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## **Gender Sorting at the Application Interface**

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## **Gender Sorting at the Application Interface**

### **Abstract**

We document gender sorting of candidates into gender-typed jobs at the point of initial application to a company. At this step of the hiring process, the firm has implemented a policy whereby organizational screeners' discretion has been eliminated such that there is no opportunity for contact between hiring agents and applicants. Thus, the job choices studied here offer unique insight as they are uncontaminated by screeners' steering of candidates toward gender-typed jobs. Even in the absence of steering, we find clear patterns of gendered job choices that line up with gender stereotypes of job roles. Moreover, these gendered patterns recur both within individuals and within race groups. Comparing our findings to the pattern of job sorting in the external local labor market, we find that supply-side factors do not fully account for the levels of job sex segregation observed in the open labor market. Although probably not the entire story, we show clear evidence that supply-side sorting processes are important factors contributing to job sex segregation.

Much recent scholarship has been devoted to documenting the patterns and trends of job sex segregation (e.g., Charles and Grusky 2004; Jacobs 1989; Kaufman 2002; Tomaskovic-Devey 1993). This attention is justified because gender segregation of jobs has important consequences for inequality in wages. Many studies have shown that men earn more than women, even after controlling for human capital factors. These wage differences, however, are significantly diminished once men and women doing the same job are compared (e.g., England, Herbert, Kilbourne, Reid and Megdal 1994; Petersen and Morgan 1995). As a consequence, understanding the mechanisms that lead to gender differences in job assignment has become a top priority in current labor market research.

A key debate in the research on job segregation has been the degree to which gender sorting is attributable to demand side factors—e.g., employers' actions and attitudes (e.g., Fernandez and Sosa 2005; Graves 1999; Kmec 2005; Mun 2010)—or reflects a feature of labor supply, e.g., the skills and preferences of job seekers (Okamoto and England 1999; Polachek 1981; Tam 1997). Indeed, a large body of research documents that “pre-market” factors such as educational background and training are themselves highly gendered (e.g., Cech, Rubineau, Serron and Silbey 2011; Charles and Bradley 2009; Dickson 2010; Rubineau, Cech, Serron and Silbey 2011; Turner and Bowen 1999). Identifying the extent to which supply and demand side factors contribute to gender sorting is also of substantial practical importance, since the idea that demographic groups differ in their degree of interest in jobs has emerged as an employer's legal defense against charges of discrimination (Nelson and Bridges 1999; see the discussion of the controversial "lack of interest" defense in Schultz and Peterson 1992).

Complicating inferences in this area is the fact that virtually all empirical research on gender sorting begins by studying *people who are already sorted into jobs*. When examining job

segregation for people who have already been hired, the effects of demand-side processes are confounded with supply-side factors. For the purposes of identifying the factors contributing to gender or race segregation of jobs, studies of people who have already been sorted into jobs select on the dependent variable (for a detailed discussion of the limitations of “start with hire” studies, see Fernandez and Weinberg 1997). While this research may *describe* the net result of supply- and demand-side sorting processes, without pre-hire baseline information, these studies cannot isolate the supply-side processes at work at the hiring interface. In contrast, studies of hiring beginning with the pool of applicants (e.g., Fernandez and Sosa 2005; Petersen, Saporta and Seidel 2000; 2005) and hiring audit studies (e.g., Booth and Leigh 2010; Riach and Rich 1987; 2006) avoid the selection on the dependent variable problem. However, these studies concentrate on demand-side discrimination and screening processes –e.g., organizational screeners’ biases (e.g., Fernandez and Sosa 2005; Foschi and Valenzuela 2008; Glick, Zion and Nelson 1988; Pager, Western and Bonikowski 2009)—and have little to say about supply side sorting processes.

In this paper, we focus on supply-side gender sorting as it contributes to job segregation. Our strategy is to examine the point where labor supply intersects the demand side screening process for this firm, namely, at the point of application. More specifically, we analyze unique pre-hire data on the expressed level of interest that male and female candidates show in two gender-typed jobs, the stereotypically female Receptionist job, and the stereotypically male Computer Programmer job. While our main focus is on gender, in order to address the question of the “intersectionality” of gender and race (Browne and Misra 2003), we also report how these gendered patterns of job choice interact with race. By assessing whether job choices are gendered *prior* to demand-side screening processes—at the point of initial application—we are

able to isolate the role of supply-side factors in producing segregation of jobs by gender. While there is evidence that firms' hiring agents can influence the application process, sometimes steering job candidates from disfavored groups away from high status, higher paying jobs to lower status jobs (Pager et al. 2009; Fernandez and Mors 2008), in this setting, organizational screeners have no opportunity to steer candidates (see below). For this reason, we can be assured that candidates' job choices are uncontaminated by the actions of screeners. By instituting organizational procedures that limit screeners' discretion at this step of the process, the firm has enacted the suggestions of a number of scholars seeking to improve labor market outcomes for women and minorities (e.g., Bielby 2000; Nelson and Bridges 1999; Reskin and McBrier 2000). Thus, the special circumstances of this case serve as a fertile ground for studying the degree of job sex segregation when screeners' discretion has been significantly curtailed.

