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The Gender Gap Reloaded: Are School Characteristics Linked to Labor Market Performance?

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Abstract

This study examines the wage gender gap of young adults in the 1970s, 1980s, and 2000 in the US. Using quantile regression we estimate the gender gap across the entire wage distribution. We also study the importance of high school characteristics in predicting future labor market performance. We conduct analyses for three major racial/ethnic groups in the US: Whites, Blacks, and Hispanics, employing data from two rich longitudinal studies: NLS and NELS. Our results indicate that while some school characteristics are positive and significant predictors of future wages for Whites, they are less so for the two minority groups. We find significant wage gender disparities favoring men across all three surveys in the 1970s, 1980s, and 2000. The wage gender gap is more pronounced in higher paid jobs (90^{th} quantile) for all groups, indicating the presence of a persistent and alarming "glass ceiling."

JEL Codes: J16, J24, J31

Keywords: wages, gender differences, school effects, quantile regression.

The existence of gender differences in labor market outcomes, such as wages, has gained ample attention in economics and the social sciences. Gender differences in wages have been researched and documented, and frequently debated in the literature. It is an established fact that males earn substantially higher wages than females. There is some empirical evidence, however, that while the gender gap is decreasing over time due to women's increased labor force participation and experience, it remains strong across the entire wage distribution.

The quality of the empirical evidence on gender differences in wages has not always been very strong for two main reasons. First, typically, the samples of various studies on gender differences in wages are not representative of a well-defined population. Many studies have used convenient samples, and it is plausible that the results obtained from such selected samples are biased (positively or negatively), and hence very different from their "true" population parameters. Second, various previous studies on gender differences in wages have typically examined and reported group differences in means (the central tendency of the distribution of wages). Gender differences in the extremes (e.g., upper and lower tails) of the wage distribution are only recently documented in the literature. Since it is likely that gender differences in the tails of the wage distribution may be different qualitatively than differences in the middle of the distribution, examining gender differences across the entire distribution of wages is important and provides a more accurate picture of the gender gap. For example, males may be over-represented in the top 10 percent of the wage distribution compared to females, a byproduct of over-concentration of men in highly paid jobs. This difference may not necessarily be similar to gender differences observed in the middle or the lower tail of the wage distribution.

In this study we employ base years and follow-up data of national probability samples of high school students in the US, namely the National Longitudinal Study (NLS) of the High

School Class of 1972 (base year, fourth and fifth follow-up) and the National Education Longitudinal Study (NELS) of the Eighth Grade Class of 1988 (second and fourth follow-up). The main advantage of these datasets is that we can link important characteristics of high schools attended in the base year to wages from follow-up years, and thus, examine how high school characteristics affect wage differentials. In addition, these rich data allow us to examine the labor market performance of similarly aged individuals seven, eight, and fourteen years after high school graduation, and hence, likely avoiding transitional labor market effects. Because of the use of national probability samples our results are more likely to have higher external validity, and be more resilient to threats of selection bias. We examine gender differences in hourly wages for young adults in the late 1970s, mid 1980s, and 2000 across the entire distribution of wages, thus covering three important time spells. Our estimation technique is to employ quantile regressions while adjusting for selection biases in the labor force. Because the gender gap may be declining on average, but may be remaining strong in the upper or lower tails, affecting women disproportionately, we examine the following quantiles of the wage distribution: 10^{th}, 25^{th}, 50^{th}, 75^{th}, and 90^{th} quantile. We conduct separate analyses for three major race/ethnic groups in the US: Whites, Blacks, and Hispanics. This permits us to determine whether the gender gap differs by race/ethnic group and whether it is changing over time.

An equally important objective of the present study is to investigate the link between high school characteristics and hourly wages. Gauging the effects of high school characteristics on the wage gender gap is of great importance because school effects have differential and enduring effects on the earnings of individuals who attend different schools net of individual and family background characteristics (Constant and Konstantopoulos, 2003). Previous work on school effects has yielded mixed and inconsistent findings with respect to the importance of schooling on school outputs such as academic achievement. Some researchers have concluded that there is little or no evidence of school effects (Hanushek, 1986), while others report that the impact of school factors may be substantial (Greenwald, Hedges, and Laine, 1996). In this study, we examine school effects on labor market outcomes and ask the question, can high school characteristics predict future wages of young adults, net of the effects of individual characteristics? If so, then which school characteristics matter more for the economic performance of young workers, and for which ethnic groups?

Related Literature

Research on the gender wage gap has documented that, on average, the wages of white males are considerably higher than those of comparable females. Oaxaca (1973) was the first to examine earnings differences between sexes using residual analysis, and found the sex differential to be quite large. In fact, a substantial proportion of the gender gap was not explained by observable characteristics and was attributed to the effects of discrimination (77 percent for whites and 93 percent for blacks). Studying the gender wage gap in the South Constant (1993) finds that an alarming portion of the earnings gap is not explained by observable attributes. That is, women are not rewarded for their large stocks of human capital in the labor market as much as men.

