HOW THE PERCEPTION OF CONTROL INFLUENCES UNEMPLOYED JOB SEARCH

ANDREW D. McGEE*

The author considers how locus of control—the degree to which one believes one's actions influence outcomes—is related to an unemployed person's job search. He finds evidence that "internal" job seekers (who believe their actions determine outcomes) set higher reservation wages than do their more "external" counterparts (who believe their actions have little effect on outcomes) and weak evidence that internal job seekers search more intensively. Consistent with the assumption that locus of control influences job search through an effect on beliefs about the return to search effort, internal job seekers are no better at converting search effort into job offers and earn no more than their peers upon finding employment.

With youth unemployment at historically high levels in the United States (Bell and Branchflower 2011), efforts to help young people find employment have taken on renewed urgency. Such efforts have tended to focus on costly and time-consuming job-training programs to improve workers' human capital, but the evidence of the effectiveness of such programs is mixed (Smith 1998). Workers' economic preferences, personality traits, and other psychological factors may be less malleable and, thus, less suited to interventions aimed at changing them than human capital, but these noncognitive characteristics are almost certainly related to job-search decisions in that they have been shown to be related to schooling decisions, occupational choice, and job search (e.g., Coleman and Deliere 2003; Della Vigna and Paserman 2005; Heckman, Stixrud, and Urzua 2006; Piatek and Pinger 2010; Antecol and Cobb-Clark 2013; Lundberg 2013) as well as to earnings (e.g., Kuhn and Weinberger 2005; Borghans, ter Weel, and Weinberg 2008). Intervening to help job seekers avoid the costly mistakes that their

*ANDREW D. McGEE is an Assistant Professor at Simon Fraser University. I thank Bruce Weinberg, David Blau, Jim Peck, Peter McGee, and Saif Mehkari; three anonymous referees and the associate editor; and seminar participants at Ohio State University, Maastricht University, Institut zur Zukunft der Arbeit (IZA), the Federal Trade Commission, Simon Fraser University, and the Midwest Economics Association meetings for their helpful suggestions and valuable discussion. I am greatly indebted to Audrey Light for her guidance throughout this project. A data appendix with additional results and copies of the computer programs used to generate the results presented in the article are available from the author at amcgee@sfu.ca.

KEYWORDS: locus of control, job search, noncognitive skills

ILR Review, 68(1), January 2015, pp. 184–211
DOI: 10.1177/0019793914556245.
Journal website: ilr.sagepub.com
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noncognitive characteristics suggest they may make in their job-search decisions could prove to be both an expedient and cost-effective strategy to promote successful employment outcomes.

For instance, many job seekers are probably uncertain about the extent to which time spent looking for work affects the probability that they will find a job. When job seekers are uncertain about this return to search effort, their general beliefs about the connection between their effort and outcomes in life—their locus of control (Rotter 1966)—may influence job-search decisions by informing beliefs about the return to search effort. In this study, I investigate whether unemployed job seekers' locus-of-control beliefs are related to their search behavior. Understanding how locus of control influences reservation-wage and search-effort decisions may help programs provide customized assistance to unemployed job seekers to speed their return to employment.

I incorporate locus of control into a discrete-time, infinite-horizon model of unemployed job search to derive comparative static predictions concerning the effects of locus of control on reservation wages and search effort. I assume that job seekers' locus-of-control beliefs influence their beliefs about the arrival rate of job offers conditional on search effort. The model predicts that job seekers with an *internal* locus of control, who believe their efforts will influence outcomes, search more than job seekers with an *external* locus of control, who believe their efforts have little effect on outcomes, because the internal job seekers believe the return to the search effort to be higher. Because the more-internal job seekers expect more offers conditional on search effort than do their less-internal counterparts, they also set higher reservation wages. The predicted effect on the exit rate from unemployment is ambiguous; increased search effort makes job offers more likely, but higher reservation wages increase the likelihood that these offers will be rejected.

