Social Skills and Promotion: A Study of Racial and Gender Gaps

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Abstract

This study tests for racial and gender gaps in the effects of social skills on promotion likelihoods and overall wages. The findings suggest that workers with higher social skills are more likely to be promoted. These findings are significant across all races and genders. There is no evidence for any gender or racial gaps in the marginal effects of social skills on the likelihood of promotion. There is evidence for substantial racial and gender gaps in the wage returns to social skills. The empirical conclusions are consistent with a standard model of statistical discrimination.

I. Introduction

The massive technological improvements in the last three decades have caused a decline in middle-skilled jobs. The literature in economics refers to this phenomenon as job polarization (Goos, Manning and Salomons 2014; Michaels and Van Reen 2014; Bárány and Siegel 2018; Jaimovich and Siu. 2020). The decline in middle-skilled jobs is mainly explained by the vanishing routine jobs (Autor, Levy, and Murnane 2003; Cortes, et al. 2020), and an increase in the substitution between robots and labor in certain industries (Graetz and Guy 2018; Acemoglu and Pascual 2020; de Vries, et al. 2020). As a result,

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economic inequality has grown in the last three decades (Armour, Burkhauser and Larrimore 2013; Duca and Saving 2016).

Other literature in economics shows a complementary relationship between high-skilled labor and technology (Acemoglu and Autor 2011; Autor, et al., 2008; Acemoglu 1998). However, the increase in inequality cannot be explained by the returns to cognitive skills. The literature in economics reports evidence that the effects of cognitive skills on wages have declined in the last two decades (Beaudry, Green, and Sand 2016; Castex and Dechter 2014). Deming (2017) shows that over the previous two decades, employment in high-skilled STEM occupations has declined. Meanwhile employment in high-skilled occupations requiring substantial interpersonal interactions has increased. Moreover, Deming shows an increase in the demand for social skill-intensive occupations. Deming and Kahn (2018) show that within these occupations, the demand for social skills greatly varies and that social skills positively correlated with pay and firm performance. Weinberger (2014) also finds increased demand for social skills complemented by cognitive skills. Given the growing importance of social skills and the broad racial and gender wage inequalities, this study tests for racial and gender gaps in the effects of social skills on promotion likelihoods and wages.

Using data from the National Longitudinal Survey of Youths 1979 (NLSY79), I show that workers with high social skills are more likely to be promoted. The estimates are highly significant for male and female workers, as well as black and white workers. I do not find evidence for any racial gaps or gender gaps regarding the marginal effects of social skills on the likelihood of promotion. In the sample, however, on average, white workers score significantly higher than black workers on the social skills measurements.

Therefore, even though there is no evidence for differences in the marginal effects of social skills on the likelihood of promotion, there is a racial gap in the absolute effect of social skills on the likelihood of promotion. For example, a white male worker is more likely to have a greater social skill score than a black worker. Since social skills are strongly associated with an increase in the likelihood of promotion and there is no evidence of racial differences in the marginal effect of social skills on promotion, the white male worker is statistically more likely to be promoted.

The study also reports estimates of the effects of social skills on wages. The estimates suggest a significant marginal effect of social skills on wages. As expected, there is strong evidence for a wage return to promotion. However, the returns to promotion do not vary with the worker's social skill level. There is no evidence that a promoted worker with high level of social skills receives a greater increase in his wage than a promoted worker with a low level of social skills. However, there is strong evidence for gender and racial gaps in the wage returns to social skills. The estimates indicate a 42 percent gender gap for white workers and a 38 percent racial gap for male workers in the wage returns to social skills. Therefore, social skills explain some racial and gender wage gaps, but these gaps are not driven by the marginal effect of social skills on the likelihood of promotion. In Section V, I argue that the empirical conclusions are consistent with theoretical predictions from a standard statistical discrimination model.

Another related work to this paper is the study by Fan, Xiangdong, and Junsen (2017), who show that the racial wage gap is smaller for hard-skilled jobs than for soft-skilled jobs. In their analysis, social skills are a part of soft skills. In addition, Borghans, Ter Weel, and Weinberg (2014) also report evidence from Britain, Germany, and the

United States that "people skills" are essential factors of occupational choices and wages. In addition, they show that trends in gender and racial gaps in employment and wages closely mirror trends in the importance of people skills in the labor market. I use a different empirical approach and specifically test for racial and gender gaps in the effects of social skills, independent of soft skills and cognitive skills, on promotion and wages.