We begin by analyzing candidates' expressed job preferences at application, and show how candidates' ratings of jobs differ by gender. We find important gender differences in the ratings of gender typed jobs in the initial application pool. Although we find clear patterns of gender preferences, we find few race interactions with gender, i.e., the gender patterns of ratings are similarly ordered across race groups. In addition, we show that these gender patterns in job ratings do not simply reflect heterogeneity among different candidates interested in different jobs, but recur within individuals' choices as well. Moreover, these results are robust to some obvious alternative explanations for the observed job ratings (e.g., degree of urgency in finding a job, self-assessed skills). Even among the subset of applicants who self-report high interest in the stereotypically male Computer Programming job, females still rate the stereotypically female Receptionist job higher than do males. Also, among those applicants who rate the stereotypically female Receptionist job highly, males rate the stereotypically male Computer Programmer job

more highly than do females. We also show that gender differences in wages in the external labor market, which might make these two jobs differentially attractive to men and women, are unlikely to explain the observed results. Finally, we compare our findings to the pattern of job sorting found in the external local labor market. While supply-side choices play a significant role in the gender segregation of jobs, these cannot fully account for the levels of gender segregation observed in the open labor market. We conclude with a discussion of implications of these findings.

### **Data and Setting**

The data analyzed here are taken from the records of applications to a call center located in the Western United States. A key feature of this study is that candidates for all jobs are required to apply to the company via telephone through a computer automated application system. Advertisements for job openings contain no street address or e-mail information; thus people cannot send resumes or other job inquiries directly to the company. Candidates for all job openings are directed to apply via the telephone. Similar to Yakubovich and Lup's (2006) Internet-based recruitment setting, these highly formalized procedures mirror the suggestions of a number of scholars (e.g., Bielby 2000; Nelson and Bridges 1999; Reskin and McBrier 2000) about the diversity enhancing benefits of limiting screeners' discretion. In this case, there is no opportunity for applicants to be steered to different jobs by company personnel during the application process. This is especially important in light of the Pager et al. (2009) study which showed that steering of minorities applying to low-wage jobs is commonplace. In contrast to other settings (e.g., Pager et al. 2009; Fernandez and Mors 2008), in this context, the job choices that applicants express during the application process assuredly reflect the candidate's interest in the job at the point of application.

The company shared with us their data on their complete applicant pool for all jobs at the call center over the 13 month period from December, 1997 through December, 1998. These data are subject to two constraints, however. First, applicants may apply only once in a 12 month period (application data is kept in a database for consideration for job openings for 12 months). Early in the telephone application process, candidates are asked to provide their social security number as identifying information.<sup>1</sup> If an applicant is found to have applied during the previous 12 months, the telephone interview is terminated.<sup>2</sup> Consistent with this policy, we found no repeat applicants over the period we studied. Second, candidates are also asked to commit to work at least 15 hours per week and to stay with the company for at least six months. The telephone interview is also terminated for candidates responding negatively to this prompt. For these terminated interviews, only the identifying information used to screen for multiple application attempts is retained. A total of 5,315 people made it past these two screening criteria and successfully applied to the call center over the period of the study.

Important for the goals of this research, applicants are also asked to respond to optional questions on demographic background: gender, race, and age (less than 40 years of age vs. 40 and older). While it is common to have data on demographic background for people who have been hired, it is quite rare to have this information on applicants (see discussion in Fernandez and Fernandez-Mateo 2006). The prompt for these items was: “We need to ask this information in order to comply with Federal law, and to ensure that our process does not have any discriminatory impact. The ... questions are optional and you are free to choose not to

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<sup>1</sup> The company did not share applicants’ social security numbers. The dataset we were provided replaced the social security number with an internal code.

<sup>2</sup> Note that names are *not* asked and the social security number is the *only* identifying information that applicants are asked to provide at the application stage. Thus, as we discuss below, unless they voluntarily choose to divulge this information, the company’s screeners are blind to the applicants’ gender and race.



respond...”. Although voluntary, applicants provided responses to the gender, race and age items at very high rates (respectively, 99.4, 94.6, and 95.1 percent).

Also key for our purposes here, irrespective of whichever job might have induced the candidate to apply to the company, applicants are presented with a series of short descriptions of 16 jobs “that might be of interest to you” and asked to rate them on a 1-5 scale, where 1 = “Really not interested” and 5 = “Strong desire and the ability to do this job.”<sup>3</sup> Although it would be of theoretical interest to separate interest and ability (see the discussion of Correll [2001, 2004] below), applicants here are being asked to self-assess their levels of both for these jobs. The company does not screen on the responses to these questions, and there is nothing preventing people from rating all 16 jobs a 5, although only 2.8 percent (145 of 5,315) did so. There is, of course, wide variation in the levels of expressed interest across the 16 jobs. *All* applicants for *all* jobs are asked to perform these ratings, and at no prior time in the interview were the applicants asked to identify which job led them to apply to the company. Thus, these questions allow applicants to reveal their level of interest in these jobs, irrespective of which job applicants might be pursuing.