Incorporating locus of control into a job search model in this manner is consistent with the role of locus of control in social learning theory, which posits that beliefs about the likelihood of outcomes given specific behaviors are influenced most by prior experiences in the same or related situations but also that general beliefs applying to a broad spectrum of situations and behaviors, such as locus of control, are important in determining beliefs when individuals confront unfamiliar situations (Phares 1976). Psychologists have argued that internal individuals will exert more effort searching for employment than external individuals (Friedrich 1987), but the evidence is inconclusive. Friedrich (1987) and Heaven (1995) found small positive correlations between internality and search activities among college students and teenage job seekers, respectively, but Saks and Ashforth (1999) and Feather and O'Brien (1987) found insignificant correlations in samples of college seniors and Australian youth. Kanfer, Wanberg, and Kantrowitz (2001) performed a meta-analysis of existing studies and found a small but positive and statistically significant correlation between internality and search intensity. These studies, however, make no attempt to disentangle effects of locus of control from the effects of human capital. More

important, the relationship between locus of control and reservation wages—a key feature of any economic model of search—has gone unstudied. Focusing only on the effects of locus of control on search intensity has led authors such as Plumly and Oliver (1987) to conclude—perhaps incorrectly—that internality leads to shorter unemployment durations. Understanding the relationship between locus of control and unemployment durations requires that we consider the effects of locus of control on *both* search intensity and reservation wages.

I test the model's assumptions and predictions using data from the 1979 National Longitudinal Survey of Youth (NLSY79), which provides direct measures of locus of control, reservation wages, and the search experiences of unemployed respondents between 1979 and 1986 and—for 1981 only—data on time spent searching for employment and the receipt of job offers. I find that locus of control is related to both reservation wages and search intensity in the manner predicted by the model—a one standard deviation increase in internality is associated with a 1.1% increase in reservation wages and an imprecisely estimated 0.42-hour increase in weekly search hours, effects on search behavior comparable to those of conventional measures of human capital. I find no significant relationship between locus of control and the probability of exiting unemployment, suggesting that the effects of locus of control on reservation wages and search intensity may offset each other. Finally, I show that locus of control does not influence re-employment wages, as it would if employers valued internality as a skill, and that internal workers are not, in fact, better searchers than their less-internal peers.

Closely related to this study is independent work by Caliendo, Cobb-Clark, and Uhlendorff (forthcoming), who found that a one standard deviation increase in internality is associated with a 1.5% increase in reservation wages and 0.14 additional applications submitted to employers among German job seekers in 2007 and 2008. Their study has several advantages. In particular, their findings are robust to controlling for personality traits unobserved in my data and to using different methods to identify internal and external respondents. They also avoided the selection issues present in my sample by studying a sample of newly unemployed workers. Perhaps most important, Caliendo et al. found that internal job seekers believe each application submitted increases their chances of receiving an acceptable job offer by more than do external job seekers—direct evidence that locus of control affects beliefs about the efficacy of search effort. By contrast, I provide indirect evidence to this effect by ruling out competing explanations for the effects of locus of control on search behavior, and I exploit the NLSY79's extensive work-history information to examine the relationships between locus of control and unemployment durations and re-employment wages. Both studies are consistent with McGee and McGee's (2011) finding that, in a laboratory experiment, locus of control is related to search behavior only when subjects are uncertain about the return to search effort, and overall the studies complement each other to the extent that the findings are similar despite using different measures of locus of control and search intensity in samples from different populations, countries, and time periods.

By modeling the effect of locus of control on beliefs that, in turn, affect decision making, this study is consistent with prior studies that assume that locus of control influences educational attainment (Coleman and Deleire 2003) and labor contracts (Bowles, Gintis, and Osborne 2000) through effects on beliefs. Numerous studies modeled how searchers update beliefs about the arrival rate of offers (Chalkley 1984; Falk, Huffman, and Sunde 2006) and the offer distribution (Morgan 1985; Burdett and Vishwanath 1988), but few studies have examined empirically how beliefs about the search process affect search behavior. Important exceptions include Anderson (1992), who found that higher recall expectations reduce the hazard rate from unemployment, and Spinnewijn (2009), who found that searchers overestimate the arrival rate of job offers independent of search effort.

