Writing Sample

Stephanie Kestelman

Gender Differences in Returns to Social Skills *

Stephanie Kestelman
Princeton University

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Abstract

This paper studies whether the returns to social skills differ for men and women, and calculates the contribution of any such differences to the gender wage gap. I use data from the 1997 NLSY to test whether (1) women have relatively higher levels of social skills, as conjectured by Beaudry and Lewis (2014); and if (2) the impact of social skills on wages are the same across genders. Social skills are measured as composite of self-reported levels of extraversion, warmth, reservedness and agreeableness. I document that women have relatively higher levels of social skills according to this metric. I also find no effect of social skills on wages, on average. However, higher levels of social skills affect men and women differently depending on their occupations gender mix. I find that higher social skill levels negatively impact wages for women in male-dominated occupations, and estimate that the gap in returns to sociability in these occupations is due to positive returns on female quietness and reservedness. I also find negative returns to social skills for men in female-dominated occupations, driven by negative returns to male agreeableness. I conjecture that gendered social norms explain my findings at least in part.

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1 Introduction

Women in the United States earn less than men in nearly all occupations, including female-dominated ones. The wage gap persists even after controlling for educational attainment, experience, industry preferences, occupational sorting, location, race and union membership (Blau and Kahn, 2017; Goldin, 2014, 2015). In fact, almost 40 percent of the wage gap is unexplained by human capital and physical skills (Blau and Kahn, 2017). A broad literature in psychology and economics suggests that non-cognitive skills and social skills affect wages (Bowles, Gintis and Osborne, 2001; Heckman, Stixrud and Urzua, 2006; Borghans, Ter Weel and Weinberg, 2008; Almlund et al., 2011; Cobb-Clark and Tan, 2011; Heckman and Kautz, 2012; Deming, 2017). Yet there is no empirical consensus of the relationship between social skills and the gender wage gap.

This paper tests whether higher social skills yield different, if any, labor market returns for men and women. I use data from the 1997 National Longitudinal Survey of Youth (NYLS97) to construct a gender-blind measure of social skills using self-reported personality metrics. I then estimate the returns to social skills for male and female workers' wages. Finally, I explore heterogeneity in returns to social skills across occupation groups broadly defined by their gender mix of employment.

I find that, on average, real log hourly wages at age 30 do not respond to higher social skills for men or women. The null effects of high sociability levels on wages disappear once we study workers in occupations where at least 75 percent of labor share identifies with a given gender. I find that women who report higher levels of social skills and work in male-dominated occupations earn 19% lower real hourly wages than their male counterparts. These estimates account for educational attainment, cognitive and non-cognitive skill levels, and some occupational sorting. In male-dominated occupations, the social skill wage gap between men and women is driven by positive (negative) returns to female quietness and reservedness (animation and interpersonal openness). I additionally estimate negative returns to social skills for men in female-dominated occupations. A one-standard deviation increase in social skill levels for men in majority female occupations is associated with 16-17% lower real hourly wages. Male employees in female-dominated roles are rewarded (penalized) for being critical (agreeable). Women in female-dominated fields and men in male-dominated fields do not earn higher hourly wages in return for higher social skill levels — or at least are not punished for being animated or quiet, respectively.

This paper contributes to a growing literature on the effects of non-physical and non-cognitive skills on labor market differences by gender. Borghans, Ter Weel and Weinberg

(2008) develop a framework where "caring" and "directness" are production inputs, such that worker wages depend on relative supply of these non-cognitive skills. They find that wages are higher in occupations that demand higher levels of directness relative to caring, and that males are relatively higher suppliers of "directness." Bertrand (2011) and Blau and Kahn (2017) review the literature on the impact of psychological attributes on gender differences in outcomes. In particular, they discuss gender differences in likelihood to initiate salary negotiations. Antecol and Cobb-Clark (2013) estimate the role of personality traits in gendered occupational sorting. I build on this literature by exploring the relationship between returns to social skills and the wage gap using recent US data.

The remainder of the paper is organized as follows. Section 2 describes the data and defines how this paper measures social skills. In Section 3, I show that social skills do not affect wages on average, but yield different returns to male and female workers depending on their occupation's gender mix. I conclude in Section 4.

2 Data and Empirical Strategy

To explore the relationship between social skills and the gender wage gap in the United States, I rely on data from the 1997 National Longitudinal Survey of Youth (NYLS97). The NYLS97 is a nationally representative longitudinal sample of Americans born between 1980-84. The survey includes detailed measures of personality traits, pre-market skills, parental background and schooling for 8,984 respondents. It also contains data on experience, employment and wages from 1997 to 2015.

2.1 Definition of Social Skills

I broadly define social skills as the set of personality traits and skills associated with interacting well with other people. I allow social skills to encompass attributes like gregariousness, openness and agreeableness, as well as interpersonal skills, such as the ability to cooperate or sympathize with others. I rely on the NSLY97 2008 personality assessment to construct my social skill index. Survey participants were asked to rate on a scale from 1 ("Strongly Disagree") to 7 ("Strongly Agree") how well the following pairs of personality traits applied to them: (1) extraverted/enthusiastic, (2) critical/quarrelsome, (3) dependable/self-disciplined, (4) anxious/easily upset, (5) open to new experiences, (6) reserved/quiet, (7) sympathetic/warm, (8) disorganized/careless, and (9) calm/emotionally stable. I rescale pairs (2), (4), (6) and (8) to respectively measure the degree to which respondents identify

as (2) agreeable/non-confrontational, (4) calm/not easily upset, (6) animated/open to others, and (8) organized/careful. I then classify traits (1)-(9) according to the Big 5 personality trait structure.[1] The Big 5 traits that most closely align with my broad definition of social skills are *extraversion* and *agreeableness*, which are well described by personality pairs (1), (2), (6) and (7) in my data. I standardize the rankings for each of these personality traits to mean 0 and standard deviation of 1, calculate the average across the four metrics, and re-standardize to create my social skill index. I similarly construct a composite measure of non-cognitive skills that uses all other personality traits.

