

# Gender and Sorting in the On-Demand Economy

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The male-female earnings gap is persistent and pervasive across many sectors of the U.S. labor market. Previous work has documented this gap in the economy as a whole (Blau and Kahn, 2016), in high-skilled occupations (Bertrand, Goldin and Katz, 2010), and even within individuals with the same position at the same firm (Goldin, 2014). Similarly, many potential reasons for the gap have been proposed such as employer discrimination, perceived differences in skill, differences in occupational choice, differences in acquired work experience, and lower promotion rates due to perceived higher risk of women exiting the labor market or reducing hours in order to raise children. Goldin (2014) finds jobs offering flexible scheduling to workers, such as those in pharmaceutical industry, come closest to achieving pay equality.

For this reason, we initially postulated that the gender gap would be relatively small in the flexible market for temporary, task-based work. While most jobs involve the employer meeting and interacting with the worker, jobs tend to be short lived, one-time, and are carried out during typical work hours. Career concerns and non-pecuniary benefits are absent, and wages are determined in a decentralized way by hundreds of small- and medium-sized employers. We were mistaken. In our examination of the online market place for tasks, the patterns in pay differentials looked strikingly similar to the economy as a whole. Perhaps most astonishingly, even when the tasks are posted as first-come-first-serve with a predetermined payment, we see the pay gap arise and it responds similarly to the addition of controls for job-

type and employer. In this paper we document the sorting in worker applications across low-skill jobs that generates the gap, and show that when we limit the role of skill or employer expectation, the gap persists. We conclude with a discussion of the role that outside options play in market places with few institutional regulations.

Our analysis focused on the behavior of men and women during the early years of an online labor market for hiring temp workers. At this time, matches were made through an open application process where employers posted jobs that workers searched through and applied for either on a first-come-first-serve basis (FCFS), or by submitting an application and a proposed level of compensation which the employer reviewed (ER) before selecting. Jobs also differed by their classification. Some jobs are listed under stereotypically male types of work, such as “construction” or “computer help” while others are listed under stereotypically female types of work such as “shopping” or “cleaning”. We compare applications across pricing mechanisms and job categories to tease apart mechanisms for the differential pay.

This paper contributes to the literature about the gender wage gap (see Bertrand (2011) and the references therein) and the literature about how the design of online labor platforms may help or hinder equality (see, for example, Agrawal et al. (2015)). The facts we review in this paper suggest that platforms may be constrained in their ability to address inequality.

## I. Platform details

The platform specialized in matching workers with employers, both households and businesses, who needed help completing one-time tasks. Nearly 9 in 10 jobs completed were done so in person within three days of posting. Most jobs did not require

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expertise, making many workers qualified to complete each job.

To initiate hiring, employers posted a job description, details of its location, and a deadline for completion. The platform classified each job posting into one of 38 categories (for example, delivery, laundry, or carpentry). Workers searched through these postings and applied to tasks they were willing to complete.

There were two assignment mechanisms, where each employer chose which mechanism to use at the time of posting. In FCFS jobs, employers posted a wage and any worker could accept the job at that price. The first worker to accept the job was matched. In ER jobs, employers reviewed worker wage proposals in real time, along with the workers' profiles, which included a rating out of five stars and a short bio. At any time prior to the deadline, employers could select a worker to complete the job at the proposed wage.

Upon completion, employers had the option to give each worker a rating out of five stars. There was no employer reputation system on the platform.

## II. Gender and sorting

While occupational differences between men and women have been well documented (Goldin, 2014), much of that sorting is thought to occur during education and training phases of the career and are made with long-term career considerations in mind. Such career considerations could include life-time earnings, job security, geographic flexibility, part-time flexibility, the gender composition of peers and managers, as well as discrimination hurdles.

Job categories on the platform do not differ along many of these critical dimensions that distinguish occupations, but they still differ in their strong association with gender.<sup>1</sup> Furthermore, men and women systematically apply for different categories of jobs, with women persistently applying to jobs that pay less and are associated with

traditionally female work. The jobs women apply to pay less, even when we only consider the pay of the male applicants. For example, for ER jobs with at least 3 applicants, we find that the average wage proposed by men was approximately 14% lower in jobs where more than half of the applicants were female than in jobs where less than half of the applicants were female.<sup>2</sup> In the following subsections we document a number of new facts regarding these sorting patterns.

### A. Gender sorting across job categories when employers-review applications

Men and women send their applications to different job categories, with women sorting into lower paying categories. The green bars in Figure II.A plot the the share of job applicants who are female within each job category. The categories have been sorted in ascending order from the category with the lowest mean hourly wages posted by employers in FCFS jobs, to the highest. If we assigned each applicant the mean wage in the job category, a gender pay gap would result; lower paying job categories are traditionally carried out by women, and the highest paying tasks, "electrician" and "construction," are stereotypically male tasks.

