Hunting for talent: Firm-driven labor market search in America*

Ines Black
Duke Fuqua
ines.black@duke.edu

Sharique Hasan
Duke Fuqua
sharique.hasan@duke.edu

Rembrand Koning
Harvard Business School
rem@hbs.edu

April 15, 2020

Abstract

Research suggests that increased digitization of the labor market combined with the changing demand for skill has altered the job-search process. In this article, we argue that these changes have led to increased investments in firm-driven search for talent (or 'outbound recruiting'). We investigate this question using two data sets, one new. First, we conduct a nationally representative survey of over 13,000 American workers. We find that nearly 18 percent of all employed workers in the US were hired into their present company by the outbound recruiting effort their employer, either directly or through labor market intermediaries such as a headhunter. The share of hiring driven by firm-driven search is greatest among higher-income workers, at 20.3 percent, and those with STEM and business degrees, at 20 percent. Moreover, considerable regional variation exists. For example, over a quarter of Silicon Valley workers are hired in this manner, whereas only 14.5% of those in Rochester are. Second, we complement our worker-level results by analyzing a large sample of job postings in the US economy over the past decade. We find that firms, especially those relying on high-skilled labor, are increasingly developing capabilities to better hunt for talent—hiring more recruiters with skill in online search. Given the growth of this practice, we discuss implications for research on firm strategy and labor markets.

*Author names are in alphabetical order. The authors thanks Duke University's Fuqua School of Business, Harvard Business School and the Kauffman Foundation for their generous financial support for this project.

Introduction

A firm's performance relies on finding, hiring, and retaining talented workers (Coff and Kryscynski, 2011). However, much of the existing research on human capital strategy implicitly assumes firms rely on the search behavior of workers to find talent. This abstraction that workers drive search is embedded in theoretical models of job search behavior (e.g., Mortensen and Vishwanath, 1994; Jovanovic, 1979) as well as in expansive empirical work on firms' hiring decisions (e.g., Fernandez and Sosa, 2005; Bertrand and Mullainathan, 2004) and human resource capabilities (e.g., Coff and Kryscynski, 2011; Barney, 1991). In most theories, firms 'search' for workers in so far as they post job openings, choose among applicants, and sometimes rely on existing employees' referrals (Fernandez, Castilla and Moore, 2000; Petersen, Saporta and Seidel, 2000). Increasingly, however, digitization and the internet have enabled firms to take a more active role in finding talent—via access to vast databases of updated worker profiles (Autor, 2001; Elfenbein and Sterling, 2018). Such data has the potential to reduce the costs of finding workers, especially those not actively searching. Yet, there remains a considerable gap in our understanding of how widespread firm-driven labor market search is, and which workers and firms participate.

In recent years, the growth of firm-driven search or "outbound" recruiting has been highlighted by many in industry and academia. A Federal Reserve report, for example, indicated that nearly 1 in 3 workers who switched employers were not actively searching—a finding they assume implied high rates of outbound recruiting by firms (Carrillo-Tudela et al., 2015). Researchers have also highlighted this trend. Cappelli (2019) argues that firms increasingly prefer to hire "passive candidates" and scour online databases (e.g., LinkedIn) for people to poach. Despite an emerging constellation of suggestive patterns and anecdotes, there remains no systematic study of this

phenomenon.

In this article, we analyze two new sources of data that provide insight into the prevalence and impact of outbound recruiting in the American labor market. To better understand the effects on workers, we conduct a nationally representative survey of working Americans to assess the prevalence of different modes —e.g., inbound, outbound, referrals— of finding a job. Next, we complement our survey by analyzing a large sample of job postings during the period between 2010 and 2018 to understand temporal and firm-level heterogeneity in investments in firm-led worker search.

Our analyses provide several new facts about the prevalence of this practice and firms' increasing investment in it. First, we show that over 18 percent of all employed workers in the US in January 2020 were hired into their present company by the outbound recruiting effort of their employer, either directly or through a headhunter.[1] Moreover, hiring through outbound recruiting is greatest among higher-income workers, at 20.3 percent, those with STEM and business degrees, at 22.5 percent.

Additionally, there is considerable regional, firm, and demographic variation. Over 25 percent of Silicon Valley workers are hired in this manner, but only 15 percent in Sacramento are. While outbound recruiting varies across regions, referrals do not, sticking near 33% across all the labor markets in our sample. For workers at firms with fewer than 100 employees 22% got their jobs through outbound recruiting; only about 15% at firms with more than 100 workers. Finally, 18.9% of men landed their current job by being recruited as against 16% of women.

In our analysis of tens-of-millions of job-postings and two-hundred-thousand US firms, we find that firms are developing capabilities to better hunt for talent. They are increasingly hiring recruiters with considerable skill in searching databases such as

[1]While we do not have a comparable historical reference point for this figure our data does suggest a decline in the use of formal applications as compared known figures from past research.

LinkedIn—nearly tripling the rate at which they employ this type of worker relative to other workers, even general HR staff. Finally, we see that the greatest demand for recruiting talent is among firms that rely on high-skilled technical and managerial labor.

These findings hold several important implications for research on human capital strategy and labor markets (Barney, 1991; Coff, 1997). If we take the firm's perspective, research must better understand the capabilities that lead some firms to more successfully find, vet, and retain talent (Coff and Kryscynski, 2011). Such capabilities are especially important in an environment where competitors are actively recruiting a firm's workers. These capabilities may be especially crucial for small or new firms with little visibility in the labor market (Cardon and Stevens, 2004). Second, our findings also highlight the importance of recruiters as essential intermediaries between firms and workers (e.g., Fernandez-Mateo and Fernandez, 2016; Finlay and Coverdill, 2007). While a voluminous literature exists about the behavior of employee referrers on individual hiring decisions, recruiters both in-house and outsourced are critical for understanding how firm-driven search operates (e.g., Fernandez-Mateo and Fernandez, 2016). A growing literature on the labor market frictions introduced by recruiters is emerging. Our findings provide novel and crucial macro-level empirical evidence of their growing importance.

Furthermore, since nearly 18 percent of Americans are hired through the outbound recruiting efforts of firms, we must understand the factors that lead individuals to be more effective *passive candidates* (Cappelli, 2019). That is, what leads workers to be easily discovered, understood, and recruited? Those impacted by this shift appear to be workers in remunerative occupations requiring STEM and management skills (Deming and Kahn, 2018). Owing to this shift, researchers must also understand the biases and frictions that hunting for passive candidates introduces, especially the effects

on workforce composition and wages. Finally, there is a possibility that this change will lead to more inequality and further entrench segregation across occupations and firms (e.g., Rubineau and Fernandez, 2013; Barbulescu and Bidwell, 2013; Ferguson and Koning, 2018). In particular, we may see a growing gap between those who are hunted by firms and those who search on their own.

The labor market strategy of firms

Management scholars have developed a rich literature on strategic human capital (e.g., Coff, 1997; Lee and Miller, 1999; Williams, Chen and Agarwal, 2017; Belenzon and Schankerman, 2015). This literature has primarily focused on identifying conditions under which human capital can be a source of sustained competitive advantage for firms (Barney, 1991; Coff, 1997; Felin, Zenger and Tomsik, 2009). Many scholars have progressively unpacked the individual, firm, and industry-level mechanisms that allow organizations to both create and capture value from their employees. Existing studies have focused on a range of levers that firms have at their disposal to get workers to perform better—e.g., incentives (Bandiera, Barankay and Rasul, 2007), organizational structure (Puranam, 2018), purpose and identity (Burbano, 2016), and managerial practices (Chatterji et al., 2019). An important stream of this research focuses on the strategic implications of hiring practices, including *who* to hire as well as an emerging literature on *how* to hire (Fernandez, Castilla and Moore, 2000; Burks et al., 2015; Pallais and Sands, 2016).

Why do firms invest in outbound search for labor?

The literature has traditionally argued that two primary factors determine whether a firm gains advantage from its people (Coff and Kryscynski, 2011; Bidwell, 2011). First,

companies that rely on firm-specific human capital, consisting of skills and knowledge more useful to them than their competitors, will fare better. The latter is because workers with a higher proportion of firm-specific capital are not as valuable to other companies, and are less likely to be poached (Jovanovic, 1979). A second means through which firms derive competitive advantage from human capital is if their cost of getting talent is lower than their competitors (Bidwell, 2011).