The remainder of the article proceeds as follows. Section II describes the data. Section III outlines the empirical models used to estimate the effects of social skills on the likelihood of promotion and the wage returns from social skills. The section also explains how I test for race and gender gaps in the effects of social skills on promotion and wages. Section IV presents the main results. Section V discusses potential empirical biases and outlines a theoretical explanation for the empirical results. Section VI concludes.

II. **Data**

The data is taken from the National Longitudinal Survey of Youths 1979 (NLSY79). This is a representative and a longitudinal sample of the United States population. The sample interviewed 12,686 responders aged 14 to 22 in 1979. The responders were interviewed annually from 1979 until 1993. Starting in 1994, they were interviewed biennially. From 1996 until 2016, the NLSY79 includes information about job promotion. Therefore, the sample used in this study is from these years.[2]

There are two dependent variables: *promoted* and *ln(wage).* The variable *promoted* is a dummy variable equal to one if the worker was promoted since the last

[2] The survey in 1996 until 2016 is biennial, so there are 11 years of observation overall.

interview. The real hourly wage is indexed to 2016 dollars using the Consumer Price Index (CPI) from the Bureau of Labor Statistics (BLS). Following Altonji, Bharadwaj, and Lange (2012) and Deming (2017), I trim values of the real hourly wage that are below three and above 200. In this study, I compare white workers to black workers; the sample includes only these two races. I exclude self-employed workers as they are less likely to be promoted. Finally, I include only workers that work at least 30 hours per week. Therefore, the sample focuses solely on workers who are fully engaged in the labor market.

The three main independent variables are social skills, soft skills, and cognitive skills. The measurements for social and soft skills are borrowed from Deming (2017). The social skills variable is based on premarket self-reported sociability, the number of clubs participated in during high school, and participation in sports during high school. The soft skills variable is the average between the Rotter Locus of Control and the Rosenberg Self-Esteem Scale. Both measurements are normalized with a mean of 0 and a standard deviation of 1. The measurement for cognitive skills is the Armed Forces Qualification Test (AFQT) scores from Altonji, Bharadwaj, and Lange (2012). The cognitive skills measurement (AFQT) has been used extensively in the literature to capture premarket cognitive skills (Neal and Johnson 1996; Kreisman and Rangel 2015). The AFQT is normalized with a mean of 0 and a standard deviation of 1.

Table 1 reports the summary statistics by race and gender. The promotion rate is 13.1 percent in the entire sample. There is a slight variation in the average level of promotion across race and gender, with the average varying between 11.8 percent for black male workers and 13.8 percent for white female workers. The average real wage

for the entire sample is $24.27. As expected, the average real wage is much greater for white male workers - at $30.16 - compared to black male workers - at $20.98. The average real wage for white female workers is $21.82 compared to black female workers at $18.11.

Table 1: Summary Statistics

VARIABLES	All	White Male	White Female	Black Male	Black Female
Promoted	0.131	0.131	0.138	0.118	0.128
	(0.00205)	(0.00342)	(0.00362)	(0.00506)	(0.00518)
Real Wage (in 2016 $)	24.27	30.16	21.82	20.98	18.11
	(0.221)	(0.456)	(0.302)	(0.401)	(0.293)
Social Skills	0.0728	0.138	0.103	0.0543	-0.129
	(0.0126)	(0.0200)	(0.0234)	(0.0307)	(0.0315)
Soft Skills	0.0130	0.0676	-0.00975	-0.00501	-0.0553
	(0.0100)	(0.0170)	(0.0175)	(0.0254)	(0.0236)
Cognitive (AFQT)	0.0722	0.303	0.288	-0.506	-0.393
	(0.0108)	(0.0174)	(0.0168)	(0.0241)	(0.0217)
Age	43.45	43.29	43.74	43.10	43.60
	(0.0358)	(0.0590)	(0.0639)	(0.0909)	(0.0869)
Black	0.301				
	(0.00605)				
Female	0.477				
	(0.00667)				
Region					
Northeast	0.156	0.173	0.169	0.128	0.117
	(0.00371)	(0.00629)	(0.00667)	(0.00896)	(0.00844)
North Central	0.241	0.284	0.268	0.151	0.164
	(0.00419)	(0.00730)	(0.00736)	(0.00891)	(0.00924)
South	0.419	0.327	0.355	0.591	0.611
	(0.00512)	(0.00794)	(0.00854)	(0.0129)	(0.0121)
West	0.184	0.216	0.208	0.130	0.109
	(0.00382)	(0.00683)	(0.00704)	(0.00829)	(0.00677)
Observations	74,130	28,018	23,791	10,748	11,573

Standard errors are clustered at the individual level

Social skills are normalized in the entire sample, but since the sample includes only employed individuals, the mean social skill measurement is slightly greater than zero at 0.07 standard deviations (SDs). The greatest average social skills level is in the white male workers' subsample at 0.138 SDs, followed by white female workers at 0.103 SDs, black male workers at 0.054 SDs, and black female workers at -0.13 SDs. The gaps in the average social skills suggest that even if the return to social skills is uniform across genders and races, white male workers receive the highest absolute return from social skills because they possess the most of it, on average.

