Waging the War for Talent: Do Recruitment and Screening Strategies Raise Employee Performance?

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Abstract

We use data from the Multi-City Study of Urban Inequality to provide an empirical answer to the question, "Do recruitment and screening strategies raise employee performance?" Our approach differs from previous empirical work in that we allow for changes in screening behavior to accompany changes in recruitment behavior. In the end, our results are consistent with those of the previous literature that ignores the auxiliary effect of recruitment through screening, in that we find no effect of recruitment methods on worker performance.

I. INTRODUCTION

The battle to attract, develop, and retain talent remains of critical importance to companies (Johnson, 2000; Michaels, Handfield-Jones, and Axelrod, 2001; Tulgan, 2001; Watson-Wyatt, 2002; Ashby and Miles, 2002; Nalbantian et al., 2004; Florida, 2005. Employers are still seeking to hire the right people as quickly and cheaply as possible. This paper addresses one element of this decision: how to recruit and screen job candidates to attract and hire high-performing employees. This information will be of interest to employers as they select recruitment and screening methods to try to raise employee performance.

Empirical answers to the question of what recruitment and screening methods raise performance have been offered in the literature. Many of the studies find that no recruitment or screening method raises performance. For example, Holzer (1987a) regressed a subjective employer-reported performance measure (on a scale of 0 to 100) on recruitment methods, screening methods, and personal characteristics such as age, gender, and experience in the previously held position. He found that no recruitment methods were statistically significant while some screening methods had a significantly negative effect on performance. Rynes (1991) presented a review of the literature including a number of studies in which recruitment or screening methods had no effect on performance.

Other studies have presented mixed results (some positive, some negative, and some insignificant) for a particular method. One review found, "There is very little evidence on the effectiveness of different recruitment methods for enhancing job performance and much of the evidence is mixed." Milkovich and Boudreau (1997, p. 208) Another reported, "Firms can use a variety of methods to recruit job candidates, including newspaper advertising, employee referrals, and employment agencies ('headhunters') … Unfortunately, the findings in this literature are far from consistent." (Bamberger and Meshoulam, 2000, p. 83). A third literature review concluded, "The relationship between search method and earnings is less clear. Findings that suggest initial wage gains for workers who found their jobs via informal contacts rather than formal means are dampened by studies suggesting these gains are short-lived for most respondents and by other studies that show no impact on wages, or even negative wage effects." (Henly, 2000). A fourth review reported, "Four studies of the association between recruitment source and job performance outcomes produced different findings" (Bishop, 1993, p. 357). (Other studies in the recruitment and screening literature deal with related issues such as

mechanisms through which employee referrals raise worker productivity (Staiger, 1990; Simon and Warner, 1992; Kugler, 2002), racial differences in extent and type of job contacts (Holzer, 1987(b); Wilson, 1987; Korenman and Turner, 1996), and the effects of unions on recruitment and selection methods (Koch and Hundley, 1997)).

In this paper we use a unique data set and new methods to identify which recruitment and screening methods are most effective in raising worker performance. Because of the null and mixed results in the literature, entering the study we had no strong prior on which methods are likely to enhance performance the most. Our goal is not simply to replicate earlier analyses using new data. Our work is differentiated from the previous literature in two other ways. First, we consider an interactive specification that allows for all possible two-way interactions of recruitment and screening methods. Second, we estimate a model that allows for recruitment to affect worker performance both directly (through the usual theoretical channel of affecting the quality of the applicant pool) and indirectly (through changes in employers' accompanying screening behavior). Previous work has not allowed for this auxiliary effect of recruitment through screening. An important goal of our study, therefore, is to determine whether the mixed results found in the prior empirical recruitment literature can be explained by their omission of implied screening effects. By neglecting the indirect effects of recruitment choices on worker performance through accompanying changes in employer screening behavior, such studies might be missing something important.

The recent paper by DeVaro (2005) uses the same data set we use in this paper to analyze the relationships among employer recruitment choices, vacancy duration, and wages. That analysis explores a wage-posting theoretical framework in which employers face a multi-period recruitment problem, choosing recruitment methods and posting wage offers in the face of a trade-off between hiring speed and expected match quality. One of the key findings to emerge is that recruitment methods that are slower than others in filling vacancies (such as informal referrals from friends) yield higher starting wages even in the presence of an extensive set of controls. This finding has a natural interpretation in the context of the wage-posting model; 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. While using the same data set, the present analysis differs from DeVaro (2005) in two key respects. First, the analysis in DeVaro (2005) used data on recruitment

strategies, starting wages, and vacancy duration but did not make use of the data on worker performance, whereas our main objective in this paper is to study how hiring strategies affect the performance of new hires. Second, while DeVaro (2005) focused only on recruitment methods, our analysis considers screening methods as well and their interactions with recruitment methods.

The work that is most similar to ours is Holzer (1987a). Holzer analyzed a cross section of 3,500 firms sampled in 1982, with information on the recruitment and screening methods used to obtain the most recently hired worker. Our analysis uses a more recent data set collected by Holzer, namely the MCSUI, a cross section of 3510 firms sampled in 1992-1995, that is similar to the 1982 data. Consistent with the rest of the empirical recruitment literature, Holzer considered a linear rather than an interactive specification and did not account for implied screening effects. Our methodology differs from Holzer's in two respects. First, the main equation expresses worker performance as a *nonlinear* (interactive) function of recruitment methods, screening methods, and firm characteristics. Second, in addition to the performance equation we incorporate seven equations that express each screening method as a function of all recruitment methods and firm characteristics.

II. DATA, MEASURES, AND SUMMARY STATISTICS

The data for this study come from the Multi-City Study of Urban Inequality (MCSUI), a sample of 3,510 establishments in four metropolitan areas (Atlanta, Boston, Detroit, and Los Angeles) collected between 1992 and 1995 via an employer telephone survey. The bulk of the questions pertain to the most recently hired worker, and our study focuses on the recruitment and screening methods that were used to obtain this worker and on the worker's subsequent job performance. We also control for firm characteristics. We present the highlights of our data set here and provide further details in the appendix.

Outcome Measure: Worker Performance

The dependent variable for our analysis is the employer-reported answer to the following question about the most recently hired worker in firm j: "On a scale of zero to one hundred, where fifty is average and one hundred is the best score, how would you rate this employee's performance in this job?" The question refers to the job into which the worker was initially

hired. We use the performance score as a proxy for the performance of all of the workers who were hired by firm j in a particular time interval. There are 2791 firms for which this dependent variable is reported. As seen in the first row of Table 1, the performance score has a mean of 78 and a standard deviation of 22.