While the gender earnings gap decreased among Whites and Blacks in the 1970s, the gender and race wage differentials persisted even after adjusting for human capital and labor market characteristics (Blau and Beller, 1988). That is, gender specific factors such as qualifications and discrimination still play a significant role in determining the gender pay gap. Other studies demonstrated that the hourly wage difference between men and women has narrowed between the mid 1970s and the late 1980s due to women's strides in investing in human capital (O'Neill and Polachek, 1993) and that the dramatic decline in the 1980s rendered women of all races to improve their earnings relative to white men (Cotter et al., 1995). However, some recent literature on the narrowing gap claims that it is rather due to men's wages decreasing (Boushey, 2001). This narrowing of the gender wage gap is oftentimes attributed to increases in women's work experience, years of schooling, and other skill acquisition with ensuing increased productivity. However, some researchers postulate that the closure of the gender gap in wages during the 1980s is not only due to improvements in women's occupational status and experience, but also to enhancements in women's unmeasured labor skills and/or a decrease in discrimination against them (Blau and Kahn, 1997). In fact, about two thirds of the wage gap is due to differences in experience, occupational choice, and industry classification (Blau and Kahn, 2000). Lately, studies find that the gap may have narrowed not due to less discriminatory practices, but rather due to women's increased access to upper level education, and their increased desire to postpone family commitments to pursue careers (Montgomery and Powell, 2003). The importance of educational attainment is also established in Boushey and Cherry (2003), who find a larger wage growth for women in college-required jobs.

The decline in the gender wage gap between 1985 and 1994 in the US is confirmed by other studies finding that about 35 percent of the gap narrowing is due to the increase in women's weeks worked, job tenure, and full-time employment (Gill and Leign, 2000). The authors find that the estimates of how education explains the narrowing of the gender wage gap heavily depend on the specification of the schooling variable, adding degree status, type of college, and major field of study increases the estimates of how education predicts the gender pay gap. Recent contributions to the literature by Boushey and Cherry (2003) show that while the gender gap closed over time through 1993, it remained unchanged for the remainder of the 1990s.

Using samples of highly educated workers Wood, Corcoran, and Courant (1993) conclude that men and women lawyers fare differently; even after 15 years in the labor market women lawyers earn 60 percent less than men lawyers. They suggest that 11 percent of the overall wage gap "should be treated as the result of discrimination" (p. 438). A more recent study on the gender gap in top corporate jobs in the US finds that only 2.4 percent of all top executives in their sample are women, that, on average, female total compensation is 33 percent lower than male total compensation, and that middle-level managers suffer from a similar gender pay gap of 46 percent (Bertrand and Hallock, 2001). While occupational segregation is very important in explaining the gap, lower female participation in large firms explains one third of the gender wage gap. Accounting for all observable differences between men and women executives, they find that there is still and unobservable gender wage differential of about five percent. Bell (2005) confirms the presence of the gender gap in wages of top executives in the US and finds that top women executives earn eight to 25 percent less than top men executives. Comparing the gender wage differential in women led firms versus men led firms she finds that in female led firms, there are more female executives and these executives earn on average more than female executives in male led firms.

Still, state of the art literature shows that the gender gap may not be the same across the wage distribution and looking at the mean may produce misleading results. Examining gender wage discrimination in Spain Gardeazabal and Ugidos (2005) find that it is not constant across the quantiles of the wage distribution in 1995, and that the highest level of gender wage discrimination is observed at the bottom of the wage distribution. In another quantile study on gender wage gaps by education, de la Rica et al. (2005) find that the wage gap in Spain increases along the wage distribution of men and women with tertiary education, in accordance with the conventional glass ceiling hypothesis. Yet, the gap is higher at the bottom than at the top for individuals with primary and secondary education. The authors argue that this is due to statistical discrimination exerted by employers.

Method

Data Sets

We employ two rich, longitudinal, and representative samples of eighth and twelfth graders. The first set of samples is the National Longitudinal Study (NLS:72) of the High School Class of 1972 that includes individuals who were high school seniors in 1972 (the base year) and wage earners in 1979 and 1986, the fourth and fifth follow-ups respectively. The second set of samples is the National Education Longitudinal Study (NELS) of the Eighth Grade Class of 1988 that includes individuals who were eighth graders in 1988 (the base year), high school seniors in 1992 (the second follow-up), and wage earners in 2000 (the fourth follow-up).

These data sets contain detailed and valuable information on the high school the individual attended, the individual's performance in high school, and the individual's performance in the labor market. Another advantage in each of these data is that these individuals have all the same age, being high school seniors in the same year, and thus they all face the same macroeconomic junctures. Both datasets are part of the National Education Longitudinal Studies program instituted by the National Center of Education Statistics with the objective to study the educational, vocational, and personal development of young people. Hence, these data provide unique opportunities to study young adults.

NLS:72 is a national probability sample of 22,583 high school seniors designed to represent all twelfth graders enrolled in public or private American high schools in the spring of 1972. These students were followed for 14 years after high school, and, thus, they were resurveyed in 1974, 1975, 1977, 1979, and 1986. We employ data collected during the base-year survey in 1972, the fourth follow-up in 1979, and the fifth follow-up in 1986. NELS:88 uses a two stage national probability sample of 24,599 eighth graders enrolled in public and private American schools in 1988. These students were followed for 12 years and hence were resurveyed in 1990, 1992, 1994, and 2000. In this study we use information from the second follow-up (NELS:92) when the students were high school seniors, and the fourth follow-up (NELS:00) eight years after high school graduation.

Both datasets are unique in providing valuable information on high school resources and quality, the educational attainment, occupational status, and employment outcomes of young adults. The longitudinal feature of the data allows us to examine the labor market performance of these individuals during their prime time in the labor market. In addition, because we are looking at individuals who have been in the labor market for seven to fourteen years we may avoid any biases from school to work transitions. Our samples incorporate individuals with various levels of education and various occupations to ensure the inclusion of all persons who reported positive hourly wages in the follow up samples. However, military personnel and full time students are excluded from our samples. Our dependent variable is hourly wages in 1979, 1986, and 2000. For comparison purposes with the NELS:00 sample, we use the fourth follow-up in NLS as well. Specifically, the average age in the NLS:86 sample is 32 years, while in NELS:00 it is 26 years. This six-year difference is crucial for young adults and hence differences between these samples may be due to age differences. However, the average age of individuals in the NLS:79 sample is

25 years. This sample is more comparable (age-wise) to the fourth NELS follow-up in 2000, and detecting differences should not be due to age differences.

