Job Preference Signaling and Matching Efficiency: Experimental Evidence from an Online Job Market

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Extended Abstract

1. Introduction

Asymmetric information about job applicants' preference—i.e., how strongly they prefer the jobs they apply for—may cause inefficiency in job matching. The problem of asymmetric information may be exacerbated in online job markets, which tend to be over-congested with many applications due to low application costs. Although this inefficiency can be theoretically reduced by credible signaling of job preference (e.g., Avery and Levin, 2010; Coles, Kushnir and Niederle, 2013; Roth, 2018; Kanoria and Saban, 2021), the literature lacks rigorous empirical evidence. Although there are a few papers building on randomized experiments (Lee and Niederle, 2015; Horton and Johari, 2018; Horton, Johari, and Kircher, 2021), none of them studies jobseekers' preference signaling.

We provide the first experimental evidence about the impacts of a job preference signaling. The mechanism is essentially the same as the one introduced by the American Economic Association in the economist job market (Coles et al., 2020). We conduct two randomized controlled trials (RCT) in the Bangladesh's largest online job portal. Applying a novel and ethical randomization design, the RCTs estimate the impacts on both jobseekers and employers.

2. Experiments

2.1. Study settings

Our experiment takes place in the Bangladesh's largest online job portal. It has about 1 million active jobseekers and 10,000 firms, and hosts over 5,000 job ads and 2 million job applications per month. In the portal, jobseekers register their CVs, browse job ads, and submit applications. Employers advertise job positions and collect applications and also can shortlist and interview candidates. The portal is free for jobseekers but charges employers for advertising jobs.

Over-congestion of too many applications occurs in the portal. Employers complain that they receive too many irrelevant applications and request Bdjobs.com to develop sorting tools. In our baseline surveys of jobseekers and employers, we find that it is more problematic for jobseekers and employers to, respectively, show and assess applicant's motivation than to show and assess applicant's skills. To reduce the over-congestion, Bdjobs.com recently introduced a rather drastic

measure, which limits the number of applications each jobseeker can send in month. Our intervention fits this issue of over-congestion in the portal.

We conduct two experiments on the same signaling mechanism but in two different settings.[1] The first experiment, which we refer to as "the job fair experiment", was conducted in an online job fair. It was organized by Bdjobs.com in November 2021 for ICT jobs, where 879 jobseekers and 110 employers participated. The second experiment, "the entire portal experiment", is conducted in the entire job portal, with approximately 500,000 jobseekers and 6000 employers during the experiment period. The second experiment is currently ongoing, started in late March 2022 and will end in June 2022.

2.2. Intervention

The intervention is a job preference signaling mechanism. It allows jobseekers to express their interest to few employers. The mechanism is essentially the same as the one introduced by the American Economic Association in the Job Openings for Economists. Some specifics about the mechanism are the following: every jobseeker is endowed with the same number of signals; the number is two in the job fair experiment and one per week in the entire portal experiment; signals can be sent to any active jobs; once signals are sent, they cannot be cancelled.

2.3. Randomization

Both the job fair experiment and the entire platform experiment apply the same randomization design. We conduct randomization only across employers, not jobseekers. All jobseekers have the access to the mechanism and are endowed with the same number of signals. A half of employers are randomly assigned as treatment employers; the other half as control employers. The difference between the two employers is that signals are disclosed only to treatment employers, although jobseekers can send signals to both treatment and control employers. Control employers are not notified of the signaling mechanism at all. Jobseekers are not informed that employers are randomized or that signals are disclosed only to treatment employers.

A novel feature of our randomization design is that it can estimate the effects of preference signaling on application-, jobseeker-, and job/employer-level outcomes despite that our randomization is only across employers. The effects on job/employer-level outcomes, e.g., job match quality, are estimated by comparing the jobs of treatment and control employers. Those on jobseeker-level outcomes, e.g., employment status, are estimated by comparing jobseekers who happen to send signals to treatment employers and those who send to control employers. While these jobseekers are endowed with the same number of signals, the *de facto* number of signals is ex post greater for the former jobseekers than for the latter. The effects on application-level outcomes, e.g., whether an applicant is shortlisted, are estimated by comparing applications with and without signals to treatment employers' jobs after controlling for the differences between applications with and without signals to control employers' jobs.

Another novel feature is that our randomization design is ethical. All jobseekers are treated equally and fairly because they are endowed with the same number of signals. It is true that

[1] Their AEA RCT registry numbers are AEARCTR-0009003 and AEARCTR-0009327.

jobseekers who happen to send signals to control employers have a smaller number of *de facto* signals ex post than those who happen to send to treatment employers, since signals sent to control employers are essentially wasted. However, jobseekers are still treated equally ex post because the signaling mechanism does not affect the competition among applicants with and without signals for control employers' jobs. Because control employers cannot view signals and are unaware of the experiment, the way they screen and select candidates is not be affected.