In the context of educational attainment, Lundberg (2013) suggested that policymakers adapt school environments to suit the personality traits students already possess, given that the traits themselves may be difficult to alter. Like efforts to alter personality traits, attempts to influence locus of control beliefs may be ineffectual, and policymakers whose objective is to reduce the ranks of the unemployed might wish to provide job seekers who have different locus-of-control beliefs with different assistance. Locus of control can be easily measured using a short, four-item questionnaire. External job seekers, who might spend less time searching, may need to be encouraged to search more, whereas internal job seekers may need to be encouraged to not let hopes of the "perfect job" stand in the way of an acceptable job by setting high reservation wages. In addition, McGee and McGee (2011) found evidence in the lab experiment that external searchers are more likely to become discouraged and quit searching, suggesting that—if this is also true in the labor market—assistance programs might be able to use locus-of-control measures to identify unemployed job seekers most at risk of exiting the workforce.

Finally, suggesting the use of locus of control to target particular job seekers for customized assistance is both ambitious and speculative, but this study does highlight one sure-fire, welfare-enhancing intervention: providing job seekers with counseling to improve their understanding of the job market and the role the search effort plays in finding work. Job seekers choose reservation wages and search effort that maximize their expected utility given their beliefs, but only with properly "calibrated" beliefs will they make the search decisions that benefit them the most. Encouragingly in this regard, McGee and McGee (2011) showed that the correlation between locus-of-control beliefs and search behavior in their experiment was eliminated by providing subjects with fairly minimal information about the search process.

Model of Unemployed Job Search

Structure of the Model

I consider a discrete-time version of the infinite-horizon job search model with a known offer distribution and endogenous search effort studied by

Mortensen (1977, 1986). In any period, an unemployed job seeker exerts effort s_t looking for a job. The probability of receiving a job offer conditional on this effort is given by $g_i(s_t) = a_i + b_i s_t$ if $s_t \leq \frac{1-a_i}{b_i}$ and by $g_i(s_t) = 1$ otherwise, where the baseline arrival rate of offers, $a_i = a(X_i)$, and search efficiency, $b_i = b(X_i)$, are deterministic functions of individual characteristics and local labor-market conditions (X_i).

I depart from the literature by assuming that job seekers know the baseline arrival rate of offers, a_i, but are uncertain about the efficiency of job search b_i. I further assume that general locus-of-control beliefs inform beliefs about the return to search effort and that these beliefs are increasing in internality.[1] Specifically, I assume that $E(b_i \mid X_i, l_i) = b(X_i)l_i$, where locus of control, l_i, ranges from 0 to $\bar{l}$ and is increasing in internality. The job seeker's estimate of the probability of receiving an offer conditional on effort is $g^E(s_t \mid X_i, l_i) = a(X_i) + b(X_i)l_i s_t$. I assume that job seekers do not update their beliefs within unemployment spells in order to focus on the stationary solution to this dynamic programming problem and gain insight into how locus of control affects search behavior in a simple, analytically tractable model.

Job seekers choose search effort and a reservation-wage policy to solve

$$\max_{s_t \in [0,\infty)} m - c(s_t) + \beta[g^E(s_t \mid X_i, l_i) E \max\{V_{t+1}^E(w), V_{t+1}^U\} + (1 - g^E(s_t \mid X_i, l_i))V_{t+1}^U]$$

where m represents unemployment benefits and other income received while unemployed, β is the discount rate, and V_{t+1}^U and $V_{t+1}^E(w)$ are the expected utilities of unemployment and employment at wage w in the next period. The costs of search effort are given by $c(s_t)$, where $c' > 0$ and $c'' > 0$. I assume that once searchers accept an offer they are employed forever at wage w; the expected utility when employed at wage w is given by

$$V_t^E(w) = w + \beta V_{t+1}^E(w).$$

The reservation wage at which workers are indifferent between accepting the wage offer and continuing to search is given by

$$w_r = (1-\beta)V^U = m - c(s) + \frac{\beta}{1-\beta} g^E(s \mid X_i, l_i) \int_{w_r}^{\infty} (w - w_r) dF(w).$$

Using this reservation-wage policy, the optimal s^* solves the first-order condition

$$c'(s) = \frac{\beta \dfrac{\partial g^E(s \mid X_i, l_i)}{\partial s}}{1-\beta} \int_{w_r}^{\infty} (w - w_r) dF(w).$$

[1]Locus of control is assumed to not influence beliefs about the baseline arrival rate of job offers because a_i is unrelated to effort. Spinnewijn (2009) found that individuals overestimate this baseline arrival rate.

