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and how applicant variety affects an employer's likelihood of making an offer**

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** Working Paper **

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ABSTRACT

Extant hiring research has generally focused on understanding outcomes for employees and not on outcomes for employers. I theorize on how employer cognitive hiring decision processes affect their likelihood of extending an offer of employment. I argue that greater variety in the job experiences of candidates in the applicant pool complicates employer comparison processes. Hiring is a two-stage process and I predict that comparison difficulties materialize among a winnowed down consideration set of candidates in this second stage. More experienced employers have less difficulty with variety because they have better constructed preferences. Regression analyses from an online market for contract labor on over 640,000 job postings by over 170,000 employers support my contentions. Greater variety in job experiences among job candidates in the applicant pool leads to a lower likelihood a job offer will be extended to any of them. This relationship is completely mediated by the variety in job candidates in the second stage consideration set. The more experience an employer has in hiring in a domain, the less of an issue variety becomes. Results utilizing an instrumental variable and several supporting analyses are also reported. Contributions to the study of evaluation in markets, hiring, and cognitive processes of categorization are discussed.

What accounts for failed labor market searches? Organizational sociologists (Fernandez et al 2000, Petersen et al 2005) and economists (Mortensen and Pissarides 1999; Oyer and Schaefer 2011) alike recognize that considerable resources are spent on recruiting. Employers therefore devote care and thought when deciding which summer interns to extend full-time employment offers to (Sterling 2012) and failed searches for domestic applicants may result in the need to extend a search to international recruiting efforts (Rissing and Castilla 2014). Whether any applicants were hired is rarely a focus of investigation, but potentially an opportunity for discrimination (Lazear 1991, Peterson and Saporta 2004). Whether a job opening is filled or not could be a crucial non-action that is revealing of an employer's hiring preferences (Pager et al 2009), lead minority applicants to expand the breadth of their job searches (Olsen 1997, Peterson et al 2005, Pager and Pedulla 2015), affect how they may invest in their education (Altonji and Blank 1999), or influence how applicants present themselves (Kang et al 2016).

Despite the substantive and theoretical importance of failed labor market searches, organizational sociologists have yet to investigate its possible causes. One reason for this oversight is because extant hiring research has focused on understanding outcomes for the employee, while outcomes for the employer have generally been ignored. The demand-side role of this two-sided market is therefore relatively undertheorized and less well-understood. While economists have theorized on and examined labor market efficiency and possible frictions (Diamond 1981, Mortensen 1988), such as the clearing of medical student placements (Roth and Peranson 1999), they examine market level outcomes and not specific employer job searches. Data on failed searches is also rare. Researchers often lack visibility into each step of an employer's hiring process, such as who applied and whether a specific job went unfilled (c.f. Fernandez and Weinberg 1997, Petersen et al 2000).

Job searches fail for many reasons[1]. Here, I focus on understanding why an employer decides not to extend an offer of employment to any job applicant for a particular position. I do so by examining the hiring process through the lens of cognitive decision making. I explicitly reveal what has been regarded as

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[1] Offers of employment may not accepted by the applicant, but evidence suggests this is a rare occurrence (Barron et al 1997, Andrews et al 2008). Bureaucratic influences, such as the failure to secure visa requirements for international applicants could also lead to failed searches.

a 'black box' by hiring theorists by employing and extending theories of choice and categorical comparison (Tversky and Shafir 1992, Iyengar and Lepper 2000, Mogilner et al 2013). The hiring process is ultimately an evaluation employers make among candidates in an *applicant pool*, those who apply. Conditional on demonstrating experience related to the job at hand, employers also value experiences unrelated to the focal job they are hiring for (Rivera 2012, Leung 2014, Merluzzi and Phillips 2015). When candidates in the applicant pool exhibit a greater variety in their backgrounds, hiring decisions become more difficult because comparisons among different experiences are hard. Tradeoffs are more salient (Iyengar and Lepper 2000, Gourville and Soman 2005). Difficult decisions are more likely to be deferred or ignored because they are demotivating (Festinger 1962, Tversky and Shafir 1992). Failed searches are therefore a function of the variety of job candidate backgrounds in the applicant pool. However, because an employer decision making process unfolds across two-stages, screening and selection (Bills 1990), employers give closer consideration to the abbreviated set of job applicants who make it beyond the initial screen. Therefore, the effect of variety of job experiences on failed searches should be isolated to the candidates in this second stage *consideration set*. Yet, variety is not always a problem. More experienced employers will have less trouble because they are better able to construct easier to evaluate consideration sets.

This paper brings a perspective that advances our understanding of evaluation in markets in several notable ways. First, while theorists have generally accepted a two-stage decision process to explain market evaluation, two salient deficiencies in the previous literature limit this conclusion. First, rather than demonstrate how market evaluations are affected by this two-stage process, extant work merely points to the predicted outcomes as evidence of it occurring. Reliance on such a model has been suggested to affect a broad range of outcomes, such as stock market valuations (Zuckerman 1999), movie ratings (Hsu 2006), or choice of exchange partners (Jensen and Roy 2008). However, direct evidence of the two-stage decision processes and its effect on decision making in markets is yet forthcoming.

Second, the notable contradiction between work that finds category spanning as either detrimental (Zuckerman et al 2003, Hsu 2006) or beneficial (Pontikes 2012, Leung 2014, Merluzzi and Phillips 2015)

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could be enlightened through explicit focus on the choices available. Because what an audience member is exposed to limits dramatically the decisions they make (Denrell 2005), studies that ignore the options evaluators actually consider risk being partial explanations. They are unable to account for how evaluators compared options or to account for what choices were accessible (Bowers 2014, Smith 2016). Examining market evaluation as a cognitive decision process addresses this by explicitly demonstrating how the items available to a decision maker affect outcomes.

This study also directly addresses hiring theorists', heretofore rarely examined, recognition that the applicant pool "matters" to hiring outcomes (Petersen and Saporta 2004). The scant work that has focused on the effects of the composition of the applicant pool concern themselves with the possibility of discriminatory outcomes for women versus men (Fernandez and Weinberg 1997, Petersen et al 2005, Fernandez and Mors 2008) but do not engage, as I do here, with questions of how it may affect the hiring decision making process or implications for employers and market efficiency more generally. Expanding our understanding of how the applicant pool matters provides the added benefit of forcing us to develop a better understanding of an employer's decision making process, the relatively neglected role of this two-sided market (c.f. Rivera 2012).

Finally, this paper also brings a novel perspective to the literature on choice overload (Iyengar and Lepper 2000, Iyengar and Kamenica 2010), by demonstrating that beyond the number of choices affecting decision makers, it is also the variety in choices that leads to cognitive comparison difficulty. This realization has the potential to inform the inconsistent evidence as to whether increasing the number of options leads to decision difficulty or eases them (Chernev 2003). This paper points to the value of disentangling these two measures because the number of options is likely correlated with the variety among them.

The present analysis addresses these shortcomings by situating the investigation in an online labor market platform for freelancing services, Elance.com. The phenomenon of temporary online work, also referred to as the gig economy, is expanding quickly and evidence that such unmediated, market platforms will alter the future of employment and scholarly investigation is mounting (Snir and Hitt 2003,

Horton 2010, Farrell and Greig 2016). One reason is that the market for temporary contract labor is steadily increasing (Barley and Kunda 2004) with some estimates suggesting that up to 53 Million individuals in the US (or 34% of the labor force) have worked in some form of (online or offline) temporary contract labor in 2013 (Edelman 2014). A more recent and rigorous examination of people in alternative work arrangements estimates that between 2005 and 2015, the percentage of individuals in this sector has increased from 10.1% to 15.8% of the total employed individuals (Katz and Krueger 2016). Furthermore, contrary to views of temporary jobs as marginal and low-skilled (Kalleberg 2000), the domain of contract labor also includes highly skilled temporary workers in well-established job domains such as programming or writing (Osnowitz 2010), what I study here. This suggests the hiring of temporary workers in this gig economy will become increasingly important to managers and organizations in the future (Cappelli 1999).

In addition to its timeliness, an examination of this setting also provides unprecedented analytic opportunities. The online nature of the platform provides visibility into which applicants applied to which jobs, their past work experiences on the website, as well as, crucially, which applicants were screened by the employer to be considered more closely – a parallel to the two-stage decision process. With this leverage, I demonstrate support for this cognitive view of hiring. Regression results of 5,021,749 applications for 643,309 job postings by 174,466 unique employers reveal that employers with applicant pools that exhibit greater variety in non-focal job experiences are less likely to extend an offer of employment to anyone. Furthermore, this relationship is completely mediated by the variety of applicants in the second stage consideration set, further bolstering the case that it is the difficulty that arises among closely considered applicants. Finally, experience an employer has in hiring for a particular category of job moderates this effect as predicted. I further support the analyses with an instrumental variable methodology to account for potential endogeneity concerns and several triangulating analyses corroborate my theoretical assumptions regarding the employer decision making process.

CONSIDERATION OF APPLICANT EXPERIENCES

Conceptualizations of hiring have advanced enough to move beyond viewing it merely as an exercise in skill matching to recognize that employers value broader aspects of job applicants beyond their ability to complete the task at hand. This is not to say relevant work experience is not valued. Instead, conditional on demonstrating suitable experience or reputational signals, factors that are not directly pertinent to the job also figure prominently into decisions to hire (Rivera 2012). For example, Merluzzi and Phillips (2015) demonstrated how investment banking applicants from a top MBA program with the most focused experience in finance were not the most attractive to employers. Instead, applicants who exhibited more variety in their past experiences obtained more offers and at higher salaries. Applicant skill was less a consideration because recruiting from a top MBA program guaranteed adequate ability. Instead, candidates with broader experiences stood out in the applicant pool because most investment banking applicants presented focused identities and perhaps the more well-rounded applicants with broader skills were more likely to possess skills useful beyond the entry level. Hiring for reasons beyond obvious fit with a specific job is also a fact recognized by the literature on idiosyncratic or opportunistic hiring (Miner, 1987; Rousseau, Ho, and Greenberg, 2006) where applicants are hired not on the basis of a particular fit with an existing job opening, but rather a job opening is crafted to fit an applicant or an open-ended role is created to induce particular individuals to join an organization.