In recent years, scholars have observed that firms may be less reliant on firm-specific human capital, and increasingly demand workers with transferable skill and knowledge (Cappelli, 2012). Research suggests that one mechanism that is driving this change is firms' decreasing investments in on-the-job training (Cappelli, 2015). This shift has several consequences for human capital strategy. First, firms may substitute lower-skilled candidates whom they train internally for higher-skilled external ones. Second, given the rising expectations for skills among new hires, firms may seek candidates from narrower pools of workers who *already* do similar jobs at competitor firms. The later should lead firms to prefer employed, and therefore passive, candidates who may not be actively searching for jobs. Finally, if the skill requirements of firms are indeed general, then we should see increased competition among firms for the same pool of workers.

A second factor that may drive the rise of outbound recruiting are the potentially decreasing returns from network hiring. A large body of research suggests that firms rely on the networks of their employees to recruit (Granovetter, 1973; Castilla, 2005; Burks et al., 2015). Hiring through network referrals helps solve many information problems for the firm (Pallais and Sands, 2016). However, while the networks of existing employees might help firms distinguish high- and low-quality workers, they constrain the consideration set, thus limiting the pool of talent and the growth potential of the firm (Black and Hasan, 2015). As a result, firm-driven search may be a partial solution

to the decreasing returns from network hiring.

Finally, another major transformation in the labor market has been its mass digitization. While online job-boards have been around for several decades, in recent years, many more people have gotten access to the Internet and created online profiles that showcase their skills and experience (Autor, 2001). Nowadays, over 163 million Americans use LinkedIn, a major online career platform that allows workers to post profiles and apply for jobs. A necessary consequence of the mass digitization of the labor market is a reduced cost of finding workers, especially those that are not actively looking for a job. However, much like any other type of technological change, firms who have complementary capabilities in place will benefit most from this information.

These three factors—the increasing demand for transferable and high-level skill, decreasing returns from network hiring *and* the mass availability of information on workers—we hypothesize will lead to more outbound recruiting by firms. Specifically, we should see firms increasingly invest in outbound recruiting capabilities. That is, they will hire more recruiters with skills that allow them to scour vast online databases. Moreover, we should especially see higher levels of outbound recruiting among highly skilled workers in managerial and technical occupations. Lastly, because of digitization, we should anticipate the most substantial proportion of workers affected by outbound recruiting to be ones on career platforms such as LinkedIn.

Which firms invest in outbound recruiting?

Not all firms will likely engage in outbound recruiting at similar levels. Theoretically, the firms that have the greatest incentive to use this practice are ones that are unlikely to have thick pipelines—either from formal job postings or through informal referrals, and those that rely on high-skilled labor. As a consequence, we should expect both firm size as well as the human capital needs of firms to impact their use of outbound

recruiting.

Regarding firm size, research suggests that large high-status firms have an advantage in the labor market. For example, Bidwell et al. (2015) find that, in the early stages of workers' careers, high-status firms can attract higher-quality employees without changing wages. On the other hand, smaller or less established firms may need outbound recruiting to increase brand awareness with candidates that would otherwise not be in their normal applicant pool—a pool drawn from job postings or referrals (Rubineau and Fernandez, 2013; Fernandez and Sosa, 2005). As a consequence, we predict that smaller firms are more likely to recruit via outbound searches.

Outbound recruiting and worker characteristics

A large stream of literature on labor markets and careers shows that there is bias in how firms hire. A sizeable empirical literature, using audit studies of the worker-driven application process demonstrates that firms discriminate against workers based on a variety of characteristics. Researchers find discrimination based on race (Bertrand and Mullainathan, 2004; Pager, Bonikowski and Western, 2009), gender (Booth and Leigh, 2010), sexual orientation (Tilcsik, 2011), and social status (Rivera and Tilcsik, 2016). These factors make an organization's employees much less diverse than their applicant pool. Another stream of work related to the application process of workers suggests that candidates from minority or disadvantaged backgrounds may also self-select out of the applicant pool, also leading to biased hiring (Pager and Pedulla, 2015). A second literature, on referral hiring, also shows that bias exists when firms use networks to hire (Rubineau and Fernandez, 2013). Fernandez and Sosa (2005), for instance, show that using employee referrals may lead to gendered jobs and racial segregation in the workplace (Fernandez and Fernandez-Mateo, 2006).

How might outbound recruiting affect bias and segregation in the labor market?

On the one hand, firms may use outbound recruiting as an opportunity to remedy the issues that arise from unbalanced applicant pools and bounded search—whether caused by the self-selection of applicants into the labor pool (Pager and Pedulla, 2015) or homogeneous employees referring friends (Fernandez and Weinberg, 1997). On the other hand, if firms rely on crude signals of skill (e.g., already working at a peer company in a similar job), we may see a reinforcement a bias due to drawing from an already biased pool (e.g., Ferguson and Hasan, 2013). As we theorized earlier, the firms that are most likely to use this mode of hiring are those that rely on high-skilled technical and managerial talent. Considerable research suggests that this pool is much more likely to be male, white, or Asian, as well as geographically concentrated in certain high-growth economic regions such as Silicon Valley (Moretti, 2012). If firms do indeed search narrowly and rely on experience in similar firms and similar jobs, then we should see a variety of biases in the aggregate statistics—including gender, racial, and geographic.

Method

Our approach in this article is descriptive and consists of analyzing two primary data sets, one of which is collected by us. First, we conducted a nationally representative survey of American workers to understand the prevalence of outbound recruiting by firms in the US labor market. These data allow us to provide national-level facts about the prevalence of this practice and insights into how it varies by the characteristics of workers and their workplaces. Second, we analyze a large sample of American firms and their job postings over the past decade. We focus on understanding the characteristics of firms that best predict the degree to which they invest in capabilities that enable firm-driven labor market search—namely, recruiters who find, vet, and hire passive

candidates. We describe these data below.

Survey of American Workers

To conduct our survey of American workers, we contracted with CivicScience, a major polling company based in the United States. CivicScience has an on-demand sample of over 85 million Americans over 18 years old. After specifying a sample size that would provide us a margin of error of $\pm 1\%$ survey responses from sub-samples are then re-weighted to reflect the population figures in the Current Population Survey (CPS) conducted by the US Census Bureau.[2]

For our study, we surveyed a nationally representative sample of 18 to 65-year-old men and women, broadly representing the working-age population of the United States. Our total sample consists of 13,680 responses to a question aimed at understanding how an employed American was initially hired into their present company. Specifically, we asked: 'Which of the following options best describes how you first got hired by your present employer?' Employed respondents had five options from which they could choose the one that *best* represented their situation.

- I found a job posting and applied for the role
- I was referred to this employer by an existing employee
- A recruiter from this employer reached out to me and invited me to apply
- A headhunting firm reached out to me and invited me to apply
- I reached out to a headhunting firm

In addition to responses to our question of interest, the CivicScience platform provided us with the ability to cross-tabulate our question's results with other questions asked of the sample. For the purposes of our study, these additional questions broadly

[2]A a complete description of the firm's methodology can be found here: https://civicscience.com/white-paper-assessing-our-methodology/

fall into five categories: (1) education, occupation and income; (2) workers' technology use; (3) firm size; (4) geography; (5) demographic characteristics. For our analysis, we create one dependent variable—the proportion of respondents who state that the best description of how they were hired into their present firm was (a)'A recruiter from this employer reached out to me and invited me to apply' or (b)'A headhunting firm reached out to me and invited me to apply.' We call this variable *Outbound recruiting*. The cross-tabulations are re-weighted using CPS weights to match the observable demographics of our sample to that of the American population (e.g., Deville, Särndal and Sautory, 1993; Kolenikov, 2014). For regional estimates, estimates are re-weighted to reflect MSA-specific weights. Such reweighting techniques are commonly used in the strategy literature by scholars conducting sample surveys (e.g., Bennett and Chatterji, 2017; Starr, Prescott and Bishara, 2019) .

Hiring by US-based firms

To shed further insight into the firm-level investments in outbound recruiting, we complement our worker survey with data covering the near universe of online job postings from Burning Glass Technologies (BGT). Our data include tens-of-millions U.S. job postings from 2010 through 2018 and are described in more detail by Deming and Kahn (2018). The raw job descriptions are cleaned and structured by BGT. The data provider assigns each job a SOC title; with these, we identify all postings that are classified as "Human Resources" roles. For the firm-level analysis, we aggregate this data in to firm-year observations, with 200,279 total firms in our sample.