2.2 Sample Construction and Summary Statistics

I restrict my analysis sample to employed thirty-year-olds. I consider a survey respondent to be employed if they had at least one job since the last NYLS interview. Since the NLSY97 is biennial, I don't observe age 30 for those who were twelve years old in 1997, so I relax the age requirement to 31 instead of 30 for a subset of the sample. The rationale behind limiting my sample is as follows. Social skill is fixed over time in my data, so I can only explore cross-sectional variation in social skill levels. Including multiple periods per person would generate artificially high standard errors by increasing my sample size without increasing variation in social skills across units.

I further restrict my sample as follows. I complement this dataset with respondents' scores in the Armed Forces Qualifying Test (AFQT), which I standardize to mean 0 and variance 1 to proxy for cognitive skills. I drop any respondents missing an AFQT score, as well as a non-cognitive skills score. Educational background and occupational code at age 30 are available for all respondents in my sample. Finally, I address potential misreporting and outliers in my outcome variable, real log hourly wages (measured in 2015 dollars). I trim values of real hourly wages (measured in 2015 dollars) that are below 3 and above 200, following Altonji, Bharadwaj and Lange (2012) and Deming (2017).

Table 1 summarizes my data by gender. My main sample size is N=4,251, with roughly equal numbers of men (N=2,062) and women (N=2,022). In my sample, men earn US$23/hour on average, while women earn US$20/hour. This difference is statistically significant ($t = 6.35$) and is in line with the broader fact that female employees earn less than their male counterparts on average, not conditioning on occupation or any other control variables (Blau and Kahn, 2000; Goldin, 2014; Blau and Kahn, 2017). Female workers in my sample spend

[1] See Nyhus and Pons (2005); Borghans et al. (2008); Almlund et al. (2011) and Heckman and Kautz (2012) for definitions of each of the Big 5 traits.

nearly one more year spent in school relative to male workers ($t = 10.41$) and score slightly higher on the AFQT, my measure of cognitive skills ($t = 2.08$).

Figure 1 and Table 1 provide evidence that women have higher social skill levels, as suggested by Beaudry and Lewis (2014). Average social skill levels for women are .457 standard deviation higher than for men ($t = 15.30$), with women self-reporting more extraverted, agreeable, animated and sympathetic. Figure 1A shows that the distribution of social skills for women and men follow similar distributions around the mean. I find no evidence of gender differences in average non-cognitive skill levels (see Figure 1B), in spite of differences in the underlying determinants of non-cognitive skills. For example, women report relatively higher levels of discipline ($t = 6.27$) and organization ($t = 4.55$), but report lower levels of emotional stability ($t = 6.27$) and greater anxiety ($t = 6.08$). Combining these different personality traits into one composite metric of non-cognitive skills evens out trait-level differences, such that gender-based differences in non-cognitive skills cancel out.

2.3 Empirical Strategy

To understand the relationship between gender and economic returns to social skills, I estimate the following baseline equation:

$$\ln wages30_i = \beta_0 + \beta_1 socskills_i + \beta_2 (socskills \times female)_i + \mathbf{X}'_{it}\Gamma + \varepsilon_i \qquad (1)$$

where y is log hourly wages for individual i at age 30; $socskills$ is individual i's social skill index; $female$ is an indicator of whether individual i is female; and $\mathbf{X}$ includes educational attainment and year fixed effects to control for different market conditions at age 30. Where specified, I additionally control for cognitive and non-cognitive skills, cognitive and non-cognitive skills by gender, and occupation fixed effects.

One potential source of concern is the degree of correlation between educational attainment, occupational choice, and social, cognitive and non-cognitive skill levels. If social skills are strongly correlated with other variables on the right hand side of my model, then excluding controls will lead to omitted variable bias, while including these additional controls will increase the noise in β_1 and β_2, my parameters of interest. Table 2 shows the correlation between education, my social skill index, standardized AFQT scores, and my composite measure of non-cognitive skills. Panel A describes correlations for the men in my main analysis sample, while Panel B does so for the women. Pair-wise correlations between social skills, education and cognitive skills are relatively small and similar across gender, so in practice I need not worry about losing precision when controlling for educational attainment in my

empirical analysis. However, social and other non-cognitive skills are strongly correlated ($\rho > .3$), which suggests that personality traits and interpersonal skills are interconnected (see Borghans et al., 2008; Almlund et al., 2011, for a treatment of Big 5 personality traits). My preferred specifications will control for cognitive and non-cognitive skills to reduce bias in my estimators.

The relationship between social and non-cognitive skills documented in Table 2 raises the potential issue of reverse causality and indirect effects. It is possible that the self-reported measures of personality traits proxy not just for latent personality traits, but also for the effects of schooling, parenting and culture on personality. Bertrand and Pan (2013) discusses differences in early childhood personality traits across genders, and the ways in which household environment exacerbates certain traits. Bowles, Gintis et al. (1976) note that schools reward behaviors such as amiability, organization and discipline. Thus the strong correlation between social and other non-cognitive skills may be due to the effects of schooling on these metrics, rather than to an intrinsic relationship between the different underlying personality traits. If this is the case, then least square estimates of the relationship between my social skill index and real hourly wages will likely be biased and inconsistent (Heckman, Stixrud and Urzua, 2006). This paper does not yet control for reverse causality, but next steps include the implementation of the method in Heckman, Stixrud and Urzua (2006) to isolate the returns to social skills.

It may also be that social skills are measured with error, with distinct distributions of error terms for men and women. Gendered social norms, such as the expectation that women are warm and men are assertive, may cause measurement error in two ways. The first is potential over-reporting of sociability levels among women. Dunning, Heath and Suls (2004) review empirical findings on the relationship between self-assessment and actual behavior, and document that people overrate themselves. Moreover, self-reporting may vary with survey incentives (Almlund et al., 2011). Female respondents in the NLSY97 may rate themselves higher on the "feminine" traits that comprise my social skills index if they believe that reporting their true personality would violate gender norms. Murray-Close and Heggeness (2018), for example, find evidence of the impacts of gendered social norms on reporting of earnings in the Current Population Survey (CPS). Similarly, male respondents may rate themselves higher in "masculine" traits. They may also under-emphasize "feminine" personality traits in the survey if they fear discrimination (Tilcsik, 2011). A complete treatment of potential measurement error in my social skill index is outside the scope of this paper. I assume no gender differences in measurement error for the remainder of my analysis.

