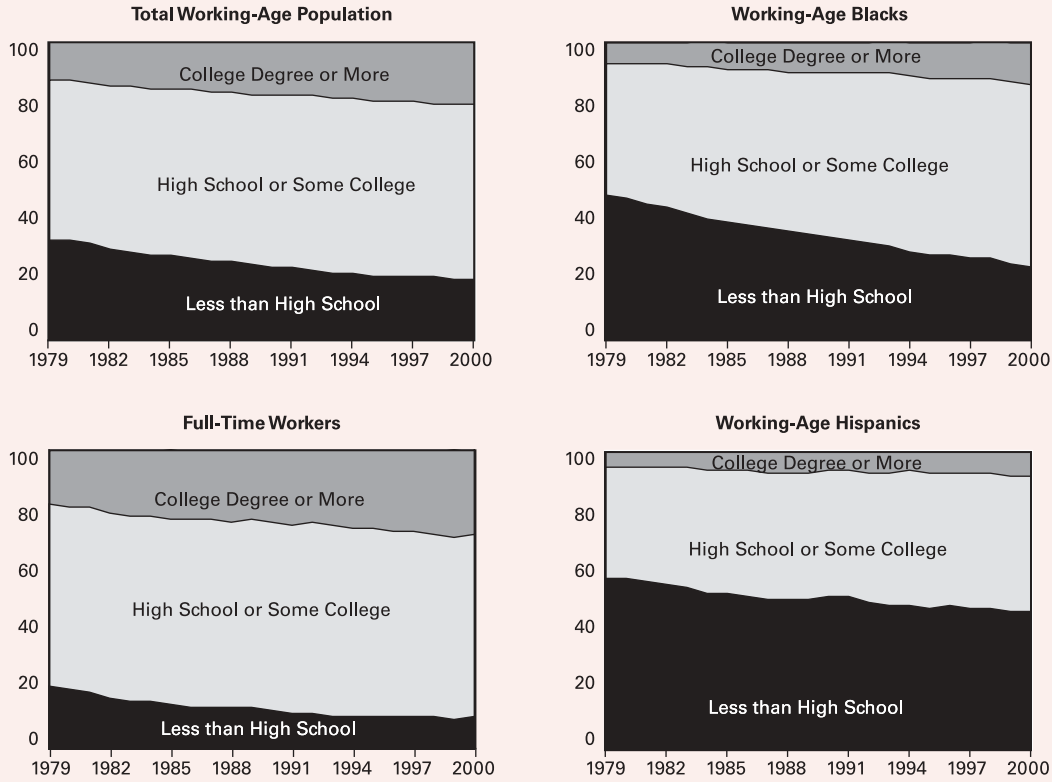
¹⁷ While upper- and lower-bound estimates consistently find lower educational wage premiums for blacks than nonblacks, equations estimated only on recent labor market entrants show smaller racial wage disparities. See Appendix C.

¹⁸ Like Figure 12, Figure 13 plots “simulated” wages by education in 1979–80 and 1999–00. These simulated wages reflect estimated Hispanic–non-Hispanic differences in the rewards to education (coefficients) for identical (in terms of all other included variables) Hispanic and non-Hispanic men (upper panel) and women (lower panel). See footnote 14.

¹⁹ These patterns are repeated in upper-bound estimates of education rewards. The differential payoffs for Hispanics and non-Hispanics using the upper-bound set of coefficient estimates (excluding occupation and industry from the equations) are reported in Appendix A Table A1.

Figure 11

Rising Educational Attainment



Source: See Figure 1.

combines and quantifies the contributions to relative wage shifts of changes over time in population characteristics (as discussed in Section III above) and the returns or payoff to those characteristics (the coefficients estimated in Section V).

In the following equation, z refers to mean characteristics, b to estimated coefficients, the subscripts v and t to beginning- and end-of-period, the subscripts j and n to the majority and minority group (in the literature, usually race groups), w is average wage, and \ln is logarithm. The change in the difference between the majority and minority groups' average wages,

$$(\ln w_{tn} - \ln w_{tj}) - (\ln w_{vn} - \ln w_{vj})$$

can be expressed as coefficient estimates (like those reported in Tables 2 and 3) multiplied by variable means, as follows:

$$(z_{tn} * b_{tn} - z_{tj} * b_{tj}) - (z_{vn} * b_{vn} - z_{vj} * b_{vj}).$$

And this expression, in turn, can be decomposed into the four following terms:

$$[(z_{tn} - z_{tj}) - (z_{vn} - z_{vj})] * b_{vj}$$

“main effect” (positive if minority characteristics improve relative to majority, improvement being judged by majority rewards at beginning of period);

$$(z_{tn} - z_{vn}) * (b_{vn} - b_{vj})$$

“race interaction” (positive if minority improves on characteristics for which wage returns were higher for minority than majority);

$$(z_{tn} - z_{tj}) * (b_{tj} - b_{vj})$$

“year interaction” (positive if payoff rises on characteristics held at end of period by minority relative to majority);

$$z_{tn} * [(b_{tn} - b_{tj}) - (b_{vn} - b_{vj})]$$

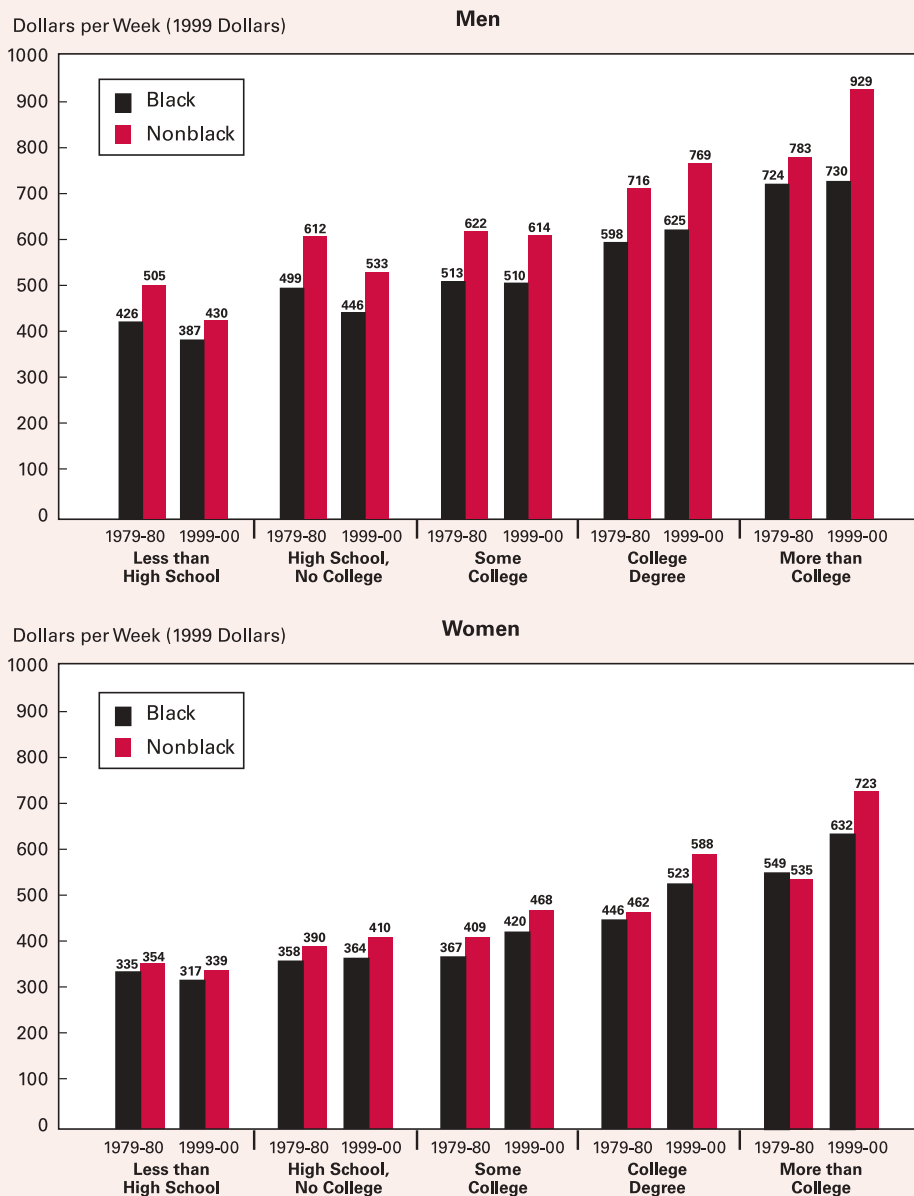
“race-year interaction” (positive if minority return to characteristic rises faster than majority return).

