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Job Search Behavior: Lessons from Online Job Search

By Marianna Kudlyak and Jessie Romero

While there is a large body of theoretical work about the job search process, there is relatively little empirical evidence about important aspects of workers' search behavior. A new database of online job posting data sheds light on how workers search for jobs.

Although the labor market has improved slightly in recent months, conditions are still weak. The labor force participation rate and the employment/population ratio have declined dramatically, and the long-term unemployment rate is at historic highs.[1]

In such a time of protracted labor market weakness—especially when that weakness includes very long unemployment spells—it is especially important to understand how workers search for jobs and how that behavior changes over the course of their search. Studying this behavior can provide economists with clues about the process of matching unemployed workers with vacant jobs.

Search-and-matching models of the labor market provide a framework for studying this process.[2] These models are based on the idea that there are "frictions" in the market—that is, it takes time for workers to locate the right firm and for firms to locate the right worker. An important concept in the matching process is the idea of a "reservation wage," which is the lowest wage at which a worker is willing to work.

While there is a large body of theoretical work about the search process, there is relatively little empirical evidence to answer important questions such as: Do workers apply for jobs randomly or systematically? How does search intensity change with search duration? Do workers' reservation wages decline as search continues.[3]

To begin answering these questions, one of the authors of this *Economic Brief*, Marianna Kudlyak, and two colleagues have used a new database from an online job search engine to study how workers' search behavior changes during their search tenure.

Sorting by Education

Is job search random or directed? In a working paper with Damba Lkhagvasuren of Concordia University and CIREQ and Roman Sysuyev of the National Exchange Carrier Association, Kudlyak looks at whether or not workers with different education levels apply for different jobs and how the types of jobs they apply for change with search duration.[4]

The data come from a private online job search engine. They include daily records of all the applications a given job seeker sends to job postings on the site and all the applications that were received for a given job between September

2010 and September 2011. Kudlyak and her co-authors focus on the search behavior of workers aged 25–64 and workers whose education level ranges from high school completion to a master's degree. On average, younger workers apply to more jobs; workers aged 25–34 send out 1.69 applications per day, while workers aged 55–64 send out 1.34 applications per day. Younger workers also have shorter search durations than older workers. To the extent that the duration of search on the website coincides with the duration of unemployment, this is consistent with evidence that shows older workers tend to have longer unemployment spells.[5] Of course, the cessation of activity on the site does not necessarily indicate that the worker has found a job; he or she could be looking elsewhere or have given up entirely.

To begin, the authors look at the distribution of job applicants with different education levels across different job postings. They find that the distribution is not the same across all jobs; some jobs have a higher share of applicants with only high school diplomas, for example, while others have a higher share of applicants with college degrees. Formal statistical tests reveal that the average education of applicants in their first week of search on the website differs from job to job. This suggests that at the beginning of their searches, jobseekers sort themselves to jobs according to education.

Based on this finding, the authors construct an "education index" for each job, which is the average education level of all workers who apply to that job during their first week of searching. (The assumption is that workers apply to the jobs they find most desirable at the beginning of their search.) The authors call jobs with higher index values—meaning applicants have higher average education levels—higher-type jobs. They call jobs with lower index values lower-type jobs.

Kudlyak, Lkhagvasuren, and Sysuyev then look at the jobseekers' behavior to see if their degree of sorting changes as their searches continue. At the beginning of the process, jobseekers with more education apply to higher-type jobs, and those with less education apply to lower-type jobs. As their searches continue, however, the degree of sorting by education decreases, and workers apply to more lower-type jobs than they did at the beginning.

These results imply that people become less choosy the longer they have been searching for a job. More precisely, the education index represents a tradeoff between the expected wage and the probability of getting a job; initially, workers apply to higher-type jobs, which are likely to pay higher wages. As their searches continue, however, workers apply to lower-type jobs for which they have a better chance of being hired. The fact that there is no single job that workers of all education levels want to apply for suggests that this tradeoff is important: jobseekers weigh not only the expected wages but also the probability of being hired when deciding where to apply.

The findings are related to the existing literature on assortative matching, which examines the degree to which the most productive workers match up with the most productive firms.[6] The findings suggest that observed firm-worker matches likely are "mismatched" compared to those in a frictionless labor market where workers find jobs right away. The results also suggest that the private cost of job search—that is, the cost of being unemployed—increases with search duration. Both of these facts may have important implications for the design of models used to study labor markets.