3 Results

This section documents the relationship between social skills and wages for men and women. Figure 2 shows the correlation between social skills and real log hourly wages for men and women in my main analysis sample. Panels A shows that men's log real hourly wages do not respond to higher social skills, even once I control for educational attainment (Panel B). However, Panels A and B suggest that higher social skills are associated with lower log hourly wages for thirty-year-old women. This negative relationship disappears once I control for occupational sorting. Antecol and Cobb-Clark (2013) find that personality traits positively affect preferences for occupations. Occupational sorting is negatively and strongly correlated with the wage gap (Goldin, 2014), so Panel C reduces the possibility of negative omitted variable bias.

Table 3 formally tests whether returns to social skills are relatively lower for women, as suggested in Figure 2B. I first test whether there are *any* effects of social skills on log real hourly wages. I find that higher levels of sociability do not affect earnings on average (Column 1). These findings are robust to controlling for occupational sorting. My results contradict the findings in Deming (2017). Two factors may explain differences in results. First, Deming (2017) pools multiple rounds of the 1979 NLSY (NLSY79) in his analysis. As in my sample, components of social skills are only measured once. Pooling respondents across years artificially enlarges his sample without increasing cross-sectional variation in social skills, thus yielding greater precision to the estimators. I estimate Deming's main regressions using log real hourly wages at age 30 as the outcome variable, and find more muted returns to sociability.

Additionally, Deming's social skill estimator is likely biased. He constructs his social skill metric as a composite of self-report levels of social skills, participation in high-school athletics, and number of clubs an individual participated in while in high-school. Participation in high-school athletics may be correlated with sociability, but it is also correlated with parental income (Flanagan, 2017). In his paper, Deming does not account for parental background when estimating the returns to social skills. It is therefore likely that Deming's social skill index captures not only sociability levels, but also family background, which in turn is strongly correlated with earnings (see for example Solon, 1999; Chetty et al., 2014). In a robustness check I show that replacing participation in high school sports with an indicator for athletics being the top activity causes the relationship between social skills and wages to be null, even when pooling multiple years of the NLSY79.[2] The NLSY97, un-

[2]Robustness checks of Deming (2017) available upon request.

like the NLSY79, records personality metrics. Though these self-reported metrics are not perfect (see Section 2.3), they are less likely to unintentionally capture the effects of other, non-sociability related determinants of wages.

In Columns (3)–(7), I explore whether there are null differences in returns to social skills across gender. I find that, on average, social skills do not affect log real hourly wages for male or female workers. Column (7) estimates my preferred specification, which controls for cognitive and non-cognitive skills for men and women separately, and accounts for occupational sorting. I estimate a negative return to women's sociability on average. These estimates are imprecise, however, so I document no returns to social skills on average, and no overall differences in returns to sociability by gender.

Next, I investigate whether the null effect of social skills on wages is not found in all occupations. I use Census data and calculate the female share of employment by occupation in 2000. I then group occupations by their gender mix: (1) female share below 25%, (2) female share between 25-50%, (3) female share between 50-75%, and (4) female share above 75%.[3] Focusing on the gender mix in 2000 accounts for the fact that workers might sort into occupations based on their gender mix. Most of my sample is not quite old enough to be in the labor market in 2000, so their occupational choices might have been affected by the gender composition they saw during their decision-making process. Grouping occupations by their occupation's gender mix in 2000 thus accounts for these potential pre-market sorting effects.

Table 4 lists some of the occupations in each of the groups. Occupations whose female share was below 25% in 2000 include physically demanding roles in construction and mining, as well as male-oriented service providers, such as barbers. This category also includes architects, engineers and dentists, however, indicating that selection of occupations into the low female share groups is not determined by physical skill requirements. Occupations whose female share was above 75% in 2000 similarly include female-oriented service providers, such as hairdressers and cosmetologists. This group also includes historically female occupations, such as nurses, dental hygienists and librarians.

Janitors and housekeepers illustrate how social skill requirements may affect occupational sorting by gender. Janitors were a majority-male occupation in 2000, while housekeepers, maids, butlers, and cleaners were majority-female. These occupations encompass relatively similar tasks. I use O*NET measures of task requirements to compare these occupations. Both sets of occupations have similar physical skill requirements. However, they differ in the average level of social interaction. Janitorial tasks are in the third decile of service and

[3]Note these break points were set arbitrarily.

interaction requirements, while housekeeping is in the 9th decile. Whether workers enter one occupation or the other is likely correlated with their preferences for providing service and interacting with other people, especially if wages are similar.

Figure 3 examines whether individuals choose their occupation based on their personality traits, as suggested by Antecol and Cobb-Clark (2013). This figure plots the distribution of social skills for each of these occupational groups, and compares them to the aggregate distribution of social skills (see Figure 1A). Two patterns emerge. First, I find that women have relatively more social skills than men across occupations with different gender mix.[4] Second, the distribution of female social skills in each of the occupational groups is similar to that in my main sample, implying that women in male-dominated fields are similar to the average woman. However, men's relative level of sociability varies slightly with occupation. Panel A suggests that men in male-dominated fields (i.e., $\leq 25\%$ female) have less social skills than the average man in my sample. On the other hand, male thirty-year-olds in relatively female-dominated fields (i.e., 50-75% female) are more sociable than average. Occupation-group differences in male sociability suggest that men sort into occupations based on social skill requirements. A complete test of whether underlying sociability affects occupational sorting is outside the scope of this version of the paper. However, it seems that women do not sort into occupations based on their personality traits, while men do to some extent.

I investigate whether the returns to social skills differ across the four occupational groups, given potential occupational sorting of men. Figure 4 plots the relationship between social skills and real log hourly wages for each of the occupation groups. This figure suggests that the null effect estimated in Table 3 is not true across my entire sample. In particular, it seems that higher levels of social skills negatively affect wages in majority-female and majority-male occupations, and only for workers who identify with the gender minority. Panel A shows that there are no returns to greater sociability for men in occupations where the female share is less than 25%. Similarly, Panel D indicates that the returns to higher social skills for women in female-dominated occupations are zero. However, more sociable women in male-dominated occupations and more sociable men in female-dominated occupations are penalized for their higher levels of social skills.

