It's Not Enough to Stay in School:
Race and Gender Differences in the Wage Returns of Educational Attainment

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Past research claims that differences in education have contributed to the racial and gender gaps in earnings. While many argue that increases in the educational attainment of racial minorities and women would reduce these gaps in pay, this strategy assumes that the economic returns for educational credentials are not shaped by gender or racial discrimination. It is unclear whether racial minorities earn less than whites simply because of lower educational attainment, or whether the effect, or slope, of education on earnings significantly differs between racial groups. Moreover, unexplored is the effect of field of degree: are gender and race differences in returns to education due to segregation by field of degree? Using the 1979-2010 waves of the National Longitudinal Survey of Youth (NLSY), we test whether African-Americans and Caucasians and men and women experience different returns to earnings for educational attainment. We examine multiple specifications of education: years of education, highest degree obtained, and field of degree obtained. Control variables include human capital, job characteristics, family structure, and demographic characteristics. While OLS models indicate African-American men generally receive higher wage returns to educational qualifications, this finding is reversed in fixed-effects regression models which control for unmeasured selection processes. African-American women consistently receive the lowest returns to educational qualifications relative to all other groups. In contrast, the gender story is less consistent: White women tend to receive higher returns for lower educational qualifications, while white men receive higher returns for Masters degrees. But the pattern is mixed at the PhD level.

Since the 1940s, gender, racial, and ethnic gaps in educational attainment have dramatically narrowed. This is particularly true in regard to high school graduation and enrolment in post-secondary education. Progress has occurred but has been slower in reducing gaps in college graduation rates and post-graduate receipt. That these education gaps have narrowed is important for racial and gender inequality because during this period, particularly since the 1970s, the returns to education, or how much having a degree "pays," have also dramatically increased. Despite this, racial and gender earnings gaps

persist, even among workers with similar educational credentials. These persistent gaps have led some scholars to argue that there are different "returns" to education for racial/ethnic groups. However, this is not necessary the logical conclusion. Race-gender groups might receive the same returns to education, but if there are racial or gender gaps in earnings among those with no educational degree, then similar returns to education will simply replicate that underlying inequality within every level of education. Thus, we seek to answer whether racial and gender disparities in earnings are constant across levels of educational attainment, or change as educational attainment increases.

The role that education plays in reducing labor market inequality by race, ethnicity, gender, nativity, and social class of origin cannot be understated. Rich traditions of sociological research on stratification argue that educational attainment is crucial for increasing the status attainment in occupational hierarchies of successive generations of workers (Blau and Duncan 1967; Haller and Miller 1963; Sewell, Haller and Portes 1969). Education may signal work-related skill acquisition (Becker 1962), socialization into the worker role (Bowles and Gintis 1976) or potential productivity (Spence 1974). Education may also serve as a convenient scale for ranking applicants for positions (Thurow 1975; Sorensen 1977). Whatever the mechanism by which education changes an individual's position vis. a vis. the opportunity structure of the labor market, increasing educational attainment for disadvantaged groups can serve as a strategy of reducing social inequality. However, if disadvantaged social groups receive lower returns to earnings for the same educational attainment, its potential as a leveler of social inequality is seriously undermined. The evidence regarding whether there are racial, or gender, differences in returns to education is inconclusive. Some studies find differences in returns to education by race (Wright 1978) while others find no differences in returns by race (Corcoran and Duncan 1979). And whereas Marini and Fan (1997) find differences in returns to education by gender and field of degree, few studies have examined how gender differences in returns to education vary by race (or vice versa). One study that has examined this has mixed results (Kilbourne, England, and Beron 1994) while another shows no differences (England, Christopher, and Reid 1999).

We fill the gaps in the literature by using a recent cohort of earners to systematically examine: 1) race and gender differences in educational attainment and fields of major, 2) race and gender differences

in the effect of education on earnings, 3) whether these effects operate through the differential placement of women and minority men in the occupational and industrial sector, and 4) the relative importance of education for increasing and decreasing the race and gender gaps in pay.

TRENDS IN EDUCATIONAL ATTAINMENT AND EARNINGS BY RACE AND GENDER

Since the *Brown v. Board of Education* decision in 1954 and the civil rights movement of the 1960s, racial and ethnic gaps in educational attainment have declined, particularly between African-Americans and whites. Yet, significant differences persist. Figure 1 shows the educational attainment of middle-aged adults (35 to 44 years old) in 2000 for three racial/ethnic groups: non-Hispanic white, non-Hispanic black, and Latinos.[1]

----------FIGURE 1 ABOUT HERE ----------

These data show moderate differences in the educational attainment between whites and blacks, with whites having higher rates of graduate and post-graduate degrees and blacks being more likely to have less than a high school diploma and to lack a post-secondary degree. Compared to whites and to blacks, Latinos are significantly different, with dramatically higher rates of less than a high school education and lower rates of secondary, post-secondary, and graduate degrees. Looking at high school graduation rates of the 2000 cohort, 93 percent of whites, 89 percent of blacks, and 62 percent of Latinos had completed high school. These rates compare to high school graduation rates of 83 percent for whites (includes Hispanics), 68 percent for blacks (includes Hispanics), and 53 percent for Hispanics (of any race) in 1974 (Census Bureau 2007). Clearly, while differences persist in the educational attainment of non-Hispanic whites and non-Hispanic blacks, educational attainment has narrowed considerably for these two groups over the past three decades, with Latinos lagging behind. In analyses not shown, we also examined CPS data separately by gender, but differences in educational attainment within racial groups by gender were very small, with men having marginally higher rates of both less than high school and post-graduate degree completion.

While the black-white gap in educational attainment has narrowed in recent decades, how has this mattered for the black-white earnings gap? Recent aggregate data demonstrate the racial/ethnic and

[1] This age range was chosen because it matches the cohort under analysis in this manuscript.

gender disparities in median earnings at every level of educational attainment (American Council on Education 2004). Table 1 shows that as a percentage of white men's earnings, the earnings of women and minority men vary dramatically.

----------TABLE 1 ABOUT HERE ----------

Black men with master's degrees come closest to their white male peers in terms of median earnings, with an earnings ratio of 0.85. Black women with professional degrees fall the farthest behind comparably educated white men; these women typically earn only 39 percent of white men's earnings. While men within all racial/ethnic groups have higher median income compared to women in their group, the gender gap varies in size by racial/ethnic group. Table 2 shows the ratio of minority groups' earnings relative to those of non-Hispanic white men. Significant gaps appear for every group. In general, gaps are smaller among men with some college to Masters degrees. Minority men with PhDs and professional degrees experience large wage gaps with white men of similar credentials. All women experience larger gaps in earnings compared to white men, particularly at lower educational levels. White women are relatively better off, while black women and Latinas fall far behind in terms of earnings at every education level. Indeed, black women with professional degrees earn less than forty cents to every white male dollar in this category.

----------TABLE 2 ABOUT HERE ----------

Despite these dramatic differences, past research has examined the effect of education on the gender gap, but rarely pays attention to race: Roos (1981) looked at whites only and Marini and Fan's (1997) study included all races but did not examine differences by race. Similarly, research on the race gap in pay rarely considers gender; for example, Wright (1978), O'Neill (1990), and Smith (1997) looked at men only. Research that has examined race and gender gaps in pay rarely tests for significant differences among race/gender subgroups (Coverman 1986; Cancio, Evans, and Maume 1996; McGuire and Reskin 1993; Tomaskovic-Devey 1993). This is despite evidence that returns to education may vary by gender and race subgroups. For example, Tomaskovic-Devey (1993) finds that education has little effect on the gender pay gap but explains 31 percent of the race gap in pay.

Where interactions between race and gender are examined, findings have been mixed. Kilbourne, England and Beron (1994) found differences by race in educational levels were greater for men than women, and this explained more of the race gap in pay for men (56%) than women (43.4%). Corcocan and Duncan (1979) found men and women of both races receive almost identical returns to education.

EXPLANATIONS FOR DIFFERENTAIL RETURNS TO EDUCATION

Innate Intelligence/Cognitive Skills, School Quality, & Race

The work at the center of the debate over innate intelligence/cognitive skills and race is Richard J. Herrnstein and Charles Murray's The Bell Curve. In this text the authors argue that innate intelligence, as measured by four components of the Air Force Qualifying Test (AFQT), matters more than parental socioeconomic status in terms of life outcomes. However, many critiques have been made of their study, beginning with the presumption that IQ tests are not biased in regards to race or socioeconomic status. The measurement instrument used has also come under scrutiny as Herrnstein and Murray did not include the numerical operations component of the AFQT, which has been found to be a strong predictor in labor market outcomes (Heckmann 1995-cite is on page 23 of Koreman and Winship). Herrnstein and Murray's measurement of socioeconomic status, as defined by total net family income, mother's education, father's education and an index of occupational status of the adults living with the subject at age 14, has also come under scrutiny (Goldberger and Manski 1995, Korenman and Winship 1995). Lastly, others have found strong evidence for the role of the environment in outcomes (Dickens and Flynn 2001).