The first two effects reflect changing characteristics of the two groups; the latter two reflect changing returns to the characteristics. Here the decomposition is applied to the contributions of education variables to changes in the black–nonblack, Hispanic–non-Hispanic, and female–male wage gaps. For purposes of these decompositions, the beginning year uses combined observations for 1979 and 1980 and the end year uses 1999 and 2000. The coefficients are taken from the regressions reported above in Tables 2 and 3, so the beginning-of-period and end-of-period coefficient estimates are based upon the educational attainment and education-trend interaction variables, while the different coefficients by race reflect the *education x black* (or *x Hispanic*) and *education x trend x black* estimates.

Sex. The left-most panel of Table 7 summarizes the decomposition for female–male wage gaps.²⁰ As Figure 1 indicated, the overall full-time weekly wage gap between men and women shrank over the 1979–00 period from over \$200 to less than \$150. In log-wage terms, this decline amounted to 0.15 log points, as shown in the bottom row of column 1 of Table 7. According to the decomposition, all the education effects combined (“sum of effects”) account for about three-quarters of the total change. The *main effect* and the *year interaction* both make very small contributions to the positive total education effect. The *main effect* calculates the change in the female–male difference in educational attainment and

Figure 12

Simulated Real Weekly Wages by Race and Sex, Based on Estimated Returns to Education



Note: Author's calculations based on regression estimates reported in column 3 of Tables 2 and 3. See footnote 14.

evaluates its wage impact with the base-year male coefficients. This effect being positive indicates that women

²⁰ The female–male decomposition uses the coefficients in column 1 of Tables 2 and 3; these are separate regressions for men and women that estimate education returns and education time trends.

Table 7

Education Decomposition: Wage Differences by Sex, Race, and Hispanic Origin

Log weekly wages, full-time workers, change from 1979–80 to 1999–00

	Sex		Race		Hispanic Origin		
			Men	Women	Men	Women	
Main Effect	.005		Main Effect	.032	–.002	–.020	–.019
Sex Interaction	–.002		Race Interaction	–.004	–.003	.012	.015
Year Interaction	.008		Year Interaction	–.024	–.019	–.066	–.064
Sex–Year Interaction	.105		Race–Year Interaction	–.006	–.043	.001	–.018
Sum of Effects	.117		Sum of Effects	–.002	–.067	–.073	–.087
Total change in female–male log wage difference	.152		Total change in black–nonblack (Hispanic–non-Hispanic) log wage difference	.024	–.073	–.179	–.171

Source: Author's calculations, based on estimated coefficients (lower-bound) reported in Tables 2 and 3 and mean values (group's education composition) in 1979–80 and 1999–00.

improved their educational attainment relative to men between 1979–80 and 1999–00. As noted earlier, women were less likely to be high school dropouts and, in 1999–00, more likely to graduate from college and obtain graduate degrees than men, which was not the case in 1979–80. The *year interaction* effect multiplies the female–male difference in educational attainment in the end-year by the change in the male coefficient. Thus, it captures the rising return to education; women benefited from this rising return relative to men because of their greater educational attainment.

The dominant contribution to the total education effect comes from the *sex–year interaction* term, which reflects changes over time in female–male relative returns to education, that is, the change in the difference between female and male coefficients. Its large positive effect indicates that women's return to education rose relative to that of men over the 20 years. As noted earlier, women's returns to education remained below those of men even by 1999–00, but the gap was much smaller than in 1979–80.

Race. The race columns in Table 7 reports similar education decompositions for wages of blacks compared with nonblacks, using the coefficients reported in column 3 of Tables 2 and 3. For men, the overall black–nonblack wage gap shrank by a small amount between 1979–80 and 1999–00, just over 0.02 log points.²¹ When combined, the effects on the black–nonblack wage gap of changing educational attainment and returns were negligible for men. But the total masks offsetting effects of several factors. The educational gains of black men relative to

nonblacks made a positive contribution to closing the gap (*main effect*, first row). Offsetting these gains, the generally rising returns to education disadvantaged blacks (*year interaction effect*) because blacks still fall well short of nonblacks in college attendance.

For women, the race story is different. Black women lost ground in wages relative to nonblack women, and educational shifts accounted for a sizable fraction of those losses. The rising educational wage premium disadvantaged black women relative to nonblacks because their educational attainment is lower than nonblack women's (*year interaction*). In addition, the payoff to education rose more slowly for black women than it did for white women (*race–year interaction*). Furthermore, black women's progress in closing the attainment gap with nonblack women was focused at the low end; they gained much less ground in terms of college graduation and post-college schooling.

Hispanics. As Figure 5 made clear, both Hispanic men and Hispanic women saw their wages decline relative to non-Hispanics. For full-time men, the gap rose from \$150 to \$240, on average; for women, from \$50 to \$130—increases of 0.18 and 0.17 log points, respectively. The decompositions shown in the right-hand columns of Table 7 indicate that roughly half the lost ground is attributable to education. Hispanics' educational attainment fell further behind that of non-Hispanics over the 20 years (nega-

²¹ Blacks were 0.27 log points below nonblacks in 1979–80 and 0.25 log points behind in 1999–00, on average.

tive *main effect*).²² And because of the resulting sizable educational gaps in 1999–00, the rising payoff to education disadvantages Hispanics (*year interaction*). In addition, the education returns of Hispanic women fell relative to those of non-Hispanic women (*race-year interaction*).