Our analysis asks three broad questions of these data: (1) how has the demand for recruiters changed over time; (2) what types of skills do firms want in recruiters; and (3) what is the relationship between the types of skills firms require and level of their

demand for recruiters? For the latter, we estimate firm-year regressions estimating the probability that a firm posts a recruiter job, as a function of the share of non-recruiting postings that require different types of skills, including cognitive, social, character, managerial, as well as technical. In these models we include a variety of controls including controls for total number of non-HR postings as well as fixed-effects for year, industry, MSA, and firm.

Results

Survey of American Workers

We begin our analysis by estimating the overall prevalence of outbound recruiting in the American labor market. We present these results in Table 1. This table provides insight into how widespread this practice is relative to mechanisms through which firms find and recruit workers.[3] Overall, we find that 17.8% of workers are hired through a firm-driven search process—i.e., a recruiter at the employer (12.5%) or contracted headhunter (5.3%) reached out to them and asking them to apply. Our survey also provides insight into the prevalence of other modes of hiring as well. Nearly 43.9% of workers in the full US sample found and applied for the role themselves, and existing employees referred another 34.6% of workers.

[Table 1 about here.]

While these broad statistics suggest that firm-driven search is indeed quite prevalent in America, these baseline statistics mask significant heterogeneity. Results vary considerably depending on firm and worker characteristics as well as geographic region.

[3]The margin of error for these estimates is ±1%.

Education, occupation and income

Research shows that educational attainment and labor market outcomes are positively related—educated and higher-skilled workers are in higher demand. As a result, we should expect a link between attainment and how workers are hired, i.e., through inbound or outbound channels, especially if there is intense competition between firms for certain types of high-skilled, knowledge-intensive talent. As competition for such labor increases, firms should invest more in finding capable workers and be more likely to recruit them directly.

Table 2 provides a cross-tabulation of educational attainment and the hiring mode. We see that the prevalence of outbound recruiting increases with education level. The largest difference is between those without college degrees (16.0%) and those with graduate or professional degrees (20.8%), a statistically significant difference of 4.8% ($z = 3.17$ and $p \leq .01$). However, a meaningful and statistically significant difference also exits between those with some college, or an associate's or a bachelor's degree, and those with graduate degrees with both differences being significant at $p \leq .01$. These results suggest that highly educated workers, i.e., those with graduate and professional degrees, are more likely to be hired through firm-driven recruitment processes.

What is interesting to note here is also how outbound recruiting trades-off with the two other significant modes of hiring across education levels. As the education level increases, the rate outbound recruiting increases, but the rate of referrals also decrease—from 42.64% for those with high school degrees or less to 30.08% for those with graduate or professional degrees. A complementary change can also be seen in the increase in outbound recruiting as education levels increase.

[Table 2 about here.]

Corroborating this evidence, in Table 3, we find that the higher end of the income distribution in the labor market is where outbound recruiting is concentrated. We see that the probability of this practice for those earning less than $50,000 is 14.6%. In contrast, the proportion is considerably higher for those making over a hundred thousand dollars at 20.3%—a difference of 5.7%. This difference is statistically significant at conventional levels ($z = 5.54$, $p \leq .01$).

[Table 3 about here.]

It is possible that some of the variation observed is driven by occupation-level heterogeneity. While our data do not have a specific measure of a surveyed person's occupation, for college-educated workers, we know the broad specialization for their undergraduate major. Table 4 suggests that there may be considerable differences in the prevalence of this practice based on whether individuals have specialized in STEM (20.8%), Health & Medicine (19.4%), and business (20.1%) versus the social science (16.4%) or education (15.2%). Comparing the first three categories (20.27%) to the latter two (16.3%) we find a statistically significant difference of 3.9% ($z = 3.515$, $p \leq .01$).

[Table 4 about here.]

Use of LinkedIn

One of the most significant enabling factors for firms aiming to search for passive candidates is the growth of online networks and job search platforms. Perhaps the most significant of these has been LinkedIn, where individuals can create online career profiles and share information about their education, experience, skill, and build a database of the connections to other workers. In Table 5 we see that LinkedIn users

are significantly more likely to have been actively recruited by a firm (21.1%) versus non-users (15.5%), a difference of 5.6% that is statistically significant ($z = 3.88$, $p \leq .01$). What does this shift to outbound recruiting substitute for? The largest difference in behavior appears in the use of direct applications to jobs with LinkedIn users at 40.15% and non-Users at 44.01% ($z = 2.06$, $p \leq .05$).

[Table 5 about here.]

This finding, though descriptive, supports our paper's central premise that technology has enabled firms to engage in active search for passive candidates. Together, our results suggest that not only has technology-enabled this type of firm behavior, but it has impacted workers differently. Specifically, high-skilled workers in high-income jobs are more likely to experience firms reaching out to them with new job opportunities.

Firm characteristics

Our worker-level survey allows us to gain considerable insight into *who* the likely targets of firm-driven search are. However, a perhaps equally important question is: which firms are most likely to leverage this hiring mechanism. In Table 6, we see workers hired through outbound recruiting are more likely to work in small, rather than large firms. Table 6 shows that workers in small firms (with fewer than 100 employees) have a 22.1% likelihood of being recruited through this method versus 14.4% for those in large firms (more than 5000+ employees), this difference of 7.6% is statistically significant ($z = 3.01$, $p \leq .01$).

[Table 6 about here.]

While not statistically different, small and medium-sized firms also appear to rely more heavily on recruiting workers through referrals than large firms with referral percentages at 39.79% and 39.13% versus 35.81%.

The increased use of outbound recruiting by small firms suggests a possible strategy to find and compete for high-quality workers in tight labor markets.

Demographic characteristics

Next, we examine whether the prevalence of outbound recruiting varies based on the demographic characteristics of workers, namely their age, race or ethnicity, gender, and geographic location. In Table 7, we find no difference between different age cohorts and the extent to which they are hired in this way. The rate of firm-driven search appears comparable across age cohorts. Though the percentage difference between 18-24 years old and 25-29, as well as 35-44 years, is most substantial, these differences are not statistically significant ($p > .1$).

However, there appears to be a correlation between age and referral hiring. The rate of referrals for 18-24 years old is 30.96% whereas the rate is 37.3% for aged between 55-64, a difference of 6.44% ($z = 2.968$, $p \leq .01$). Several mechanisms, both supply and demand-driven, could lead to this outcome. On the worker side, individuals' professional networks may grow as they gain experience, and thus, these networks may be more consequential for hiring as workers age. From the demand side, workers with experience may have to use networks to communicate their more complex skills to employers. These factors may lead older workers to use network hiring more.

[Table 7 about here.]

There is a large body of research examining the role of gender in the labor market. Much of this research finds that women are disadvantaged in job search and career outcomes as well. Our findings on gender, presented in Table 8, finds evidence of a gender difference of 2.9% in the likelihood of firm-driven search—women at 16.0% and men at 18.9% ($z = 4.35$, $p \leq .01$). What is also notable is that women are less likely

to be referred than men, 32.55% versus 35.98%, a difference that is also significant (z = 4.11, $p \leq .01$). This pattern suggests that women are significantly more likely to rely on applying to jobs as compared to men. The need to rely on this formal channel may have a profound effect on the ability to find work in certain types of firms or be hired into certain jobs that may be more remunerative.

[Table 8 about here.]

Finally, research also suggests differences across racial and ethnic groups in labor market outcomes. Namely, research has suggested the minority applicants— primarily Hispanic and African American—are disadvantaged in the labor market. Table 9 presents our results, examining the relationship between race/ethnicity and hiring mechanism. While Hispanic and Latino workers have a slightly lower likelihood of being recruited through outbound recruiting relative to Whites (16.6% vs. 17.2%) this difference is not statistically significant. However, we find some evidence that African American applicants are more likely to be recruited in this manner (19.6%), though this difference is only significant at the p $\leq$ .1 level. Although we cannot say for sure, this higher rate for African Americans may be due to firms using a proactive approach to recruit a more diverse workforce.

We also find some evidence of an increased likelihood of outbound recruiting for Asian workers (19.6%), but again this difference is suggestive, though not statistically significant. Given our data, we are unable to determine whether there are considerable racial differences in this mechanism. One possibility is that firms use this mode to compensate for biases in other sources of recruiting.