Real or presumed race differences in cognitive skills may be linked to the quality of the school attended (Kozol 1992 & 2006, Orfield and Lee 2005 & 2006). If African Americans as a group are disproportionately educated in more crowded and less well funded public schools that provide a suboptimal education, this would impact the school completion rates, college attendance rates, and possibly lower the wage returns for high school qualifications for African Americans. This would be true whether the cognitive skills of students in low-quality public schools are measurably lower than those of students in better quality schools, or employers operate on the assumption that skills will be lower for a job applicant who attended such a school. We discuss this latter process below. However, the negative effects of poor public school quality should erode with higher educational attainment. While college

prestige affects earnings, the impact of school quality should matter less for college graduates and much less for post-graduate degrees where school quality would have a smaller degree of variation. Nevertheless, our use of fixed-effects regression models addresses the concern that blacks and whites may differ on stable characteristics that affect both educational attainment and earnings, such as cognitive skills.

Job Segregation, Employer Discrimination, and Devaluation of Feminine-typed Skill

Employers may interpret the same educational credentials possessed by black and white workers differently. They may assume school quality is lower for the average black applicant, compared to a white applicant, and give less weight to educational attainment, particularly high school and associate's degrees for black workers. This could affect both hiring decisions into better jobs, placement within organizations, and wages set at jobs. Presumably this should matter less with experience in a firm, though might impact later promotions as well. While past research does not find that the level of racial job segregation in occupations at the national level is related to earnings (Reid 1998), other research on local labor markets claims that the segregation of black workers into black-dominated jobs can account for the racial gap in pay (Huffman and Cohen 2004). In particular, Wright's classic study (1979) demonstrates that the segregation of highly educated black men into academic jobs (as opposed to jobs in the private, non-academic sector) is one mechanism producing lower returns to education. To investigate the extent to which blacks with similar educational credentials to whites are tracked into less rewarding jobs or industries, and that racial job segregation can account for race differences in returns to those degrees, we include measures of job characteristics, percent black in occupation-by-industry cell, and industrial sector in supplemental models.

In a similar vein, gender job segregation and the devaluation of feminine skills may also be linked to gender differences in returns to education. Cultural feminists have argued that female-typed skills, such as nurturance, are devalued in the labor market and that occupations with high proportions of women are assumed to require feminine-typed skills that are more "natural" for women and thus less well rewarded (Kilbourne, England, Farkas, Beron, and Weir 1994; Steinberg 1990). Degrees in higher education remain highly segregated, despite the movement of women into post-secondary education (Charles and Bradley

2000; England, Allison, Li, Mark, Thompson, Budig, and Sun 2007). It follows that a similar devaluation process could occur with degree-fields that include a high proportion of women. Female-typed degrees may lead to female-typed occupations and this connection may account for gender differences in returns to education. However, processes of gender segregation in the labor market could lower returns to women's degrees even in non-female-dominated degree fields. Marini and Fan (1997) showed that women often end up in jobs that are much more feminized than the ones to which they aspired. The tracking of women, regardless of degree field, into female occupations may thus explain gender differences in returns to education. To consider this, in supplemental models we include measures of percent female in one's occupation-within-industry, job characteristics, and industrial sector.

Measurement

Returns to education may vary by how education in measured. Past research typically uses years of education or highest grade completed, but other studies use the highest degree obtained (Cancio et. al 1996; Neal and Johnson 1996; Marini and Fan 1997). Area of study is rarely used (Marini and Fan 1997) but may significantly affect differences in returns for those obtaining an Associate's degree or higher. Differences in areas of study in higher education may lead to differences in job placement among which returns to education may not be the same. For example Wright (1978) found that the racial difference in returns to education among professionals and managers was explained by the prevalence of blacks among academic careers and the prevalence of whites in business careers.

DATA AND METHODS

Our data are from the 1979-2000 waves of the NLSY (National Longitudinal Survey of Youth), a national probability sample of 12,686 individuals aged 14-21 in 1979, with oversampling for Blacks and Latinos. Respondents were interviewed annually 1979-1994 and biennially since. We limit the sample to non-Hispanic whites and non-Hispanic blacks and those who are not full-time students. We also limit the sample to those employed full-time (35 or more hours weekly) during at least two of the years 1979-2000, since the fixed-effect models we use require at least two observations on each person. We calculate the percent female and the percent African-American in each detailed occupation/ industry combination from 1990 Census data (U.S. Bureau of Census 1993). The Dictionary of Occupational Titles (U.S. Department

of Labor 1977) contains data on over 10,000 occupations. Department of Labor observers coded occupations for their skill demands and other characteristics of the work. DOT variables were transformed into averages for each 1980 detailed Census occupation (England 1992, Ch. 3). They were merged onto our data according to 1980 Census occupation codes.

The dependent variable is the natural log of hourly wage in the respondent's current job. The principal independent variable is education; different specifications of education are assessed separately. These include highest grade completed (measured as a linear variable), highest degree obtained[2] (measured with a set of six categorical variables: high school dropout, high school graduate, some college/associates degree, bachelors degree, masters degree, and PhD), and a detailed measure of level of education by field of specialization. This last measure was constructed using transcript data available in the NLSY. The source document for coding the educational variables was Appendix 4: Major Fields of Study and Subspecialties of the NLSY79 Codebook Supplement. For high school diplomas we initially coded three tracks: college preparatory, vocational education, and general studies. We did not find race differences in the effects of these tracks on earnings. For efficiency, we collapsed these categories into one high school diploma indicator. For field of specialization in collegiate studies and beyond we tested various specifications and decided to use five broad categories for field: hard sciences, social sciences, business, legal and medical studies, and humanities. In our initial analyses we examined the effects of these majors by each additional year of education. We found a more parsimonious and efficient modeling approach was to examine field of study by highest degree completed. Like with our findings for tracks in high school we did not find race differences in the effects of fields on earnings for those respondents with "some college" but no degree. Thus, we collapsed this category into one for "some college."

Thus, our models include fields of specialization by degree obtained for bachelors, masters, and PhD degrees. The following educational fields were coded as hard sciences: Agricultural and Natural Resources, Biological Sciences, Computer and Information Systems, Engineering, Mathematics and

[2] Regarding the number of years of study, 12 completed grades were coded as high school graduate and > 12 were coded as high school dropout. 13-15 years of schooling college are coded as some college, 16 years of education is coded as Bachelors Degree. Those in the 17-18 years of education category are coded as MA and those with 19+ years of education are coded as PhD/JD/MD (depending on field).

Physical Sciences. For the social sciences the fields are: Communications, Education, Library Science, Psychology and Social Sciences. Business and Management fields were coded as business. The variable for legal and medical studies includes Health Professions and Law degrees. Lastly, the category humanities is broad and includes fields listed as General Studies, Area Studies, Fine and Applied Arts, Foreign Languages, Home Economics, Letters, Military Sciences, Public Affairs and Science, Theology and Interdisciplinary Studies.

We run separate models for men and women and test for significant differences in returns to education by racial group. Pooled fixed-effect models contain for race with education to test whether returns to education vary by racial/ethnic group. Race is measured by a dummy variable indicating non-Hispanic black (non-Hispanic white is the reference category).

Our control variables are chosen to minimize omitted-variable bias in our estimate of the effect of education on earnings. In addition to education, relevant human capital variables include years of experience and years of seniority (i.e., experience in the organization for which one currently works). Experience includes seniority in one's present workplace. Individual labor supply patterns are measured by number of jobs ever held and usual weekly work hours. We also control for whether the respondent is currently enrolled (part-time) in an educational program.

Previous research indicates family structure affects earnings and these effects may be different by gender and race. Measures of family structure include number of children in the household and marital status. Controls for demographic characteristics include whether the respondent lives in a rural or urban area (rural is reference category), and region of residence (dummy variables for south, northeast, and north central, with west being the reference category). We also include a control variable for the unemployment rate of the county in which the respondent resides to capture the effects of local labor market changes and economic strength on earnings.

In supplemental models we examine whether controls for job, occupational, and industrial characteristics explain race differences in returns to education. These measures include a dummy variable indicating whether the job includes non-standard hours (rotating schedules, on-call, night shift etc.), whether wages are set by collective bargaining agreements, and a dummy variable for public sector

employment. We also control for the physical hazards and the level of authority associated with one's occupation. These characteristics are occupational averages of variables taken from the Dictionary of Occupational Titles, merged onto these data according to NLSY respondents' detailed occupation. To examine the impact of race and gender segregation, we include measures for the percent female and the percent African-American in respondents' 3-digit census occupation by 3-digit census industry cells. We will also include variables to control for eleven industrial sectors.

