Race and Gender Wage Gaps in the Market for Recent College Graduates

CATHERINE J. WEINBERGER*

Using a large sample of recent college graduates, the study tests the hypothesis that observed race and gender wage differentials reflect between-group differences in the type and quality of education attained rather than labor market discrimination. After controlling for narrowly defined college major, college grade point average, and the exact educational institution attended, white male and Hispanic male graduates earn 10 to 15 percent more per hour than comparable female, black male, or Asian male graduates.

Introduction

Women and black men have lower average hourly earnings than white men with the same number of years of education (Corcoran and Duncan 1979; Blau and Ferber 1987a). Part of these "wage gaps" may be due to labor market discrimination, whereas part may be due to differences in productivity between the typical members of different demographic groups. For example, it is often suggested that the racial wage gap reflects a tendency for black students to receive a lower quality of education than white students with the same number of years in school (Nechyba 1990; Juhn, Murphy, and Pierce 1991). Similarly, it has been suggested that women lack the mathematical ability to pursue college degrees in more remunerative technical fields (Paglin and Rufolo 1990) and that women choose to pursue degrees in fields where the associated careers are compatible with their anticipated family responsibilities (Polachek 1978,

1981; Blakemore and Low 1984).[1] In all these examples, adding appropriate controls to the wage equation for the type and quality of education attained should reduce or eliminate the estimated wage gap.

One approach is to control for the occupation of employment. If we believe that labor markets allocate individuals to the jobs for which they are best suited, then occupation is a good proxy for an individual's productivity and preferences. Adding controls for occupation significantly reduces estimated race and gender wage gaps (Blinder 1973; Trieman and Hartman 1981; Blau and Ferber 1987b; Ferber and Green 1991). The more narrowly occupation is defined, the smaller is the estimated gender wage gap (Gunderson 1989; Groshen 1991). This observation is interpreted by some as evidence that the gender wage gap results from gender differences in productivity or preferences.

The limitation of this method is that occupation is a labor market outcome. Occupational assignments may themselves be affected by labor market discrimination (Brown, Moon, and Zoloth 1980; Blau 1984; Bielby and Baron 1984; Ferber and Green 1991; Gill 1994). If so, then occupation measures neither an employee's productivity nor preferences, and differences in occupation cannot be used to "explain" differences in wages.

An alternative approach is to control carefully for the skills and preferences that an individual takes into the labor market. For example, estimates of the wage differential between white male and white female recent college graduates are reduced by about one-half when controls for four to eight broad college major categories are included in the wage equation (Polachek 1978; Daymont and Andrisani 1984; Eide and Grogger 1992; Rumberger and Thomas 1993; Eide 1994). Given that increasingly detailed designations of an individual's occupation lead to diminishing estimates of the gender wage differential, an interesting question is whether increasingly detailed measures of the type and quality of education will reduce estimated wage gaps between white men and other groups of young recent college graduates.[2]

While many economic studies focus on differences in outcomes between white men and white women or between black men and white men, this study examines wage outcomes for men and women who

---

[1] In fact, white women are less than half as likely as white men with the same mathematics test scores to complete college degrees in technical fields (Weinberger 1997a), and there is no correlation between anticipated family responsibilities and choice of a technical college major among mathematically talented women (Weinberger 1997b).

[2] Fuller and Schoenberg (1991) examined this question for a sample of business graduates from one university and found that including controls for grades, narrow major, and internship experience actually increases the estimated gender wage differential.

identified themselves as white, black, Hispanic, or Asian. This broader focus can reveal relationships in the data that would otherwise not be recognized. For example, Hispanic children face disadvantages in quality of education similar to those faced by black children (Oakes 1990; NCES 1994). Yet, unlike black men, U.S. born Mexican-American men do not earn much less than white men with the same number of years of education (Trejo 1995). Or, for example, controls for occupation lead to *larger* estimates of the wage disadvantage faced by Asian-American men (Duleep and Sanders 1992).

This study uses a unique sample of recent college graduates. The *1985 Survey of Recent College Graduates* reports the earnings, exact college major, college grade point average, and educational institution attended for over 8000 young college graduates. The sample includes several hundred graduates who identified themselves as black, Asian, or Hispanic.

Each individual in the sample completed a four-year bachelor's degree in an academic field one to two years before the 1985 survey date. These young graduates have very low levels of previous work experience and are homogeneous with respect to the number of years of education completed. College major, college grades, and the college attended represent both exceptionally detailed measures of the type and quality of education attained and an indication of the ability of each graduate to work productively at the broad range of tasks involved in completing college coursework. In addition, college major provides an indication of each graduate's occupational preferences.[3] This sample therefore provides a unique opportunity to observe whether race and gender wage differentials remain after controlling very carefully for the education, productive ability, and preferences an individual takes into the labor market.