VII. Possible Explanations for Differences Among Groups in Educational Wage Premiums and Their Rates of Change

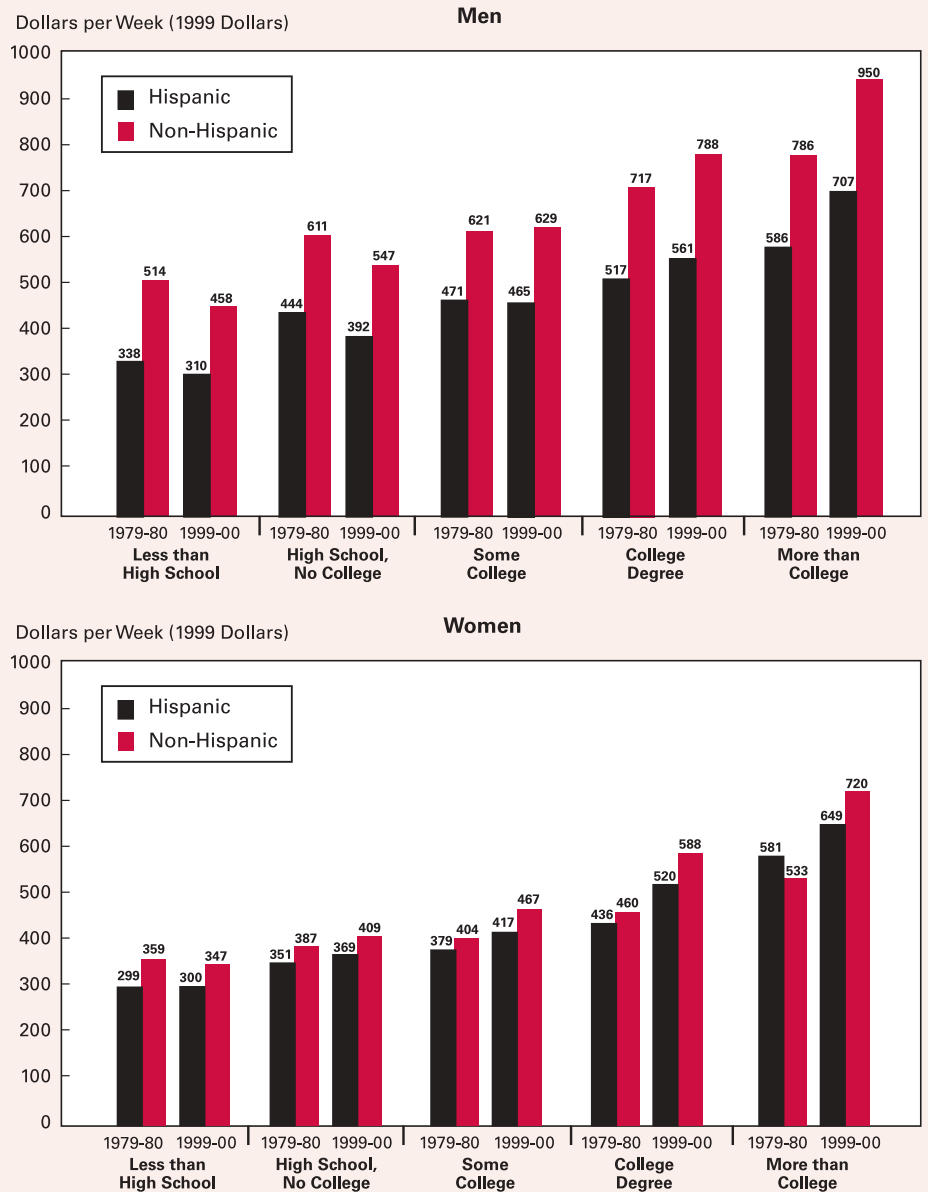
Why would educational payoffs be higher or lower or rise at a different rate for one demographic group than another? A number of hypotheses have been offered in the literature. One has to do with relative supply and demand for the labor of various groups (defined by demography and educational attainment). A second hypothesis, centering on the demand side of the market, relates to institutional factors, including discrimination and government policy, that favor one group relative to another. A third hypothesis, emphasizing the supply side, focuses on issues of school quality. These hypotheses might operate through choices (or restrictions) regarding occupation and industry as well as directly through wages.

Supply and Demand Shifts

If the labor supplies of some groups increase faster than those of others, relative to demand, then the relative price (wage) would fall for the groups in greater relative supply if the market clears separately for each group.²³ For example, if employers do not treat black and white male college graduates as perfect substitutes, faster growth in the supply of black male

Figure 13

Simulated Real Weekly Wages by Hispanic Origin and Sex, Based on Estimated Returns to Education



Note: Author's calculations based on regression estimates reported in column 3 of Tables 2 and 3. See footnote 18.

²² Using upper-bound estimates of education effects (from equations without occupation and industry), the main effects are larger (more negative) because the upper-bound estimates give more (negative) weight to the growing attainment gaps between Hispanics and non-Hispanics.

college graduates will cause their wages to grow more slowly than the wages of otherwise comparable whites, unless demand also rises more for black college graduates. Note that the “ifs” in the preceding sentences are important. If employers view the groups as substitutes (given job-relevant characteristics such as educational attainment), then shifts in relative supply should not affect wages.

This analysis reports declines in relative returns for black men, with the steepest declines for higher education levels (Tables 4 and 5 and Figure 12). These losses might be explained by the supply changes reported in Table 1 if the labor market does not treat black and nonblack men as perfect substitutes. Table 1 indicates that the growth in the number of working-age black male high school graduates and college graduates exceeded that for all men, with the greatest increases in college grads. Furthermore, the shrinkage in supply of black male high school dropouts was somewhat steeper than for non-blacks, and this is the only group for which black men’s returns rose compared with nonblack men’s. Similarly, the number of working-age black women with a high school diploma and with a college degree expanded faster over the two decades than the corresponding groups of nonblack women (Table 1) and black women’s returns rose more slowly (Tables 4 and 5).

The patterns by sex also conform. Recall that women’s return to a high school diploma rose relative to men’s while women made smaller gains than men in the payoff to college graduation (Tables 4 and 5). Meanwhile, the number of female high school graduates (who did not go on to complete college) rose more slowly than the number of male high school grads (Table 1) and the number of women with a college degree rose faster than the number of college-educated men.

For Hispanics, the dominant fact is the remarkably fast rate of population growth at all education levels. Although Hispanics had much a higher fraction of the population without a high school diploma even at the end of the period, the numbers grew fastest, in percentage terms, at the highest education levels (Table 1). With segmented markets, such large increases in numbers would be associated with smaller increases in the Hispanic payoff to obtaining additional education. That was indeed the case, except that the payoff to a college education for Hispanic men rose in parallel with (not more slowly than) that of non-Hispanic men over the two decades (Tables 6 and A1).

Overall, the data on supply changes and shifts in relative education returns are consistent with the quantity hypothesis, setting aside differences in the pace at which labor demand for members of different groups was growing. For quantity changes to be so consistently associated with shifts in various groups’ relative returns, the labor markets must be somewhat distinct.²⁴ A key question, therefore, is why employers do not treat individuals of different sex, race, or ethnicity as closer substitutes in the workforce. Two explanations are discussed below.

Discrimination, Government Policy, and Other Institutional Factors

The demand-side hypothesis explaining relative wages has to do with cultural or institutional factors that might lead to or mitigate discriminatory behavior by employers, altering the degree to which they treat different groups as substitutes in hiring. Research has focused on government policy regarding equal or preferential treatment of some groups in the labor market relative to others, most prominently, affirmative action policy.

Freeman (1973), for example, documents that blacks made considerable gains in income and occupational status relative to whites in the 1950s and 1960s and infers “a virtual collapse in traditional discriminatory patterns in the labor markets” (p. 67). He examines a range of supply and demand factors in his study and finds that “much of the improvement in the black economic position that took place in the late sixties appears to be the result of governmental and related

²³ The mix of educational attainment for each group is not independent of changes in relative wage rates, of course. Supply is likely to respond over time to changes in opportunity, that is, demand shifts. For example, in his review of black–white differences in wages in the 1950s and 1960s, Freeman (1973) characterizes large relative wage gains for college-educated blacks as “a significant change in the incentive for young black men to pursue higher education” (p. 84). When supply does shift in response to such wage incentives (according to this hypothesis), wages are affected and these, in turn, affect the evolution of supplies. These responses may be immediate or take generations to play out. Cameron and Heckman (2001) note that when the return to college education began to rise in the early 1980s, white males responded with a lag, black males responded even later, and Hispanic males “did not respond at all” (p. 456). They report that parental background and family environment are key determinants of the schooling decisions of young men. Hence, the education decisions and resulting earnings outcomes of one generation will affect the parental background and hence schooling decisions of the next generation.

