

The internet as a labor market matchmaker

How effective are online methods of worker recruitment and job search?

Keywords: job search, recruitment, internet, matching, job boards

ELEVATOR PITCH

Since the internet’s earliest days, firms and workers have used various online methods to advertise and find jobs. Until recently there has been little evidence that any internet-based tool has had a measurable effect on job search or recruitment outcomes. However, recent studies, and the growing use of social networking as a business tool, suggest workers and firms are at last developing ways to use the internet as an effective matchmaking tool. As less and less work in an information economy needs someone who is physically present on an employer’s premises, labor market intermediation may soon become the norm for many firms and workers.

KEY FINDINGS

Pros

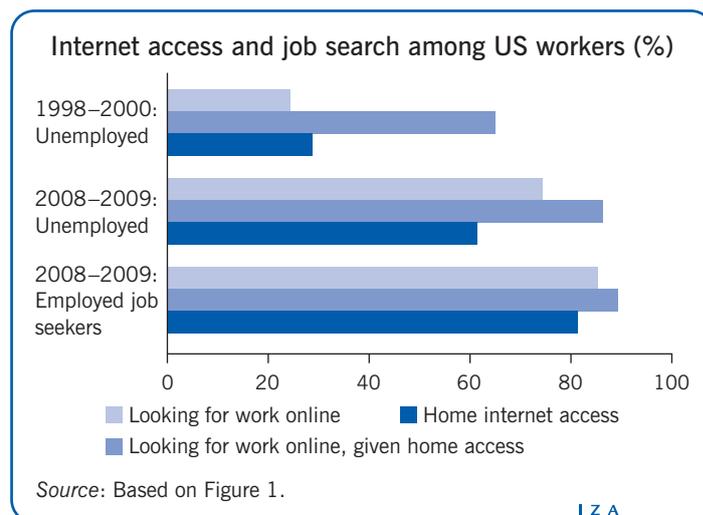
- ⊕ The cost of looking for work and recruiting workers online is very low compared with traditional job search and recruiting methods.
- ⊕ Recent research has detected an unemployment duration reducing effect of internet job search where before no effect was detected.
- ⊕ People who look for jobs online are not casual “window shoppers”: They search just as actively as others who search off-line.
- ⊕ The advent of social networking sites as a job search tool promises to yield further improvements in labor market matching efficiency.
- ⊕ Electronic job boards—i.e. websites where job ads and résumés are posted—are emerging as an important source of data on labor market trends.

Cons

- ⊖ The low cost of applying for jobs online can result in large numbers of inappropriate applications being submitted.
- ⊖ Internet job boards can be dominated by large numbers of “stale” résumés.
- ⊖ Most previous studies have found no labor market friction-reducing effects of online job seeking.
- ⊖ Internet job search remains disproportionately anonymous and formal, i.e. it does not take advantage of preexisting networks of friends, relatives, or colleagues. Historically these have been the most effective search and recruitment tools.

AUTHOR’S MAIN MESSAGE

Online tools, including job boards and social networking, could significantly reduce frictions in labor markets. Much of this potential is only now being realized, as early evidence showed no friction-reducing effect. Job boards are also emerging as important for the statistical study of labor markets, yielding useful data for firms, workers, and policymakers. After a slow start, the internet-based job market is beginning to be used effectively.



MOTIVATION

Since the early 1990s, a large share of commerce in developed countries has moved from bricks-and-mortar settings to the web. In the process, a number of markets—notably, books and recorded music—have been fundamentally transformed. Entirely new market mechanisms, such as eBay, have been created. And in a number of cases there is solid evidence that moving transactions online has had beneficial effects on market functioning.

Given all these developments, plus the fact that a large share of workers' job search efforts and firms' recruitment activities has shifted online, it seems possible that online matching has improved the functioning of labor markets as well. This paper reviews the evidence on whether this has actually happened.

DISCUSSION OF PROS AND CONS

Trends in internet job searching

Figure 1 shows the percentage of job seekers looking for work online in the United States in two periods: 1998–2000 and 2008–2009; the numbers are taken from a recent study that focused on persons aged 23–29 in both periods [1]. Not surprisingly, there was a massive increase in online job searching over this ten-year period: The share of unemployed persons who said they used the internet to look for jobs more than tripled, from 24% to 74%.