Search Effort

Workers might apply to different types of jobs depending on how long they have been searching, but do they apply to more jobs or fewer jobs? In a forthcoming paper, Kudlyak and Jason Faberman of the Chicago Fed use the online job posting data to study how search effort changes with search duration.[7]

Theoretically, search effort could follow several different patterns. It could remain constant throughout the search. It could increase right before unemployment benefits expire, or it could decline as the search

continues. With respect to the third case, there are several reasons why observed search effort might decline. One possibility is that the composition of jobseekers changes: the workers who exert the most effort find jobs sooner, leaving behind workers who exert less effort. In this case, any given individual's effort might remain constant, but the effort of the group as a whole appears to decline. Another explanation could be that there is a "stock-flow" effect, in which the worker's search effort depends on the demand for labor. At the beginning of a search, a jobseeker searches through the full stock of vacancies. After that, however, the jobseeker only looks at newly posted jobs, so the level of search effort depends on the size of the flow. Finally, search effort could decline because the jobseeker's reservation wage has declined, which lowers the value of searching. While on the one hand a lower reservation wage should increase the number of jobs a worker is willing to accept, on the other hand those jobs also would be worth less to the worker.

Some studies using cross-sectional data (which contain one observation per worker and thus allow comparing groups of workers at different durations of search) have concluded that a worker's reservation wage remains constant throughout the search. This result, however, could be due to the fact that workers with low reservation wages find jobs earlier, and thus are not observed in the data at longer search durations. A unique feature of the online job search data set is that the researchers are able to follow the same worker through time, rather than comparing reservation wages of different workers at different durations. Faberman and Kudlyak find that search effort, as measured by the number of applications sent out by jobseekers, declines as search continues, even after controlling for composition and stock-flow effects. Thus, it's possible that the decrease in search effort reflects the perceived lower value of the job to the jobseeker or other factors that Faberman and Kudlyak are continuing to study.

Conclusion

These studies use a large, novel database from an online job search engine to study workers' search behavior. The results suggest that workers direct their search based on education. The degree of sorting decreases as search tenure increases, however, as does search effort. It appears that workers become more willing to accept job offers at lower wage rates after they have been searching for a while.

The matching process involves both inputs and outputs: the input is workers' search effort, and the output is getting hired at a certain wage. The online job search data shed light on important aspects of the first half of the equation, but do not reveal what happens to workers when their searches conclude. These outcomes are an important topic for future research.

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Endnotes

[1] The unemployment rate has been below 8 percent for the past six months after remaining stuck around 9 percent for almost three years. But the labor force participation rate has declined 2.5 percentage points since the beginning of the recession, and the employment/population ratio has declined 4 percentage points. The long-term unemployment rate—the share of unemployed workers who have been unemployed for more than half a year—has been near or above 40 percent since November 2009.

[2] For an overview of search-and-matching models, see Diamond, Peter, "Unemployment, Vacancies, Wages," *American Economic Review*, June 2011, vol. 101, no. 4, pp. 1045–1072; and Mortensen, Dale T. , "Markets with Search Frictions and the DMP Model," *American Economic Review*, June 2011, vol. 101, no. 4, pp. 1073–1091.

[3] Emerging literature in this area includes Krueger, Alan B., and Andreas Mueller, "Job Search and Job Finding in a Period of Mass Unemployment: Evidence from High-Frequency Longitudinal Data," CEPS Working Paper No. 215, January 2011; and Mukoyama, Toshihiko, Christina Patterson, and Aysegul Sahin, "Job Search Behavior over the Business Cycle," Manuscript, February 2013.

[4] Kudlyak, Marianna, Damba Lkhagvasuren, and Roman Sysuyev, "Sorting by Skill over the Course of Job Search,"

Federal Reserve Bank of Richmond Working Paper No. 12-03, April 2012.

[5] For example, according to the Bureau of Labor Statistics, in February 2013 the average duration of unemployment for workers aged 25–34 was 32.6 weeks, compared to 45.1 weeks for workers aged 45–54 and 45.6 weeks for workers aged 55–64.

[6] For example, see Eeckhout, Jan, and Philipp Kircher, "Identifying Sorting—In Theory," *Review of Economic Studies*, July 2011, vol. 78, no. 3, pp. 872–906.

[7] Faberman, Jason, and Marianna Kudlyak, "The Intensity of Job Search and Search Duration," Manuscript, November 2012.