Table 5 formally tests whether the returns to social skills differ for male and female workers across occupational groups. I present another version of my preferred specification from Table 3, where I control for occupation task requirements instead of controlling for occupation fixed effects. I follow Deming (2017) and measure occupation requirements using O*NET. I include the following occupation-level characteristics, measured in percentiles:

[4] A formal test of differences in social skill by gender for each of the groups is available upon request.

social skill requirements, routine task intensity (i.e., how automated is a job), non-routine analytical task intensity, social interaction intensity, coordination task intensity, and service requirements.[5] Controlling for task requirements instead of occupation fixed effects allows me to capture occupation-level characteristics that may be correlated with how social skills affect productivity, without absorbing too much of the variation in my data. Doing so is particularly helpful when the sample sizes are smaller and the number of occupations in a given category is relatively big. My results are robust to controlling for occupational requirements or occupation fixed effects.

Columns (1) and (2) estimate the relationship between social skills and log real hourly wages for workers in occupations with female employment share below 25% in 2000. I find that the returns to social skills for men in these occupations is indistinguishable from zero. When controlling for occupational requirements, I find that women whose social skill level is one standard deviation above the mean have 19.7% lower hourly wages, *ceteris paribus*.[6] This is a seemingly large effect, but I show in Table 1 that the average social skill level in my sample is 0.33 standard deviations above the mean, with a standard deviation of 0.944. Being one standard deviation above the female mean implies a much higher sociability level, so my estimates might be reasonable. These estimated effects become smaller and statistically insignificant when I control for occupation fixed effects instead of requirements, potentially suggesting lack of power to estimate my parameter of interest.

Panels B and C of Figure 4 suggest negative returns to higher social skill levels for women relative to men in occupations with female share of employment between 25 and 75 percent in 2000. I find in Columns (3)–(6) that the difference in returns, though negative, is statistically insignificant at the 10% level. Moreover, the linear combination of returns to social skills and returns to female social skills is close to zero for this subsample. These results suggest that the null returns to social skills estimated in Table 3 apply to occupations with relatively balanced gender mix.

Columns (7) and (8) replicate Columns (1) and (2) for the female-dominated occupations in my sample. Notably, there seems to be no statistically significant gender wage gap in occupations whose employees are at least 75 percent female. Moreover, men in occupations with female share above 75% are penalized for reporting a higher score on my social skill index. I find that men whose social skill level is one standard deviation above the mean have 15.6–17.3% lower hourly wages than men with average levels of social skills. These estimates are robust to controlling for education and occupation characteristics. The coefficient on

[5] See Deming (2017) for a description of how these variables were constructed.

[6] Recall that in my preferred specification I control for number of years of education, cognitive skills by gender, and non-cognitive skills by gender, as well as occupational characteristics.

returns to social skills for women is positive and statistically significant at the 1% level. However, a simple linear combination of the two coefficients on returns to social skills yields that female wages' response to higher social skills are close to zero.

What drives these differences? In Table 6 I regress log real hourly wages at age 30 on the self-reported personality traits that compose my social skills index, standardized to mean 0 and standard deviation 1.[7] As in Table 5, I control for educational attainment, cognitive and non-cognitive skills by gender, and occupation characteristics.

Columns (1) and (2) report the estimates for male-dominated occupations. I find that the negative relative returns to higher social skills for women are driven by negative returns to reporting higher levels of animation. As described in Section 2, "Animated" is constructed by rescaling "reserved/quiet." Thus, we can interpret the results in Columns (1) and (2) as follows: women in male-dominated fields who report being one standard deviation more reserved or quiet than the average earn 11.1–13.2% higher wages at age 30.

The negative returns to higher social skills for men in female-dominated occupations are due to negative returns to agreeableness. Similarly to "Animated," "Agreeable" is a rescaled variable — individuals in the NLSY97 report how critical and quarrelsome they are. Columns (3) and (4) imply that men in female-dominated fields who report being one standard deviation less critical or quarrelsome than the average earn 11.9-13.3% lower wages than thirty-year-old men with average levels of agreeableness. Linearly combining the coefficients indicates that female hourly wages don't change with agreeability. Women do seem to benefit from greater extraversion: a one standard deviation increase in extraversion is associated with 10.9-12.2% higher hourly wages.

I argue that my findings in Table 6 stem from the same root: the upsetting of social norms. Individuals in not-own-gender dominated fields are penalized for displaying personality traits commonly associated with their occupation's dominating gender. For instance, I document in Table 1 that women are relatively more agreeable than men in my main analysis sample. Men in female-dominated fields are penalized for being more agreeable, or more "feminine" in this regard. My findings are in line with Tilcsik (2011), who documents that openly gay men are discriminated against by employers who perceive them to be more feminine. Moreover, Rudman and Glick (2001) finds that women who violate gender prescriptions face hiring costs, which might help explain why women who are loud and animated in male-dominated occupations earn lower hourly wages.

[7] See Section 2 for a thorough description of how I construct my variables.

4 Conclusion

Women are consistently paid less than their male counterparts given equal education, experience and occupational preferences. This paper identifies differences in returns to equal sociability levels as another component of the gender wage gap. Using data from the 1997 National Longitudinal Survey of Youth, I explore the distribution of pre-market social skills by gender, and estimate the relationship between sociability and wages. I then decompose the sociability wage gap into gender differences in social skills and differences in returns to sociability by gender. Finally, I study the wage gap effect of different pre-market sociability metrics in order to preliminarily identify mechanisms.

In this paper I find that on average real log hourly wages at age 30 do not respond to higher social skills for men or women. However, higher levels of social skills affect men and women differently depending on their occupations gender mix. I find that a one standard deviation increase in social skill level for women in male-dominated occupations is associated with a 19% relative decrease in real hourly wages. This difference is driven by positive (negative) returns to female quietness and reservedness (animation and interpersonal openness). I additionally estimate negative returns to social skills for men in female-dominated occupations. A one-standard deviation increase in social skill levels for men in majority female occupations lowers their real hourly wages by 16-17%. In this case, men are rewarded (penalized) for being critical (agreeable). Women in female-dominated fields and men in male-dominated fields do not earn higher hourly wages in return for higher social skill levels.

A shortcoming of my study is that I only observe hourly wages and not total earnings. If workers respond to lower returns to their personality traits by working more hours, I might find no effect of sociability on aggregate earnings. Due to data limitations, however, I cannot test whether social skills affect the number of hours worked. In the future, I hope to explore whether social skills affect the extensive margin of labor supply differently across genders, if at all.