The average level of soft skills also fluctuates across the subsamples. The order of averages in the subsamples is the same as for the social skill measurement. The average soft skills for white male workers is 0.07 SDs compared to -0.01 SDs for white female workers. The average soft skills for black male workers is -0.01 SDs compared to -0.05 SDs for black female workers. The average AFQT scores in the white male and female subsamples are significantly greater than the average AFQT scores in the black male and female subsamples. The average age in the sample is 43 years, and varies between 31 and 60 years.

III. **Methodology**

The first analysis of this study tests whether social skills can explain the likelihood of promotion and whether social skills contain explanatory information independent of the information in soft skills and cognitive skills. The sample is divided into four subsamples:

white male, white female, black male, and black female. For each of the four relevant groups, I estimate the following equation

$$Promoted_{it} = \alpha + \beta_1 Social_i + \beta_2 Soft_i + \beta_3 AFQT_i + \gamma \boldsymbol{X_{it}} + \varepsilon_{it}, \quad (1)$$

where *Promoted* is a binary variable equal to one if the worker was promoted, *Social* is a normalized measurement of social skills, *Soft* is a normalized measure of soft skills, and *AFQT* is a normalized measure of cognitive skills. I keep the regression parsimoniously to avoid heterogeneity biases. Therefore, the vector of other controls (***X***) includes variables that are clearly exogenous -- age in quadratic form, year fixed effects, three regional dummies, and trend in quadratic form. The coefficient of interest is β_1, which captures the effect of social skills on the likelihood of promotion.

The second analysis tests whether there are racial gaps and gender gaps in the effect of social skills on the likelihood of promotion. The sample is divided into four subsamples: male, female, black, and white workers. For each of the four subsamples, I regress the following equation

$$Promoted_{it} = \alpha + \sum_{s=1}^{3} [\beta_s \boldsymbol{Skill_i} + \delta_s \boldsymbol{Skill_i} \times G_i] + \gamma \boldsymbol{X_{it}} + \varepsilon_{it}, \quad (2)$$

where the ***Skill*** vector includes social, cognitive, and soft skills. The indicator variable, $G_{i,}$ is a black indicator in the male and female subsamples, and G_i is a female indicator in the black and white subsamples. The coefficient of interest is the δ on the interaction between social skills and G_i. If δ is different from zero in the male or female subsamples,

it indicates a racial gap in the effect of social skill on the likelihood of promotion. If δ is different from zero in the black or white subsamples, it indicates a gender gap in the effect of social skill on the likelihood of promotion.

The next analysis tests whether the wage returns to promotion vary with the social skills level. That is, are high socially skilled workers who are promoted compensated more than low socially skilled workers? I divide the sample into four subsamples: white, black, female, and male workers. For each one of the four subsamples, I regress the following equation:

$$\ln (wage)_{it} = \alpha + \sum_{s=1}^{3}[\beta_s \boldsymbol{Skill_i} + \delta_s \boldsymbol{Skill_i} \times Promoted_{it}] + \gamma \boldsymbol{X_{it}} + \varepsilon_{it}. \quad (3)$$

The coefficient of interest is the δ on the interaction between social skills and *Promoted*. If δ is different from zero, it indicates that the wage returns to promotion vary with the social skill level.

The final analysis of this study tests whether there are gender gaps and racial gaps in the wage returns to social skills. I divide the sample into four subsamples: white, black, male, and female workers. For each of the four subsamples, I regress the following equation:

$$\ln (wage)_{it} = \alpha + \sum_{s=1}^{3}[\beta_s Skill_i + \delta_s Skill_i \times G_i] + \gamma \boldsymbol{X_{it}} + \varepsilon_{it}, \quad (4)$$

where G_i is a black indicator in the male subsample and the female subsample, and G_i is a female indicator in the black subsample and white subsample. The coefficient of

interest the δ on the interaction between social skills and G_i. If δ is different from zero in the male or female subsamples, it indicates a racial gap in the wage returns to social skills. If δ is different from zero in the black or white subsamples, it indicates a gender gap in the wage returns to social skills.