The limitation of this analysis is that it examines the wage differential in only a small sector of the economy. This analysis does not even begin to explore whether earlier discrimination affected the educational attainments of these college graduates or of their less educated age-mates. In particular, black and Hispanic young people are much less likely than white young people to become college graduates and enter this sample (Berryman 1983). This analysis has nothing to say about whether individuals with more or less education face comparable wage differentials or what will happen to these wage differentials as the cohort ages.[4] However,

---

[3] For example, in this sample, 74 percent of female education majors but only 2 percent of other employed women are employed as teachers. See also Blau and Ferber (1991).

[4] The wage differentials estimated between male and female college graduates tend to increase with the time since graduation (Fuller and Schoenberg 1991; Wood, Corcoran, and Courant 1993).

this data set provides a unique opportunity to learn whether wage differentials can be found even in the markets for these highly and equally educated young men and women.

The Data

This study is based on the *1985 Survey of Recent College Graduates*. The survey was conducted by the U.S. Department of Education, National Center for Education Statistics. In 1985, 13,200 recent college graduates were sampled from a random sample of 404 institutions in the United States. Each of the graduates surveyed had earned a bachelor's or master's degree from a sampled institution between July 1983 and June 1984. The probability that an institution was sampled and the number of students sampled from an institution were generally proportional to the usual number of bachelor's and master's degrees granted. Institutions with high minority enrollments and individuals with certain college majors were oversampled. The effective response rate was 78 percent of students sampled (NCES 1988). Of the 10,311 respondents, the 964 master's degree recipients and the 1217 bachelor's degree recipients over age 30 were not used in the analysis, leaving 8130 bachelor's degree graduates no more than 30 years old.[5]

The analysis was further restricted to the 5952 bachelor's degree graduates no more than 30 years old who, in April 1985, were not enrolled in school full time, were either employed full time or involuntarily employed part time, earned more than $1 an hour, and had data present for earnings, work experience, college major, and college grades. Only 1 percent of this sample was lost due to missing data or extremely low wages.

This group of 5952 respondents has less educated parents, more pregraduation work experience, and lower college grades than the 2178 bachelor's degree graduates no more than 30 years old who were omitted

---

[5] Of the 8130 bachelor's degree graduates no more than 30 years of age, 96 percent are either in school or in the labor force, with 8 percent only in school, 15 percent both in school and employed, 70 percent only employed, and 3 percent unemployed. Labor force participation is statistically the same (88 percent) for all groups but one. It is slightly higher for white women than for members of other demographic groups.

Of these 8130, three groups are proportionally underrepresented in the sample of 5952. The underrepresentation of black women is due to a high rate of involuntary unemployment (12 percent, compared with an overall unemployment rate of 3 percent, and a rate no higher than 6 percent for any other group. This rate is statistically higher than the unemployment rate for other groups. Limiting the analysis to graduates who did not attend historically black institutions does not affect this estimate). The underrepresentation of Asian men is due to a high propensity to enroll in further education, and the underrepresentation of black men is due to a combination of enrollment in further education and other voluntary reasons.

from the analysis (see Table 1, columns 1 and 2). The majority of those who were omitted were enrolled in school, so the observed differences between those in and out of the sample reflect the ability of graduates from wealthier families to delay working until after completing a lengthy education and the higher propensity of academically talented students to continue their education. Graduates with liberal arts degrees in the humanities, sciences, or social sciences are also less likely to go directly into the labor market than graduates with professional degrees in business, computer science, education, engineering, or nursing and are under-represented in this sample.

It is possible that selection bias will be introduced due to sample selection. For example, because talented white women are more likely than equally talented white men to forgo graduate school and enter the labor market directly, there may be an upward bias on the wages of white women, leading to an underestimate of the gender wage gap.[6] However, with careful controls for type and quality of human capital, sample selection effects are minimized.

The data set is very well suited to determine the average wages of graduates with a given college major.[7] Surveyed individuals were asked to identify their college major from a list of over 300 major fields and sub-specialties, of which 246 are represented in this sample.[8] The level of detail includes, for example, 32 types of biology major, 19 types of business major, 55 types of education major, and 25 types of engineering major.[9] Collapsed major categories are used in some of the analysis, and these categories are business, communications, computer science, economics, education, engineering, humanities, mathematics, nursing, science, social sciences (other than economics), and "other."

---

[6] Overall, 50 percent of white women and 35 percent of white men have at least a 3.25 grade point average. In the sample used for analysis, the proportions are 47 percent and only 29 percent.

[7] Unfortunately, this data set contains no information about the precollege characteristics of the graduates. This means that the results of this analysis say nothing about the *returns* to a particular college major or institution. In other words, it cannot be assumed that if a particular graduate had simply chosen a different major or institution, he or she would be earning as much as the average graduate from that major or institution.