Although such subjective performance ratings are frequently used as outcome measures in previous empirical studies on recruitment, these measures have some limitations that are worth noting at the outset. First, focusing on worker performance as an outcome variable to capture the desirability of alternative recruitment methods neglects the fact that these methods differ in their costs to employers. As noted by Holzer (1996), "Some recruitment methods (such as the use of private employment agencies or newspaper advertisements) are more costly than others for employers, but these methods may be more effective in generating the higher-quality applicants (or those with specialized skills) that some employers need." Since we lack data on the costs of recruitment methods, our analysis, like the literature preceding it, focuses only on the benefits side. It is worth noting, however, that even if data were available on the direct costs of recruitment methods, the true cost of recruitment methods should be thought of more generally, including, for example, investments of time in soliciting referrals from current employees. Lack of data on the cost side is an unfortunate defect in any empirical analysis of recruitment.

A second limitation is that the performance measure is subjective. Despite some noteworthy exceptions, (for example, Medoff and Abraham 1980) labor economists have preferred to focus on objective measures of labor-market outcomes, like wages, hours of work, and employment rather than on subjective opinions. We believe that the concept of performance, as measured by the employer-reported performance index, is worthy of study for the simple reason that employers quite obviously prefer to employ workers who perform well to those who perform poorly. Nonetheless, we acknowledge that we are on safer ground in assuming that the subjective measure accurately reflects performance if we can demonstrate that the measure is positively associated with wages, since the wage is a measure both of the employer's willingness-to-pay for the employment relationship and of the benefits that the worker receives from the relationship.

To address this concern, we ran the following regression of the logarithm of the current hourly wage of the most recently hired worker on this worker's employer-reported performance:[1]

$$\log(\text{current wage})_i = 1.776 + 0.005(\text{PERF})_i \qquad N = 2432$$
$$(0.107) \quad (0.001)$$

A performance score of 50 (which all employers are instructed to interpret as an "average" performance level according to the wording of the survey) is associated with an hourly wage of $7.58 in 1990 dollars. A performance score of 78, which is roughly the mean performance score reported by employers in the sample, is associated with an hourly wage of $8.72, and a maximum performance score of 100 is associated with an hourly wage of $9.74. The fact that higher worker performance is associated with (objectively measured) higher wages further supports the view that the performance measure is a reasonable object of analysis.

Recruitment and Screening Methods

The survey presents each employer with a menu of ten possible recruitment methods. The employer is then asked to identify those methods that were used in the campaign to hire the most recent worker. The ten methods and their sample frequencies are displayed in Table 1.

The survey questions pertaining to screening, as opposed to recruitment, are slightly different. The employer is presented with a list of seven possible screening methods and is asked to identify those that are used for positions "of this type" (that is, of the type held by the most recently hired worker). Whether or not a particular screening method was definitely used in the campaign to hire the most recently hired worker is unknown, since the questions only ask about the firm's screening policy for positions "of this type". Furthermore, for five of these seven questions the employer is asked about the frequency with which these methods are used when hiring into this type of position, with possible responses including "Always", "Sometimes", or "Never". We recoded these five screening variables to equal one if the particular screening

[1] Since augmented wage regressions that include demographic characteristics and human capital measures are substantively similar, we report only the results from the simplest specification that includes only wages. Standard errors are in parentheses. Wages are measured at the time of the survey and are deflated to 1990 dollars using the CPI-UX. The reduced sample size (2432 instead of the full 3510) is the result of missing observations on either or both of the variables.

method is always used, and zero otherwise. We interpret a response of "Always" to mean that this method was indeed used in hiring the most recent worker. We do not recode the remaining two screening variables, since these do not ask about frequency; the employer is merely asked whether these methods are used when hiring into positions of this type. The seven screening methods and their sample frequencies are displayed in Table 1.

Firm Controls

In addition to the recruitment and screening methods, our analysis includes the following controls for firm characteristics: whether or not the firm is for profit, whether or not it is a franchise, the number of sites on which it operates, the number of employees, the fraction of the current workforce that is unionized, whether any of the workers are temporary workers, whether any of the workers are contract workers, and industry identifiers. Summary statistics for these firm characteristics are displayed in the lower panel of Table 1.

III. METHODOLOGY: ASSESSING THE EFFECTS OF INDIVIDUAL RECRUITMENT METHODS ON PERFORMANCE

Virtually all empirical work on recruitment, including our study, implicitly treats the recruitment choices as exogenous regressors and typically estimates equations by least squares. The single exception, to our knowledge, is DeVaro (2004), which uses the MCSUI data to estimate a dynamic structural model of employer recruitment choice in which the recruitment decision is endogenous. Although the recruitment decision is more appropriately treated as endogenous, the aggregation assumptions required in DeVaro (2004) to render that analysis tractable are less palatable in the present context, in which our goal is to infer the individual effects of multiple recruitment methods. Furthermore, a central focus of the present study is on how recruitment methods indirectly impact worker performance through the auxiliary channel of altering the employer's screening choices. While enriching the DeVaro (2004) model to allow for these features would be conceptually straightforward, the task of estimating such a model would require more extensive data than are currently available.

We begin this section by describing the standard approach taken in most of the empirical recruitment literature. We then discuss the two key respects in which our methodology extends the standard approach, namely allowing for interactions and for implied screening effects. The

section closes with a discussion of recruitment "bundle derivatives" and how they contribute to our analysis.

Standard Approach

Given a cross-sectional sample of workers that spans a number of firms, the standard approach taken in the previous literature on recruitment (see, for example, Holzer (1987), Bishop (1993), DeVaro (2005)), is to regress an outcome variable on a set of recruitment dummies indicating which recruitment methods were used to hire the worker in question. In some cases, dummies for screening methods are also included in the regression so that the "standard specification" may be expressed as follows:

$$Y = a + b_1 REC_1 + \ldots + b_K REC_K + c_1 SCRN_1 + \ldots + c_J SCRN_J + \mathbf{Xd} + \varepsilon. \qquad (1)$$

In this specification, REC_1 to REC_K denote a set of K dummy variables indicating which recruitment methods were used in the campaign to hire the worker, $SCRN_1$ to $SCRN_J$ denote a set of J dummy variables indicating which screening methods were used in the campaign to hire the worker, **X** is a vector of controls for worker and firm characteristics, **d** is a conformable parameter vector, and ε is a stochastic disturbance. The outcome variable, Y, represents either a subjective worker performance score or, alternatively, an objectively-measured labor market outcome such as turnover rate or vacancy duration. The standard approach is to interpret the parameters b_1 to b_K as measuring the effect of recruitment choice on the outcome variable. Our approach extends this framework in two key ways, as we now describe.