²⁴ And to the degree that causation runs in the other direction, as discussed in the previous footnote, the observed relationship would be weaker.

antidiscriminatory activity associated with the 1964 Civil Rights Act" (p. 119).²⁵

Later authors, however, note that just as focused government policy can improve the relative position of blacks in the labor market, its absence can allow discriminatory patterns to reemerge. Smith and Welch (1989), in their overview of black economic progress

*Just as focused government policy
can improve the relative position
of blacks in the labor market,
its absence can allow discriminatory
patterns to reemerge.*

from the time of Myrdal's 1944 book, *An American Dilemma*, to the mid 1980s, offer the civil rights movement as one of two explanations for the black-white convergence in educational payoffs in the 1970s. However, they argue that the wage gains associated with the initial phases of affirmative action from 1967 to 1972 "did not prove to be permanent" and subsequently dissipated.

Bound and Freeman (1992) similarly report that "the era of relative black economic advance ended in the mid-1970s." Examining wages by educational attainment, they find that black college graduates experienced one of the largest erosions in relative position in the 1980s. And they argue that "the large decline in the relative earnings . . . of young black college men found in our data is what one would expect from firms no longer facing an affirmative action gun, since young college men were the major beneficiaries of the previous decades' pressures" (p. 229). Mason (2000) similarly mentions "major changes in antidiscrimination policy in the 1980s," and hypothesizes that "the mid-1970s stagflation initiated an increase in market discrimination" against black men (p. 316).²⁶ While most of this earlier research on racial disparities focuses on men, Freeman notes black women made much greater gains relative to white women than black men relative to white men in the '50s and '60s.²⁷

The findings reported earlier in this article clearly indicate less of an increase in the payoff to high school and college graduation for black men and for black women than for otherwise similar nonblacks in the 1980s and 1990s. Hence, they are consistent with these

arguments of weakening government pressures against discrimination. But because the study period begins in 1979, well after most analysts place the peak of affirmative action, the data do not allow separation of the effects of the waning of antidiscrimination activity from a time trend.

Affirmative action and other government policies addressed not only racial gaps but also the standing of women relative to men. In Table 7's decomposition, the largest education contribution to the convergence of women's wages toward men's (higher) wages is the *sex-year interaction*, reflecting faster increases in women's than men's rewards for additional education, especially obtaining a high school diploma. The rise in women's relative payoff to education that this reflects could result from quality improvements in the education women were obtaining (discussed below) or from social or cultural changes favoring women or reducing women's disadvantage in the labor market. The latter changes could reflect alterations either in women's choices (given education and the other variables included in the regression) or in conditions such as discrimination they might face in the labor market.

Blau (1998) examines sources of reduction in the gender pay gap over the 1969-95 period and finds a large fraction unexplained, especially in the 1980s. This finding reflects some combination of "an upgrading of women's unmeasured labor market skills [and] a decline in labor market discrimination against them" (p. 136). She argues that the declining discrimination hypothesis is less credible than the alternative, "because it is well known that the federal government scaled back its antidiscrimination enforcement effort during this period" (p. 138). But Blau goes on to outline a variety of paths through which antidiscrimination efforts in earlier periods might have influenced measured and unmeasured characteristics and hence relative wages in the pres-

²⁵ However, Butler and Heckman (1977) argue that Freeman's analysis is flawed and conclude that "there is no evidence that government antidiscrimination policy has had any impact on eliminating black-white wage differentials" (p. 267).

²⁶ In addition to government policy on civil rights or affirmative action, other institutional factors may influence demand for various groups. For example, Levy and Murnane (1992) suggest that wage-setting institutions and the macroeconomic environment are important. They note that declining unionization is likely to have the greatest effects on the workforce with high school but no college while declines in the real minimum wage affect largely dropouts. Since blacks and Hispanics are less educated, on average, than white non-Hispanics, both these institutional changes would be expected to increase wage gaps by race and Hispanic origin.

²⁷ And Blau (1998) reports that black women, like black men, saw the rate of convergence of wages slow markedly in the 1970s and 1980s.

ent, largely by altering choices women made about their own labor market qualifications, including education and training, that allowed them to enter more “traditionally male” occupations. She concludes the discussion by noting that while discrimination against women may have declined, it does not appear to have disappeared.

For Hispanics, the decomposition of factors contributing to their relative wage decline (Table 7) puts the heaviest negative weight on Hispanics’ deteriorating relative attainment. Lower attainment causes them to fall behind directly via population composition and also because the increase in the premium on education causes the handicap of being less educated to increase. Hispanic women also lost ground on account of shifts in relative returns. Compared with non-Hispanics, Hispanic women may face internal cultural pressures discouraging high attainment in the labor market as well as whatever (discriminatory) attitudes the non-Hispanic community inflicts.

School Quality

Quality differentials among the schools in which various demographic groups are concentrated would contribute to wage differentials within education cate-

Quality differentials among the schools in which various demographic groups are concentrated would contribute to wage differentials within education categories.

gories. Differences in school quality, in effect, alter the “effective supply” of various educational groups—those who obtain a low-quality college education may be seen as substitutes in the job market for individuals who have a high-quality, two-year degree (and corresponding wage levels) rather than for college graduates from the “best” schools. Furthermore, if the relative quality of schools attended by one demographic group improves (or deteriorates) over time, the educational wage premium will rise more (or less) over time for that group.

This explanation, of course, can coexist with the view that discrimination is key; indeed, school quality differences may reflect discrimination at an earlier stage.²⁸ While women now typically attend most of the same high schools, colleges, and universities as men, blacks and Hispanics appear to be less evenly distributed across educational institutions, especially elite ones, even today.²⁹

Card and Krueger (1992) find that improvements in the quality of black schooling in Southern states in the first half of the twentieth century explain about one-fifth of the narrowing of the black–white male wage gap in the 1960s and 1970s.³⁰ Smith and Welch (1989) note that the “historical improvement in the quality of black schooling resulted largely from Southern black migration to the better schools of the North and from the overall rise in the quality of Southern schools.” They express concern that these improvements have now “largely run their course,” so further progress depends on improvements in urban black schools in the North, about which they are skeptical (p. 560).

Heckman, Lyons, and Todd (2000) echo this concern, arguing that some of the slowdown in black economic progress between 1980 and 1990 is attributable to trends in education quality. They report that by 1990, secular “quality improvements in the overall black workforce were slowing down, so the retirement of cohorts most severely affected by the low schooling quality of the Jim Crow era ceased to be quantitatively important. At the same time, schooling quality of the youngest cohorts, with many members educated in inner-city schools, did not improve as rapidly as the schooling quality of the previous generation improved over its predecessors” (p. 346).

Hoxby (1997, 2000) documents that since the early 1970s colleges have become increasingly segregated on the basis of student “aptitude” (innate ability and achievement) and also that the correlation between a college’s average student aptitude and its educational spending has risen. A paper co-

²⁸ Neal and Johnson (1996) attribute virtually the entire black–white wage gap for young adults to skill differences between blacks and whites with the same years of schooling. They blame the skill gap, in turn, on differences in family background and school environments for black and white children that make it more costly for black parents to invest in their children’s skills.