Two of these jobs are of particular interest for this paper: the stereotypically-male Computer Programmer job (described in the telephone interview as a job to “...create customized computer applications for a specific client”), and the stereotypically-female Receptionist job (described in the telephone interview as a job to “answer incoming phone calls...”). Indeed, both these jobs are highly sex-skewed in the PUMS data for the local labor

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<sup>3</sup> For completeness: 2 = “You think you could do this job, even if it is sometimes boring”, 3 = “Not sure, but you think you could do this job for a while”, 4 = “...could do the job well, and it would be ok.”

market:<sup>4</sup> males constitute 72.4 percent of the Computer Programmers in the local area, while females are 93.8 percent of the local area Receptionists. Focusing on these two jobs allows us to examine job ratings for males and females for both gender typical (i.e., females rating the Receptionist job, and males rating the Computer Programming job) and gender atypical jobs (i.e., females rating the Computer Programmer job, and males rating the Receptionist job). As noted above, since these ratings are occurring in a context where steering by hiring agents is not possible, these analyses offer unique insight into the gendered nature of applicants' job choices for different race groups.<sup>5</sup>

The most popular job—i.e., the one with the highest percentage of '5' ratings—is the Interviewer job. Sixty three percent (3,309 of 5,252 non-missing cases) of the people who applied to the company during the 13 month study window rated the Interviewer job a '5'. In contrast to the Computer Programmer and Receptionist jobs, applicants for the Interviewer job are not significantly gender skewed: females 51.1 constitute percent of those rating the Interviewer job a '5'. Because it is attracting the modal applicant to the company, we will use the Interviewer job as a baseline of comparison in descriptive analyses assessing how individuals rate other jobs.

In light of our decision to study this one setting, we can make no claims regarding generalizability. The theoretical significance of this case is that it provides a window through which one can view the operations of a set of processes that are normally hidden from view. Our

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<sup>4</sup> We obtained data on persons employed in the local MSA in the 5 percent 2000 Public Use Micro Sample (PUMS; Ruggles, Alexander, Genadek, Goeken, Schroeder and Sobek 2009). The specific six digit occupation codes used are: Receptionist = 434171, and Computer Programmer = 151021).

<sup>5</sup> For several reasons, we limit our study to examining the gender and race composition of these two jobs. First, our strategy in this paper is to study jobs that are gender stereotyped, and these two job titles are the most clearly gender typed from among the sixteen job titles. Also, a number of the 16 titles are idiosyncratic to the firm, so their use would make it impossible to preserve the firm's identity. However, we will use information on all sixteen jobs in an aggregated form to construct a key control variable (see below).

main goal in adopting this empirically grounded, case-study approach is to gain insight into gender and race differences in job choices, a task which is normally very difficult due to the fact that it operates in the pre-hire phase of the recruitment process. Especially since these applications are occurring in a context where choices are uncontaminated by the actions of Human Resources personnel, the unique, fine-grained data we analyze here are exceptionally well suited to addressing these important questions.

### **Analysis**

Table 1 shows the race distribution of all applicants to the call center over the 13 month study window by race and gender. Unlike many other call center settings (e.g., Fernandez, Castilla and Moore 2000; Fernandez and Mors 2008), the applicant pool for this call center is not highly feminized. The overall pool of applicants to the firm shows a slight skew toward males (52.0 percent); the left panel of the table shows that the race distribution within gender is quite similar. A slight majority of both males and females are non-Hispanic white (respectively, 51.3 and 51.8 percent). This is slightly less than the percentage of whites in the local area labor force (cf. the right panel of Table 1). For both sexes, African Americans are overrepresented, and Hispanics are underrepresented in the applicant pool as compared to the local labor force.

We explored whether these disparities between the applicant pool and the metro area labor force could be due to geographic differences in where various race groups live. We do not have addresses for the applicants, but we can get a sense of geographic patterns by varying the size of the catchment area around the call center. We used census block data from the Summary Files 1 (i.e., SF1 files) of the 2000 census to define catchments areas of sizes varying from 1 to 25 kilometers (Table 2). We included data in the area if the geographic centroid of the census block fell within the distance specified. Table 2 shows that the area immediately surrounding the

company is clearly a majority white area: the population of the area within one km or less from the firm is 70.5 percent white. African Americans appear to be drawn to apply to this company at somewhat higher rates than one would expect on the basis of their representation in the local population. Although on occasion the numbers diverge slightly, the percentage of Asians roughly matches their proportion of the applicant pool. The same cannot be said for Hispanics, however. Except when compared to the 1 kilometer catchment area, Hispanics are clearly underrepresented in the applicant pool.<sup>6</sup>

Table 3 shows the data for applicant ratings of the baseline (non-stereotyped) Interviewer job, and the two focal jobs, i.e., Receptionist and Computer Programmer. Looking first at the total set of candidates (i.e., without regard to race), applicants of both sexes show the highest degree of interest in the Interviewer job (mean scores of 4.40 on the 5 point scale for both males and females). We see the same pattern replicated within racial groups: within each race, the highest scores are for the Interviewer job, with no significant gender differences.

