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Employer Recruitment Strategies and the Labor Market Outcomes of New Hires

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Keywords

recruitment, wages, starting, offers, vacancy, duration, choices

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Comments

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RRH: DEVARO: RECRUITMENT STRATEGIES

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I. INTRODUCTION

Employers and job seekers are brought together for potential matches through their recruitment and job search activities. Employers may post help wanted signs, run newspaper advertisements, or seek referrals from private employment agencies. Job seekers may speak with friends and relatives, solicit the aid of the state employment agency, or simply walk in and apply. These recruitment and search activities help both parties acquire information about each other, and the more information they obtain prior to entering an employment agreement the higher the likelihood of a good employment match. The crucial role of information in the labor market has been recognized since Stigler (1962), but despite a voluminous literature on job matching and organizational behavior in labor markets, we know far less about employers' recruitment strategies than about job seekers' search strategies. As Granovetter (1995) notes, "while people are finding jobs, employers are finding people to fill them, and their behaviors, strategies, and purposes play a central but often neglected role in the process of matching people to jobs." This imbalance in research effort is explained more by a dearth of adequate data describing employer recruitment behavior than by lack of scholarly interest. Indeed, labor economists, sociologists, psychologists, and human resource management specialists have spent the last half-century exploiting the meager existing data sets in efforts to learn about employer recruitment behavior.

In this paper I address several empirical questions concerning employer recruitment using the Multi-City Study of Urban Inequality (MCSUI), a large cross sectional survey of employers in four metropolitan areas of the United States that has not been exploited for a detailed analysis of the relationships among recruitment strategies, starting wages, and vacancy duration, despite the richness of the data set for this purpose. The MCSUI data contain detailed information on firm and job characteristics and, most importantly for the purpose of this paper, indicators of the

recruitment methods these employers used when hiring the most recently hired worker. The data allow a number of interesting questions to be addressed concerning the link between employer recruitment choices and starting wages, vacancy duration, and the skill levels of new hires. As there has been relatively little empirical research done by labor economists on employer recruitment, this work with a relatively large representative sample of employers should enhance our understanding of a number of basic questions. I consider three of these.

First, I present evidence describing which recruitment methods employers use and how these vary by firm characteristics, vacancy characteristics, and the skill requirements of jobs. I estimate a multivariate probit model with a separate equation for each of ten recruitment choices. In addition to providing information about the relationship of each recruitment method with each of the covariates, this method has the attractive feature of allowing for an analysis of the relationships among the unobserved determinants of recruitment choice. To my knowledge, this methodology is new to the recruitment literature.

Second, I present regression evidence showing how vacancy duration varies by recruitment choices. Some recruitment methods can be expected to be faster than others in generating job applicants. However, since an employer must invest time in screening the applicant pool, the recruitment methods that generate applicants quickly do not necessarily fill vacancies quickly. Therefore the link between recruitment methods and vacancy durations is an empirical question.

Third, I present evidence concerning the relationship between starting wages and recruitment methods. In particular, I augment standard log-wage specifications based on the human capital model with recruitment choices and find that the recruitment variables have explanatory power, even in the presence of all of the usual controls. One can envision alternative

theoretical mechanisms by which recruitment choices are associated with starting wages. In this paper I appeal to a wage-posting model as the theoretical framework underlying the empirical work, and I provide some empirical justification for this view.

I follow the convention in the recruitment literature of treating recruitment strategies as exogenous in equations for starting wage and vacancy duration. A typical paper regresses a variable describing some labor market outcome, such as a starting wage, on various "recruitment dummies", controlling for firm and vacancy characteristics. In this paper I provide analogous information from the MCSUI data. Since many of the past studies have been on narrower datasets than the MCSUI, restricted only to certain worker or employer types, there is more to be learned from a wide and representative cross section of metropolitan area employers.

Recruitment methods are purposefully chosen by employers, however, and are likely determined by many of the same factors that determine wage offers. Strictly speaking then, the recruitment choice is endogenous, and if we wish to analyze policies that operate through the channel of employer recruitment choice, we require an economic model in which wages and recruitment choice are endogenous variables. Such a dynamic structural model is proposed and estimated in DeVaro (2003) using the MCSUI data. In the present paper, I am simply interested in measuring correlations between recruitment methods and these other labor market outcomes after controlling for other factors, including firm characteristics and city controls. For this purpose a regression analysis is useful, facilitating a finer classification of recruitment strategies than the highly aggregated categories of "informal methods", "formal methods", and "both methods simultaneously" that are used in the structural analysis in DeVaro (2003).

I begin the discussion with a review of the previous literature on employer recruitment. Next I describe the data set and present a theoretical framework for thinking about recruitment

strategies, vacancy duration, and wages. The empirical results follow, with a separate subsection for each of the three research questions. I then draw together the empirical findings with some concluding remarks and suggestions for future research.

II. PREVIOUS LITERATURE

Although the literature on employer recruitment has spanned five decades, dating back to some early empirical papers by Malm in the 1950s, research in this area did not begin in earnest until the mid 1960s to early 1970s, with seminal work by Rees (1966), Rees and Shultz (1970), and Granovetter (1974). In the economics literature the stage was set by Stigler (1962), which emphasized the crucial role of information in the labor market. Rees (1966) then explored the role of the recruitment choice as an information-generating device. More recently, Montgomery (1991) embedded social networks in an adverse selection model to analyze the effects of social networks on labor market outcomes.

Following Rees, the fashion in the recruitment literature has been to distinguish between "formal" and "informal" recruiting methods. Informal or word-of-mouth methods involve asking current employees or friends for referrals, or accepting walk-ins. Formal methods are usually defined to encompass everything else, most notably advertising and soliciting referrals from various employment agencies. Rees documents the prevalence of informal methods in recruiting blue and white-collar workers in a Chicago-area study and argues that the effectiveness of informal networks is under appreciated. Prior to Rees' work, the conventional view was that formal methods provided better information than informal methods, thereby contributing to the efficient functioning of the labor market. In counterpoint, Rees and Shultz (1970) write "… we do not feel that this reliance [on informal methods] is necessarily evidence

of an imperfect market. Rather it suggests to us the importance of kinds of qualitative information about job seekers and about vacant jobs that could not be communicated well through formal channels, such as newspaper ads and employment agencies…"

In highlighting the role of recruitment choice as an information-generating device, Rees and Schultz distinguish between "extensive" and "intensive" information. Extensive information pertains to the number of job seekers and vacancies covered by the information, while intensive information provides detailed information about specific job seekers or vacancies. Recruiting methods such as newspaper advertising are effective in generating substantial extensive information, for example a high volume of applicants, but the information about individual applicants is usually quite limited. In contrast, informal methods provide inside information on a smaller but more select group of applicants. Employers' recruitment choices therefore depend on the type of worker desired, the direct costs of the recruitment method, and how quickly the worker is needed. Rees argues that informal methods, by generating more intensive information (both for the job seeker and the employer) lead to better employment matches.

Rees' identification of the information-generating function of recruitment choice spawned a literature exploring the effects of recruitment choice on the quality of the resulting employment matches. Research in the psychology literature mostly during the 1970s suggested that more information, positive as well as negative, prior to the start of an employment relationship is associated with lower turnover (Gannon 1971; Farr, O'Leary and Bartlett 1973; Ilgen and Seely 1974; Wanous 1973, 1975; Mencken and Winfield 1998). More recent empirical work by labor economists has generally supported the hypothesis that informal recruiting methods are associated with higher productivity and longer average tenure than other methods (Reid 1972; Datcher 1983; Barron, Bishop and Hollenbeck 1983; Holzer 1987; Roper 1988;

Simon and Warner 1992; van Ours and Ridder 1992; Bishop 1993; Gorter, Nijkamp and Rietveld 1996; DeVaro and Fields 2004).

A noteworthy theoretical development is due to Montgomery (1991), who considers a standard adverse selection model augmented to include a structure of social ties. Workers in the model are observationally equivalent with respect to ability, and may or may not have a friend to recommend to their employer. High-ability workers tend to know other high ability workers, while low-ability workers tend to know other low-ability workers. Although ability is *ex ante* unobservable to the employer, after observing a worker for one period the employer learns his ability. After learning a worker's ability, an employer wishing to hire through referral will post a wage offer that may be conveyed by the worker to his acquaintance. Jobseekers then compare received offers and choose the highest one. The model demonstrates how social structure can be integrated into formal economic analysis.

DeVaro (2003) diverges from the previous empirical literature on recruitment by treating the recruitment choice as endogenous in a dynamic structural model. The model is estimated using data from the Multi-City Study of Urban Inequality and then policy simulations are run to analyze a number of government policies designed to improve job placement rates for low-skilled workers. These policies include the Workforce Investment Act of 1998, the Work Opportunity Tax Credit, and the Welfare-to-Work Tax Credit, and all of them have labor market effects by altering employer recruitment choices. The distinguishing feature of this work is that, unlike the previous recruitment literature, it takes a structural approach in treating the employer's recruitment choice as endogenous.