²⁹ As noted above, Blau (1998) indicates that women’s education, training, and occupation choices—and hence wages—have moved closer to men’s in recent decades, partly because of earlier affirmative action.

³⁰ Heckman, Lyons, and Todd (2000), however, find that most of the effect of school quality on wages found by Card and Krueger occurs through its effect on educational attainment.

authored by Hoxby and Long (1999) finds an important role for these two factors in explaining the increase in wage inequality among college grads in the 1972–95 period.

To the extent that groups already disadvantaged in the labor market—blacks and Hispanics, perhaps women—are underrepresented at elite colleges and, on average, attend schools with lower average student “aptitude” and fewer per-student resources, Hoxby and Long’s findings imply that members of these groups will earn less than otherwise similar “college-educated” individuals. Furthermore, Hoxby and Long report that the difference in the quality of education received by college students at more and less selective institutions has increased over time; this increasing differentiation would contribute to increasing wage gaps.

Subsumed in the quality hypothesis is the issue of compositional differences. For example, steep growth in the number of Hispanics at every education level in the 1980s and 1990s reflects substantial Hispanic immigration. Among dropouts, immigrants often have much less education than others—they are not “dropping out” of high school at age 16 as some U.S. residents do, but rather coming from backgrounds where they attended almost no school. As a result, they are likely to earn lower wages than other dropouts. Similarly, to the degree that those classified as high school graduates from some demographic groups have a greater fraction of GEDs (General Educational Development certificates), they would earn lower wages than other groups with more traditional high school diplomas.³¹

Another compositional issue relates to field of study. Blau (1998), for example, notes that “gender differences in college major have been found to be strongly related to the gender wage gap” (p. 138). She sees some evidence of declining wage gaps as gender differences in fields of study among college students decreased over the 1970s and 1980s. Weinberger (1998), however, finds that broadly defined college majors explain nearly half the wage disadvantage of white women relative to white men.³²

VIII. Summary and Conclusions

This research has investigated differences in weekly full-time wages among groups defined by sex, race, Hispanic origin, and educational attainment during the 1979 to 2000 period. Women earned lower wages than men, blacks lower wages than nonblacks,

and Hispanics lower wages than non-Hispanics, in total and for each level of educational attainment during the entire period. The 1980s and 1990s were characterized by growing wage disparities between those with more and less education, with the wages of less-educated individuals declining in real terms while the wages of college graduates and beyond rose. The average educational attainment of each group increased during the period, but the pace of improvement varied across groups.

Since the payoff to education was increasing, the average wages of some groups rose more than others, depending on the degree to which their educational attainment improved. But the payoff to attaining specific educational thresholds, such as graduating from high school or earning a college degree, also varied among groups. Black men, black women, and Hispanic women saw a slower rise in the payoff to a high school diploma and college graduation than nonblacks and non-Hispanics.³³ The incentives created by these differential growth paths and differential current payoffs serve to augment the disadvantages that blacks and Hispanics have long faced in the U.S. labor market.

Some would argue that the differential payoffs simply reflect the labor market’s price response to different rates of growth in labor supply by different groups. But if so, it is still necessary to understand why employers do not treat members of different groups as substitutes in their hiring decisions. One possibility is that institutional factors, including discrimination, create distinctions between groups. Another is that differences exist in the quality of education obtained by members of different groups, implying that individuals with similar “educational attainment” do not actually have the same education and, by implication, job skills. Research quantifying and supporting each of these factors suggests that the current situation reflects some combination of the two.

³¹ Cameron and Heckman (1993), Murnane, Willett, and Tyler (2000), and Boesel, Alsalam, and Smith (1998) report that wages of GEDs are somewhat higher than those of dropouts (in proportion to additional years of schooling), but lower than those of traditional high school grads.

³² Having found effects of major and individual college attended, she concludes, nonetheless, with “very strong evidence that discrimination [against blacks and women] operates in the market for recent college graduates” (p. 82). Since these “choices” regarding college and major reflect a variety of influences, including potential discrimination, Weinberger’s estimates of the magnitude of discrimination’s effects on wages (controlling for college and major) must be seen as lower bounds.

³³ In addition, Hispanic men saw the payoff to a high school diploma rise more slowly than non-Hispanic men did.

Indeed, recent research by Weinberger (1998) finds important roles for type and quality of schooling *and* discrimination in explaining wage disparities among recent college graduates.

Identifying these two sources of wage disparities does not suggest obvious solutions, however. For addressing discrimination, some analysts question the efficacy of the civil rights and affirmative action policies of the 1960s and, in any case, they do not seem to be politically acceptable today. Further research into the sources of school quality gaps between blacks, Hispanics, and majority non-Hispanic whites should be fruitful, although current understanding of how education is “produced” and the institutional context in which that production occurs (many locally controlled public K–12 school districts with varying resources, colleges and universities ranging from non-selective to highly elite) has not suggested any levers for closing these gaps. Furthermore, given the importance of family background, including parental educa-

tion, in determining educational outcomes, any corrective action on the schooling front is likely to take many years to alter labor market outcomes, unless the interventions are intensive.

Appendix A

Table A1

Upper-Bound Payoffs to Attaining Educational Thresholds, by Hispanic Origin

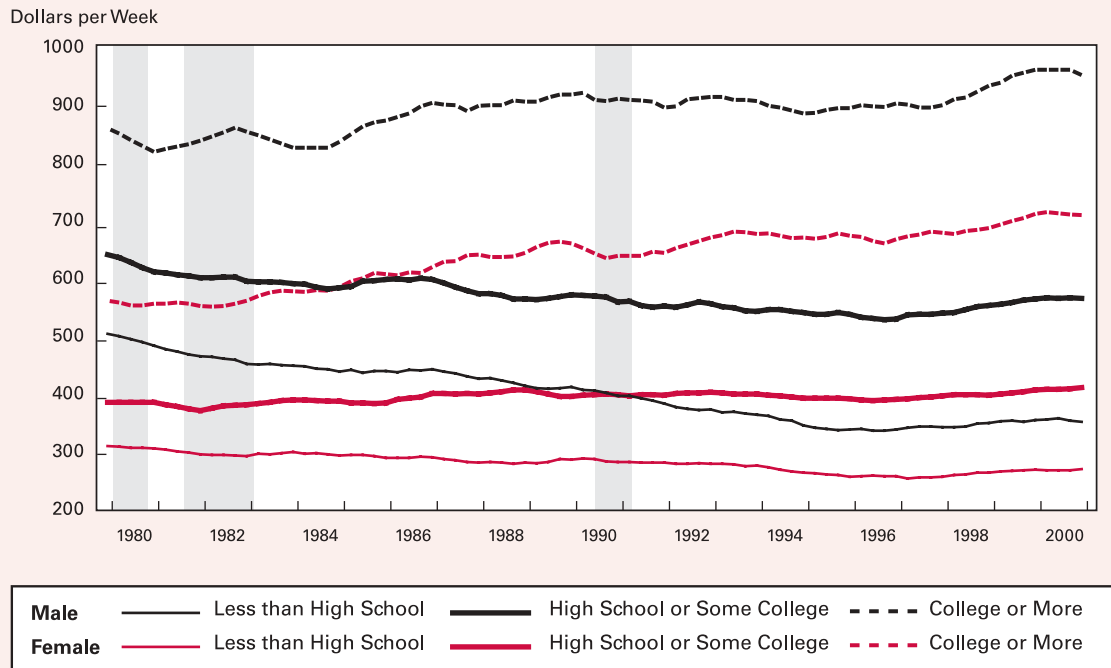
Estimates of weekly earnings differentials in log points

	High School Graduate Compared with Dropout		College Graduate Compared with High School Graduate	
	1979–80	1999–00	1979–80	1999–00
Non-Hispanic Men	.209	.208	.255	.476
Hispanic Men	.333	.286	.250	.478
Non-Hispanic Women	.177	.254	.320	.499
Hispanic Women	.264	.321	.366	.492

Source: Author's calculations based on estimates from equations similar to those in Tables 2 and 3, column 4, but not including occupation and industry in regressions.