[8] The complete list of college majors and the number of observations for each major are available on request from the author. The distribution of individuals over college majors is not uniform; 59 majors contain only one observation, while 93 majors contain more than 10 observations. Where narrow major controls are used, the 59 individuals in unique majors are effectively removed from estimation of wage differentials. This seemed preferable to, for example, arbitrarily assuming that the botany, anatomy, and neurosciences majors should all earn the same wage.

[9] The level of detail includes, for example, the following social science majors: Social Sciences—General, Anthropology, History, Geography, Political Science and Government, Sociology, Criminology, Interntional Relations, Urban Studies, and Other Social Science.

Research about which colleges open the doors to higher paying jobs is at a very early stage. There is statistical evidence that graduates of the most selective private colleges earn higher wages than graduates of other colleges (Brewer, Eide, and Ehrenberg 1996), but knowledge about the relative returns to attending the majority of colleges is speculative. Existing rankings of "college quality" are based on various characteristics of schools that may or may not lead to higher wage jobs. In addition, these rankings are not complete orderings.

In this analysis, a separate dummy variable for each of the 388 colleges represented in the sample was included in the wage equation. These variables control for the relative valuation by the labor market of graduates from each institution. This is the best available information about whether attendance at a particular college tends to be remunerative. Factors that influence this valuation may include instructional quality, the quality of the students admitted, the prevailing campus work ethic, or the reputation of the institution. Local labor market conditions also may affect this estimate, if graduates are geographically constrained.

The current geographic location of the graduates is not recorded in the survey. Each graduate was assigned to one of nine census regions based on the location of the college attended.

College grade point average is self-reported. Self-reported grades are generally accurate, with no gender difference in the tendency to inflate self-reported grades (Freeberg 1988; Maxwell and Lopus 1994). Therefore, we do not expect the estimated wage gaps to be affected by misreported grades. College grade point average was recoded from a categorical variable ("mostly A's, ≥ 3.75," "about half A's and half B's, 3.25–3.75," etc.) to a continuous variable. All ranges were recoded to the midpoint of the range.

The graduates are grouped demographically by gender and into the following five subgroups: non-Hispanic white (N=5025), non-Hispanic black (N=403), Asian or Pacific Islander (N=157), Hispanic (N=349), and American Indian or Native Alaskan (N=18). Because of small sample size, estimated means and coefficients for the last group are not reported. However, this group was included in the computation of returns to non-demographic characteristics.

Employment data were gathered for the week of April 29, 1985. Respondents had the option of reporting wages or earnings on an hourly, daily, weekly, monthly, or annual basis. Hourly earnings are computed from whatever wage or income figures were reported and from reported hours worked per week. Those reporting their occupation as "teacher" and their salary on an annual basis were assumed to earn that salary in only ten months.

Two separate variables reflecting work experience are included in the analysis. The first is actual full-time work experience prior to receiving the bachelor's degree, excluding summer or other temporary jobs. This question was specifically asked of the graduates in the survey. The second is postdegree experience, defined as time elapsed since college graduation, which varies from ten to twenty-two months in this sample. This "potential experience" variable is a common proxy for work experience.

A final labor market variable included in the analysis is hours worked per week.

All analysis contained in this paper is weighted by the "final adjusted weight" constructed by the NCES to adjust for oversampling of graduates of certain demographic groups, institutions, and college majors.

Observations on Sample Means

Sample means of selected variables are displayed in Table 1. Of the 5952 graduates in this sample, men earn 18 percent more per hour than women.[10] Hispanic men have the highest average hourly earnings ($10.02), followed by Asian men, white men, Asian women, Hispanic women, black men, white women, and black women ($7.08).

Each group has a distinctive profile. Groups vary in average grades, average education of parents, and propensities to pursue degrees in technical fields. Some of the striking numbers in Table 1 include the high college grades of white women, the low number of Hispanic men (and relatively high number of black men) with a college-educated parent, and the high concentrations of Asian men and women in technical fields.

Nearly half of all white women in the sample reported that they earned at least a 3.25 grade point average.[11] For all other groups, the proportion reporting such high college grades is less than a third.

---

[10] Average hourly wages are $9.07 for men and $7.70 for women. This is almost exactly equal to the 19 percent male wage advantage found by Grogger and Eide (1995) among college graduates 6 years after high school graduation in the 1986 high school and beyond (HS & B) data set.

[11] This is comparable to, but a bit higher than, the 42 percent of white women in a similar subset of the HS&B 1980 seniors in 1986 who reported grade point averages over 3.25. In the Maxwell and Lopus study (1994), no tendency toward the overreporting of A grades was seen; overreporting tended to take the form of C students reporting B's.

If the proportion reporting A's is high, it may result from an increased probability of A students returning their surveys. In the education literature, the idea that girls and women earn high grades because they turn their homework in on time is prevalent. If this is true, then perhaps these very women also returned their surveys in large numbers. Since our analysis controls for college grades, higher response rates by women with high grades would not affect the estimated wage differentials.