Individuals' expected lifetime utilities depend on their reservation-wage and search-effort choices and the actual costs and productivity of search. Individuals whose beliefs regarding the efficacy of search b_i are incorrect choose reservation wages and search intensities that maximize their expected lifetime utility *given their beliefs*, but their expected utility would be higher, ceteris paribus, if their beliefs were properly calibrated such that $E(b_i \mid X_i, l_i) = b(X_i)$, which suggests the possibility of utility-enhancing interventions.

Predictions

I show in Appendix A that $\frac{\partial s^*}{\partial l} > 0$ and $\frac{\partial w_r}{\partial l} > 0$. Internal (high-$l$) job seekers believe that the return to search effort, in terms of the probability of receiving an offer, is higher than do external job seekers, and they exert more search effort (s^*) as a result. Conditional on their search effort, however, internal job seekers expect more offers and thus set higher reservation wages (w_r). The probability of exiting unemployment in any period is given by $h(s, w_r) = \Pr(\text{Offer} = 1 \mid s) \Pr(w \geq w_r)$, where Offer = 1 indicates the receipt of a job offer. Search effort and reservation wages have competing effects on the exit rate from unemployment, resulting in an ambiguous comparative static prediction. Internal job seekers search more and receive more offers as a result, but they refuse more offers as a consequence of their higher reservation wages.

Other Roles for Locus of Control

The model assumes that locus of control affects unemployed job search only through its effect on beliefs about the return to search effort, but other channels may exist. First, locus of control may be a skill or be correlated with unmeasured skills that influence productivity on the job. Second, locus of control may be related to the actual productivity of job search. Finally, internality may be associated with lower search costs if internal job seekers find search effort less onerous. These alternative channels imply that an increase in internality leads to a higher continuation payoff to search, resulting in higher reservation wages, and either higher marginal benefits or lower marginal costs of search, resulting in higher search intensity—the same comparative static predictions as in my model. The assumption that locus of control affects search through an effect on beliefs about the efficacy of search effort is most consistent with the construct that psychologists designed locus-of-control scales to measure, but empirical tests of this assumption and each comparative static prediction are presented in the Findings section.

Alternative models of job search are also possible. For instance, one might consider a directed search model in which internal job seekers enjoy a comparative advantage in certain occupations or industries. If internal workers seek employment in occupations or industries in which they expect to be

more productive, then they will hold out for higher wages and internality will be positively correlated with reservation wages. Furthermore, the payoff to finding employment should be higher for these internal job seekers than for other job seekers, and they should exert more effort searching as a result. In short, the comparative static predictions from such a model are likely to be similar to those in the model presented earlier in this article.

An alternative Roy model of job search might assume that job seekers allocate their search time among different search activities and that internal job seekers enjoy a comparative advantage in particular search activities. Internality has been found to be correlated with information gathering (Srinivasan and Tikoo 1992) and word-of-mouth communication with individuals with whom an individual has weaker ties (Lam and Mizerski 2007); such behaviors might complement or improve the efficiency of some search activities but not others. If the return to search is higher for some search activities for internal searchers, then internal job seekers should use these search methods more intensively than others. Internality and total search hours would be positively correlated because the marginal benefit to search hours would be higher for internal job seekers who use search methods in which they enjoy a comparative advantage. Likewise internality and reservation wages would be positively correlated because internal job seekers would (correctly) expect more offers conditional on any amount of time spent searching. In the Findings section, I discuss whether these alternative modeling assumptions find support in the data.

Data

Samples

The data come from the NLSY79, which follows a nationally representative sample of 12,686 men and women who were between the ages of 14 and 22 when first interviewed in 1979. The respondents were interviewed annually between 1979 and 1994 and biennially thereafter, providing information on their families, backgrounds, educational attainment, and labor-market experiences.