Figure 1. Trends in internet access and job search among young workers aged 23–29 in the US (%)

<i>Period and sample</i>	<i>Home internet access</i>	<i>Looking for work online, given home access</i>	<i>Looking for work online</i>
1998–2000: Unemployed	28.6	64.9	24.2
2008–2009: Unemployed	61.2	86.1	74.4
2008–2009: Employed job seekers	81.3	89.3	85.3
2008–2009: During search for current job (all)	77.8	48.0	43.6
2008–2009: During search for current job (unemployed)	74.4	63.6	55.3

Source: Kuhn, P., and H. Mansour. *Is Internet Job Search Still Ineffective?* IZA Discussion Paper No. 5955, September 2011. Online at: <http://ftp.iza.org/dp5955.pdf> [1].

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Much of this increase was related to the growth of internet access—the share of unemployed persons who had internet access at home more than doubled—but was also driven by growing use of the internet for job searching among those who did have home access. This suggests that the online tools available for job searching may have become more attractive to people seeking work.

Another contributing factor, of course, is the fact that the vast majority of job advertisements have migrated to the internet: Job seekers have moved to where the jobs are advertised, while firms have moved to where the job seekers are, in a self-reinforcing cycle.

While unemployed persons, by definition, are looking for work, it is important to remember that they are not the only ones doing so in any labor market. In fact, in most labor markets a substantial share of job seekers already have a job. Although historical data are not available for this group, Figure 1 shows that by 2008–2009, 85.3% of employed job seekers used the internet as part of their job search. In short, over the past decade, job seekers have dramatically expanded their use of the internet as a means of finding new jobs, to the point where internet job search is almost universal, at least among job seekers who already have jobs.

Who looks for work online?

Not surprisingly, both in 1998–2000 and 2008–2009 job searchers who looked online were, on average, younger and much better educated than job seekers who did not [1], [2]. It is perhaps noteworthy, though, that by the second period, when internet access was much more universal, this large education gap was evident even among job seekers with home internet access. Thus, even though they had the option to look for work online from a home computer, many unemployed, less-educated job seekers did not use the internet when looking for work. In neither period was there a gender difference in the use of online search. Internet job search activity is also more likely to be used by people seeking work in certain industries, such as information technology (IT), finance/insurance, and real estate [3].

Somewhat more surprising are the ethnic and racial gaps in online search—at least in the US, where these data are available. For example, while black and Hispanic workers were less likely to look for work online than whites in 1998–2000, this gap was absent in the subsample of job seekers who had home internet access. By 2008–2009, black and Hispanic job seekers were just as likely to look for work online as white job seekers, even though they were less likely to have home internet access.

In fact, controlling for internet access and a number of other worker characteristics, black job seekers were significantly *more* likely to look for work online than white job seekers in 2008–2009. One possible explanation is that black workers have less access to informal referral networks for jobs than white workers; this could compel them to use more formal, impersonal methods, like responding to job ads and posting résumés [4], which until very recently were the main ways in which the internet was used to look for work.

How do job seekers look for work online?

While it is clear that internet job searching has increased dramatically over the past decade, what do people actually do when they look for work online? Importantly, the rates of internet job search displayed in Figure 1 include *any* kind of online activity to look for work, including e-mail. What do we know about the ways in which workers

use the new electronic tools that have emerged in the past decade in their job search strategies?

The first study of this question used data from 1998–2000 [5]. Although the survey used by the authors did not ask respondents whether they used the internet to conduct any given type of search activity (such as contacting public employment agencies or filling in résumés), it does allow us to tabulate the mix of search activities separately for persons who did any online search versus persons who searched only offline. Figure 2 shows the results.

Figure 2. Use of different search activities by job seekers, by whether they engaged in any internet job search, 1998–2000 (%)

Search activity	Looked for work online?	
	No	Yes
Contacted employer directly	65.0	62.0
Contacted public employment agency	19.5	25.2
Contacted private employment agency	6.0	10.2
Contacted friends or relatives	13.8	11.9
Contacted school/university employment center	2.0	3.5
Sent out résumés or filled out applications	45.5	64.1
Checked unions or professional registers	1.2	3.1
Placed or answered ads	12.7	24.5
Other active methods	3.4	10.1

Source: Kuhn, P., and M. Skuterud. "Job search methods: Internet versus traditional." *Monthly Labor Review* (October 2000): 3–11. Online at: <http://bls.gov/opub/mlr/2000/10/art1full.pdf> [5].