TABLE 1
MEANS OF SELECTED DESCRIPTIVE STATISTICS

	Not in Sample	All in Sample	White Men	Black Men	Asian Men	Hispanic Men	White Women	Black Women	Asian Women	Hispanic Women
Hourly earnings In dollars	—	8.38	9.06	8.15	9.60	10.02	7.70	7.08	8.50	8.18
As percent of white male earnings	—	—	100	90	106	111	85	78	94	90
Grade point average ³ 3.25	.53	.37	.29	.20	.27	.22	.47	.17	.28	.33
Average grade point average	3.2	3.1	3.0	2.8	3.0	2.8	3.2	2.8	3.0	3.0
Parent has bachelor's degree	.59	.51	.51	.44	.52	.20	.55	.32	.39	.35
Predegree work experience (years)	.30	.89	1.09	1.13	.81	1.61	.70	.61	.38	.59
Postdegree potential experience (years)	1.02	1.07	1.07	1.14	1.06	1.13	1.06	1.06	1.09	1.12
Hours worked per week(if not involuntarily part time)	—	41.4	42.5	42.6	41.1	40.6	40.4	40.5	39.9	39.8
Age	23.8	24.0	24.2	24.4	24.9	25.3	23.6	23.7	23.8	24.3
College Major:										
Business	.14	.27	.31	.32	.33	.23	.22	.29	.20	.25
Math, science, engineering, computer	.26	.22	.32	.30	.50	.38	.12	.14	.34	.10
Humanities or social sciences	.32	.17	.13	.14	.04	.20	.21	.22	.19	.27
Education	.08	.10	.05	.07	.00	.07	.16	.10	.07	.08
Sample Size	2178	5952	2227	147	72	166	2798	256	85	183
Weighted Proportion			.46	.02	.01	.01	.45	.03	.01	.01

Sample: 5952 1983–1984 B.A. graduates surveyed in 1985 who are employed full time or involuntarily part time, not enrolled in school full time, no more than 30 years old, earn more than $1 per hour, and have no missing data on earnings, hours worked per week, work experience, or college grades. Column 1 reports means for the group of all B.A. graduates no more than 30 years old who are not included in the sample described above.

Only 20 percent of the male Hispanic graduates have a college-educated parent, compared with 44 to 52 percent for all other groups of men and 32 to 55 percent for all groups of women. Hispanic male college graduates come from families with much less educated parents than black male college graduates. In this sample, female Hispanic graduates come from families with more educated parents than male Hispanic graduates. For Asian and black women, the relationship is reversed; those from families with less educated parents are more likely than their brothers to complete college.[12]

White, black, and Hispanic women in this sample are much more likely than men to have a degree in low-paying fields such as education, humanities, or social sciences and much less likely to have a degree in the high-paying fields of engineering or computer science. However, Asian women in this sample are at least as likely as white men to have studied engineering, math, computer science, or science, and yet they earn lower average wages than white men.

The groups are more similar in the other characteristics used in this analysis. On average, the men are seven months older than the women by the time they complete college. Hispanic men are the oldest at the time of graduation (25.3), followed by Asian men, black men, Hispanic women, white men, Asian women, black women, and white women (23.6). For college graduates in their twenties, there is no established relationship between age at college completion and labor market productivity.

The men have an average of only five months more work experience than the women before completing college, with no significant variation between groups. All groups of graduates have an average of about one year and one month postgraduation experience. Relative to the typical worker in the U.S. labor force, the amount of both pre- and postgraduation work experience is very small for every member of this sample.

Methodology

The goal of this analysis is to determine whether increasing proportions of the observed wage differentials between different demographic groups can be explained by increasingly careful specification of the type and quality of education received by the members of each group. Because college major, college attended, and college grades are all correlated with race, ethnicity, and gender, failure to control completely for these factors

---

[12] These relationships are true for the full sample of 8130 college graduates, as well as for this sample of employed graduates.

results in apparent wage differentials between groups, even in the absence of labor market discrimination.

If wages depend only on the type and quality of education, then the following equation describes the true relationship between human capital and wages for all demographic groups:

$$\ln(\text{wage}) = f(\text{work experience, hours/week}) \\ + g(\text{type and quality of college education}) \tag{1}$$

If the model is misspecified in the following way, that is,

$$\ln(\text{wage}) = f(\text{work experience, hours/week}) + c_1*\text{white female} \\ + c_2*\text{black female} + c_3*\text{Asian female} + c_4*\text{Hispanic female} \\ + c_5*\text{black male} + c_6*\text{Asian male} + c_7*\text{Hispanic male} \tag{2}$$

then, even in the absence of discrimination, correlations between type and quality of education and race, gender, and ethnicity will result in nonzero estimates of the c_i.

