Competing for jobs: Labor queues and gender sorting in the hiring process

Roberto M. Fernandez a,*, Marie Louise Mors b

a MIT Sloan School of Management, 50 Memorial Drive, Cambridge, MA 02142-1347, USA
b London Business School, Regent’s Park, London NW1 4SA, UK

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Abstract

While much research has documented the pattern and extent of sex segregation of workers once they are employed, few studies have addressed the pre-hire mechanisms that are posited to produce sex segregation in employment. While the notion of a labor queue—the rank order of the set of people that employers choose among—plays a prominent role in pre-hire accounts of job sex sorting mechanisms, few studies have examined the ways in which job candidates are sorted into labor queues. In this paper, we explore the mechanisms by which labor queues contribute to the gendering of jobs by studying the hiring process for all jobs at a call center. Being placed in a queue has a clear gendering effect on the hiring process: the sex distribution of applicants who are matched to queues and those who are rejected at this phase diverge, and among those assigned to queues, women are prevalent in queues for low pay, low status jobs. The screening process also contributes to the gendering of the population of hires at this firm. Females are more prevalent among hires than they are among candidates at initial queue assignment. Among high status jobs, however, males are more prevalent than females. Moreover, there are important wage implications associated with matching to queues. While there are large between-queue sex differences in the paid wages associated with allocation to queues, once allocated to queues the wage differences between male and female candidates are nil. Consequently, the roots of gender wage inequality in this setting lie in the initial sorting of candidates to labor queues.

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1. Introduction

Much recent scholarship has focused on sex segregation of jobs as a key determinant of gender inequality in the labor market (see e.g., Petersen and Morgan, 1995; Padavic and Reskin, 2002). Most of this research has documented the pattern and extent of sex segregation of workers once they are employed. However, very few studies have appeared that address the pre-hire mechanisms that are posited to produce sex segregation in employment (for reviews, see Petersen and Saporta, 2004; Fernandez and Sosa, 2005).

* Corresponding author.
E-mail addresses: robertof@mit.edu (R.M. Fernandez), lmors@london.edu (M.L. Mors)

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The notion of the labor *queue* is a key concept in both the theoretical and empirical literatures examining the pre-hire sorting of males and females into jobs (e.g., Reskin and Roos, 1990; Reskin, 1991; Padavic and Reskin, 2002). This idea encompasses the sets of individuals that compete for specific job openings at the same time, and are rank ordered by the employer. This focus on the queue has been one of the most prominent of the responses to earlier calls to study the labor market interface to deepen our understanding of the processes that match persons and jobs (Granovetter, 1981; Sorensen and Kalleberg, 1981). And for good reason: to the extent that competition is structured around job vacancies, rather than around wages (Sorensen and Kalleberg, 1981), understanding the rank orderings that employers impose on candidates for job vacancies becomes a high priority for accounts of the determinants of inequality.

Reskin and Roos (1990) explicitly trace the roots of job sex segregation to queuing processes at work in the pre-hire stage of the labor market interface (also see Reskin, 1991). The recent literature examining pre-hire mechanisms has similarly addressed stratification mechanisms in the screening process. In contrast to “start with hire” studies (Fernandez and Weinberg, 1997) that attempt to study hiring only on the basis of people who have already been hired, this research examines people who are rejected during screening as well as those who have been hired (e.g., Fernandez et al., 2000; Petersen et al., 2000). These studies offer many insights about employers’ choices from a candidate pool among workers of different race and sex groups (Fernandez and Fernandez-Mateo, 2006; Fernandez and Sosa, 2005; Petersen et al., 2000; Petersen and Saporta, 2004). There remains, however, a gap between the empirical measurement and the theoretical idea of a queue in these studies. Specifically, these studies fail to measure one of the defining dimensions of labor queues, i.e., the rank ordering of the set of people that hiring agents choose among. While some studies disaggregate analyses of the hiring process for different job titles (see e.g., Fernandez and Sosa, 2005; Petersen and Togstad, 2006; Penner, 2007; an early example is Fernandez and Weinberg, 1997), all of these studies stop short of defining employers’ choice sets among candidates for specific job openings.

In this paper, we seek to move the notion of a labor queue out of the metaphorical realm. We traverse this gap between the theory and empirical research by delving into the hiring process using unique data on labor queues. We measure the set of candidates who are competing for employment in particular job openings at specific points in time. Although we cannot measure all the criteria (e.g., education, skills, etc.) that the firm’s hiring agents use in sorting candidates, we are able to observe the outcome of these screening decisions. As candidates are accepted or rejected through successive steps of screening, the data reveal hiring agents’ relative ranking of sets of candidates. Because we are interested in understanding how labor queues become gendered, we document the sex distribution for survivors of successive stages of the screening process (e.g., application, interview, offer and hire). We argue that queues so defined are the organizational filter that employers use to structure the supply side of the labor market, and thus, are a crucial component of the job-person matching process. We describe the processes by which queues are formed by hiring agents (human resources screeners and hiring managers), and thus provide crucial links between organizational processes at the level of the firm, and the mechanisms by which people are allocated to job openings. We argue that this level of detail is needed in order to understand the ways in which labor demand is transformed into a set of hiring choices.

We demonstrate the value of this approach by shedding light on the mechanisms by which labor queues contribute to the gendering of jobs. We study the hiring process for all jobs at a call center over a two year (1995–1996) period using the complete set of applicants to the company (N = 16,887). These applicants are matched against job openings, thus forming sets of candidates—queues—composed of people who are in competition with one another to be hired for specific job openings. We measure over 700 such queues over the two year window of the study. These data offer an unprecedented level of detail about the choice set confronting hiring managers. Further, these data allow for key insights into sex sorting between and within labor queues. Also, because networks employee referrals have been shown to have important effects on

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1 Although the data analyzed here yield interesting information on where gendered patterns appear in the hiring process, and reduced form estimates of the magnitude of those effects, the sparseness of controls leads us to be circumspect in drawing conclusions about screening discrimination (see National Research Council, 2004).
firms’ screening processes (e.g., Fernandez et al., 2000; Petersen et al., 2000; Fernandez and Sosa, 2005), we also examine the ways in which network factors interact with labor queues to produce gendering in the hiring process.

We begin by examining the sex composition of the flow of applicants to the company, and compare this to the distribution of applicants who survive this initial step of the process and are successfully matched with job openings. This initial assignment to queues is critical since it is virtually impossible for individuals who do not survive this step to be hired. We then document the gender stratifying consequences of the initial placement in queues by studying the status of the job (level and remuneration) to which the surviving candidates are matched. We further look at the sex composition of candidates as they progress through the hiring pipeline, from initial application, to assignment in a specific queue, to interview, offer, and hire. We find that females are more prevalent among hires than they are among candidates at the initial step of the candidate sorting process, queue assignment. When we decompose this overall pattern we find that the feminization of the candidate pool is not uniform across queues. Females are more likely to be hired into hourly jobs, but the pattern reverses for salaried jobs. We conclude by examining the gender wage inequality observed at the end of the hiring pipeline by analyzing the offered wages of the individuals hired into these jobs. There are large between-queue sex differences in offered wages. Moreover, once men and women in the same queue are actually hired, there are no sex differences in the wages that male and female hires are paid. We conclude with a discussion of the implications of this research for our understanding of job sex segregation and wage inequality by gender.

2. Data

We study the hiring process at a call center, within a large, globally diversified financial services institution during the period January 1, 1995 to December 31, 1996. While many of these jobs involve work on the telephone, the company also recruits and hires for a number of non-customer facing clerical, technical, and administrative jobs (see below). The phone center offers a number of practical advantages for this research. The human resources department keeps virtually complete databases on recruitment for all jobs, which allows us to track candidates’ movements through the various phases of the hiring process. During the period of the study (1995–1996), 16,887 applications are presented to the call center. The vast majority of these (78.7 percent) are from external applicants, and 21.3 percent are from people already employed at the company. These internal applicants are an important comparison group since they are more likely than externals to be familiar with the company and its hiring procedures and do not rely on the human resources department when applying for jobs (see below). Note that the unit of analysis here is the application, and that some people apply multiple times during the period of our study. Thus, 12,609 people produce the 16,887 applications; 4278 (25.3 percent) are repeat applications submitted by people who have previously applied. One individual applied 26 times, but 59.5 percent of the applications are from people who apply only once, and 91.4 percent of the applications are from people who apply 4 or fewer times.