IV. Results

This section presents direct evidence of the importance of social skills for the likelihood of promotion and wages. In all the regressions, the standard errors are robust and clustered at the individual level. Table 2 reports the estimates of the effect of social, soft, and cognitive skills on the likelihood of being promoted from equation (1). In all subsamples, the effect of social skills on the likelihood a worker is promoted are statistically and economically significant.

In the entire sample, a one standard deviation increase in social skills increases the likelihood of promotion by an absolute 1.44 percent change. The average promotion rate in the entire sample is 13.1 percent. Therefore, an increase of one standard deviation in social skills is associated with a relative increase in the likelihood of promotion by 11 percent. White male workers enjoy a slightly bigger effect of social skills on the likelihood of promotion. Specifically, a one standard deviation increase in social skills is associated with an absolute 1.71 percent or a relative 13.1 percent increase in the likelihood of promotion. The effect of social skills is statistically significant for white female workers but economically much smaller than for white male workers. For white female workers, a one standard deviation increases in social skills is associated with an absolute 0.96 percent or a relative 6.9 percent increase in the likelihood of promotion.

For black male workers, a one standard deviation increase in social skills is associated with an absolute 1.5 percent or a relative 12.7 percent increase in the likelihood of promotion. For black female workers, social skills are even more economically significant. Specifically, a one standard deviation increase in social skills is associated with an absolute 1.9 percent or a relative 15.1 percent increase in the likelihood of promotion.

Table 2: The Effect of Skills on the Likelihood of Being Promoted

		White Workers		Black Workers	
VARIABLES	All	Male	Female	Male	Female
Social Skill	0.0144***	0.0171***	0.00956***	0.0150***	0.0193***
	(0.00220)	(0.00385)	(0.00361)	(0.00549)	(0.00578)
Cognitive (AFQT)	0.0101***	0.0101***	0.00865**	0.00989**	0.0128**
	(0.00183)	(0.00288)	(0.00336)	(0.00453)	(0.00498)
Soft Skill	0.00503***	0.00868***	0.00122	0.00803**	0.00210
	(0.00165)	(0.00295)	(0.00289)	(0.00359)	(0.00384)
Observations	74,130	28,018	23,791	10,748	11,573

Notes: The dependent variable is binary and equals one if promoted and 0 otherwise. The estimates are from Pooled OLS regressions. All regressions control for years of fixed effects, age in a quadratic form, three regional dummies, and time trends in a quadratic form. In column 2 (the entire sample), the regression controls for black and female dummies. Standard errors are robust and clustered at the individual level.

*** Significant at the 1 percent level.

** Significant at the 5 percent level.

* Significant at the 10 percent level.

As expected, cognitive skills have a statistically and economically significant effect on the likelihood of being promoted. This is consistent with the estimates reported in Tripp and Fadlon (2020). In all the subsamples, the estimates of a one standard deviation increase in cognitive skills are associated with an absolute between 0.87 and

1.3 percent or a relative between 6.3 and 10 percent increase in the likelihood of promotion.

In comparison, soft skills have a smaller effect on the likelihood of promotion. Specifically, soft skills have an economically and statistically significant effect on the likelihood of promotion only in white and black male workers. For white male workers, a one standard deviation increase in soft skills is associated with an absolute 0.87 percent or a relative 6.6 percent increase in the likelihood of promotion. For black male workers, a one standard deviation increase in soft skills is associated with an absolute 0.8 percent or a relative 6.8 percent increase in the likelihood of promotion. For white and black female workers, the estimates of the effects of soft skills on promotion are close to zero and statistically insignificant.

To summarize, the effects of social skills and cognitive skills on the likelihood of being promoted are statistically and economically significant amongst all four groups. The soft skill variable, however, does not have a significant effect on the likelihood of promotion for female workers. For male workers, the soft skill variable does have a statistically significant effect on the likelihood of promotion.

Next, I test whether the returns to social, soft, and cognitive skills vary by race and gender. Table 3 reports the estimates from equation (2). The qualitative conclusions derived from Table 2 do not change. That is, social skills play an important role in determining wages for male and female workers, as well as black and white workers. In the male workers' subsample, the estimated coefficients on the black times social skill are close to zero and statistically insignificant. In the female subsample, the estimated coefficient on the interaction between the *Black* indicator variable and the *Social Skill*

variable is economically significant. That is, the effect of social skills on the likelihood of promotion is greater for black female workers than for white female workers. However, this estimate is statistically insignificant. Overall, I conclude that there is no statistical evidence for a racial gap in the marginal effect of social skills on the likelihood of promotion. In addition, there is no evidence of a racial gap in the marginal effects of cognitive and soft skills on the likelihood of promotion.