However, estimation of the correct specification, that is,

$$\ln(\text{wage}) = f(\text{work experience, hours/week}) \\ + g(\text{type and quality of college education}) + c_1*\text{white female} \\ + c_2*\text{black female} + c_3*\text{Asian female} + c_4*\text{Hispanic female} \\ + c_5*\text{black male} + c_6*\text{Asian male} + c_7*\text{Hispanic male} \tag{3}$$

will show $c_i = 0$ for all i if wages are entirely determined by human capital.

In this analysis, equation (3) is estimated with increasingly better measures of type and quality of education. If type and quality of education are measured perfectly, then $-c_i$ is the estimated percentage wage disadvantage of a typical member of group i relative to a white man with the same human capital. If wages depend only on human capital, and if human capital is measured perfectly, then the c_i will equal zero. The null hypothesis to be tested is that as measures of type and quality of education improve, the coefficients c_i, $i = 1, 2, \ldots, 7$, will go to zero.

The controls for human capital included in each specification are predegree work experience, postdegree experience, college grade point

average, and hours worked per week. Model 1 contains no additional controls. The remaining models include increasingly detailed specifications of the type and quality of education. Model 2 includes controls for the 12 collapsed college major categories, model 3 includes controls for all 246 narrow major categories, model 4 includes 9 controls for the geographic region of the educational institution attended as well as the 246 narrow major controls, and model 5 includes 387 dummy variables for the exact institution attended as well as the 246 narrow major controls. Model 6 is identical to model 5, except that an additional demographic control is included for graduates whose parents have no college degree.

We already know that members of the eight demographic groups vary in their propensities to choose remunerative broad college majors. This method will determine whether there is also a tendency for the members of some groups to choose more remunerative majors within a given broad college major designation or to attend colleges whose graduates are highly valued by the labor market.

This analysis also will determine whether, on average, women and non-white men earn less than white men with the same type and quality of education. Labor market discrimination can be broadly defined as a mechanism that causes individuals with the same productive characteristics but different ascriptive characteristics to be valued differently in the labor market. Where coefficient c_i is nonzero, even with the best controls, then it is likely that the graduates in group i face labor market discrimination.

Results

Discussion of general results. Table 2 reports the results of the regression analysis of models 1 to 6. The coefficients on experience, college grade point average, and hours worked per week are statistically significant and quite stable under the different specifications. As might be expected, the return to a year of postdegree work experience is higher than the return to predegree experience. Also as expected, higher college grades lead to higher wages. However, the return to working longer hours is negative. This result is statistically significant and robust and will be the subject of a separate paper.[13]

Controlling for 12 broad college major categories has the expected effect, significantly reducing the estimated wage disadvantage faced by white women. These broad college major controls also affect the estimated wage

---

[13] The negative return to working longer hours is also robust to most major specific regressions. It is partially but not completely due to the high earnings of individuals reporting that they work 40 hours per week.

TABLE 2

REGRESSION RESULTS: THE EFFECT ON WAGE GAPS OF INCLUDING CONTROLS FOR
COLLEGE MAJOR AND INSTITUTION ATTENDED (Standard errors are in parentheses.)

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
White women	−.17	−.09	−.09	−.09	−.10	−.10
	(.01)	(.01)	(.01)	(.01)	(.01)	(.01)
Black women	−.25	−.20	−.18	−.18	−.16	−.15
	(.03)	(.03)	(.03)	(.03)	(.03)	(.03)
Asian women	−.06	−.04	−.05	−.10	−.15	−.15
	(.05)	(.04)	(.04)	(.04)	(.05)	(.05)
Hispanic women	−.11	−.01	+.01	−.01	−.06	−.06
	(.05)	(.04)	(.04)	(.04)	(.04)	(.04)
Black men	−.09	−.08	−.09	−.09	−.09	−.09
	(.04)	(.03)	(.03)	(.03)	(.04)	(.04)
Asian men	+.08	−.00	−.02	−.06	−.14	−.14
	(.05)	(.04)	(.04)	(.04)	(.04)	(.04)
Hispanic men	+.08	+.06	+.06	+.05	+.01	+.01
	(.05)	(.04)	(.04)	(.04)	(.05)	(.05)
Hours	−.005	−.006	−.005	−.005	−.006	−.006
	(.001)	(.001)	(.001)	(.0001)	(.001)	(.001)
Predegree experience	.012	.012	.013	.013	.013	.013
	(.002)	(.002)	(.002)	(.002)	(.002)	(.002)
Pos-degree experience	.04	.06	.05	.06	.06	.06
	(.02)	(.02)	(.02)	(.02)	(.02)	(.02)
Grade point average	.08	.07	.06	.06	.07	.07
	(.01)	(.01)	(.01)	(.01)	(.01)	(.01)
Neither parent has college degree	—	—	—	—	—	−.015
						(.009)
12 major controls?	no	yes	—	—	—	—
246 major controls?	no	no	yes	yes	yes	yes
9 region controls?	no	no	no	yes	—	—
388 school controls?	no	no	no	no	yes	yes
Sample size	5952	5952	5952	5952	5952	5952
R^2	.06	.23	.30	.31	.3982	.3987