The ratings for the Receptionist and Computer Programmer jobs, however, show strong and significant gender differences in the expected directions: on average, males rate the Computer Programmer job more highly than do females, and females rate the Receptionist job more highly than do males. Also noteworthy is the fact that these gender patterns in job ratings recur *within* racial groups. The only exception to this pattern are the relatively small numbers of Native American applicants, for whom the gender differences in ratings for the Computer Programmer job are not statistically reliable. Because we found very little evidence that race

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<sup>6</sup> A possible explanation is that Hispanics are less attracted to telephone work, perhaps due to a lack of comfort in speaking English. The PUMS data for the local area showed that many Hispanics in the local labor force were limited in their proficiency in English. Indeed, 11.4 percent of Hispanics spoke no English at all, compared with 1.2 percent of Asians, 0.1 percent of whites, and 0.0 percent of blacks.

interacts with gender in these and subsequent analyses, going forward we simplify the analyses to focus on gender differences.

The ratings in Table 3 are simple aggregations of responses across individuals to the three jobs (i.e., Receptionist, Interviewer, and Computer Programmer) and thus the patterns there could reflect heterogeneity among different candidates interested in different jobs. Close analysis shows that the gendered patterns of job ratings recur *within* individuals as well. Individual males tend to rate the Computer Programmer higher relative to the way they rate the Receptionist job, while individual females' relative ranking of these two jobs shows the opposite pattern. Females constitute 61.8 percent of those rating the Computer Programmer job lower than the Receptionist job. In contrast, the group of applicants rating the Computer Programmer job higher than the Receptionist job is 75 percent male. This gender pattern is even more pronounced when the degree of difference between the two job ratings is taken into account: The population simultaneously giving the Computer Programmer the lowest rating (i.e., '1') and the Receptionist the highest rating ('5') is 73.7 percent female, while the group of people giving the Computer Programmer job their highest rating ('5') and the Receptionist job their lowest rating ('1') is 78.9 percent male.

#### *Multivariate Analyses*

Although it is clear from the analyses up to this point that male and female applicants self-sort in ways that line up with stereotypical notions of job roles at the point of initial application, it is possible that these patterns might be due to other factors that also break down along gender lines. While we are limited by the available information, we are able to control for a number of the most important alternative explanations for these observed sex differences in patterns of applicants' ratings in multivariate analyses. To anticipate the key findings, the

multivariate analyses show that the patterns of gender sorting observed in Table 3 cannot be explained by these alternative factors.

One obvious alternative explanation for these patterns concerns the outside options available to these applicants. To the degree that labor market options vary by sex in the local labor market, these differences in job options should affect the relative attractiveness of these jobs for male and female applicants. These outside options should also affect the degree of urgency these job seekers have in finding *any* job, and not just the jobs on which we focus here. Similarly, hedging in anticipation of discrimination in screening could lead applicants to give higher ratings across the board for all 16 jobs. In addition, individuals might vary in their propensity to rate all jobs highly, and if males and females differ in this tendency, not controlling for this factor can affect the substantive results. In order to account for these factors, for each of the jobs we study, a key control that we measure is the applicant's average rating on the other 15 jobs.

Another variable that is likely to affect the extent to which applicants hold stereotypical gender role attitudes is age. In national data, younger cohorts show more liberal gender role attitudes than do older cohorts (Brooks and Bolzendahl 2004). While it is rare to have age information for job applicants, these candidates were asked during the telephone interview whether they were less than or greater 40 years of age. While this question was optional in the interview protocol, 95.1 percent of applicants responded to this question. We control for age differences in ratings by entering a dummy variable for age (1= greater than 40 vs. 0=40 or less) in the analyses.

There is much research showing that people are willing to travel farther for higher paying than lower paying jobs, and that such willingness to travel often differs by gender (for a review,

see Fernandez and Su 2004). While the jobs' wages are not mentioned in the automated screening protocol, it is reasonable for applicants to infer that the Receptionist job is likely to pay less than the Computer Programmer job. Indeed, estimates based on the 2000 PUMS data for the local labor market show that the average hourly wages for Receptionists are \$13.13 while Computer Programmers' average wages are \$30.99. Consequently, when considered in relation to these wage differences, spatial considerations might also influence applicants' ratings of the desirability of these jobs. To address this question, we measured distance between the applicant's home and the location of the call center. To capture diminishing returns, we also entered distance-squared in the multivariate analyses.<sup>7</sup>

It is also possible that gender-stereotypical job choices might be explained by personality traits that differ by gender. All applicants are asked to respond to a series 45 Likert-style items designed to measure a version of the "Big Five" personality traits (Wiggins 1996). Recent research has found that the "Big Five" personality traits are related to women's labor force participation (Wichert and Pohlmeier 2010) and the male-female earnings gap (Mueller and Plug 2006). Most relevant for our purposes here, men and women have been shown to differ on two factors—"agreeableness" and "negative emotionality"—across a variety of studies and samples (e.g., Costa, Terracciano, and McCrae 2001; Mueller and Plug 2006). We will use these data to address the degree to which patterns of gender-stereotypical job choices might be explained by gender differences in measured personality.