Employers have additional reasons for preferring a breadth of experiences when hiring freelancers, the context studied here. While specialized experiences demonstrate narrow skill, freelancers who exhibit a measured amount of diversity in their past jobs, conditional on having the appropriate experiences, are more attractive than either narrowly focused freelancers or ones who worked too broadly (Leung 2014). Demonstrating some breadth in one's past experiences evinced increased commitment to the freelancing occupation. Furthermore, while freelancing is often portrayed as employment for singular jobs, repeatedly hiring the same individual is highly beneficial for the employer (Barley and Kunda 2004, Cappelli 1999) for several reasons. First, employers often hire across a range of tasks or for a large job with multiple components. Therefore, hiring a freelancer repeatedly for several aspects of a job, in

essence "redeploying" them, is advantageous because they will possess knowledge specific to the project at hand, providing continuity and also knowledge of the employer and how they work.

In a survey of employers conducted by the platform under study here, over 50% of the employers were looking to hire freelancers for repeated jobs (Elance 2012). This same survey also revealed that employers on these online platforms are generally small businesses that have little recourse for hiring contract workers through other channels. With 45% reporting that the jobs they hire for online would not be filled if they were unable to employ here. Employers in this market are therefore reliant on this platform to identify skilled labor suggesting they will value a repeated relationship with freelancers they hire. Additionally, because this is a virtual platform, work is remote. Trust in a freelancer is valuable as well and once a freelancer is identified, employers will tend to utilize them repeatedly across a broad range of jobs.

Note, employer preference for broadly experienced applicants is likely stronger for jobs that are minimally skilled. For unskilled hiring, it is unlikely that past job experiences will figure prominently into an employer's decision to hire because it serves no value in determining how they will perform, either now or in the future. Perhaps, in these situations employers will instead look for evidence of reliability. However, applicant past experiences come to the fore when employers are seeking skilled labor (Zuckerman et al 2003, Fergusen and Hasan 2013) because employers spend effort considering how an applicant's experiences will be relevant. Even for project-based work, where hiring is temporary, freelancers are aware of how their past experiences may allow them to stretch and be considered for jobs which differ from what they have done in the past (O'Mahony and Bechky 2006).

Furthermore, it is clearly the case that indicators of reputation or skill, such as through referrals (Fernandez and Weinberg 1997, Fernandez et al 2000) or education (Merluzzi and Phillips 2015) serve to reduce hiring uncertainty on the part of the employer. Non-focal job experiences do not act as a substitute for these more salient signals of ability. While in some instances quality signals may be correlated with a breadth of experiences, such as for veteran actors (Zuckerman et al 2003), in my rendering this is neither

an assumption nor a requirement. Instead, only when signals of appropriate ability are present and visible suggesting a job candidate is worthy of consideration, does non-focal job experiences become salient.

APPLICANT POOL, CONSIDERATION SETS, AND FAILED SEARCHES

Decisions on whether and who to hire begin with a consideration of those who have applied. I define an *applicant pool* as the set of job seekers who have applied for a particular position[2]. Thurow (1969) implicitly suggests this in his portrayal of the labor market as a queue in his attempt to explain African American unemployment. He reasoned that employers likely ranked African American applicants below White applicants for jobs. As individuals are considered for particular jobs, White applicants will be ranked ahead of Black applicants for each one, thereby leading to black disadvantage and increased unemployment. Reskin and Roos (1985) extended the concept of a labor queue to suggest that this perspective can also be used to explain gender differences and occupational sorting. Labor market outcomes are therefore sensitive to the applicant pool because, ultimately, these are the applicants who are in competition with one another for the job. An applicant pool does not suggest ordering, as a queue does, but rather the circumscribed set of individuals who are in contention for a particular position.

Note that an applicant pool can be structured in at least two ways, which I term *slate* and *sequence*. A slate is characterized a hiring decision made at a particular point in time regarding a set of job applicants. The pool, in this case, is well-defined and consists of those applicants who have applied within a certain timeframe and are all considered by an employer simultaneously. Alternatively, a hiring decision can be structured as a sequence, where individual employer decisions to hire are made on each applicant as they apply over time. The applicants who will eventually enter into consideration, in this case, are unknown to the employer. Hiring choices are therefore made on each individual applicant as they apply. The distinction between these two conceptualizations can be seen in the college admissions

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[2] While related, this definition differs from what has been termed an applicant pool by other streams of work. For example, this term has been used to refer to the general set of applicants for a particular category of job or even the set of job categories that a particular type of applicant has applied to. Examples of applicant pools include the case of race and how broadly African Americans compared to Non-African Americans apply across job categories (Pager and Pedulla 2015) or gender and the types of jobs women and men tend to apply to (Fernandez and Sosa 2005).

processes. Some schools have what is termed "rolling" admissions, where applicants are evaluated and decisions are made as to their suitability on an individual basis. Alternatively, other schools prefer to have multiple deadlines, which serve as rounds for applicants to apply. At each deadline, all applicants who have applied by that certain date are evaluated as a whole and suitability is determined among this pool.

Hiring that is structured as a slate is therefore a cognitive comparison process based on judgments of similarity and differences of the job candidates to one another (Tversky 1977, Markman and Genter 1996). This perspective has recently gained traction in the work that explores how decision makers in markets evaluate items (Bowers 2014, Smith 2016). This decision process can either be complicated or eased by how similar the objects under consideration are with one another. The more characteristics a set of options share, the more similar they will be to one another. Take the example of deciding among several commodity-like products, such as a pound of nails with identical properties, i.e. they are the same size, material, shape. If they merely vary by price, then this decision would be one of "alignable differences" (Markman and Gentner 1996). That is, all the characteristics among the items under consideration exhibit high commonality. The comparison here is relatively straightforward. One only needs to decide along the single dimension of differences, namely cost.

This pertains to the hiring contexts because conditional on demonstrating appropriate past experiences, employers will turn to consider the job applicants' additional experiences[3]. Here is where variety will affect the decision process. The more disparate the backgrounds of different candidates, the greater cognitive effort will be required to compare them to one another (Gourville and Soman 2005). Consider the hiring of an academic as an example. While a department may express an interest, say for a quantitative economic sociologist who is able to teach the core strategy class, faculty members may find it difficult to decide which of the various research interests applicants present will be more valuable. While one applicant may investigate financial institutions, another may study labor markets, and a third,

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[3] Job applicants also are likely to vary on other dimensions, such as test scores or their level of education, but these measures are more objective and also more easily to be directly comparable, i.e. a higher score on a test is unambiguously better than a lower score, and therefore present less of a cognitively difficult decision. In fact, on objectively quantifiable measures, variety should be advantageous as rank ordering and preference is straightforward – better indicators are preferred.

entrepreneurship. Despite the fact that all the applicants under consideration possess the minimal requirement of being a quantitative economic sociologist, their research areas are not identical. This complicates comparisons among applicants.

Decision makers will therefore face greater inherent conflict when attempting to make decisions that require increasing numbers of tradeoffs (Tversky and Shafir 1992). Two alternatives that vary along incomparable dimensions would have different advantages and disadvantages, and these differences are hard to reconcile. So the labor market researcher I introduced above may be more apt to delve deeply into a particular phenomenon or setting whereas a financial institutions researcher may be better equipped to examine a different domain. This leads to conflict in a decision maker's mind because tradeoffs have to be made regardless of the choice (Gourville and Soman 2005).

A reasonable reaction people have when faced with a difficult choice is to delay a decision or not make one at all. Choice theorists demonstrate that when individuals are presented with an overwhelming set of options, a common response is to not make any choice (Iyengar and Kamenica 2010) because individuals regret the choices they do not make (Iyengar and Lepper 2000) making it even harder to decide. Avoidance from difficult to reconcile choices is often a reasonable defensive mechanism (Festinger 1962) because the effort required to conduct a thorough evaluation on applicants who possess less similarity in past job experiences to one another is not trivial. A parallel finding by Snir and Hitt (2003) corroborates this idea. They find that buyers of virtual IT services in a similar online freelance market were less likely to hire when they received an excessive number of bidders. They suggest that this was due to the increased cost bid evaluation when too many applicants apply. Therefore, in these situations, not making a choice is often the preferred alternative (Tversky and Sharif 1992) and path of least cognitive difficulty. Therefore,

Hypothesis 1: The greater the variety of job applicant experiences in the applicant pool, the more likely the job search will fail.

The Consideration Set

I further refine my theory by developing a more detailed understanding of the hiring decision process. In particular, how employers further winnow down the applicant pool. Conceptions of the hiring process suggest that it unfolds over two distinct stages of screening and selection (e.g., Petersen, et al., 2000; Fernandez and Sosa, 2005; Petersen, et al., 2005; Fernandez and Fernandez-Mateo, 2006; Fernandez and Mors, 2008). In the first stage screening process, employers examine the set of available candidates, in this case the applicant pool, with the goal of selecting a subset of the applicants to consider more closely. Limiting the number of options to be examined in the second stage ostensibly simplifies the process and guarantees a closer consideration of those items. I term this abbreviated pool, on which a more detailed evaluation is made, the *consideration set*. While the applicant pool should exert an effect on failed searches, it likely operates through the consideration set, which is more temporally proximate to the hiring decision and also consists of the applicants who are examined closely.

I believe the screening process of identifying an abbreviated list of job applicants who warrant further consideration is more nuanced that the extant descriptions of two-stage decision models (Zuckerman 1999, Hannan et al 2007). Scholars maintain that decision makers filter the pool of items under consideration in this first stage by eliminating those that are not a clear categorical fit to the applicable domain under consideration. This simplifies the comparison processes. For example, finance analysts, whose objective is to compare firms in a specific industry, may filter out from their consideration set those firms that are not narrowly focused in the particular industry of expertise. Instead, as described above, employers will focus on job applicants who possess applicable experiences to warrant further consideration as well as value their broader past experiences. In this case, applicants that make it to the selection stage and into the consideration set will not necessarily be more similar to one another as other market models infer (Zuckerman 1999). More specifically, the consideration set does not necessarily result in a slate of applicants with similar experiences and in fact may result in one that is highly varied.

Variation in variety of job applicants in this consideration set will therefore exert a significant effect on failed searches. Applicants who move beyond the first stage applicant pool screen into the second stage consideration set are the ones who are considered more thoroughly. It is among this set that an offer of employment, if any, will most likely be made. Therefore, the locus of action in my theory of the hiring process will be revealed in the abbreviated consideration set, past the initial screening stage. While variety in the whole applicant pool is certainly correlated with the eventual consideration set and therefore, decision difficulty, the mechanism of cognitive comparison difficulty should materialize in this abbreviated consideration set. More formally, the hypothesized relationship between application pool variety and decision difficulty should be completely mediated by the variety of job applicants who are in the consideration set because the applicants in the consideration. Formally,

> *Hypothesis 2:* The variety of job applicant experiences in the consideration set fully mediates the positive relationship between applicant pool variety and failed job searches.