Sample: 5952 1983–1984 B.A. graduates surveyed in 1985 who are employed full time or involuntarily part time, not enrolled in school full time, no more than 30 years old, earn more than $1 per hour, and have no missing data on earnings, hours worked per week, work experience, or college grades.
Dependent variable: Log of hourly earnings.
Reference demographic group: Non-Hispanic white men.

differential for several other groups. However, including 246 college major controls has very little effect on the estimated wage differential faced by any demographic group compared with including only 12 controls. For each demographic group, the typical member does not tend to choose more, or less, remunerative majors within a given broad college major category. This list of 12 broad college majors therefore will be very useful in future research on wage differentials among college graduates.

After controlling for college major and college attended, differences in parents' education does not explain even part of the wage gap of any demographic group; none of the estimated gaps are significantly affected by inclusion of a control for parents' education.[14] Controls for geographic region and the educational institution attended do affect the estimated wage disadvantage for some groups.

Overall, the hypothesis that all c_i go to zero as more controls for the type and quality of college education are included can be soundly rejected. This does occur for one group. As more controls are added, the apparent wage advantage of Hispanic men does go to zero. For the six remaining groups, the c_i values remain or become negative as more controls are added. After controlling for the 388 institutions attended and 246 narrowly defined college majors, white male and Hispanic male college graduates have a 10 to 15 percent wage advantage over white, black, and Asian women and black and Asian men.[15] Discussion of the effects of increasingly fine controls for college major, geographic region, and college attended on the estimated wage differential for each of the seven groups follows.

White women. For white women, differences in broadly defined college major explain nearly half the estimated wage disadvantage relative to white men. Adding further controls for narrow college major, geography, or institution attended has absolutely no additional affect on the estimated 9 percent white female wage disadvantage. This means that within a broad college major category, women do not choose less remunerative majors on average. It also means that, on average, white women and white men attend colleges whose graduates are similarly valued.

Black men. For black men, controls for college major and institution attended have no effect on the 9 percent estimated wage disadvantage

---

[14] No demographic coefficient changed by more than one-tenth the standard error.

[15] This result is robust to limiting the sample to those no more than 26 years of age (8 to 15 percent white male advantage) or to those who worked 35 to 45 hours per week (9 to 15 percent white male advantage).

relative to white men. This means that black male college graduates, on average, choose equally remunerative college majors as white men. In addition, black male college graduates attend colleges whose graduates are as highly valued in the labor market as the colleges attended by white men. Because these black male and white male college graduates come from families with similar levels of education, it is not surprising that their educational attainments are similar in type and quality.

Black women. Unlike black men, black women attend colleges whose graduates are less valued by the labor market, on average, than those attended by white men. This difference may reflect the fact that the black women in this sample came from less affluent families. Like white women, black women have less remunerative college majors than white men. However, black women have somewhat less remunerative college majors than white men within as well as between broad college major categories. Altogether, controls for college major and the educational institution attended explain two-fifths of the black female wage disadvantage relative to white men, reducing the estimated wage disadvantage from 25 percent to 16 percent.[16] This remaining wage gap is still the largest of any demographic group.

Hispanic men. Hispanic male college graduates earn somewhat more than white men until controls for college attended are included. After controlling for type and quality of college education received, the Hispanic male recent college graduates in this sample face no wage disadvantage relative to white men.

Hispanic women. Like Hispanic men who complete college, Hispanic women attend colleges whose graduates are highly valued by the labor market. Controls for college major reduce the estimated wage disadvantage faced by Hispanic women from 11 percent to zero. However, further controls reveal that there is a 6 percent gap relative to white men who attended the same college. The 6 percent estimated wage disadvantage faced by Hispanic women has a large standard error. Therefore, we can conclude only that Hispanic women probably face some wage disadvantage and that it is no larger than that faced by other women.

---

[16] Removing the black graduates of historically black institutions from the sample has almost no effect on these estimates. The male cofficient is unaffected, and the female coefficient is reduced only from 16 to 14 percent.

Asian men and women. For Asian men and women, controlling for college major and institution attended reveals a hidden wage disadvantage. Asian men and women tend to choose more remunerative college majors, to live in higher-wage geographic regions, and to graduate from colleges with better-paid graduates than other men and women. All these factors contribute to relatively high average wages. However, Asian men and women actually face the same 10 to 15 percent wage disadvantage as white women, black women, and black men relative to white male graduates of the same institution and college major.