The last two columns in Table 3 report the estimates for the gender gap in the effect of social skills on the likelihood of promotion. The estimated coefficients on the *Female*Social Skills* variable are statistically insignificant. The magnitude of these estimated coefficients is much smaller than the estimated coefficients on the variable *Social Skills*. Therefore, I conclude that there is no evidence of a gender gap in the marginal effect of social skills on the likelihood a worker is promoted.

As for the effect of cognitive skills and soft skills, I find no statistical evidence for a racial gap or gender gap in the marginal effect of cognitive skills on the likelihood of promotion. However, there is statistical evidence that the effect of soft skills on the likelihood of promotion for white female workers is statistically and economically smaller than for white male workers. This result is consistent with the estimates in Table 2. Specifically, we cannot reject the assumption that the effect of soft skills on the likelihood of promotion for white female workers is statistically equal to zero.

Table 3: Gender and Racial Differences in the Likelihood of Being Promoted

	All	Male	Female	White	Black
Social Skill	0.0173***	0.0172***	0.00962***	0.0170***	0.0149***
	(0.00401)	(0.00385)	(0.00361)	(0.00385)	(0.00548)
Cognitive (AFQT)	0.00956***	0.0102***	0.00866***	0.0100***	0.00946**
	(0.00298)	(0.00288)	(0.00336)	(0.00287)	(0.00447)
Soft Skill	0.00797***	0.00856***	0.00124	0.00863***	0.00827**
	(0.00283)	(0.00295)	(0.00288)	(0.00294)	(0.00363)
Black*Social Skill	0.00124	-0.00211	0.00985		
	(0.00524)	(0.00670)	(0.00679)		
Black*Cognitive Skill	0.00225	-0.00118	0.00379		
	(0.00428)	(0.00530)	(0.00595)		
Black*Soft Skill	0.000452	-0.000440	0.000437		
	(0.00365)	(0.00470)	(0.00478)		
Female*Social Skill	-0.00646			-0.00745	0.00419
	(0.00516)			(0.00528)	(0.00794)
Female*Cognitive Skill	-0.00550			-0.00131	0.00393
	(0.00407)			(0.00439)	(0.00659)
Female*Soft Skill	-0.00829**			-0.00736*	-0.00627
	(0.00380)			(0.00409)	(0.00528)
Observations	74,130	38,766	35,364	51,809	22,321

Notes: The dependent variable is binary and equals one if promoted and 0 otherwise. The estimates are from Pooled OLS regressions. All regressions control for years of fixed effects, age in a quadratic form, three regional dummies, and time trends in a quadratic form. In column 2 (the entire sample), the regression controls for black and female dummies. Standard errors are robust and clustered at the individual level.

*** Significant at the 1 percent level.

** Significant at the 5 percent level.

* Significant at the 10 percent level.

Next, I report the estimates for the wage return to promotion. Table 4 presents the estimates for the log real wage regressions by the workers' race and gender from equation (3). In the entire sample, all three measures of skills are positive and statistically significant. A one standard deviation increase in social skills is associated with about a 9.5 percent increase in real hourly wage. For white male workers, social skill has a much greater economic effect on wages than for female and black workers. Specifically, a one standard deviation increase in social skills is associated with an increase of 11.5 percent in real wages. For the other workers, the return to social skills varies between 6.4 percent and 7.3 percent. Note that, on average, white male workers have a much greater social skill level than the other subgroups. Therefore, returning to social skills is an important component that can explain some racial and gender wage gaps.

The estimates on soft and cognitive skills are also statistically and economically significant. For cognitive skills, a one standard deviation increase in AFQT score increases wages by 11 to 15 percent. This is consistent with the vast literature documenting a strong causal effect of AFQT on wages (Neal and Johnson, 1997, Kreisman and Marcos, 2015). A one standard deviation increase in soft skills increases wages by 4.5 and 6.6 percent. Balcar (2016) and Fan, Xiangdong, and Junsen (2017) also report similar qualitative estimates about the effects of soft skills on wages.