To maximize the sample sizes, I used separate samples to estimate the relationships between locus of control and reservation wages, search intensity, the exit rate from unemployment, re-employment wages, and the productivity of search effort. All samples were restricted to person-year observations from respondents born between 1960 and 1964 who were unemployed and 18 or older when interviewed between 1979 and 1986 with valid responses for all controls. These restrictions ensure that complete labor-market histories are observed from age 18 onward and that locus of control is measured early in most respondents' labor-market careers.

A respondent contributed a person-year observation to the reservation wage sample if, when interviewed between 1979 and 1986, he or she was unemployed and reported a reservation wage. Respondents contributed

multiple person-year observations if their unemployment spell spanned multiple interviews or if they were interviewed in two distinct unemployment spells in this survey period. I dropped the top 1% and bottom 1% of reported reservation wages, leaving me with a sample of 5,615 person-year observations from 3,291 respondents.[2]

The sample used to estimate the relationship between locus of control and search effort was restricted to respondents who were unemployed when interviewed and had looked for work in the previous four weeks in 1981 (the only year respondents were asked the number of hours spent searching in the last week in which the respondent looked for work). The resulting sample, which I also used to estimate the relationship between locus of control and the productivity of search effort, has observations from 386 respondents.

The sample used to estimate the proportional hazard model of the exit rate from unemployment includes the first unemployment spell ongoing when a respondent was interviewed between 1979 and 1986. Unemployment durations were not observed for 76 respondents who contribute observations to the reservation-wage sample, leaving me with a sample of 3,215 unemployment spells.

The sample used to estimate the relationship between locus of control and reemployment wages includes observations of wages observed on the completion of unemployment spells associated with observations in the reservation-wage sample. Respondents contributed multiple person-year observations only if they were interviewed during separate unemployment spells in this survey period, and I also dropped the top and bottom 1% of reemployment wages, resulting in a sample of 4,646 person-year observations from 3,157 respondents.[3]

Dependent Variables

The self-reported reservation wage comes from responses to the question, "What would the wage or salary have to be for you to be willing to take [a job offer]?" This was asked of unemployed respondents who were looking for work or who had looked for work in the previous four weeks between 1979 and 1986. The responses have been converted to 1979 dollars using the Consumer Price Index.

The search-intensity measure sums the number of hours during the last week in which a respondent looked for work spent contacting employers directly, checking with state or private employment agencies, placing or answering ads, looking in the newspaper, checking with a school placement service, looking for work through friends or relatives, and using all other methods of looking for work. I used responses concerning whether each

[2]Trimming the extreme responses eliminated reported reservation wages below $1.50/hour and above $25/hour. To put this in perspective, the U.S. federal minimum wage on January 1, 1979, was $2.90.

[3]The sample is smaller than the reservation-wage sample because some respondents were interviewed twice during a single (lengthy) unemployment spell, dropped out of the survey before their re-employment wage could be observed, or had responses that were missing data on re-employment wages.

search method led to a job offer to create the indicator for whether a job offer had been received when interviewed.

The completed duration of an unemployment spell counts the number of weeks an individual spent unemployed using the NLSY79's weekly labor-force-status array. The weekly labor-force status identifies whether the respondent was working, out of the labor force, unemployed, or in the military on a week-by-week basis from January 1, 1978, onward.[4] I excluded 76 observations for which the calculated duration equals 0.[5] Approximately 2% of unemployment durations were right-censored because the respondents dropped out of the survey before their unemployment spell ended, and unemployment spells longer than 140 weeks were treated as if they were right-censored given the difficulty in estimating the baseline hazard during these periods.

Once the unemployment spells were complete, respondents reported their wages with their new employers—the re-employment wage. Re-employment wages have also been converted to 1979 dollars.