Future research should explore the mechanisms behind the gap in returns to sociability by occupation gender mix. I conjecture that negative returns to female and male sociability in occupations where they are in the minority gender have the same root: gendered social norms. Women in male-dominated fields may be rewarded for "shrinking" their personalities and being less extraverted. Men in female-dominated fields, however, are rewarded for exhibiting more masculine traits, such as being critical and quarrelsome, as suggested by Tilcsik (2011).

Next steps include a higher level treatment of potential reverse causality, especially through occupational sorting. Additionally, I did not provide evidence of mechanisms for

my results, and hope to address them in future work. Future work can also explore the returns to social skills in promotion decisions and in the marriage market. It may be the case that more sociable women find higher earning partners, and can afford receiving lower wages in exchange for greater time flexibility (Goldin, 2014). Women with higher sociability levels might also exhibit lower labor force participation rates, so my sample of employed adults negatively select females on social skills. Finally, the framework of this paper can be extended to analyze the relationship between race and returns to social skills. This last research avenue can help explain wage gap patterns between men and women of the same race, as well as wage gaps across races.

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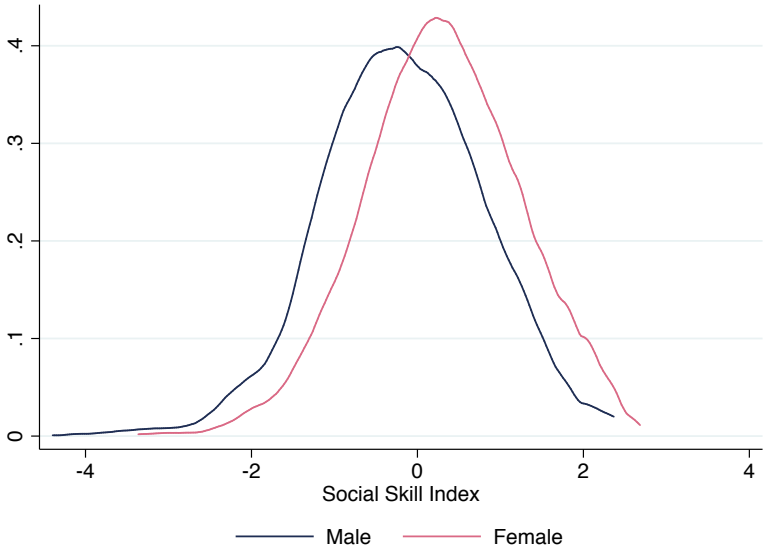
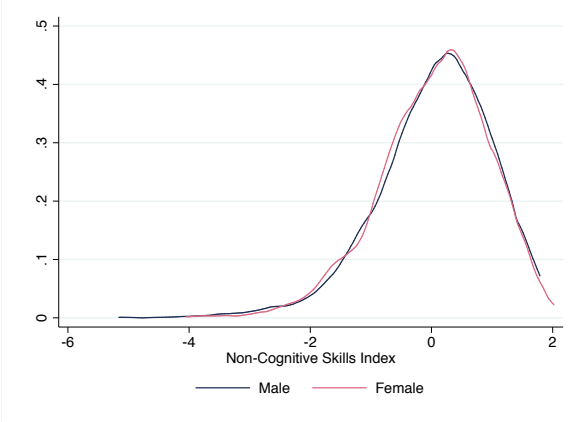
Figure 1: Kernel Density of Social, Non-Cognitive and Cognitive Skills by Gender

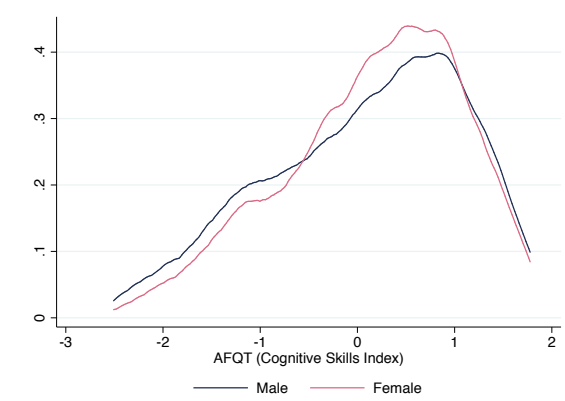
A. Social Skills



B. Non-Cognitive Skills



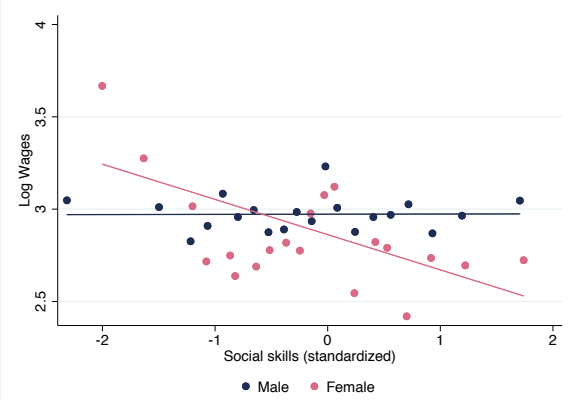
C. Cognitive Skills



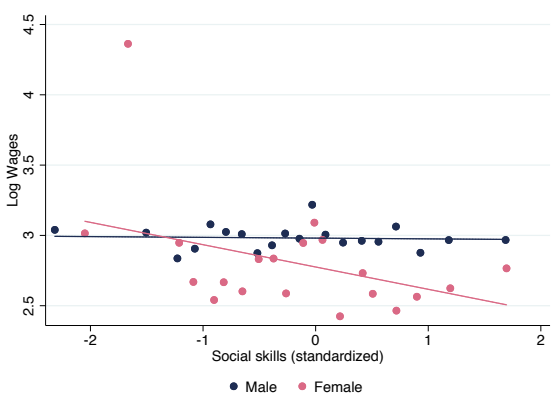
NOTES: This figure plots the kernel density of social skills, cognitive skills and non-cognitive skills by gender in my main analysis sample. *Social skills* is a composite index of self-reported extraversion, agreeableness, warmth and animation, standardized to mean 0 and standard deviation 1. *Cognitive skills* are standardized AFQT scores. *Non-cognitive skills* is a composite of self-discipline, ability to not be easily upset, openness to new experiences, carefulness and emotional stability. See Section 2 for data sources and a detailed description of how the social skill index was constructed.