Allowing for Recruitment-Screening Interactions

Given that recruitment and screening methods are commonly used together in packages and that the effect of a particular method on performance likely depends on the use of other methods, it is preferable to augment the standard specification by adding recruitment-screening interactions. A dimensionality problem arises when one moves to an interactive specification, given the large number of individual recruitment and screening methods observed in typical data sets (including ours). One approach to the dimensionality problem is to use principal components analysis to construct indexes of recruitment and screening and to use these in the

regression analysis rather than the individual methods. The simplest interactive specification using only the first principal components of recruitment and screening, RECPC and SCRNPC, is:

$$Y = a + b_1 RECPC + b_2 SCRNPC + b_3(RECPC \times SCRNPC) + \mathbf{Xb_4} + \varepsilon \qquad (2)$$

Although the principal components analysis reduces the dimensionality of the problem, in the event that only a small proportion of the total variation in recruitment and screening is accounted for by the first principal components (as is the case in our data), it is better to leave the recruitment and screening methods disaggregated. A fully interactive specification is not practical, however, given our sample size and the post-estimation computation of bundle derivatives described below, so we restrict our attention to two-way interactions, including all such interactions on the right-hand side of the following performance equation:[2]

$$\begin{aligned} PERF = a &+ \sum_r b_r REC_r + \sum_s c_s SCRN_s + \sum_r \sum_{r'<r} d_{rr'} REC_r \times REC_{r'} \\ &+ \sum_s \sum_{s'<s} e_{ss'} SCRN_s \times SCRN_{s'} + \sum_r \sum_s f_{rs} REC_r \times SCRN_s + \sum_i g_i F_i + \varepsilon. \end{aligned} \qquad (3)$$

This interactive performance equation, estimated using least squares, underlies the bulk of our empirical work. Given estimates of the performance equation, we calculate derivatives at the means of the recruitment and screening variables. These derivatives estimate the effect that each recruitment or screening method would have on performance holding the use of all other recruitment and screening methods (and firm characteristics) constant.

Allowing both for Interactions and for "Implied Screening Effects"

Although these results describe the effect on performance of a change in an individual method, there is good reason to believe that when a recruitment method changes, the employer simultaneously changes screening methods. This means that each screening method is a function of the full set of recruitment methods. A more general structure would allow each recruitment

[2] For ease of presentation, the firm subscript j is suppressed from this and the remaining equations.

method to be a function of all other recruitment methods and all screening methods, and each screening method to be a function of all recruitment and screening methods. To keep the analysis tractable, we restrict our attention only to the "implied screening effects" that result from allowing employers to modify their screening behaviors accordingly, given a change in recruitment. Thus, in our framework recruitment methods have a direct effect on worker performance (since recruitment methods affect the quality of the applicant pool) and also an indirect or implied screening effect (since employers change their screening behavior when recruitment methods change).

To implement this functional dependence of screening on recruitment empirically, we specify an auxiliary screening equation for each of the seven screening methods, as follows:

$$SCRN_s = a_s + \sum_r b_{rs} REC_s, s = 1,...,7, \qquad (4)$$

We use the linear probability model and prefer it to the probit or logit because the slope coefficients are interpretable directly as derivatives. This greatly simplifies the expressions for the derivatives of the performance equation. As a sensitivity check, we verified that estimation of the seven auxiliary equations as probits gives results very similar to those with the linear probability model.

In summary, we estimate eight equations (the interactive performance equation and the seven auxiliary screening equations) by least squares. We then use the parameter estimates to compute recruitment "bundle derivatives" as we now describe.

Post-Estimation Computation of Bundle Derivatives

A recruitment bundle is a set of recruitment methods used together to raise performance. The effect of a bundle of recruitment methods on performance is quantified by performance derivatives that account for implied screening effects. Thus, the effect of a particular bundle of recruitment and screening methods on performance is found by totally differentiating the performance equation (3) and the seven auxiliary screening equations (4) with respect to a particular bundle of methods, denoted $B\tilde{r}$, used by a given firm:

$$\frac{\partial PERF}{\partial B\tilde{r}} = \sum_{\tilde{r}} b_r REC_r + \sum_s c_s \frac{\partial SCRN_s}{\partial B\tilde{r}} + \sum_{r\in\tilde{r}}\sum_{r'\in\tilde{r}} d_{rr'}\left[REC_r\left(\frac{\partial REC_{r'}}{\partial B\tilde{r}}\right) + REC_{r'}\left(\frac{\partial REC_r}{\partial B\tilde{r}}\right)\right]$$
$$+ \sum_s \sum_{s'<s} e_{ss'}\left[SCRN_s \frac{\partial SCRN_{s'}}{\partial B\tilde{r}} + SCRN_{s'}\frac{\partial SCRN_s}{\partial B\tilde{r}}\right] + \sum_{\tilde{r}}\sum_s f_{rs}\left[SCRN_s + REC_r \frac{\partial SCRN_s}{\partial B\tilde{r}}\right]. \quad (5)$$

This bundle derivative should be interpreted as the change in worker performance associated with using a particular bundle of methods. After computing bundle derivatives for each firm there are numerous ways to analyze them and to summarize the information. We present three alternative ways in the next section.

IV. RESULTS

The key results of the paper are presented in Table 2. Before presenting our results that allow for interactions and for implied screening effects, for the sake of completeness and for comparison purposes we present results based on the standard approach in Column 1. This approach neglects the fact that many of the recruitment methods are used simultaneously in bundles and that the effect of an individual method can be expected to depend on the other methods in the bundle. The fact that many methods are used simultaneously can be seen most simply in Table 3, which reveals many significant bivariate correlations among the seventeen recruitment and screening methods, nearly all of them positive. In particular, 1) recruitment methods are complementary with other recruitment methods, 2) screening methods are complementary with other screening methods, and 3) screening methods are complementary with recruitment methods. Given the extensive use of recruitment bundles, we expect that the effect of an individual method on performance depends on the presence or absence of other methods used by the employer. This leads to an interactive performance specification and to our first step in generalizing the standard approach.