One attractive feature of these data is that we are able to match employee referrals (i.e., applicants to the company who are referred by company employees) with their referrers at the application phase. Unlike much past research where data on the characteristics of the job contact are observed only among hires (e.g., Berger, 1995; Corcoran et al., 1980), here referrers are linked to job applicants. The HR screeners record the recruitment source of each applicant.2

Also important given the focus of this paper, is the fact that sex can be identified for 97.2 percent of the applications, and for 96.4 percent of the individuals. About half (53.3 percent) of the applications have sex recorded in the database by the HR screeners. The balance of the applications are coded by referencing

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2 The HR screeners could have been more diligent in doing this, however. While they identify whether the applicant is an internal vs. an external candidate with great fidelity (i.e., only 11 cases were missing), the more detailed recruitment source which is used to identify employee referrals is missing for 20.9 percent of the applications. In separate analyses, we included a variable for whether external applicants are missing on referral status. Because the substantive conclusions are largely unaffected by their inclusion or omission, we have chosen to present the results without these missing cases, but noting any exceptions (see note 11).
identifies the structure of competition among candidates. How applicants flow into queues is depicted in fashion), a focus on job openings more precisely delineates the hiring agent’s choice set for job openings, and identifies the structure of competition among candidates. How applicants flow into queues is depicted in Fig. 1. In this setting, there are two sets of actors whose actions are relevant to the queuing process. The job openings—the slots to be filled on the right side of Fig. 1—are defined by hiring managers, who begin the process by submitting job requisitions asking for the human resources department to send them candidates. These jobs range broadly from low pay “Data Entry Clerk” (average salary of $10,800), middle levels jobs like “Business Development Specialist” or “Trainer” (approximately $30,000), to high pay jobs such as “Unit Manager” ($150,000 and above). Hiring managers can use one requisition for multiple job openings of the same type, with the number of openings varying between 1 and 22. A total of 175 hiring managers (51.0 percent male) submitted 767 job requisitions to the human resources department over the 2 year course of the study. Most (64.4 percent) of these requisitions are for a single job opening; 5 or fewer openings account for 81.2 percent of the requisitions.

The second set of important actors in this process are the human resources managers, whose job it is to advertise, recruit, and screen potential applicants to fill the open jobs. As a large volume employer, the call center is constantly advertising in the local labor market (mainly in newspapers and radio) and attracting large numbers of external applicants (i.e., people who are not employed at the call center at the time they apply): the 11,214 external individuals applying in 1995–1996 constitute about 9 percent of the population of the metro area. For the entry-level jobs (e.g., CSRs), the screeners are making screening decisions on a daily basis. However, for other jobs, the flow of applications can be more episodic.

As shown on the left side of Fig. 1, external candidates then face a three-step sorting process. As candidates are accepted or rejected through successive steps of screening, the relative ranking of candidates is revealed. In the first step, the external applicants are screened by one of 3 women (all white) in the human resources department of employees for internal applicants (4.6 percent), and by the coding of names (34.2 percent). 3

The focus of our study is the labor queue, i.e., the pool of candidates from which the employer orders candidates in the hiring process. We define labor queues as sets of candidates matched to specific job requisitions. While other definitions of queues are possible (e.g., Reskin and Roos (1990) use job or occupation), a focus on job openings more precisely delineates the hiring agent’s choice set for job openings, and identifies the structure of competition among candidates. How applicants flow into queues is depicted in Fig. 1. In this setting, there are two sets of actors whose actions are relevant to the queuing process. The job openings—the slots to be filled on the right side of Fig. 1—are defined by hiring managers, who begin the process by submitting job requisitions asking for the human resources department to send them candidates. These jobs range broadly from low pay “Data Entry Clerk” (average salary of $10,800), middle levels jobs like “Business Development Specialist” or “Trainer” (approximately $30,000), to high pay jobs such as “Unit Manager” ($150,000 and above). Hiring managers can use one requisition for multiple job openings of the same type, with the number of openings varying between 1 and 22. A total of 175 hiring managers (51.0 percent male) submitted 767 job requisitions to the human resources department over the 2 year course of the study. Most (64.4 percent) of these requisitions are for a single job opening; 5 or fewer openings account for 81.2 percent of the requisitions.

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In order to address the “intersectionality” of race and sex (Browne and Misra, 2003), we attempted to code race of the applicant using similar procedures, but we were much less successful. Racial background data is not often found for applicant pools since companies rarely solicit such information on application material (it was not asked for at the call center), and in contrast to sex, it is impossible to accurately code race on the basis of the names. While of obviously limited utility for the goals of a hiring study, we did find race information that the company gets for EEO reasons from employees through voluntary self-identification (see Fernandez and Castillo, 2001). Of the people employed at the call-center at any time over the period of the study, 96.1 percent of workers are white. However, this figure must be considered against the racial distribution of the population of the local area. The call center is located in a racially homogeneous, white area of the Midwest. The 1990 STF1 census data showed that 97.3 percent of the metro area was white; by 2000, the SF1 census data lists the percentage white as 93.4. The lack of racial variation in this setting casts doubt on our ability to successfully address issues of intersectionality, even if we were able to glean race data for the external applicant pool. For more successful—and exceptional treatments—of these issues in the context of hiring studies, see Fernandez and Fernandez-Mateo (2006) and Petersen et al. (2000).

While this company does classify job openings into 186 distinct job titles, these titles do not vary within job requisition. However, since openings can occur at different times over the course of the study, there can be many job requisitions associated with each job title, so that titles do not vary within job requisition. Since individual hiring managers are responsible for each opening, requisition-level variation also captures more detail than would hiring manager variation. Consequently, applicants with the same job title or hiring manager might not be considered against one another for the same job opening. Because we consider such competition a defining feature of a labor queue, we measure labor queues by job requisitions.

Most of these job openings are for non-exempt jobs (e.g., “customer service representative”), we also study the hiring process for 155 openings for exempt jobs such as “Unit Managers.” We provide further details on the level and wages of these jobs below.

There is very little racial variation among this group: 97.5 of the hiring managers are white. For the reasons noted above (see note 3), we set aside questions related to race of hiring manager. For a recent treatment of such issues in a more diverse context, see Fernandez and Greenberg (2006).

Of the 767 queues studied, 26 (3.4 percent) are for customer service representatives. While the hiring process for CSRs has been examined in detail before (Identifying cite), we include these in the analyses here in order to represent the complete applicant pool for all jobs during the hiring window in question. Excluding these queues from the analysis does not change any of the substantive results.
department against the open job requisitions submitted by the hiring managers. External candidates may in their application material ask to be considered for specific jobs, while other applicants apply only seeking employment at the company in general. The standard operating procedure is for HR recruiters to honor candidates’ wishes by matching people to the applicant pool for the specific job opening they requested. As we discuss below, however, HR personnel can and do stray from this policy and may attempt to steer applicants to particular openings. Although this issue of steering has surfaced as being very important in audit studies of racial discrimination (Turner et al., 1991; Pager and Western, 2005), to our knowledge ours is the first study to examine the gender stratifying consequences of this process. HR personnel have the option of interviewing candidates if the submitted resumes and other application material look particularly relevant for specific jobs, even if they were only applying to unspecified job openings at the company. Indeed, 61.2 percent of the HR screens occur with the benefit of a brief, 15 min telephone or in-person interview, and 38.8 percent are paper screens where candidates are not contacted until after a decision has been made. External candidates who successfully pass the screen are then matched to open requisitions, i.e., they are sorted into the pool of people being considered for specific job openings. We define labor queues as sets of candidates matched to specific job requisitions openings that HR retains for consideration of further advancement through the hiring process. The vast majority of candidates interviewed by HR (84.3 percent) are assigned to a requisition and advance for further consideration; not surprisingly, the rate of advancement is much lower among those the HR department decided not to interview (10.4 percent). Thus, the result of this first step of the process is a set of labor queues, defined as candidates for specific job openings. Although only crude at this point, the rank ordering of candidates that emerges from this step is that all candidates who have been rejected at this initial stage are placed behind those who have been assigned to a labor queue for further consideration.

Given the critical role that HR personnel play as gatekeepers to the system, HR personnel’s actions can affect the hiring process in important ways. Most relevant for the purposes of this study is the possibility that HR personnel may be steering external job inquiries in a gendered way. Although she denies using sex as the

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For applicants who are successfully matched to a job requisition, we know with near certainty which of these women made the match (we are missing the information on which of the HR women did the match for one applicant). However, the HR department does not keep records of who screened the unsuccessful applicants that are not matched to any opening; thus, we cannot distinguish among the actions of these 3 HR screeners at this first step.
basis for such suggestions, one of the human resources screeners says that she does occasionally steer people to apply to jobs which she thinks would be best suited for during screening. While we are limited in not having access to the original material that candidates submitted to the company, the company does keep records of explicit steering in the database. HR’s standard operating procedure is to log the original application in accordance with the applicant’s wishes, including requests that are unspecific with respect to the particular opening being sought. When upon screening the application material the HR screeners consider the person as a possible match for a different opening, HR personnel add a comment to the original record (e.g., “Recruiter Invite” or “Referred to Another Position”), and send a form letter asking to meet with the person (verbatim: “Based on your qualifications, I would like to meet with you at your earliest convenience.”). A total of 447 such letters were sent by HR over the course of the study, with females receiving 74.2 percent of the letters. Thus, explicitly steered applicants appear in the database as a repeat application from that person, subsequent to the sending of the letter. Not all of the 447 people who HR contacted chose to reapply, however. We observed 157 instances (59.0 percent of which are females) of reapplication from a person after receiving a letter from HR. Nevertheless, gendering is evident among these 157 cases: steered females are placed in queues that are 70.2 percent female on average, while males are being sent to queues that are 60.2 percent female. This difference is statistically reliable ($p < .0001$, F-test 21.45 with 1 and 152 d.f.). In order to incorporate this measure of explicit steering into multivariate analyses, we have coded a dummy variable to distinguish these applications from other repeat applications.