A final possibility we consider is that sex differences in patterns of job choices reflect sex differences in prior skills. Although the company does not ask any questions about education

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<sup>7</sup> Since the company did not ask applicants for their home addresses, we geocoded each applicant to the only spatial information we could glean for them: the centroid of the area defined by the area code + exchange (first three digits) of the applicant's telephone number. Mobile telephones, of course, weaken this spatial link, but this is unlikely to be important for the 1997 -1998 field period of this study.

or experience at this stage of the screening process, the firm does ask all applicants irrespective of which of the 16 jobs that attracted them to apply to the firm about knowledge of specific computer software. Following the interview questions about jobs, applicants are told “[this organization] has a number of employment opportunities that require knowledge of specific software.” Applicants are then asked a general question on whether or not they have computer “knowledge and interest.” We coded a dummy variable 1 if the respondent said “yes” to this question, and 0 if the reply was “no.” This step is not significantly gendered: males constitute 53.5 percent of those answering affirmatively to this question, and this is quite close to the percent male in the overall applicant pool (i.e., 52.0 percent).

Applicants responding positively to the computer “knowledge and interest” question, were then asked to rate their knowledge of six specific software programs on a scale ranging from 1 (“Beginner”) to 5 (“Expert”).<sup>8</sup> We constructed a spline for computer knowledge by taking the average rating across the six programs for those responding “yes” to the “knowledge and interest” question, and 0 for those answering “no.” Thus, in the analyses below, the effect of computer knowledge is conditional on the respondent having expressed at least some computer “knowledge and interest.”

Table 4 presents the multivariate analyses predicting the ratings of the two gender stereotyped jobs, Receptionist and Computer Programmer. Model 1 shows the unstandardized coefficients from an OLS regression predicting applicants’ ratings of the Receptionist job using the 1 – 5 scale.<sup>9</sup> After controls, females rate the Receptionist job .863 points higher on average

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<sup>8</sup> While we cannot divulge the titles, these programs require considerable specialized training in that they are used in a relatively low-level programming environment to build back-office call center applications.

<sup>9</sup> In preliminary analyses, we replicated the analyses in three ways. First, we repeated these analyses using ordinal probit models. Second, we predicted dichotomized versions of these variables coded 1 if the person rated the job a ‘5,’ and zero otherwise. Third, in order to capture individuals’ relative ranking of these two jobs, we standardized each individual’s ratings across all 16 jobs, producing variables that are within-



than do males. Consistent with the arguments discussed above, applicants who rate the other 15 jobs (i.e., excluding the Receptionist rating) highly are also likely to rate the Receptionist job highly. The magnitude of the effect is substantial: for a one point increase in the average ratings of the other jobs, the ratings of the Receptionist job increase by .856 points. With respect to geographic distance, Model 1 shows positive linear and negative squared associations with distance measured by the natural-log of kilometers. This effect is substantively small, however: the net effect of distance on the rating of the Receptionist job is -.06 points at the median (13 kms.), -.10 points at the 75<sup>th</sup> percentile (22 kms.), and -.13 points at the 90<sup>th</sup> percentile (32.0 kms.) of distance.<sup>10</sup> The demographic variables show that controlling other factors, applicants who are 40 years of age and older rate the Receptionist job .566 points lower on average than applicants under 40. The dummy variables for race show that net of other factors, Hispanics and Asians rate the Receptionist job more highly than do whites. Taken as a set, the personality measures are also significantly related to the job rating.<sup>11</sup> Most important for our purposes here, however, is the fact that controlling for these factors does not explain away gender differences in the rating of the Receptionist job.

Model 2 repeats the analyses for the Computer Programmer job ratings. Even after controlling other confounding factors, the results of both models show that males' and females' job ratings continue to reflect the gender stereotype of the job. As in Model 1, older applicants rate the Computer Programmer job lower than younger applicants (-.186 points). The degree to which applicants rate the other 15 jobs highly is strongly predictive of the applicant's Computer

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individual z-scores (i.e., standard deviation units) for the Computer Programmer and Receptionist jobs. All these analyses yield substantively identical results to the simpler models we present here.

<sup>10</sup> In preliminary analyses, we found no evidence of significant interactions between distance and gender.

<sup>11</sup> We do not have access to the proprietary measurement formula that the company uses to score individuals on these 45 items. Our strategy then is to use the set of raw items as a set of controls as a way of assessing whether personality factors can explain gender patterns in job choices.