III. DATA: MULTI-CITY STUDY OF URBAN INEQUALITY (MCSUI)

The 3510 observations in the data are from the Multi-City Study of Urban Inequality (MCSUI), a cross sectional telephone survey of employers in Los Angeles, Boston, Detroit and Atlanta, conducted in 1992-1995. Harry Holzer conducted the bulk of the survey, producing 3213 cases. A supplement of 297 cases was provided by Kirschenman, Tilly, and Moss. The bulk of the observations in the data set concern the hiring and employment of each establishment's most recently hired worker. Telephone screening was used in an effort to identify a respondent who actually hired the most recently hired worker. The respondent was the owner in 14.5% of the cases, the manager or supervisor in 42%, a personnel department official in 31.5%, and someone else in 12%. The survey instrument took 30-45 minutes to administer on the telephone, with an overall response rate of 67%. More detail on the data set is provided in Holzer (1996).

Slightly less than two thirds of the cases were drawn from regional employment directories provided by Survey Sampling, Inc. (SSI) based on local telephone directories. This was a sample stratified by establishment size and designed to be self-weighting. Slightly more than one third of the cases were drawn from the current or most recent employer reported by respondents in the companion MCSUI household survey. A number of considerations render the complete (unweighted) sample unrepresentative of the population of interest. One issue is that the MCSUI household survey over-sampled low-income areas and areas with high concentrations of racial minorities. A second issue is that the SSI subsample was restricted to employers who had hired a worker for a position that did not require a college degree within the previous three years, whereas the household subsample was not restricted to entry-level jobs in this way. Inverse-probability sampling weights adjust for these complexities of the sampling

scheme, and weighted observations are a representative sample of firms such as would occur if a random sample of employed people were drawn from each city. I apply these sampling weights throughout this study.

Table 1 provides some descriptive statistics characterizing the employers in the sample. The average firm size, including temporary and contract workers, is 657 and the median is 55. The sample representation of small firms is noteworthy; 25% of the firms have 15 or fewer employees. For-profit companies comprise 76% of the sample, and only 6% are franchises. Of the 62% of firms operating on multiple sites, the average number of sites is 60 and the median number is 3. About a quarter of the firms have at least some employees covered by collective bargaining agreements, and of these firms the fraction of employees covered is about two thirds. Firms that have at least some contract workers comprise 30% of the sample, and those that have at least some temporary workers comprise about 36%. The composition of the sample by industry is reflective of major metropolitan areas in the United States. Seventy-five percent of the sample consists of firms in the services, manufacturing, and retail trade industries, and most of the remaining firms are in wholesale trade, finance, or transportation, with less than 4% of the sample in construction, public administration, mining, and agriculture, forestry or fishing.

In addition to the firm characteristics summarized in Table 1, the key variables used in this paper are: recruitment methods, vacancy duration, starting wages, and the skill requirements of jobs, each of which I now briefly describe.

The survey contains two types of information about recruitment. First, employers are asked which of a list of methods (posting help wanted signs, running newspaper advertisements, accepting walk-ins, seeking referrals from current employees or friends, seeking referrals from state, private, or community employment agencies, or referrals from school placement officers or

unions) were used in the recruitment campaign to hire the most recently hired worker. Employers answer "yes" or "no" to each method that was used, and most employers report the use of multiple methods. Second, the survey asks which of these individual methods actually generated the most recently hired worker. In response to this question, the employer may select only one method.

The vacancy duration question is worded as follows: "From the time you began recruiting until you hired someone, how long did it take to hire your newest employee [in weeks]?"

When asked the starting wage of the most recent hire, about 70% of employers responded with an hourly wage. The other 30% reported a weekly, monthly, or annual wage, and these I converted to hourly wages assuming standard work schedules. I then deflated all hourly wages to 1990 dollars using the CPI-UX.

Three different measures of the skill requirements of jobs are used in this paper: an indicator for whether the position requires a college degree, the occupation, and the frequency with which various tasks must be performed on the job. These tasks include talking face-to-face or on the phone with customers or clients, reading instructions, writing memos, doing math, and working with computers. In the wage regressions, rather than using the indicator for whether the position requires a college degree I use the educational attainment (college or post-college, with less than college serving as the reference group) of the most recently hired worker. Obviously, the correlation between the indicator for whether the position requires a college degree and whether the most recent hire actually has at least a college degree is extremely high.

IV. THEORETICAL FRAMEWORK FOR RECRUITMENT CHOICES, VACANCY

DURATION, AND WAGES

A theoretical framework for understanding the determination of employer recruitment

choices, starting wages, vacancy duration, and the skill level of new hires is provided in the

dynamic structural model proposed by DeVaro (2003). I now draw on some of the main ideas

underlying that model to provide some intuition and motivation for the empirical work in the

following section.

Recruitment methods may usefully be thought of as the initial means by which an

employer collects information about potential hires. The recruitment choice affects the quality,

size, and arrival speed of the applicant pool. To capture these ideas, the basic structure of the

underlying theoretical framework has employers choosing recruitment strategies, wage offers,

and worker type (or skill level) to maximize expected profits. Specifically, the employer's quest

to fill a vacancy is modeled as a multi-period recruitment problem. The employer begins the

recruitment campaign by choosing in the first period a worker type (skill level), a recruitment

strategy (a bundle of recruitment methods), and a posted wage offer ("high" or "low" for

simplicity).

When making their choice of recruitment strategies, we assume that employers are faced

with a fundamental tradeoff between speed of hiring and expected match quality of the worker.

That is, some recruitment methods quickly generate an applicant pool of modest quality and

others yield a smaller but more select group of applicants. This "quality versus speed tradeoff"

in choosing recruitment methods is a central assumption of the model. Hiring decisions in this

model are stochastic, with distributions that vary with the employer's choices.

Although the choices of worker-type and recruitment strategy that are made at the outset remain fixed for the duration of the campaign, the employer retains the option of adjusting the posted wage offers as the recruitment campaign progresses. In particular, if the campaign is going badly the employer can increase the offered wage in an attempt to lure applicants faster. A key point to note from this structure is that an employer can influence hiring speed in two ways: either through the recruitment choice or through the posted wage offer. Some recruitment methods yield hires faster than do others, and high posted wage offers yield hires faster than do lower wage offers. Another point to note is that the model implies that employers might raise the posted wage offer as the campaign progresses (particularly if the campaign is going badly in that a hire has not occurred) but will never lower the wage offer.

The theoretical framework sketched here motivates the empirical questions asked in the following section. Since match quality will be relatively more important to some employers and hiring speed relatively more important to others, recruitment choices can be expected to vary by firm characteristics and the desired worker skill level. Which characteristics are associated with different recruitment choices is the question addressed in Section 5.1. The theoretical framework also suggests that vacancy duration should vary with recruitment choice. Which particular recruitment methods are associated with longer or shorter vacancy durations is an empirical question, and I confront this in Section 5.2.

Although the traditional human capital model for wages does not typically include employer recruitment choices, the wage-posting theoretical framework suggests a channel of influence implying an association between starting wages and recruitment choice. Recall that the employer can increase hiring speed either through the recruitment choice (that is, choosing faster methods) or through the wage offer (that is, posting higher wage offers). This suggests that

recruitment choices will have explanatory power in a standard wage regression, and I explore this in Section 5.3 by augmenting standard wage regressions to include recruitment choices.

The model offers a simple framework for understanding the determination of recruitment choices, starting wages, and vacancy duration and, at an anecdotal level, appears plausible as a description of many hiring processes. Nonetheless, there are obviously alternative stories one could envision, particularly concerning the determination of starting wages. My framework is based on a wage-posting game in which the employer sets wage offers and therefore determines the starting wage. One could imagine other mechanisms, such as ex post bargaining, for determining the starting wage. A more compelling case can be made for the model if some empirical support can be found for the notion of employer wage-posting in recruitment campaigns.

Empirical Support for the Wage-Posting Framework

An implication of the model is that although the employer may choose to raise the posted wage offer as the recruitment campaign progresses, the wage offer will never be lowered. This implies, *ceteris paribus*, a positive correlation between *offered* wages and vacancy duration. This implication would appear to be untestable, since the MCSUI data contain only starting wages, not offered wages. The model might also seem to imply a positive correlation between vacancy duration and *starting* wages, since longer vacancy durations induce some employers to increase their wage offers. The trouble with this is that a high wage offer from the outset is more likely than a low wage offer to yield a short duration. If a high starting wage is observed in the data, there is no way to determine whether that employer's offered wage was high from the outset of the campaign, or if it started low and was raised later. Employers who offer high wages

from the outset are likely to experience shorter vacancy durations than those who start out with low wages and switch to high wages later.

This discussion suggests that in a regression of vacancy duration on starting wages, a positive estimated slope provides no evidence in favor of the wage-posting model or against it. If we restrict our attention to the subsample of employers who hired someone very quickly, however, then offered wages are essentially the same as starting wages, since few if any employers would have increased their wage offer in such a short time. In contrast, the full sample will contain many employers who raised their wage offer at some point(s) during the recruitment campaign. So the wage-posting model does imply that if we run the above regression on successive subsamples (a hire occurring within the first two weeks, within the first three weeks, within the first four weeks, …) the slope coefficient should increase with the size of the subsample. The reason is that as we increase the sample size in this way, we include more employers who raised their initial wage offer (because the recruitment campaign was going badly) and these high-starting-wage employers will experience longer vacancy durations than employers who offered a high wage from the start.

Figure 1 presents the results of these regressions on successive subsamples. The vertical axis gives the slope coefficient of a regression of (number of weeks to hire the most recently hired employee) on a constant and (hourly starting wage for this worker). The horizontal axis indicates the subsample, so "2" refers to the regression using only those observations for which the hire occurred in less than two weeks after the start of the recruitment campaign. The graph is monotonically increasing, as predicted by the model.