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Interestingly, while most activities were used in similar amounts by these two groups, internet searchers were much more likely to look for work by sending out résumés and by placing or answering job ads. At the same time, they were less likely to contact employers directly about jobs and less likely to contact friends or relatives about job possibilities. These differences confirm the notion that, at least in its early days, internet job search was primarily an anonymous, formal process of looking at (and responding to) ads and posting résumés.

A follow-up survey using data from 2008–2009 directly measured which types of job search activities were done mostly online and which mostly off-line [1]. As in 1998–2000, the use of the internet was quite similar for most job search activities, but two stark differences were apparent: Sending out résumés and filling in applications were much more likely to be done online, and the reverse was true for contacting friends and relatives about jobs. This reinforces the idea that as recently as 2008–2009 the internet was primarily a tool for formal, anonymous job search, not for informal networking activities.

Finally, it is worth mentioning a distinct and small but growing way in which internet job search is happening: sites like oDesk, Amazon Mechanical Turk (MTurk), Elance,

and Freelancer, which mediate the actual provision of labor online. To the extent that less and less work in an information economy needs to be done by someone who is physically present on an employer's premises, this form of labor market intermediation, which transcends national boundaries, may soon become the norm for many firms and workers.

How effective is internet job searching?

As mentioned, the internet has become a widely used intermediary in many markets, and studies of its effects have, in many cases, shown significant improvements in market functioning. For example, one feature of a well-functioning market is that identical products should be priced identically. A well-crafted early study found that the advent of internet exchanges reduced the dispersion of prices for a standardized product: life insurance [6]. Since the internet made it easy to compare prices, firms charging above-market rates found it harder to attract customers.

Another feature of well-functioning markets is that matches between suppliers and customers are made quickly, so few resources lie idle. Pursuing this idea, a further study from 2012 has shown that the entry of the US website Craigslist—which is widely used for home rentals—into a city reduces the apartment vacancy rate.

Given this, it is perhaps surprising that most early studies of the effects of the internet on the speed and efficiency of labor market matching do not show a beneficial effect. The first study to compare the job search outcomes of persons looking for work online with similar workers not looking online used data from 1998 and 2000 [2]. The authors found—much to their surprise—that unemployed people who looked for work online were *less* likely to be reemployed than unemployed people who did not look online. This was true even when the authors controlled for a detailed set of worker and labor characteristics, as well as the person's overall search intensity.

One possible explanation for this puzzling result is the formal nature of internet search: Not only is a formal search less effective, but persons who use it may be doing so precisely because their informal contacts and social networks are poor. Another possibility is low search intensity: Could it be that the low cost of internet job searching attracts many searches from people browsing available jobs with only a casual interest in finding a new job?

Interestingly, this study's results about the apparent ineffectiveness of internet job search were confirmed by a very different study covering the period 2000–2007 [7]. The authors here took advantage of the fact that the Craigslist website expanded dramatically during that period, but at different times in different cities. Since Craigslist quickly became one of the main job boards in those cities, it seems reasonable to ask whether its entry into a city reduced the city's unemployment rate in much the same way that it reduced the rental apartment vacancy rate. Consistent with the earlier findings [2], the later study found no effect of Craigslist on the local unemployment rate [7].

In 2011 the issue of internet search effectiveness was revisited using survey data that was obtained in 2008 and 2009 [1]. The authors did their utmost to use exactly the same sampling rules and statistical methodology used in the earlier study [5].

Much to the authors' surprise, the counterproductive internet search effect found in 1998–2000 was *reversed* in 2008. In particular, they found that internet searchers now had unemployment durations that were about 25% shorter than non-internet searchers. While this does not prove that internet use now has a positive, causal effect on workers' search outcomes, it does indicate that something quite substantial has changed over the last decade in the relationship between online job search and job search success.