3. Data

3.1 Administrative data of the job portal [both the job fair and the entire portal experiments]

The administrative data consists of employer data, job data, jobseeker data, and application data. The employer data is based on employer profiles registered in the job portal. The job data includes essentially all information in job ads. The jobseeker data is based on their profiles and CVs. The application data includes the information of each application as to who applies for which job, whether a signal is sent, and whether an application is viewed, shortlisted, and hired. The available information about shortlisting is whether employers shortlist using the portal. The information as to whether employers shortlist outside the portal is unavailable. The information of hires is incomplete because the information is provided by employers voluntarily and rarely. Given this incompleteness, our estimation on hires using the administrative data is mostly conducted as secondary analysis. A remarkable strength of our data is that we receive the entire administrative data, not a sample data, including includes all employers, jobs, jobseekers, and applications.

3.2. Online baseline surveys of employers and jobseekers [both the experiments]

We conduct online baseline surveys using Qualtrics. The survey populations are all employers who had advertised at least one job since March 2021, about 12 months prior to the survey, and all jobseekers who had applied for at least one job since March 2021.

3.3. Interview endline surveys of employers and jobseekers [the job fair experiment]

We conduct interview endline surveys of all employers and jobseekers who participated in the job fair to collect endline outcomes.

3.4. Interview endline surveys of employers [the entire portal experiment]

We conduct interview endline surveys of 2000 employers twice, two and nine months after the experiment, to collect their hiring outcomes and job match quality.

3.5. Online endline surveys of employers and jobseekers [the entire portal experiment]

We conduct the online endline survey using Qualtrics approximately two months after the completion of the intervention implementation. The survey populations are the employers and jobseekers who, respectively, advertise and apply for at least one job since March 2021.

4. Estimation strategy

We estimate the effects of signaling at the application, jobseeker, job, and employer level. The main regression equation at the application level is

$$y_{ijk} = \alpha_0 + \alpha_1 s_{ij} + \alpha_2 s_{ij} T_k + \alpha_3 ns_{ij} T_k + \gamma X_{ijk} + e_{ijk}, \quad (1)$$

where subscripts i, j, and k denote jobseeker, job, and employer, respectively; s_{ij} is the dummy indicating that jobseeker i sends a signal to job j; ns_{ij} is the dummy that jobseeker i does not send a signal to job j ($ns_{ij} = 1 - ns_{ij}$); T_k is the dummy that employer k is a treatment employer. The unit of observation is an application. The dependent variable is whether the application is viewed, shortlisted, and hired. Coefficient α_2 is of our primary interest, the effect of a signal. It shows how much the application-level outcomes change if a signal is sent and delivered to an employer. Coefficient α_3 is the spillover effect to applicants who do not send signals.

At the jobseeker level, the main equation is

$$y_i = \beta_0 + \beta_1 TS_i + \sum_l \tau_l 1\{S_i = l\} + \gamma X_i + e_i, \quad (2)$$

where S_i is the number of signals sent by jobseeker i; TS_i is the number of signals sent to treatment employers by jobseeker i; $1\{\ \}$ is an indicator function; τ_l is a fixed effect of sending l signals, which controls for unobserved differences between jobseekers sending l signals and those sending m ($\neq l$) signals. The dependent variable is whether the jobseeker is employed and her job match quality. The coefficient of interest is β_1, showing the effect of the de facto number of signals.

At the job and employer levels, the equations are, respectively,

$$y_{jk} = \pi_0 + \pi_1 T_k + \gamma X_{jk} + e_{jk}, \quad (3)$$
$$y_k = \pi_0 + \pi_1 T_k + \gamma X_k + e_k, \quad (4)$$

where T_k is employer k's treatment status. The dependent variable, y_{jk}, is the number of hires and match quality of job j, and y_k is employer k's overall search experience and future prospect.

5. Results

Our preliminary results from the job fair experiment are the following. At the application level, the overall effect of the signaling on the probability of application being viewed, or shortlisted, or hired is not found to be significant. However, we find heterogenous effects: for the jobs that receive fewer than 4 signals (which is the median number of signals received by a job), the signaling increases the probability of being viewed and shortlisted by, respectively, 27 ppt and 15 ppt (or 111 percent and 196 percent). For the jobs that receive 4 or more signals, the effects are insignificant, and their point estimates are essentially zero. At the jobseeker, job, and employer levels, we do not find any significant effects, most likely because of lack of power.

Estimation results from the entire platform experiment, which are much more precise, are not available yet since the experiment is still ongoing till the end of June. Its results based on the

administrative data, and potentially based on the first endline data too, will be available by August 2022.