Analysis

Important Correlates of Wages

Wages are a function of education, training, health, and experience in the labor market. A central concept of human capital theory is the returns to schooling, as education enhances labor market productivity and, therefore, wages (Becker, 1964). The main hypothesis is that higher levels of education correspond to higher levels of human capital, which in turn results in higher labor market performance or productivity and higher paying jobs. To that end, we explore gender and racial differences in wages controlling for educational attainment. We create a dummy for educational attainment that takes the value of one if the individual has a college degree or more and zero otherwise. We also control for potential experience in the labor market. Potential experience is calculated as (age – education – 6) and captures general training, specific on the job training, and tenure or seniority. We expect more years of labor market experience to increase wages albeit at a decreasing rate.

We further control for marital status since married women and mothers in particular bear the cost of family responsibilities and have fewer opportunities to invest in human capital, which can lead to wage disparities. Women's intermittent labor force participation (due to familial obligations) and its subsequent decay in skills is certainly one culprit for the persistent gender wage gap. Previous findings have also reported that marital status is an important correlate of wages for men, but in a positive way. In principle, being married conveys stability and commitment, signals productivity to the labor market, and affects potential tenure on the job, hence positively affecting wages. We construct a marital status indicator that takes the value of one if the individual is married or living under common law and zero otherwise. Finally, we also control for the number of children that a person has since it can significantly affect women's labor market performance. For example, some research has indicated that mothers have lower hourly wages than non-mothers, controlling for labor force participation and the characteristics of their occupations (Elliott and Parcel, 1996).

A contribution of the present study is that, beyond the wage gender gap, we also examine the role of school effects in the determination of wages. In particular, we include in the wage regression four important attributes that capture high school characteristics and can be directly measured from the surveys. All four variables have been positively and consistently associated with achievement in previous studies, and hence we hypothesize that these variables will have a positive impact on wages as well (see Bryk, Lee, and Holland, 1993; Konstantopoulos, 2006). The first high school predictor is the percent of teachers with graduate degrees and represents school resources (see Hanushek, 1997). The remaining three high school predictors are average school achievement, average school socioeconomic status (SES), and percent of high school graduates who go to college. There important variables capture school composition or school social context (see Bryk, Lee, and Holland, 1993).

We should acknowledge however, that in principle, other factors can affect the gender gap beyond human capital (e.g., personal choices, home responsibilities, occupational crowding, labor market barriers, different growth patterns in earnings, and discrimination). Large contributors to the wage gap are child rearing and the unequal share of home-work (which are more frequently done by women). Discrimination, that includes racism or sexism, can also be a factor that impacts the gender gap. Unequal opportunities for high-quality schooling for example, are responsible for sex and race wage differentials and are manifestations of discrimination. However, because there are no direct measures of discrimination, it is difficult to ascertain the extent to which it impacts the wage gap. As Becker (1971) argues, discrimination in the labor market can be due to employer's tastes for discrimination, co-worker or employee discrimination, or customer discrimination. In all cases, however, the existence of competitive markets would decrease discrimination in the long run and competition would erode distortions due to statistical discrimination or even feedback discrimination. Racism and sexism are phenomena more likely to occur in noncompetitive settings. Sexism for example, manifests itself more in the household where specialization causes diverse human capital investment paths by gender. Lastly, we acknowledge that occupation may also be a mechanism through which discrimination operates. The way people are brought up, cultural differences, and social roles also affect men and women differentially and ultimately their productivity. The bottom line is that the actual discrimination in the labor market against minorities (women, and non-whites) depends on the combined discrimination of employers, workers, consumers, schools, and governments and is difficult to capture empirically.

Estimation Strategy

The unit of our analysis is the individual. In our surveys we only observe the wages of those who are working. Since workers may differ from non-workers in unobservable ways we need to adjust our models for possible selection bias in the labor force. This is very important especially when studying women, who may not be as strongly attached to the labor market as men. Following Heckman (1979) we first estimate a probit model on the labor force participation for the entire sample (workers and not workers). Our binary outcome variable is working (part-or full-time) or not. The predictors of the labor force participation equation are carefully chosen to accurately determine the probability that individuals decide to join the labor force, given their reservation wages and other constraints. These characteristics include gender, family background (i.e., socioeconomic status of the person's family), educational attainment, marital status, family size (i.e., number of children), sources of non-labor income (the best identifier of labor force participation that affects reservation wages), and high school grades. Since most of these predictors may have differential effects on gender, we also included in our specification all possible interactions between gender and the remaining predictors.

From the probit model we calculate the inverse Mill's ratio or lambda (λ), which we take into account in the wage regressions to adjust for possible non-random selection of workers. All analyses are hence corrected for selection in the labor force, and therefore, all results presented here are adjusted for potential selection bias. The natural log of hourly wages, adjusted for different years, is the outcome variable in the wage regression. This regression specification includes the following predictors, fine-tuned and sufficiently different than those in the probit to ensure identification: gender (our main independent variable), educational attainment and marital status of the individual, family size (i.e., number of children), high school grades, estimated work experience (linear and quadratic terms), and four school predictors (school achievement, school SES, proportion of high school graduates that go to college, and proportion of teachers with graduate degrees). All school predictors have previously used in school effects research, and are expected to be positively and significantly associated with hourly wages.