However, more subtle forms of steering are likely to be going on as well. HR considers its job to consider people against any open positions available at the time the person applies. Thus, in some sense, they are always attempting to steer applicants. This is confirmed by the annotations they use in the screening database, and the letters they send to unsuccessful steering attempts. When a person is deemed as not appropriate for any of the openings, the applicant’s record would be annotated with comments, such as “No available position; no match,” or “No available position; strong application.” In addition, “strong application” candidates often receive a form letter with the following text: “We have reviewed your application against our current staffing needs and we do not have a suitable opportunity at this time.” Although we introduce some controls designed to measure the aforementioned “opportunities” that the HR screener faces at the time of the screening decision (i.e., the numbers of applications and openings available on the day the candidate applied), we do not have access to the full set of candidate’s application materials. This is largely due to the intractability of coding the resumes and the paper applications for nearly 17,000 applicants. As a consequence, there is much room for HR to apply gendered notions of “suitability” as it does its work. For these reasons, we cannot rule out more subtle forms of steering by the HR managers. We depict the uncertainty surrounding this potential flow of applicants with a dotted line on Fig. 1. In order to proceed conservatively, we treat the assignment of the external applications to queues as determined jointly by candidates’ choices for particular jobs, and the actions of HR recruiters. While we cannot assume that HR screeners’ assignments to labor queues at this step simply reflect the preferences of external applicants as they approach the company, we can document the magnitude of the gendering effect of passing through this stage of the process.

It is important to realize that for one group of applicants—internal candidates—there is no ambiguity at all about who is making the choice of which job opening to pursue. The job requisition system is also used as an internal job posting system. As shown in Fig. 1, call center workers who are seeking internal transfers directly respond to announcements of specific job openings without the intervention of HR recruiters. This short-circuiting of the first screening step yields important insights on the gendering of the hiring pipeline to the firm. Although inferences about gender and the job preferences of external applicants are made difficult by the possibility of subtle steering by the HR managers, such inferences for the population of internal applicants are clear-cut: within the constraints of openings available, the choice of which job opening to pursue reflects candidates’ preferences alone. As mentioned above, 21.3 percent are applications from internals. With the exception of 0.4 percent of internal applications that did not register properly in the system, all of these internal

9 In this respect, the Fernandez and Sosa (2005) paper is special. Because they hand coded the paper materials for over 4400 applications for the CSR position, they are able to control many factors that the HR screeners use in their decisions. While this is certainly progress over past research, even here there always exists the possibility of omitted factors (National Research Council, 2004). As we noted above (note 1), drawing conclusions about discrimination remains difficult.
applications are matched to a job specific requisition. In contrast, 53.9 percent of the 13,286 external applications are matched to job requisitions.

The second step of the process in this setting is also controlled by the HR department. Among both external and internal candidates who made it past this first cut and were assigned to a job requisition, HR managers next select candidates to send for face-to-face interviews with the managers hiring for the various job openings. This step reveals HR managers’ further sorting of candidates, with survivors of this step being preferred over the rejects. The third step of the screening process (right side of Fig. 1) is then handled by the hiring managers. At this step, hiring managers reveal their ranked preferences as they decide who among the interviewees to offer jobs to (no one is ever offered a job without being interviewed). At the hiring stage, the decision whether to accept or reject job offers is then made by candidates.

Although it is our sense that the firm’s hiring practices are not particularly distinctive when considered against the population of other large firms (c.f. Kalleberg et al., 1996), in light of our decision to study this one setting, we can make no claims regarding generalizability. Our main goal in adopting this empirically grounded, case-study approach is to elucidate the workings of the pre-hire mechanisms that are alleged to sort men and women into different queues for jobs, and how processes at work within queues affect the sex composition of jobs. Thus, our strategy has been to trade broad data across many settings for very deep knowledge of this particular case. While we would expect that there will be some contingency in the ways the pre-hire processes contribute to sex segregation of jobs in different settings, it is impossible to distinguish among the different pre-hire mechanisms which might produce queue level gender sorting without the unique, fine-grained data we analyze here. The need for this kind of detailed data is made even more acute by the fact that for many of these pre-hire mechanisms, no empirical evidence at all has ever been offered. 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. Thus, the insights gleaned from this case study can be used to guide broader-gauge research designed to represent wider populations of organizations.

3. Analysis

3.1. Assignment to queues

We begin by examining the process by which candidates for employment at the call center are initially assigned to labor queues. Since there is virtually no chance of getting hired without first being sorted into a queue, this first step of the hiring process is crucial for unpacking the job matching process. Understanding this process is also important for elaborating the ways that queues contribute to job sex segregation and gender wage inequality (Reskin and Roos, 1990).

Overall, 65.2 percent (11,013 of 16,887) of initial applications are matched to one of the 767 job requisitions over the course of the study. While there is considerable variation in the types of jobs that need to be filled (see below), the call center as a whole attracts an applicant pool that is majority female: 62.0 percent of all applicants are female. Gendering is evident at this initial step of assigning applicants to queues, since women constitute 65.8 percent of those who are successfully matched to requisitions. For comparison, females are 54.2 percent of applications that are rejected at this stage. This difference is statistically very reliable ($p < .0001$, $\chi^2 = 207.2$, with 1 d.f.). Consequently, this first step of the hiring process—matching candidates to job requisitions—contributes to the feminization of the call center.

As we noted above, internals match themselves to job requisitions (Fig. 1), and here we find that women constitute 66.0 percent of both the initial internal applications, and internals who are assigned to job requisitions. Consequently, there is no gendering at all at the queue assignment step for internals. As we noted above, it is rare to have insight at all into the steering process at the labor market interface. However, the findings here suggests that HR steering is not required to produce a sex biased sorting of applicants at this stage. It is interesting to compare this percentage female to that of externals. While women are 60.8 percent of initial external applicants, their representation increases to 65.7 percent among externals who have been matched to queues, a highly significant increase ($p < .0001$, $\chi^2 = 173.1$, with 1 d.f.). Interestingly, the percentage females among those assigned to queues is not significantly different between externals and internals (65.7 vs. 66.1; $p < .701$, $\chi^2 = .15$, with 1 d.f.). Although there may be opportunities for the HR screeners to steer
applicants on the basis of sex, the fact is that the HR screening process yields a queue-matched candidate pool that is similar in sex composition to that produced by the self-matched internals.

In order to shed light on this early but critical step of the job matching process for externals, we further explore the patterns of assignment to job requisitions. Table 1 shows the results of logistic regression models predicting assignment to a job requisition among externals (leftmost portion of Fig. 1). We exclude internal candidates here because they are virtually assured of being placed in a queue for further consideration. Sex of applicant is coded as a dummy variable, 1 = female, 0 = male. We control for whether the applicant has applied previously (recall that 25.3 percent are repeat applicants). The variable for number of times applied is coded 0 for people who apply only once, and 1 if the person applies more than once. As we discussed above, explicit steering is manifested in a repeat application that occurs subsequent to HR recruiters inviting the person to discuss their application; we have included a dummy variable 1 if steered, and 0 otherwise. Table 1 also includes two variables that indicate how much competition the applicants face on the day of application. The first variable is the total number of applicants across all jobs who apply on the same day that the person applies. This indicates the gross supply of people the applicant is competing with at the time of application. The second variable measures demand as the total number of job requisitions open on the day the applicant applies. In order to address the role of network factors, we also enter a dummy variable for whether the applicant is an employee referral.

For Model 1, we exclude cases that are missing on any variable included in Models 2 and 3 in order to make sure that the results are based on the same cases (9453). Model 1 shows that the odds of females being placed in a queue are 52 percent higher than the odds for males. The coefficient on repeat applications shows that persistence is rewarded: the chances of being assigned to a queue nearly double when the person applies more than once. Model 1 also shows that competition matters: the more applicants that apply on the day a person applies, the less likely that person is to be assigned to a queue. And, if there are more openings on the day of application, the applicant has 2 percent higher odds of being assigned to a queue. Employee referrals are more likely to be placed in queues than non-referrals.

As we mentioned above, there is variation in the ways that HR screeners consider applications. For the entry-level jobs (e.g., CSRs), screeners are making decisions on a daily basis, but for other jobs the flow of applications can be more episodic. We have no way of measuring how HR screeners batch the applications. In preliminary analyses, we have varied the time span used for the competition measures (weekly, bi-weekly, and monthly). The results are not substantively different from those we present here which are based on daily counts of applications and job openings.