ANALYSES

Our analyses are conducted in several stages. First, we present descriptive statistics on all variables used in the analyses separately by racial/ethnic group and gender. We use t-tests to examine differences in means and chi-square tests to examine differences in proportions by race and gender. In the second stage of analysis we use ordinary least squares and fixed-effect regressions to estimate the full and partial effects of education on earnings, and how these effects differ by race and gender. While our sample is very young, we exclude the years in which respondents are full-time students. This means that for workers who delay employment until after their school completion, values on education do not change over their observed years. This would be particularly true of less educated workers, such as high school dropouts or high school graduates, who are less likely to hold a job prior to education completion, relative to workers who continue on to post-secondary education. Because fixed-effect models only capture the effects of changing values on education on earnings, we may underestimate the effects of education on earnings in a fixed-effects model, particularly for high school graduates. Thus, we begin with OLS models to examine the total effect of education on earnings. However, OLS models cannot control for high levels of unobserved heterogeneity on factors that predict both higher educational attainment and earnings. To correct for this, we use fixed-effects regression models to analyze NLSY data arranged in a pooled time-series cross-section with person-year as units of analysis. Effects are fixed for years and persons. That is, the coefficients on independent variables are estimated to control for person and year dummies. Person fixed-effects are useful for eliminating omitted-variable bias created by the failure to include controls for unmeasured, unchanging personal characteristics that have additive effects. As we have stated previously, fixed-effects regression has the advantage of reducing unmeasured heterogeneity.

For example, if blacks and whites differ on stable characteristics that affect both educational attainment and earnings, such as cognitive skills or family of origin socioeconomic background, the fixed-effects approach will control for this kind of selectivity. For all models, the Hausman test was conducted to assess whether random effects models would be adequate. In all cases the Hausman test indicated fixed-effects models were needed.

Multiple specifications of education are examined: years of education, highest degree obtained, and field of major. We conduct separate regression models for men and for women. All measures of education are interacted with race to test for significant differences in returns to earnings by race. Our initial models include control variables for demographic characteristics and family structure. Our second set of models adds control variables for human capital and labor supply measures. To examine how job segregation might shape racial and gender differences returns to education, in supplemental analyses we include measures of percent African-American and percent female in one's job, as well as other job characteristics and industrial sector.

RESULTS

Descriptive Analysis

Table 3 presents descriptive statistics for all variables used in the analysis, means and standard deviations are presented for each race and sex group. It is important to remember that only employed persons are included in these data and the unit of analysis is the person-year observation, thus these statistics are not generalizable to the population. T-tests for quantitative variables and Chi-Square tests for qualitative variables were used to test for significant statistical differences within gender groups to examine whether differences by race were significant. Focusing on educational measures first we see that in terms of highest grade obtained, women average about 13.3 years of education with no differences by race. Men average slightly less, with black men having a significantly lower mean of twelve and a half years of education. Turning to highest degree obtained we see that men are more likely to be high school dropouts than are women, and race differences within gender are significant. In our data, one-half of black men end their educational attainment with a high school diploma, compared with 46 percent of white men and white women, and forty-one percent of black women. Only among employed black

women does the majority attend at least some college and go beyond a high school diploma. Despite this, black women are less likely to obtain a post-secondary degree (12%), compared with white men (15%) and white women (17%), while black men are least likely (9%). Examining field of highest degree obtained shows typical segregation by gender. Differences by race (within gender) also appear, although in many cases the magnitude of the difference is small. In most cases, the race gap in attainment of a particular degree shows black disadvantage.

Turning to employment characteristics, we find significant race and gender gaps in hourly earnings where the gap is larger among men than among women. The difference in AFQT by race is dramatic, with the average white scoring at the 53rd percentile and the average black scoring at the 25th percentile. Black women and white men have greater job tenure, white men have the most experience, black men have the greatest job turn over, and men (particularly white men) work longer hours. African-Americans are more likely to work irregular shifts, be union members, be in the public sector, be in more race segregated occupations-within-industries, and, within gender group, face more occupational hazards, compared to their white counterparts. Women work in more gender segregated jobs and, compared to men of their own race, more racially segregated jobs. In regard to industry, African-Americans are more likely to be in public administration and professional services compared to their white peers.

Turning to family structure and demographic characteristics, African-Americans are far less likely to be married, more likely to live in urban areas and in the southern region, compared to whites. Black women tend to have the most children in the home, and black men the least, compared to whites.

Regression Analysis

While the descriptive statistics show that there are racial differences in educational attainment, these differences mainly appear in the completion of post-secondary degrees and are much less in the completion of high school and attendance of some college. Lower educational attainment surely contributes to African-American disadvantage in the labor market and to the race gap in earnings. But do African-Americans and whites have different returns to the same educational credentials? We answer this question in Tables 4 and 5. These tables show the coefficients and standard errors from OLS regression and fixed-effect regression from 36 different models. All models were run separately by gender. All

education variables were interacted with race to test for significant differences in the returns to education. Where interactions were significant, the slopes for each racial group are presented for the education variables. Where race did not significantly interact with education, the values for both racial groups (within gender) are the same.

The set of columns, headed "Panel 1 and Panel 2" show the effects of two different specifications of education on the natural log of hourly earnings, controlling for demographic and family characteristics as detailed in table 3. The second set of columns, "Panel 2" adds controls for human capital and individual labor supply to the controls. Finally, "Panel 3" adds in remaining controls for job characteristics and industrial sector to the controls contained in Panel 2. These variables are also detailed in table 3. Presenting the findings in this manner allows us to see the total effects of education on earnings and how they are moderated by the inclusion of theoretically relevant control variables.

Within each Panel, the first specification for education is called "Model A" and shows the effect of highest grade obtained (a continuous measure) on logged earnings. The second specification, "Model B," shows the effect of highest degree obtained (high school diploma, some college, BA, MA, and PhD, with high school dropouts as the reference category) on logged earnings. Finally, "Model C" shows the effect of highest degree within academic track or field on logged earnings.

OLS REGRESSION RESULTS

Table 4 presents results from the OLS models with robust standard errors. Considering first Panel 1 that only includes controls for family composition and demographic characteristics, models A, B, and C show quite surprising results of black and female advantage in educational returns. Model A shows that women receive slightly higher returns to education (6.5%, computed as $([e^{(0.063)}-1]*100)$ relative to men (5.9%) for each additional grade completed. In model B of panel 1, women continue to dominate: black women receive the highest returns for high school diplomas, some college, and college degrees, while white men receive among the lowest returns for masters and PhD level degrees. Model C of panel 1 shows that white or black women, or occasionally black men, receive the highest returns for every single attainment-by-field level with one exception: white men receive the highest wage return for PhDs in business.

When we add control variables for human capital differences in panel 2 of Table 4, we see that women's advantages in education returns are significantly eroded. While white women receive slightly higher returns for highest grade completed, black women receive the lowest. On all degree measures presented in model B, women receive the same or significantly lower wage returns, with black women receiving significantly the lowest returns of all groups for bachelor, masters, and PhD degrees. In model C, there is no measure of education-by-field where women receive the highest returns. Compared to the findings of panel 1, this indicates that women's higher amounts of human capital (job experience, seniority) are partially responsible for the educational return advantages of panel 1. Within gender groups, however, there continues to be evidence of higher returns for African American men. Black men receive higher returns, relative to white men, for high school diplomas, some college, BAs in hard sciences, social sciences, humanities, and unspecified fields, MAs in hard sciences, social sciences, and PhDs in social sciences and unspecified fields. Yet, white men maintain their higher returns for BAs and PhDs in business and MAs in legal/medical fields. Among women, there is no clear pattern of advantage or disadvantage. Occupational and industrial gender and race segregation appears to account for virtually none of these differences. Once job characteristics and industrial sector are included in panel 3, the patterns observed in panel 2 are largely unaltered.

The finding that black men have higher returns, relative to white men and that these higher returns emerge more strongly in panel 2 (with controls for human capital and work hours) is surprising. The emergence of these higher returns net of human capital indicates that black men's lower human capital in terms of job experience and seniority masks their higher returns to education in Panel 1. Panel 3 shows that small part of black men's greater returns to education are due placement in jobs and industries with more positive characteristics that are associated with pay. In Panel 3, black men's higher educational returns for three categories erodes (social science BA and PhDs and humanities Bs) and emerges in a new category (masters degrees in medical/legal studies). However, on balance, black men remain more likely to receive significantly higher returns to their educational credentials relative to white men. It is important to recall that the proportion of black men who receive educational credentials at the bachelor, masters, and PhD/JD/MD levels is significantly smaller than the proportion of white men who receive those

degrees. This indicates that black men with post-secondary educational degrees are far more selected group than are white men. It also indicates that black male college graduates are a far rarer commodity than white male college graduates, even aside from their minority status in the general population. Both positive selection and rarity in the labor market may contribute to higher earnings returns for education observed in the OLS models for black men. Thus, fixed-effects regressions will reveal whether black men receive higher educational returns once we reduce the effects of positive selectivity.