Testing this hypothesis may also reveal how the applicant pool and consideration set differentially affect the likelihood of hiring and search. Once the consideration set is accounted for, variety in the applicant pool could increase the likelihood of an employer being more likely to hire or have no effect. This is because more variety in an applicant pool means a greater variety of choices. The greater differences there are in choice, the more likely any employer should be able to identify an applicant who possesses a particular set of experiences they desire. I explore this idea more thoroughly below[4].

Employer Experience as Moderator

I have hypothesized that increased variety in past experiences of job applicants increases the difficulty of a hiring decision because comparisons among job applicants with varying background are harder.

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[4] While an understanding of the factors that affect the likelihood of whether an applicant moves from the applicant pool to the consideration set is an important one, for example, is it experience or reputation that matters more, it is beyond the scope of this paper. I discuss this more below.

However, variety should be less of a problem for employers who are more experienced at hiring for a particular type of job. There are at least two, related, reasons for this. First, more experienced employers will be better at identifying what type of candidate they prefer than less experienced ones. More experienced employers will therefore be better able to sort through an assortment of job applicants with a keener sense of what they are looking for – quickly eliminating the poor fits and quickly identifying the good fits. Cognitive decision theorists demonstrate that when subjects were given the opportunity to identify their ideal point (Chernev 2003), that is when they were given stronger *a priori* preferences regarding their decision criteria, they were more confident in making a choice and also expressed less difficulty in making the decision among a variety of items. Second, a more experienced employer may also be more malleable in their preferences and understand that an ideal candidate may be unobtainable. When faced with a variety of applicants, more experienced employers may be willing to be less critical of the differences and realize that a perfect candidate may not exist. On the other hand, less experienced employers may hold onto the belief that spending the extra effort to compare and contrast different candidates is valuable.

In either case, the greater variety of job applicants should ease an experienced employer in identifying a candidate that satisfies their requirement. Greater variety among applicants increases the likelihood that a specific background is available. These employers who have a better understanding as to precisely who they are looking for will also be better at sorting out the extraneous experiences of job applicants, even if they are varied among the pool of candidates. In contrast to this, an employer who has less understanding as to what they need or have a less well-informed belief as to what specific experiences they require will necessarily require more time to examine and compare the varied job applicant backgrounds, as described above.

Take the academic hiring example I introduced above. Newer faculty will be less familiar with their domain in the sense that they have yet to see as many job applicants and their subsequent success as more experienced faculty. These newer faculty will necessarily be less well-informed as to what types of backgrounds are more likely to be successful and therefore hold less clear preferences than their more

senior colleagues[5]. To these evaluators, because their preferences may be less well-formed, then newly minted PhD candidates may all seem to possess skills that can be considered useful. Perhaps labor markets are worthy of consideration, perhaps financial industry specific research is also valuable. The less well-formed preferences will make more job candidates seem worthy of consideration, and therefore variety, as presented in the hypotheses above, will make the decision more difficult. In contrast, consider the senior faculty with more experience in their hiring domain. They will be more likely that junior faculty to possess clearer preferences for the type of job applicant they are seeking. Because senior colleagues have considered and hired more candidates in the past they will be more likely to have a better sense for what types of experiences they believe will have greater potential. Therefore, I predict:

> *Hypothesis 3:* The positive effect of variety of experiences of candidates in a consideration set on failed searches will be moderated by employer experience. Specifically, more experienced employers will be less affected by applicant pool variety.

The hypotheses above depend on the categorization schema to usefully partition different jobs and the skills associated with them. The observed distinctions therefore imply discernable differences in past experiences but not extremely different as to preclude comparison. If the categorization schema differentiated jobs that did not have any similarity to one another, then variety in this case would be among extremely different past experiences and therefore would likely not complicate the decision as there would be no comparisons to be made. For example, if one set of jobs entailed Brain Surgery and another set of jobs were classified as Academic Research, then the variety would be so extreme as to negate any reasonable direct comparison.

AN ONLINE MARKET FOR CONTRACT LABOR

Following a similar trend in tangible product markets, labor market hiring has begun to move online as well (Leung 2014). For example, the recent proliferation of online labor markets that mediate employers

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[5] This is not to say that more senior faculty necessarily will 'know' with certainty which candidate will be successful, just that their preferences will likely be better defined than the preferences of less experienced faculty.

and employees, such as Monster or Career Builder; or ones that specialize in temporary contract labor, such as Freelancer, 99Design, Toptal, Guru, PeoplePerHour, FreelanceWritingGigs, and Upwork exemplify this shift. In particular, the online gig economy is a quickly growing labor market segment (Cappelli 1999, Katz and Krueger 2016). Elance.com[6], the site under study here, acts as a virtual marketplace where employers of a broad range of business services find and hire independent professionals on a contract basis to work remotely. Since founding in late 1999, cumulative transactions worth over \$2 Billion have been completed on the website with an average job value of over \$600 in 2014 with over 2 million freelancers located worldwide on the website.

The process of hiring a freelancer online begins with an employer submitting a job posting, which includes a written description of the task required. Figure 1 provides an example of a job posting. The purpose of the job description is to communicate to potential applicants the details of the job requirements as well as the expectations for completing the work (such as a timeframe and technologies to be used) and the skills an applicant is expected to possess. Freelancers are expected to read and respond to the job postings when they apply and to detail how their past experiences can best be utilized to address the work requirements.

The example job posting in Figure 1 is to hire a freelancer under the job category of "Other IT & Programing." All job postings on this website are organized into a specific job category that represent conventionally recognized divisions of tasks in order to assist freelancers in finding jobs to apply to and employers to identify where and how to post jobs as well as how to recognize and compare a freelancers past job experiences. All job postings are categorized into one, and only one, category. These job categories provide a parallel to the recognized common notions of how work is partitioned in the offline world. Elance employed a group whose sole responsibility was to work on creating a sensible categorization system by which to organize the job postings as well as provide a way to report past job experiences of freelancers. The goal was to ensure that the categories were usefully recognizable, not too

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[6] Elance and oDesk have recently merged to become UpWork. Activity examined here occurred while Elance was still an independent company. All details presented pertain to Elance and the period before this merger.

broad yet not too detailed, to an employer and employee which provided them a way to distinguish among the jobs. Other job categories on this website include "Website Programming", "Administrative Assistance", "Translation Services", and "Logo Design." (See Appendix for complete list of the 168 categories.) The sorting of the jobs, and also freelancer past experiences, into these categorized groups provides a clear system to distinguish the different types of work that occurs on this website.

[Insert Figure 1 about here]

Once a job is posted, freelancers are free to apply to them. Applications are submitted by freelancers for each individual job listing in the form of an online proposal. See Figure 2 for an example of how freelancers who bid on a particular job are displayed. The complete list of all applicants for each job therefore represents the applicant pool. A freelancer cannot be considered or hired if they do not apply. During the time period of observation, all posted jobs received on average of approximately eight applications, though this ranged from a minimum of 0 to a maximum of 124 applications.

[Insert Figure 2 about here]

Once an employer receives these applications, they may choose to hire whomever they wish and may hire more than one candidate or not hire at all. In evaluating the applicants, an employer is able to look closely at a freelancer's past experiences on the website via a freelancer's profile page. See Figure 3 for an example of a freelancer's profile. Here a freelancer's history of past completed jobs on the website is visible and identified by their job category. Note in Figure 3 that each job completed by the freelancer is listed with the category the work occurred in, which further highlights the distinctions between jobs in a freelancer's past history and the salience of this categorization system. Therefore, these job categories provide a proxy for how employers will compare the job experiences of the applicants. The bidding concludes within a timeframe established by the employer, generally within a week, whereupon the employer may choose to hire or not.

[Insert Figure 3 about here]

In September, 2002 the website introduced new functionality that allowed an employer to indicate whether any job applicant should warrant further consideration. To do so, an employer simply checked a

box on the freelancer's job proposal. The specifics of the functionality have varied since it was first implemented, but the basic purpose has remained. Notice in Figure 3, in the upper right hand corner of each of the job proposals there is a feature that allows an employer to rate or rank the applicant. Employers used this to indicate that they wanted to shortlist the job applicant for further consideration. Once freelancers' bids were checked in this manner, the employer was later able to sort the list of applicants by this indicator, thereby ensuring these applicants appeared at the top of the queue and made it easier for employers to view them more closely. The shortlisted applicant list for each job therefore represents those applicants who made it beyond the initial screening stage of the hiring decision process and into the second stage consideration set as it comprises of those job applicants whom an employer examines more closely.

DATA AND METHODS

I received a download of all operational data from Elance from their inception in December, 1999 to April, 2008. This included all job posting details, all freelancer past histories, and, most crucially, the applicants for each of the jobs posted on the website and who was hired or not. In this timeframe there were 643,309 job postings by 174,466 unique employers across all 168 job categories, with an employer posting an average of 2.7 jobs each. These job postings received 5,021,749 bids from 50,683 unique freelancers. The average freelancer therefore applied to 129.4 jobs and each applicant pool was comprised of an average of 7.8 freelancers.

Dependent Variables

A failed search was operationalized as whether a job posting resulted in an applicant being hired. Of the 643,309 jobs posted in my dataset, 326,157 (50.7%) of them ended with no freelancer being hired. Exchange does not occur in these instances. I coded postings that closed with a freelancer being hired as 1 and a 0 otherwise.

Independent Variables

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My two main independent variables of interest are the amount of variety among the past job experiences of all the applicants in the total applicant pool and among the applicants in the consideration set. I leveraged the fact that all job experiences on this website are clustered into recognizable groupings of job categories. Because job categories represented similar jobs, job experiences across different job categories necessarily suggested differences. Therefore, variety in intra-applicant job experiences is a function of how dissimilar their past experiences from one another.

To calculate this I first measured the overlap of the non-focal job experiences of the applicants with the Jaccard index. I reasoned that identical jobs experiences will be easier to compare than dissimilar (therefore non-overlapping) job experiences. This measure captures overlap, so I simply subtracting this measure, which ranges from 0 (no overlap) to 1 (complete overlap) from 1 to arrive at the variety of job experiences of the applicant pool, Pool Variety. Greater overlap of past experiences among job applicants in a pool leads to less variety and vice versa.