Effect on Performance of Individual Recruitment Methods Allowing for Interactions

Given the sample size and the large number of individual recruitment and screening methods, a fully interactive performance specification is intractable. In an attempt to reduce the

dimensionality of the problem, we first construct principal components indexes of recruitment and screening. Results from the principal components analysis are displayed in Table 4. Unfortunately, the principal components analysis reveals that neither the recruitment nor the screening methods can be sensibly aggregated into indexes. In neither case does a small subset of principal components account for a large proportion of the variation in recruitment and screening, and in fact the first principal components of recruitment and screening account for only about a quarter of the variation in recruitment and screening. We therefore do not estimate the specification in (2). Henceforth we work only with the individual recruitment and screening methods, addressing the dimensionality problem by estimating the performance equation (3) that includes only two-way interactions as opposed to higher-order interactions.

Since the interactive performance equation is nonlinear in the variables, the actual parameter estimates are uninteresting. For this reason we do not report the actual parameter estimates but rather the derivatives of performance with respect to individual recruitment and screening methods, evaluating the derivative function at the means of all variables. These results are shown in Column 2 of Table 2. Such derivatives account for interactions but not for implied screening effects. We see that only one method of the seventeen significantly raises performance, and that is checking for a criminal record. Three other recruitment and screening methods are significantly associated with lower performance; we offer an explanation for this peculiar result in our conclusion. Since these results allow for interactions but not for implied screening effects, they should be viewed as a stepping stone to our most preferred results that we now discuss.

Effect on Performance of Individual Recruitment Methods Allowing both for Interactions and for Implied Screening Effects

The preceding results neglect the fact that when certain recruitment methods are used, employers make corresponding changes to screening methods. To account for this, we estimate the seven auxiliary screening equations and display the results in Table 5. Most of the statistically significant coefficients are positive, consistent with the bivariate correlations in Table 3 that suggested complementarities in pairs of recruitment and screening methods. With estimates from the interactive performance equation and the seven auxiliary screening equations in hand, we turn our attention to our preferred method (using bundle derivatives) for measuring

the effect of an individual recruitment method on performance. The bundle derivative (5) measures the change in performance associated with the use of a particular recruitment bundle, taking account of interactions among recruitment methods, screening methods, recruitment and screening methods, and implied screening effects. After computing these bundle derivatives we analyze them in three different ways.

First, we rank recruitment and screening bundles from those that raise performance the most to those that lower performance the most. We then list the 20 "best" and "worst" bundles in Table 6 for the reader's inspection.[3] We find that many more recruitment methods are used in the best 20 as compared with the worst 20, whereas the number of screening methods used varies little between these two groups. This suggests that firms can affect performance more by choice of recruitment strategies than by choice of screening strategies.

Second, to give the reader a sense of how prominent particular recruiting methods are among the best and worst bundles, in Table 7 we report the frequency with which individual methods are used in the best 25 percent of bundles versus the worst 25 percent.[4] We find that there are much larger differences in the frequency with which different recruitment methods are used as compared with different screening methods, which parallels the results from Table 6. Despite these similarities, both tables are misleading in that they fail to hold other things constant, and for this reason our preferred method for summarizing the information from the bundle derivatives is the following.

Third, we calculate the *ceteris paribus* effect of a particular recruitment method on performance taking account of implied screening effects. For the effect of a recruitment method that the firm was already using in the chosen bundle, $B\tilde{r}$, we define a bundle $B\hat{r}$ that includes all of the methods in $B\tilde{r}$ except the recruitment method of interest. For the effect of a recruitment method that the firm was not using in the chosen bundle, the comparison bundle $B\hat{r}$ includes all of the methods in $B\tilde{r}$ plus the recruitment method of interest. The derivative $\frac{\partial PERF}{\partial B\hat{r}}$ is defined analogously to (5), replacing all $\tilde{r}$ with $\hat{r}$. The effect of an individual recruitment method on performance when the method of interest is included in the original bundle is $\frac{\partial PERF}{\partial B\tilde{r}} - \frac{\partial PERF}{\partial B\hat{r}}$.

[3] We chose the number "20" for easy of display on a page of standard size.

We calculate this difference in bundle derivatives for each firm that used the method in question and then average them across those firms, presenting these averages for each method in Column 3 of Table 2. We see that none of the recruitment methods has a statistically significant effect on performance when we account for implied screening effects. What is striking is that this result confirms the result from previous research using other data sets, but ignoring the auxiliary effect of recruitment through screening, that recruitment methods have no significant effect on worker performance.

Allowing for Skill Differences through Occupations

A potential criticism of our analysis is that while we have controlled for firm characteristics, we have not controlled for worker characteristics that might be correlated with worker performance. Although much of the previous literature includes controls for worker characteristics such as demographics, such variables are omitted from all of our analyses. In fact, we estimated a number of (unreported) specifications that included controls for worker demographic characteristics and found that our substantive results remained unaffected. We therefore chose to omit the worker characteristics in the interests of parsimony, given the large number of parameters created by a full set of two-way interactions in the performance equation.

Although our results appear insensitive to the exclusion of demographic characteristics, of potentially greater concern is the omission of controls for worker skill levels. In estimating the model on a cross section of workers, we have implicitly assumed that the recruitment and screening strategies affect worker performance in the same ways for all workers, regardless of skill type. Given that employers likely use different recruitment and screening strategies for high-skilled as opposed to low-skilled workers, our finding that recruitment methods have no effect on worker performance might reflect this aggregation of workers by skill level. To address this, we estimated the main results of interest (those in Column 3 of Table 2) for two broad occupational subsamples. These are:

[4] Our choice of the first and last quartiles is arbitrary, though other choices (such as splitting the sample by the median or considering the first and last quintiles) yield very similar results.

High Skilled: Administrative, engineering, scientific, teaching, and related occupations, including creative artists; technical, clerical, sales, and related occupations; precision production, craft and repair

Low Skilled: Service occupations, including military occupations; operators, fabricators, laborers; farming, forestry, fishing, and hunting occupations.

We created these groups using a MCSUI question that asks employers about the type of job into which the most recently hired worker was hired. Responses were coded according to the 1980 Standard Occupational Classification, from the two to four-digit level. We categorized each observation into one of the two broad occupational groups. This occupational disaggregation is coarse but, given the large number of parameters that our interactive performance specification requires, we could not consider a finer disaggregation. Our results are presented in Table 8. Like the results for the full sample, none of the recruitment methods has a statistically significant effect on performance. We therefore conclude that our original result is not merely an artifact of worker aggregation by skill level.

It is interesting to note that, although none of the effects are statistically significant, many of the signs of the point estimates are as expected when comparing high-skilled to low-skilled workers. For example, recruiting workers using help wanted advertising or accepting walk-ins are thought to be much more effective for lower-skilled than for higher-skilled jobs. In fact, the point estimates are negative for high-skilled workers and positive for low-skilled workers. Similarly, recruitment through school placement officers is generally thought to be more effective for high-skilled than for low-skilled workers. In fact, the point estimate is positive for high-skilled and negative for low-skilled workers.