Turning to the results for black women, Panel 1 also shows that they receive higher returns relative to white women for having high school diplomas, some college, bachelors degrees in social sciences and in humanities, and unspecified degrees at the masters and PhD levels. But unlike black men's advantage relative to white men, black women's advantage relative to white women is more mixed. Black women experience lower returns than white women for PhDs in business, MA degrees in the humanities, legal/medical, and hard sciences fields. Moreover, black women's advantage in every single category except unspecified masters degrees erodes when we include measures of human capital and work hours in Panel 2. Clearly, black women's greater experience and seniority accounts for their higher initial returns. Indeed, with controls for experience and seniority are added to the model, black women's disadvantage in returns to education starkly emerges. Black women receive lower returns than white women in highest grade completed, in MA and PhD degrees, and in the specific fields of hard sciences (BA and MA levels), business (BA and PhD levels), legal medical (MA and PhD level), humanities (MA level), and social sciences (PhD level). Finally, with the inclusion of job characteristics and industry sector in Panel 3 models, we find that the picture worsens for black women, relative to white women, with lower returns to education emerging in several categories. This again indicates that black women's jobs are located in slightly more favorable industrial sectors and have more favorable job characteristics that are associated with pay. Holding these characteristics constant, their returns to education deteriorate further. Why does the picture for black women look so much more negative, in regard to returns for educational credentials, than it does for black men in these OLS regressions? Black women have higher rates of educational attainment, relative to black men, and so are likely somewhat less positively selected into higher educational categories. Black women may also experience greater blocked access to jobs,

more discrimination from employers and coworkers, or greater work-family conflicts than do black men, reducing the impact of educational credentials on their earnings. The fixed effects regression models presented next may help reveal the extent of differential selection into higher levels of education for black women.

FIXED EFFECT REGRESSION RESULTS

Fixed effects regression models reduce unmeasured heterogeneity on stable unmeasured factors. Our results are presented in Table 5. Considering men first, we see that all of the black male advantage in returns to education we observed in the OLS models has disappeared using fixed effects. In no fixed effects model do black men have higher returns to education, relative to white men. However, we find consistent white male advantage over black men and all women in most models. This indicates that the unmeasured and stable positive selection of black men into higher educational credentials explains the higher returns observed in the OLS models. In Table 5, Panel 1, Model A we find a race gap in the effect of highest grade obtained on earnings where white men receive a significantly higher return for each additional year of education (13.9 percent [(exp(0.130)-1)*100], relative to 9.7% for black men, and 10.9% for white and black women). As we look across the columns to Panel 2 we find that even with the inclusion of human capital and work hours in model 2 this inequity persists. Model A, Panel 2 shows white men enjoy the highest returns to education measured as highest grade (6.5%) relative to black men and white women (3.2% and 4.5%, respectively), and relative to black women who receive the lowest return of 2.5% per grade completed. Clearly, whites have significantly higher returns for education relative to same gender blacks, as do men relative to same race women.

To investigate this further, "Model B" breaks educational attainment down into highest degree obtained, rather than using a continuous measure of highest grade completed. Model B in Panel 2 shows that male advantage in returns to education only appears at the graduate degree level, whereas women receive higher returns for degrees at the bachelor's degree levels. There are no differences by race in returns to education at college degrees; race differences emerge at the graduate degree levels. At the Masters level, all race-gender groups receive higher returns (15.2 to 16.8 percent) to black women, who receive no positive return. White men receive the highest returns for PhD/MD/JD degrees (38.0%)

compared with black men (16.8%), white women (23.5%) and black women (2.8%). Again we see whites are advantaged over blacks in returns to the highest degrees, and men are advantaged over women within their racial group. Consistently, black women receive the lowest returns to education for post-graduate degrees.

Turning to Model C where we further break down highest degree completed by field of degree we find that in both panels 1 and 2, the race patterns are robust while the gender patterns are more mixed at the BA level. Within-gender race advantage for whites appears in the hard sciences and legal/medical fields (white men's return 17.5% and 24.1% compared to no significant returns for black men), and in business (white women's return is 32.2% relative to black women's return of 11.8%). Within-race gender differences are mixed: Men receive higher returns to legal/medical degrees relative to women (24.1% for white men compared to 11.4% for white and black women) whereas women receive higher returns than do men for BA degrees in social sciences and humanities (20.3% and 18.2% for women relative to no significant effect for men). Finally, white women receive the highest returns to business degrees relative to all other race/gender groups. Thus, while we find robust white advantage in returns to field-specific degrees at the bachelor's level, there is no strong consistent story by gender.

In contrast to the somewhat mixed findings at the bachelor's level, at the Masters level of education we find consistent evidence of male advantage over women, and of white advantage over black. In every field at the MA level, white men enjoy the highest net returns in Model 2. Black men share those same high male returns in social sciences and business, but are disadvantaged relative to white men in the hard sciences, medical/legal fields, and in humanities (27.2%, 29.2, and 14.4% for white men compared to 3.2% and no significant return in medical/legal or humanities for black men). Black women are disadvantaged relative to white men in every field at the masters level, and are additionally disadvantaged relative to white women in hard sciences, social sciences, and humanities (where returns are a marginally significant at 9.8%, 6.6%, and 11.2% for white women while all are nonsignificant for black women. Relative to white men, white women are similarly disadvantaged in returns to educational credentials at the Masters level in all fields.

At the PhD/MD/JD level, we find more mixed patterns of white and male advantage. Men, regardless of race, receive higher returns to PhDs in social science and business, men and white women receive higher returns relative black women JD/MD degrees and humanities, and white women alone receive positive returns to unspecified PhDs. Whereas white women incur a negative return to PhDs in the social sciences, black women receive neither a positive or a negative return. The only consistent story at the PhD level and all other levels is that clearly black women suffer significantly lower returns to educational credentials, particularly graduate degrees.

DISCUSSION

While race and gender gaps in educational attainment have been closing over time, but important differences remain. Women have made greater inroads in closing the overall educational attainment gap, but remain highly segregated by field of degree (Charles and Bradley 200). And while African-Americans have greatly closed the gap with whites in graduation from high school, the black-white gap grows at each higher level of educational attainment. Even more important than continued gaps and segregation in attainment of higher educational credits are the serious gender and racial differences in returns to similar educational credentials.

Our initial OLS estimates reveal a surprising result: evidence of greater returns to educational credentials for black men, white women, and black women relative to white men. While women's higher returns for education are largely explained with the inclusion of human capital and job characteristics in the OLS models, indicating that their higher human capital and better job characteristics mitigate lower returns for educational attainment, the advantage black men hold in wage returns to education are less well accounted for with these measures. Yet the OLS models do not adequately factor out positive selection into higher levels of education, a process which is clearly strong for black men. Given the relative rarity of black men with college or higher educations, the black men with these degrees represent a highly select group, particularly in comparison to white men and women whose educational attainment at college and beyond remains higher than their black peers. To address this unmeasured heterogeneity, we used fixed effects regression models which reduce the impact of selection bias on stable characteristics. In the results of the fixed effects models black men never have higher wage returns to any

educational credential, relative to white men, and frequently have significantly lower returns. This indicates that black men in our sample who obtain post-graduate degrees owe their higher returns to these degrees in the OLS models to their "super-star" status as highly selected achievers. When we control for these unmeasured positive aspects in the fixed-effects models, we find black men receive lower, not higher, returns for the highest educational credentials.

And while initial OLS models also showed women advantaged over men in returns to education, these advantages largely eroded with the inclusion of measures for human capital, work hours, and still more with the inclusion of job characteristics and industrial sector. More strikingly, the wage returns to education in the fixed-effects models show a persistent disadvantage for women at educational attainment levels of graduate degrees. However, female advantage, more specifically, white female advantage in higher returns to education is pervasive at the levels of high school diploma, some college, and bachelor's degrees. But perhaps the most glaring inequity is the highly disadvantaged experience of black women. Consistently at every level of educational attainment, black women's returns are dramatically lower than that of white men, and often lower than that of white women.

Very little of the lower returns to educational qualifications experienced by African-Americans men or women are explained by occupational or industrial segregation by race and gender. While the race difference in returns to PhD/MD/JD degrees generally is explained by job characteristics and segregration among women, the racial difference in returns to these degrees persists among men, to black men's disadvantage. Moreover, all of the other racial and gender differences in returns are robust to the inclusion of these controls. Our models include extensive controls for human capital differences, unobserved selection, family structure, local labor markets, and job characteristics. The persistence of gender and racial disparities in the returns to education, particularly the highest educational credentials, suggests the possibility of labor market discrimination. Unfortunately, our data do not include measures of employer behaviors.