Specifically, overlap among all candidates' job experiences in each applicant pool is therefore calculated as the average overlap between each pair of candidates, with the overlap of each dyad calculated as the intersection of their individual categorical job experiences (as a count of identical categories) divided by the union of their past categorical job experiences (the count of total categories) – with the experience in the focal category removed. For example, in an applicant pool of two freelancers bidding on job category A, if freelancer 1 worked in job categories A, B, C, D, and E and freelancer 2 worked in categories A, C, and E – then the measure of their overlap in past experiences would be 2/4, or .5. This leads to an applicant pool variety measure of .5 (1-.5). For jobs with more than two candidates, the overlap measure was calculated between all (pairs of) candidates for each job and then averaged, with this number subtracted from 1. Formally,

$$Pool\ Variety_k = 1 - \frac{\sum_{i=2}^{n} \sum_{j=1}^{i-1} Jaccard_{i,j}}{\binom{n}{2}},$$

$$Jaccard_{i,j} = \frac{(i \cap j)}{(i \cup j)}$$

Where Pool Variety is 1 minus the average Jaccard overlap of all pairs of different candidates i and j have with one another in past categories of non-focal jobs they have completed before posting their bid. This measure can range from 0 to 1, with 0 meaning none of the candidates had any past experiences in common and 1 meaning all candidates had the exact same past experiences. Freelancers are not compared to themselves in this calculation and multiple experiences in each job category are collapsed into one instance of experience in that category. The pool variety measure is only calculated for jobs with at least one applicant, this reduced the sample to 301,740 jobs.

I utilized the same method to calculate consideration set variety on those shortlisted applicants. Employers utilized a shortlist for approximately 61% of the jobs that received more than one job applicant (184,565/301,740). Clearly, there is variation in the types of jobs and types of employers that did or did not utilize a shortlist. I account for possible selection differences below.

[Insert Figure 4 about here]

Figure 4 plots the histogram of the Applicant Pool Variety measure of all jobs – separated by those jobs that ended with a freelancer being hired versus none being hired. There are two aspects of note. First, the measure of overall applicant pool variety is Gaussian in distribution, with a mean of 0.61 and standard deviation of 0.15. However, pool variety for jobs that ended with a hire has a mean of 0.58 versus a significantly different mean of 0.64 (t-test of p<0.001) for jobs that did not end with a hire, lending credence to my hypothesis. Also seen in Figure 4, there is a shift in the two distributions, where the jobs that ended with a winner were more prevalent than those that did not end with a winner on the left-hand side of the distributions – those jobs with lower pool variety.

In Figure 5, I compare the variety of applicants in the total applicant pool versus those in the consideration set for jobs where a consideration set was used. The variance of variety among Consideration sets is much greater than the variety in the total Applicant pool. This is, in part, due to the fact that the shortlist is a subset of the total applicant pool, we should expect that shortlisted applicants are likely to have greater variance when compared to the total distribution they were drawn from. While a t-test confirms there is a significant difference in variety of job experiences among the applicants; mean of

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0.62 versus 0.59 for the total applicant pool versus consideration set, p<0.001); the sheer number of observations guarantees significance. The fact that there is such variation in among consideration sets throws into doubt the contention that a first stage decision process necessarily weeds out dissimilar items (Zuckerman et al 2003). Instead, the finding that first stage decision processes leads to greater variety in job experiences among applicants in the consideration set for some cases is suggestive of my more nuanced contention that some employers value broader job experiences from their candidates. I explore this more rigorously below.

[Insert Figure 5 about here]

I used the number of jobs that an employer had hired within a particular job category to operationalize their domain experience. As an employer gains increasing experience with a job category, they will be increasingly familiar with the experiences that they found to be more or less applicable to what they are hiring for. The number of times that employers hired in a specific job category ranged from 0 to 1375, with a mean of 2. Clearly, this is a highly skewed number. To account for this, I added 0.01 (to account for zeros) and took the natural log of the sum to reduce the effect of outliers and to reflect the diminishing returns to learning and employer develops for hiring in a job category. This measure is updated every time an employer hires.

Control Variables

I include job-varying controls at the level of the job, the set of freelancers bidding and the employer. At the level of the job, the most obvious alternative explanation is the complexity of the job. The more complex the job, the greater variety of freelancers may be inclined to bid on it because complexity may suggest a greater variety of skills may be applicable to the task. This could subsequently also affect the difficulty in choosing a candidate because a complex job will require more deliberation than a simple one. In order to control for this potential endogeneity problem I included two control variables. First, the average amount of all the bids received should serve as an indicator, at least from the perspective of the freelancers, of how complex the job is. More expensive jobs are likely more complex. The mean bid amount of jobs which received one or more bids in my observation window was $778.69 with a standard

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deviation of $2737.25 and ranged from $0 to $623,252.90. I added $1 and log transformed the resulting variable to account for the skew. Second, I also accounted for the complexity of the job by including a variable that equaled the count of the words in the job description posted by the employer. I reasoned that more complex tasks will likely require a greater number of words to explain. Job descriptions ranged from three words to 826, with an average of 146.4 and a standard deviation of 113.1. I log transformed this to reduce skew and capture the diminishing value of additional words. Finally, as a measure for how well-understood a job posting may be by the freelancers, I included the standard deviation of all bids received as I reasoned that variation among wages requested indicates how well-understood the job was.

In addition to these controls for endogeneity of a job's inherent complexity, I also included controls specific to the freelancers bidding for each job. Another reasonable alternative explanation to my predictions is simply that highly disparate applicant pools could mean an employer received poor quality freelancers. To account for applicant quality, I included the maximum focal job category experience of all the candidates in the pool[7]. Recall that if employers merely choose according to experience in the focal bidding category, this measure should increase the likelihood a freelancer will be hired. Relatedly, the greater this measure, the greater likelihood of increased overlap of the candidates as well. I also included the maximum star ratings of all the freelancers bidding for the job as a measure of the available quality of the pool – the higher the star ratings, the higher the quality of candidates, the easier decision an employer will have[8]. I also included the total number of candidates the job received, as the greater number of candidates, the more difficult the decision should be. Finally, I included control variables specific to the employer. Here, I included the overall experience an employer had in hiring on this virtual platform, updated each time they hire. Summary statistics and correlations are presented in Tables 1 and 2 below.

[Insert Tables 1 and 2 about here]

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[7] I could have also included the average, which does not change any results in unreported models. However, many job applicants do not have any experience, so this average measure is skewed downward. Also, an employer generally hires one freelancer, so the maximum measure better captures this.

[8] Similar to applicant experience, I could also have included the average feedback ratings. However, there are many freelancers who bid with no star ratings, so this measure is difficult to adequately calculate. Including a measure of available average feedback ratings does not alter results.

MODELS AND RESULTS

The dependent variable of whether a job ended in an offer of employment or not is dichotomous, so a logistic regression would be appropriate, however, testing hypothesis 3 requires an interaction, which is challenging to account for in a logistic regression framework. Instead, I utilized a linear probability model to estimate this outcome. Note, all results hold with a logistic regression. I included employer fixed-effects and also job category fixed-effects to allay concerns that the results are biased either by heterogeneity among employers or differences among job categories.

Results estimating that the likelihood of a job ending in a failed search are reported in Table 3. In Model 1, control variables generally act as expected. Consistent with the basic models of choice overload (Iyergar and Lepper 2000), the greater number of applicants a job receives, the less likely an employer will be to extend an offer of employment. The more complex the job, as measured by the average price of all bids received and the number of words in the job description, both increase the likelihood of a failed search. This accords with the general notion that the more thought an employer may put into hiring for the job, as would be the case with increasingly complex or expensive jobs, the more difficult it will be to arrive at a decision. The greater overall experience an employer has with hiring on this platform the less likely they are to extend an offer of employment, however, this finding is countered by the fact that the more the employer has hired in the focal job category, the more likely they will extend an offer. Finally, the greater the maximum experience any applicant has in the focal category, the lower likelihood of an offer being extended. Conversely, the greater the maximum feedback rating of all job applicants, the greater likelihood of an offer being extended.

[Insert Table 3 about here]

Hypothesis 1 is tested in Model 2 by including the measure of variety in non-focal job experiences of the applicant pool. As predicted, greater applicant pool variety leads to a lower likelihood of an offer being extended to any applicant (β=-0.177, p<0.001). Hypothesis 2 further demonstrates that this is due to the fact that the narrower consideration set, which are the set of applicants an employer will examine more closely, is the source of the cognitive difficulty in comparison. Specifically, Model 3

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includes the measure of variety in non-focal job experiences of the candidates in the consideration set. As predicted, the measure exerts a significantly negative effect (β=-0.142, p<0.001) on the likelihood that an offer of employment will be extended. This equates to an approximately 2% reduced likelihood (.151*-.142) of a job ending in an offer of employment for a standard deviation increase in consideration set variety above the mean. Logistic regression estimates report a substantial 24% decrease in likelihood of a failed search with a 1 standard deviation increase in variety[9]. Furthermore, as predicted, the effect of the consideration set fully mediates the main effect of the applicant pool variety. This better demonstrates, as theorized, that it is the cognitive difficulty in the detailed comparison among applicants occurring during the second stage evaluation of the consideration set that drives failed searches. It is not who applies as much as who is seriously considered. Alternative mechanisms, such as poor applicant quality, are less amenable to this finding that it is the consideration set that accounts for failed searches because presumably poor applicants would have been screened out in that first stage.

Use of the consideration set by employers occurs on only a subset of the job postings. To account for potential selection issues, I utilized a Heckman two-stage selection model where in the first stage I predict likelihood of using a consideration set, then in the second stage, I model the effect of the consideration set variety on failed searches. I use the standard deviation of bid amounts as an instrument to predict use of a consideration set because this was a significant predictor of consideration set use but not a predictor of failed searches. Analyses, reported in Table A.1 of the Appendix continue to support my hypothesis.