However, what is interesting in these findings is that African Americans have considerably lower rates of referrals than Whites and Hispanic workers (30.57% vs. 35.68% and 35.96%). These differences are statistically significant at p $\leq$ .01 and p $\leq$ .01, re-

spectively. These statistics correspond to prior work that suggests a lower likely of references among African American workers (e.g., Smith, 2005).

[Table 9 about here.]

Geography

Finally, to examine whether the use of this practice varies by geographic region, we over-sampled workers five US MSAs (Rochester, Denver, Sacramento, Portland, and Miami). These regions were selected randomly within 2019 unemployment-rate quintiles. We over-sampled three major technology hubs in the United States (San Jose, San Francisco, and New York City). We present these results in table 10. As can be seen in the table, there are differences in outbound recruiting by region. Perhaps the greatest outlier is San Jose, California, the home of Silicon Valley, with the highest concentration of technology workers and firms in the world. In San Jose, 25.4% of workers are hired through outbound recruiting. In contrast, only 14.5% of workers in Rochester are. Comparing these two extremes represents a difference of 10.9% which is statistically different ($z = 3.7$, $p \leq .01$). Additional analysis suggests that this may be more due to the composition of the workforce, rather than rates of unemployment.

[Table 10 about here.]

What is also notable about the pattern of results in Table 10 is the overall stability of referrals, at approximately 33 to 34%, with little variability across regions. On the other hand, it appears that firm-driven search substitutes for worker-driven search. As the percentage of firm-driven search increases, we see a corresponding and significant decrease in individuals responding that they 'found a job posting and applied for the role.' For instance, this percentage is 46.5 in Rochester, but 37.4% in San Jose. Both MSAs, however, have a comparable level of referrals at 34.5% and 33.2%, respectively.

Hiring by US-Based Firms

We now turn to our analysis of firm-level investment in outbound recruiting using data on job postings from Burning Glass Technologies (BGT). The different modes of recruitment, *inbound* versus *outbound*, require different capabilities from firms. If more workers are actively searched for by firms today than in the past, we anticipate three trends in this data: (1) there will be an increasing demand for recruiters, (2) skill requirements will be increasingly digital, and (3) firms that depend on high-skilled workers will hire more of these recruiters.

Increasing demand for recruiters

To answer the first question, we analyze the BGT data on monthly online job postings from 2010 through 2018 in the United States, focusing on the relative importance of recruiting skills and jobs relative to the HR category as a whole. Within these HR postings, we search the job title for the word "recruiter" and tag these positions as recruiting roles. Figure 1 shows the percentage of job postings by month that are classified as HR roles (top) and that are recruiting roles (bottom). We scale the points by the number of job postings in the month. For general HR jobs, we see little in the way of an upward or downward trend with a little more than 1 in 100 postings overall being for HR professionals. For recruiting roles, however, we see a steady upward trend from about 0.2% to under under 0.5%. There appears to be an increasing demand for recruiters corresponding to our expectations.[4]

[Figure 1 about here.]

[4]That said, Figure 1 also shows big jumps in the data series in 2014 and 207, with the percentage of both HR and recruiting jobs dropping and then bouncing back. This "jitter" is most likely an artifact of the data collection process. BGT's underlying data sources vary over time and when certain providers come onto the BGT platform, or leave, there can be jumps in the relative composition of postings. Prior work has addressed this issue by looking at trends within a job category since shifts in the composition of which HR jobs are less likely to occur than shifts in the relative percentage of HR versus engineering roles.

In figure 2, we adjust our graphs to account for changes in the composition of data providers that make up the BGT data. We plot the percentage of recruiting jobs relative to the number of HR jobs to account for data heterogeneity across years as per prior literature (e.g., Deming and Kahn, 2018). As in Figure 1, we again see a steady upward climb. For example, in 2010, roughly 20% of HR postings were recruiting roles. By 2018 this share was just over 30%. Consistent with our survey results, it appears U.S. firms are increasingly relying on recruiters to proactively find talent.

[Figure 2 about here.]

Recruiter skills

We examine whether this shift is due to a mere change in job titles or an actual change in the skills required by firms in the recruiting role. If differences were to come from job titles, this pattern could be indicative of a broader trend of changing composition of labor demand. To explore this possibility, we use data from BGT on each job's listed skill requirements. BGT tags each job description with a vector of skills listed on the resume, and produces structured skill requirements for a given job posting, ranging from "Python" to "Negotiations." The top left panel in Figure 3 plots the percentage of HR jobs that list "recruiting" as a skill.[5] Again, we see an upward trend from just over 25% to just over 40%. These changes suggest an increase in the demand for specific-skills related to the recruiting function, rather than general HR skill.

[Figure 3 about here.]

[5]Specifically, we classify any of BGT's skills that have the phrases "RECRUITING", "RECRUITMENT", "CANDIDATE SOURCING", or "TALENT" as recruiting skills.

To further understand the shift towards recruiting, the remaining three panels in Figure 3 show the percentage of HR jobs that require social media skills ("SOCIAL MEDIA", "LINKEDIN", "FACEBOOK", or "GITHUB"), knowledge of applicant tracking systems ("TALEO", "BRASSRING", "ICIMS", "JOBVITE", or "ATS"), and onboarding ("ONBOARDING"). We find strong upwards trends for all three. Firms increasingly show a preference for hiring recruiters who can spot talent using social media, who can log those workers into applicant tracking systems, and then onboard those hires into the company. Further, in Figure 4 we show that the "SALES" and "COMMUNICATION" skills show no strong trends upwards within HR postings nor does the total number of skills required in a HR job, which has hovered near 9 since 2010. These findings complement the evidence we present in the previous section, painting a consistent picture of rising firm-driven search.

[Figure 4 about here.]

Employee skills and the demand for recruiters

Which firms are increasing their demand for recruiters? To answer this question, we aggregate our BGT data into firm-year observations. Just over 60% of postings list a firm name in the BGT data. We fun these firm names through a cleaning and fuzzy matching process to generate unique firm identifiers. In each year, we then calculate the logged-plus-one count for the number of recruiter postings along with an indicator for whether a firm posted an opening for a recruiter. For all non-recruiting postings during the year, we calculate the firm's skill mix. We build on Deming and Kahn (2018) and create a count for each type of skill in a firms' postings. Skills are bucketed into the following ten categories: Cognitive, Social, Character[6], Writing, Customer Service,

[6]For example "ENERGETIC" or "ORGANIZED."

Project Management, People Management, Financial, Computer, and Software. For example, if a firm posts ten engineering jobs, five of which require the skill "Python," one that requires "SQL," and one that requires "Python" and "SQL" and we say the firm has has a count of 7 software jobs. We then log-plus-one these counts.

Using these data, we run panel regressions where the dependent variable is how many or whether the firm posts a recruiter opening, and the independent variables are the skill mix counts. Since our data spans thousands of firms and multiple years, we can include firm and year fixed effects to account for time-invariant firm heterogeneity and time-varying macro-trends. When the dependent variable is log-counts our model is log-log and so estimates can be interpreted as elasticises. When our dependent variable is a binary indicator estimates represent the percent point increase in recruiter demand for a 1% increase in the skill.

Table 11 displays the estimates from our regressions. Model 1 only includes fixed effects for year and the number of non-HR postings by the firm in the year. These controls allow us to interpret the coefficients in Table 11 as the effect of skill mix for firms holding their level of labor demand constant. We also cluster our standard errors at the Firm, MSA, and Industry levels. Consistent with our survey results that those with business and STEM skills are more likely to be recruited we find that that firms that demand project management skills, computer skills, and software skills are most likely to post for recruiters. For each skill a 10% increase in the the quantity of postings featuring the skill results in roughly 1% more recruiter postings. We also find that personal character has a positive effect, though the coefficient is roughly half as large.