Because our goal is to examine the gender wage gap across the entire distribution, we use quantile regression of hourly wages on gender and all other covariates. Quantile regression allows the estimation of gender differences in hourly wages at various quantiles of the distribution net of the effects of covariates at those quantiles (Bushinsky, 1998). We hypothesize that the wage gap is not uniformly distributed across the wage distribution, rendering gender differences in hourly wages in the tails of the distribution qualitatively different than differences in the middle. In addition, the gender wage gap may be larger in the upper tails than in the lower tails. We obtain robust standard errors for all estimates to account for heteroskedasticity, through bootstrapping. Note that we use the year 1979 as the base year of wage calculation and deflate the wages of the years 1986 and 2000 accordingly.

Finally, we also examine gender differences in the variability of the hourly wage distributions using variance ratios (see Hedges and Nowell, 1999). The variance ratio is simply the square of the ratio of the standard deviation of the wages distribution for women to that of the wages distribution for men. A ratio greater than one indicates that the variance of the wage distribution for women is larger than that for men, while a ratio smaller than one indicates that the variance of the wage distribution for men is larger. Differences in variability may indicate differences in the tails of the distribution.

Results and Discussion

Descriptive Statistics

Our raw data sow that, in general, women are more likely to work in white collar or professional jobs, and men are more likely to work in blue or white collar jobs. In 2000, the men in our sample are almost equally likely to work in white, blue collar, or professional jobs. In NLS the overwhelming majority of individuals are married, while in NELS most of the individuals are single. Given that individuals in NLS:79 and NELS:00 have comparable ages this indicates that in 2000 young adults in their mid 20s are more likely to be single than they are in 1979. Women are consistently more likely to be married or divorced, separated, or widowed than men. In contrast, men in our samples are more likely to be single. Overall, nearly a quarter of the individuals in our sample have a college degree (or more education). While in NLS men are more likely to have at least a college degree, in NELS:00 it is the women who are more likely to have at least a college degree. The hourly wages of Whites are consistently larger than the wages of minority groups across all surveys. The hourly wages of men are also consistently larger than the wages of women across all surveys and groups. In general, the gender gap seems to be more pronounced for Whites; for example, in 2000 men earned on average $8.5 per hour more than women. The gender gap is somewhat smaller for Hispanics ($5.5 per hour) and even smaller for Blacks ($4.0 per hour).

School Effects

Table 1 provides the results of the quantile regression. It summarizes the associations between the indicators of school characteristics and hourly wages controlling for important covariates for Whites, Blacks, and Hispanics across the wage distribution. Overall, school characteristics have some predictive efficacy in the wage regressions of Whites especially in the NLS samples. Specifically, in the NLS samples, we find that the proportion of high school graduates who go to college and the proportion of teachers who have graduate degrees are typically positive and significant predictors of hourly wages. School SES is also typically a positive and significant predictor of wages, while school achievement does not seem to play a significant role on wages (net of the effects of the other predictors). Our results indicate that those Whites, who attend high schools with high proportions of high school graduates going to college, high schools of higher SES, and with high proportions of teachers having graduate degrees earn significantly more in NLS:79 and NLS:86 than those who attend other schools. These effects are typically more pronounced in the middle and the lower tail of the wage distribution, which indicates that these high school characteristics may have larger benefits for individuals in lower or medium paying jobs. In the NELS:00 sample most school characteristics except school SES are not significant predictors of wages. School SES is a significant predictor of future wages in the upper tail as well (for all surveys) indicating that school SES may benefit individuals in lower, medium, and higher paying jobs equally. Overall, these results provide evidence of long-lasting school effects on wages for Whites, controlling for other characteristics.

Insert Table 1 Here

Turning to the results on Blacks, Table 1 shows that overall school characteristics do not significantly predict their future wages across the wage distribution and among the different samples. While this is consistent with the results of Grogger (1996) (although he used different school measures) this is still a troubling finding. In the NLS samples there is some (rather weak) evidence that characteristics, such as the proportion of high school graduates who go to college and the proportion of teachers who have graduate degrees, are positive and significant predictors of future wages of those Blacks who attended these schools. Interestingly, in NLS:79 attending high schools where a high percentage of students went to college, makes a significant difference in wages only when individuals are located in the middle and low bottom of the wage distribution; this high school attribute is not significantly different from zero for the upper tail individuals. In the NELS sample, it is only the school SES variable that is a positive and a significant predictor of wages across quantiles.

Similarly to results on Blacks, we find that high school characteristics are not consistent predictors of the future wages of Hispanics. The proportion of teachers with graduate degrees is a positive and significant predictor of wages in the NLS samples at the 10^{th}, 25^{th} and 50^{th} quantiles but not at the top 25 or 10 percent. The proportion of high school graduates who go to college is a significant and positive predictor only at the 50^{th} quantile in NLS:86. As with Blacks, Hispanics who are in the middle and low part of the wage distribution can benefit from attending better high schools. In the NELS sample, school SES is positively and significantly associated with wages across all quantiles and this finding is similar to that observed in the NELS sample for Blacks (and to a certain extent for Whites). There is also evidence that in 2000 the proportion of high school graduates attending college have a positive effect on the wages of Hispanics in the top high paying jobs (90^{th} quantile). Note that the Black and Hispanic samples are much smaller than the White samples (nearly 10 times), and across all surveys the standard errors of the school characteristics coefficients are consistently larger for the Black and Hispanic samples (3 times or more). This indicates that failure to detect significant coefficients in Blacks and Hispanics may be due to the smaller statistical power of the t-tests.