Independent Variables

In the 1979 interview, respondents completed an abbreviated four-item version of Rotter's Internal–External Locus of Control Scale measuring their general locus of control.[6] Each item consists of a pair of statements (see Appendix B), one reflecting an internal locus of control and the other reflecting an external locus of control. The items are scored by assigning a value of 4 when respondents indicate that the internal statement is "much closer" to their own views, 3 when the internal statement is only "slightly closer" to their own views, 2 when the external statement is "slightly closer" to their own views, and 1 when the external statement is "much closer" to their own views. Raw scores ranging from 4 (highly external) to 16 (highly internal) are obtained by summing these responses. I subtracted birth-year means to avoid confounding locus-of-control with age-at-test effects and divided by the standard deviation for all respondents to the NLSY79 (regardless of whether they were in my samples) to produce standardized locus-of-control scores.[7]

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[4]Categories in the weekly status array also included cases in which out of the labor force versus unemployed could not be determined and cases of employment with gaps in employment with the same employer when the dates of the gaps could not be identified. When counting the weeks of unemployment, I included weeks when out of the labor force versus unemployment could not be determined but not the weeks associated with a period of employment with gaps. How these ambiguous weeks were handled did not affect the findings in this article.

[5]Calculated duration can equal 0 if the respondent indicated that he or she had looked for work during the previous four weeks but not during the current week. When calculating the length of an unemployment spell using the weekly labor-force-status array, I required that the unemployment spell include the week of the interview.

[6]Locus-of-control beliefs may be either situation-specific or general. For instance, an individual may believe, based on prior experience, that outcomes in Scrabble depend mostly on random letter draws rather than effort. The same individual may believe, in general when confronting unfamiliar situations, that his or her effort is the primary determinant of outcomes. This individual is internal in general but external in the context of a specific activity.

[7]Children exercise little control over their daily routines and are very external as a result, but they become more internal with age, with internality peaking between 8th and 10th grades (Sherman 1984).

If locus of control changes over the life cycle or in response to events, a respondent's locus of control when unemployed may not be well measured by the 1979 score. Buchele (1983), however, found using longitudinal data that labor-market experiences have at most very small effects on the measured locus of control; more recently Cobb-Clark and Schurer (2013) showed using Australian data that locus of control is a mostly stable trait that largely does not respond to important life events. As such, I have assumed that the locus of control measured for respondents in 1979 is representative of the locus of control in later periods. I mitigated the potential for reverse causality by considering unemployment spells ongoing at the same time as or after locus of control was measured.

Internality is positively related to intelligence (Bar-Tal and Bar-Zohar 1977), self-esteem (Judge, Erez, Bono, and Thoresen 2002), and motivation (Spector 1982)—characteristics that may also be related to productivity and, hence, reservation wages and search effort. To proxy for cognitive ability, I control for respondents' standardized 1980 Armed Forces Qualifying Test (AFQT) scores. To proxy for psychological factors, I include standardized scores from the Rosenberg Self-Esteem Scale, the Armed Services Vocational Aptitude Battery (ASVAB) coding test for conscientiousness (Segal 2008), and the interviewers' assessments of the respondent's attitude.[8]

Additional controls for human capital include the respondent's highest grade completed and the number of weeks worked after the respondent turned 18 and before the unemployment spell. Other controls capture differences in the offer distribution and availability of employment opportunities (region of residence, whether the residence is urban, local unemployment rates, and union membership in the previous job), differences in the opportunity costs of search (weekly unemployment insurance benefits, marital status, family size, and whether the residence is urban), and differences in access to social and employment networks (race, gender, and mother's highest grade completed). Finally, I included as additional covariates the total number of weeks the respondent had spent unemployed since entering the workforce as of the interview and the number of weeks unemployed in the current unemployment period as of the interview.

Summary Statistics

Table 1 presents the summary statistics for the reservation-wage sample and for the dependent variables in the remaining samples.[9] The average reservation wage deflated to 1979 dollars ($3.11) was approximately 7% higher

[8]I subtracted birth-year means and divided by the standard deviation of the full NLSY79 sample for the AFQT, self-esteem, and ASVAB coding test scores. The interviewer's assessment of the respondent's attitude comes from remarks in which the interviewer indicated whether the respondent was "friendly and interested," "cooperative but not interested," "impatient and restless," or "hostile." I assigned scores ranging from 4 for "friendly and interested" to 1 for "hostile." Interviewers, however, differed systematically in their perceptions of respondents' attitudes, so I subtracted from the respondent's score the average score assigned by the interviewer, took the average of the respondent's interviewer-adjusted scores from 1979 and 1980, and divided by the sample's standard deviation.