V. CONCLUSIONS

In this paper, we have answered the question, "Which recruitment methods raise worker performance the most?" Consistent with previous literature using different data and simpler methodologies, our main conclusion based on our preferred specification allowing for interactions and implied screening effects is that recruitment and screening methods do not exhibit a statistically significant effect on worker performance. What is striking about this result

is that in contrast to earlier work, our approach allows for recruitment methods to have a direct effect on worker performance and also an auxiliary effect that occurs when employers change their screening methods to accompany a change in recruitment methods. Previous literature has not allowed for such an auxiliary screening effect. While we conjectured that the null findings from previous studies might be an artifact of neglecting the indirect effect of recruitment through implied screening effects, our results show that this is not the case and that even our enriched model confirms the prior work.

Although accounting for implied screening effects did not establish significant positive effects in our study, we believe that future work that allows for these indirect effects of recruitment would be warranted. The proposition that employers adjust their screening behavior in response to changes in recruitment behavior is plausible a priori, and indeed we find clear evidence of this in the data. In particular, more intensive screening accompanies the addition of a recruitment method. Analyses that ignore this indirect effect can potentially give misleading results. We believe that although implied screening effects did not prove to be important in this analysis, our study highlights the general point that it is important to consider an employer's recruitment and screening strategies jointly rather than in isolation.

A promising direction for future work is to incorporate objectives other than worker performance into an analysis of recruitment and screening behavior. One possibility is that firms choose recruitment and screening methods not just to get more productive employees but also to get a larger *number* of employees. There are circumstances in which firms aim merely to hire people, provided that their performance is expected to be above some minimal threshold – fast food restaurants, for example. We would have liked to have included information on the quantity of workers hired, but this information is absent from our data. One implication of not being able to include quantity in our analysis is that when we estimated the performance equation we might have, and indeed did, find that some recruitment and screening methods were associated with *lower* performance. This finding may simply reflect the purposeful pursuit of quantity in hiring as opposed to quality, which we see as a plausible explanation for the negative signs that appeared in the performance equation.

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

The Multi-City Study of Urban Inequality (MCSUI), funded by the Russell Sage and Ford Foundations, is the product of an interdisciplinary team of over forty scholars from fifteen universities and colleges. The study has two cross sectional components, an employer telephone survey and a household survey, both sampled during 1992-1995 in the metropolitan areas of Atlanta, Boston, Detroit, and Los Angeles. The employer survey contains information on firm characteristics, current vacancies, composition of the current workforce, and a wealth of information about the most recently hired employee, the most important of which, for our purposes, is the performance of this worker. The number of employers who provided a performance score was 2791 out of 3510 total employer respondents. 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%.

Two thirds of the data is a probability sample stratified by establishment size (25% 1-19 employees, 50% 20-99 employees, 25% 100 or more employees), drawn from regional employment directories provided by Survey Sampling, Inc. (SSI), primarily based on local telephone directories. The remaining third was drawn from the current or most recent employer reported by respondents in the corresponding MCSUI household survey. Screening for these two sub-samples was somewhat different. Only employers who had hired an employee in the previous three years for a position that did not require a college degree were included in the SSI sub-sample. In contrast, in the household-based sub-sample, employers had to have hired an employee in the past three years into the same occupation that was held by the household respondent who generated the employer name. A substantial fraction of survey questions pertain to these "most recent hires." Screening identified a respondent who actually carried out hiring for the relevant position, and the survey instrument took 30-45 minutes to administer on the telephone, with an overall response rate of 67% for screened interviews. Sampling weights were constructed to correct for the 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. Descriptive statistics for the recruitment and screening data and as well as firm characteristics are provided in Table 1. For more information about the data, see Holzer (1996).

Definitions of MCSUI Variables and Abbreviations Used Throughout the Paper

Performance Measure:

PERF: On a scale of 0-100 where 50 is average and 100 is the best score, how would you rate this employee's performance on the job?

Recruitment Variables:

Next I would like you to indicate if you used any of the following referral or recruiting methods to fill this position. (0/1 dummy where 1=Yes)

Help Wanted: Did you post help-wanted signs?
Newspaper: Did you list advertisements in newspapers?
Walk-ins: Did you consider walk-ins without referrals?
Current Employees: Did you ask for or accept referrals from current employees?
State EA: How about referrals from the state employment service?
Private EA: How about referrals from a private employment service or temp agency?
Community EA: How about referrals from a community agency?
School Referrals: Did you ask for referrals from schools?
Union Referrals: How about referrals from a union?
Friends: Did you ask for referrals from other sources (such as acquaintances, etc.)?

Screening Variables:

The following 5 questions ask about the frequency of the screening practices used by the employer when hiring into the position held by the most recent hire. They are originally coded as (1=Always, 2=Sometimes, 3=Never). When we include these variables as regressors, we recode them as follows (1=Always, 0=Sometimes, Never)

Application: How often do you require a written application?
Interview: How often do you conduct a personal interview?
Reference Check: How often do you check the references?
Education Check: How often do you check to verify education or training?
Criminal Record: How often do you check criminal record?

The next 2 screening questions are coded (1=Yes, 0=No)

Test: Do you require a test?
Work sample: Do you require actual work samples?

Firm Characteristics (including industry):
All yes/no questions are coded 1=Yes and 0=No.

For Profit: Is this a for-profit company?
Franchise: Is this a franchise?
Number of Sites: At how many sites does your firm operate?
Size: number of regular, temporary, and contract workers
Union: The fraction of unionized employees working at the firm is positive if union=1.
Temp Workers: Do you have any temporary employees?
Contract Workers: Do you have any contract workers?

What is your firm's main product or service? (10 Industry Categories):
Agriculture, forestry, and fishing; Mining; Construction; Manufacturing; Transportation; Wholesale Trade; Retail Trade; Finance; Services; Public Administration

current wage: Hourly wage in $1990 dollars, deflated using the CPI-UX. This is the worker's wage measured on the survey date.

REFERENCES

Ashby, Meredith D. and Stephen A. Miles, 2002. *Leaders Talk Leadership.* (New York: Oxford University Press).

Bamberger, Peter and Ilan Meshoulam, 2000. *Human Resource Strategy: Formulation, Implementation, and Impact.* (Thousand Oaks, CA: Sage Publications).