Overall, these results indicate that high school characteristics can predict the future remuneration of Whites in the labor market. Individuals who attend high schools with high percentages of students going to college and schools with many teachers with graduate degrees earn a premium later in life, but his is mostly true for the 1970s and 1980s. The significance of these characteristics vanishes in 2000 except average school SES that plays a positive role on the wages of individuals in the 50^{th}, 75^{th}, and 90^{th} quantile. For Blacks and Hispanics the predictive efficacy of school characteristics is less evident and less uniform among the three samples over the three decades. In general, all significant high school characteristics are positive, and affect the minority groups in the middle and low end of the wage distribution. School SES however, was a consistent predictor of wages for Blacks and Hispanics, but only in NELS:2000.

The Gender Wage Gap

Table 2 presents the results on the wage gender gap net of the effects of other important predictors for the three race groups and for all three datasets. We estimated the gender wage gap at different quantiles of the wage distribution (10^{th}, 25^{th}, 50^{th}, 75^{th}, and 90^{th} quantile). For Whites and across all samples, we find the following evidence. First, all gender coefficients are negative and significant indicating that males earn more per hour than females across the entire wage distribution and across all three decades. Second, the gender gap in wages is consistently larger in the middle and the upper tail of the wage distribution, and increases as we move up, indicating that women at the top are penalized the most. In particular, we find that in NLS:79 and NELS:00 - where individuals are of comparable age - the wage gap is the largest at the 90^{th} quantile of the wage distribution, with women earning 24 to 27 percent less than men respectively. Note that in NLS:86 the corresponding estimate for a sever year older cohort is 25 percent. Our interpretation is that the wage gap in the top persists through the ages and time. In NLS:86 the wage gap is the largest at the 50^{th}, and 75^{th} quantiles of the wage distribution, with women earning about 25 percent less than men. This suggests an alarming glass ceiling for Whites. Recall that the gender coefficients are conditioned on the effects of the covariates that are included in the model and hence are adjusted for these effects. Overall, while these estimates indicate comparatively more pronounced gender differences in medium and higher paying jobs, white men earn more than white women across the entire spectrum of jobs: lower, medium, and higher paying jobs. In addition, the estimates we obtained across all surveys seem to be consistent and did not change much over time (for the same age groups). Third, with the exception of the top 10 quantile, the magnitude of the wage gender gap for Whites increased in NLS:86 but decreased again in NELS:2000. Note that the gender gap in the 90th percentile keeps increasing over the three decades.

Insert Table 2 Here

We also constructed two t-tests to examine whether the gender gap in the upper tail (90th quantile) was significantly different from the gap in the middle (50th quantile) or the lower tail (10th quantile) of the wage distribution (taking into account the covariance among the estimates). Differences in the gender gap between the middle and the lower tail of the wage distribution were also examined. Our results indicate that in 1979 and 2000 all three t-tests are significant and hence, the gender gap for Whites is significantly larger in medium and highest paying jobs. We find similar results for the gender gap in Blacks. All gender coefficients that are significantly different from zero (nearly 80 percent of them) are negative indicating that black men earn more than black women per hour across the entire wage distribution and across all three decades. Specifically, the gender gap in the middle of the distribution is significant (except in NLS:79) and negative across all surveys (favoring men). The gap is smaller in the lower tail (except for the 10th quantile in NELS) and larger in magnitude in the upper tail. The largest wage gender disparity occurs at the 90th quantile in NLS:86, with women earning nearly 30 percent less than men. In NLS:79 and NELS:00 the largest wage gap is observed at the 75th percentile, with women earning 21 to 23 percent less than men respectively. This indicates an alarming glass ceiling for Blacks as well. Overall, Black women earn consistently less than comparable black men and the gap is not becoming smaller over time. It is interesting that the wage gap between same age sex-pairs is consistently larger in 2000 than in 1979 across all quantiles, except the 90^{th}. As with Whites, we constructed t-tests to examine differences in the gender gap in the upper middle and the lower tail of the wage distribution. Our results indicate that all three t-tests are insignificant and hence, the gender gap for Blacks is similar in the lowest, medium, or highest paying jobs.

Overall, the gender wage gap for Hispanics follows similar patterns, but only 60 percent of the coefficients are negative and significant (favoring men). In fact, in the lower tail (10^{th} quantile) of the wage distribution we cannot detect any significant wage disparities in ether sample across the decades. In the NLS samples, the gender coefficients are negative and significant at the 25^{th}, 50^{th} and 75^{th} quantiles, suggesting that Hispanic men earn more per hour than women. The gap ranges from 10 percent in NLS:79 at the bottom 25 decile of the distribution to 40 percent at the 75^{th} quantile in NLS:86. This is a huge increase in the gap within seven years. The highest wage gap we found occurs between Hispanic men and women at the 90^{th} quantile, with women earning 44 percent less than men. In NELS:00 the gender gap becomes larger and significant (favoring men) at the 75^{th} and 90^{th} percentile, with women earning 14 to 24 percent less than men respectively. Similar to Whites and Blacks this indicates a glass ceiling effect, where women who managed to climb to the top are experiencing to highest wage disparity. Comparing NLS:79 to NLS:86 samples, it appears that the wage gender gap increased in the 1980s across all ranges of the distribution. However, the gap decreased in NELS:00. This could be an encouraging finding that among younger Hispanics the gender gap in the top 25 percent went down in 2000. As with Whites and Blacks we constructed t-tests to examine differences in the gender gap in the upper middle and the lower tail of the wage distribution. Our results indicate that in 2000 the gender gap in the 90^{th} quantile was significantly different from the gender gap in the 50th or the 10th quantile. Hence, the gender gap for Hispanics is larger in the highest paying jobs in 2000.