There are serious implications for public policy: while the racial and gender gaps in education are closing, racial and gender differences in the effects of education are significant. It's not enough to stay in school for closing racial and gender pay gaps. Equivalent returns to education perpetuate the pay gaps

found among the least educated. And the unequal returns to education in ways that disadvantage minority racial groups and women exacerbate the underlying racial and gender pay gaps. All else constant, we can only expect this problem to grow if educational opportunities, particularly in graduate degrees, continue to expand for women and minority men. Currently these groups, particularly African-Americans, are more positively selected into higher educational degrees than are whites, particularly white men. The strong positive selection has some protective benefits in terms of wages for minority men. But as this pool becomes less positively selected, we should expect to see growing disadvantage in the wage returns to education for women and minority men.

Works Cited

American Council on Education: Center for Policy Analysis. Median Annual Earnings of Workers 18 Years or Older by Educational Attainment, Race and Gender, 2002. 2004. http://www.acenet.edu/AM/Template.cfm?Section=InfoCenter&TEMPLATE=/CM/ContentDisplay.cfm&CONTENTID=22889

Becker, Gary. 1962. "Investment in Human Capital: A Theoretical Analysis." Journal of Political Economy 70:9-49.

Blau, Peter M. and Otis Dudley Duncan. 1967. The American Occupational Structure. New York: Wiley.

Bowles, Samuel, and Herbert Gintis. 1976. Schooling in Capitalist America. New York: Basic Books.

Cancio, A. Silvia; T. David Evans & David J. Maume, Jr. 1996. "Reconsidering the Declining Significance of Race: Racial Differences in Early Career Wages." *American Sociological Review* (61) August 541-556.

Charles, Maria and Karen Bradley. 2002. "Equal but Separate? A Cross-National Study of Sex Segregation in Higher Education." *American Sociological Review* 67(4):573-599.

Corcocan, Mary & Greg J. Duncan. 1979. "Work History, Labor Force Attachment, and Earnings Differences Between the Races and Sexes." *Journal of Human Resources* 14:3-20.

Coverman, Shelley. 1986. "Occupational Segmentation and Sex Differences in Earnings." *Research in Social Stratification and Mobility* 5: 139-172.

England, Paula, Paul Allison, Su li, Noah Mark, Jennifer Thompson, Michelle J. Budig, and Han Sun. 2007. "Why Are Some Academic Fields Tipping toward Female? The Sex Composition of U.S. Fields of Doctoral Degree Receipt, 1971-2002." *Sociology of Education* 80(1): 23-42.

England, Paula, Karen Christopher, and Lori Reid. 1999. Gender, Race, Ethnicity, and Wages." In Latinas and African American Women at Work : Race, Gender, and Economic Inequality, Irene Browne, editor. New York: Russell Sage Foundation.

England, Paula. 1992. Comparable Worth: Theories and Evidence. New York: Aldine de Gruyter.

Haller, Archibald O. and Irwin W. Miller. 1963. "The Occupational Aspiration Scale: Theory, Structure, and Correlates." East Lansing: Michigan Agricultural Experiment Station Bulletin 288.

Huffman, Matt L. and Philip N. Cohen. 2004. "Racial Wage Inequality: Job Segregation and Devaluation across U.S. Labor Markets." *American Journal of Sociology* 109(4): 902-36.

Kilbourne, Barbara, Paula England & Kurt Beron. 1994. "Effects of Individual, Occupational, and Industrial Characteristics on Earnings: Intersections of Race and Gender." *Social Forces* 72(4):1149-1176.

Kilbourne, Barbara, Paula England, George Farkas, Kurt Beron, and Deborah Weir. 1994. "Returns to Skill, Compensating Differentials, and Gender Bias: Effects of Occupational Characteristics on the Wages of White Women and Men." *American Sociological Review* 100(3): 689-719.

Marini, Margaret Mooney and Pi-Ling Fan. 1997. "The Gender Gap in Earnings at Career Entry." American Sociological Review 62(4):588-604.

McGuire, Gail M. & Barbara F. Reskin. 1993. "Authority Hierarchies at Work: The Impact of Race and Sex." *Gender and Society* 7(4):487-506.

O'Neill, June. 1990. "The Role of Human Capital in Earnings Differences Between Black and White Men." Journal of Economic Perspectives 4 (4): 25-45.

Reid, Lori L. 1998. "Devaluing Women and Minorities: The Effects of Race/Ethnic and Sex Composition of Occupations on Wage Levels." *Work and Occupations* 25(4): 511-36.

Roos, Patricia. 1981. "Sex Stratification in the Workplace: Male-Female Differences in Economic Returns of Occupation." *Social Science Research* 10(3):195-223

Sewell, William H., Archibald O. Haller, and Alejandro Portes. 1969. "The Educational and Early Occupational Attainment Process." American Sociological Review 34:82-92.

Smith, Ryan A. 1997. "Race, Income, and Authority at Work: A Cross-Temporal Analysis of Black and White Men." *Social Problems* 44(1):19-37.

Sorensen, Aage B. 1977. "The Structure of Inequality and the Process of Attainment." American Sociological Review 52:965-978.

Spence, A. Michael. 1974. Market Signaling: Informational Transfer in Hiring and Related Screening Processes. Cambridge: Harvard University Press.

Thurow, Lester. 1975. Generating Inequality. New York: Basic Books.

Tomaskovic-Devy, Donald. 1993. "The Gender and Race Composition of Jobs and the Male/ Female, White/Black Pay Gaps." *Social Forces* 72 (1): 45-76.

U.S. Bureau of the Census. 2007. Table A-2. Percent of People 25 Years and Over Who Have Completed High School or College, by Race, Hispanic Origin and Sex: Selected Years 1940 to 2007. Washington, DC: Government Printing Office.

U.S. Bureau of the Census. 1993. 1990 Census of the Population Supplementary Reports: Detailed Occupation and Other Characteristics From the EEO File for the United States. Washington, DC: Government Printing Office.

U.S. Department of Labor. 1977. Dictionary of Occupational Titles, 4th Ed. Washington, D.C.: U.S. Government Printing Office.

Winship, Christopher and Larry Radbill. 1994. "Sampling Weights and Regression Analysis." Sociological Methods & Research 23:230-257.

Wright, Erik Olin. 1978. "Race, Class, and Income Inequality." *American Journal of Sociology* 83(6):1368-1397.

Table 1. 2005 Median Earnings by Education Level, Race, and Gender

	White Men	Black Men	Latinos	White Women	Black Women	Latinas
< High School	23,556	19,890	21,623	14,086	14,300	14,365
High School Diploma	36,753	27,360	29,471	22,590	20,449	19,864
Some College/ Assoc.	42,206	33,544	34,754	26,547	25,422	24,493
Bachelor's Degree	69,852	52,070	54,700	40,344	43,516	37,003
Post-Graduate Degree	103,144	77,210	84,033	55,461	54,044	55,554

Data Source for Table 1: Current Population Survey Table A-3, 2005

Table 2. Ratio of Each Gender/Race Group Earnings to White Men's Earnings, Workers aged 18+, 1975-2005

	1975	1985	1995	2005
< High School				
Black Men	0.78	0.80	0.87	0.84
Latinos	0.83	0.86	0.87	0.92
White Women	0.43	0.51	0.56	0.60
Black Women	0.55	0.51	0.63	0.61
Latinas	0.40	0.49	0.58	0.61
High School Diploma				
Black Men	0.73	0.71	0.71	0.74
Latinos	0.80	0.81	0.76	0.80
White Women	0.45	0.53	0.59	0.61
Black Women	0.64	0.52	0.53	0.56
Latinas	0.44	0.51	0.55	0.54
Some College/ Assoc.				
Black Men	0.77	0.77	0.88	0.79
Latinos	0.80	0.86	0.73	0.82
White Women	0.45	0.54	0.59	0.63
Black Women	0.70	0.54	0.59	0.60
Latinas	0.43	0.56	0.57	0.58
Bachelor's Degree				
Black Men	0.70	0.74	0.77	0.75
Latinos	0.80	0.77	0.75	0.78
White Women	0.42	0.49	0.57	0.58
Black Women	0.72	0.55	0.54	0.62
Latinas	0.39	0.48	0.54	0.53
Post-Graduate Degree				
Black Men	0.69	0.79	0.82	0.75
Latinos	0.91	0.81	0.72	0.81
White Women	0.49	0.53	0.54	0.54
Black Women	0.79	0.53	0.52	0.52
Latinas	0.41	0.56	0.52	0.54

Data Source for Table 2: Author's Calculations from the Current Population Survey Table A-3, 2005