Figure A1

Median Weekly Earnings by Sex and Educational Attainment



Note: See Figure 1 for notes and source.

Figure A2

Median Weekly Earnings by Race, Sex, and Educational Attainment

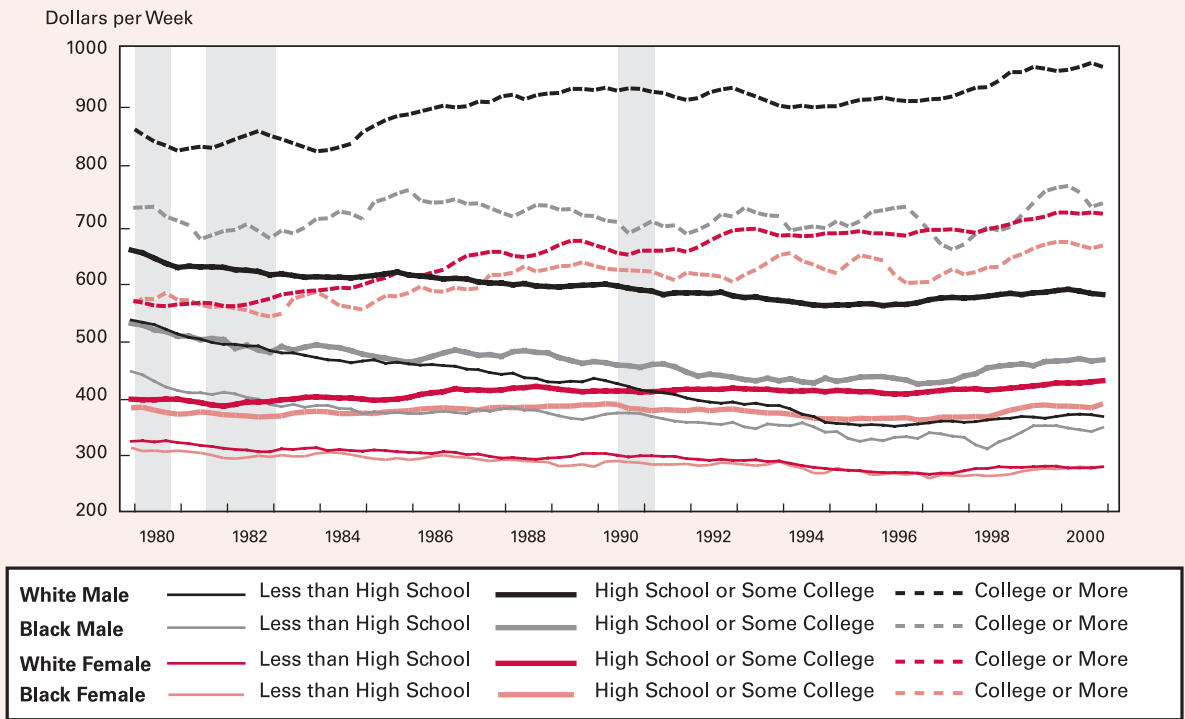
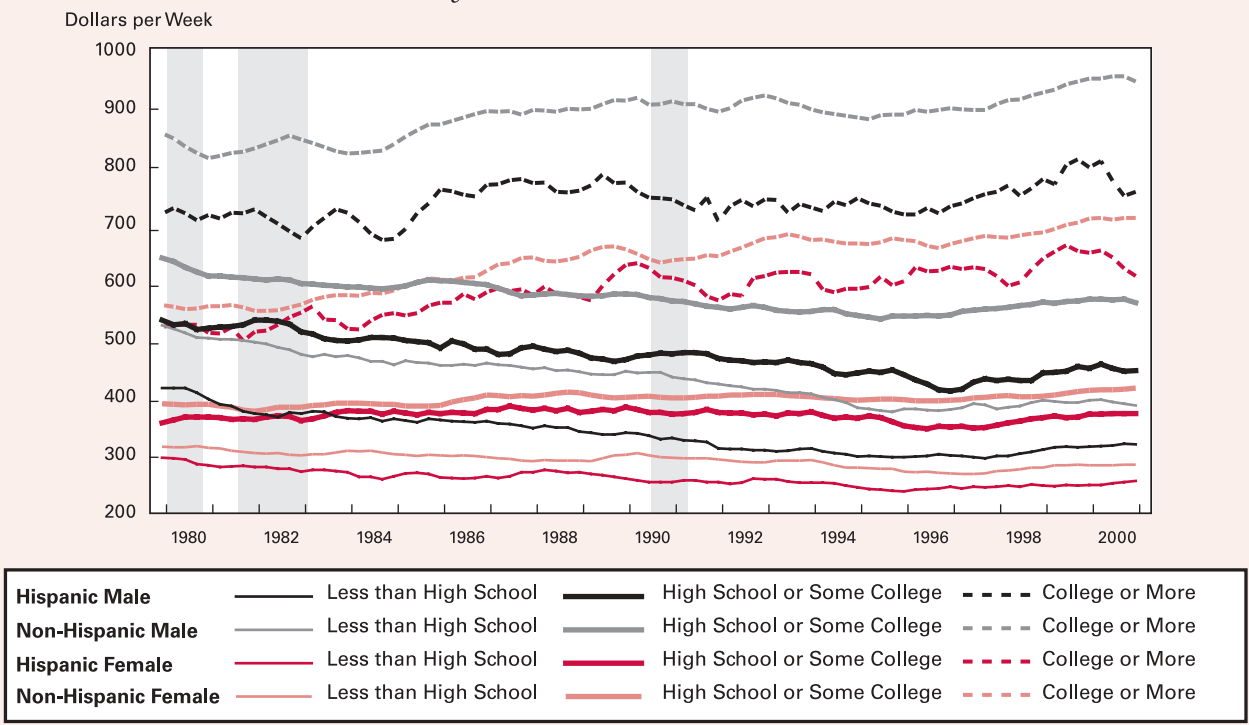


Figure A3

Median Weekly Earnings of Hispanics and Non-Hispanics by Educational Attainment



Appendix B

1992 Changes in Education Categories

The Current Population Survey (CPS) changed the questions employed to collect data on educational attainment in 1992. As a result, the five education categories are not fully comparable over the 1979–2000 time span used in this study. This appendix describes how the categories are defined from the education questions in the survey and what adjustments are made to the regression analysis to correct for the discontinuity.

Definitions

Before 1992, the CPS asked individuals what the highest grade they attended was and then asked them if they completed that grade; the combination of these two questions is used to define highest grade completed (“grdcom” in the table below). From 1992 on, the CPS asked about highest level of school completed or highest degree received.