As mentioned in note 2, this variable has a relatively high rate of missing data. HR personnel are more casual in keeping records for candidates they do not think fit available job openings. Indeed, the missing rate on referral status is 30.0 percent for applicants who are not assigned to a queue, compared with 15.9 percent of those who are matched to a job requisition. In separate analyses not reported here, we explored the implications of this pattern of missing data by re-estimating the models in Table 1 and including a dummy variable for the whether or not the case was missing on referral status. The substantive results are largely the same, with the only exception being the sex interaction with steering. The effects of steering are smaller for females than males both with and without the case that are missing on referral, but this pattern is not statistically reliable when including cases missing on referral status (z-value = –1.55).

10 As we mentioned above, there is variation in the ways that HR screeners consider applications. For the entry-level jobs (e.g., CSRs), screeners are making decisions on a daily basis, but for other jobs the flow of applications can be more episodic. We have no way of measuring how HR screeners batch the applications. In preliminary analyses, we have varied the time span used for the competition measures (weekly, bi-weekly, and monthly). The results are not substantively different from those we present here which are based on daily counts of applications and job openings.

11 As mentioned in note 2, this variable has a relatively high rate of missing data. HR personnel are more casual in keeping records for candidates they do not think fit available job openings. Indeed, the missing rate on referral status is 30.0 percent for applicants who are not assigned to a queue, compared with 15.9 percent of those who are matched to a job requisition. In separate analyses not reported here, we explored the implications of this pattern of missing data by re-estimating the models in Table 1 and including a dummy variable for the whether or not the case was missing on referral status. The substantive results are largely the same, with the only exception being the sex interaction with steering. The effects of steering are smaller for females than males both with and without the case that are missing on referral, but this pattern is not statistically reliable when including cases missing on referral status (z-value = –1.55).
explicitly steered repeat applicants (i.e., those who respond to HRs letter) is statistically indistinguishable from other repeat applicants.

In Model 2, we explored whether the effect of steering is different by sex. Although it is not significant, the coefficient for steering is now greater than one (1.222). However, the interaction of steering and sex shows that steered women are less likely to be assigned to a queue than men. None of the other effects change from those in Model 1. We also tested whether the effects of the other predictor variables differ for women and men (Model 3). Except for the sex interaction with steering, none of the interactions with sex are statistically significant. In both Models 2 and 3, there is evidence of gendered steering among external applicants. Among males, steered applicants are more likely to be placed in a queue (odds = 1.25), but this is not statistically significant. Yet, steered females have a significantly lower chance of being placed in a queue than do males (odds for the interaction = 0.42). Splitting the data by sex and re-estimating Model 2, reveal that the odds of queue assignment for those who have been steered are 0.53 among females ($p < .019$, $z$-value = $-2.35$) compared to 1.248 among males ($p < .501$, $z$-value = 0.67).

The results in Table 1 show robust effects of both sex and recruitment source among external applicants. Most important, females are more likely than males to be assigned to queues. In addition to these gendered patterns of initial placement in a queue, further analysis shows that there are also sex differences as to which queues applicants are assigned to. Looking within the set of candidates assigned to a queue, males and females are not assigned to the various queues in the same proportions as they apply, i.e., there is a significant relationship between sex and the requisition to which individual applicants are assigned ($p < .001$, LR $\chi^2$ 1,670.378, with 765 unadjusted d.f.). As we noted above, we are limited in our ability to identify the job to which HR might be steering candidates. However, since internals match themselves to job openings and are not subject to direct steering by HR, they form an important baseline of comparison for assessing the impact of steering to the degree it is at work for externals. To the extent that direct HR steering is contributing to the gendering of external queues, we should see the sex distribution of externals across the various queues to differ from the sex allocation by queue for the self-matched internals. Indeed, this is precisely the pattern we find. Fitting a conditional log-linear independence model (Goodman, 1972; Fernandez and Weinberg, 1997) of the form \{REQ\ \{SEX, APPLICANT SOURCE\} to a 3-way requisition $\times$ sex $\times$ applicant source table shows that requisition is not independent of the joint sex and applicant source distribution ($p < .001$, LR $\chi^2$ 12,916.83, with 2298 unadjusted d.f.; 2294 adjusted d.f.). It is of course possible that other processes might also account for the different sex distributions of internals and externals across queues. While these results are consistent with gendered steering, we cannot say definitively whether steering is causing the observed pattern. Irrespective of whether there is steering by HR in the queue sorting process, these findings do confirm an important insight of queuing theories of gender inequality. These analyses show that sex sorting is occurring very early in the job matching process. In marked contrast to past studies which document the extent of sex segregation at the end of the hiring process (i.e., among job holders), sex segregation is already apparent as labor queues are initially formed.

3.2. Characteristics of queues

This sorting of candidates among queues has important consequences for the gender stratification. Queues vary widely by organizational level and remuneration. Among these job requisitions, 78.0 percent (545 of 699) are defined as salaried (i.e., exempt from overtime regulations), and 22.0 percent are for hourly (non-exempt) jobs. While most of the requisitions are for salaried employees, 89.0 percent of the applications

\footnote{As we discuss below, a number of the requisitions contain only one candidate. Consequently, sampling zeros reduce the number of degrees of freedom from 765 to 370.}

\footnote{In looking at these, we have eliminated queues that are withdrawn or censored by the design of the study. Sixty-eight of the 767 job requisitions handled by HR recruiters during the period of the study do not result in a hire: 62 are withdrawn, and 6 remain open at the end of the study period and are censored by the design. Those 68 requisitions cover a total of 402 applications. Eliminating these cases has only a very minor effect on the sex distribution of the overall analysis sample (i.e., females are 66.0 percent of the uncensored cases, compared with 65.8 percent of the incumbents of the original 767 queues), and does not affect the substantive results. For simplicity of presentation, we retain these 68 requisitions and 402 cases in Fig. 1. However, when describing the queues (Table 2) and analyzing who gets hired (Table 3) we focus thus on the 699 uncensored requisitions containing 10,611 uncensored applicants.}
are for hourly jobs. Moreover, female and male candidates are not assigned to salaried and hourly queues in equal proportions. The first column of Table 2 shows that 7.5 percent of the pool of candidates for salaried (exempt) jobs are female; the corresponding percentage for males is almost double that rate at 14.3 percent. The sex skew is even greater among external applicants, where the percentage of male applicants to exempt jobs is over 3 times the rate for females (6.1 vs. 1.8 percent). Although not as strong, it is interesting to note that the tendency for women to be disproportionately in queues for lower-status, non-exempt jobs is also present among the self-matched internals.

Within the exempt and non-exempt categories, job requisitions also define pay grades, with hourly job requisitions being classed into 9 grades, and salaried jobs spread across 6 levels. In keeping with their stated goals of “offering a total compensation program that is competitive with leading corporations in the markets where we do business...” (company internal document “Management Guide to Human Resources Policy”), the actual salary amounts assigned to these grades are determined by periodic wage surveys of the local area. These grades are not isomorphic with wages paid to hires, however, since the guidelines for wages by level are stated in terms of ranges. For example, level 5 is stated to be $15,700–24,400. Moreover, wage ranges often overlap levels, so a well-paid level 4 person might earn as much or more than a poorly paid level 5 person. Further complicating the relationship between wages and queues is the fact that 33 of the 699 requisitions are written with a range of grades, e.g., 2–3, or 10–12. For these, there is even more flexibility with respect to offered wages. Virtually all of the candidates for exempt jobs are assigned to requisitions where the lowest level of the range cited (1178 of 1180) and the top level of the range (1171 of 1180) are grade 1 to 4. Among candidates for exempt jobs, there is marked gender inequality with the percentage of women decreasing as the level of the queue increases. For the bottom of the requisition’s stated range, women comprise 72.1 percent of level 1, 50.9 percent of level 2, 46.4 percent of level 3, and 36.4 percent of level 4 candidates (p < .001, LR $\chi^2$ 22.07, with 3 d.f.). The corresponding figures for the top of the range are: 72.1, 51.8, 43.1, and 38.8 percent (p < .001, LR $\chi^2$ 23.16, with 3 d.f.). This pattern of gender inequality is repeated among candidates for hourly, non-exempt jobs. Across the 9 hourly job levels, whether considering the bottom or the top of the stated level of the job requisition, women are more prevalent among the applicants for the lower than the higher tier jobs (bottom of the range: p < .001, LR $\chi^2$ 86.32, with 8 d.f.; top of the range: p < .001, LR $\chi^2$ 60.37, with 8 d.f.).