Programmer rating (1.078 points). Not surprisingly, the computer skill measures are also associated with higher ratings of the Computer Programmer job. However, as for Model 1, the key result for Model 2 is that the gender difference in ratings remains strong and statistically significant even after controls: female applicants rate the Computer Programmer job lower than do male applicants by .358 points.

### **Discussion**

Taken together, these results are consistent with Cjeka and Eagly's (1999) findings that gender-stereotypic images of occupations correspond to the sex segregation of employment. But the question remains: why do male and female applicants sort themselves in ways consistent with gender stereotypical notions of job roles? One possibility is that pre-existing gender inequalities in the open labor market affect how men and women choose jobs. In particular, gender inequalities in wages make different jobs more or less attractive to men and women and thereby can affect the composition of firms' applicant pools (Fernandez and Sosa 2005; Grams and Schwab 1985). To the extent that males earn more than females in the open labor market, the pool of potential applicants who might be interested in low paying jobs will tend to be more female. Since job-seekers usually try to avoid wage cuts when seeking new jobs, external gender wage inequality in the local labor market will make lower wage jobs relatively unattractive to male applicants.

While the jobs' wages are not mentioned in the automated screening protocol, as we mentioned above, the local labor market data show that the average hourly wages for Receptionists are \$13.13 while Computer Programmers' average wages are \$30.99. Thus, it is reasonable for applicants to the call center to infer that the Receptionist job is likely to pay less than the Computer Programmer job. Based on the 2000 PUMS data for the local area, men

constitute 55.5 percent of those in the labor force with positive wages, and men earn a higher hourly wage than do women (\$25.53 vs. \$19.54). The \$13.13 average hourly wage for Receptionists falls at the 48<sup>th</sup> percentile of the local area wage distribution for females, and at the 41<sup>st</sup> percentile for males. As a consequence of their higher pay in the external labor market, fewer men than women would be interested in the relatively low pay Receptionist job. However, 80 percent of the local area males earn less than the Computer Programmer's average \$30.99 hourly wage, and the percentage of females who would find such a wage attractive is even higher: 89 percent of females earn less than \$30.99. Thus, sex differences in external wages *per se* can help to explain why men might avoid low paying Receptionist job, but external wage differences cannot explain why women would *avoid* the high paying Computer Programming job.

A second possible explanation for the observed gender-stereotypical patterns concerns people's hesitancy to apply for gender-atypical jobs for fear of being discriminated against. Experimental research has shown evidence of employers having gendered judgments of desirable candidates for specific types of jobs. For example, Riach and Rich (2006) found that employers prefer women overall, but that their preference for women was particularly strong when filling secretarial jobs, and that they preferred men for engineering jobs. Booth and Leigh (2010) also find that employers particularly prefer women for female-dominated jobs.

For this discrimination avoidance mechanism to work, however, applicants would need to have accurate knowledge of an employer's tastes and preferences. Barbalescu and Bidwell (2010) demonstrate in the case of MBAs applying for jobs in finance that potential applicants' knowledge of employers' preferences are not always accurate, however. In their study, graduating female MBAs rate their chances of obtaining finance jobs lower than do graduating

male MBAs, although conditional on applying, women are actually more likely than men to be offered finance jobs. To the degree that beliefs about employer discrimination are inaccurate, then application decisions based on those beliefs become hard to disentangle from other gendered beliefs that might affect job choices (e.g., “low perceived quality of work-life balance in finance jobs,” see Barbalescu and Bidwell 2010: 7).

We do not have direct evidence on whether or not male and female applicants for gender non-stereotypical jobs anticipate being discriminated against by this employer. However, in this setting, the gender and race questions on the standardized and automated screening protocol are optional. Nor are the names of the applicants asked for at this stage—the only identifying information kept is the social security number. Thus, unlike many other real-world settings, people can easily mask their ascriptive characteristics during this initial step of the hiring process. This firm’s policy is particularly interesting in light of the results of Rudman and Farichild’s (2004) lab study of gender stereotypes. They found that subjects’ fear of backlash led them to hide their gender counterstereotypical behaviors. In this respect, the fact that very few of the applicants in this setting chose to hide their gender or race suggests that, at least among those who choose to apply to the company, such concerns were not widespread.

While avoidance of discrimination cannot be completely ruled out, we think that it is unlikely to account for the patterns we report here. Knowledge of whether an employer will discriminate is likely to vary considerably among potential candidates. It is difficult to see how such a mechanism could explain stereotypically gendered choices among subsets of candidates who—through either ignorance or perseverance—have expressed a strong interest in the counterstereotypically gendered jobs. Yet, this is precisely the pattern we observe here. Even among the subset of applicants who report high interest and ability in Computer Programming,

females rate the stereotypically female Receptionist job higher than do males. More specifically, females who rate the male-typed Computer Programmer job a ‘5,’ on average rate the Receptionist job 4.414, compared to 3.812 for males rating the Computer Programmer job a ‘5.’ For the subset of applicants who report high interest and ability in the Receptionist job (rating the job a ‘5’), males rate the stereotypically male Computer Programmer job more highly than do females (3.135 for males vs. 2.350 for females). Thus, even when the candidate pool is narrowed to those who have expressed the highest level of interest in jobs that are *atypical* for their gender, the job ratings of the gender stereotypical jobs align tightly with the gender of the applicant.<sup>12</sup>