Table 3. Means and Standard Deviations

	White Men	Black Men	Sig. Test	White Women	Black Women	Sig. Test
Number of Person-years	**37,444**	**15,793**		**27,213**	**13,362**	
Education: Highest Degree						
Years of Education						
Highest Grade Attained	13.118	12.621	*	13.392	13.314	*
	(2.472)	(2.020)		(2.234)	(1.963)	
Degree						
High School Dropout	14.3%	15.7%	*	6.9%	6.4%	*
High School Graduate	45.6%	51.6%	*	45.5%	41.1%	*
Some College	18.5%	20.7%	*	22.8%	35.4%	*
Bachelor Degree	14.8%	8.6%	*	16.5%	11.7%	*
Masters Degree	5.3%	2.8%	*	6.4%	4.3%	*
Doctorate	1.5%	0.5%	*	0.8%	0.6%	*
Degree and Major						
Bachelor's: Physical Sciences	4.7%	1.8%	*	2.1%	1.4%	*
Bachelor's: Social Sciences	3.1%	3.3%		5.5%	3.8%	*
Bachelor's: Business	5.0%	2.4%	*	4.7%	4.5%	
Bachelor's: Legal Studies/ Medical	0.4%	0.3%	*	2.1%	1.4%	*
Bachelor's: Humanities	1.6%	0.9%	*	2.2%	0.7%	*
Bachelor's: Not Specified	0.1%	<0.1%		0.1%	<0.1%	
Masters: Physical Sciences	1.3%	0.5%	*	0.5%	0.4%	
Masters: Social Sciences	1.1%	0.9%	*	3.4%	1.7%	*
Masters: Business	2.0%	0.9%	*	1.1%	0.8%	*
Masters: Legal Studies/ Medical	0.2%	0.2%		0.8%	0.8%	*
Masters: Humanities	0.7%	0.3%	*	0.6%	0.5%	
Masters: Not Specified	0.0%	<0.1%		<0.1%	0.1%	
Doctorate: Physical Sciences	0.2%	0.1%	*	0.1%	<0.1%	*
Doctorate: Social Sciences	0.3%	<0.1%	*	0.2%	0.2%	
Doctorate: Business	0.1%	0.1%		0.1%	<0.1%	*
Doctorate: Legal Studies/ Medical	0.6%	<0.1%	*	0.2%	0.2%	
Doctorate: Humanities	0.1%	0.1%		0.1%	0.1%	
Doctorate: Not specified	0.3%	0.2%		0.1%	0.1%	
Human Capital & Labor Supply						
AFQT	53.053	23.751	*	54.256	26.484	*
	(27.690)	(21.879)		(25.211)	(19.782)	
Job Tenure	4.527	3.860	*	3.969	4.618	*
	(5.135)	(4.590)		(4.651)	(5.194)	
Job Experience	11.057	10.638	*	10.124	10.552	*
	(7.219)	(6.885)		(6.943)	(6.901)	
# of Jobs Ever Held	7.974	8.333	*	7.657	7.324	*
	(5.492)	(5.377)		(5.122)	(4.838)	

	White Men	Black Men	Sig. Test	White Women	Black Women	Sig. Test
Number of Person-years	**37,444**	**15,793**		**27,213**	**13,362**	
Usual Work Hours	47.220	45.108	*	42.819	42.508	*
	(10.543)	(9.875)		(7.560)	(8.308)	
Currently Enrolled in School	4.86%	3.65%	*	6.58%	6.21%	*
Job Characteristics						
Hourly Wage	$13.38	$10.65	*	$10.09	$9.70	*
	(11.44)	(8.36)		(8.31)	(6.98)	
Log Wage	2.329	2.149	*	2.067	2.073	
	(0.723)	(0.649)		(0.699)	(0.637)	
Authority	0.171	0.093	*	0.134	0.097	*
	(0.377)	(0.290)		(0.341)	(0.296)	
Occupational Hazards	23.181	25.075	*	7.466	11.282	*
	(30.255)	(30.332)		(17.182)	(21.991)	
Irregular Shift	24.62%	28.76%	*	20.28%	24.42%	*
Union Member	16.11%	23.97%	*	12.76%	21.14%	*
Public Sector	9.28%	15.56%	*	13.93%	24.56%	*
Percent Female in Job	23.56%	26.62%	*	61.31%	62.94%	*
Percent Black in Job	9.8%	15.2%	*	12.09%	20.86%	*
Industry						
Extractive Industries	5.66%	3.39%	*	1.93%	0.78%	*
Construction	12.09%	9.76%	*	1.40%	0.46%	*
Manufacturing	26.69%	24.36%	*	16.95%	14.53%	*
Retail & Wholesale Trade	22.91%	20.65%	*	20.09%	14.73%	*
Financial Services	10.75%	10.26%		13.54%	12.56%	*
Business Services	14.95%	15.01%		9.56%	9.67%	*
Personal Services	9.68%	13.03%	*	14.08%	17.66%	*
Professional Services	17.04%	19.99%	*	33.87%	38.11%	*
Public Administration	3.77%	5.29%	*	4.17%	7.79%	*
Family & Demographics						
Currently Married	56.28%	36.60%	*	52.61%	34.54%	*
Number of Children in Home	0.810	0.700	*	0.769	1.202	*
	(1.092)	(1.092)		(1.019)	(1.162)	
Age	30.601	31.674	*	30.231	32.430	*
	(7.685)	(7.755)		(7.829)	(7.800)	
Local Unemployment Rate	6.819	6.220	*	6.797	6.100	*
	(2.919)	(0.019)		(2.891)	(2.359)	
Urban Residence	11.65%	32.00%	*	12.08%	31.58%	*
Northeastern Region	18.96%	16.01%	*	18.99%	14.06%	*
Northcentral Region	31.97%	16.16%	*	28.97%	16.27%	*
Southern Region	31.88%	59.43%	*	35.33%	62.97%	*

Notes: *= $p < .05$ for within-gender t-test or chi-square test for significant difference by race

Table 4. Coefficients and Robust Standard Errors from OLS Models Regressing Alternate Specifications of Education and Control Variables on Ln Earnings, By Sex with Racial Group Interactions

	Panel 1: Demographic & Family Controls								Panel 2: Mod.1 + Human Capital & Labor Supply								OLS: Panel 3: Panel 2 + Job Characteristics & Industry							
	White Men		Black Men		White Wom.		Black Wom.		White Men		Black Men		White Wom.		Black Wom.		White Men		Black Men		White Wom.		Black Wom.	
MODEL A																								
Highest grade	.058	***	.058	***	.063	***	.063	***	.059	***	.059	***	.066	***	.050	***	.067	**	.062	***	.053	***	.040	***
	.002		.002		.002		.002		.002		.002		.004		.002		.004		.002		.004		.002	
MODEL B																								
HS Diploma	.053	***	.053	***	.056	***	.130	***	.030	**	.058	***	.023	*	.023	*	.028	**	.055	***	.013		.013	
	.010		.010		.031		.014		.021		.010		.013		.013		.020		.009		.013		.013	
Some College	.134	*	.162	***	.148	***	.227	***	.130	***	.178	***	.091	***	.091	***	.139	***	.177	***	.080	***	.080	***
	.027		.012		.033		.015		.026		.012		.014		.014		.024		.011		.013		.013	
BA / BS	.330	***	.330	***	.315	***	.377	***	.330	***	.330	***	.285	***	.250	***	.339	***	.339	***	.244	*	.209	***
	.016		.016		.038		.017		.015		.015		.035		.016		.015		.015		.034		.016	
MA / MS	.389	***	.479	***	.396	***	.396	***	.400	***	.471	***	.343	***	.258	***	.415	***	.502	***	.295	***	.227	***
	.050		.023		.022		.022		.047		.022		.045		.021		.045		.021		.043		.020	
PhD/ MD/ JD	.464	***	.610	***	.552	***	.552	***	.516	**	.641	***	.556	***	.354	***	.575	***	.702	***	.498	***	.318	***
	.106		.051		.049		.049		.101		.049		.098		.045		.095		.046		.094		.043	
MODEL C																								
HS Diploma	.055	***	.055	***	.058	***	.131	***	.035	**	.060	***	-.002	**	.034	***	.032	**	.055	***	.021	*	.021	*
	.010		.010		.031		.014		.021		.009		.027		.013		.020		.009		.012		.012	
Some College	.138	**	.169	***	.152	***	.229	***	.135	***	.183	***	.104	***	.104	***	.143	***	.178	***	.089	***	.089	***
	.027		.012		.032		.014		.025		.011		.013		.013		.024		.011		.013		.013	
BA Hard Science	.419	***	.504	***	.395	***	.395	***	.413	**	.472	***	.412	***	.267	***	.420	*	.472	***	.347	***	.210	***
	.059		.028		.032		.032		.056		.027		.063		.029		.053		.025		.061		.028	
BA Social Science	.292	***	.292	***	.175	***	.311	***	.254	**	.307	***	.151	**	.207	***	.304	***	.304	***	.097	***	.160	***
	.022		.022		.049		.022		.045		.020		.044		.020		.020		.020		.042		.020	