Of course, an alternative interpretation is that this graph might reflect heterogeneity in the types of positions employers seek to fill. To address this possibility, Figure 2 plots the slope

coefficients of the starting wage for an analogous series of regressions on successive subsamples, though these regressions also include controls for the type of position. In particular, the regressions include ten industry controls, four occupation controls, indicators for whether the position requires a college degree, whether the firm is a franchise, fraction of unionized employment, establishment size, and number of sites of operation. Since Figure 2 displays an increasing pattern similar to that of Figure 1, this lends credence to the wage-posting interpretation as opposed to the unobserved heterogeneity interpretation. Although it does not provide definitive evidence, as some obvious alternative theories for the wage-generating process -- such as ex-post bargaining -- would not have the implication of an increasing pattern, the graph provides some empirical support for the wage-posting framework.

V. EMPIRICAL ANALYSIS OF RECRUITMENT, STARTING WAGES, AND VACANCY DURATION

In the following subsections I present empirical evidence concerning the three main questions of the paper: How do employer recruitment choices vary by firm and vacancy characteristics and the skill requirements of jobs? How does vacancy duration vary with recruitment choice? How do starting wages vary with recruitment choice?

5.1 How do Employer Recruitment Choices Vary by Firm and Vacancy Characteristics and the Skill Requirements of Jobs?

In the model of the previous section, employers choose recruitment methods in recognition of a tradeoff between hiring speed and the quality of potential matches. In a cross section of establishments, employers will differ in the relative weights they place on these

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objectives. Furthermore, the same employer might make different recruitment choices according to the skill needs of the vacant position. We should therefore expect to see observed recruitment choices varying with firm and vacancy characteristics and the skill requirements of jobs. Identifying these empirical relationships is the purpose of the present subsection.

For each employer in the sample we observe which of ten methods they used in recruiting their most recent hire. Table 2 displays the fraction of employers that used each of these methods in the campaign to hire the most recent worker. As noted in Holzer (1996), by far the most frequently used method is seeking referrals from current employees. Since the fractions in this table sum to well over 100%, it is clear that many employers use multiple methods simultaneously. In fact, the average and median number of methods used is four. To get a sense of which methods are bundled together and which are used apart, let us consider the correlation matrix for the ten methods. As seen in Panel A of Table 3, every correlation is positive, a number of them are sizeable, and nearly all are statistically significant. No pair of methods appears to be substitutes in the sense that the use of one is associated with less frequent use of the other.

Although this correlation matrix answers the simple question of which methods tend to be bundled together in the cross section, the MCSUI sample represents a highly diverse group of employers and jobs. An interesting question that is not illuminated by the correlation matrix is what methods tend to be bundled together, or used apart, by *observably similar* employers. That is, holding constant such characteristics as firm size, industry, and the skill requirements of jobs, what recruitment methods tend to be bundled together or used apart? I answer this question using a multivariate probit analysis, simultaneously estimating equations for each of the ten recruitment methods.[1] The main advantage of the multivariate probit for our purpose is that it

yields unrestricted estimates of the full set of 45 cross-equation correlations in the unobserved

determinants of recruitment choice. Examination of these correlations provides insights into

which recruitment methods tend to be used together across firms and jobs with similar

observable characteristics.

Specifically, the multivariate probit model I estimate is:

$$\text{Prob}(R_j = 1) = \Phi(\boldsymbol{\beta}_j{}' \mathbf{x}) \qquad\qquad j = 1, 2, \ldots, 10$$

where Φ is the standard normal cdf; R_j is a dummy variable that equals 1 if the jth recruitment

method was chosen in the campaign to hire the most recent worker, and 0 if this method was not

chosen; $\boldsymbol{\beta}_j$ is a parameter vector in the jth equation; and $\mathbf{x}$ is a vector of covariates that includes

the general categories of firm characteristics, industry controls, job tasks, worker skill levels, and

city controls.

Firm characteristics include firm size, the number of sites on which the firm operates, the

fraction of workers covered by a collective bargaining agreement, and dummy variables for

whether the firm is for-profit, whether it is a franchise, whether some employees are contract

workers, and whether some employees are temporary workers. Industry controls are dummy

variables for agriculture, forestry, and fishing; mining; manufacturing; transportation; wholesale

trade; retail trade; finance; services; and public administration, treating construction as the

reference group. Job tasks are dummy variables that equal one if a particular task is required in

the position on a daily basis, and zero otherwise. These tasks include:

talk: talking face-to-face with customers or clients;

phone: talking over the phone with customers or clients;

read: reading instructions at least one paragraph long;

write: writing paragraphs or memos;

math: doing arithmetic or other computations;

computer: working with a computer

The skill level is measured using four broad occupational controls (professionals, sales, services, operators and laborers) and a dummy for whether a college degree is required for the position.

In this application of the multivariate probit, we envision a continuous (normally distributed) latent index for each of the ten recruitment methods. This may be interpreted as the employer's propensity to use that particular method, and it is a function of both observed and unobserved characteristics of the employer and job. The observed recruitment choice is a discrete indicator that the latent index exceeds some threshold. The disturbance in this context represents the part of the latent index that is unrelated to observed firm characteristics, so it can be interpreted as the propensity to use the given method for observably similar employers and jobs. We are interested in the correlations between these propensities across equations representing different recruitment methods, and these are displayed in Panel B of Table 3.

The broad pattern of evidence from the residual correlations in Panel B is similar to the pattern of recruitment correlations from Panel A in the sense that most correlations are positive and statistically significant, and many are large in magnitude. The most noteworthy differences pertain to informal recruitment through friends. Panel B clearly reveals that referrals from friends are different from other recruitment methods. This method tends to be bundled with no method other than referrals from school placement officers; it is also the only method that is negatively related to other methods. In contrast, the recruitment correlations are somewhat misleading in suggesting that this method tends to be bundled with referrals from current employees, private and temporary employment agencies, community employment agencies, school placement officers, and unions. Furthermore, while the recruitment correlations suggest

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that this method is completely uncorrelated with recruitment through newspaper advertising, the residual correlations reveal a negative relationship between these methods.

One interpretation of the negative relationship between newspaper advertising and informal referrals from friends among observably similar employers can be found in the model of the previous section. This could reflect a tradeoff of match quality and hiring speed in recruitment methods. While newspaper advertising generates a large applicant pool, anyone who reads an ad is free to apply for the job. Hence, this method provides no pre-screening of applicants, and expected match quality is likely to be low. In contrast, informal referrals from friends are likely to generate a much smaller and slower flow of applicants, though the pool will be of higher average quality. It is interesting that recruitment through school placement officers is the one method that gets bundled with referrals from friends. Given that employers frequently have ongoing relationships and repeated interactions with the same school placement officers, it is plausible that this method could yield an applicant pool similar to that generated by informal referrals from friends. As we shall see later, both methods are associated with longer vacancy duration and higher starting wages. This is consistent with the notion that employers who favor recruitment bundles containing these methods are likely to favor match quality over hiring speed.

It is interesting to note, however, that informal referrals from current employees are clearly bundled with newspaper advertising even though informal referrals from friends are not. This would seem to be at odds with the idea of a tradeoff between informal methods and newspaper advertising. But the data suggest that informal recruitment through current employees probably means something different than informal recruitment through friends. As the residual correlations show, these methods are clearly not bundled by observably similar employers. A plausible hypothesis is that informal recruitment through friends yields better

matches than informal recruitment through current employees, because incentives are more likely to be aligned between an employer and his friends than between an employer and his current employees. While a current employee might be willing to take some reputational risk to recommend a low-ability friend in need of employment, an employer's friends will more frequently have the employer's interests at heart.

Turning to the effects of firm and job characteristics on recruitment methods, in Table 4 I report marginal effects from individual probit equations estimated for each recruitment method.[2] The probit estimates reveal a large number of statistically significant associations between each recruitment choice and firm characteristics, industry controls, job tasks, occupation controls, required skill levels, and city controls. In the interests of space, I restrict the commentary to four of the more interesting patterns that emerge.

First, for-profit firms are less likely than nonprofits to recruit using help wanted advertising, walk-ins, or state and community employment agencies. In fact, a separate calculation reveals that the average number of recruitment methods used to hire the most recent worker is 3.65 in for-profit firms and 4.33 for nonprofit firms, and this difference in means is significant with a t-statistic exceeding 4. This is a striking finding, in the presence of the other controls in the model, and is consistent with a growing body of evidence that the personnel policies of nonprofits differ systematically from those of for-profits. Most of these studies concern wage differentials between the for-profit and nonprofit sectors (Weisbrod 1983; Preston 1988; Preston 1989; Frank 1996; Leete 2001), though a recent paper by DeVaro and Samuelson (2003) finds that promotion rates are lower in nonprofit than in for-profit firms.

Second, the industry controls tend not to be statistically significant. That is, after controlling for other firm and vacancy characteristics, the probability of using any particular

recruitment method does not vary much with the industry in which the firm operates. The coefficients on the "agriculture, forestry, and fishing" and "mining" industry controls are not very informative, given their trivial representation in this metropolitan sample. Relative to the construction industry, the remaining industries have no statistically significant association with the probability of recruiting through any of help-wanted signs, newspaper advertising, walk-ins, current employee referrals, private or temp agency referrals, community agency referrals, or referrals from school placement officers. The three exceptions to this pattern include referrals from state employment agencies, unions, or friends. Firms in the wholesale trade and finance industries are less likely than in construction to recruit through the state employment agency, firms in retail trade are less likely than firms in construction to recruit informally through friends, and firms in virtually all sectors other than the highly unionized construction industry are less likely to recruit through union referrals.