The standard errors of the gender coefficients are larger in the tails of the wage distribution. This indicates that, other things being equal, there is a lower chance of detecting significant differences in the tails (since the power of the statistical test is lower). In addition, the standard errors of the gender gap coefficients for Blacks and Hispanics are consistently larger than those obtained for Whites. Hence, there is a lower chance of detecting significant gender wage differences for Blacks and Hispanics than for Whites (due to lack of statistical power again). Nonetheless, the estimates are comparable across the three racial/ethnic groups.

The Effects of School Sector

We also investigated whether the observed glass ceiling effect for women was different for individuals who attended private or public high schools. Accordingly, we ran models that included school sector, coded as a binary indicator taking the value of one if a school is private and zero otherwise, and the interaction between gender and school sector. In this exercise we find that, in the NELS:00 sample, attending private schools is not significantly associated with wages. In addition, all interactions are insignificant indicating that the glass ceiling effect is similar for individuals who attend private or public schools. In the NLS:86 sample the private school coefficient is negative and significant at the 90th quantile for Whites, meaning that attending private schools is not beneficial for women who reach the top of the ladder. This coefficient is, however, positive and significant at the 10th quantile for Blacks meaning that private schools can help minorities at the low end. No school sector effect was observed for the Hispanic sample. In addition, across groups the female-private school interaction is insignificant (as in NELS:00). In the NLS:79 sample the private school coefficient and the female-private school interaction are not significantly different from zero across quantiles for Whites and Blacks. The private school coefficient, however, was positive and at the borderline of statistical significance at the 25th quantile for Hispanics. It is interesting that at the same quantile (25th) the female-private school interaction was negative and significant for Hispanics. Overall, these results show that the glass ceiling effect observed for all groups is similar for females who attended private or public high schools.

Differences in Variability

Differences in the variability of the wage distribution can provide important information about the gender gap. For example, the wage distributions for men and women may have comparable means, but different variances. Larger variation indicates that there are more individuals in the lower and upper tails of the wage distribution. From previous work we know that males have much more spread out distributions in school outputs, such as academic achievement (Hedges and Nowell, 1995). Since, wages can be thought of as a long-term school output we examine the variation of wages for men and women to determine differences in variability. Our results show that for Whites, the wage distributions for men and women have comparable variances. The variance ratios are close to one, indicating gender parity in wage variation across all surveys. For Blacks, we find that men have consistently more spread out wage distributions than women, since all variance ratios are smaller than one. This difference is more pronounced in the NLS samples. For Hispanics, in the NLS samples the wage distribution for women is more spread out than that for men. In NELS:00 however, the variance ratio is smaller than one indicating larger variation in the wage distribution for men.

Conclusion

In this study we revisit the gender wage gap for three race/ethnicity groups in the US over three decades using important school characteristics as predictors and a novel estimation technique. Our goal is threefold: (i) to examine how the gender wage gap changes over time among Whites, Blacks, and Hispanics, (ii) to examine whether the gender wage gap is larger or smaller at the tails of the wage distribution, compared to the middle, and (iii) to examine whether school effects have an indelible impact on the future wages of young adults in the labor market.

Our findings indicate that high school characteristics, such as the percentage of high school graduates in college, that of teachers with graduate degrees, and school SES, can predict the wages of young men and women well, but this finding is mainly obtained for Whites. School characteristics do not have a consistent and significant impact on the wages of Blacks and Hispanics. However, some of the school characteristics, such as the proportion of teachers with graduate degrees variable, are significant for the wages of Blacks and Hispanics in 1986, while others, such as the proportion of high school graduates in college variable, are significant for the wages of Hispanics in 2000 and of Blacks in 1979. The school SES is consistently an important predictor of the wages of Blacks and Hispanics, especially in 2000. It is worth noting that these variables affect the wages of minorities differentially depending on the quantile the group occupies in the distribution. With few exceptions, these school characteristics seem to be beneficial to individuals in the middle and lower part of the wage distribution. In comparison to Whites, these finings are somewhat alarming since they indicate that high schools do not matter much in the future labor market performance of minority groups. If one assumes that there is differential attrition among the three groups and that Blacks and Hispanics are more likely to dropout of high school, these results become even more discouraging since, at best, they indicate trivial school effects for the "best" students of the minority groups. In general, our findings of school effects on future wages across all groups and decades are somewhat weak.