Bishop, John, 1993. "Improving Job Matches in the U.S. Labor Market," *Brookings Papers: Microeconomics*, 335-400.

DeVaro, Jed, 2005. "Employer Recruitment Strategies, Wages, Vacancy Duration, and the Skill Level of New Hires." *Economic Inquiry*, 43:2 (April), 263-282.

DeVaro, Jed, 2004. "The Labor Market Effects of Employer Recruitment Choice." Working paper. Cornell University.

Florida, Richard, 2005. *The Flight of the Creative Class.* (New York: HarperBusiness).

Henly, Julia R. 2000. Mismatch in the Low-Wage Labor Market: Job Search Perspective. In Kelleen Kaye and Demetra Smith Nightingale, (Eds) *The Low-Wage Labor Market: Challenges and Opportunities for Self*-Sufficiency. (Washington: Urban Institute Press, 145-167).

Holzer, Harry, 1987 (a). "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), 243-274.

Holzer, Harry, 1987 (b). "Informal Job Search and Black Youth Unemployment," *The American Economic Review*, 77:3, 446-452.

Holzer, Harry, 1996. *What Employers Want: Job Prospects for Less-Educated Workers*. (New York: Russell Sage Foundation).

Johnson, Mike, 2000. *Winning the People Wars*. (London: Prentice Hall).

Koch, Marianne J. and Greg Hundley, "The Effects of Unionism on Recruitment and Selection Methods." *Industrial Relations* 36:3, 349-370.

Korenman, Sanders and Susan C. Turner, 1996. "Employment Contacts and Minority-White Wage Differences," *Industrial Relations* 35:1, 106-122.

Kugler, Adriana D., 2002. *Employee Referrals and Effficiency Wages*. IZA Discussion Paper No. 633.

Medoff, James L., and Katharine G. Abraham. "Experience, Performance, and Earnings." *Quarterly Journal of Economics*, December 1980.

Michaels, Ed, Helen Handfield-Jones, and Beth Axelrod, 2001. *The War for Talent.* (Boston: Harvard Business School Press).

Milkovich, George, and John Boudreau, 1997. *Human Resource Management*, 8th edition. (Boston: Irwin McGraw-Hill.)

Nalbantian, Haig R., Richard A. Guzzo, Dave Kieffer, and Jay Doherty, 2004. *Play to Your Strengths.* (New York: McGraw-Hill).

Rynes, Sara L., 1991. "Recruitment, Organizational Entry, and Early Work Adjustment: A Call for New Research Directions," in Marvin D. Dunnette and Leaetta M. Hough (Eds.) *Handbook of Industrial and Organizational Psychology*. (Palo Alto, CA: Consulting Psychologists Press, Vol. 2, 399-444).

Simon, Curtis J. and John T. Warner, 1992. "Matchmaker, Matchmaker: The Effect of Old Boy Networks on Job Match Quality, Earnings, and Tenure," *Journal of Labor Economics* 10:3, 306-330.

Staiger, Douglas, 1990. *The Effects of Connections on the Wages and Mobility of Young Workers.* Unpublished manuscript. Kennedy School of Public Policy, Harvard University.

Tulgan, Bruce, 2001. *Winning the Talent Wars*. (New York: Norton).

Watson Wyatt, 2002. *Companies Altering Pay and Benefits in Response to Economic Uncertainty, Net Watson Wyatt Study Finds.* Available online at http://www.watsonwyatt.com/news/press/asp?ID=10469.

Wilson, William Julius, 1987. *The Truly Disadvantaged.* (Chicago: University of Chicago Press).

Table 1
Descriptive Statistics

	Mean	Standard Deviation
Performance	78.268	22.352
Recruitment Methods:		
Help wanted	0.263	0.766
Newspaper	0.486	0.825
Walk-ins	0.659	0.819
Current employees	0.822	0.587
State EA	0.351	0.821
Private EA	0.216	0.715
Community EA	0.281	0.795
School referrals	0.401	0.857
Union referrals	0.069	0.367
Friends	0.377	0.840
Screening Methods:		
Application	0.822	0.555
Interview	0.878	0.475
Reference check	0.757	0.559
Education check	0.375	0.798
Criminal record check	0.320	0.700
Test	0.311	0.759
Work sample	0.208	0.647
Firm Characteristics:		
For Profit	0.755	0.823
Franchise	0.061	0.326
Number of Sites	60.432	439.829
Size	655.919	13470.849
Union	17.257	58.208
Temp Workers	0.356	0.846
Contract Workers	0.298	0.731
Agric., Forestry, Fishing	0.000	0.014
Mining	0.006	0.159
Transportation	0.055	0.432
Wholesale Trade	0.075	0.582
Retail Trade	0.152	0.505
Finance	0.073	0.340
Services	0.402	0.847
Public Administration	0.014	0.146

Table 2
Effects of Recruitment and Screening on Performance

	Column 1	**Column 2**	**Column 3**
Recruitment Method	Results from Standard Approach	Results Allowing for Interactions	Results Allowing for Interactions and for Implied Screening Effects
Help wanted	-0.710 (0.925)	0.193 (1.081)	-4.050 (4.231)
Newspaper	-1.455* (0.803)	-1.357 (0.837)	3.113 (2.453)
Walk-ins	-4.061** (0.872)	-4.064** (0.995)	-3.316 (2.796)
Current employees	-0.490 (1.038)	0.586 (1.402)	5.507 (3.678)
State EA	0.320 (0.899)	-0.200 (4.931)	4.331 (3.972)
Private EA	1.871* (0.976)	1.093 (1.037)	3.477 (3.111)
Community EA	-3.099** (0.967)	-2.895** (1.224)	1.424 (5.297)
School Referrals	1.758* (0.932)	1.086 (0.943)	-0.682 (3.514)
Union Referrals	-1.997 (1.481)	-2.155 (2.227)	5.143 (4.985)
Friends	0.459 (0.828)	-0.294 (0.883)	3.034 (2.357)
Screening Method			
Application	-1.800* (0.926)	-2.278* (1.241)	N/A
Interview	1.437 (1.008)	0.710 (1.316)	N/A
Reference check	1.963** (0.950)	1.479 (1.162)	N/A
Education check	1.648* (0.924)	1.248 (0.979)	N/A
Criminal record	0.748 (0.950)	1.609* (0.974)	N/A
Test	-2.117** (0.900)	-1.063 (0.926)	N/A
Work sample	2.303** (1.056)	1.331 (1.237)	N/A