Third, there is a clear pattern in the types of recruitment strategies used by occupation and the skill requirements of jobs. Relative to the professional occupations, employers seeking to fill vacancies in sales, services, or laborer/operators are more likely to rely on walk-ins, private and temp agency referrals, and community agency referrals and less likely to rely on referrals from friends. Employers with vacancies in the lowest-skilled occupational group of laborers and operators are more likely to use state employment agency or union referrals than in the professional occupations. When a position requires a college degree, employers are less likely to use walk-ins and help wanted signs (methods typically reserved for lower-skilled jobs) and more likely to use school referrals.

Finally, the recruiting methods for a given position are clearly associated with the job tasks that are performed on a daily basis in that position. All of the six tasks variables are

statistically significant in at least one recruitment equation and most of them are significant in more than one equation. Jobs that require workers to talk face-to-face with customers on a daily basis are associated with more frequent use of help-wanted signs, accepting walk-ins, current employee referrals, community agency referrals, referrals from school placement officers, union referrals, and informal referrals from friends. The only recruitment method negatively associated with this task is soliciting referrals from private employment or temp agencies. Interestingly, the only recruitment method of the ten that is not positively associated with at least one daily task is referrals from the state employment agency. The fact that specific skill requirements in a particular area do not appear to induce the employer to recruit through the state employment agency is consistent with the longstanding notion that recruiting through state employment agencies yields low-quality matches on average (Rees 1966).

5.2 How Does Vacancy Duration Vary With Recruitment Choice?

The theoretical framework of the previous section predicts an association between vacancy duration and recruitment choice. Since the model is based on a tradeoff between match quality and hiring speed, employers can affect vacancy duration through their choice of recruitment methods. Some methods can be expected to generate a large applicant pool quickly. But a high applicant volume does not imply a short vacancy duration, due to time spent screening applicants. Since the process of sorting through a large applicant pool and screening the applicants consumes time, the relationship between individual recruitment strategies and vacancy duration is not obvious *a priori* and must be determined empirically. In the MCSUI data the unconditional means of vacancy duration for the most recent hire (measured in weeks)

are displayed in Table 5, by the recruitment method that generated the most recently hired worker.

Table 6 contains maximum likelihood estimates from a parametric Weibull survival-time regression measuring the relationship between recruitment choice and vacancy duration, after controlling for firm and vacancy characteristics and city effects.[3] The dependent variable is vacancy duration measured as the number of weeks taken to hire the newest employee. I report the results in log relative-hazard form, meaning that coefficients above one imply a positive effect on the hazard rate (i.e. shorter vacancy duration) and those less than one imply a negative effect. The log relative-hazard metric allows for a more intuitive interpretation of the magnitudes of the effects, as opposed to simply their signs. For example, since the hazard ratio for "community agency referrals" exceeds 1 by nearly 0.25, we can say that this recruitment method is associated with nearly a 25% increase in the hazard rate.

The results show that, even after controlling for firm and industry characteristics, the skill level of jobs, and city effects, recruiting workers through walk-ins or referrals from a community agency are associated with shorter vacancy durations. In contrast, recruiting through private employment or temporary agencies, newspaper advertisements, or referrals from friends is associated with longer vacancy durations. The underlying reason for the "slowness" of these latter three methods probably differs between referrals from friends and the other two methods. In particular, it is likely that the long duration associated with referrals from friends reflects the lag in actually generating applicants, whereas for the other two methods it reflects time investments associated with screening a large applicant pool. DeVaro and Fields (2004) present some evidence in support of this view, showing that in fact the average size of the applicant pool is much larger when newspaper ads or private employment agency recruitment methods are used

than when they are not, and that the pool is smaller when referrals from friends are used than when they are not.

Documenting that employers screen applicants generated by newspaper ads or private employment agencies more intensively than applicants generated by referrals from friends is more difficult. DeVaro and Fields (2004) show that a number of screening methods are positively associated with the use of each of those recruitment methods. There is evidence, however, that employers use a slightly larger number of screening methods when new hires are generated through newspaper ads or private agency referrals, as revealed in Table 7. When new hires are generated by either newspaper ads or private employment agency referrals, employers use a larger number of screening methods, though the differences are small and only statistically significant for newspaper ads. When new hires are generated by referrals from friends, employers use slightly fewer screening methods.

The result that for-profit firms experience substantially shorter vacancy duration (a 33% increase in the hazard rate relative to nonprofit firms) is interesting in light of the earlier finding that for-profit firms use fewer recruitment methods than nonprofits. One interpretation is that the average nonprofit firm seeks to attract a particular type of worker, namely one that is intrinsically motivated by the organizational mission. This type of highly-specific search would require more recruitment methods on average and a longer time to find the right match for the position. This interpretation is consistent with the literature on nonprofit firms, in which it is argued that workers in nonprofit firms receive some nonpecuniary rewards derived from their empathy towards the organizational mission.

Finally, a number of the other firm and industry controls and job tasks have a significant effect on vacancy duration. Franchises, as well as firms in the agriculture, forestry and fishing

industries, experience shorter vacancy duration. Vacancies in public administration take considerably longer to fill than those in construction; this is expected since Civil Service procedures require a series of codified steps for filling vacancies. Positions requiring daily use of writing or a computer take longer to fill, with associated reductions in the hazard rate of 10% and 25%, respectively. In the presence of these task variables, there is no economically significant effect of skill level, as measured by whether the position requires a college degree, on vacancy duration. Although the city effects are not individually significant, a likelihood ratio test for their joint significance has a p-value of 0.038. Likelihood ratio tests for each of the other underlined categories of coefficients have p-values less than 0.001.

In summary, the duration regression is consistent with the theoretical model in that some recruitment methods (community agency referrals and accepting walk-ins) are associated with shorter durations and other methods (private employment agencies, newspaper advertisements, and referrals from friends) are associated with longer durations, even controlling for firm characteristics and the skill requirements of jobs. Some further interpretation can be offered about the relationship between recruitment methods and vacancy duration in light of the theoretical model, but I defer this discussion to the following subsection since it also relates to starting wages.

5.3 How Do Starting Wages Vary With Recruitment Choice?

Although the traditional human capital model that forms the basis for most wage regressions does not explicitly recognize the role of recruitment choices in influencing wages, the theoretical framework presented in the previous section clearly predicts a relationship between recruitment choices and starting wages. Recall that in that wage-posting model

employers can offer higher wages to fill positions faster. Alternatively, employers can influence vacancy duration through their choice of recruitment strategies. Thus, if an employer can alter vacancy duration through either wage offers or recruitment choice, we should expect these two variables to be correlated. In the present section, we augment standard log starting-wage regressions to include the recruitment methods that generated the most recently hired worker.

Although the wage-posting framework is appealing on a number of grounds, other factors not considered by the model might also contribute to an empirical relationship between recruitment choices and starting wages. For example, different recruitment methods generate a different average match quality of new hires, and to the extent that the starting wage might partially reflect match quality, we would expect a relationship between chosen recruitment methods and starting wages. I believe such considerations to be less important than the mechanism described in the wage-posting model, for the simple reason that the regressions control for the skill requirements of the job. We must remember that we are seeking to explain *starting* wages for workers, not *current* wages. Starting wages are based only on information the employer can collect up to the hiring date and not on observed worker performance after hiring. Much of the information about the quality of a worker-job match will only be revealed to the employer over the duration of the employment relationship and is not observable at the time of hiring.

I begin the analysis with a simple specification in column 1 of Table 8 that includes only the recruitment method that generated the most recent hire on the right-hand side of the log starting-wage regression. The reference group is recruitment through posting help wanted signs. All recruitment coefficients in this initial specification are positive and all except the one for walk-ins are statistically significant at the 10% level. The estimated wage gaps (relative to help-

wanted signs) are substantial, ranging from 12% to 70%. The large positive coefficients are not surprising since the reference group consists of workers generated by help-wanted signs, typically a recruiting technique for low-skilled jobs.

The more important question, however, is what explanatory power the recruitment variables add to a standard log-wage regression. I therefore include in the log-wage specification the standard human capital variables: age, age squared, educational attainment, gender, etcetera. Each of columns 2 through 5 successively adds variables for personal characteristics, job characteristics (including tasks and occupation), firm characteristics, and industry controls. I also estimated specifications that included city controls, though I do not report these because they look extremely similar to the reported specifications.

When skill level is controlled for by including human capital variables in the model, each of the recruitment coefficients decreases substantially in magnitude, and referrals from state and community employment agencies become statistically insignificant. Inclusion of job characteristics (both daily tasks and occupation) also induces reductions, albeit more modest ones, in the magnitudes of the recruitment coefficients. The most dramatic change in this specification (moving from columns 2 to 3) concerns recruitment through school placement officers; this coefficient decreases by 50% and becomes statistically insignificant. An interpretation, consistent with the results in Table 4 (the probit for school referrals), is that employers are more likely to recruit through school placement officers when jobs require certain regular tasks, such as daily reading and computer use. Since such requirements are associated with higher starting wages, part of the apparent effect of "school referrals" in the first few wage regressions in fact reflects the omitted task requirements.