Model 3 tests Hypothesis 3 by including an interaction between the consideration set variety and the experience an employer has with hiring in the focal job category. As predicted, the coefficient is significant and positive, indicating that as an employer becomes more experienced in hiring for a specific type of job, increasing variety in job applicant backgrounds does not commensurately lead to increased

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[9] The linear probability model returns a small effect size because the OLS estimate assumes a linear relationship between the independent and dependent variables. However, given this is a dichotomous outcome, a logistic regression would be a better model to use to understand effect sizes. The effect size, when a Logistic regression is used, is a 24% decrease (1-exp(.151*-1.8)) in the likelihood to hire for a one standard deviation increase in consideration set variety.

difficulty in choosing a freelancer. Figure 6 depicts this effect visually. The horizontal axis is the variety in non-focal job experiences of the consideration set and the vertical axis is the likelihood of an offer being extended to any applicant. The dashed line represents the effect of variety on the likelihood of hiring for unexperienced employers, those with no previous experience hiring for this particular type of job. As expected, increasing variety complicates the decision and results in a lower likelihood of anyone being hired. However, this effect is highly moderated for those employers with more experience. Specifically, the solid line represents the effect of variety on likelihood of hiring for those employers who are two standard deviations above the mean, employers that have hired approximately five times. For this population, there is practically no effect of variety on the likelihood of hiring.

[Insert Figure 6 about here]

Accounting for potential endogeneity

The variety in past experiences of the job applicants an employer receives for a job is likely correlated with the likelihood of failed searches for at least two difficult to observe reasons. First, as mentioned above, the job itself can vary in complexity. Those more complex jobs may attract more variation in applicants as well as be less likely to end in hiring. Second, poorly defined requirements of a job may also invite a broad range of applicants but may simultaneously indicate an ill-informed employer who may be less likely to hire. While the controls for job complexity and job category fixed-effects included should mitigate these concerns, an ideal test would be to demonstrate how exogenous variation that affects the variety of job applicant experience in the applicant pool but is uncorrelated with these, and any other, explanations, leads to the expected observed outcome.

To do so, I utilized an instrumental variable identification strategy (Angrist, Imbens and Rubin 1996). I take advantage of a natural experiment in the form of a functional change that was implemented on the website. At one point in their history, Elance had market-makers in place whose responsibility was to review each job posting to ensure their quality, completeness, and suitability for the job category it was posted in (Kohler and Applegate 2000). These market makers took job postings and edited them and also ensured they were posted in the correct job category, thereby increasing the chances appropriate

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freelancers would understand and therefore bid on the job. For example, they would ensure job postings included the appropriate skills required in a more systematic way. In October 2002, this function was eliminated because it was not cost effective as the website scaled. Instead, employers were directed to sample templates to assist them in filling out job postings as the only assistance. Given this change, I expect to see that job postings reviewed by these market makers will garner an applicant pool of job candidates with past experiences that are much more similarly focused than those not reviewed by them. In short, the timing, before and after the use of these market makers, can serve as an instrument to proxy for the overlap of job applicants[10].

To verify this, Figure 7 plots the average applicant pool variety measure for all jobs posted within an individual 30-day window over my observation timeframe. The vertical dashed line identifies the period when the company switched from using market markers to eliminating them. As expected, applicant pool variety was lower beforehand. See the Appendix for additional checks regarding suitability in applying the instrumental variable paradigm.

[Insert Figure 7 about here]

The average number of jobs posted in the "before" period was lower than the number posted after this change (1,151 versus 5,402 per 30-day period). This is not a surprise, as this platform was growing dramatically over this time period. Another concern is that if the analysis window were extended too broadly in either direction from this change, I risk other functional or environmental changes affecting the outcomes. To guard for both these issues, I limited the analyses to jobs posted in a one-year window before and after this change[11]. By considering this narrower window, the average number of job posts per 30-day period, though still different, was substantially more similar (2,064 vs. 3,936) than not limiting the window.

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[10] Note, the timing of this functional change was close to the implementation of the consideration set (shortlist) functionality on the website, so I had to limit the analyses to variety in the applicant pool only. This limitation prevents me from testing Hypothesis 2 in this manner.

[11] Limiting the analyses to a shorter time frame of six months, for example, does not alter results in any meaningful way. Longer time frames further strengthen the results.

A variable was created to instrument for applicant pool variety which was set to equal 1 in the period after the elimination of these market-makers and set equal to 0 in the period before. To test the significance of this instrument I used the before and after indicator to predict applicant pool variety, as described above. Results, reported in the Appendix, demonstrate that the indicator for the time period after the removal of market makers is significant and positive, as expected[12]. I describe results of a formal test for weak instruments (Stock and Yogo 2005) in the Appendix as well.

I ran fixed-effects regressions clustered by employer to address the risk that new employers joining the website may differ in their hiring decision process from those on the website earlier. Given this, only individual employers who posted jobs both before and after this change were included in this analysis. This specification also eliminated employers who were not serious, namely those who posted a job once and did not hire any freelancer, as there would be no within-employer variance in this case. This resulted in an examination of 27,490 job postings by 6,455 employers.

The dependent variable, whether an employment offer was made or not, is a dichotomous outcome; therefore, a logistic regression seemed most appropriate. However, because of the interactions necessary to test my second hypothesis, I ran and report results of linear probability models. I note that all results hold with logistic regression specifications as well[13]. In addition to the employer-level fixed-effects, I also included fixed-effects specifications clustered by job category to account for possible variation across the different types of jobs.

To include the instrument, I utilized a Two-Stage Least Squares (2SLS) estimate with the first stage predicting the measure of applicant variety for each job postings using the period indicator instrumental variable and the second stage incorporating this estimate into the model that predicted the decision difficulty outcomes of interest. Specifically, I utilized the XTIVREG2 command with the 2SLS

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[12] I considered including a time variable as an additional instrument, considering the downward trend in the Overlap measure. While this variable was significant using the complete window of observation, it was not significant within the narrower, 2-year window I limited the analysis to. The use of only one indicator as an instrument becomes a more conservative test, as the instrument doesn't provide much variation in predicted probabilities.

[13] IVPROBIT was used to estimate the dichotomous outcome using the instrumental variable paradigm.

option in STATA 13 to include the instrument in an employer fixed-effects model. Job category

indicators were included as dummy variables in the model as well.

<center>[Insert Table 4 about here]</center>

Table 4 reports the results of the likelihood of the job posting ending with a freelancer being

hired. Model 1 is the base model with the control variables only. For brevity, I discuss this in more detail

in the Appendix. Model 2 includes the instrumented applicant pool variety. Results support my first

hypothesis – greater variety in past experiences in an applicant pool, the less likely an employer will hire

(β=-0.132, p<0.001). Specifically, a one standard deviation increase in applicant pool variety above the

mean (holding all other variables constant at their means) will decrease the likelihood an employer will

hire by ~ 2% (-0.13 x 0.15 = -0.02)[14]. I test my third hypothesis in Model 3 by including the interaction of

applicant pool variety with the experience of an employer in that job domain. The coefficient is positive

and significant as predicted (β=0.167, p<0.001), suggesting that increasing experience in hiring in a

specific domain eases an employer's ability to choose among a greater variety of job applicants. I plot this

effect graphically in Figure 8, which parallels the findings from the whole population depicted in Figure 6

above.

<center>[Insert Figure 8 about here]</center>

Additional analyses

I argued the link between variety and failed searches is the mechanism of comparison difficulty. This

should also manifest in the time it takes an employer to evaluate and eventually chose someone to hire

because increased cognitive effort expended by an employer should be partly reflected by the time they

spend deciding. Therefore, the time to hire should support my mechanism of cognitive difficulty. I

operationalize this dependent variable as the number of days it took for an employer to eventually make

an offer of employment. This is a count variable that is calculated by subtracting the day a listing was

posted on the website to the eventual day a freelancer was hired. Job postings that concluded without a

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[14] Note, the small effect size is partly due to the fact that I modeled a dichotomous outcome with a LPM and also that this is a highly limited sample with an instrumental variable.

<center>27</center>

freelancer being hired were clearly not included in this analysis. This variable ranged from 0 to 1429[15] and averaged 10.9 days with a standard deviation of 22.9.

I estimated the number of days it took an employer to eventually hire an applicant with a Linear Probability model with fixed-effects by employer and job category[16]. Results reported in Table 5, demonstrate the predicted pattern. Greater variety in the non-focal job experiences of the applicant pool serve to increase the number of days required to make a decision. This effect is fully mediated by the consideration set variety.

[Insert Table 5 about here]

I described a process of hiring that hinges on the assumption that an employer considers and values the experiences outside of what they are seeking. This should be reflected in the fact that job applicants who demonstrate broader experiences are preferred over those that do not. I test this specific notion by examining what qualities of an applicant help them move from the first stage applicant pool into the second stage consideration set. I reason that if broader experience, controlling for the experiences in the focal domain, is attractive to employers, than this factor should increase an applicant chances of moving into the consideration set.

I utilize a logistic regression to estimate the likelihood a job applicant moves from the applicant pool into the consideration set. Results, reported in Table 6, demonstrate that an applicant is more likely to move from the applicant pool to the consideration set if they possess a broader set of past job experiences, as measured by the number of different job categories they have worked across in the past. Breadth of past experiences is significant over and above the included control variables for reputation and experience in the focal category, which are both significant predictors of being in the consideration set as well. This result demonstrates support for my contention that employers find additional experience attractive beyond the focal job category. Of particular note is that this finding contradicts an underlying

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[15] I accounted for the high number of days, which could be due to computer functional mistakes, and is likely an outlier, by truncating the distribution to a maximum of 90 days, which encompassed 99.9% of the jobs. This did not change any results.
[16] The outcome is a count of days, so I could also model this as a negative binomial. Results are identical and the linear probability models are reported because they are easier to interpret.

assumption of the two-stage model proposed by market theorists who suggest audiences will select more similar and focused items for consideration in the second stage (Zuckerman 1999),

[Insert Table 6 about here]

Readers may also be concerned that the results are driven by the highly complex jobs on this website. More complex jobs likely take longer to hire, are more difficult to hire for, are more difficult to describe clearly, and also more likely to attract a greater variety of candidates. Though the instrumental variable paradigm and the job category fixed-effects models should have accounted for this, there may continue to be high heterogeneity even within these jobs categories. To account for this, I isolated my analyses to those job categories that comprised of jobs that were the least complex. To do so, I reasoned that job categories that received bids from freelancers that exhibited lower variance in price represent jobs that are better understood, and therefore less complex, than jobs that received a higher variance in bids among freelancers. Higher variance bids would mean there was less understanding as to the tasks and complexity the jobs may entail among those freelancers bidding on them. Consequently, I identified the jobs categories in the lowest quintile (bottom 20%) as measured by the average variance of bids each job received. Of these job categories, I isolated the observations to only those job categories in the top decile in terms of volume, to ensure adequate variation within category, resulting in an examination of article writing, web content, logo design, and graphic design categories of work. Analyses on these 43,857 jobs, with category fixed-effects, were substantively identical to those above and continue to support my contentions[17].