In addition, our results confirm significant gender disparities in hourly wages favoring men across three surveys and three racial/ethnic groups in the 1970s, 1980s, and 2000. The gender gap is similar for Whites, Blacks, and Hispanics. Consistently, the magnitude of the gender gap is larger in the upper tails of the hourly wage distribution for all race/ethnic groups. That is, women earn, overall, less than men in highly paid jobs, and this is in congruence with the glass ceiling hypothesis. In sum, for the top 10 and 25 percent of the wage distribution of Whites, women earn about 25 percent less than men. In fact, the gender gap at the top is significantly larger than the gender gap in the middle or the bottom of the wage distribution in 1979 and 2000 (the 25-26 year old group). Similar patterns are observed for Blacks and Hispanics, that is, women in higher paying jobs earn at least 20 percent less than men. In addition, it appears that in our samples the gender gap remained relatively unchanged over time. It is interesting that for Blacks we also find a large wage gap in the lower paying jobs (10^{th} quantile) with women earning nearly 25 percent less than men in 2000. Nonetheless the gender gap is similar in lower medium and higher paying jobs. For Hispanics, women earn nearly 20 percent less than men at the 90^{th} quantile. In 2000 the gender gap at the top was significantly larger than the gender gap in the middle or the bottom of the wage distribution. Overall, our estimates consistently indicate that the gender disparity is larger at the upper tail of the wage distribution across race groups. Overall, our results suggest that the gender gap did not become smaller over time, it is significant (especially in higher paying jobs), and that men earn more than women in lower, medium, and especially in higher paying jobs.

References

Becker, G. S., 1971. The Economics of Discrimination. Chicago: University of Chicago Press, 2nd edition.

Becker, G. S., 1964. Human Capital: A Theoretical and Empirical Analysis with Special Reference to Education. New York: Columbia University Press.

Bell, L. A., 2005. Women-Led Firms and the Gender Gap in Top Executive Firms. IZA Discussion Paper No. 1689.

Bertrand, M. and K. Hallock, 2001. The Gender Gap in Top Corporate Jobs. Industrial and Labor Relations Review 55: 3-21.

Blau, F. D. and A. H. Beller, 1988. Trends in Earnings Differentials by Gender (1971-1981). Industrial and Labor Relations Review 41: 513-529.

Blau, F. D. and L. M. Kahn, 1997. Swimming Upstream: Trends in the Gender Wage Differential in the 1980s. Journal of Labor Economics 15: 1-42.

Blau, F. D. and L. M. Kahn, 2000. Gender Differences in Pay. Journal of Economic Perspectives 14: 75-99.

Boushey, H., 2001. http://www.epinet.org/content.cfm/webfeatures_viewpoints_gender_gap

Boushey, H., and R. Cherry, 2003. The economic boom and women: Issues of race, education, and regionalism. National Women Studies Association, 15, 34-53.

Bryk, A. S., Lee V. E., and Holland, 1993. Catholic schools and the common good. Cambridge, MA: Harvard University Press.

Bushinsky, M., 1998. Recent Advances in Quantile Regression Models: A Practical Guideline for Empirical Research. The Journal of Human Resources 33: 89-126.

Constant, A., 1993. Male-Female Wage Disparity in the Deep South. Unpublished monograph.

Constant, A. and S. Konstantopoulos, 2003. School Effects and Labor Market Outcomes for Young Adults in the 1980s and 1990s. Applied Economics Quarterly 49: 5-22.

Cotter, D. A., J. M. DeFiore, J. M. Hermsen, B. Marsteller Kowalewski, and R. Vanneman, 1995. Occupational Gender Segregation and the Earning Gap: Changes in the 1980s. Social Science Research 24: 439-454.

de la Rica, S., J. J. Dolado, and V. Llorens, 2005. Ceiling and Floors: Gender Wage Gaps by Education in Spain. IZA Discussion Paper No.1483.

Elliott, M. and T. L. Parcel, 1996. The Determinants of Young Women's Wages: Comparing the Effects of Individual and Occupational Labor Market Characteristics. Social Science Research 25: 240-259.

Gardeazabal, J. and A. Ugidos, 2005. Gender Wage Discrimination at Quantiles, Population Economics 18: 165-180.

Gill, A. M. and D. E. Leign, 2000. Community College Enrollment, College Major, and the Gender Wage Gap. Industrial and Labor Relations Review 54: 163-181.

Greenwald, R., L. V. Hedges, and R. Laine, 1996. The Effects of School Resources on Student Achievement. Review of Educational Research 66: 361-396.

Grogger, J., 1996. Does School Quality Explain the Recent Black/White Wage Trend? Journal of Labor Economics 14: 231-253.

Hanushek, E. A., 1986. The Economics of Schooling: Production and Efficiency in Public Schools. Journal of Economic Literature 24: 1141-77.

Hanushek, E. A., 1997. Assessing the effects of school resources on student performance: An update. Educational Evaluation and Policy Analysis, 19, 141-164.

Heckman, J. J., 1979. Sample Selection Bias as a Specification Error. Econometrica 47: 475-492.

Hedges, L. V., and A. Nowell, 1995. Sex Differences in Mental Test Scores, Variability, and Numbers of High Scoring Individuals. Science 269: 41-45.

Hedges, L. V., and A. Nowell, 1999. Changes in the Black-White Gap in Achievement Test Scores. Sociology of Education 72: 111-135.

Konstantopoulos, S., 2006. Trends of School Effects on Student Achievement: Evidence from NLS:72, HSB: 82, and NELS:92. Teachers College Record, 108: 2550-2581.

Montgomery, M., and I. Powell, 2003. Does an advance degree reduce the gender wage gap? Evidence from MBAs. Industrial Relations, 42, 396-418.

Oaxaca, R., 1973. Male-Female Wage Differentials in Urban Labor Markets. International Economic Review 14: 693-709.

O'Neill, J. and S. Polachek, 1993. Why the Gender Gap in Wages Narrowed in the 1980s. Journal of Labor Economics 11: 205-28.

Wood, R. G., M. E. Corcoran, and P. N. Courant, 1993. Pay Differences among the Highly Paid: The Male-Female Earnings Gap in Lawyers' Salaries. Journal of Labor Economics 11: 417-441.

Table 1.
Quantile Regression Estimates of School Effects on Wages.