Not surprisingly, these job levels are associated with different levels of compensation. Consequently, this pattern of disproportionate allocation of male candidates to higher status, salaried jobs and female applicants to lower status, hourly jobs can have important consequences for gender stratification. In order to gauge the wage implications of this differential assignment to queues, we assemble a database of what these jobs pay. In order to do this, we select people who are already employed at the company at any time over the 2 year period, and calculate the average wage rates of the job incumbents for each of the levels. For job requisitions that span levels, we calculate averages for the bottom level of the range, and for the top level of the range. We then match these averages to the levels defined in the job requisitions; for those requisitions that span levels, we match the average wages to both the bottom and top of the ranges. The incumbents of hourly jobs observed here have annual wages ranging from a low of $10,800 (e.g., Data Entry clerk) to a high of

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**Table 2**

Sex differences in queue characteristics by applicant source (number of cases in parentheses)

<table>
<thead>
<tr>
<th></th>
<th>Percent exempt</th>
<th>LR $\chi^2$ test</th>
<th>Mean incumbent wages</th>
<th>t-test</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>All candidates</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>14.3% (3586)</td>
<td>119.88 (1 d.f.)</td>
<td>$24,785 (3584)</td>
<td>12.33 (10,525 d.f.)</td>
</tr>
<tr>
<td>Female</td>
<td>7.5% (6948)</td>
<td>$ p &lt; .0001</td>
<td>$23,247 (6943)</td>
<td>$ p &lt; .0001</td>
</tr>
<tr>
<td><strong>External candidates</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>6.1% (2491)</td>
<td>90.88 (1 d.f.)</td>
<td>$22,494 (2488)</td>
<td>8.275 (7260 d.f.)</td>
</tr>
<tr>
<td>Female</td>
<td>1.8% (4783)</td>
<td>$ p &lt; .0001</td>
<td>$21,644 (4774)</td>
<td>$ p &lt; .009</td>
</tr>
<tr>
<td><strong>Internal candidates</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>33.0% (1095)</td>
<td>64.46 (1 d.f.)</td>
<td>$29,986 (1096)</td>
<td>11.674 (3263 d.f.)</td>
</tr>
<tr>
<td>Female</td>
<td>20.0% (2165)</td>
<td>$ p &lt; .0001</td>
<td>$26,776 (2169)</td>
<td>$ p &lt; .0001</td>
</tr>
</tbody>
</table>
$36,700 (e.g., Business Development Specialist); the incumbents of salaried jobs range from $30,000 (e.g., Trainer) to over $150,000 (Unit Manager). Although according to company policy, it is possible to be paid above the maximum of the salary range “in exceptional cases,” no exceptions are provided for with respect to the minimum of the salary range: “employees should not be paid below the minimum of their job’s band or range.” For this reason, we have chosen to focus on the bottom of the wage range in all analyses of incumbent wages (the substantive results do not change when we use the top of the wage range or the average of the top and bottom of the range). For ease of presentation, we refer to this variable as the “Mean Queue Level Wage of Incumbents.”

The second column of Table 2 shows that male candidates are competing for jobs that on average pay $1538 more than the jobs for which females queue. For both sexes, external candidates are sorted into jobs that pay less than the jobs attracting internal candidates. This is due to the fact that jobs attracting many externals tend to be disproportionately entry-level hourly jobs, whereas internals are more likely to be queuing for higher level salaried jobs. Indeed, internals are likely to be seeking promotions as they apply for these jobs. Here, too, gender inequality is evident within categories of applicant source. Among the external applicants seeking relatively low level jobs, the male–female difference shrinks to $850. But among the self-matched internals, the gender difference swells to over $3200.

All totalled, these analyses of this step of the job matching process show systematic patterns where women are disproportionately competing for jobs that are lower paying than the jobs that men are being considered against. Among externals, we cannot discern whether these differences in queue assignment are due to self-selection on the part of applicants, steering by recruiters, or a combination of both processes. However, the fact that the job requisition database is also a job posting system for internal transfers, means that the application process is open to be used by people already employed at the firm without the intervention of HR recruiters. While we cannot eliminate the possibility of steering by HR as an explanation of the sex gaps for externals, direct steering cannot explain the sex differences in the choice of queues that male and female internals make. Of course, internals might be indirectly steered in the sense that they may have friends on the job—some of which might be in the HR department—who have suggested that they should apply. Also, as we have emphasized above (see note 1), sex differences in education or other background factors might be affecting these choices. Some scholars argue that sex differences in either preferences or constraints lead to important supply-side differences in men and women’s job choices (for a concise review, see Fernandez and Sosa, 2005). This would suggest that men and women are not likely to have made identical choices with respect to which jobs they are interested in when they apply. On the other hand, sex differences in jobs could reflect screeners’ stereotypical notions of what are gender appropriate jobs (see Fernandez and Sosa, 2005). The evidence that HR recruiters are steering external applicants (Table 1) is consistent with this interpretation. Nevertheless, in the case of the internals, to the extent that omitted background factors are important determinants of which jobs people choose, they reflect the judgments of the candidate, and not the HR recruiters.

This is not to say, however, that differences in the queue choices made by male and female internals cannot be affected by other, more indirect actions of HR recruiters or others in the company. The insight we can offer here is that for internals such steering actions would need to be more subtle than declining to allow candidates to enter the queue at all. What the findings show clearly is that direct steering by HR is not required to produce a result where females are disproportionately assigned to lower pay, lower status jobs. In addition to the gendering associated with being assigned to a queue (Table 1), the analyses of queue-level wages show that there are important stratifying consequences of how men and women are sorted into queues.

3.3. Progress through the hiring pipeline

To this point, the analyses have documented gendered patterns of initial allocation to queues. As some of these candidates will be hired, these sex segregation patterns across labor queues may have important implications for gender inequality in the wages they will eventually be paid. Returning to Fig. 1, we see the aggregate sex skew across all the steps of the hiring process: application, assignment to a queue, interview by hiring manager, job offer, and hire. As we argued above, progress through these stages is a key way in which hiring agents reveal the rank order of sets of candidates. Overall, the sex composition of the population of hires is
more female than the initial population of applicants (c.f. the initial application phase to the final hire stage). Underscoring the importance of the initial assignment to a job requisition step we discussed in the previous section, the biggest single change in sex composition overall is between initial application and assignment to queue (62.0 to 65.8 percent). The percent female among those interviewed by hiring managers (66.6) is quite similar to that of the population of applicants matched to requisitions (65.8 percent). This is not surprising when one considers that the same organizational actors who assign applicants to queues—human resources screeners—are the ones granting interviews with hiring managers. However, there is a bigger jump in the percent female between the interview and job offer stages. Hiring managers control the job offer decision, and the net result of their actions is to further feminize the hiring pipeline: the percentage female increases from 66.6 to 69.3. The final stage of the process—the hiring step—does not change its sex composition. This step is not directly controlled by the hiring manager, but requires the candidate to accept or reject job offers made by the hiring manager. Decisions taken by candidates at this step apparently do not further skew the sex distribution of hires.

The data shown in Fig. 1, however, average across all the queues, and thus reflect both within- and between-queue variation in progress through the pipeline. In order to make inferences about hiring agents’ revealed preferences, we need to separate these two sources of variation. It is useful to consider two extreme cases to understand why this is important. On the one hand, if none of the variation is within-queue, then males and females would be progressing through the screening stages in each queue in the same proportions as they initially appear in the queue for each job. Between-queue sex variation in the initial queue assignment might appear if, e.g., jobs are being gender coded by the applicants and/or screeners as male or female jobs. Some queues might be 30 percent females, and others might be 70 percent female, but the sex composition across all the queues would average to 62.0 percent female at initial application. Of course, gender-related labor market differences that might make the jobs differentially attractive to the two gender groups would also manifest themselves in between-queue differences in sex composition. Fernandez and Sosa (2005), for example, document how the fact that females earn lower wages in the local labor market makes the pool of people who might be interested in the low-wage customer service representative job more female. Irrespective of the reasons that men and women might be sorted into the different queues, in this scenario, once the assignment is made to the queue, males and females would flow in representative proportions through the hiring pipeline. Thus, all gender variation in hiring would be reflected in the initial queue assignment. As candidates are screened, males and females would be taken in the same proportions as they are represented in the initial queue assignment. The shift toward a more female population of hires in this scenario (in Fig. 1, 69.2 percent female) would be a compositional effect due to more hires being produced by queues that are disproportionately composed of females than predominantly male queues.

On the other hand, if all the sex variation in the chances of proceeding to hire is within-queue, then the shift in the sex distribution of hires would be occurring as screeners compare sets of people in competition with one another for the same job openings, and differentially screen out one sex over another. If there is no between-queue variation, then each of the different queues would reflect the overall sex composition at initial application, i.e., each queue would be 62.0 percent female. In the all within-queue scenario, the sex distribution would shift across stages of the screening process resulting in an overall sex distribution of hires of 69.2 percent female.14

As we showed above, the vast majority of the queues are for non-exempt, relatively low paying jobs, and these queues account for the lion’s share of queues, applicants, and hires. Moreover, there is a strong sex skew in the queues, with higher percentages of females associated with non-exempt and more poorly paying jobs. Especially in light of the fact that there is clear evidence of between-queue sex variation at initial assignment to the queue (see above), the undifferentiated analysis of the sex distribution across stages of the hiring process presented in Fig. 1 is dominated by females being screened for low status, low pay jobs.