Table 4: The Effect of Social, Cognitive, and Soft Skills on Ln(Wage)

		White Workers		Black Workers	
VARIABLES	All	Male	Female	Male	Female
Social Skills	0.0949***	0.115***	0.0638***	0.0732***	0.0650***
	(0.00816)	(0.0120)	(0.0113)	(0.0160)	(0.0152)
Cognitive (AFQT)	0.134***	0.151***	0.111***	0.140***	0.138***
	(0.00685)	(0.00930)	(0.0100)	(0.0139)	(0.0125)
Soft Skills	0.0589***	0.0663***	0.0561***	0.0456***	0.0520***
	(0.00622)	(0.00871)	(0.00892)	(0.0117)	(0.0114)
Promoted	0.104***	0.110***	0.0837***	0.142***	0.138***
	(0.0111)	(0.0162)	(0.0152)	(0.0249)	(0.0208)
Promoted*Social Skills	-0.00478	-0.0165	0.0124	-0.0253	-0.0269
	(0.0121)	(0.0177)	(0.0153)	(0.0233)	(0.0220)
Promoted*Cognitive Skills	0.00978	0.00659	0.0264*	0.0210	0.0167
	(0.00959)	(0.0134)	(0.0142)	(0.0205)	(0.0181)
Promoted*Soft Skills	-0.00161	-0.0131	0.0165	-0.00957	-0.00537
	(0.00938)	(0.0130)	(0.0132)	(0.0208)	(0.0150)
Observations	74,130	28,018	23,791	10,748	11,573
R-squared	0.196	0.165	0.102	0.125	0.130

Notes: The dependent variable is binary and equals one if promoted and 0 otherwise. The estimates are from Pooled OLS regressions. All regressions control for years of fixed effects, age in a quadratic form, three regional dummies, and time trends in a quadratic form. In column 2 (the entire sample), the regression controls for black and female dummies. Standard errors are robust and clustered at the individual level.

*** Significant at the 1 percent level.

** Significant at the 5 percent level.

* Significant at the 10 percent level.

Consistent with previous studies, the promotion has a statistically and economically significant effect on real wages (Tripp and Fadlon 2020; Gibbons and Waldman 1999). In the entire sample, promotion increases real hourly wage by 10.4 percent. This translates to a $2.52 increase in real hourly wages, on average. In the white male subsample, a promotion increases real wages by about 11.5 percent or $3.47, on average. In the white female subsample, a promotion increases real wages by about 8.4 percent or $1.83, on average. Black workers enjoy a greater percentage change in the wage returns to a promotion. A black male worker who is promoted receives about a 14.2 percent increase in real wages or $2.98, on average. A black female worker receives about a 13.8 percent increase in real hourly wage or $2.50, on average. Therefore, the greatest absolute return to a promotion is for white male workers.

Finally, Table 4 reports estimates from the interactions between the three skill measurements and the *promoted* variable. The estimates are statistically insignificant at the five percent significance level in all the subsamples. Therefore, I conclude there is no evidence that the wage returns to promotion change with either skill level. Specifically, to the focus of this study, there is no evidence that a highly socially skilled worker who is promoted, enjoys a greater wage increase than a low socially skilled worker who is promoted.

In the last analysis, I test whether there are gender and racial gaps in the wage returns to social skills. Table 5 reports the estimates from equation (4). In the entire sample, there is strong evidence for racial and gender gaps in the wage returns to social skills and a gender gap in the wage return to cognitive skills. In the male workers' subsample, black male workers receive a much smaller return on their social skills

compared to white male workers. Specifically, the racial gap in the wage returns to social skills for male workers is 38 percent. In the female subsample, there is no evidence of a racial gap in the return to social skills.

Furthermore, in the black workers' subsample, there is no evidence of a gender gap in the returns to social skills. Finally, in the white workers' subsample, there is evidence of a gender gap in the return to social skills. Specifically, white female workers receive 42 percent less wage returns on their social skills compared to white male workers. In the male and female subsamples, there is no evidence of a racial gap in the returns to cognitive skills or soft skills. There is evidence of a 24.5 percent gender gap in the returns to cognitive skills in the white subsample.

Putting together the results in Tables 2-5, I conclude that social and cognitive skills are associated with the likelihood of promotion. Soft skills are associated with the likelihood of promotion only for male workers. In addition, promotion is associated with higher wages, but the returns to promotion do not change with the level of social skill. That is, workers with high social skills are likely to be promoted and be compensated for the promotion. However, there is no evidence that the wage increases from the promotion changes with the level of social skill. Finally, there is evidence to indicate a substantial racial gap in the returns to social skills for male workers and a substantial gender gap in the returns to social skills for white workers.