Figure 2: Gender Gap in Returns to Sociability Varies with Occupations Gender Mix

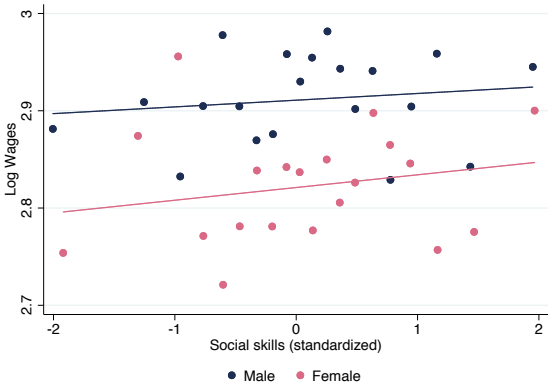
A. Raw Data



B. Controlling for Education

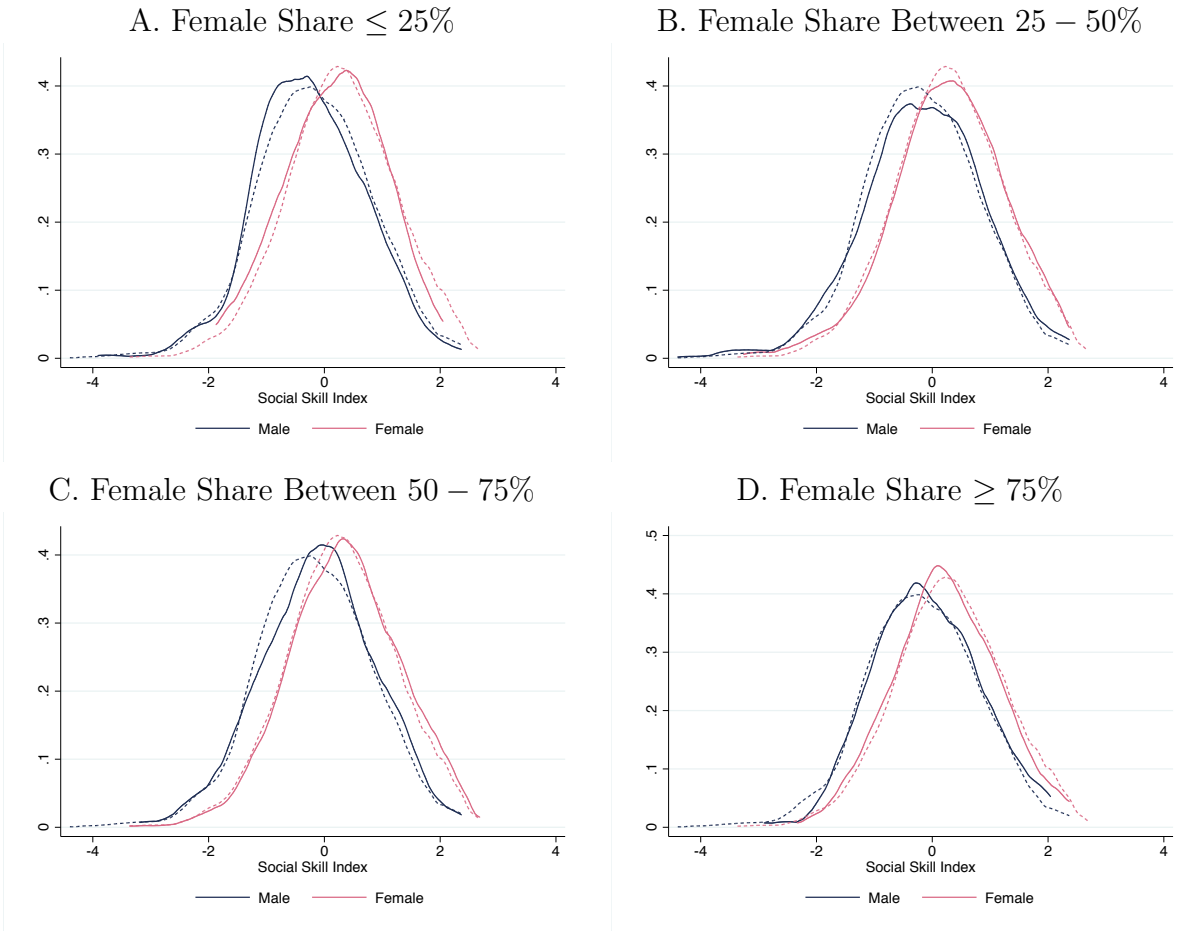


C. Controlling for Education and Occupational Sorting



NOTES: This figure plots the relationship between log wages at age 30, social skills and gender in my main analysis sample. Panel B controls for educational attainment, measured as number of years of schooling by age 30. Panel C absorbs occupation fixed effects to control for occupational sorting, and no other controls are included. See Section 2 for data sources and a description of how the social skill index was constructed.

Figure 3: Kernel Density of Social, Non-Cognitive and Cognitive Skills by Gender



NOTES: This figure replicates Figure 1 for subsamples defined by occupation skill mix. Panel A plots the kernel density of social skills by gender for occupations whose female share of employment in 2000 was 25 percent or less. Panels B and C replicate Panel A for occupations whose female share of employment lie between 25-50% and 50-75%, respectively. Panel D replicates Panel A for occupations whose female share of employment in 2000 was 75 percent or more. Dashed lines indicate the full sample distribution from Figure 1, and full lines represent the subsample distribution of social skills. *Share of employment* is measured using the 2000 Census. See Section 2 for data sources and a description of how the social skill index was constructed.

Figure 4: Gender Gap in Returns to Sociability Varies with Occupations Gender Mix

NOTES: This figure replicates Figure 2 for subsamples defined by occupation skill mix. Panel A plots the relationship between log wages and social skills for occupations whose female share of employment in 2000 was 25 percent or less. Panels B and C replicate Panel A for occupations whose female share of employment lie between 25-50% and 50-75%, respectively. Panel D replicates Panel A for occupations whose female share of employment in 2000 was 75 percent or more. All panels control for years of schooling and occupation fixed effects. *Share of employment* is measured using the 2000 Census. See Section 2 for data sources and a description of how the social skill index was constructed.