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14 Of course, it is possible for both within- and between-queue processes to be at work, and for these processes to interact with one another. We will examine these alternatives below.
Table 3 investigates the between- and within-queue determinants of progressing through the pipeline and getting hired. Model 1 presents the coefficients of a traditional logistic regression model with sex, repeat application, recruitment source, and the level of competition as predictors of hire. These variables are all measured at the level of the individual applicant, and thus, do not distinguish within- and between-queue variation in the variables. As in Table 1, we exclude cases that are missing on any variable included in subsequent models in order to ensure that the results are based on the same cases. The sex coefficient in Model 1 is significantly related to the odds of getting hired: the odds of females getting hired are 25 percent higher than the odds for males. The effect of repeat application is small and insignificant. Also important in light of the goals of this study, Model 1 shows significant boosts to the odds of getting hired for both external referrals and internals (respectively, 66 and 40 percent) compared with external non-referrals. There are also significant effects for competition. The candidates applying when there are many competitors are less likely to be hired, whereas people applying on days where there are many jobs open have 5 percent higher odds of getting hired.15

As we argued above, it is important to address both the within- and between-queue variation in progress through the hiring pipeline. Model 2 adds controls for two important queue-level characteristics that we have shown are related to sex, i.e., whether the job is exempt vs. non-exempt and the average queue-level wage of job incumbents. The sex coefficient in Model 2 is somewhat attenuated compared with Model 1 (1.169 vs. 1.247), indicating that some part of the tendency for females to be preferred at hire is due to the kinds of jobs for which they are being considered. Nevertheless, even within categories of exempt and wage levels, females still show significantly higher odds of getting hired than males (17 percent). As in Model 1, Model 2 also shows

---

<table>
<thead>
<tr>
<th>Model</th>
<th>Female applicant</th>
<th>Repeat application</th>
<th>Employee referral</th>
<th>Internal applicant</th>
<th>Applications on day of application</th>
<th>Queues open on day of application</th>
<th>Exempt queue</th>
<th>Wage of queue</th>
<th>Female × exempt queue</th>
<th>Repeats × exempt queue</th>
<th>Referrals × exempt queue</th>
<th>Internals × exempt queue</th>
<th>Applications on day of application × wage of queue</th>
<th>Queues open on day of application × wage of queue</th>
<th>Likelihood ratio χ² (Degrees of freedom)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1.247a (3.29)</td>
<td>0.922 (−1.09)</td>
<td>1.655a (6.51)</td>
<td>1.401a (4.04)</td>
<td>0.993a (−4.77)</td>
<td>1.049a (5.16)</td>
<td>1.623a (3.13)</td>
<td>0.929a (−7.56)</td>
<td>0.651 (−1.71)</td>
<td>0.624 (−1.62)</td>
<td>1.573 (0.64)</td>
<td>0.195a (−2.69)</td>
<td>0.988 (−1.58)</td>
<td>0.987 (−0.26)</td>
<td>0.968a (−2.46)</td>
</tr>
<tr>
<td>2</td>
<td>1.169 (2.31)</td>
<td>0.899 (−1.42)</td>
<td>1.619a (6.21)</td>
<td>1.919a (7.06)</td>
<td>0.994a (−4.03)</td>
<td>1.043a (4.52)</td>
<td>1.015 (1.30)</td>
<td>1.019 (1.57)</td>
<td>0.624 (−1.62)</td>
<td>1.573 (0.64)</td>
<td>1.014 (0.49)</td>
<td>0.195a (−2.69)</td>
<td>0.988 (−1.58)</td>
<td>0.987 (−0.26)</td>
<td>0.968a (−2.46)</td>
</tr>
<tr>
<td>3</td>
<td>1.373a (4.18)</td>
<td>0.928 (−0.87)</td>
<td>1.589a (5.46)</td>
<td>2.656a (6.20)</td>
<td>0.999 (−0.49)</td>
<td>1.015 (1.30)</td>
<td>1.019 (1.57)</td>
<td>1.025 (1.22)</td>
<td>1.014 (0.49)</td>
<td>1.573 (0.64)</td>
<td>1.014 (0.49)</td>
<td>0.195a (−2.69)</td>
<td>0.988 (−1.58)</td>
<td>0.987 (−0.26)</td>
<td>0.968a (−2.46)</td>
</tr>
<tr>
<td>4</td>
<td>1.438a (4.51)</td>
<td>0.973 (−0.31)</td>
<td>1.586a (5.38)</td>
<td>2.967a (6.73)</td>
<td>0.999 (−0.49)</td>
<td>1.015 (1.30)</td>
<td>1.019 (1.57)</td>
<td>1.025 (1.22)</td>
<td>1.014 (0.49)</td>
<td>1.573 (0.64)</td>
<td>1.014 (0.49)</td>
<td>0.195a (−2.69)</td>
<td>0.988 (−1.58)</td>
<td>0.987 (−0.26)</td>
<td>0.968a (−2.46)</td>
</tr>
<tr>
<td>5</td>
<td>1.799a (4.44)</td>
<td>1.116 (0.80)</td>
<td>1.482a (2.19)</td>
<td>7.129a (6.33)</td>
<td>1.000 (−0.03)</td>
<td>1.019 (1.57)</td>
<td>1.025 (1.22)</td>
<td>1.025 (1.22)</td>
<td>1.014 (0.49)</td>
<td>1.573 (0.64)</td>
<td>1.014 (0.49)</td>
<td>0.195a (−2.69)</td>
<td>0.988 (−1.58)</td>
<td>0.987 (−0.26)</td>
<td>0.968a (−2.46)</td>
</tr>
</tbody>
</table>

a Significant at p < .05 level or lower.
b Conditional logit model, with fixed effects for requisition.
c Wage rescaled by subtracting lowest observed queue-level wage ($15,820 in thousands of dollars).

---

15 In separate analyses, we find no evidence of sex interactions, i.e., none of the interaction terms—female × referral, female × internal, female × repeat application, female × number of applications on the day of application, and female × number of requisitions on day of application—are individually significant.
significant increases to the odds of getting hired for both external referrals and internals compared with external non-referrals (respectively, 62 and 92 percent). Indeed, the importance of being an internal applicant rises when exempt status and wage level are controlled. The effects of competition remain significant: candidates applying when there are many competitors are less likely to be hired, and people applying on days where there are many jobs open have higher odds of getting hired.

Of course, queues differ in ways besides exempt status and wage level, and these factors—whether observed or unobserved—can affect how hiring managers order their choices. In order to make proper inferences about screeners’ rankings of candidates, it is important to separate the within- and between-queue variation in progress through the hiring pipeline. Toward this end, we estimate a fixed effect logit model with fixed effects for queues (Model 3) and provide estimates of the within-queue effects of the independent variables on the odds of being hired. This estimation strategy therefore purges all between-queue factors—both observed and unobserved—associated with queues. The results show that the within-queue effects of sex and recruitment source are robust to controlling for the influence of omitted queue-level factors. Queue-level variables cannot account for females higher odds of progressing through the hiring pipeline. If anything, the sex difference becomes stronger in Model 3 than Models 1 and 2.

The analyses to this point do not address the possibility of different gender orderings for high and low status jobs. Model 4 adds interaction terms between the main effects and a dummy variable distinguishing exempt from non-exempt queues in the logit model with fixed effects for queues. Because exempt status does not vary within queue, the fixed effects absorb the main effect of exempt status in Model 2. The interactions terms, however, pick up within-queue variation in each of the independent variables. In Model 4, therefore, the main effects measure the impacts of the independent variables for non-exempt queues, and the interaction terms the extent to which these variables lead to different outcomes for candidates in exempt, as opposed to non-exempt queues. Among the candidates for non-exempt jobs (i.e., the main effects), both employee referrals and internals are much more likely to be hired than non-referrals. Only one of the interaction terms meet traditional levels of statistical significance. The results show that among applicants to non-exempt jobs, internal candidates are almost 3 times as likely to be hired as external candidates (i.e., the main effect). The interaction effect shows that internals in exempt queues are much less likely to be hired than internals in non-exempt queues. Indeed, the odds of internals in exempt queues getting hired are only 0.58 (2.967 main effect $\times 0.195$ interaction = 0.58), while the odds for internals in non-exempt queues getting hired are almost three times higher than for externals (2.967).

Perhaps of most interest is the interaction term for sex. This direction of the effect shows that males are more likely to be hired in exempt queues than are females. The odds of women in exempt queues being hired are less than one (i.e., 0.94; 1.438 main effect $\times 0.651$ interaction = 0.94). Thus, among applicants in exempt queues, the odds of females being hired are only slightly lower than the odds for males. Among candidates in non-exempt queues, females are much more likely to be hired than are males (female odds are 1.438 times the odds for males). The $z$-value of 1.71 on the interaction term, however, shows that this difference is only significant at the 10 percent level. As we noted above, the vast majority of the queues are for non-exempt jobs, with much higher percentages of females associated with non-exempt queues. The disproportionate sorting of females into non-exempt queues at first assignment results in a paucity of females in exempt queues in these hire models. This likely accounts for the lack of statistical power in estimating the interaction term for sex in Model 4.

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16 The parameter for sex in these models shows the preference that hiring agents reveal when selecting from among a pool of candidates, and thus yields information about the relative rank of women and men in each queue. We also explored a rank ordered logit specification (procedure rologit in STATA), where the dependent variable reflects the rank ordering of hiring agents’ alternatives (in this case, hired vs. not hired), and where equal scores of the dependent variable are tied. We have chosen to report the fixed effects logit models here because they are more familiar (McFadden, 1973), and the results are substantively identical to the results of the ranked ordered logit models.  