So why does internet job search appear to have been effective—at least for the individuals who used it—in 2008 but not ten years earlier? Turning first to the earlier hypotheses [5], the later study shows that, at least by 2008, internet search was not a casual, low-intensity activity: Internet searchers engaged in just as many distinct types of activities to find work and did not disproportionately use search methods that are considered “passive” rather than active [1]. As noted, the authors do find, however, that even in 2008 the internet was still largely a formal job search channel; thus, any improvements in internet job matching must be largely due to improvements in how these formal channels work.

What kinds of improvements might these have been? One candidate that leaps immediately to mind is the better design of internet job search sites. Certainly, the major sites have invested a great deal of money and effort in improving their product over this period, and the problems of early job sites—such as large numbers of “stale” résumés—are well known. That said, as Figure 2 makes clear, a significant share of internet searching involves activities that do not use job boards at all.

For this reason, we think that a more likely explanation for the recent greater effectiveness of internet job search—one consistent with the significant rise in online job search over the past decade—is network externalities: Internet searching is effective for job seekers only if a large selection of ads is posted online, and for firms only if a large number of résumés are posted. Through this simple but profound mechanism, greater overall connectivity can raise a network's effectiveness for every individual user.

Internet job boards as sources of labor market data

Internet job boards are a rich source of information on the number and characteristics both of vacant jobs and of those looking for jobs, and sometimes the results of the matching process between searchers and jobs. Job boards have a number of unique strengths compared with “traditional” sources of labor market data, and these strengths are being used to answer new questions that are difficult to study with traditional data.

One key advantage of job board data is their immediacy: Because new job board information can be downloaded almost continuously, it can provide highly current information on labor market trends. For example, Monster.com publishes a monthly index of online job demand, based on a number of corporate career sites and job boards in addition to Monster itself. Monster claims that its index provides useful advance information, since job advertising typically precedes hiring by one or two months. Monster also releases detailed reports on the online market for specific job categories (such as sales) in individual US cities. Reports like these may one day

provide useful information on emerging skill shortages and surpluses that can be used by workers, firms, and local community colleges in refining their search and training strategies.

Also, since 2005 the Conference Board in the US has released its *Help Wanted OnLine* data series (HWOL), which measures the number of new, first-time online jobs and jobs reposted from the previous month for more than 16,000 internet job boards. This has now replaced the Board's *Help-Wanted Advertising Index* (HWI) of print ads, which was discontinued in July 2008 after 55 years of operation. A related use of internet data to measure labor market trends is based on counts of keyword searches, such as Google Trends data. For example, a 2009 study has shown that Google searches for terms like "unemployment office" and the names of job search engines predict unemployment rates in Germany, providing a useful leading indicator [8].

Second, job board data can serve as a complement to traditional social and labor force surveys as a general social science research tool, providing data on a number of aspects of labor market activity and outcomes that are hard to obtain otherwise. In this regard, job board data are especially useful in the study of specialized, local, or rapidly evolving labor markets in developed countries (for example, the market for IT workers) where standard labor force surveys do not provide enough detail, and of markets in less-developed countries where standard labor force data are not available or of high quality. In such situations, data that are voluntarily provided by a job board, or even data that are scraped from the internet by a user-designed web crawler, can be a unique source of basic labor market information.

Thus, for example, scraped job board data from China has been used to study employers' gender preferences in hiring [9]. Other recent applications include estimating the effect of English language skills on earnings in countries where this information is not available in social surveys, estimating the labor market value of personality characteristics, characterizing how workers' application behavior responds to new public information on whether a company is in financial distress, and estimating the effect of recent US unemployment insurance policy changes on job search behavior. Although processing this type of data (especially converting free-form text fields in job descriptions or résumés into quantifiable data for statistical analysis) can be time-consuming, the time and expense can compare very favorably with conducting a survey.

A final use of job board data is to advance economic research of the most basic and fundamental kind. Specifically, *internal* job board data contain detailed information on the mechanics of the labor market that is of potentially great relevance to how economists should best model labor markets. It is, in fact, amazing how little labor economists know about the actual mechanics of how workers get assigned to jobs, such as the share of jobs that are filled via formal applications, the number of applications that are submitted to a typical advert, and the number of applications workers make and where they apply.