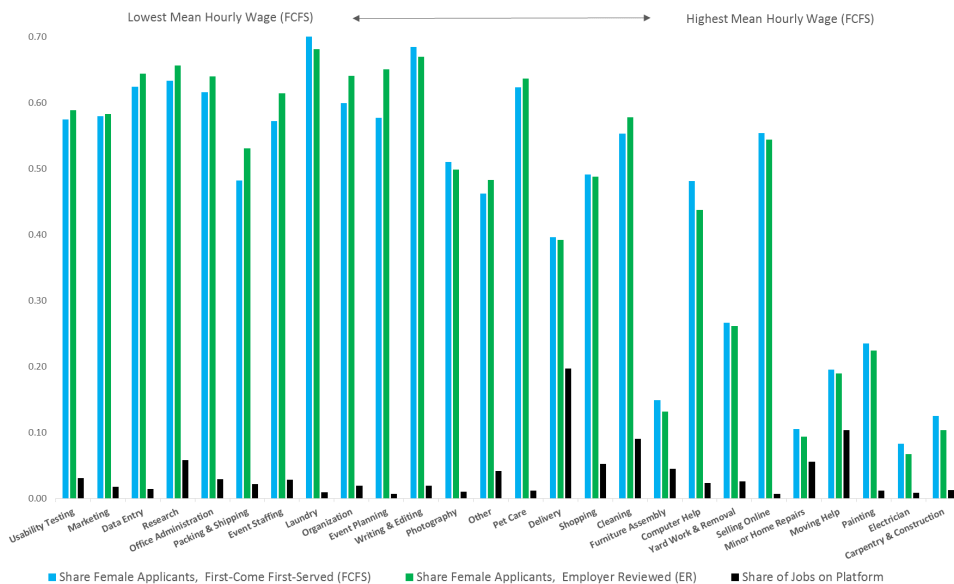
On average, shopping pays less than delivery, and cleaning or laundry pays less than minor home repairs, regardless of who carries out the job. For example, we see that once we condition on job category, the 14% lower pay reported for men applying to jobs where the majority of applicants are female is reduced to 5%.

Along the same axis, we plot the share of jobs that fall within each category in black. The low paying jobs women sort into are also less common on the platform than the higher paying jobs men sort into.

<sup>1</sup>Prior career considerations may still influence sorting decisions by changing the skills and past experiences men and women bring to the platform.

<sup>2</sup>This result controls for the month and city of the job posting, how long the individual had been on the platform, their average reviews to date, and the number of jobs applied to to date. Both results are statistically significant at the 0.001 level.

FIGURE 1. SHARE FEMALE APPLICANTS BY ASSIGNMENT MECHANISM



*Note:* Along the x-axis are the job categories with over 500 jobs listed as first-come-first-serve between 2010-2014, sorted from lowest mean hourly wage to highest mean hourly wage based on posted hourly prices (not bids). Along the y-axis are three separate series, in blue is the share of applicants to first-come-first-served posted jobs who are female. In green are the share of applicants to employer reviewed jobs. In black are the share of jobs in each category on the platform overall.

### B. Gender sorting across job categories in first-come-first-serve jobs

For the ER jobs discussed above, employers could still discriminate against women in the hiring process. Using FCFS jobs, we can study sorting into different job categories when employers do not select which worker is hired. For such jobs, female workers would not shy away from applying due to anticipation of employer discrimination in the selection process. Yet, the blue bars in Figure II.A show that sorting patterns across job categories is only slightly less pronounced relative to sorting in ER jobs (green bars). This places an upper bound on the relevance of employer selection or anticipation of outright rejection for sorting. The risks of negative reviews may still drive women to sort away from traditionally male tasks if they believe their work may be perceived as being lower quality. Nevertheless, negative reviews are uncommon and we do not believe the risk of negative reviews are driving this pattern.