	Column 1	Column 2	Column 3
Firm Controls	Results from Standard Approach	Results Allowing for Interactions	Results Allowing for Interactions and for Implied Screening Effects
For Profit	-3.078**	-3.243**	-3.243**
	(1.260)	(1.186)	(1.186)
Franchise	-2.053	-1.630	-1.630
	(1.572)	(1.494)	(1.494)
Number of Sites	0.000	0.000	0.000
	(0.001)	(0.001)	(0.001)
Size	0.000*	0.000	0.000
	(0.000)	(0.000)	(0.000)
Union	0.018	0.008	0.008
	(0.012)	(0.012)	(0.012)
Temp Workers	-2.345**	-1.641**	-1.641**
	(0.855)	(0.811)	(0.811)
Contract Workers	-1.468	-0.870	-0.870
	(0.909)	(0.898)	(0.898)
Agriculture, Forestry, Fishing	-16.916**	-7.855	-7.855
	(7.955)	(8.337)	(8.337)
Mining	-2.268	1.270	1.270
	(4.483)	(4.368)	(4.368)
Transportation	0.942	0.015	0.015
	(1.950)	(1.925)	(1.925)
Wholesale Trade	1.923	0.399	0.399
	(1.719)	(1.458)	(1.458)
Retail Trade	1.958*	2.446**	2.446**
	(1.128)	(1.142)	(1.142)
Finance	-3.099*	-3.071*	-3.071*
	(1.880)	(1.728)	(1.728)
Services	1.819*	1.131	1.131
	(1.104)	(1.066)	(1.066)
Public Administration	-6.666*	-7.175**	-7.175**
	(3.904)	(3.514)	(3.514)
Constant	82.663**	86.546**	86.546**
	(2.062)	(3.311)	(3.311)

Notes: Standard errors in parentheses. ** and * indicate significance at the 5% and 10% levels, respectively.
Standard errors for Columns 2 and 3 are bootstrapped with 1000 replications.

Table 3
Correlation Matrix of Recruitment and Screening Methods

	Recruitment Method											Screening Method						
	HW	News	Walk-ins	Curemp	SEA	PEA	CEA	School	UnionR	Friends		App	Inter	Refcheck	Edcheck	Crimrec	Test	Wrksamp
Recruitment Method																		
HW	1.000																	
News	0.089*	1.000																
Walkins	0.105*	0.228*	1.000															
Curemp	0.025*	0.091*	0.159*	1.000														
SEA	0.299*	0.198*	0.239*	0.236*	1.000													
PEA	0.049	0.103	-0.054	0.170*	0.380*	1.000												
CEA	0.192*	0.092*	0.198*	0.263*	0.513*	0.349*	1.000											
School	0.228*	0.105*	0.191*	0.224*	0.375*	0.252*	0.453*	1.000										
UnionR	-0.025	-0.039	0.127*	0.080*	0.097*	0.132*	0.195*	0.040*	1.000									
Friends	0.051	-0.105	-0.364	-0.109	-0.094	-0.020	-0.090	0.059*	-0.074	1.000								
Screening Method																		
App	0.095*	0.092*	0.024*	0.068*	0.150*	0.112*	0.223*	0.216*	-0.037	0.125		1.000						
Inter	0.054	-0.052	-0.122	-0.026	-0.149*	0.021	0.074	0.072	0.033	0.013		0.158*	1.000					
Refcheck	0.053*	0.103*	-0.178*	0.058*	0.043	0.130	0.189*	0.198*	0.015	0.136		0.179*	0.129*	1.000				
Edcheck	0.012	0.022	-0.251*	-0.077	0.035	0.144	0.029	0.259*	-0.003	0.381*		0.172*	0.159*	0.304*	1.000			
Crimrec	-0.078	-0.031	0.163*	0.105*	-0.075*	0.017	0.071*	0.125*	0.143*	-0.144		0.090*	-0.024	0.044*	0.024*	1.000		
Test	-0.071	0.121*	0.056	0.050	-0.003*	0.151*	-0.087*	-0.104	0.118	-0.159		0.030*	-0.052	-0.119	-0.097	0.231*	1.000	
Wrksamp	-0.152	-0.186	-0.161*	-0.099	-0.151	-0.153	-0.163	0.004	0.162	0.258*		-0.092*	0.061	0.038	0.148*	-0.107	-0.022*	1.000

Note: * indicates significance at the 5% level.

Table 4
Principal Components Analysis of Recruitment and Screening Methods

Component	*Eigenvalue*	*Proportion*	*Cumulative Proportion*	*Scoring Coefficients of First Principal Component*
Recruitment Methods				
1	2.37	0.24	0.24	0.27
2	1.21	0.12	0.36	0.22
3	1.03	0.10	0.46	0.31
4	0.94	0.09	0.56	0.29
5	0.91	0.09	0.65	0.44
6	0.83	0.08	0.73	0.26
7	0.80	0.08	0.81	0.48
8	0.71	0.07	0.88	0.39
9	0.70	0.07	0.95	0.23
10	0.49	0.05	1.00	0.11
Screening Methods				
1	1.64	0.24	0.24	0.32
2	1.17	0.17	0.40	0.22
3	1.05	0.15	0.55	0.48
4	0.96	0.14	0.69	0.53
5	0.77	0.11	0.80	0.52
6	0.74	0.11	0.91	0.27
7	0.67	0.10	1.00	0.03

Table 5
Auxiliary Screening Equations:
How a Given Screening Method Changes with Recruitment