Rather, these results suggest that there are important supply-side processes affecting the gender sorting of job candidates. Indeed, a plethora of studies provide evidence that this result is over-determined. Past studies have documented gender differences in early role socialization (Corcoran and Courant 1985; Subich, Barrett, Doverspike, and Alexander 1989; Vella 1994), sex-role attitudes (Betz and O’Connell 1989; Bielby and Bielby 1984; Corrigan and Konrad 2007), gendered patterns of educational background and training (Brown and Corcoran 1997; Charles and Bradley 2009; Dickson 2010; Turner and Bowen 1999), and job values (Daymont and Andrisani 1984; Marini, Fan, Finley, and Beutel 1996). Correll’s (2001; 2004) research is also noteworthy in this regard. She shows that females often have biased self-assessments of their own ability. Thus, in a context like this one where applicants are asked to rate jobs based on both their “desire and ability,” such biased assessments can also affect candidates’ gendered self-sorting into jobs. While we cannot differentiate among the numerous pre-application factors that

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<sup>12</sup> These findings hold even after controlling for the factors included in Models 1 and 2 in Table 4. After controls, among the subset of applicants who rated the Receptionist a ‘5,’ males rated the Computer Programmer job significantly higher than did females (point estimate = .301, t-value = 4.53). For the subset of applicants who rated the Computer Programmer job a ‘5,’ females rated the Receptionist job .503 points (t-value = 4.93) higher than did males.

are behind the gendered application choices we observe here, in this setting, we can say with assurance that these patterns are not due to the actions of demand-side screeners.

While this paper provides strong evidence of gender sorting at the point of initial application, we do not think that is likely to be a complete explanation of occupational sex segregation. Although we do not have access to the demand side of the screening process here, we are able to compare these results to the gender distribution of people working in labor market in the local area from the PUMS data. Compared to the percentage of applicants rating the Receptionist and Computer Programmer jobs '5' at the company, the gender distributions of these jobs in the open labor market are more extreme. In our findings, the self-sorted applicants with the highest interest in the Receptionist job are 2/3rds female, but 93.8 percent of Receptionists in the area are female. While about 2/3rds of our applicants rating Computer Programmers '5' are male, compared with 72.4 percent male among people working as Computer Programmers in the local area. The fact that the post-hire PUMS data yield more extreme gender distributions for these jobs suggests that, in addition to the supply-side job rankings we have isolated here, demand-side screening and post-hire processes (e.g., gender differences in turnover and promotions) are also likely to contribute to job segregation by sex.

### **Summary and Conclusion**

These findings have important implications for our understanding of supply-side gender and race sorting. While Reskin and Roos (1990) developed the idea of a job queue to capture the idea that different job seekers might rank order various job opportunities differently, extant research on how gender is related to job queues has been limited. In this conceptualization, the actions of job seekers are occurring *prior* to anyone being hired. But with few exceptions, analyses of job segregation have been based on data collected on people *after* they have been

hired. As a consequence, such studies conflate the effects of supply-side job queues with demand-side screening processes. By studying choices made at the point of application to this company, however, we have been able to isolate the sex segregating consequences of the actions of supply-side actors at this labor market interface. Since the company's application procedures do not allow for any contact between the recruiters and the applicants at this initial stage, the pattern of applicants' job choices made here is not contaminated by the influence of screeners who might steer applicants toward gender stereotypical choices.

Men and women rate jobs differently, with more men preferring the Computer Programmer job, and more women interested in the Receptionist job. Gender patterns of ratings are similarly ordered across race groups, and recur within individuals as well. Moreover, introducing control variables into the analyses shows that these patterns are robust to some obvious alternative explanations for the observed job ratings (e.g., degree of urgency in finding a job, self-assessed computer skills). Thus, at least in this setting, the answer to Okamoto and England's (1999) question—is there a supply side to occupational sex segregation?—is yes.

Finally, this paper offers valuable lessons for our understanding of policies designed to reduce job sex segregation. In particular, the special features of this case shed valuable light on what the likely effect of removing managerial discretion from the demand-side screening process is likely to be (e.g., Bielby 2000; Reskin and McBrier 2000). The fact is that significant gendering is evident at a step *prior* to screening, even in a setting where there is no contact between the candidate and the screener. Thus, the main lesson of this paper is that job sex segregation is not the exclusive product of the demand-side actions of organizational screeners. Although probably not the entire story, these analyses show clear evidence that supply-side sorting processes are important factors contributing to job sex segregation.