	Panel 1: Demographic & Family Controls								Panel 2: Mod.1 + Human Capital & Labor Supply								OLS: Panel 3: Panel 2 + Job Characteristics & Industry							
	White Men		Black Men		White Wom.		Black Wom.		White Men		Black Men		White Wom.		Black Wom.		White Men		Black Men		White Wom.		Black Wom.	
BA Business	.381	**	.311	***	.398	***	.398	***	.369	***	.299	***	.367	***	.271	***	.390	***	.317	***	.324	***	.214	***
	.052		.025		.021		.021		.050		.024		.043		.020		.047		.022		.041		.019	
BA Legal/Medical	.515	**	.515	**	.526	***	.526	***	.465	***	.465	***	.431	***	.431	***	.490	***	.490	***	.436	***	.436	***
	.068		.068		.032		.032		.065		.065		.029		.029		.061		.061		.028		.028	
BA Humanities	.209	***	.209	***	.166	***	.378	***	.124	***	.249	***	.139	*	.218	***	.159	**	.247	***	.157	***	.157	***
	.038		.038		.092		.044		.077		.036		.084		.040		.073		.034		.039		.039	
BA Unspecified	.177	***	.810	***	.232		.232		.189	***	.751	***	.075		.075		.152	***	.714	***	.025		.025	
	.373		.176		.196		.196		.355		.167		.180		.180		.335		.158		.173		.173	
MA Hard Science	.494	***	.737	***	.612	***	.374	***	.493	***	.694	***	.526	***	.247	***	.478	***	.692	***	.463	***	.169	***
	.100		.048		.124		.057		.095		.046		.113		.052		.090		.043		.109		.050	
MA Soc. Science	.159	***	.389	***	.350	***	.350	***	.188	***	.393	***	.224	***	.224	***	.238	***	.434	***	.192	***	.192	***
	.080		.037		.029		.029		.076		.035		.027		.027		.072		.033		.026		.026	
MA Business	.579	***	.579	***	.571	**	.674	***	.558	***	.558	***	.496	***	.496	***	.567	***	.567	***	.419	***	.419	***
	.039		.039		.089		.041		.037		.037		.037		.037		.035		.035		.036		.036	
MA Legal/Medical	.382	***	.382	***	.560	**	.445	***	.527	*	.369	***	.512	***	.350	***	.573	*	.423	***	.486	***	.348	***
	.078		.078		.091		.041		.162		.074		.083		.038		.153		.070		.080		.036	
MA Humanities	.146	**	.146	**	.211	***	.052		.180	***	.180	***	.111	***	.111	***	.191	***	.191	***	.078	***	.078	***
	.063		.063		.111		.051		.025		.025		.025		.025		.023		.023		.024		.024	
MA Unspecified	.238		.238		-.718	***	.474	***	.333		.333		-.888	***	.300	***	.339		.339		-.913	***	.273	**
	.248		.248		.306		.125		.236		.236		.280		.115		.223		.223		.269		.110	
PhD Hard Sci.	.566	***	.566	***	.784	***	.784	***	.912	***	.912	***	.675	***	.675	***	.998	***	.998	***	.598	***	.598	***
	.188		.188		.069		.069		.137		.137		.063		.063		.129		.129		.061		.061	
PhD Soc. Science	.665		.665		.594	***	.594	***	-.064	**	.377	**	-.286	***	.346	***	.057	**	.418	**	.523	***	.291	***
	.252		.252		.070		.070		.371		.183		.208		.064		.350		.173		.137		.062	

	Panel 1: Demographic & Family Controls								Panel 2: Mod.1 + Human Capital & Labor Supply								OLS: Panel 3: Panel 2 + Job Characteristics & Industry							
	White Men		**Black Men**		**White Wom.**		**Black Wom.**		**White Men**		**Black Men**		**White Wom.**		**Black Wom.**		**White Men**		**Black Men**		**White Wom.**		**Black Wom.**	
PhD Business	.906	**	.591	***	.472	**	-.001		.885	***	.587	***	-.010	**	-.136		.893	**	.638	***	.345	**	-.129	
	.214		.136		.467		.226		.204		.092		.226		.208		.193		.087		.411		.199	
PhD/ JD/ MD	.520	***	.520	***	.650	***	.650	***	.728	***	.728	***	.246	***	.574	***	.790	***	.790	***	.764	***	.524	***
	.085		.085		.085		.085		.029		.029		.137		.078		.027		.027		.164		.075	
PhD Humanities	.132	*	.235		-.046		-.046		.194	*	.194	*	-.047		-.047		.300	***	.300	***	-.028		-.028	
	.081		.159		.125		.125		.114		.114		.115		.115		.107		.107		.110		.110	
PhD Unspecified	.287	***	.492	***	.467	*	.797	***	.346	***	1.018	***	.398	***	.398	***	.414	***	1.038	***	.315	**	.315	**
	.165		.189		.341		.161		.158		.074		.148		.148		.149		.070		.142		.142	

Notes: * is p < .05, ** is p < .025, and *** is p < .01, two-tailed tests. "NA" means too few cases to analyze in that cell. "n.s." means not significant. Within-sex race differences in returns are distinguished by the bolding of the group receiving the lower return. Race differences in returns are calculated from race interactions on pooled models. Interactions are added to main effects in the models presented to show the total effect of each educational credential for each race-sex group.

Table 5. Coefficients and Robust Standard Errors from Fixed–Effect Models Regressing Alternate Specifications of Education and Control Variables on Ln Earnings, By Sex with Racial Group Interactions