17 Obviously, single-person queues are useless for examining between- and within-queue sources of variation since for these cases, there is no within-queue variation. The models in Table 3 all contain 7836 cases across 408 multiple person queues. Of the uncensored 699 queues, 27 queues are dropped due to missing data. Two hundred and fifty-three of the remaining 662 queues (38 percent) are single applicant queues, and thus fall out of these analyses. These 253 cases tend to be internal (55.7 percent), female (65.5 percent) and apply for exempt positions at relatively high wages (23.7 percent). Including these single applicants in Model 1 does not change any of the substantive results.
Model 5 presents the results of fixed effect logit models investigating similar interaction terms for mean queue-level wages of incumbents measured in thousands of dollars. In order to facilitate the interpretation of the interaction terms, we rescaled queue-level wages by subtracting the lowest observed queue-level wage ($15.820 in thousands of dollars) from the queue-level wage for each observation. Thus, the rescaled wage variable varies from 0 to $58.601. Here, too, the main effect of queue-level wages drops out of the equation (since there is no within-queue variation in wages), and the interactions terms pick up within-queue variation in each of the independent variables. In Model 5, therefore, the main effects measure the effects of the independent variables for queues which are coded 0 (i.e., the lowest wage queues), and the interaction terms the extent to which these variables have different effects for candidates in queues with increasing values on the rescaled queue-level wage variable.

The strongest effect of all is the main effect for internal candidates in lowest paid queues (odds of hire = 7.13). This is consistent with our arguments above that internal candidates are likely to be climbing internal promotion ladders out of entry-level jobs. The main effect for employee referral also shows that referrals in the lowest paid queues are more likely to be hired (1.48). The interaction effects show that the chances of hire for internals decrease as the pay of queues increase (odds ratio = 0.87 per thousand dollar increment).

Most important for our purposes, the sex effect also differs for high and low paying queues. Females are almost twice as likely as males to be hired from the lowest paying queues (odds ratio = 1.799). The significant interaction term (odds ratio.968) shows that this female advantage decreases as the pay of queues increases, however. The magnitude of this effect is substantial. With every $1000 increment in queue-level wages, the female advantage is eroded by 3.2 percent. Thus, queues paying $1000 more than the minimum (i.e., $16,820) show a female advantage of 1.741 (i.e., 1.799 * .968). The observed female advantage disappears (i.e., the odds of hire become even for males and females) at $33,820, which falls at the 92nd percentile of queue-level wages. It is only at the highest level jobs that male applicants have higher chances of getting hired than females.

To summarize the results of the analyses presented in Table 3, overall women tend to be preferred over males (Model 1), and this preference appears within categories of salaried or hourly jobs, as well as within levels defined by wages (Model 2). This preference for females appears even within-queue, i.e., in competition for specific job openings (Model 3). Finally, we explored whether these tendencies worked differently for high and low status queues. While hampered by the small number of females in exempt queues, we find some evidence that the preference for females reverses in queues for exempt jobs (Model 3). Moreover, this preference for males is observed for the highest paying jobs, those at the 92nd percentile and above of the mean queue-level wages of incumbents.

These finding strongly suggest that the pattern of increasing female overrepresentation among hires evident in Fig. 1 is a compositional effect due to more female queues having more hires. Within the queues for the plentiful low status jobs, more males than females are screened out as they are being considered against one another. However, more females than males are being screened out as they compete in queues for the relatively less numerous high status job openings. Although individual level factors omitted from the regressions may explain why we find these gendered patterns of advancement through the hiring pipeline, these results show that the impact of these factors needs to be traced to the processes that initially allocate men and women to labor queues.

3.4. Gender wage inequality

The results thus far have documented that males and females are sorted into distinct jobs at the point of queue assignment, and that as candidates progress through the various stages of screening, there is additional sorting resulting in a gendered bifurcation where males are more likely to be hired in high status jobs, and
females more likely to be hired in low status positions. In this section, we examine the implications of these sorting processes for gender wage inequality.

Table 4 examines the actual wages—as distinct from average queue-level wages—paid to hires by the sex composition of the queue. Without any controls, female hires are paid $3101 less than male hires \((t\text{-value} = -7.27, p < .0001)\). Model 1 regresses actual wages paid to hires on application behavior, recruitment source, and sex. The number of applicants applying on the same day as the candidate is not statistically significant; however, the number of openings on the day of application is negatively associated with wages paid. There are also strong effects of recruitment source. While employee referrals are more likely to be assigned to queues and be hired (Tables 1 and 3), having been referred is negatively associated with wages paid. This latter result is consistent with Penner’s (2007) findings for another large financial services firm. In contrast, internal candidates being hired into jobs that are open to external recruitment are paid substantially more than external non-referrals. This finding is not surprising since these wages are likely to be associated with promotions.

Table 4
Regression models predicting annual salary in dollars (number of cases = 1572)

<table>
<thead>
<tr>
<th></th>
<th>Model [1]\text{a}</th>
<th>Model [2]\text{a}</th>
<th>Model [3]\text{a}</th>
<th>Model [4]\text{a}</th>
<th>Model [5]\text{a}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>21,313.76\text{a}</td>
<td>13057.88\text{a}</td>
<td>19142.40\text{a}</td>
<td>22115.33\text{a}</td>
<td>19764.72\text{a}</td>
</tr>
<tr>
<td></td>
<td>(617.86)</td>
<td>(319.67)</td>
<td>(252.52)</td>
<td>(500.62)</td>
<td>(284.70)</td>
</tr>
<tr>
<td>Female applicant</td>
<td>-2830.93\text{a}</td>
<td>-259.27 (195.60)</td>
<td>-1.46 (141.85)</td>
<td>48.20 (136.66)</td>
<td>179.20 (258.84)</td>
</tr>
<tr>
<td></td>
<td>(404.15)</td>
<td>(199.61)</td>
<td>(154.58)</td>
<td>(147.82)</td>
<td>(293.16)</td>
</tr>
<tr>
<td>Repeat application</td>
<td>-1195.38\text{a}</td>
<td>-566.69 (199.61)</td>
<td>-346.90 (154.58)</td>
<td>-240.22 (147.82)</td>
<td>284.84 (293.16)</td>
</tr>
<tr>
<td></td>
<td>(419.00)</td>
<td>(237.11)</td>
<td>(145.47)</td>
<td>(147.82)</td>
<td>(315.44)</td>
</tr>
<tr>
<td>Employee referral</td>
<td>-1083.44\text{a}</td>
<td>-192.85 (237.11)</td>
<td>-60.55 (153.03)</td>
<td>-51.37 (145.47)</td>
<td>245.37 (315.44)</td>
</tr>
<tr>
<td></td>
<td>(497.39)</td>
<td>(154.58)</td>
<td>(145.47)</td>
<td>(147.82)</td>
<td>(315.44)</td>
</tr>
<tr>
<td>Internal applicant</td>
<td>5026.78\text{a}</td>
<td>558.19 (233.43)</td>
<td>1000.70 (248.38)</td>
<td>1132.85 (236.08)</td>
<td>3059.94 (495.78)</td>
</tr>
<tr>
<td></td>
<td>(473.08)</td>
<td>(233.45)</td>
<td>(236.08)</td>
<td>(236.08)</td>
<td>(495.78)</td>
</tr>
<tr>
<td>Applications on day of application</td>
<td>-9.33 (8.11)</td>
<td>-7.98 (3.86)</td>
<td>-1.37 (2.83)</td>
<td>-1.35 (2.69)</td>
<td>2.68 (6.10)</td>
</tr>
<tr>
<td>Queues open on day of application</td>
<td>-110.25 (54.26)</td>
<td>-11.49 (21.11)</td>
<td>-15.77 (20.15)</td>
<td>-4.55 (41.65)</td>
<td></td>
</tr>
<tr>
<td>Exempt queue</td>
<td>4175.16\text{a}</td>
<td>829.13 \text{a}</td>
<td>79.74 \text{a}</td>
<td>323.83 \text{a}</td>
<td></td>
</tr>
<tr>
<td>Wage of queue\text{d}</td>
<td>(406.67)</td>
<td>(17.20)</td>
<td>(39.30)</td>
<td>(69.40)</td>
<td>(69.40)</td>
</tr>
<tr>
<td></td>
<td>829.13 \text{a}</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

\text{a} Significant at \( p < .05 \) level or lower.

\text{b} Ordinary least squares regression (standard errors).

\text{c} Regression model with fixed effects for requisition.

\text{d} Wage rescaled by subtracting lowest observed queue-level wage ($15.82 in thousands of dollars).
Most of interest here, the sex coefficient shows that female hires are being paid $2831 less than males after the other variables are controlled. This is only slightly less than the zero-order magnitude of the female-male difference in wages paid (−$3101). As we have emphasized, we cannot control for many important factors in these regressions. However, the results in Model 1 show that the magnitude of overall gender wage inequality at the hire stage is substantial.