None of the other coefficients are consistently significant across our models. Model 2 adds in industry fixed effects using three-digit NAICS codes, and Model 3 further adds MSA fixed effects. The effect size on project management and software/computer skills

remain mostly unchanged. It does not appear that differences in recruiting intensity can be explained by simple industry differences or differences in the conditions of the local labor market. Model 4 includes firm-level fixed effects to account for time-invariant observed and unobserved firm differences. The association between technological and management skill and hiring for outbound recruiting holds, though magnitudes for the computer/software skills drop by roughly one-third. Finally in Model 5 we replace our logged dependent variable with a dummy for whether the firm posts for a recruiter or not to asses robustness. We find similar patterns to Columns 1-4, firms with greater demand for managerial and technical talent are more likely to have a recruiter. In this model a 1% increase int these skills leads a firm to look for a recruiter 2-4 percentage points more often. In our regression sample 13.9% of firm-years include posting for a recruiter. This suggests that a firm which "digitizes" its workforce from 10% software-focused to 50% would roughly double its likelihood of posting for a recruiter.

Overall, our findings suggest that there has been an increase in demand for recruiting work, that this work increasingly involves online tools like social media and applicant tracking systems, and that the firms driving this increase are those hunting high-skilled talent. They are also in line with our survey findings, and together suggest that high-skilled managerial and technical occupations are more likely to be subject to outbound recruitment practices.

[Table 11 about here.]

Discussion and Conclusion

What impact has the digitization of the labor market had on the firm-driven search for talent? Recent work has highlighted the growing role of large platforms that now shape

the hiring strategies of firms (Elfenbein and Sterling, 2018). We theorize that the digitization of the labor market, combined with a preference for hiring high-skilled workers versus training them in-house (Cappelli, 2012), has increased outbound recruiting by firms. Using two novel data sources, a nationally representative survey of over 13,000 American workers, and a large sample of over 80% job postings in the American economy, we provide new facts on the prevalence of this practice, which firms are more likely to engage in it, and which occupations and demographics are more likely to be its target.

We find that nearly 18 percent of all employed workers in the US were hired into their present company by the outbound recruiting effort of their employer, either directly or through labor market intermediaries such as a headhunter. The share of hiring driven by outbound recruiting is greatest among higher-income workers, at 20.3%, and those with STEM and business degrees, at 20%. Moreover, there is considerable regional variation. Over a quarter of Silicon Valley workers are hired in this manner, whereas only 14.5% of those in Rochester are. Moreover, this channel appears primarily to substitute for worker-driven search (i.e., individuals applying to jobs without any contact with the firm). Referral hiring, for the most part, appears, on the whole, to be quite stable as a mechanism through which firms hire—at approximately 33-34 percent, which is consistent with prior estimates from past decades (Granovetter, 1995). Finally, we find evidence that workers at smaller firms are more likely to be recruited by firm-driven search. This finding is consistent with the theory that smaller firms must actively hunt for talent to compete for knowledge-workers.

We complement our worker-level survey results with an analysis of a large sample of job postings in the US economy over the past decade. We find that firms, especially those relying on high-skilled technical and managerial labor, are increasingly developing capabilities to better hunt for talent. These changes are reflected in three broad

findings. First, we see an overall increase in firms hiring recruiters as a share of total HR personnel. Second, we observe a growing demand for social media and digital skills among recruiters. Finally, we see that this demand is concentrated in firms that require high-skilled workers with both technical and social skills.

Our article informs three research agendas at the intersection of strategy, human capital, and digitization. First, research on the human capital strategy of firms has focused on how firms can invest in complementary capabilities that turn their talent into a competitive advantage (Coff, 1997; Coff and Kryscynski, 2011). Our findings highlight that firms must also invest in capabilities that allow them to hunt for talent and keep them from being hunted. While wages may be an useful lever in attracting talent, non-pecuniary incentives may increasingly play an essential role in retaining high-value workers who may be actively monitored and recruited by competitors.

Second, much of the literature on the hiring interface focuses on firm decision-making in the context of worker-driven search (e.g., Bertrand and Mullainathan, 2004; Pager, Bonikowski and Western, 2009) and network recruiting (Fernandez, Castilla and Moore, 2000; Rubineau and Fernandez, 2013; Fernandez and Sosa, 2005). While these two hiring mechanisms do indeed account for a large share of how firms hire, firm-driven search and its growing prevalence among high-skilled workers suggests several questions for both job seekers and firms. For job seekers, the job search may increasingly be less about finding and applying for jobs, but being an effective *passive* candidate. This change may require workers to develop find-able, signal-laden profiles that firms can discover. It may also require the ability to discover and join the speciality hiring platforms and databases firms now rely on (e.g., hired.com, online spreadsheets listing recently exited employees from major tech firmshttps://news.crunchbase.com/news/looking-at-spreadsheets-as-a-solution-to-layoffs/). For firms, a key challenge may be developing the capabilities to find hidden gems, not on the radar of other companies. Even when

workers are plentiful firm-led search may allow companies to cheaply sift through the multitudes to find the most promising workers. From both the perspective of the worker and the firm, these questions raise important considerations for how firm-driven search impacts gender, racial, and geographic inequality.

Another contribution of our research is to the growing literature on the digitization of the economy and its impact on firm-behavior (e.g., Brynjolfsson and McElheran, 2016). This literature argues that firms are becoming increasingly data-driven, and this is likely to affect how firms organize themselves to compete. We show evidence consistent with this theory: the growing ubiquity of data about workers has forced firms to invest in capabilities to exploit this information. In turn, this change in how firms hire has reshaped the outcomes of workers.

While we can provide new facts about a growing, and likely impactful phenomenon, our approach is not without limits. Our results derive from a survey and observational data, which fundamentally limit our ability to make causal claims or concretely identify mechanisms. However, our results paint a consistent story and provide new insights both into the prevalence of different hiring mechanisms but also heterogeneity across the economy. Nevertheless, we see our study as the first step towards further research on what we identify as a growing and important phenomenon, with broad implications for our understanding of labor market outcomes and human capital strategy.

Moving forward, the continued growth of platforms that give firms access to detailed information about workers both outside and inside the organization will raise important questions for scholars and practitioners. How should firms design capabilities that allow them to find and assess worker capabilities (Barney, 1991)? How will this shift affect the nature of existing labor market signals, such as firm status (Bidwell et al., 2015; Rider and Tan, 2014), education (Spence, 1973), or experience (Ferguson and Hasan, 2013), and what impact will this have on the individual worker and the labor market

as a whole? Finally, how will the broadening reach of this phenomenon affect workers beyond those in high-skilled occupations or economic hubs such as Silicon Valley or New York as well as the global talent pool? Addressing these questions, among others, will guide future research and practice.

References

Autor, David H. 2001. "Wiring the labor market." *Journal of Economic Perspectives* 15(1):9–49.

Bandiera, Oriana, Iwan Barankay and Imran Rasul. 2007. "Incentives for managers and inequality among workers: Evidence from a firm-level experiment." *The Quarterly Journal of Economics* 122(2):729–773.

Barbulescu, Roxana and Matthew Bidwell. 2013. "Do women choose different jobs from men? Mechanisms of application segregation in the market for managerial workers." *Organization Science* 24(3):737–756.

Barney, Jay. 1991. "Special theory forum the resource-based model of the firm: origins, implications, and prospects." *Journal of Management* 17(1):97–98.

Belenzon, Sharon and Mark Schankerman. 2015. "Motivation and sorting of human capital in open innovation." *Strategic Management Journal* 36(6):795–820.

Bennett, Victor M and Aaron K Chatterji. 2017. "The entrepreneurial process: Evidence from a nationally representative survey." *Strategic Management Journal* .

Bertrand, Marianne and Sendhil Mullainathan. 2004. "Are Emily and Greg more employable than Lakisha and Jamal? A field experiment on labor market discrimination." *American Economic Review* 94(4):991–1013.

Bidwell, Matthew. 2011. "Paying more to get less: The effects of external hiring versus internal mobility." *Administrative Science Quarterly* 56(3):369–407.

Bidwell, Matthew, Shinjae Won, Roxana Barbulescu and Ethan Mollick. 2015. "I used to work at Goldman Sachs! How firms benefit from organizational status in the market for human capital." *Strategic Management Journal* 36(8):1164–1173.

Black, Ines and Sharique Hasan. 2015. "Network hiring, firm performance growth." *Working paper* .

Booth, Alison and Andrew Leigh. 2010. "Do employers discriminate by gender? A field experiment in female-dominated occupations." *Economics Letters* 107(2):236–238.

Brynjolfsson, Erik and Kristina McElheran. 2016. "The rapid adoption of data-driven decision-making." *American Economic Review* 106(5):133–39.