	Screening Method						
	Application	Interview	Reference check	Educ check	Criminal rec check	Test	Work sample
Recruiting Method							
Help wanted	0.046**	0.024	0.050**	-0.014	-0.032	0.040	0.011
	(0.022)	(0.022)	(0.022)	(0.034)	(0.034)	(0.039)	(0.026)
Newspaper	0.071**	0.025	0.109**	0.066**	-0.004	0.040	-0.033
	(0.021)	(0.018)	(0.020)	(0.028)	(0.031)	(0.030)	(0.024)
Walk-ins	0.056**	-0.008	-0.074**	-0.095**	0.003	-0.030	-0.054*
	(0.026)	(0.019)	(0.023)	(0.032)	(0.032)	(0.032)	(0.028)
Current employees	0.055*	0.014	0.067**	-0.031	0.035	0.021	-0.011
	(0.033)	(0.026)	(0.030)	(0.039)	(0.034)	(0.033)	(0.036)
State EA	0.039*	-0.075**	-0.018	0.041	0.008	0.003	-0.027
	(0.023)	(0.025)	(0.025)	(0.033)	(0.039)	(0.040)	(0.029)
Private EA	0.031	-0.007	0.025	0.017	0.008	0.096**	0.009
	(0.024)	(0.026)	(0.028)	(0.037)	(0.040)	(0.042)	(0.029)
Community EA	0.034	0.043*	-0.001	-0.098**	-0.035	0.032	0.004
	(0.026)	(0.025)	(0.027)	(0.041)	(0.048)	(0.046)	(0.034)
School Referrals	0.018	0.018	0.016	0.137**	0.114**	0.049	0.040
	(0.028)	(0.020)	(0.023)	(0.035)	(0.037)	(0.036)	(0.032)
Union Referrals	-0.020	-0.009	-0.003	0.068	0.107*	0.029	0.142**
	(0.044)	(0.038)	(0.054)	(0.060)	(0.062)	(0.067)	(0.070)
Friends	-0.007	-0.034	0.032	0.097**	-0.008	-0.048	0.091**
	(0.023)	(0.021)	(0.021)	(0.031)	(0.031)	(0.030)	(0.027)
Constant	0.685**	0.878**	0.718**	0.352**	0.218**	0.147**	0.209**
	(0.056)	(0.053)	(0.046)	(0.065)	(0.064)	(0.060)	(0.057)

Note: Standard errors are in parentheses. * indicates significance at the 10% level and ** indicates significance at the 5% level.

Table 6
Recruitment and Screening Methods Used in the 20 Most Performance-Enhancing and Least Performance-Enhancing Recruitment and Screening Bundles

Methods Used in Each of the Best 20 Bundles

	Bundle Number, Where 1 is Highest and 20 is 20th Highest																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Recruitment Method																				
Help wanted				x																
Newspapers				x				x	x	x	x	x	x	x			x	x		
Walk-ins	x	x	x	x	x		x	x	x	x	x	x	x	x		x	x	x	x	
Current employees	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
State EA	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Private EA		x					x	x			x		x			x		x	x	
Community EA	x	x		x	x	x	x	x	x	x	x		x	x	x	x		x	x	x
School Referrals				x										x	x					x
Union Referral	x	x	x	x	x	x	x		x	x		x	x	x	x		x			x
Friends	x	x		x	x			x					x					x		

Methods Used in Each of the Worst 20 Bundles

	Bundle Number, Where -1 is Worst and -20 is 20th Worst																			
	-1	-2	-3	-4	-5	-6	-7	-8	-9	-10	-11	-12	-13	-14	-15	-16	-17	-18	-19	-20
Recruitment Method																				
Help wanted	x	x	x	x	x	x			x	x	x	x	x	x	x		x			x
Newspapers							x	x						x		x		x	x	
Walk-ins	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x		x	x	x
Current employees	x	x	x	x	x	x			x	x	x	x	x	x	x		x			x
State EA							x	x								x		x	x	
Private EA	x						x							x			x			
Community EA	x	x					x	x								x			x	
School Referrals							x	x										x	x	
Union Referrals	x						x							x						
Friends							x	x						x		x		x		

Methods Used in Each of the Best 20 Bundles

	Bundle Number, Where 1 is Highest and 20 is 20th Highest																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Screening Method																				
Application	x		x	x	x	x			x	x	x	x		x	x		x	x		x
Interview		x	x		x		x	x	x	x	x	x	x	x	x			x	x	x
Reference Check				x		x	x		x	x				x	x					x
Educ Check						x	x		x		x									x
Criminal Record Check						x			x	x	x	x		x						
Test		x	x	x		x	x		x		x	x		x	x		x			x
Work sample							x													

Methods Used in Each of the Worst 20 Bundles

	Bundle Number, Where -1 is Worst and -20 is 20th Worst																			
	-1	-2	-3	-4	-5	-6	-7	-8	-9	-10	-11	-12	-13	-14	-15	-16	-17	-18	-19	-20
Screening Method																				
Application	x	x		x	x	x	x	x	x	x	x	x	x	x	x	x		x	x	x
Interview	x	x		x	x	x	x	x				x	x	x		x		x	x	x
Reference Check	x	x		x	x	x	x	x	x	x	x	x	x	x		x	x	x		
Education Check			x										x	x		x		x		
Criminal Record Check	x						x				x					x		x		
Test			x	x	x	x	x				x			x		x	x	x		
Work sample		x	x	x	x	x						x	x							x

Table 7
Difference in Frequencies of use of Recruitment and Screening Methods Between the "Best 25%" and "Worst 25%" of Recruitment Bundles

Recruitment Method	Difference
Help wanted	-0.225 (0.165)
Newspapers	0.290 (0.156)*
Walk-ins	-0.236 (0.151)
Current employees	0.103 (0.111)
State EA	0.265 (0.184)
Private EA	0.314 (0.128)**
Community EA	0.170 (0.187)
School Referrals	0.199 (0.185)
Union Referrals	0.073 (0.058)
Friends	0.284 (0.145)**
Screening Method	
Application	-0.085 (0.097)
Interview	0.011 (0.079)
Reference Check	-0.051 (0.106)
Education Check	0.096 (0.128)
Criminal Record Check	-0.056 (0.138)
Test	0.071 (0.128)
Work Sample	-0.110 (0.112)

Note: Standard errors are in parentheses and are bootstrapped with 1000 replications.
** and * indicate significance at the 5% and 10% levels, respectively.

Table 8
Estimated Difference in Performance Because a Particular Recruitment Method Was Used, Average of Firm Effects, Allowing for Implied Screening Effects

	High-Skilled	*Low-Skilled*
Recruitment Methods		
Help Wanted	-3.005 (5.512) [-.545]	1.565 (13.249) [.118]
Newspapers	3.319 (2.740) [1.211]	0.059 (7.436) [.008]
Walk-ins	-5.824 (3.582) [-1.626]	6.737 (8.803) [.765]
Current Employees	1.801 (4.454) [.404]	5.586 (11.385) [.491]
State EA	3.443 (5.348) [.644]	-3.752 (9.672) [-.387]
Private EA	2.450 (3.984) [.615]	-6.746 (10.182) [-.663]
Community EA	-0.041 (7.258) [-.006]	1.053 (11.858) [.089]
School Referrals	2.299 (4.364) [.527]	-6.236 (11.507) [-.542]
Union Referrals	11.093 (8.745) [1.269]	-2.125 (12.576) [-.169]
Friends	3.532 (2.685) [1.316]	5.971 (7.342) [.813]

Notes: Standard errors in parentheses are bootstrapped with 1000 replications. ** and * indicate significance at the 5% and 10% levels, respectively. [t-stat].