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Table 1: Race and Sex Distributions of Applicant Pool (December, 1997-December, 1998) and Persons in the Metropolitan Area Labor Force

	Applicant Pool		Metro Area From 2000 PUMS <sup>a</sup>	
	<u>Male Applicants</u>	<u>Female Applicants</u>	<u>Male Workers</u>	<u>Female Workers</u>
Non-Hispanic White	51.3	51.8	55.6	57.5
African American	6.8	8.0	1.6	1.6
Hispanic	14.7	13.0	25.8	22.7
Asian American	16.3	16.1	12.9	14.0
Native American	2.5	1.8	0.4	0.4
Other, Multirace	8.5	9.3	3.7	3.9
Total	100.0	100.0	100.0	100.0
Total N	2,733	2,522	40,345	32,369

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<sup>a</sup> Persons in the local area 5 percent 2000 PUMS who are in the labor force. PUMS data are weighted to reflect the population; Ns are unweighted.

Table 2. Race Distribution of Applicant Pool and Population Residing in Labor Catchment Areas

	Applicant Pool	Catchment Area Based on 2000 Census Data <sup>a</sup>					
		<u>1 km.</u>	<u>5 km.</u>	<u>10 km.</u>	<u>15 km.</u>	<u>20 km.</u>	<u>25 km.</u>
Non-Hispanic White	51.2	70.5	46.6	40.7	44.1	46.8	49.9
African American	7.3	2.8	1.6	1.3	1.2	1.3	1.5
Hispanic	13.8	5.5	26.1	42.9	36.8	34.5	31.7
Asian American	16.1	13.5	22.1	12.7	15.4	14.8	14.1
Native American	2.2	0.0	0.2	0.2	0.3	0.3	0.3
Other, Multirace	9.3	7.7	3.5	2.2	2.2	2.3	2.4
Total Percent	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Number of Cases	5,286	325	129,975	715,619	1,259,887	1,895,220	2,507,052

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<sup>a</sup> Population of 2000 census blocks (based on SF1 files) whose geographic centroids falls within the specified distance from the firm (in kilometers).

Table 3. Mean Levels of Interest/Ability in Receptionist, Telephone Interviewer, and Computer Programmer Jobs by Gender and Race (1=Really not interested, 5=Strong desire and the ability to do this job)

	Receptionist		Interviewer		Computer Programmer		Minimum Valid N	
	Male	Female	Male	Female	Male	Female	Male	Female
<b>White</b>	2.73	3.63	4.46	4.49	2.36	1.98	1,397	1,302
<b>Black</b>	2.92	3.93	4.43	4.35	2.85	2.19	184	201
<b>Hispanic</b>	3.20	4.10	4.34	4.35	2.70	2.19	395	327
<b>Asian</b>	3.51	3.91	4.35	4.30	2.96	2.64	446	405
<b>Nat. Amer.</b>	2.97	3.69	4.29	4.38	2.35	2.18	68	44
<b>Other</b>	2.75	3.67	4.18	4.22	2.66	2.18	209	206
<b>Total</b>	2.95	3.77	4.40	4.40	2.57	2.15	2,711	2,497

Note: For Receptionist ratings, all differences between males and females are statistically significant ( $p < .001$ ). Except among Native Americans, for Computer Programmer ratings, all differences between males and females are statistically significant ( $p < .001$ ). For Interviewer ratings, *none* of the differences between males and females are statistically significant ( $p > .05$ ).

Table 4. OLS Regression Models Predicting Ratings of Receptionist and Computer Programmer Jobs for all Applicants (t- values in parentheses; N = 4,669)

	[1] Predicting Receptionist <u>1 - 5 Rating</u>	[2] Predicting Computer Programmer <u>1 - 5 Rating</u>
<b>Gender (Female=1)</b>	0.863** (22.01)	-0.358** (-9.99)
<b>Age (1=GT 40)</b>	-0.566** (-10.69)	-0.186** (-3.86)
<b>Black</b>	0.091 (1.21)	0.125 (1.82)
<b>Hispanic</b>	0.226*** (3.93)	0.070 (1.33)
<b>Asian</b>	0.115* (2.08)	0.218** (4.34)
<b>Native American</b>	-0.040 (-0.30)	-0.038 (-0.32)
<b>Other Race</b>	-0.012 (-0.16)	0.130 (1.84)
<b>Mean Rating of Other 15 Jobs</b>	0.856** (24.91)	1.078** (34.01)
<b>Working Software Knowledge</b>	-0.067 (-0.92)	0.134* (2.04)
<b>Average Computer Skill</b>	0.037 (1.27)	0.123** (4.65)
<b>Ln(Distance in kms)</b>	0.011* (2.03)	-0.076 (-1.59)
<b>Ln(Distance in kms)<sup>2</sup></b>	-0.014 (-1.79)	0.006 (0.86)
<b>+ 45 “Big Five” Personality items <sup>a</sup></b>	$p < .0001$ LR $X^2 = 508.74$ (with 45 d.f.)	$p < .0001$ LR $X^2 = 243.04$ (with 45 d.f.)
<b>Adjusted R-square</b>	.328	.365

Note: \*\* =  $p < .001$ ; \* =  $p < .05$ .

<sup>a</sup> Joint test of statistical significance based on Likelihood-ratio test.