Survey	10th Quantile	25th Quantile	50th Quantile	75th Quantile	90th Quantile
			Whites		
NLS:1979					
Percent of High School Graduates in College	0.001*	0.001**	0.002**	0.001**	0.0009*
Percent of Teachers with Graduate Degrees	0.0008**	0.0005	0.0009**	0.0002	-0.00003
Average School Achievement	0.001	-0.002	-0.002	-0.002**	-0.001
Average School SES	0.078*	0.126**	0.091**	0.070*	0.120**
NLS:1986					
Percent of High School Graduates in College	0.002*	0.003**	0.002**	0.002**	0.002
Percent of Teachers with Graduate Degrees	0.001**	0.001**	0.002**	0.001**	0.0006
Average School Achievement	0.001	0.001	-0.0004	0.0004	0.00003
Average School SES	-0.064	0.035	0.122**	0.061	0.183**
NELS:2000					
Percent of High School Graduates in College	0.00002	-0.0006*	-0.00006	-0.00006	-0.0001
Percent of Teachers with Graduate Degrees	0.0004	0.0004	-0.00005	-0.00003	-0.0003
Average School Achievement	0.0009	0.001	0.0003	0.0007	0.001
Average School SES	0.019	0.067	0.078**	0.112*	0.244**
			Blacks		
NLS:1979					
Percent of High School Graduates in College	0.004**	0.003**	0.003**	-0.0009	-0.001
Percent of Teachers with Graduate Degrees	-0.001	-0.0007	0.0006	0.002	0.0007
Average School Achievement	-0.0001	-0.004	-0.006	-0.003	-0.007
Average School SES	-0.164	0.019	0.044	0.080	0.273
NLS:1986					
Percent of High School Graduates in College	0.002	0.0007	0.002	0.002**	-0.0007
Percent of Teachers with Graduate Degrees	0.0008	0.002	0.003*	0.004**	0.002
Average School Achievement	-0.007	-0.0005	-0.003	-0.002	0.003
Average School SES	-0.179	0.030	-0.030	0.061	-0.067
NELS:2000					
Percent of High School Graduates in College	0.0006	-0.001	0.0002	0.0007	-0.0006
Percent of Teachers with Graduate Degrees	-0.0003	0.00008	0.0008	-0.0005	-0.0008
Average School Achievement	-0.0006	0.003	-0.0008	-0.002	-0.002
Average School SES	0.513**	0.320**	0.331**	0.312**	0.161

Table 1 Continued

Survey	10th Quantile	25th Quantile	50th Quantile	75th Quantile	90th Quantile
			Hispanics		
NLS:1979					
Percent of High School Graduates in College	-0.003	0.001	-0.0005	0.0002	-0.003
Percent of Teachers with Graduate Degrees	0.007**	0.004**	0.003**	0.002	-0.0005
Average School Achievement	0.007	-0.006	-0.004	0.003	0.014
Average School SES	-0.286	-0.064	0.171	0.115	0.005
NLS:1986					
Percent of High School Graduates in College	-0.003	0.003	0.002	0.0009	-0.001
Percent of Teachers with Graduate Degrees	0.005	0.002	0.005**	0.003	0.002
Average School Achievement	0.006	0.003	0.005	0.001	0.007
Average School SES	-0.156	0.101	-0.161	0.236	0.172
NELS:2000					
Percent of High School Graduates in College	-0.0005	-0.0000	0.001	0.001	0.003**
Percent of Teachers with Graduate Degrees	-0.001	-0.001	-0.0009	-0.002	-0.003
Average School Achievement	0.0008	0.002	0.001	0.001	-0.001
Average School SES	0.211**	0.299**	0.298**	0.196*	0.347**

* $p < 0.05$

Table 2.
Quantile Regression Estimates on Gender Differences in Wages.

	Whites									
Survey	10th Quantile		25th Quantile		50th Quantile		75th Quantile		90th Quantile	
	Coefficient	SE	Coefficient	SE	Coefficient	SE	Coefficient	SE	Coefficient	SE
NLS:1979	-0.093*	0.027	-0.137*	0.021	-0.163*	0.020	-0.207*	0.015	-0.240*	0.019
NLS:1986	-0.168*	0.052	-0.205*	0.027	-0.256*	0.021	-0.256*	0.027	-0.251*	0.033
NELS:2000	-0.099*	0.021	-0.122*	0.020	-0.171*	0.017	-0.197*	0.018	-0.267*	0.029
	Blacks									
	10th Quantile		25th Quantile		50th Quantile		75th Quantile		90th Quantile	
NLS:1979	-0.054	0.082	-0.120*	0.052	-0.096	0.103	-0.219*	0.089	-0.181*	0.086
NLS:1986	-0.144	0.106	-0.196*	0.094	-0.212*	0.064	-0.275*	0.071	-0.286*	0.117
NELS:2000	-0.214*	0.064	-0.122*	0.056	-0.193*	0.054	-0.233*	0.045	-0.141*	0.067
	Hispanics									
	10th Quantile		25th Quantile		50th Quantile		75th Quantile		90th Quantile	
NLS:1979	-0.037	0.133	-0.106*	0.110	-0.213*	0.082	-0.211*	0.093	0.051	0.155
NLS:1986	-0.151	0.206	-0.229*	0.116	-0.364*	0.090	-0.395*	0.100	-0.439*	0.149
NELS:2000	0.006	0.045	0.016	0.049	-0.062	0.051	-0.141*	0.057	-0.244*	0.100

* $p < 0.05$