The specifications of greatest interest are those in columns 4 and 5 of Table 8, both of which control for personal characteristics, job characteristics, and firm characteristics. In column 4, roughly half of the variation in log starting wages is explained by recruitment methods, personal characteristics, job characteristics, and firm characteristics. Even in the presence of all of these controls, many of the recruitment effects are individually statistically significant and are associated with large positive wage effects. These recruitment effects include newspaper advertisements, current employee referrals, private employment agency referrals, union referrals, and referrals from friends. The associated wage gaps, relative to recruitment via help wanted signs, are in the range 13% to 15%, except for union referrals, which is 46%.

The final specification in column 5 adds industry controls. Although this negligibly increases the R^2, only two recruitment coefficients remain statistically significant at the 10% level in the presence of industry controls: newspaper advertisements (with a wage gap of 9% relative to help wanted signs) and union referrals (with a wage gap of 42%). Evidently much of the apparent variation in wages due to recruitment methods is in fact due to industry variation.[4] Although the statistical significance of the recruitment methods declines from specification 1 to specification 5, particularly when the industry controls are included, it should be mentioned that the sample size is also decreasing at the same time as variables with missing values are added to the specification. So part of this may reflect decreasing sample size. Furthermore, even though most of the recruitment variables are statistically insignificant at the 10% level in the most general specification, they are jointly significant. The F statistic is 2.05 with an associated p-value of 0.0251.

Finally, the three recruitment methods that drop from statistical significance between columns 4 and 5 still have t-statistics in the neighborhood of 1.4 to 1.5 and have larger point

estimates than the other recruitment methods. If the results of columns 4 and 5 are taken collectively, the conclusion is that a number of recruitment methods (in particular newspaper advertising and referrals from private agencies, unions, current employees and friends) are statistically significantly associated with starting wages, even in the presence of controls for characteristics of workers, firms, jobs, and industry. The fact that hiring through newspaper advertisements is associated with higher starting wages is consistent with some recent findings by DeVaro and Fields (2004) showing that recruiting through newspaper advertisements is associated with higher levels of worker performance. Hence, it is not surprising that the higher performance is accompanied by higher wages.

As a final interpretative point, an interesting pattern emerges when comparing the recruitment coefficients from the wage regressions of Table 8 to the corresponding coefficients in the duration model of Table 6. Consider the five recruitment methods found to have large, positive, statistically significant associations with starting wages relative to help-wanted advertising: newspaper advertising, current employee referrals, private employment agency referrals, union referrals, and referrals from friends. Of these five methods, the three that are statistically significant in the duration model of Table 6 (namely newspaper advertising, private employment agency referrals, and referrals from friends) are all associated with longer vacancy duration. That is, the recruitment methods associated with the largest increases in starting wage tend to be the slower methods. In contrast, the faster methods such as community employment agency referrals and accepting walk-ins have statistically insignificant associations with starting wages and have the smallest magnitudes of any of the recruitment methods. The theoretical framework of the preceding section offers a potential explanation for this pattern of results. Recall from the wage-posting model that as the recruitment campaign progresses, employers will

only increase posted wage offers; they will never decrease them. So any recruitment method that lengthens the vacancy duration (such as informal referrals from friends) suggests, on average, relatively higher posted wage offers and, therefore, higher starting wages.

The most notable empirical result that deviates from this general pattern concerns recruitment through union referrals. Although the estimated starting-wage effect is positive and large for recruitment through union referrals, the estimated effect of union referrals on vacancy duration is essentially zero. This is to be expected, however, since employers recruiting through union referrals are likely to face various hiring constraints imposed by unions that affect the process of wage determination. The wage-posting framework of the preceding section would obviously be inappropriate for such hiring situations. Finally, it must be acknowledged that although the finding that "slower" recruitment methods are associated with higher starting wages is consistent with the wage-posting theoretical model of the previous section, there may well be alternative theories for explaining this pattern of empirical results.

VI. CONCLUSIONS

As the sole means of generating a pool of job applicants, the choice of a recruitment strategy is clearly an important problem an employer faces in the process of hiring a new worker. Nevertheless, employer recruitment behavior is a relatively neglected area of empirical work in labor economics. We lack even the most basic information about how recruitment choices vary across employer types and how they relate to wages and vacancy duration. Until recently, extensive establishment-level data with sufficient detail to answer these questions about the recruitment behavior of employers has been unavailable. I exploit a large, cross sectional establishment-level data set, the Multi-City Study of Urban Inequality, with rich information

about the recruiting behavior of employers, to partially bridge this gap in our knowledge. Rather than summarizing the many empirical results of this paper, I conclude the discussion by recapitulating a few highlights and proposing some directions for future research.

The fact that there exists a strong association between recruitment choices and starting wages in standard log-wage regressions in the presence of controls for worker characteristics, job characteristics, and firm characteristics, might seem hard to reconcile with standard theories of wage determination. In fact, however, this is exactly what is predicted by a wage-posting framework in which employers face a multi-period recruitment problem, choosing recruitment methods and posting wage offers in the face of a tradeoff between hiring speed and expected match quality. Although this pattern of results may be permissive of other theoretical interpretations, the wage-posting model is appealing at an anecdotal level and some of its main implications find support in the data. This framework is also helpful in explaining why recruitment methods that are slower than others, such as informal referrals from friends, yield higher starting wages even in the presence of an extensive set of controls. Methods that are slower but yield a higher-quality applicant pool imply longer vacancy durations and more opportunities for the employer to increase the posted wage offers as the recruitment campaign progresses.

The results also suggest a difference in recruitment behavior between the for-profit and nonprofit sectors. In particular, recruitment campaigns in the nonprofit sector take longer and involve more recruitment methods than those in the for-profit sector. A potential explanation is that nonprofit firms seek to attract a particular type of worker who is sympathetic to and motivated by the organizational mission of the firm. The need for such a highly-specific match necessitates a more vigorous recruitment campaign involving more methods, and suggests that a

longer search must be conducted before finding the right person. Confirming or rejecting this interpretation would be a fruitful endeavor for future work, particularly since the empirical literature on nonprofits has focused almost exclusively on wage differentials, neglecting differences in the personnel policies of these organizations.

Finally, a promising direction for future work would be to integrate an employer's screening choices into the wage-posting theoretical framework discussed in this paper. This paper has focused only on recruitment behavior. As the sole means of creating a pool of applicants and generating the first wave of information used in hiring decisions, the topic of recruitment is important enough to study in isolation. Furthermore, the channels of influence from recruitment methods to vacancy duration and wages are easiest to understand when abstracting from screening behavior. Nevertheless, a complete understanding of the hiring process ultimately requires a melding of these employer recruitment decisions with the screening problems an employer confronts when selecting among a pool of applicants.

References:

Barron, J., J. Bishop, and K. Hollenbeck. "Recruiting Workers: How Recruitment Policies

    Affect the Flow of Applicants and the Quality of New Workers." Unpublished paper,

    National Center for Research on Vocational Education, Columbus, Ohio, 1983.

Bishop, J.. "Improving Job Matches in the U.S. Labor Market." *Brookings Papers on*

    Microeconomic Activity. 1993.

Bobo, L., J. Johnson, M. Oliver, R. Farley, B. Bluestone, I. Browne, S. Danziger, G. Green, H.

    Holzer, M. Drysan, M. Massagli, and C. Z. Charles. MULTI-CITY STUDY OF URBAN

    INEQUALITY, 1992-1994: [ATLANTA, BOSTON, DETROIT, AND LOS ANGELES]

    [HOUSEHOLD SURVEY DATA] [Computer file]. 2nd ICPSR version. Atlanta, GA:

    Mathematica/Boston, MA: University of Massachusetts, Survey Research

    Laboratory/Ann Arbor, MI: University of Michigan, Detroit Area Study and Institute for

    Social Research, Survey Research Center/Los Angeles, CA: University of California,

    Survey Research Program [producers], 1998. Inter-university Consortium for Political

    and Social Research [distributor], 1998.

Datcher, L. "The Impact of Informal Networks on Quit Behavior." *Review of*

    Economics and Statistics 65 (August 1983): pp. 491-495.

DeVaro, J. "The Labor Market Effects of Employer Recruitment Choice." 2003.

    Working Paper. Cornell University.

DeVaro, J., and G. Fields. "Waging the War for Talent: Do Recruitment and Screening Strategies Raise Employee Performance." 2004. Working Paper. Cornell University.

DeVaro, J., and D. Samuelson. "Why Are Promotion Less Likely in Nonprofit Firms?" 2003. Working Paper. Cornell University.

Farr, J.L., B.S. O'Leary and C.J. Bartlett. "Effects of Work Sample Test Upon Self-Selection and Turnover of Job Applicants," *Journal of Applied Psychology*, Vol. 58, October 1973, pp. 283-285.

Frank, R. H. "What Price the High Moral Ground?" *Southern Economic Journal* 63 (July 1996): 1–17.

Gannon, M.J. "Sources of Referral and Employee Turnover," *Journal of Applied Psychology,* Vol. 55, June 1971, pp. 226-228.

Gorter, C., P. Nijkamp and P. Rietveld. "Employers' recruitment behavior and vacancy duration: an empirical analysis for the Dutch labour market." *Applied Economics*, 1996, 28, 1463-1474.