Further discussion. How big is a 10 to 15 percent wage disadvantage? As a point of reference, the wage disadvantage associated with coming from a family with no college-educated parent is an order of magnitude smaller, 1.5 percent.[17]

Of course, this 10 to 15 percent disadvantage is only an average. Within any group, there are likely to be individuals and subgroups of individuals with a larger or smaller unexplained wage differential. It is likely that the graduates of certain majors and certain colleges face a greater wage disadvantage than other graduates of the same demographic group. This analysis clearly demonstrates that, on average, the typical white or Hispanic male college graduate enjoys a wage premium relative to other graduates with the same type and quality of college education.

Summary and Conclusions

The question of whether race and gender differentials in pay among individuals with the same number of years of education are due to labor market discrimination or to unobserved differences in career preferences and the type and quality of education attained is difficult to answer. The focus of this paper is a large survey of recent college graduates. This data set contains extremely detailed information about the productive characteristics and career preferences that an individual takes into the labor market. The available controls include narrowly defined college major, college grades, and the exact educational institution attended by each

---

[17] Table 2, model 6. If only major but not school attended is controlled, then there is a 3 percent disadvantage to having no college-educated parent. If neither major nor school attended is controlled, then the wages of those with no college-educated parent are 2 percent *higher* than the wages of graduates with at least one college-educated parent. In other words, four-year college graduates with no college-educated parents attend less remunerative colleges and face a small unexplained wage disadvantage but choose more remunerative college majors, with a positive net effect on average wages. In all cases, controls for parents' education have no effect on any estimated demographic coefficients.

graduate. This paper examines the effects on estimated wage differentials of including increasingly detailed controls for the type and quality of education attained.

This analysis shows clearly that among recent college graduates, white women, black men, black women, Asian men, and Asian women all face the same 10 to 15 percent wage disadvantage relative to white men with the same type and quality of college education. If labor market discrimination is defined as a mechanism that causes individuals with the same productive characteristics but different ascriptive characteristics to be valued differently by the labor market, then this is very strong evidence that discrimination operates in the market for recent college graduates.

REFERENCES

Bielby, William, and James Baron. 1984. "A Woman's Place Is with Other Women: Sex Segregation within Organizations." In *Sex Segregation in the Workplace*, edited by Barbara Reskin, pp. 27–55. Washingtton, DC: National Academy Press.

Berryman, Sue. 1983. *Who Will Do Science? Trends and Their Causes in Minority and Female Representation Among Holders of Advanced Degrees in Science and Mathematics.* A Special Report. New York: The Rockefeller Foundation.

Blakemore, Arthur E., and Stuart A. Low. 1984. "Sex Differences in Occupational Selection: The Case of College Majors." *Review of Economics and Statistics* 66 (February):157–63.

Blau, Francine. 1984. "Occupational Segregation and Labor Market Discrimination." In *Sex Segregation in the Workplace*, edited by Barbara Reskin, pp. 117–143. Washington, DC: National Academy Press.

Blau, Francine, and Marianne Ferber. 1987a. "Discrimination: Empirical Evidence from the United States." *American Economic Review* 77 (May):316–20.

Blau, Francine, and Marianne Ferber. 1987b. "Occupations and Earnings of Women Workers." In *Working Women: Past, Present and Future*, edited by Karen S. Koziara, Michael Maskow, and Lucretia D. Tanner. Washington, DC: Bureau of National Affairs.

Blau, Francine, and Marianne Ferber. 1991. "Career Plans and Expectations of Young Women and Men: The Earnings Gap and Labor Force Participation." *Journal of Human Resources* 26 (Fall):581.

Blinder, Alan S. 1973. "Wage Discrimination: Reduced Form and Structural Estimates." *Journal of Human Resources* 8 (Fall):436–55.

Brewer, Dominic, Eric Eide, and Ronald G. Ehrenberg. 1996. "Does it Pay to Attend an Elite Private College? Cross-Cohort Evidence on the Effects of College Quality on Earnings." Unpublished paper.

Brown, Randall S., Marylyn Moon, and Barbara S. Zoloth. 1980. "Incorporating Occupational Attainment in Studies of Male-Female Earnings Differentials." *Journal of Human Resources* 15 (Winter):3–28.

Corcoran, Mary, and Greg J. Duncan. 1979. "Work History, Labor Force Attachment, and Earnings Differences between the Races and Sexes." *Journal of Human Resources* 14 (Winter):1–20.

Constantine, Jill. 1995. "The Effect of Attending Historically Black Colleges and Universities on the Future Wages of Black Students." *Industrial and Labor Relations Review* 48:531–46.

Daymont, Thomas, and Paul Andrisani. 1984. "Job Preferences, College Major and the Gender Gap in Earnings." *Journal of Human Resources* 19 (Summer):408–28.

Duleep, Harriett, and Seth Sanders. 1992. "Discrimination at the Top: American-Born Asian and White Men." *Industrial Relations* 31 (Fall):416–32.