Category	1979–91	1992–00
1. Less than high school	grdcom ≤ 11	less than high school diploma
2. High school, no college	grdcom = 12	high school diploma
3. Some college	13 ≤ grdcom ≤ 15	Associate’s degree or some college but no degree
4. College degree, no more	grdcom = 16	Bachelor’s degree
5. More than college	grdcom > 16	Master’s, professional, or doctoral degree

Using these definitions, the measured number of full-time workers with less than a high school education declined in 1992 by 0.7 million (about the same as the change in the preceding year with no definition change). That same year, the number in the “high school, no college” category fell by 3.0 million as the number in the “some college” group rose by 4.1 million. Similarly, the number with terminal college degrees rose by 1.6 million while the number with more than a college education fell by a slightly smaller amount. (The total full-time workforce rose by 0.6 million that year.) Thus, it appears that the definition changes were particularly important for the distinction between categories 2 and 3 and categories 4 and 5. The shift between 4 and 5 is most easily understandable as a reclassification of individuals who took more than four years to complete college or individuals who began but did not complete a post-college degree out of category 5 (where the pre-1992 focus on more than 16 years of education would

have put them) into category 4 (where the 1992-on questions about degrees earned would put them).

Regression Adjustments

Research by Frazis and Stewart (2000) indicates that the shift in educational categories in 1992 affects estimates of changes in the educational wage premium estimated over time spans that include the 1991–92 period. They find that the change accounts for a sizable fraction of the increase in the college/high school earnings ratio between 1989 and 1993 and suggest adjustments to correct for this error.

In the regressions reported in Part V, adjustments are estimated by including dummy variables for the five educational attainment categories in the years before 1992. This specification allows for an additive discontinuity (in 1992) in the estimated effect of each educational level on wages, controlling for all the other variables in the equations. In effect, the estimated coefficients indicate the difference in average wages between each education group as defined pre-1992 and that group as defined in 1992 and thereafter. In regressions that also include a trend variable interacted with the educational categories, this specification assumes that the same trend slope (the same annual increment to the wage payoff to a given educational category) applies pre- and post-1992, but that there may be a one-time (permanent) rise or fall in the return in 1992. In regressions that also include race or Hispanic origin interactions with education (and trend), the pre-1992 dummy is also interacted with the black or Hispanic education terms to allow the 1992 education shift terms to vary by race or Hispanic origin.

Because the shift of individuals from category 2 to 3 seems likely to lower the average educational attainment in both groups (the most educated individuals leave category 2 and are the least educated in category 3), one would expect average wages to be higher for both groups before 1992 than in later years, other things equal. Similarly, the reclassification of individuals from category 5 to category 4 should raise the wages of both those groups in 1992 and thereafter, on average. However, the estimated shift terms tell a somewhat different story. They indicate that weekly wages moved up in 1992 for the high school grad group (the estimated coefficient on the pre-1992 dummy variable is negative) and down (as expected) for those with some college, on average. Furthermore, estimated wages moved down in 1992 for workers with a college degree, and up (as expected) for those with a degree beyond college, controlling for the other variables in the equations. These results suggest that those reclassified as having some college were not the “most educated” (or at least the best paid) in the high school grad group and, similarly, that those reclassified from the “more than college” group did not raise the average education level (or average pay) of those in the (terminal) college graduate category.

Appendix C

Educational Payoffs for Less Experienced Workers

One would expect the wages of new entrants to the labor force to be more responsive to current supply and demand conditions than the wages of more experienced workers, as the latter reflect market conditions in the past (when the individuals first entered the labor market) and long-term implicit or explicit contracts, as well as current labor market conditions. Table C1 reports education payoffs for recent entrants to the labor market—full-time workers with ten or fewer years of potential experience.³⁴

A comparison of Table C1's estimates for new entrants with those reported in Table 4 for all men and all women shows lower payoffs to new entrants than to more experienced workers for a college degree in 1979–80 and for a high school diploma at the beginning and end of the period. By contrast, the payoff was higher to new entrants than to experienced workers for college in 1999–00, other things equal.³⁵ It may be that additional work experience mutes the differentiating effects of the college credential. For example, a high performer with only a high school education may close some of the wage gap with a college graduate by demonstrating his or her worth through a decade-plus on the job, and a low-performing college graduate is likely to lose some of his or her education-related wage premium over time as employers observe actual performance.

The estimates show a small increase (a slight decline for men) in the payoff to a high school diploma for recent labor market entrants between 1979–80 and 1999–00, but a very substantial increase in the college payoff for less experienced workers. As the wage premium for education rose in general over the 1980s and 1990s, the increased emphasis on a college degree apparently played out especially strongly for less experienced workers, consistent with the hypothesis that the wages of recent entrants are most responsive to current market conditions.

Racial patterns of educational wage payoffs for new labor market entrants do not uniformly match those for more experienced workers. Comparisons of the lower-bound estimates in Table C1 with Table 4 or the upper-bound estimates in Table C2 with Table 5 indicate that the educational wage payoffs of black men and women in 1999–00 are closer to those of nonblacks for recent entrants than for more experienced workers, with the exception of a college degree for women.³⁶ Similarly (comparing Tables C1 and C2 with Tables 6 and A1), graduating from college brought almost the same payoff to less experienced Hispanic women as to similarly inexperienced non-Hispanic women, whereas Hispanic women with more experience saw lower payoffs to college than non-Hispanic women.³⁷

Smaller race differences in education payoffs for recent hires could reflect several factors: (1) Racial discrimination may operate over time through discretionary post-hire deci-

³⁴ Potential experience is calculated as age minus years of education minus 5 (since most people enter school at age five).

³⁵ This 1999–00 pattern of higher payoffs to college and lower payoffs to high school for recent entrants than for all experience levels also occurs in upper-bound estimates of the same equations (compared with upper-bound estimates for all experience levels); see Table C2.

Table C1

Lower-Bound Payoffs to Attaining Educational Thresholds for Recent Labor Market Entrants

Estimates of weekly earnings differentials in log points

	High School Graduate Compared with Dropout		College Graduate Compared with High School Graduate	
	1979–80	1999–00	1979–80	1999–00
All Men	.145	.144	.120	.415
All Women	.079	.134	.147	.414
Nonblack Men	.148	.149	.110	.417
Black Men	.125	.103	.259	.395
Non-Hispanic Men	.133	.136	.115	.411
Hispanic Men	.189	.140	.227	.436
Nonblack Women	.078	.134	.144	.415
Black Women	.092	.141	.193	.401
Non-Hispanic Women	.072	.126	.145	.413
Hispanic Women	.101	.154	.198	.413

Note: These are lower-bound estimates because the equations include dummy variables for occupation and industry.

Source: Author's calculations.

Table C2

Upper-Bound Payoffs to Attaining Educational Thresholds for Recent Labor Market Entrants

Estimates of weekly earnings differentials in log points

	High School Graduate Compared with Dropout		College Graduate Compared with High School Graduate	
	1979–80	1999–00	1979–80	1999–00
All Men	.170	.168	.176	.502
All Women	.150	.187	.269	.564
Nonblack Men	.171	.173	.165	.501
Black Men	.161	.126	.330	.502
Non-Hispanic Men	.155	.158	.171	.496
Hispanic Men	.236	.159	.300	.542
Nonblack Women	.151	.189	.264	.564
Black Women	.146	.140	.335	.603
Non-Hispanic Women	.146	.174	.266	.564
Hispanic Women	.164	.215	.333	.566

Note: These are upper-bound estimates because the equations do not include dummy variables for occupation and industry.