We have yet to examine the within- vs. between-queue distribution of actual wages, however. Model 2 introduces two queue-level factors (exempt vs. non-exempt status and average queue-level wages of incumbents) as controls. As we mentioned above, these variables contain only between-queue variation. Not surprisingly, salaried (exempt) jobs are associated with higher wages than hourly jobs. The effect of the queue-level wages of incumbents variable is very strong (t-value = 48.2), indicating that wages paid to new hires depart very little from the average for the incumbents of those jobs. The coefficient shows that new hires are paid on average $829 for every $1000 increment in the average queue-level wage of job holders (recall the average queue-level wage of incumbents has been scaled in thousands of dollars). Since job requisitions are written in ranges, the fact that new entrants are likely to be paid less than the average of those already in the job is understandable.

Compared with Model 1, the recruitment source effects are much smaller and statistically insignificant in Model 2. Controlling the wage level of the queue likely captures much of the effect of recruitment source since referrals play an important role in sorting people into lower paying queues, and internals tend to seek out higher paying queues (Table 2). The effects of the application behavior variables (repeat application, applicants on the same day, and job openings on day of application) are also attenuated in Model 2 compared with Model 1. Most important, however, the point estimate for sex in Model 2 ($259) shows a much reduced degree of gender inequality in pay. While this effect is not statistically different from zero, it is also small in substantive terms since it is only 1.3 percent of the average annual wage. But most important for our purposes, this gap is only 8 percent of the overall gender wage gap of $3101. The queue-level factors alone account for 91 percent of the disadvantage in pay that women showed in Model 1 ($259 vs. $2830).

While Model 2 captures much of the between-queue variation in what hires are actually paid, wages paid to hires can still diverge from the average of incumbents’ wages in ways that are systematically related to gender. In order to completely account for between-queue variation in wages, we estimated regression models with fixed effects for queues (Model 3). As hires are compared within queues, internals are on average paid $1001 more than external non-referrals. As we discussed above, the fact that the queue salaries are stated in ranges of several thousand dollars leaves room for internals to be paid somewhat higher in the range than others. Consistent with our interpretation above that the main effect of being a referral is to direct people to queues, being a referral does not lead to a wage benefit within queues. Most important for our purposes, however, is the fact that the average within-queue effect of being female remains small ($1.46) and statistically insignificant in Model 3. In aggregate, when men and women are hired into jobs in the same queue, there is very little difference in the wages they are paid.

Similar to our analyses of hiring patterns, we investigated whether these wage trends hold across low and high status queues. While the number of exempt queues is quite modest compared to the number of non-exempt queues (126 vs. 479), these queues include jobs that pay a great deal more than non-exempt jobs. While the average exempt job pays $35,879, the average annual wages for non-exempt jobs is only $17,446. Also important is the fact that the wages paid by exempt jobs range widely, from just over $13,000 to over $111,000.

Model 4 shows the results of regression models with fixed effects for queues including interactions for exempt vs. non-exempt queues. Similar to Model 3, internal candidates are offered $1132 more than external candidates in non-exempt queues (see main effects). However, internal candidates on average receive much less ($35,185) than external candidates in exempt queues. Referrals, too, make much less money ($15,235) than non-referrals in exempt queues. Estimating Model 3 for those in exempt queues and non-exempt queues separately (available on request) shows a constant of $66,324 for exempt queues vs. $17,280. Thus, the large effects of the external and internal dummy variables among exempt queues are being subtracted off of a rather

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19 As we discussed above (see note 17), because this model compares people within the same queue, it excludes single person queues which are useless for examining between- and within-queue sources of variation. Here, too, excluding these single applicants from Models 1 and 2 does not change any of the substantive results.
high base. Substantively, these results show that when two people in the same exempt queue are hired, there is a large average difference in wages paid between internals and externals, and between referrals and non-referrals. We can only speculate, but we think that these large within-queue differences in wages being paid could reflect unmeasured differences between internal and external and referral and non-referral candidates that lead hiring managers to pay some people the top of the salary range for the job while others are paid near the bottom of the range (recall that job requisitions sometimes cross grades and allow a broad range of salary to be paid).

Most important for our purposes, we find no evidence of reliable sex differences in pay across exempt and non-exempt queues (Model 4). The story with respect to high vs. low wage queues (Model 5) is no different. Sex differences in pay are not reliably different from zero in the lowest wage queues; nor do females’ paid wages significantly decline with increases in queue-level wages.

4. Summary and conclusion

This paper makes an important contribution to the literature on job sex segregation by strengthening the conceptual and empirical grounding of theories about queues in the hiring process. We go beyond the metaphorical notion of a labor queue by measuring the set of applicants that are placed in competition for the same job at the same time, and examine the mechanisms by which employers choose among candidates which contribute to the gendering of jobs. By studying sets of people who compete for specific job openings at the same time, this paper sharply delineates the set of hiring choices available to employers, and thus paints a more complete picture of the employer side of the labor market. We describe the processes by which queues are formed by hiring agents, and thus provide crucial links between organizational processes at the level of the firm, and the mechanisms by which people are allocated to job openings. We argue that queues so defined are the organizational filter that employers use to structure the supply side of the labor market, and thus, are a crucial component of the job-person matching process.

We find that being placed in a queue is a critical step in the hiring process since it is virtually impossible for individuals who do not survive this step to be hired. Moreover, being placed in a queue has a clear gendering effect on the hiring process: the sex distribution of applicants who are matched to queues and those who are rejected at this phase diverge. Careful examination of the queues show that there is sex sorting at the stage where applicants are assigned to queues. Women are prevalent in queues for low pay, low status jobs. Within queues, the screening process contributes to the gendering of the population of hires at this firm. In aggregate, females are more prevalent among the hires than they are among candidates at initial queue assignment. However, we found evidence of important queue-level heterogeneity in this pattern. Although limited by the number of exempt queues we analyze, we found some evidence that males are more likely than females to be hired in queues for exempt jobs. While there are important wage implications associated with matching to queues, once men and women in the same queue are actually hired, there are no reliable sex differences in the wages that male and female hires are paid.

Networks play an important role in this story. At the initial sorting of applicants to queues, recruitment source affects the labor queues to which individuals are assigned, with employee referrals being more likely to be assigned to a labor queue than external non-referrals. Networks also play an important role in later stages of the hiring process: employee referrals are more likely to progress through the pipeline and be hired. The impact of referral networks on wages is negative, however. Referral networks appear to direct people to queues for lower paying jobs (see Fernandez and Fernandez-Mateo (2006) on “wrong network” arguments), and being a referral does not lead to wage benefits within queues.

The results we report here have important implications for our understanding of the allocative mechanisms at work in producing gender inequality. When men and women do the same work, they are paid virtually the same wages (e.g., Kilbourne et al., 1994; Petersen and Morgan, 1995; Padavic and Reskin, 2002). Therefore, the major source of gender wage inequality is that men and women rarely do the same work (e.g., for a review, see Fernandez and Sosa, 2005). As a consequence, understanding the determinants of the sex segregation of jobs has become a key focus of inquiry.

The mechanisms that are posited to allocate men and women to jobs are commonly pre-hire, apart from for a few exceptional studies (Petersen et al., 2000; Petersen et al., 2005; Fernandez and Sosa, 2005), the data are
based only on people who have already been hired. This lack of fit between theory and evidence has hampered
the examination of the pre-hire allocative processes that might account for sex segregation of jobs and the
attendant wage disadvantages for women. Except for Petersen and Togstad (2006), previous pre-hire studies
have only looked at sex differences across broad ranges of jobs (e.g., Petersen et al., 2000; Petersen et al., 2005)
or focused on a single job (Fernandez and Sosa, 2005). However, none of the previous research has addressed
the processes we highlight here, i.e., the mechanisms by which women and men are sorted within and between
queues of people in competition with one another for specific job openings, and the importance of these pro-
cesses for gender wage inequality.

Perhaps the most important contribution we offer the literature on gender inequality is the fact that we have
been able to trace the consequences of a key point of sex segregation in this context. At the end of the hiring
pipeline for this organization, we find large gender inequality in paid wages. This is similar to Petersen and
Saporta’s (2004) investigation of initial conditions at hire at a large service firm; they too find large sex differ-
entials in attainment in the placement at initial hire. In contrast to their study which focuses on the outcomes
of the hiring process (i.e., the end of the hiring funnel), we are able to show in our setting that the sex segre-
gating allocative mechanism operates much earlier in the hiring process, at the point where applicants are ini-
tially matched to queues for job openings. Moreover, the processes that sort candidates into labor queues of
people in competition for specific job openings clearly contribute to gender wage stratification in the company.
Future research in other settings is needed to address the scope conditions of these findings. But at least in this
setting, the roots of gender wage inequality lie in the initial sorting of candidates to queues. In this respect, this
paper has empirically demonstrated the power of the theoretical notion of a queue for understanding the
mechanisms producing gender inequality.

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