Eide, Eric, and Jeff Grogger. 1992. "Omitted-Ability Bias, Major-Specific Wage Premia, and Changes in the Returns to College Education." Unpublished Paper, University of California, Santa Barbara.

Eide, Eric. 1994. "College Major and Changes in the Gender Wage Gap." *Contemporary Economic Policy* 12 (April):55–64.

Ferber, Marianne, and Carole Green. 1991. "Occupational Segregation and the Earnings Gap." In *Essays on the Economics of Discrimination*, edited by Emily P. Hoffman. Kalamazoo, MI: W.E. Upjohn Institute.

Freeberg, Norman. 1988. "Analysis of the Revised Student-Descriptive Questionnaire. Phase 1: Accuracy of Student-Reported Information, College Board Report 88-5." College Entrance Examination Board, New York (ERIC: ED304460).

Fuller, Rex, and Richard Schoenberger. 1991. "The Gender Salary Gap: Do Academic Achievement, Internship Experience, and College Major Make a Difference?" *Social Science Quarterly* 72 (December):715–26.

Gill, Andrew M. 1994. "Incorporating the Causes of Occupational Differences in Studies of Racial Wage Differentials." *Journal of Human Resources* 29 (Winter):20–41.

Grogger, Jeff, and Eric Eide. 1995. "Changes in College Skills and the Rise in the College Wage Premium." *Journal of Human Resources* 30 (Spring):280–310.

Groshen, Erica L. 1991. "The Structure of the Female/Male Wage Differential." *Journal of Human Resources* 26 (Summer):457–72.

Gunderson, Morley. 1989. "Male-Female Wage Differentials and Policy Responses." *Journal of Economic Literature* 27 (March):46–72.

Juhn, Chinhui, Kevin Murphy, and Brooks Pierce. 1991. "Accounting for the Slowdown in Black-White Wage Convergence." In *Workers and Their Wages: Changing Patterns in the U.S.* edited by Marvin Kosters. Washington, DC: American Enterprise Institute Press.

Koch, James V. 1972. "Student Choice of Undergraduate Major Field of Study and Private Internal Rates of Return." *Industrial and Labor Relations Review* 26 (October):680–5.

Oakes, Jeannie. 1990. *Multiplying Inequalities: The Effects of Race, Social Class, and Tracking on Opportunities to Learn Mathematics and Science*. Santa Monica, CA: Rand Corporation (ERIC ED329615).

Maxwell, Nan L., and Jane S. Lopus. 1994. "The Lake Wobegon Effect in Student Self-Reported Data." *American Economic Review* 84 (May):201–5.

National Center for Education Statistics (NCES). 1988. *Employment Outcomes of Recent Master's and Bachelor's Degree Recipients*, CS 88-251. Washington, DC: U.S. Department of Education.

National Center for Education Statistics (NCES). 1994. *The Condition of Education 1994*. Washington, DC: U.S. Department of Education.

Nechyba, Thomas J. 1990. "The Southern Wage Gap, Human Capital and the Quality of Education." *Southern Economic Journal* 57 (October):308–22.

Paglin, Morton, and Anthony M. Rufolo. 1990. "Heterogeneous Human Capital, Occupational Choice, and Male-Female Earnings Differences." *Journal of Labor Economics* 8 (January):123–44.

Polachek, Solomon. 1978. "Sex Differences in College Major." *Industrial and Labor Relations Review* 31 (July):498–508.

Polachek, Solomon W. 1981. "Occupational Self-Selection: A Human Capital Approach to Sex Differences in Occupational Structure." *Review of Economics and Statistics* 63 (February):60–9.

Rumberger, Russell W., and Scott Thomas. 1993. "The Economic Returns to College Major, Quality, and Performance: A Multilevel Analysis of Recent Graduates." *Economics of Education Review* 12 (March):1–19.

Trieman, Donald, and Heidi Hartmann, editors. 1981. *Women, Work and Wages: Equal Pay for Jobs of Equal Value*. Washington, DC: National Academy Press.

Trejo, Stephen. 1995. "Why Do Mexican Americans Earn Low Wages?" Unpublished Paper, University of California, Santa Barbara.

Weinberger, Catherine J. 1997a . "Mathematics Test Scores, Gender, and Undergraduate Participation in Engineering, Mathematics, and Science." Unpublished Paper, University of California, Santa Barbara.

Weinberger, Catherine J. 1997b. "What's the Difference? Characteristics of Mathematically Talented Men and Women Who Do Not Pursue College Degrees in Engineering, Mathematics or Science." Unpublished Paper, University of California, Santa Barbara.

Wood, Robert G., Mary E. Corcoran, and Paul N. Courant, 1993. "Pay Differentials Among the Highly Paid: The Male-Female Earnings Gap in Lawyers' Salaries." *Journal of Labor Economics* 11 (3):417–41.