Burbano, Vanessa C. 2016. "Social responsibility messages and worker wage requirements: Field experimental evidence from online labor marketplaces." *Organization Science* 27(4):1010–1028.

Burks, Stephen V, Bo Cowgill, Mitchell Hoffman and Michael Housman. 2015. "The value of hiring through employee referrals." *Quarterly Journal of Economics* 130(2):805–839.

Cappelli, Peter. 2012. *Why good people can't get jobs: The skills gap and what companies can do about it*. Wharton Digital Press.

Cappelli, Peter. 2019. "Your approach to hiring is all wrong." *Harvard Business REview* .

Cappelli, Peter H. 2015. "Skill gaps, skill shortages, and skill mismatches: Evidence and arguments for the United States." *ILR Review* 68(2):251–290.

Cardon, Melissa S and Christopher E Stevens. 2004. "Managing human resources in small organizations: What do we know?" *Human resource management review* 14(3):295–323.

Carrillo-Tudela, Carlos, Bart Hobijn, Patryk Perkowski and Ludo Visschers. 2015. "Majority of Hires Never Report Looking for a Job." *Federal Reserve Bank of San Francisco Economic Letter* .

Castilla, Emilio J. 2005. "Social networks and employee performance in a call center." *American Journal of Sociology* 110(5):1243–1283.

Chatterji, Aaron, Solène M Delecourt, Sharique Hasan and Rembrand Koning. 2019. "When does advice impact startup performance?" *Strategic Management Journal (Forthcoming)* .

Coff, Russell and David Kryscynski. 2011. "Invited editorial: Drilling for micro-foundations of human capital–based competitive advantages." *Journal of Management* 37(5):1429–1443.

Coff, Russell W. 1997. "Human assets and management dilemmas: Coping with hazards on the road to resource-based theory." *Academy of Management Review* 22(2):374–402.

Deming, David and Lisa B Kahn. 2018. "Skill requirements across firms and labor markets: Evidence from job postings for professionals." *Journal of Labor Economics* 36(S1):S337–S369.

Deville, Jean-Claude, Carl-Erik Särndal and Olivier Sautory. 1993. "Generalized raking procedures in survey sampling." *Journal of the American statistical Association* 88(423):1013–1020.

Elfenbein, Daniel W and Adina D Sterling. 2018. "(When) Is Hiring Strategic? Human Capital Acquisition in the Age of Algorithms." *Strategy Science* 3(4):668–682.

Felin, Teppo, Todd R Zenger and Joshua Tomsik. 2009. "The knowledge economy: emerging organizational forms, missing microfoundations, and key considerations for managing human capital." *Human Resource Management: Published in Cooperation with the School of Business Administration, The University of Michigan and in alliance with the Society of Human Resources Management* 48(4):555–570.

Ferguson, John-Paul and Rembrand Koning. 2018. "Firm turnover and the return of racial establishment segregation." *American Sociological Review* 83(3):445–474.

Ferguson, John-Paul and Sharique Hasan. 2013. "Specialization and career dynamics: Evidence from the Indian Administrative Service." *Administrative Science Quarterly* 58(2):233–256.

Fernandez-Mateo, Isabel and Roberto M Fernandez. 2016. "Bending the pipeline? Executive search and gender inequality in hiring for top management jobs." *Management Science* 62(12):3636–3655.

Fernandez, Roberto M, Emilio J Castilla and Paul Moore. 2000. "Social capital at work: Networks and employment at a phone center." *American Journal of Sociology* 105(5):1288–1356.

Fernandez, Roberto M and Isabel Fernandez-Mateo. 2006. "Networks, race, and hiring." *American Sociological Review* 71(1):42–71.

Fernandez, Roberto M and M Lourdes Sosa. 2005. "Gendering the job: Networks and recruitment at a call center." *American Journal of Sociology* 111(3):859–904.

Fernandez, Roberto M and Nancy Weinberg. 1997. "Sifting and sorting: Personal contacts and hiring in a retail bank." *American Sociological Review* pp. 883–902.

Finlay, William and James E Coverdill. 2007. *Headhunters: Matchmaking in the labor market*. Cornell University Press.

Granovetter, Mark. 1973. "The strength of weak ties." *American Journal of Sociology* 78(6):1360–13806.

Granovetter, Mark. 1995. "How to get a job: a study on contacts and careers.".

Jovanovic, Boyan. 1979. "Firm-specific Capital and Turnover." *Journal of Political Economy* 87(6):1246–1260.

Kolenikov, Stanislav. 2014. "Calibrating survey data using iterative proportional fitting (raking)." *The Stata Journal* 14(1):22–59.

Lee, Jangwoo and Danny Miller. 1999. "People matter: Commitment to employees, strategy and performance in Korean firms." *Strategic Management Journal* 20(6):579–593.

Moretti, Enrico. 2012. *The new geography of jobs*. Houghton Mifflin Harcourt.

Mortensen, Dale T and Tara Vishwanath. 1994. "Personal contacts and earnings: It is who you know!" *Labour Economics* 1(2):187–201.

Pager, Devah, Bart Bonikowski and Bruce Western. 2009. "Discrimination in a low-wage labor market: A field experiment." *American Sociological Review* 74(5):777–799.

Pager, Devah and David S Pedulla. 2015. "Race, self-selection, and the job search process." *American Journal of Sociology* 120(4):1005–1054.

Pallais, Amanda and Emily Glassberg Sands. 2016. "Why the referential treatment? Evidence from field experiments on referrals." *Journal of Political Economy* 124(6):1793–1828.

Petersen, Trond, Ishak Saporta and Marc-David L Seidel. 2000. "Offering a job: Meritocracy and social networks." *American Journal of Sociology* 106(3):763–816.

Puranam, Phanish. 2018. *The microstructure of organizations*. Oxford University Press.

Rider, Christopher I and David Tan. 2014. "Labor market advantages of organizational status: A study of lateral partner hiring by large US law firms." *Organization Science* 26(2):356–372.

Rivera, Lauren A and András Tilcsik. 2016. "Class advantage, commitment penalty: The gendered effect of social class signals in an elite labor market." *American Sociological Review* 81(6):1097–1131.

Rubineau, Brian and Roberto M Fernandez. 2013. "Missing links: Referrer behavior and job segregation." *Management Science* 59(11):2470–2489.

Smith, Sandra Susan. 2005. ""Don't put my name on it": Social capital activation and job-finding assistance among the black urban poor." *American Journal of Sociology* 111(1):1–57.

Spence, Michael. 1973. "Job Market Signaling." *Quarterly Journal of Economics* 87(3):355–374.

Starr, Evan, James J Prescott and Norman Bishara. 2019. "Noncompetes in the US labor force." *U of Michigan Law & Econ Research Paper* (18-013).

Tilcsik, András. 2011. "Pride and prejudice: Employment discrimination against openly gay men in the United States." *American Journal of Sociology* 117(2):586–626.

Williams, Charles, Pao-Lien Chen and Rajshree Agarwal. 2017. "Rookies and seasoned recruits: How experience in different levels, firms, and industries shapes strategic renewal in top management." *Strategic Management Journal* 38(7):1391–1415.

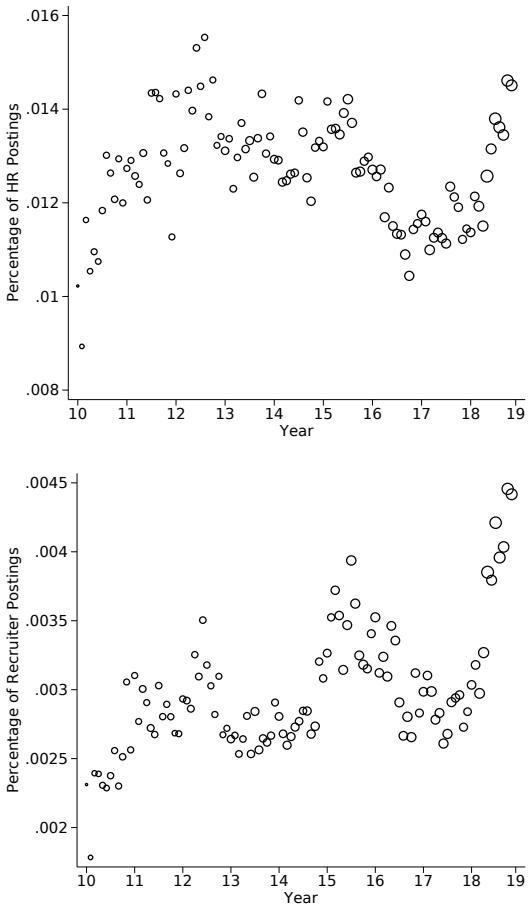

Figure 1: The top panel shows the percent of all postings classified as HR jobs each month. The bottom panel the percent of all postings that are classified as recruiting roles. Points are scaled by the number of job postings in the month.