In hypothesizing that more experienced employers will have less difficulty with a variety of job applicants, I theorized that they would have clearer well-identified requirements and therefore be able to assess variety easier by quickly choosing the applicants that match their needs. This suggests that the advantage a more experienced employer will have can be reflected in their consideration set. Specifically, because they will have a better developed sense for what they are looking for, more experienced

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[17] Because this drastically reduced the sample size, I included observations from the whole observation period and could not utilize the instrumental variable paradigm.

employers will construct consideration sets that reflect less variety (because shortlisted applicants will look more alike) and also shorter consideration sets (because fewer applicants should match their needs). In analyses reported in the Appendix, I find support for both of these contentions. More experienced employers construct consideration sets that are comprised of more similar job applicants and fewer of them – controlling for all other observable differences among job postings, including the original applicant pool variety. This suggests their advantage in being able to navigate a greater variety of job applicants is in being better at identifying precisely what they are looking for.

DISCUSSION AND CONCLUSION

Hiring is a costly endeavor for employers. Unfortunately, hiring research by organizational sociologists has examined outcomes from the perspective of the employee, while, for the most part, neglecting the consequences faced by employers. I investigated antecedents to failed labor market searches, defined as job postings that end with no applicant being hired. To do so, I portrayed hiring as a cognitive decision making process, thereby providing a detailed account how employers may be constrained in their ability to hire. My analyses of hiring transactions from an online labor market for freelancers demonstrated how the composition of the applicant pool affects the likelihood of an offer of employment being extended. Because comparison among options is complicated when they differ, jobs that attracted a greater variety of applicants who differed in their past experiences were more likely to end in a failed search.

This paper also demonstrates how the composition of the applicant pool "matters" to labor market outcomes. Hiring theorists have recognized that the results of hiring decisions cannot be fully accounted for without visibility into the pool of available applicants (Fernandez and Weinberg 1997). This criticism has been best represented by those scholars who study discrimination against particular social groups (Peterson and Saporta 2004, Fernandez and Sosa 2005). However, this paper demonstrates that the applicant pool affects more general labor market outcomes, such as how efficient a job search may be (Diamond 1981, Mortensen 1988, Mortensen and Pissarides 1999). Furthermore, instead of labor market thickness, defined as the number of applicants in a labor market – this paper examined variety – an

orthogonal concept yet one that clearly addresses the question as to how easily employers can find employees (Roth and Peranson 1999).

A novel perspective this paper brought is to focus on outcomes for the employer, as opposed to employee or job seeker, in the two-sided labor market. For the most part, work in hiring and labor markets has concentrated on developing an understanding of the constraints and outcomes for job seekers. However, employers are themselves the second role and arguably the more important one, as they ultimately hold the resources to hire or not. Failed searches are one example of how they may alter outcomes for job seekers. There are others, such as their ability to attract particular applicants or their attempts a steering job candidates to particular positions – all employer actions which are necessary to better understand. Without an understanding as to employers and their constraints and limitations risks the hiring literature only being able to provide a partial perspective at best. Scholarship should seek to develop a much better understanding as to how employers choose.

This paper took a cognitive decision making perspective in theorizing on employer hiring processes and the benefits to such a perspective are many. For example, scholars have well-noted that a job candidate's social category membership, such as their race, gender, or country of affiliation, affects their likelihood of being hired. While there is no doubt that animosity towards members of particular social groups contributes to such outcomes, a cognitive perspective may instead investigate how employers may be boundedly rational in their decisions. Perhaps employer have beliefs regarding gender and particular abilities which may or may not be malleable with additional experience. A cognitive learning perspective on employment may assist us in developing this understanding as to the potential causes of the observed discriminatory hiring practices. This understanding would assist us in identifying appropriate remediation to solve problems of labor market inequality.

While cognitive choice theorists have recognized how the composition of the choice set a decision maker is presented with affects whether and how they make decisions (Tversky 1977, Iyergar and Lepper 2000) there is disagreement as to whether a greater number of choices is helpful or harmful to a decision maker (Chernev 2003, Gourville and Soman 2005). This paper contributes to this literature by

demonstrating how better identified preferences, from employers who are more experienced at hiring within a particular domain, moderates this effect. Therefore, greater variety can be seen as either easing or complicating the decision process.

The setting studied here, an online market for freelance labor, brings to the fore much needed understanding as to the dynamics of the so-called "Gig Economy" (Cappelli 1999) a small but quickly growing component of the larger population of contract workers and their employers (Barley and Kunda 2004, Katz and Krueger 2016). In addition to providing novelty in terms of a setting, the data available provided heretofore unavailable visibility of the hiring process of employers. While both similarities and differences with offline hiring are evident, it is beyond the scope of this paper to lay those bare. Future research should seek to better understand how the dynamics of temporary contract hiring may differ from offline hiring, particularly since there is a greater and greater likelihood of internet mediated job seeking in the future for full-time jobs, such as the one provided by LinkedIn and similar platforms.

The results of this study provides qualified credence to those theorists who have relied on a two-stage model of evaluation in markets, but have yet to explicitly demonstrate such a process accounts for their hypothesized outcomes (Zuckerman 1999, Jensen and Roy 2008, Hannan 2010). Here, in hiring, the dual stages of screening an applicant pool and then selection of those candidates into a consideration set were explicitly theorized and empirically identified to affect whether an employer decided to extend an offer of employment or not. Interestingly, my findings contradict the extant belief that the screening stage would result in a consideration set of more similar items, I instead find that a consideration set can vary dramatically in how similar the applicants were to one another. This suggests revisiting the assumptions of how the two-stage market models operate is warranted, particularly given the contradictory findings as to whether simple (Zuckerman et al 2003, Hsu 2006, Fergusen and Hasan 2012) versus complex (Pontikes 2014, Leung 2014, Merluzzi and Phillips 2015) identities are preferred by evaluators.

In this vein, this paper also highlights a particularly interesting tension suggested by two-stage market decision models. The motivations of job applicants to differentiate themselves from one another appear to be at odds with facilitating the comparisons, and ultimately a decision, by an employer

(Zuckerman et al 2003). Conceptions of a two-staged decision process suggest that a seller's should aim to differentiate themselves in the second-stage, consideration set – thereby assisting them in standing out from the crowd. However, this encouragement that seller's attempt to distance themselves from one another, particularly in the second stage, results in an employer suffering the consequences of increased difficulty in candidate comparisons, thereby reducing market efficiency in terms of transaction closure. Seller motivated actions to differentiate lead to employer difficulties in making a decision. Future consideration as to how audiences may ameliorate these challenges is a potentially useful path of investigation.

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FIGURE 1
JOB POSTING

Scraping data from a website

IT & Programming > Other IT & Programming

Job Status: Selecting Candidate

Posted: Sat, Nov 23, 2013

Location: Anywhere

Start: Immediately

My Team (1)

Budget: Less than $500

Fixed Price Job

Elance Escrow Protection

W9 Not Required

6 invited

Hi there,

I need someone to scrape data from a website and provide the data and the code used to me. The code should be in Python or Perl.

Specifically, I need the following four datafields scraped from the metacritic.com website, for only the movies.

- Movie Title
- Production Company
- Release Date
- Home Release Date

I have attached a sample screenshot of the page from which this data will come from. Note, I've circled the fields I would need scraped.

Webpage: http://www.metacritic.com/movie/the-worlds-end/details

Title: The World's End
Production: Relativity Media
Release Date: Aug 23, 2013
Home Release Date: Nov 19, 2013

FIGURE 2
SAMPLE OF APPLICATIONS RECEIVED

Kalpesh Tawde ☆
Rate Proposal ○○○○○

🇮🇳 India | Rate: $15/hr | IT & Programming [2] | 27 jobs | $3,618 Earnings | ⭐⭐⭐⭐⭐ 4.9 | 📷 Portfolio

$300.00
Delivery within 3 days

Expand Proposal ▾

⊖ Hide   **Select**

B. D. ☆
Rate Proposal ○○○○○

🇷🇴 Romania | Rate: $15/hr | IT & Programming [3] | 8 jobs | $2,888 Earnings | ⭐⭐⭐⭐⭐ 4.8 | ▶ Portfolio

$273.97
Delivery within 1 week

Expand Proposal ▾

⊖ Hide   **Select**

Malik Khan ⊘ ☆
Rate Proposal ○○○○○

🇧🇩 Bangladesh | Rate: $15/hr | IT & Programming [2] | 0 jobs | $0 Earnings | ☆☆☆☆☆ 0.0 | ▶ Portfolio

$219.18
Delivery within 2 weeks

Expand Proposal ▾

⊖ Hide   **Select**

Salman Tariq Mirza ☆
Rate Proposal ○○○○○

🇨🇦 Canada | Rate: $14/hr | IT & Programming [1] | 0 jobs | $0 Earnings | ☆☆☆☆☆ 0.0 | ▶ Portfolio

$219.18
Delivery within 3 days

Expand Proposal ▾

⊖ Hide   **Select**

Liu H. ☆
Rate Proposal ●●●●●

🇨🇳 China | Rate: $20/hr | IT & Programming [8] | 56 jobs | $6,648 Earnings | ⭐⭐⭐⭐⭐ 5.0 | ▶ Portfolio

$200.00
Delivery within 1 week

Expand Proposal ▾

AWARDED

FIGURE 3
FREELANCER PROFILE PAGE

Liu H.
Python

🇨🇳 China | Shaoguan, Guangdong | 7:15 am Local Time

Overview

Minimum Hourly Rate $20

I'm skilled in Web Scraping, Data Mining, Automatically, Networking, etc. Happy to help you. Thanks.