Table 1: Social and Cognitive Skills by Gender, NLSY97

	Male	Female	Difference
Hourly wages (2015 USD)	23.13	19.66	3.335***
	(19.49)	(15.40)	[6.35]
Years of education	14.13	15.11	-0.944***
	(2.931)	(2.854)	[-10.41]
Cognitive Skills (AFQ, std.)	0.267	0.348	-0.0618*
	(0.950)	(0.853)	[-2.08]
Social Skills (std.)	-0.152	0.330	-0.457***
	(0.982)	(0.944)	[-15.30]
Extraversion/Enthusiasm (Scale 1-7)	5.200	5.403	-0.195***
	(1.340)	(1.304)	[-4.72]
Agreeable (Scale 1-7)	4.297	4.646	-0.318***
	(1.601)	(1.618)	[-6.26]
Animated/Not Quiet (Scale 1-7)	4.011	4.463	-0.416***
	(1.913)	(1.867)	[-6.94]
Sympathetic/Warm (Scale 1-7)	5.237	5.934	-0.677***
	(1.299)	(1.079)	[-17.66]
Non-cognitive Skills (std.)	0.0398	0.00812	0.0180
	(0.926)	(0.894)	[0.63]
Disciplined (Scale 1-7)	6.043	6.183	-0.128***
	(0.999)	(0.904)	[-4.24]
Calm/Not Anxious (Scale 1-7)	4.793	4.418	0.333***
	(1.703)	(1.738)	[6.08]
Open to Experiences (Scale 1-7)	5.725	5.768	-0.0654
	(1.190)	(1.120)	[-1.80]
Organized/Careful (Scale 1-7)	5.079	5.330	-0.236***
	(1.635)	(1.637)	[-4.55]
Emotional Stability (Scale 1-7)	5.624	5.344	0.253***
	(1.252)	(1.309)	[6.27]
Observations	2062	2022	4084

NOTES TO TABLE 1: This table summarizes social skill and components of the NLSY97 social skill metric by gender. *Hourly wages (2015 USD)* are real hourly wages in 2015 dollars, with values below 3 and above 200 trimmed as in Altonji, Bharadwaj and Lange (2012). *Years of education* measures the number of years of schooling by age 30. *Cognitive skills* are standardized AFQT scores. *Social skills* is a composite index of self-reported extraversion, agreeableness, warmth and animation, standardized to mean 0 and standard deviation 1. *Non-cognitive skills* is a composite of self-discipline, ability to not be easily upset, openness to new experiences, carefulness and emotional stability. The different components of social and non-cognitive skills were self-reported on a scale from 1 ("Strongly Disagree") to 7 ("Strongly Agree"). Survey respondents were asked to rate how well the following pairs of personality traits applied to them: *extraverted/enthusiastic*, *agreeable/non-confrontational*, *dependable/self-disciplined*, *calm/not easily upset*, *open to new experiences*, *animated/open to others*, *sympathetic/warm*, *organized/careful*, and *calm/emotionally stable*. Standard errors are reported in parentheses. The "Difference" column reports the difference in means between male and female respondents. Welch standard errors for the test $H_0 : Male - Female = 0$ are reported in brackets below the difference in means ($^{*}p = 0.10$, $^{**}p = 0.05$, $^{***}p = 0.01$). See Section 2 for data sources and a description of how the social skill index was constructed.

Table 2: Correlation Between Different Components of the Social Skill Metric

	Educ	Social Skills	Non-Cognitive Skills	Cognitive Skills
Panel A. Male Sample				
Years of education	1			
Social Skills (std.)	0.10	1		
Non-cognitive Skills (std.)	0.16	0.34	1	
Cognitive Skills (AFQ, std.)	0.55	0.05	0.07	1
Panel B. Female Sample				
Years of education	1			
Social Skills (std.)	0.08	1		
Non-cognitive Skills (std.)	0.13	0.32	1	
Cognitive Skills (AFQ, std.)	0.51	0.09	0.05	1

NOTES: Table 2 shows the correlation between education, my social skill index, standardized AFQT scores, and my composite measure of non-cognitive skills. Panel A describes correlations for men in my main analysis sample, while Panel B does so for the women. *Years of education* measures the number of years of schooling by age 30. *Social skills* is a composite index of self-reported extraversion, agreeableness, warmth and animation, standardized to mean 0 and standard deviation 1. *Non-cognitive skills* is a composite of self-discipline, ability to not be easily upset, openness to new experiences, carefulness and emotional stability. *Cognitive skills* are standardized AFQT scores. See Section 2 for data sources and a description of how the social skill index was constructed.

Table 3: Wage Returns to Social Skill by Gender

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Cognitive skills (AQT standardized)					0.039***		0.041***
					(0.014)		(0.014)
Cognitive skills × Female					0.026		0.026
					(0.018)		(0.018)
Social skills (standardized)	0.010	0.013	0.009	0.011	0.012	0.003	0.004
	(0.010)	(0.009)	(0.014)	(0.013)	(0.013)	(0.014)	(0.014)
Social skills × Female			0.003	0.004	-0.000	-0.002	-0.006
			(0.020)	(0.017)	(0.017)	(0.019)	(0.019)
Female	-0.224***	-0.130***	-0.224***	-0.130***	-0.135***	-0.123***	-0.127***
	(0.020)	(0.021)	(0.020)	(0.021)	(0.021)	(0.021)	(0.021)
Non-cognitive skills (standardized)						0.025*	0.027*
						(0.014)	(0.014)
Non-cognitive skills × Female						0.019	0.019
						(0.019)	(0.019)
Observations	4,251	4,251	4,251	4,251	4,251	4,250	4,250
R-squared	0.150	0.394	0.150	0.394	0.398	0.396	0.401
Occupation FE		✓		✓	✓	✓	✓

NOTES: This table estimates the average economic returns to social skills for my main analysis sample. Columns (1) and (2) estimate the aggregate effects of social skills on log real hourly wages. Columns (3)-(7) allow the relationship between wages and the social skill index to vary by gender. All specifications additionally control for number of years of schooling and year fixed effects to account for labor market conditions in the year survey respondents are thirty years old. Robust standard errors are reported in parentheses ($^{*}p = 0.10$, $^{**}p = 0.05$, $^{***}p = 0.01$). See Section 2 for data sources and a description of how the social skill index was constructed.