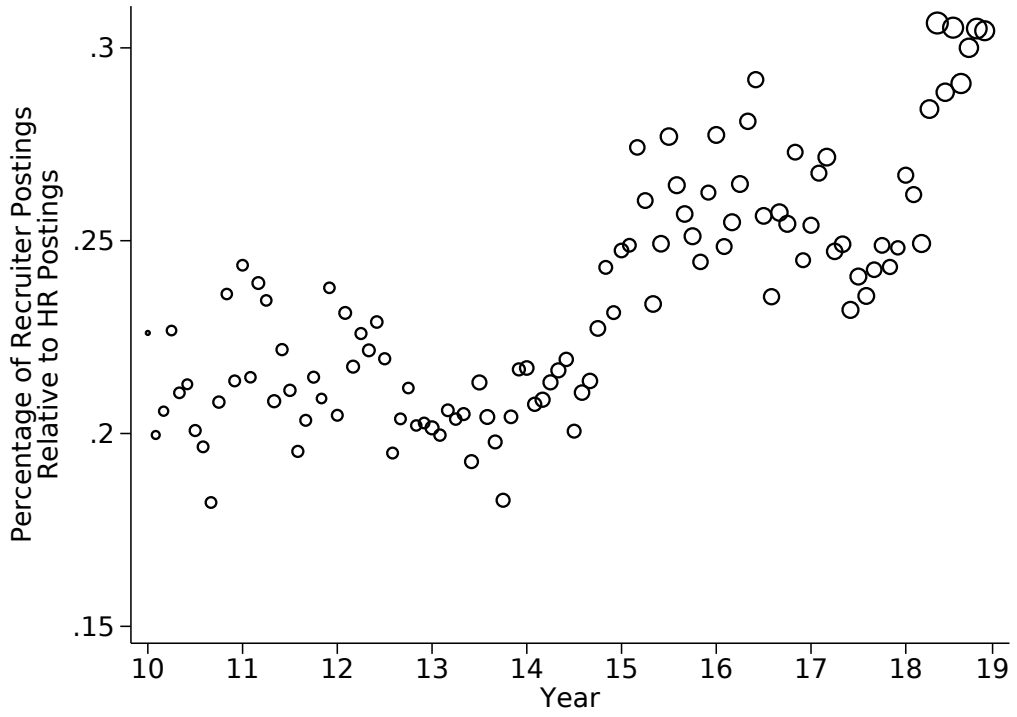

Figure 2: The percent of HR posts where the job title is classified as focused on recruiting. Points are scaled by the number of job postings in the month.

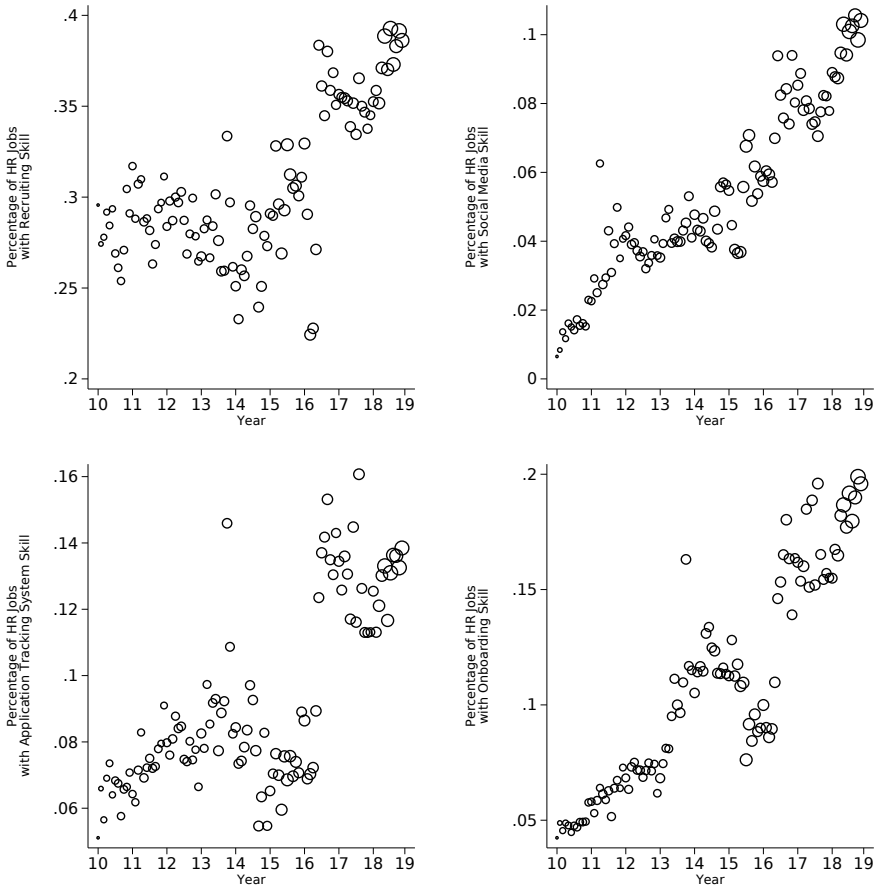

Figure 3: The percent of HR posts that list recruiting as a skill (top left), that list social media as a skill (top right), that list applicant tracking systems as a skill (bottom left), and onboarding as a skill (bottom right). Points are scaled by the number of job postings in the month.

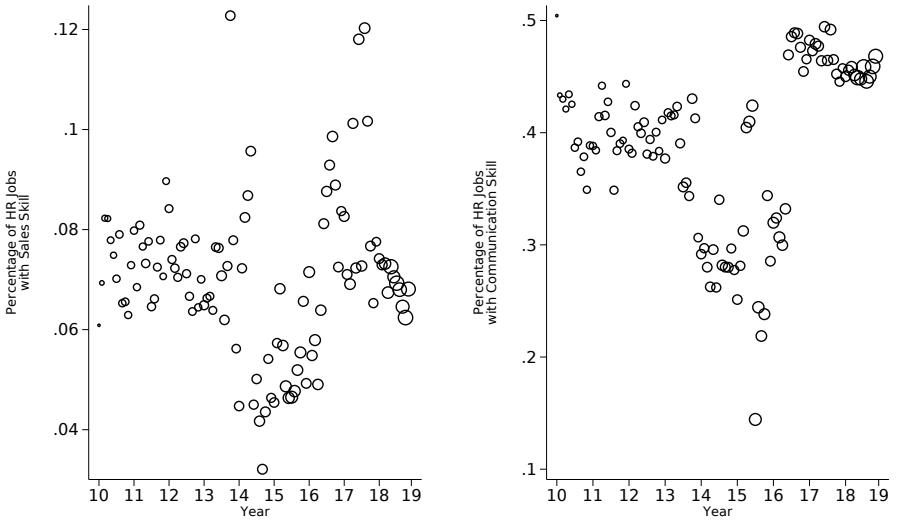

Figure 4: The percent of HR posts that list sales as a skill (left) and the percent that list communication as a skill (right). Points are scaled by the number of job postings in the month.

Table 1: The prevalence of different hiring mechanisms in the United States labor market in January 2020.

	USA (N)	(%)
I found and applied for the role	6,003	43.9%
Referred by existing employee	4,732	34.6%
Recruiter invited me to apply	1,711	12.5%
Headhunting firm invited me to apply	725	5.3%
I reached out to a headhunting firm	497	3.6%
Firm driven search (%)	2,436	**17.8%**
Total	13,668	**100.0%**

Table 2: The prevalence of different hiring mechanisms in the United States labor market based on education level.

	HS or less	Some college, no degree	Bachelor's or assoc. degree	Graduate/Prof degree
I found and applied for the role	403	1,023	2,059	806
Referred by existing employee	449	935	1,472	531
Recruiter invited me to apply	134	302	531	245
Headhunting firm invited me to apply	34	108	245	122
I reached out to a headhunting firm	33	91	157	61
Firm driven search (%)	**16.0%**	**16.7%**	**17.4%**	**20.8%**
Total	1,053	2,459	4,464	1,765

Table 3: The prevalence of different hiring mechanisms in the United States labor market based on income level.