Read More »

Job History

Private Job
Dec 6, 2014 | Data Analysis | Private | Working

Private Job
Dec 6, 2014 | Web Programming | Private | Completed | ⭐⭐⭐⭐⭐ 5.0

Private Job
Nov 27, 2014 | Database Development | Private | Completed | ⭐⭐⭐⭐⭐ 5.0

Private Job
Nov 19, 2014 | Database Development | Private | Completed | ⭐⭐⭐⭐⭐ 5.0

View All »

My Snapshot

All Categories ▾

12 months | Lifetime

Jobs	56	Total
	58	Milestones
	88	Hours
Reviews	48	⭐⭐⭐⭐⭐ 5.0
	99%	Recommend
Clients	14	Total
	43%	Repeat
Earnings	Private	Total
	Private	Per Client

Identity

Username	liuhz
Type	Individual 👤
Member Since	April 2013
Elance URL	http://liuhz.elance.com
Verifications	💲 📞 🌐 0️⃣

FIGURE 4

VARIETY OF APPLICANT POOL EXPERIENCES FOR ALL JOBS BY OFFER MADE OR NOT
(1999-2008, Jobs with >1 Bidder, N=301,740)
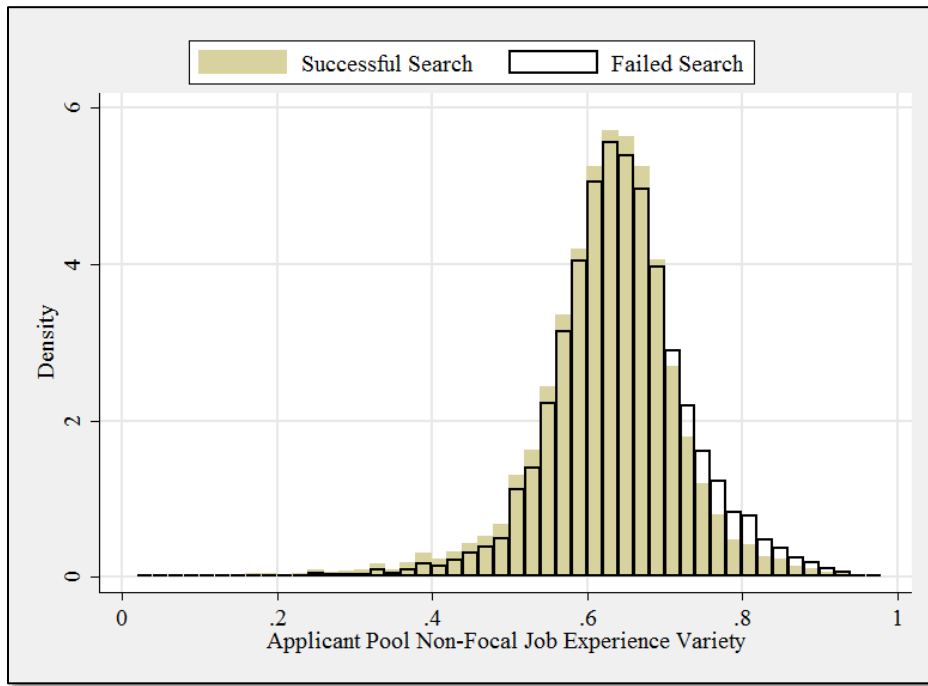
FIGURE 5

VARIETY OF APPLICANT JOB EXPERIENCES FOR APPLICANT POOL VS. CONSIDERATION SET
(1999-2008, Jobs with >1 Bidder, N=301,740)
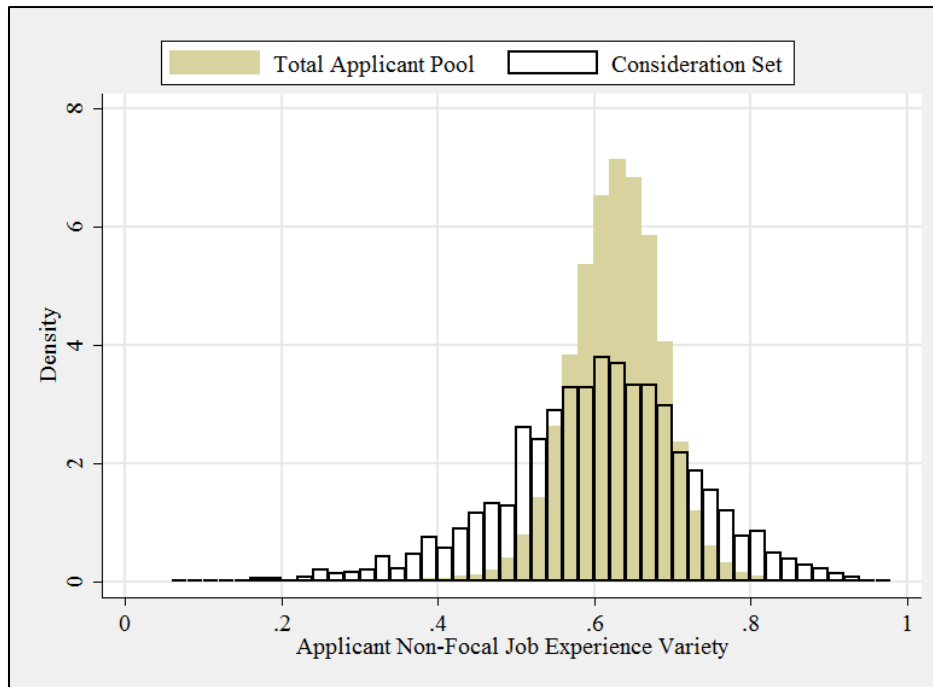
TABLE 1
SUMMARY STATISTICS
(N = 301,740)

Variable	Mean	Std. Dev.	Min	Max
Winner Picked = 1	0.509	0.499	0	1
Total Number of Applicants (logged)	2.190	.921	1	4.820
Average Price of All Bids (logged)	5.355	1.818	0	13.342
Standard Deviation of All Bid Amounts (logged)	4.614	2.067	0	13.790
Word Count of Listing Description (logged)	4.464	1.372	0	6.716
Overall Employer Experience (logged)	1.179	1.172	0	7.277
Employer's Category Experience (logged)	0.241	0.690	0	7.226
Maximum Applicant Experience in Category (logged)	2.877	1.570	0	7.365
Maximum Applicants Star Ratings (with zeros)	1.338	2.154	0	5
Applicant Pool Variety	0.613	0.066	0	0.966
Consideration Set Variety	0.591	0.151	0	0.964

TABLE 2
CORRELATIONS
(N = 301,740)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
(1) Winner Picked = 1	1									
(2) Total Number Applicants (logged)	-0.066	1								
(3) Average of All Bids (logged)	-0.080	0.027	1							
(4) Std Dev of All Bid Amounts (logged)	-0.049	0.011	0.951	1						
(5) Word Count Listing Description (logged)	-0.002	-0.050	0.073	0.042	1					
(6) Overall Employer Experience (logged)	0.071	-0.072	-0.031	-0.015	0.011	1				
(7) Employer's Category Exp (logged)	0.055	-0.019	-0.011	-0.008	0.019	0.566	1			
(8) Max Applicant Exp in Category (logged)	-0.019	0.327	0.023	0.007	0.041	-0.064	-0.01	1		
(9) Max Applicant Star Ratings (w/ zeros)	0.195	0.133	-0.010	-0.004	0.026	-0.013	-0.001	0.595	1	
(10) Applicant Pool Variety	-0.011	-0.097	-0.054	-0.024	-0.078	0.058	-0.032	-0.180	-0.276	1
(11) Consideration Set Variety	-0.105	-0.000	-0.000	0.003	-0.024	-0.003	-0.033	-0.130	-0.115	0.423

TABLE 3

OLS ESTIMATES OF LIKELIHOOD OF A HIRE
(Employer and Job Category Fixed-Effects)

	(1)	(2)	(3)	(4)
Job Controls				
Total Number of Applicants...	-0.0023***	-0.0020***	-0.0017***	-0.0008***
	(0.0001)	(0.0001)	(0.0003)	(0.0003)
Average Price of All Bids (logged)..	-3.71e-6***	-3.88e-6***	-1.07e-6***	-2.15e-6***
	(6.06e-7)	(6.05e-7)	(3.00e-6)	(2.95e-6)
Standard Deviation of All Bid Prices (logged)........................	1.62e-7	2.77e-7	-1.89e-6	-6.08e-8
	(3.95e-7)	(3.94e-7)	(1.93e-6)	(1.93e-6)
Word Count of Listing Description (logged)............................	-0.0153***	-0.0063***	-0.0035	-0.0140**
	(0.0015)	(0.0015)	(0.0053)	(0.0052)
Employer Controls				
Employer Overall Experience (logged)....................................	-0.0711***	-0.0702***	-0.0942***	-0.0995***
	(0.0017)	(0.0017)	(0.0048)	(0.0048)
Employer Category Specific Experience (logged)	0.0272***	0.0242***	0.0579***	0.0120
	(0.0019)	(0.0019)	(0.0062)	(0.0170)
Applicant Quality Controls				
Maximum Applicant Experience in Category (logged).............	-0.0176***	-0.0181***	-0.0339***	-0.0335***
	(0.0006)	(0.0006)	(0.0016)	(0.0016)
Maximum Applicant Star Rating in Category	0.0598***	0.0577***	0.0818***	0.0831***
	(0.0010)	(0.0010)	(0.0027)	(0.0027)
Applicant Pool Variety...		-0.1766***	-0.0091	0.0938
		(0.0072)	(0.0525)	(0.0492)
Consideration Set Variety...			-0.1418***	-0.1923***
			(0.0201)	(0.0224)
Consideration Set Variety X Employer Domain Exp.				0.0958***
				(0.0276)
Constant..	0.7212***	0.8006***	0.3262	0.8147***
	(0.0236)	(0.0238)	(0.2049)	(0.0404)
Job Category Fixed-Effects	Yes	Yes	Yes	Yes
Employers	103952	103952	37924	37924
Min	2	2	2	2
Mean	2.9	2.9	3.9	3.9
Max	113	113	113	113
Observations	300539	300539	147903	147903
Log-Likelihood	-90354.30	-89888.84	1741.07	1070.10