### C. Gender sorting within job categories in first-come-first-serve jobs

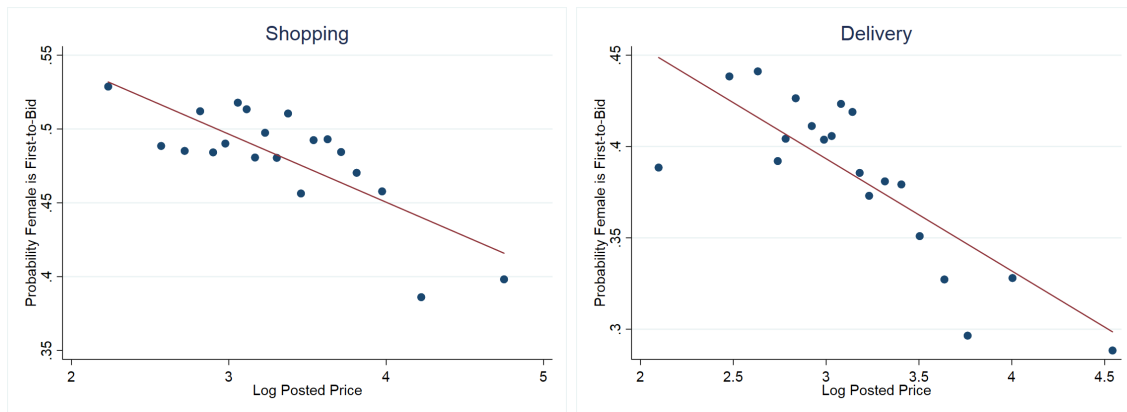
As a last step, we study application sorting patterns in FCFS jobs *within* job categories. By restricting our sample in this way, we limit the role of fit along skill dimensions as well as the role of anticipated discrimination. Figure II.C shows the relationship between the pay and the probability of a woman receiving the job within a job category. Specifically, the figure shows this relationship for “shopping,” a job more commonly completed by women, and “delivery,” a relatively gender-neutral job.<sup>3</sup> Women applied for lower paying FCFS jobs than their male counterparts in traditionally male jobs, neutral jobs, and traditionally female jobs.

## III. Discussion and conclusion

We provide new facts about how women sort into tasks in an online platform for

<sup>3</sup>The results shown in the figure additionally control for city and month fixed effects and removes all jobs that specifically mention words associated with physical strength.

FIGURE 2. GENDER SKEW AMONG FIRST-COME-FIRST-SERVE JOB APPLICANTS



*Note:* The above figures show the average likelihood of a female applicant winning a first-come-first-serve job (y-axis) by the payout of the job (x-axis) within a given job category. We exclude any jobs whose description includes words associated with physical strength and control for the city and month.

temporary work. This platform provides an interesting environment to study the labor gap as (1) the jobs are relatively homogeneous and low skill, (2) there is no promotion, and (3) we see not only the jobs which workers complete, but also the jobs for which they apply. Jobs were also assigned through two mechanisms – one which allowed employers to review and select workers and another where jobs were posted and taken by the first willing worker who applied. By comparing these two mechanisms, we can assess the role of employers’ willingness to hire women.<sup>4</sup>

As documented above, we find that women systematically sort into lower paying jobs, that these jobs also pay less to men who apply, and that these jobs are commonly in categories associated with traditionally female work. While differences in performances of men and women across tasks could explain this, employer evaluations offer little evidence of a skill gap, nor evidence that employers actively punish workers who complete “the wrong” type of jobs. Considering FCFS jobs, we find that women sort into a subset of lower paying

jobs even when the employer does not directly select between applicants. Moreover, these sorting patterns hold within job category, with women accepting more of the lower-paying FCFS jobs within a particular job category than men. These results are robust when controlling for differences in the flexibility of some jobs, including the time of day the job is posted, the time between the posting of a job and its due date, the hour the job must be completed by, and the timing of the application relative to job posting, and job cancellations. Overall, adding these controls does not alter the inverse relationship between pay and gender within a category of job.

Taken together, sorting across high and low paying tasks can’t be fully explained by mechanisms such as performance differences between men and women, sorting to avoid discrimination, and worker preference for flexibility. It is, however, consistent with the hypothesis that men have higher outside options than women.<sup>5</sup> Indeed, outside options may play a large role in determining the types of jobs workers apply for through online labor markets. For example, Farrell and Greig (2016) find that work-

<sup>4</sup>Though this will not address employers selecting into which mechanism to use, potential lower outside options for women due to discrimination in the economy as a whole, or perceived risk that women may receive worse reviews when performing tasks more traditionally associated with male labor.

<sup>5</sup>Cullen and Pakzad-Hurson (2017) find via an incentivized elicitation method that women on a different online labor platform have outside options that are 10% lower than men’s on average after controlling for relevant demographic factors.

ers in online labor markets earn on average one third of their total income through platforms. The existing gender gap in the economy as a whole can spill over onto the labor platform, causing men who receive higher wages through other employment opportunities to be more selective about the jobs they apply for. This is consistent with the sorting patterns we find and the higher wage proposals from men in ER jobs. Moreover, since workers can easily move between the platform and the broader labor market, the gender gap in on-demand jobs will likely be sensitive to differences in outside options generated by the gender gap in the broader economy. Thus, large earnings gaps in such online platforms may not indicate direct discrimination on the platform.

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