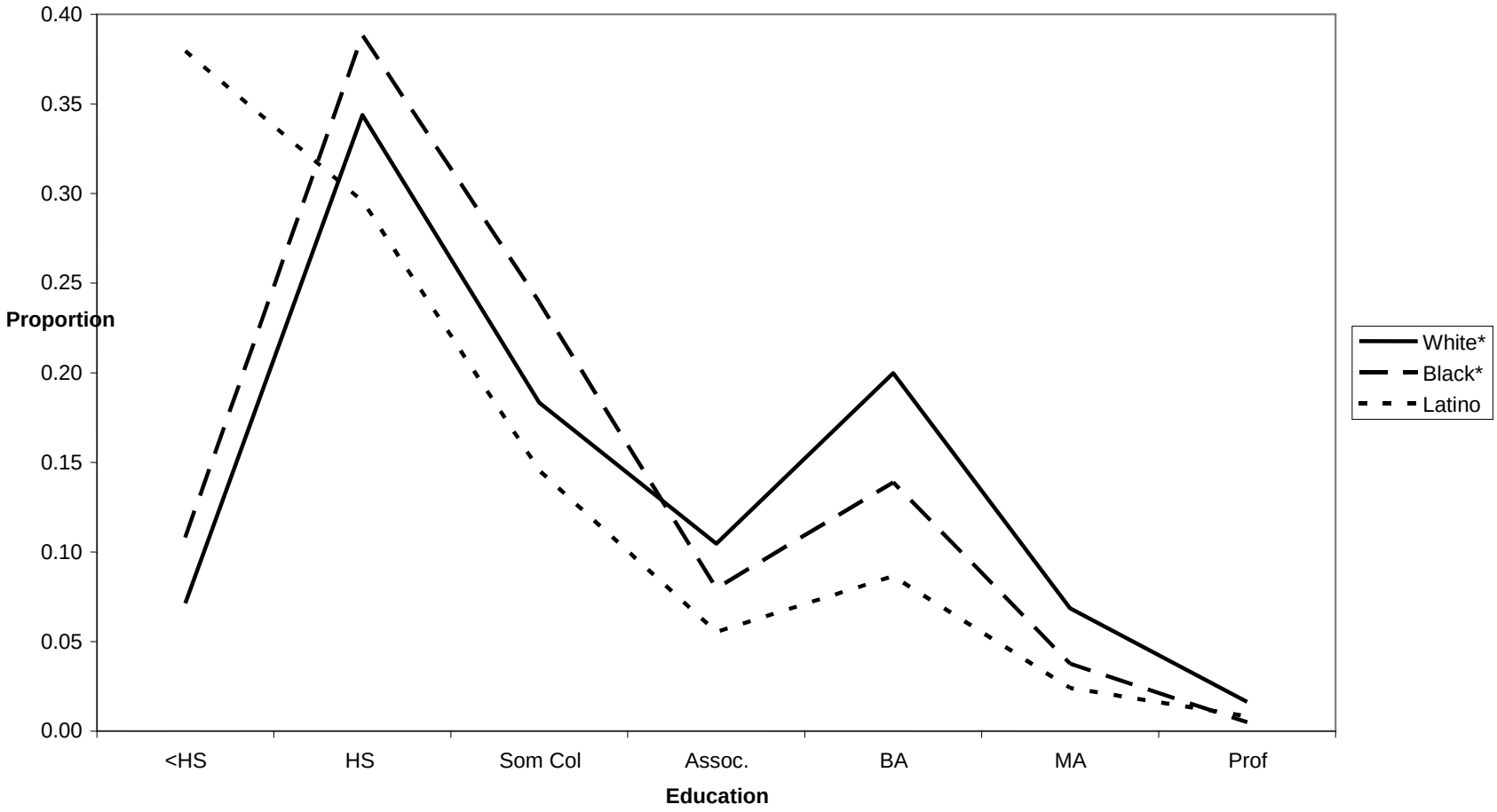
	Model 1: Demographic & Family Controls								Model 2: Mod.1 + Human Capital & Labor Supply								Fixed Effects: Panel 3: Panel 2 + Job Characteristics & Industry							
	White Men		Black Men		White Wom.		Black Wom.		White Men		Black Men		White Wom.		Black Wom.		White Men		Black Men		White Wom.		Black Wom.	
MODEL A																								
Highest grade	.130	***	.092	***	.103	***	.103	***	.063	***	.031	***	.044	***	.024	***	.064	***	.034	***	.041	*	.028	***
	.015		.007		.007		.007		.014		.007		.014		.006		.014		.006		.013		.006	
MODEL B																								
HS Diploma	.089	***	.089	***	.083	**	.083	**	-.027		-.027		.021		.021		-.036		-.036		-.043	**	.034	
	.023		.023		.035		.035		.021		.021		.032		.032		.021		.021		.069		.031	
Some College	.169	***	.169	***	.220	***	.220	***	-.005		-.005		.044		.044		.002		.002		.075	**	.075	**
	.035		.035		.039		.039		.032		.032		.035		.035		.031		.031		.035		.035	
BA / BS	.378	***	.378	***	.393	***	.393	***	.084	**	.084	**	.135	***	.135	***	.096	**	.096	**	.141	***	.141	***
	.045		.045		.045		.045		.041		.041		.041		.041		.040		.040		.040		.040	
MA / MS	.462	***	.462	***	.467	**	.334	***	.142	***	.142	***	.156	***	-.001		.150	***	.150	***	.124	*	.024	
	.055		.055		.108		.050		.050		.050		.098		.045		.050		.050		.096		.045	
PhD/ MD/ JD	.589	***	.589	***	.436	***	.436	***	.322	*	.155	*	.211	**	.027		.328	*	.180	**	.082		.082	
	.088		.088		.081		.081		.170		.080		.161		.073		.168		.079		.072		.072	
MODEL C																								
HS Diploma	.089	***	.089	***	.092	***	.092	***	-.064		-.029		.023		.023		-.038		-.038		-.076	**	.035	
	.023		.023		.035		.035		.048		.021		.032		.032		.021		.021		.038		.031	
Some College	.171	***	.171	***	.231	***	.231	***	-.022		-.006		.046		.046		.001		.001		.076		.076	
	.035		.035		.039		.039		.069		.032		.035		.035		.032		.032		.035		.035	
BA Hard Science	.487	***	.262	***	.494	***	.494	***	.162	***	-.026		.157	**	.157	**	.147	**	-.006		.154	**	.154	**
	.143		.068		.073		.073		.130		.062		.066		.066		.129		.061		.065		.065	
BA Social Science	.344	***	.344	***	.400	***	.400	***	.062		.062		.185	***	.185	***	.067		.067		.196	***	.196	***
	.061		.061		.055		.055		.056		.056		.050		.050		.056		.056		.049		.049	

	Model 1: Demographic & Family Controls								Model 2: Mod.1 + Human Capital & Labor Supply								Fixed Effects: Panel 3: Panel 2 + Job Characteristics & Industry							
	White Men		Black Men		White Wom.		Black Wom.		White Men		Black Men		White Wom.		Black Wom.		White Men		Black Men		White Wom.		Black Wom.	
BA Business	.522	***	.522	***	.533	*	.415	***	.218	***	.218	***	.279	***	.111	**	.230	***	.230	***	.130	**	.098	**
	.063		.063		.123		.056		.058		.058		.111		.051		.057		.057		.059		.050	
BA Legal/Medical	.541	*	.277	**	.384	***	.384	***	.216	**	-.043		.108	*	.108	*	.223	*	-.002		.136	**	.136	**
	.258		.119		.070		.070		.235		.109		.064		.064		.233		.108		.063		.063	
BA Humanities	.363	***	.363	***	.440	***	.440	***	.068		.068		.167	**	.167	**	.074		.074		.185	**	.185	**
	.083		.083		.083		.083		.076		.076		.075		.075		.075		.075		.074		.074	
BA Unspecified	.228		.228		-.020		-.020		-.220		-.220		-.214		-.214		-.203		-.203		-.227		-.227	
	.249		.249		.285		.285		.227		.227		.258		.258		.225		.225		.253		.253	
MA Hard Science	.559	**	.284	**	.267	**	.267	**	.240	*	.031		.101	**	-.135		.230	*	.046		.063	*	-.130	
	.229		.110		.109		.109		.209		.101		.212		.099		.207		.100		.208		.097	
MA Soc. Science	.525	***	.525	***	.380	***	.257	***	.170	**	.170	**	.069	**	-.077		.190	***	.190	***	-.030		-.030	
	.078		.078		.133		.061		.071		.071		.121		.056		.071		.071		.055		.055	
MA Business	.633	***	.633	***	.645	***	.645	***	.288	***	.288	***	.204	***	.204	***	.289	***	.289	***	.191	***	.191	***
	.078		.078		.075		.075		.072		.072		.068		.068		.071		.071		.067		.067	
MA Legal/Medical	.314	**	.314	**	.196	**	.325	***	.257	*	-.027		.086		.086		.273	*	-.003		.101		.101	
	.150		.150		.095		.079		.299		.137		.072		.072		.296		.135		.071		.071	
MA Humanities	.397	*	.152		.267	**	.143		.135	**	-.116		.108	**	-.142		.127	**	-.133		.076	*	-.115	
	.240		.113		.120		.104		.218		.103		.203		.094		.216		.101		.200		.093	
MA Unspecified	-.119		-.119		.117		.117		-.348		-.348		-.208		-.208		-.297		-.297		-.190		-.190	
	.337		.337		.201		.201		.307		.307		.182		.182		.303		.303		.178		.178	
PhD Hard Sci.	.575	***	.575	***	.699	***	.699	***	.211	***	.211	***	.366	***	.366	***	.227	***	.227	***	.413	***	.413	***
	.188		.188		.135		.135		.102		.102		.123		.123		.107		.107		.120		.120	
PhD Soc. Science	.667	***	.667	***	-.265	**	.396	***	.327	***	.327	***	-.279	**	-.019		.318	***	.318	***	-.295	***	.058	
	.252		.252		.129		.101		.130		.130		.208		.091		.127		.127		.114		.090	

	Model 1: Demographic & Family Controls								Model 2: Mod.1 + Human Capital & Labor Supply								Fixed Effects: Panel 3: Panel 2 + Job Characteristics & Industry							
	White Men		**Black Men**		**White Wom.**		**Black Wom.**		**White Men**		**Black Men**		**White Wom.**		**Black Wom.**		**White Men**		**Black Men**		**White Wom.**		**Black Wom.**	
PhD Business	1.027	*	.717	***	.329		.329		.403	***	.403	***	-.037		-.037		.423	***	.423	***	.017		.017	
	.317		.143		.285		.285		.130		.130		.258		.258		.129		.129		.254		.254	
PhD/ JD/ MD	.525	***	.525	***	.616	***	.616	***	.331	***	.331	***	.560	*	.250	*	.348	***	n.s.		.296	**	.296	**
	.085		.085		.152		.152		.078		.078		.308		.137		.077				.135		.135	
PhD Humanities	.693	**	.238		.903	***	-.236		.299	***	-.290	**	.302	***	-.483	**	.295	***	-.277	*	.695	***	-.410	**
	.354		.160		.273		.210		.322		.146		.438		.190		.319		.144		.243		.187	
PhD Unspecified	.635	**	.635	**	.421		.421	*	-.058		-.058		.688	***	-.151		.032		.032		.847	***	-.161	
	.261		.261		.228		.228		.238		.238		.487		.207		.235		.235		.275		.203	

Notes: * is p < .05, ** is p < .025, and *** is p < .01, two-tailed tests. "NA" means too few cases to analyze in that cell. "n.s." means not significant. Within-sex race differences in returns are distinguished by the bolding of the group receiving the lower return. Race differences in returns are calculated from race interactions on pooled models. Interactions are added to main effects in the models presented to show the total effect of each educational credential for each race-sex group.

Figure 1. Highest Completed Educational Level of 35 to 44 year-olds in 2000, by Race/Ethnicity



Note: Data from the Current Population Survey, March 2000, authors' calculations.