	Under $50,000	$50,000-$100,000	$100,000+
I found and applied for the role	1,006	1,624	1,781
Referred by existing employee	671	1,249	1,627
Recruiter invited me to apply	220	426	615
Headhunting firm invited me to apply	80	153	290
I reached out to a headhunting firm	78	125	138
Firm driven search (%)	**14.6%**	**16.2%**	**20.3%**
Total	2,055	3,577	4,451

Table 4: The prevalence of different hiring mechanisms in the United States labor market based on specialization.

	STEM	Health & medicine	Business	Social sciences Arts & humanities	Education
I found and applied for the role	559	185	652	816	89
Referred by existing employee	387	136	512	561	68
Recruiter invited me to apply	171	65	207	202	19
Headhunting firm invited me to apply	87	16	103	81	10
I reached out to a headhunting firm	39	16	67	63	5
Firm driven search (%)	20.8%	19.4%	20.1%	16.4%	15.2%
Total	1,243	418	1,541	1,723	191

Table 5: The prevalence of different hiring mechanisms in the United States labor market based on use of LinkedIn.

	Users	Non-Users
I found and applied for the role	483	728
Referred by existing employee	426	621
Recruiter invited me to apply	164	205
Headhunting firm invited me to apply	90	51
I reached out to a headhunting firm	40	49
Firm driven search (%)	21.1%	15.5%
Total	1,203	1,654

Table 6: The prevalence of different hiring mechanisms in the United States labor market based on estimated number of employees at current employer.

	Large (5,000+ employees)	Midsize (100 - 4,999 employees)	Small (less than 100 employees)
I found and applied for the role	207	215	163
Referred by existing employee	159	198	191
Recruiter invited me to apply	48	54	78
Headhunting firm invited me to apply	16	26	28
I reached out to a headhunting firm	14	13	20
Firm driven search (%)	14.4%	15.8%	22.1%
Total	444	506	480

Table 7: The prevalence of different hiring mechanisms in the United States labor market based on respondent age.

	18 - 24	25 - 29	30 - 34	35 - 44	45 - 54	55 - 64
I found and applied for the role	356	439	507	1,354	2,753	589
Referred by existing employee	239	261	328	995	2,383	527
Recruiter invited me to apply	99	117	109	410	790	181
Headhunting firm invited me to apply	32	52	72	171	328	68
I reached out to a headhunting firm	46	42	51	92	217	48
Firm driven search (%)	17.0%	18.6%	17.0%	19.2%	17.3%	17.6%
Total	772	911	1,067	3,022	6,471	1,413

Table 8: The prevalence of different hiring mechanisms in the United States labor market based on respondent gender.

	Male	Female
I found and applied for the role	3,472	2,536
Referred by existing employee	3,000	1,738
Recruiter invited me to apply	1,114	597
Headhunting firm invited me to apply	466	259
I reached out to a headhunting firm	287	210
Firm driven search (%)	18.9%	16.0%
Total	8,339	5,340

Table 9: The prevalence of different hiring mechanisms in the United States labor market based on respondent's race and ethnicity.

	White or Caucasian	Hispanic or Latino	Black	Asian or Pacific Islander	Other
I found and applied for the role	3,454	362	333	150	414
Referred by existing employee	2,812	301	221	107	276
Recruiter invited me to apply	961	94	98	44	110
Headhunting firm invited me to apply	395	45	44	21	59
I reached out to a headhunting firm	259	35	27	9	36
Firm driven search (%)	17.2%	16.6%	19.6%	19.6%	18.9%
Total	7,881	837	723	331	895

Table 10: The prevalence of different hiring mechanisms in the United States labor market in January 2020, MSA-level results.

	Rochest.	Denv.	Sacram.	NYC	Portl.	San Fran.	Miami	San Jose
I found and applied for the role	175.0	246.4	216.7	333.7	199.6	305.4	214.5	146.4
%	46.5%	47.6%	46.9%	43.7%	43.3%	41.6%	43.7%	37.4%
Referred by existing employee	129.8	173.7	150.0	265.8	150.6	256.7	163.5	129.9
%	34.5%	33.6%	32.4%	34.8%	32.6%	34.9%	33.3%	33.2%
Recruiter invited me to apply	41.4	48.6	53.5	85.1	61.3	86.5	67.4	57.6
%	11.0%	9.4%	11.6%	11.2%	13.3%	11.8%	13.7%	14.7%
Headhunting firm invited me to apply	13.1	31.8	19.1	43.3	22.9	50.6	24.5	41.8
%	3.5%	6.1%	4.1%	5.7%	5.0%	6.9%	5.0%	10.7%
I reached out to a headhunting firm	17.2	16.9	23.2	35.2	26.9	35.8	20.8	15.5
%	4.6%	3.3%	5.0%	4.6%	5.8%	4.9%	4.2%	4.0%
Total firm-driven search	54.5	80.4	72.6	128.4	84.2	137.1	91.9	99.4
%	14.5%	15.5%	15.7%	16.8%	18.3%	18.7%	18.7%	25.4%
Total response count	376.5	517.4	462.5	763.1	461.3	735.0	490.7	391.2

Table 11: What drives a firm's demand for recruiters? Here we regress whether a firm posts for recruiters on that firm's skill mix. The independent variables are logged-plus-one skill counts across all the postings by a firm in a given year. In columns (1)-(4), the dependent variable is the logged-plus-1 count of recruiter positions posted by the firm. In Column (5) the dependent variable is a a binary indicator for whether the firm posts a recruiter job ad. We include fixed effects for the number of non-HR positions in all our models to account for differences due to firm scale. Relatedly, we drop all observations with fewer than 10 non-HR postings since such firms are extremely unlikely to hire a recruiter in that year. That said, our primary findings hold when including all firm-year observations or when focusing only on firm-years with 50 or more postings. All regressions are at the firm-year level, are weighted by the number of postings by the firm in a given year, and include robust standard errors clustered at the firm-MSA-industry level. '$*p < 0.01; **p < 0.001$.

	Log-recruiter postings				*Recruiter posting?*
	(1)	(2)	(3)	(4)	(5)
Log-Cognitive	-0.020	-0.019*	-0.021*	-0.005	0.005
	(0.008)	(0.007)	(0.007)	(0.004)	(0.003)
Log-Social	-0.015	-0.016	-0.017	-0.017	-0.014**
	(0.008)	(0.008)	(0.007)	(0.007)	(0.004)
Log-Character	0.043**	0.045**	0.043**	0.029**	0.016**
	(0.007)	(0.006)	(0.006)	(0.006)	(0.003)
Log-Writing	0.007	0.009	0.009	0.018	0.007
	(0.009)	(0.007)	(0.007)	(0.007)	(0.004)
Log-Customer Service	0.028**	0.022	0.023*	0.011	0.002
	(0.007)	(0.009)	(0.008)	(0.007)	(0.004)
Log-Project Management	0.094**	0.089**	0.090**	0.084**	0.035**
	(0.010)	(0.009)	(0.010)	(0.007)	(0.005)
Log-People Management	0.009	0.012	0.011	0.016	0.010
	(0.008)	(0.006)	(0.006)	(0.008)	(0.004)
Log-Financial	-0.039**	-0.015	-0.015	0.025**	0.010*
	(0.010)	(0.008)	(0.008)	(0.007)	(0.003)
Log-Computer	0.083**	0.072**	0.074**	0.056**	0.037**
	(0.007)	(0.006)	(0.006)	(0.007)	(0.004)
Log-Software	0.101**	0.096**	0.095**	0.058**	0.022**
	(0.009)	(0.007)	(0.007)	(0.005)	(0.003)
# Non-HR Postings FE	Yes	Yes	Yes	Yes	Yes
Year FEs	Yes	Yes	Yes	Yes	Yes
Industry FEs	No	Yes	Yes	Yes	Yes
MSA FEs	No	No	Yes	Yes	Yes
Firm FEs	No	No	No	Yes	Yes
Observations	500,042	500,042	500,038	396,270	396,270
Number of Firms	200,279	200,279	200,275	96,574	96,574
R^2	0.622	0.633	0.644	0.853	0.706