Table 5: Gender and Racial Gaps in the returns to Social, Cognitive, and Soft Skills

VARIABLES	All	Male Workers	Female Workers	White Workers	Black Workers
Social Skills	0.121***	0.113***	0.0652***	0.112***	0.0691***
	(0.0128)	(0.0118)	(0.0111)	(0.0118)	(0.0160)
Cognitive (AFQT)	0.150***	0.152***	0.114***	0.152***	0.143***
	(0.00968)	(0.00906)	(0.00963)	(0.00904)	(0.0137)
Soft Skills	0.0638***	0.0643***	0.0574***	0.0666***	0.0441***
	(0.00925)	(0.00850)	(0.00858)	(0.00850)	(0.0115)
Black*Social Skills	-0.0422***	-0.0429**	-0.00457		
	(0.0151)	(0.0199)	(0.0182)		
Black*Cognitive Skills	0.0143	-0.00956	0.0244		
	(0.0126)	(0.0164)	(0.0154)		
Black*Soft Skills	-0.0130	-0.0199	-0.00271		
	(0.0111)	(0.0143)	(0.0139)		
Female*Social Skills	-0.0432***			-0.0471***	-0.00786
	(0.0160)			(0.0162)	(0.0216)
Female*Cognitive Skills	-0.0456***			-0.0373***	-0.00200
	(0.0124)			(0.0131)	(0.0180)
Female*Soft Skills	-0.00798			-0.0101	0.00769
	(0.0120)			(0.0122)	(0.0158)
Promoted	0.104***	0.113***	0.106***	0.102***	0.132***
	(0.0117)	(0.0134)	(0.0122)	(0.0113)	(0.0145)
Black	-0.116***	-0.179***	-0.0282		
	(0.0154)	(0.0202)	(0.0185)		
Female	-0.285***			-0.279***	-0.131***
	(0.0140)			(0.0145)	(0.0228)
Observations	74,130	38,766	35,364	51,809	22,321
R-squared	0.199	0.202	0.120	0.185	0.137

Notes: The dependent variable is log real hourly wage. The estimates are from Pooled OLS regressions. All regressions control for years of fixed effects, age in a quadratic form, three regional dummies, and time trends in a quadratic form. Standard errors are robust and clustered at the individual level.

*** Significant at the 1 percent level.

** Significant at the 5 percent level.

* Significant at the 10 percent level.

V. Discussion

This section discusses some potential biases in the estimations and provides a potential theoretical explanation of the empirical outcomes.

The average social skill levels of black workers are significantly lower compared to white workers. This might cause two potential biases in the estimations. First, it could be that the social skills proxy variable used in this study does not accurately capture the social skills of black workers. If this argument is true, then the estimates of the coefficient on social skills in all the regressions in the blacks' subsamples should have been statistically insignificant. Second, it could be that the social skills proxy variable used in this study underestimates the social skills of black workers. If this argument is true, then the estimates of the effects of social skills on promotion for black workers would have been smaller. However, in the estimations, there is no evidence for a racial gap in the marginal effects of social skills on the likelihood of promotion. In addition, the racial gap in the wage returns to social skills would have been even bigger.

Another potential problem in the estimation is the potential that two of the skills measurements are highly correlated to each other. That is, two of the skills measurements capture similar skills. This correlation might cause multicollinearity in the estimations. However, the correlations between the skills measurements in the sample are positive and at most 23 percent.

A third potential bias in the estimations is that the effects of social skills are correlated with unmeasured ability differences. In an online Appendix file, I control for the college indicator variable and re-estimated all of the regressions in this study. In addition, I added a control between the product between cognitive skills and social skills,

as was suggested in Weinberger (2014). All qualitative conclusions are unchanged when I add these two controls to the regressions.

Could the theory of statistical discrimination explain the conclusions?

In a standard statistical discrimination model of Aigner and Cain (1977), employers base hiring decisions on an indicator of skill *y* (such as cognitive ability or social ability) that measures a true worker's productivity *q*. The measurement equation is then

$$y=q+u.$$

The standard assumptions made in Aigner and Cain (1977) are that q is independent of u, $q \sim N(\alpha, \sigma_q^2)$, and $u \sim N(0, \sigma_u^2)$. Employers observe *y* but not q and use *y* to obtain information about q. Let $\hat{q} = E[q|y]$ be the employer's predicted value of true skill q given the observed indicator of skill *y*.