Source: Author's calculations.

sions regarding merit raises and job promotions as well as at the time of initial hire. (2) If blacks have less skill than whites and those skill differences are not captured by education, then racial pay disparities would rise with experience to the degree that employers can observe (and reward) these skill differences after an individual has spent more time in the labor market. (3) The prevalence of discrimination (and unobserved skill differences) may have declined over time, so that recent hires at any time faced less hiring discrimination than contemporaneous, more-experienced workers. The first two explanations would imply that any given cohort's racial gap would grow as its members age and gain experience, while the third implies that each cohort has a lower racial gap than its predecessors did.

Notwithstanding improvements, racial disparities in wage levels by education and in educational wage payoffs were not zero for recent entrants to the labor market even at the end of the period, especially among men. Even recently hired black men saw smaller payoffs to finishing high school

(about 5 percent, or 0.05 log points, lower weekly wages) and obtaining a college degree (0.02 log points) than did otherwise similar nonblack men in 1999–00. Nonetheless, if the wages of less experienced workers are more responsive to current conditions, these experience-related differences in wages and wage trends by race suggest that racial differences in educational payoffs may shrink in the future.

³⁶ Black women with less than 10 years of experience saw a lower payoff to college graduation in 1999–00 than nonblack women with similarly little experience; when all experience levels are combined, black women's payoff to graduating from college was slightly above nonblack women's.

³⁷ For Hispanic men, or for Hispanic women graduating high school, Hispanic–non-Hispanic differences in educational payoffs for recent entrants compared with more experienced workers do not fit the pattern. They vary considerably, but interpretation of these patterns is complicated by the fact that Hispanics had so much higher payoffs to obtaining a high school diploma than non-Hispanics, even in 1999–00.

References

- Bernstein, Jared. 1995. *Where's The Payoff? The Gap Between Black Academic Progress and Economic Gains*. Washington, DC: Economic Policy Institute.
- Blau, Francine D. 1998. "Trends in the Well-Being of American Women, 1970–1995." *Journal of Economic Literature*, vol. 36 (March), pp. 112–65.
- Blau, Francine D., Marianne A. Ferber, and Anne E. Winkler. 1998. *The Economics of Women, Men, and Work*. 3rd edition. Englewood Cliffs, NJ: Prentice-Hall.
- Blau, Francine D. and Lawrence M. Kahn. 2000. "Gender Differences in Pay." *Journal of Economic Perspectives*, vol. 14, no. 4 (Fall), pp. 75–99.
- _____. 1997. "Swimming Upstream: Trends in the Gender Wage Differential in the 1980s." *Journal of Labor Economics*, vol. 15, no. 1, pt. 1 (January), pp. 1–42.
- Boesel, David, Nabeel Alsalam, and Thomas M. Smith. 1998. "Educational and Labor Market Performance of GED Recipients." National Library of Education, Office of Educational Research and Improvement, U.S. Department of Education. *Research Synthesis* at <http://www.ed.gov/pubs/GED>. (February).
- Bound, John, and Richard B. Freeman. 1992. "What Went Wrong? The Erosion of Relative Earnings and Employment Among Young Black Men in the 1980s." *Quarterly Journal of Economics*, vol. 107, issue 1 (February), pp. 201–32.
- Butler, Richard, and James J. Heckman. 1977. "The Government's Impact on the Labor Market Status of Black Americans: A Critical Review." In Leonard J. Hausman et al., eds. *Equal Rights and Industry Relations*, Chapter 9, pp. 235–81. Madison WI: Industrial Relations Research Association.
- Cameron, Stephen V. and James J. Heckman. 1993. "The Nonequivalence of High School Equivalents." *Journal of Labor Economics*, vol. 11, no. 1, pt. 1, pp. 1–47.
- _____. 2001. "The Dynamics of Educational Attainment for Black, Hispanic, and White Males." *Journal of Political Economy*, vol. 109, no. 3 (December), pp. 455–99.
- Card, David and Alan B. Krueger. 1992. "School Quality and Black–White Relative Earnings: A Direct Assessment." *Quarterly Journal of Economics*, vol. 107, no. 1, pp. 151–200.
- Chandra, Amitabh. 2001. "Is the Convergence in the Racial Wage Gap Illusory? New Estimates of the Butler-Heckman Hypothesis." Unpublished paper, Dartmouth College (September).
- Frazis, Harley and Jay Stewart. 2000. "Tracking the Returns to Education in the 1990s: Bridging the Gap Between the New and Old Current Population Survey Education Items." *Journal of Human Resources*, vol. 34, no. 3, pp. 629–41.
- Freeman, Richard B. 1973. "Changes in the Labor Market for Black Americans, 1948–72." *Brookings Papers on Economic Activity* vol. 1, pp. 67–131.
- Hanushek, Eric A. 2001. "Black–White Achievement Differences and Governmental Interventions." *American Economic Association Papers and Proceedings*, vol. 91, no. 2, pp. 24–28.
- Heckman, James J., Thomas M. Lyons, and Petra E. Todd. 2000. "Understanding Black–White Wage Differentials, 1960–1990." *American Economic Association Papers and Proceedings*, vol. 90, no. 2, pp. 344–49.
- Hoxby, Caroline. 1997. "The Changing Market Structure of U.S. Higher Education: 1940–1990." Unpublished paper, Harvard University Department of Economics.
- _____. 2000. "The Effects of Geographic Integration and Increasing Competition in the Market for College Education." Revision of National Bureau of Economic Research Working Paper No. 6322, May.
- Hoxby, Caroline and Bridget Terry Long. 1999. "Explaining Rising Income and Wage Inequality Among the College-Educated." National Bureau of Economic Research Working Paper No. 6873.
- Juhn, Chinhui, Kevin M. Murphy, and Brooks Pierce. 1991. "Accounting for the Slowdown in Black–White Convergence." In Marvin H. Koster, ed., *Workers and Their Wages: Changing Patterns in the United States*, pp. 107–43. Washington, DC: The AEI Press.
- Levy, Frank and Richard J. Murnane. 1992. "U.S. Earnings Levels and Earnings Inequality: A Review of Recent Trends and Proposed Explanations." *Journal of Economic Literature*, vol. 30 (September), pp. 1333–81.
- Little, Jane Sneddon and Robert K. Triest. 2001. "The Impact of Demographic Change on U.S. Labor Markets." Conference paper for *Seismic Shifts: The Economic Impact of Demographic Change*. June draft, in process.
- Mason, Patrick L. 2000. "Persistent Discrimination: Racial Disparity in the United States, 1967–1988." *American Economic Review*, vol. 90, issue 2 (May), pp. 312–16.
- Murnane, Richard J., John B. Willett, and John H. Tyler. 2000. "Who Benefits from Obtaining a GED? Evidence from High School and Beyond." *The Review of Economics and Statistics*, vol. 82, no. 1 (February), pp. 23–37.
- Neal, Derek A. and William R. Johnson. 1996. "The Role of Pre-Market Factors in Black–White Wage Differences." *Journal of Political Economy*, vol. 104, no. 5, pp. 869–95.
- Smith, James P. and Finis R. Welch. 1989. "Black Economic Progress After Myrdal." *Journal of Economic Literature*, vol. 27, issue 2 (June), pp. 519–64.
- Weinberger, Catherine J. 1998. "Race and Gender Wage Gaps in the Market for Recent College Graduates." *Industrial Relations*, vol. 37, no. 1 (January), pp. 67–84.