Granovetter, M. S. *Getting a Job.* 2nd ed. Cambridge, MA: Harvard Press, 1995.

Holzer, H. "Hiring Procedures in the Firm: Their Economic Determinants and Outcomes."

In *Human Resources and Firm Performance*, ed. R. Block, et al. Madison, Wis.:

Industrial Relations Research Association, 1987

Holzer, H. *What Employers Want: Job Prospects for Less-Educated Workers*. New

York: Russell Sage Foundation, 1996.

Holzer, H., J. Kirschenman, P. Moss, and C. Tilly. MULTI-CITY STUDY OF URBAN

INEQUALITY, 1992-1994: [ATLANTA, BOSTON, DETROIT, AND LOS ANGELES]

[TELEPHONE SURVEY DATA] [Computer file]. ICPSR version. Atlanta, GA:

Mathematica/Boston, MA: University of Massachusetts, Survey Research

Laboratory/Ann Arbor, MI: University of Michigan, Detroit Area Study and Institute for

Social Research, Survey Research Center/Los Angeles, CA: University of California,

Survey Research Program [producers], 1998. Inter-university Consortium for Political

and Social Research [distributor], 1998.

Ilgen, D.R., and W. Seely. "Realistic Expectations as an Aid in Reducing Voluntary

Resignations," *Journal of Applied Psychology*, Vol. 59, August 1974, pp. 452-455.

Leete, L. "Whither the Nonprofit Wage Differential? Estimates from the 1990 Census."

Journal of Labor Economics 19, 2001, 136-170.

Malm, F. T. "Recruiting Patterns of Labor Markets." *Industrial and Labor Relations*

Review (1954): 507-525.

Malm, F. T. "Hiring Practices and Selection Standards in the San Francisco Bay Area."

   Industrial and Labor Relations Review 8 (1955): 231-252.

Mencken, F. C. and Idee W. "In Search of the 'Right Stuff:' The Advantages and Disadvantages

   of Informal and Formal Recruiting Practices in External Labor Markets." *American*

   Journal of Economics and Sociology, Vol. 57, No. 2 (April, 1998).

Montgomery, J. D. "Social Networks and Labor-Market Outcomes: Toward an Economic

   Analysis." *American Economic Review*, Vol. 81 No. 5 (December, 1991).

Preston, A. "The Effects of Property Rights on Labor Costs of Nonprofit Firms: An Application

   to the Day Care Industry." *Journal of Industrial Economics.* Vol. 36, No. 3. (Mar.,

   1988), pp. 337-350.

Preston, A. "The Nonprofit Worker in a For-Profit World." *Journal of Labor Economics,* 7,

   1989, 438-463.

Rees, A. "Information Networks in Labor Markets." *American Economic Review* 56: 1966.

Rees, A. and G. P. Shultz. *Workers and Wages in an Urban Labor Market*. Chicago: University

   of Chicago Press, 1970.

Reid, G. L. "Job Search and the Effectiveness of Job-Finding Methods," *Industrial and Labor Relations Review*, July 1972, 25, 479-495.

Roper, S. "Recruitment methods and vacancy duration." *Scottish Journal of Economics*, 35, 1988.

Simon, C. J. and J. T. Warner. 1992. "Matchmaker, Matchmaker: The Effect of Old Boy Networks on Job Match Quality, Earnings and Tenure." *Journal of Labor Economics* 10: 306-329.

Stigler, G. J. "Information in the Labor Market." *Journal of Political Economy*. October 1962.

van Ours, J.C. and R., G. (1992) "Vacancy durations and the recruitment of new employees", *Journal of Labor Economics,* volume 10, 138-55.

Wanous, J.P. "Effects of a Realistic Job Preview on Job Acceptance, Job Attitudes, and Job Survival," *Journal of Applied Psychology*, Vol. 58, December 1973.

Wanous, J.P. "Tell it Like it is at Realistic Job Previews," *Personnel*, Vol. 52, 1975.

Weisbrod, B. A. "Nonprofit and Proprietary Sector Behavior: Wage Differentials Among Lawyers." *Journal of Labor Economics*, Vol. 1, No. 3, July 1983, 246-263.

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[1] The multivariate probit has historically been a rare guest in applied work involving a large number of discrete choices, requiring as it does the computation of high-dimensional integrations of the multivariate normal density function. Fortunately, the development of simulation methods in recent years has rendered this model tractable for the case of many binary choices (ten in this case). The multivariate probit model is estimated by the method of simulated maximum likelihood, using the Geweke-Hajivassiliou-Keane (GHK) smooth recursive simulator to evaluate the 10-dimensional integrations of the multivariate normal distribution that appear in the likelihood function. The model was estimated using 100 random draws for calculating the simulated likelihood and converged in roughly 4.8 days on a desktop computer.

[2] Results are from standard probit models estimated equation by equation rather than from the multivariate probit model recently discussed. For the purpose of displaying the relationships between individual firm characteristics and recruitment choices the multivariate probit model is somewhat inconvenient. Marginal effects and their associated standard errors are more cumbersome to define and compute in the multivariate probit than in standard probits. Since standard probits still yield consistent (albeit less efficient) estimates of the parameters of interest, I report these.

[3] The Weibull model is parameterized as a proportional hazard model, with baseline hazard $h_0(t) = pt^{p-1}$ where p is a nonnegative shape parameter to be estimated. Since $h(t_j) = h_0(t)g(\mathbf{x}_j)$, the covariates have a multiplicative effect on the hazard function. The function g is the relative risk: $g(\mathbf{x}_j) = \exp(\mathbf{x}_j\boldsymbol{\beta})$. The Weibull model

nests the exponential, characterized by a constant hazard rate, as the special case for which p = 1. The Weibull for p

≠ 1 is characterized by a monotone hazard rate that either increases or decreases exponentially with time; the

reported results strongly suggest a constant hazard.

[4] Although within these broad industry categories many of the recruitment methods appear not to be associated with wages (in the presence of controls), there is the possibility that one of the effects being captured by the industry controls reflects a "preference" for recruitment method by firms in that industry. That is, firms within an industry share a bundle of recruitment methods. This point was suggested by an anonymous referee.

TABLE 1
Descriptive Statistics for MCSUI Employer Data

Observations (broken down by city and time of survey)

Detroit	June 8, 1992 - March 9, 1993	804
Los Angeles	March 5, 1993 - March 15, 1995	1010
Boston	March 5, 1993 - March 15, 1995	889
Atlanta	March 8, 1993 - May 19, 1994	807
Total Observations		3510

Firm Size (including temporary and contract workers)

Mean	657
Minimum	1
0.25 quantile	15
Median	55
0.75 quantile	234
Maximum	102,000

Other Firm Characteristics

For-profit companies	76%
Franchises	6%
% Operating on only 1 site	38%
Average number of sites (if >1)	60
Median number of sites (if >1)	3
% with positive fraction of employees covered by collective bargaining	26%
Average % of employees covered by collective bargaining (given greater than 0%)	67%
% of firms with some contract workers	30%
% of firms with some temporary workers	36%

Percent of Firms in Each Industry

Agriculture, forestry, fishing	0.03%
Mining	0.62%
Construction	1.97%
Manufacturing	20%
Transportation	5.54%
Wholesale Trade	7.47%
Retail Trade	15%
Finance	7.32%
Services	40%
Public Administration	1.37%

TABLE 2
Recruitment Methods Used For Most Recent Hire

1.	Help Wanted Signs	26%
2.	Newspaper Ads	49%
3.	Accepting Walk-ins	66%
4.	Referral from Current Employee	82%
5.	State Employment Agency	35%
6.	Private Employment Agency	22%
7.	Community Employment Agency	28%
8.	School Placement Officer Referral	40%
9.	Union Referral	7%
10.	Referral from Friend or Acquaintance	38%

Note: Entries are percentage of employers who used that method when recruiting the most recently hired worker.

TABLE 3

Which Recruitment Methods Tend to Be Bundled Together or Used Apart?

Panel A
Correlation Matrix for Recruitment Methods Chosen in Campaign to Hire Most Recent Worker

	1.	2.	3.	4.	5.	6.	7.	8.	9.
1. Help Wanted	1								
2. Newspapers	0.10**	1							
3. Walk-ins	0.20**	0.13**	1						
4. Current	0.17**	0.12**	0.28**	1					
5. SEA	0.16**	0.14**	0.18**	0.18**	1				
6. PEA	0.02	0.05**	0.04**	0.07**	0.24**	1			
7. CEA	0.16**	0.12**	0.20**	0.14**	0.48**	0.27**	1		
8. Schools	0.16**	0.16**	0.17**	0.15**	0.26**	0.12**	0.35**	1	
9. Unions	0.08**	0.03*	0.05**	0.04**	0.17**	0.12**	0.22**	0.14**	1
10. Friends	0.02	0.00	0.01	0.05**	0.01	0.05**	0.09**	0.14**	0.04**

Panel B
Correlation Matrix for Cross-Equation Disturbances from Multivariate Probit Model