Aigner and Cain (1997) show that you can express the predicted value of skill--$\hat{q}$ as follows:

$$\hat{q} = (1-\theta)\alpha + \theta y,$$

where $\theta = \frac{var(q)}{var(q)+var(u)}$. That is, if the observed indicator of skill (*y*) is less informative (higher value of $var(u)$), then employers would put greater weight on the average group productivity (α). Now assume two different groups: white and black. The two groups might have different mean abilities (α^B, α^W) and different variances of *u* and *q*. Then the predicted values of q depend on the information employers have. That is,

$$\hat{q}^W = (1-\theta^W)\alpha^W + \theta^W y$$

$$\hat{q}^B = (1-\theta^B)\alpha^B + \theta^B y.$$

There is strong evidence that there are significantly fewer black and female supervisors than white male supervisors (Fadlon 2015). Therefore, $var(u)$ is likely to be greater for black and female workers. That is, employers make more "mistakes" when they try to predict a black worker's ability and a white female's ability at hiring. Consequently, employers would put a smaller weight on the black worker's individual social skills and a bigger weight on the group's average social skill. That is, $\theta^W > \theta^B$ and $\theta^M > \theta^F$, where M=male workers and F=female workers.

White workers have significantly greater social skills than black workers, on average ($\alpha^W > \alpha^B$). The statistical gender gap in the average social skills cannot be rejected from being zero ($\alpha^M = \alpha^F$). Then the predicted values of skill are:

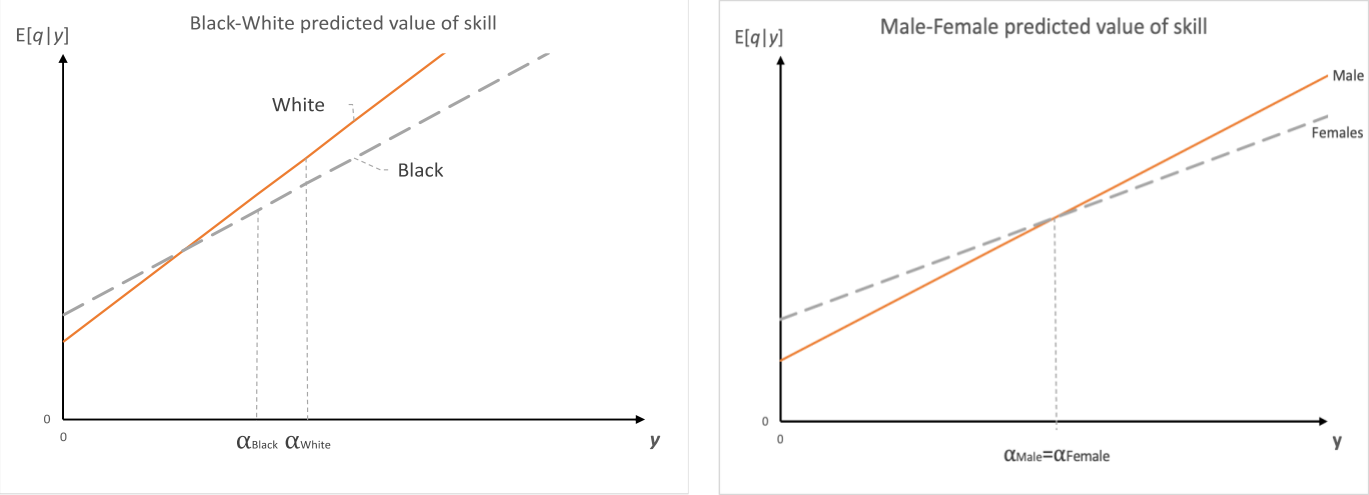

Figure 1: The Impact of Statistical Discrimination on Predicted Skill

From both graphs in Figure 1, we can see that a highly skilled white male worker gets a greater predicted social skill level compared to a black worker and a white female worker with equivalent skill levels. Therefore, the first prediction from the model is that

the marginal effect (slope) of social skill for white male workers is greater than the marginal effect of social skill for black workers and white female workers.

The theory of statistical discrimination assumes that the employer does not observe the worker's true skill level at hiring. However, promotion decisions are made after the employer gets to know the worker. Therefore, the second prediction is that there should not be racial differences in the marginal effects of social skills on the likelihood of promotion. The two predictions are confirmed in the empirical analysis. Therefore, I conclude that the empirical estimates are consistent with the predictions from a standard statistical discrimination model.

VI. Conclusions

This study tests the effects of social skills on the likelihood of promotion and whether there are racial or gender gaps in that effect. In addition, the study tests whether the wage return to a promotion varies by the level of social skill. Finally, the study tests whether there are racial or gender gaps in the return to social skills. The estimates provide strong evidence that social skills increase the likelihood of promotion. In addition, there is no evidence for racial or gender gaps in the marginal effects of social skills on promotion, and the wage return to promotion does not change with the social skill level. Therefore, even though a highly socially skilled worker is more likely to be promoted, there is no evidence that this worker is compensated for being promoted differently than a worker with a lower social skill level. The conclusions suggest substantial gender and racial gaps in the wage return to social skills.

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