Filling some of these gaps, a series of papers uses job board data to show that when employers are especially eager to fill a vacancy, they specify fewer job requirements, provide more details about the job application process, fill the vacancies faster, and are more likely to fill the job with an underqualified worker. In 2012 research revealed

that the fraction of job ads that advertise a wage varies widely across different labor markets and declines with the job's skill level [10].

These types of results shed a useful light on economists' theoretical models of labor market search and recruiting, including the canonical equilibrium search models developed by economics Nobelist Dale T. Mortensen and his coauthors. Also in this vein, an analysis of data provided by CareerBuilder, the largest job board in the US, shows that labor markets are much more specialized than the users of the above models have typically assumed [3].

Emerging trends and future potential

Personal and professional networking sites, like Facebook and LinkedIn, are a key online tool whose implications for labor markets are not yet fully understood. That said, one emerging way these sites affect labor markets is by providing information to employers that was previously unavailable: An increasing number of employers now examine applicants' social network profiles when deciding whom to interview. Also of potentially major importance, job search features have recently been introduced into existing networking sites, including Facebook and LinkedIn's "Apply within LinkedIn" button.

Given the finding that informal online job searching—that is asking friends or family about jobs—is still rare but highly effective when it is used, these developments might significantly improve matching efficiency in labor markets. Improvements in job boards' suggestion systems—which recommend matches both to firms and workers on the basis of what has worked well in the past—also offer significant potential [1].

At the same time, internet-sourced labor market data, such as HWOL and Google Trends data on job searches, remain in their infancy. Much more remains to be done in harnessing the potential of the internet as a source of highly detailed, real-time data on the functioning of labor markets.

LIMITATIONS AND GAPS

A key limitation of studies which compare unemployment durations of internet versus non-internet searchers, is that they do not reveal the effects of improved search technologies on the overall unemployment rate in the economy [1]. It remains to be seen whether making each "horse" in the race for jobs faster yields substantial aggregate benefits in terms of improved quality of matching and lower overall unemployment. Thus, additional research on the aggregate effects of the new search technologies would be very useful.

And while internet job boards have tremendous potential as data sources, it is important to remember that these data are not representative of the workers or jobs in the labor market as a whole. By their nature, ads represent *vacant* jobs, which means that growing and high-turnover industries, occupations, and regions will be overrepresented. By the same token, unemployed, mobile, and dissatisfied workers will be overrepresented in job board résumés.

Finally, as we have noted, young and highly educated workers are much more likely to job search online than other workers. Additional challenges affecting the representativeness of online job postings are “multihoming” (the tendency of firms (workers) to post the same advert (résumé) on multiple job boards) and duplicates (the tendency of employers on some sites to frequently re-post the same advert until a vacancy is filled). These technical issues need to be resolved to make job board data more useful as an indicator of national patterns and trends.

SUMMARY AND POLICY ADVICE

Despite negative early findings, recent research suggests that online job searching might indeed speed up the reemployment of unemployed workers. If so, the rapid spread of internet job searching suggests that the rise in unemployment seen in the Great Recession, large as it was, may actually underrepresent its severity compared with previous recessions. Macroeconomic policymakers may wish to take this into account.

Another emerging policy concern involves the effects of online labor exchanges like MTurk and oDesk, which allow the direct online exchange of labor services, often across international borders. At the moment these exchanges, like “mainstream” job boards, are essentially unregulated and are not effectively governed by any country’s labor standards legislation.

Whether online exchanges (and the labor they facilitate) should be regulated is a question policymakers need to consider, although the industry may still be evolving too rapidly for most forms of regulation to be practical. A reasonable starting point, however, might be a common set of privacy guidelines or certificates for all job boards.

Finally, policymakers may wish to use government resources to take greater advantage of the tremendous potential of internet-sourced data on labor markets. Small infusions of public funding could yield great rewards by supplementing expensive, slow-moving surveys with internet-sourced data on market conditions and emerging labor market shortages that are both relatively cheap to collect and available in real time.

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Competing interests

The IZA World of Labor project is committed to the *IZA Guiding Principles of Research Integrity*. The author declares to have observed these principles.

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