	1.	2.	3.	4.	5.	6.	7.	8.	9.
1. Help Wanted	1								
2. Newspapers	0.19**	1							
3. Walk-ins	0.25**	0.22**	1						
4. Current	0.31**	0.16**	0.40**	1					
5. SEA	0.22**	0.31**	0.29**	0.36**	1				
6. PEA	0.05	0.05	0.13**	0.16**	0.36**	1			
7. CEA	0.11**	0.16**	0.32**	0.18**	0.71**	0.47**	1		
8. Schools	0.18**	0.15**	0.30**	0.24**	0.41**	0.21**	0.50**	1	
9. Unions	0.05	0.01	0.21**	0.15**	0.38**	0.28**	0.54**	0.24**	1
10. Friends	-0.03	-0.09*	-0.02	0.01	-0.07	-0.03	0.06	0.16**	-0.02

Notes: In both panels, * and ** denote statistical significance at the 10% and 5% levels

TABLE 4

Marginal Effects from Individual Probit Models of Recruitment Choice

	Help Wanted Signs	Newspaper	Walk-Ins	Current Employees	State Emp. Agency
Firm Characteristics					
For Profit	-0.183	-0.041	-0.106	-0.011	-0.115
	0.042**	0.051	0.045**	0.032	0.050**
Franchise	0.067	-0.112	0.010	0.094	-0.067
	0.040*	0.051**	0.057	0.030**	0.044
Thousands of Sites	0.073	-0.031	0.059	0.028	0.057
	0.026**	0.035	0.048	0.032	0.030*
Firm Size in Thousands	-0.018	-0.012	0.021	0.005	0.000
	0.007**	0.009	0.010**	0.004	0.003
Union	0.000	-0.001	-0.001	-0.001	0.000
	0.000	0.001	0.001	0.000**	0.000
Temps	0.074	-0.017	0.082	0.065	0.129
	0.026**	0.036	0.032**	0.023**	0.033**
Contracted	0.072	0.031	0.008	0.030	0.069
	0.027**	0.035	0.033	0.023	0.033**
Industry Characteristics					
Agriculture	0.560	-0.254	-0.324	0.175	-0.191
	0.250*	0.284	0.209	0.012	0.169
Mining	0.229	-0.203	0.006	0.017	-0.203
	0.216	0.190	0.080	0.053**	0.093
Manufacturing	0.024	0.074	-0.024	0.007	-0.022
	0.082	0.079	0.101	0.072	0.068
Transportation	-0.085	0.087	-0.150	0.021	-0.106
	0.067	0.107	0.095	0.067	0.080
Wholesale Trade	-0.083	-0.013	0.121	0.046	-0.123
	0.066	0.093	0.075	0.051	0.061*
Retail Trade	0.057	-0.009	0.013	0.012	-0.077
	0.089	0.084	0.087	0.060	0.067
Finance	-0.082	0.076	0.001	0.064	-0.153
	0.068	0.088	0.081	0.053	0.056**
Services	-0.032	0.027	-0.067	-0.076	-0.095
	0.078	0.080	0.143	0.116	0.066
Public Admin	0.105	0.074	0.147	0.058	-0.142
	0.134	0.145	0.035	0.028	0.087
Job Characteristics					
Talk	0.061	-0.009	-0.124	-0.069	0.002
	0.027**	0.041	0.037**	0.026**	0.031
Phone	0.029	0.034	0.050	0.007	-0.014
	0.026	0.040	0.031**	0.024**	0.035
Read	-0.021	0.075	-0.063	-0.052	0.036
	0.025	0.033**	0.034	0.025	0.029
Write	-0.044	-0.017	0.029	-0.002	-0.004
	0.027	0.038	0.033*	0.023**	0.033
Math	0.004	0.048	0.032	0.062	0.027
	0.025	0.034	0.034	0.025	0.030

	Help Wanted	Newspaper	Walk-Ins	Current Emp.	State Agency
Job Characteristics cont.					
Computer	0.068	0.080	0.081	-0.030	-0.008
	0.024**	0.034**	0.044	0.033**	0.033
Sales	-0.056	0.020	0.154	-0.027	0.068
	0.036	0.050	0.050*	0.046	0.046
Service	-0.023	0.078	0.170	0.004	0.113
	0.042	0.067	0.043**	0.038	0.071*
Labor/Operator	-0.011	-0.047	-0.076	-0.033	0.206
	0.045	0.060	0.046**	0.035	0.062
Requires College	-0.122	0.044	-0.074	-0.027	-0.013**
	0.031**	0.052	0.038*	0.030	0.046
Atlanta	0.009	-0.068	-0.045	-0.003	-0.076
	0.029	0.038*	0.039**	0.029	0.033**
Boston	0.043	0.044	0.070	-0.028	-0.016
	0.031	0.042	0.040	0.033	0.037
Detroit	0.065	0.110	-0.106	-0.011	-0.057
	0.036*	0.045**	0.045*	0.032	0.038
N	2606	2605	2603	2601	2592
Pseudo-R^2	0.087	0.039	0.084	0.045	0.052

Note: Standard errors are below coefficients. ** and * indicate significance at the 5% and 10% levels respectively. Number of sites and the number of employees within establishment are measured in thousands, so that the coefficient estimates and standard errors represent 1000 times the values for the marginal effect of adding one more establishment or one more employee.

TABLE 4 Continued

	Private Emp. Agency	Community Emp. Agency	Schools	Unions	Friends
Firm Characteristics					
For Profit	0.024	-0.080	0.003	0.005	0.021
	0.041	0.046*	0.048	0.011	0.047
Franchise	-0.034	-0.052	-0.044	0.023	0.021
	0.054	0.040	0.049	0.022	0.057
Thousands of Sites	0.005	0.056	0.055	0.001	0.023
	0.021	0.026**	0.030*	0.008	0.026
Firm Size in Thousands	-0.002	0.001	0.013	0.000	-0.004
	0.002	0.003	0.009	0.001	0.003
Union	0.000	0.000	0.000	0.001	-0.001
	0.000	0.000	0.001	0.000**	0.001
Temps	0.085	0.151	0.021	-0.002	-0.084
	0.028**	0.031***	0.036	0.010	0.034**
Contracted	0.011	0.025	0.038	0.016	0.012
	0.029	0.031	0.035	0.010*	0.033
Industry Characteristics					
Agriculture	0.650	0.563	-0.282	0.515	-0.264
	0.176**	0.208**	0.076	0.359**	0.152
Mining	0.419	-0.185	0.062	-0.027	0.169
	0.247*	0.058*	0.087*	0.008	0.205
Manufacturing	0.057	-0.025	-0.005	-0.029	-0.076
	0.062	0.066	0.101	0.010**	0.072
Transportation	0.017	-0.032	-0.087	-0.024	-0.058
	0.073	0.072	0.087	0.008*	0.090
Wholesale Trade	0.058	-0.078	0.082	-0.032	-0.035
	0.080	0.061	0.092	0.006**	0.084
Retail Trade	0.050	-0.012	0.034	-0.024	-0.139
	0.072	0.070	0.093	0.011	0.068*
Finance	-0.050	-0.071	0.139	-0.033	-0.094
	0.054	0.062	0.086	0.005**	0.073
Services	0.008	-0.002	0.166	-0.034	-0.065
	0.058	0.068	0.148	0.016**	0.074
Public Admin	0.000	0.024	0.072	-0.027	0.075
	0.103	0.124	0.038	0.007*	0.130
Job Characteristics					
Talk	-0.079	0.064	0.027	0.023	0.063
	0.034**	0.029**	0.039	0.009**	0.036*
Phone	0.077	-0.039	0.057	-0.017	0.000
	0.032*	0.032	0.032	0.013	0.038
Read	0.041	0.042	-0.011	0.011	-0.007
	0.024*	0.026	0.035*	0.008	0.032
Write	0.031	0.023	0.005	0.023	0.053
	0.029	0.033	0.033	0.009**	0.036
Math	0.027	-0.010	0.058	0.014	0.056
	0.026	0.030	0.033	0.008*	0.033

	Private Emp. Agency	Community Emp. Agency	Schools	Unions	Friends
Job Characteristics cont.					
Computer	0.026	0.024	-0.005	0.010	0.016
	0.028	0.029	0.048*	0.010	0.033
Sales	0.119	0.117	0.007	0.020	-0.127
	0.044**	0.043**	0.064	0.014	0.046**
Service	0.098	0.239	0.025	0.019	-0.069
	0.063	0.068**	0.058	0.023	0.058
Labor/Operator	0.132	0.159	0.114	0.067	-0.122
	0.067**	0.061**	0.050	0.033**	0.048**
Requires College	0.048	0.044	-0.066	-0.013	0.025
	0.047	0.044	0.037**	0.012	0.048
Atlanta	-0.024	-0.129	-0.086	-0.035	-0.017
	0.029	0.029**	0.040*	0.007**	0.038
Boston	-0.002	-0.049	0.049	-0.030	-0.020
	0.034	0.033	0.042*	0.008**	0.040
Detroit	0.020	-0.046	0.049	-0.019	-0.085
	0.036	0.034	0.003	0.008**	0.040**
N	2602	2595	2599	2601	2605
Pseudo-R^2	0.059	0.080	0.072	0.226	0.041

Note: Standard errors are below coefficients. ** and * indicate significance at the 5% and 10% levels respectively. Number of sites and the number of employees in the establishment are measured in thousands, so that the coefficient estimates and standard errors represent 1000 times the values for the marginal effect of adding one more establishment or one more employee.