Table 4: Examples of Occupations by Occupation Group

A. Female Share $\leq 25\%$	B. Female Share Between $25-50\%$
Barbers	Lawyers & Judges
Engineers (all)	Physicians
Architects	Assemblers of electrical equipment
Janitors	Managers (All)
Construction laborers	Pharmacists
Miners	Economists & Survey researchers
C. Female Share Between $50-75\%$	**D. Female Share $\geq 75\%$**
Marketing, Advertising & PR	Nurses
Teachers (K-12)	Dental hygienists
Health technicians	Housekeepers, maids, butlers, & cleaners
Accounting and Finance	Library assistants
Office supervisors	Hairdressers and cosmetologists
Animal caretakers	General office clerks

NOTES: This table provides examples of occupations in different occupational sub-groups. Panel A lists occupations whose female share of employment in 2000 was 25 percent or less. Panels B, C and D replicate Panel A for occupations whose female share of employment is between 25-50%, between 50-75% and greater than 75%. See Section 2 for data sources and a description of how the social skill index was constructed.

Table 5: Wage Returns to Social Skills by Occupation Group

	Female Share $\leq 25\%$		Female Share $25-50\%$		Female Share $50-75\%$		Female Share $\geq 75\%$	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Social skills (standardized)	0.001	-0.002	0.014	0.010	0.050	0.052	-0.156***	-0.173***
	(0.021)	(0.023)	(0.022)	(0.021)	(0.037)	(0.033)	(0.054)	(0.052)
Social skills × Female	-0.197**	-0.094	-0.027	-0.006	-0.051	-0.049	0.158***	0.171***
	(0.099)	(0.061)	(0.033)	(0.031)	(0.044)	(0.040)	(0.057)	(0.056)
Female	-0.238***	-0.195***	-0.190***	-0.197***	-0.063	-0.058	-0.062	-0.073
	(0.077)	(0.060)	(0.031)	(0.031)	(0.040)	(0.038)	(0.058)	(0.054)
Observations	946	948	1,255	1,255	1,219	1,219	828	828
R-squared	0.159	0.371	0.276	0.340	0.373	0.466	0.340	0.423
Cognitive Skill	✓	✓	✓	✓	✓	✓	✓	✓
Non-cognitive Skill	✓	✓	✓	✓	✓	✓	✓	✓
Occupation Requirements	✓		✓		✓		✓	
Occupation FE		✓		✓		✓		✓

NOTES: This table estimates the economic returns to social skills for different occupational sub-groups. Columns (1) and (2) estimate the relationship between log wages and social skills for occupations whose female share of employment in 2000 was 25 percent or less. Columns (3) and (4) replicate Columns (1)-(2) for occupations whose female share of employment lie between 25-50%. Columns (5) and (6) replicate Columns (1)-(2) for occupations whose female share of employment lie between 50-75%. Finally, Columns (7) and (8) replicate Columns (1)-(2) for occupations whose female share of employment in 2000 was 75 percent or more. All specifications control for number of years of schooling and year fixed effects, as well as cognitive and non-cognitive skills separately for men and women. *Share of employment* is measured using the 2000 Census. *Occupation Requirements* control for the following occupation-level characteristics, measured in percentiles using O*NET: social skill requirements, routine task intensity (i.e., how automated is a job), non-routine analytical task intensity, social interaction intensity, coordination task intensity, and service requirements. Robust standard errors are reported in parentheses ($^{*}p = 0.10$, $^{**}p = 0.05$, $^{***}p = 0.01$). See Section 2 for data sources and a description of how the social skill index was constructed.

Table 6: Wage Returns to Components of Social Skill Index by Occupation Group

	Female Share $\leq$ 25%		Female Share $\geq$ 75%	
	(1)	(2)	(3)	(4)
Agreeable (standardized)	-0.015	-0.014	-0.133**	-0.119**
	(0.019)	(0.020)	(0.059)	(0.054)
Agreeable × Female	-0.042	0.015	0.115*	0.109*
	(0.062)	(0.059)	(0.063)	(0.058)
Animated (standardized)	0.035*	0.016	-0.016	-0.043
	(0.019)	(0.019)	(0.048)	(0.047)
Animated × Female	-0.132**	-0.111*	-0.003	0.021
	(0.057)	(0.063)	(0.051)	(0.051)
Extraverted (standardized)	-0.007	0.008	-0.082*	-0.076
	(0.021)	(0.021)	(0.045)	(0.047)
Extraverted × Female	0.021	0.008	0.122**	0.109**
	(0.069)	(0.075)	(0.051)	(0.052)
Sympathetic (standardized)	-0.023	-0.022	-0.093	-0.109
	(0.020)	(0.020)	(0.070)	(0.067)
Sympathetic × Female	-0.197	-0.075	0.088	0.107
	(0.128)	(0.082)	(0.074)	(0.071)
Female	-0.206**	-0.169**	-0.049	-0.058
	(0.086)	(0.071)	(0.050)	(0.047)
Observations	908	910	803	803
R-squared	0.170	0.373	0.356	0.432
Cognitive Skill	✓	✓	✓	✓
Non-cognitive Skill	✓	✓	✓	✓
Occupation Requirements	✓		✓	
Occupation FE		✓		✓

NOTES: This table estimates the economic returns to the personality traits that make up my social skills index for different occupational sub-groups. Columns (1) and (2) estimate the relationship between log wages and social skills for occupations whose female share of employment in 2000 was 25 percent or less. Columns (3) and (4) replicate Columns (1)-(2) for occupations whose female share of employment in 2000 was 75 percent or more. All specifications control for number of years of schooling and year fixed effects, as well as cognitive and non-cognitive skills separately for men and women. *Share of employment* is measured using the 2000 Census. *Occupation Requirements* control for the following occupation-level characteristics, measured in percentiles using O*NET: social skill requirements, routine task intensity (i.e., how automated is a job), non-routine analytical task intensity, social interaction intensity, coordination task intensity, and service requirements. Robust standard errors are reported in parentheses ($^{*}p = 0.10$, $^{**}p = 0.05$, $^{***}p = 0.01$). See Section 2 for data sources and a description of how the social skill index was constructed.