*Notes: Standard errors in parentheses; * p < 0.05, ** p < 0.01, *** p < 0.001*

FIGURE 6
MARGINAL EFFECTS CONSIDERATION SET JOB EXPERIENCE VARIETY AND EMPLOYER EXPERIENCE ON LIKELIHOOD OF SUCCESSFUL SEARCH
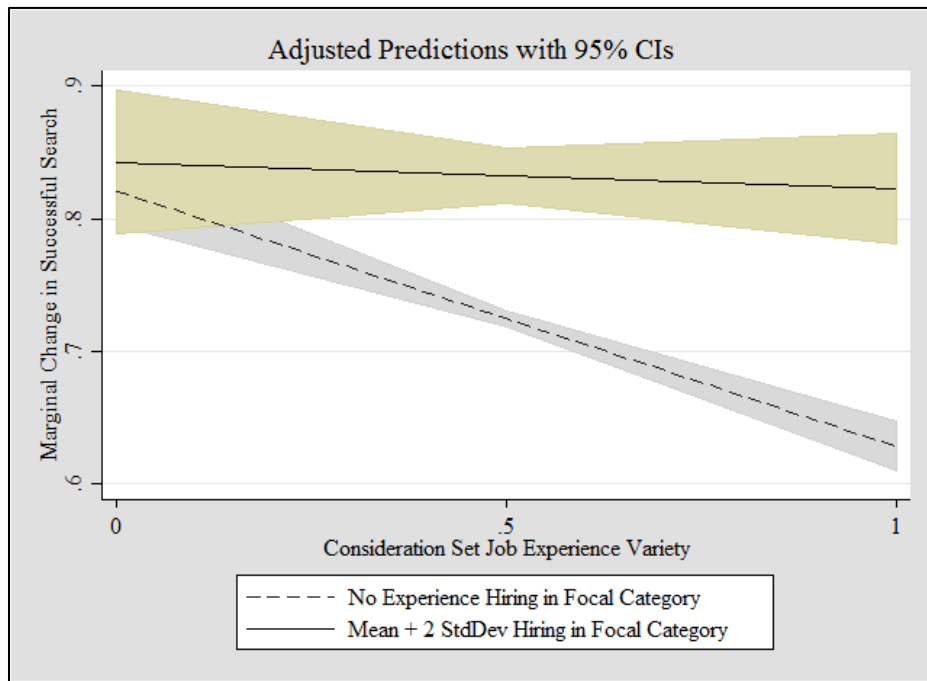

FIGURE 7
30-DAY SPELLS OF AVERAGE APPLICANT EXPERIENCE OVERLAP
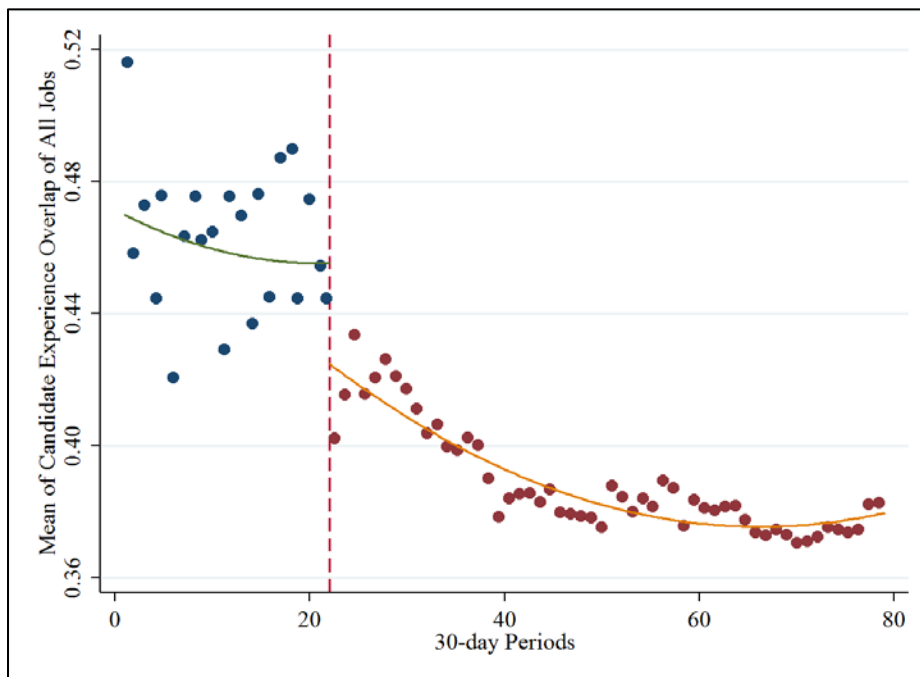(1999-2008 All Jobs with Number Bidders>1, N=301,740)

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TABLE 4
OLS ESTIMATES OF LIKELIHOOD OF A HIRE
(Employer and Job Category Fixed-Effects)

	(1)	(2)	(3)
Job Controls			
Total Number of Applicants...	-0.007***	-0.007***	-0.007***
	(0.002)	(0.002)	(0.002)
Average Price of All Bids (logged)	-0.010***	-0.011***	-0.011***
	(0.002)	(0.002)	(0.002)
Standard Deviation of All Bid Prices (logged).................	-0.006***	-0.005***	-0.005***
	(0.001)	(0.001)	(0.001)
Word Count of Listing Description (logged)	0.021***	0.021***	0.021***
	(0.002)	(0.002)	(0.002)
Employer Controls			
Employer Overall Experience (logged)............................	-0.044***	-0.043***	-0.043***
	(0.002)	(0.002)	(0.002)
Employer Category Specific Experience (logged)	0.058***	0.057***	0.047***
	(0.002)	(0.002)	(0.012)
Applicant Quality Controls			
Maximum Applicant Experience in Category (logged) ...	0.026***	0.028***	0.027***
	(0.001)	(0.001)	(0.001)
Maximum Applicant Star Rating in Category..................	0.118***	0.117***	0.117***
	(0.000)	(0.000)	(0.001)
Applicant Pool Variety (instrumented)		-0.132***	-0.171***
		(0.011)	(0.013)
Applicant Pool Variety (instrumented) X Employer Domain Exp.			0.167***
			(0.019)
Constant...	-.047	0.052	0.079**
	(0.029)	(0.029)	(0.029)
Job Category Fixed-Effects...	Yes	Yes	Yes
Groups	6455	6455	6455
Min	2	2	2
Mean	4.3	4.3	4.3
Max	113	113	113
Observations	27,490	27,490	27,490

Notes: Standard errors in parentheses; * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

FIGURE 8
MARGINAL EFFECTS
APPLICANT POOL VARIETY AND EMPLOYER EXPERIENCE
ON LIKELIHOOD OF SUCCESSFUL SEARCH
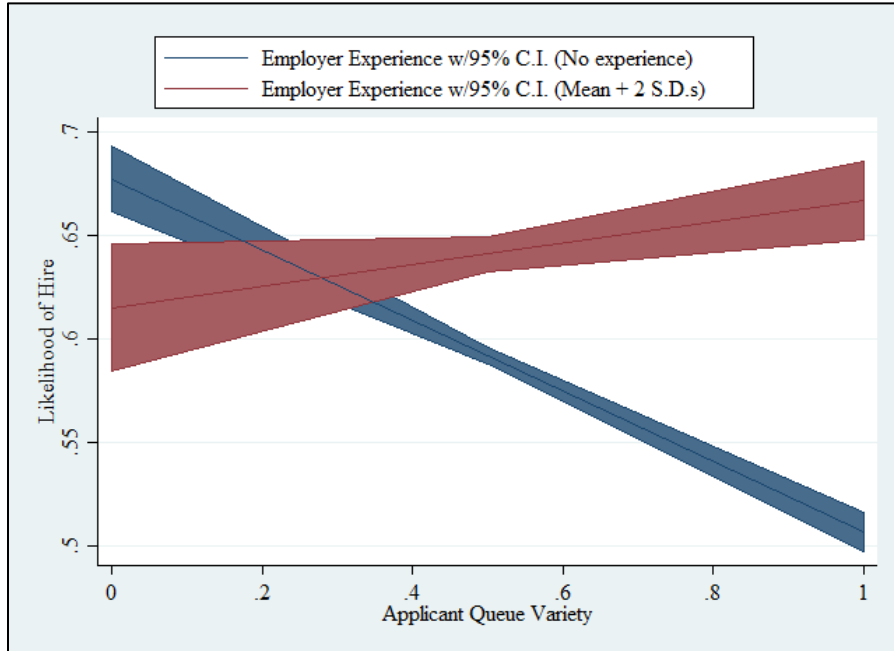(Instrumented for Variety)

TABLE 5
OLS ESTIMATES OF NUMBER OF DAYS TO HIRE
(Employer and Job Category Fixed-Effects)

	(1)	(2)	(3)
Job Controls			
Total Number of Applicants..	0.2857***	0.2718***	0.2128***
	(0.0060)	(0.0061)	(0.0174)
Average Price of All Bids (logged)...............................	0.0001**	0.0002***	0.0005*
	(0.0000)	(0.0000)	(0.0002)
Standard Deviation of All Bid Prices (logged)	-0.0001	-0.0001	0.0002
	(0.0001)	(0.0001)	(0.0001)
Word Count of Listing Description (logged)	1.4799***	1.1822***	1.1287***
	(0.0808)	(0.0850)	(0.3263)
Employer Controls			
Employer Overall Experience (logged).........................	0.7772***	0.7700***	1.8527***
	(0.0889)	(0.0889)	(0.2752)
Employer Category Specific Experience (logged)........	-0.2263*	-0.1607	0.0744
	(0.0980)	(0.0981)	(0.3567)
Applicant Quality Controls			
Maximum Applicant Experience in Category (logged)	-0.0972**	-0.0916*	-0.0055
	(0.0371)	(0.0371)	(0.1110)
Maximum Applicant Star Rating in Category...............	-0.2807***	-0.2381***	-0.2392
	(0.0571)	(0.0572)	(0.1808)
Applicant Pool Variety..		3.9309***	-3.8375
		(0.3537)	(3.0435)
Consideration Set Variety.			4.1836***
			(1.1587)
Constant...	3.3623	2.1935	-1.5727
	(1.8276)	(1.8294)	(16.7603)
Job Category Fixed-Effects..	Yes	Yes	Yes
Employers	57594	57594	29416
Min	2	2	2
Mean	2.6	2.6	3.2
Max	95	95	75
Observations	152068	152068	94130

Notes: Standard errors in parentheses; * p < 0.05, ** p < 0.01, *** p < 0.001

TABLE 6
OLS ESTIMATES OF BEING IN THE CONSIDERATION SET
(Job Fixed-Effects)

	(1)	(2)
Average Feedback	0.1113***	0.1117***
	(0.0049)	(0.0049)
Applicant Bidding Order	-0.0223***	-0.0223***
	(0.0003)	(0.0003)
Amount of Bid	2.62e-6**	2.57e-6**
	(8.01e-7)	(8.01e-7)
Worked Together Before Flag (=1)	1.6938***	1.6952***
	(0.0170)	(0.0171)
Applicant Overall Experience (logged)	0.0274***	0.0185***
	(0.0016)	(0.0026)
Applicant Experience in Category (logged)	0.0910***	0.0917***
	(0.0011)	(0.0011)
Applicant Experience Breadth, Number Categories (logged) ..		0.0221***
		(0.0051)
Observations	1373095	1373095
Jobs	82059	82059
Log Likelihood	-523871.77	-523862.47
Chi²	40916.38	40934.98

Standard errors in parentheses, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$