TABLE 5
Mean Vacancy Duration by Method That Generated the
Most Recent Hire

Recruitment Method	Weeks
1. Help Wanted Signs	3.43
2. Newspaper Advertisements	4.09
3. Accepting Walk-Ins	2.40
4. Current Employee Referrals	3.08
5. State Employment Agency	2.64
6. Private Employment Agency	5.56
7. Community Employment Agency	3.74
8. Referral from School Placement Officer	3.71
9. Union Referral	1.18
10. Referral from Friends or Acquaintances	3.52

TABLE 6
Parametric Weibull Model for Job Vacancy Duration

	Hazard Ratio	Z
Recruitment Methods		
Help wanted signs	0.818	-1.92*
Newspaper advertisement	0.693	-5.36**
Walk-ins	1.115	1.27
Current employees	1.011	0.13
State employment agency	0.856	-1.70*
Private employment agency	0.668	-3.73**
Community employment agency	1.232	2.25**
School referrals	0.926	-1.01
Union referrals	0.950	-0.33
Friends	0.873	-1.96**
Firm Characteristics		
For profit	1.329	2.78**
Franchise	1.274	2.66**
Number of sites	1.000	1.15
Size	1.000	-5.08**
Union	1.000	0.43
Temps	0.988	-0.15
Contract	0.910	-1.30
Industry Characteristics		
Agriculture, forestry, fishing	3.752	2.73**
Mining	1.035	0.15
Manufacturing	0.846	-0.91
Transportation	0.925	-0.40
Wholesale trade	0.902	-0.50
Retail trade	1.053	0.26
Finance	0.786	-1.15
Services	0.880	-0.70
Public Administration	0.410	-3.48**
Job Tasks		
Talk	1.035	0.43
Phone	0.937	-0.88
Read	1.004	0.05
Write	0.905	-1.35
Math	0.938	-0.84
Computer	0.751	-3.78**
Skill Level		
Sales Occupations	1.199	1.96**
Service Occupations	1.183	0.99
Laborers/Operators	1.212	1.33
College Required	1.000	3.42**
City Effects		
Atlanta	0.883	-1.23
Boston	1.007	0.07
Detroit	0.926	-0.75

Note: ** and * indicate significance at the 5% and 10% levels respectively. Results are in log relative-hazard form, meaning that coefficients above one imply a positive effect on the hazard rate (i.e. shorter vacancy duration) and those less than one imply a negative effect.

TABLE 7

Average Number of Screening Methods Used

Principle Recruitment Method	How many screening methods were used if the principle recruitment method …		Difference
	Generated New Hire?	Did NOT Generate New Hire?	
Newspaper Advertisements	3.84	3.63	0.21**
Private Employ. Agency	3.76	3.68	0.08
Referrals from Friends	3.47	3.71	-0.24**
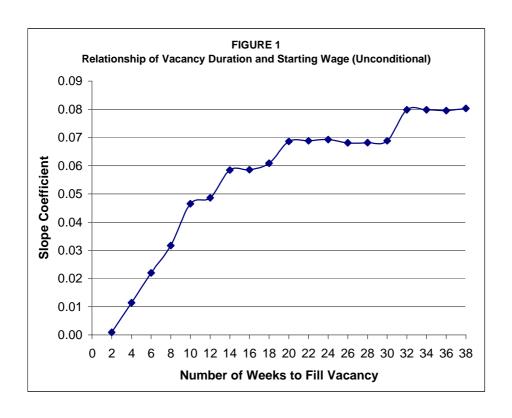
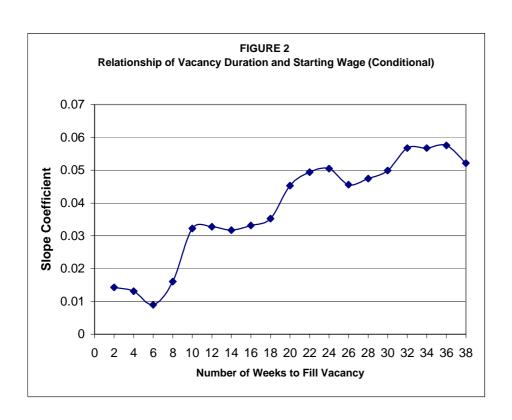Note: ** denotes statistical significance at the 1% level

TABLE 8
Log-Wage Regressions for Starting Wages

	1	2	3	4	5
Recruitment Methods					
Newspaper adv.	0.315 (0.064)**	0.186 (0.053)**	0.135 (0.051)**	0.152 (0.061)**	0.089 (0.054)*
Walk-ins	0.012 (0.063)	0.030 (0.054)	0.018 (0.051)	0.026 (0.060)	0.002 (0.057)
Current Employees	0.226 (0.066)**	0.141 (0.055)**	0.102 (0.051)**	0.128 (0.060)**	0.088 (0.059)
State employment agency	0.119 (0.072)*	0.033 (0.064)	0.068 (0.066)	0.060 (0.075)	0.011 (0.071)
Private employment agency	0.324 (0.063)**	0.243 (0.056)**	0.144 (0.064)**	0.145 (0.070)**	0.095 (0.062)
Community employment agency	0.152 (0.086)*	0.096 (0.090)	0.066 (0.077)	0.050 (0.093)	-0.004 (0.088)
School referrals	0.504 (0.164)**	0.186 (0.077)**	0.095 (0.065)	0.086 (0.083)	0.051 (0.087)
Union referrals	0.698 (0.110)**	0.533 (0.108)**	0.570 (0.114)**	0.463 (0.133)**	0.425 (0.126)**
Friends	0.239 (0.066)**	0.153 (0.055)**	0.113 (.052)**	0.128 (0.060)**	0.081 (0.058)
Other	0.382 (0.067)**	0.185 (0.061)**	0.116 (0.064)*	0.078 (0.070)	0.062 (0.068)
Personal Characteristics					
Male	•	0.079 (0.029)**	0.126 (0.028)**	0.132 (0.031)**	0.126 (0.028)**
Age	•	0.065 (0.008)**	0.054 (0.008)**	0.052 (0.009)**	0.046 (0.008)**
Age squared	•	-0.0007 (0.000)**	-0.0006 (0.000)**	-0.0006 (0.000)**	-0.0005 (0.000)**
College	•	0.356 (0.034)**	0.197 (0.041)**	0.157 (0.047)**	0.154 (0.048)**
Post college	•	0.690 (0.101)**	0.456 (0.104)**	0.429 (0.115)**	0.340 (0.089)**
Job Characteristics					
Talk	•	•	-0.075 (0.027)**	-0.107 (0.031)**	-0.096 (0.033)**
Phone	•	•	-0.010 (0.037)	0.0425 (0.0451)	0.024 (0.041)
Read	•	•	0.075 (0.022)**	0.070 (0.026)**	0.063 (0.026)**
Write	•	•	0.160 (0.030)**	0.155 (0.033)**	0.147 (0.034)**
Math	•	•	0.016 (0.028)	0.039 (0.033)	0.033 (0.032)
Computer	•	•	0.039 (0.041)	0.011 (0.043)	0.044 (0.031)
Sales Occupation	•	•	-0.178 (0.045)**	-0.164 (0.053)**	-0.153 (0.053)**
Services Occupation	•	•	-0.403 (0.062)**	-0.390 (0.075)**	-0.356 (0.075)**
Laborers/Operators Occupation	•	•	-0.298 (0.057)**	-0.287 (0.064)**	-0.304 (0.065)**

Firm Characteristics					
For profit	•	•	•	-0.075 (0.048)	-0.025 (0.049)
Franchise	•	•	•	-0.080 (0.037)**	-0.036 (0.041)
Number of sites	•	•	•	-0.00003 (0.000)	-0.00006 (0.000)**
Size	•	•	•	0.001 (0.001)	0.001 (0.001)
Union	•	•	•	0.002 (0.001)**	0.001 (0.000)**
Temps	•	•	•	0.066 (0.031)**	0.062 (0.031)**
Contract	•	•	•	0.030 (0.032)	0.024 (0.031)
Industry Characteristics					
Agriculture, forestry, & fishing	•	•	•	•	-0.200 (0.108)*
Mining	•	•	•	•	0.240 (0.067)**
Transportation	•	•	•	•	0.042 (0.042)
Wholesale trade	•	•	•	•	-0.090 (0.041)**
Retail trade	•	•	•	•	-0.166 (0.037)**
Finance	•	•	•	•	-0.011 (0.038)
Services	•	•	•	•	0.017 (0.033)
Public administration	•	•	•	•	0.015 (0.079)
Constant	1.874 (0.053)**	0.569 (0.137)**	0.931 (0.125)**	0.977 (0.151)**	1.116 (0.143)**
N	3029	2593	2496	2109	2037
R^2	0.07	0.38	0.47	0.49	0.49

Note: Standard errors are in parentheses. ** And * indicate significance at the 5% and 10% levels respectively.

FIGURE 1
Relationship of Vacancy Duration and Starting Wage (Unconditional)

FIGURE 2
Relationship of Vacancy Duration and Starting Wage (Conditional)

Captions:

Figure 1:

Note: Slope coefficient of regression of vacancy duration (measured in weeks) on a constant and the starting wage. Horizontal axis gives the subsample over which the regression was run. For example, "4" indicates that the sample includes only those employers who filled the position in less than four weeks.

Figure 2:

Note: Slope coefficient of regression of vacancy duration (measured in weeks) on a constant, the starting wage, firm characteristics, industry controls, occupation controls, and whether the position requires a college degree. Horizontal axis gives the subsample over which the regression was run. For example, "4" indicates that the sample includes only those employers who filled the position in less than four weeks.