[9]The summary statistics for the independent variables in the other samples are similar to those reported here.

Table 1. Summary Statistics

Variable	*Mean*	*Standard deviation*
A. Reservation-wage sample		
Reservation wage (in 1979 dollars)	3.11	1.28
Residual locus of control score	−0.13	1.02
Residual AFQT score	−0.33	0.94
Highest grade completed	11.49	1.76
Work experience (weeks)	54.37	64.78
Race (1 if black)	0.41	
Ethnicity (1 if Hispanic)	0.16	
Gender (1 if male)	0.53	
Mother's highest grade completed	9.40	4.61
Marital status (1 if married)	0.14	
Family size	4.26	2.33
Region, South/other (1 if lives in South)	0.38	
Region, Northeast/other (1 if lives in Northeast)	0.17	
Region, West/other (1 if lives in West)	0.18	
Rural/urban residence (1 if urban)	0.59	
County unemployment rate (%)	9.39	3.58
Weeks unemployed at interview date	12.27	14.53
Total weeks of prior unemployment experience	36.71	41.77
Unemployment insurance compensation ($/week)	13.93	108.12
Union (1 if in union in previous job)	0.11	
Residual ASVAB coding test score	−0.14	0.97
Attitude at interview	−0.13	1.01
Residual self-esteem score	−0.12	1.01
Number of observations	5,615	
Number of individuals	3,291	
B. 1981 search-hours sample		
Hours per week spent searching	6.44	9.17
Direct search hours	1.64	3.79
Nondirect search hours	4.81	7.47
Percentage receiving offers	0.24	
Number of individuals	386	
C. Unemployment-duration sample		
Unemployment duration (weeks)	30.77	39.07
Number of individuals	3,215	
D. Re-employment–wage sample		
Re-employment wage (in 1979 dollars)	3.37	1.71
Number of observations	4,646	
Number of individuals	3,157	

Notes: AFQT, 1980 Armed Forces Qualifying Test; ASVAB, Armed Services Vocational Aptitude Battery.

than the 1979 minimum wage and $0.26 less than the average re-employment wage. Unemployed job seekers spent on average just 6.4 hours per week looking for work—75% of this time they devoted to looking for work through means other than directly contacting employers. About a quarter of unemployed job seekers had received a job offer at some point prior to being interviewed. On average, these job seekers spent just a little more

than 30 weeks before finding work. In terms of the controls, the average locus of control, AFQT, self-esteem, ASVAB coding, and interview attitude scores in the NLSY79 as a whole are 0 by construction, implying that the respondents contributing observations to the reservation wage sample were more external, less cognitively able, had lower self-esteem, demonstrated less conscientiousness, and were less cooperative when interviewed than the average NLSY79 respondent.

Findings

Reservation Wages

To test the prediction that internality and reservation wages are positively related, I estimate by ordinary least squares (OLS) the log–reservation wage model

$$\ln w_{it}^{r} = \alpha^{w} l_i + X_{it}\beta^{w} + \varepsilon_{it}^{w}$$

where w_{it}^{r} is respondent i's reservation wage at time t, l_i is his or her locus of control, X_{it} are the controls (as described in the previous section), and ε_{it}^{w} is the econometric error term. I corrected the standard errors in the reservation-wage and re-employment-wage regressions to reflect the non-independence of the error terms resulting from having multiple observations from some respondents.

Panel A of Table 2 reports the coefficient estimates for locus of control in alternative specifications of the reservation wage model. Without other controls, in column 1, a one standard deviation increase in internality is associated with an estimated increase in a respondent's reservation wage of 2.4%. Consistent with the model's prediction, a one standard deviation increase in internality with the full set of controls in column 2 is associated with an estimated increase in reservation wages of 1.1%—slightly smaller than the estimated 1.5% increase among German job seekers that Caliendo et al. (forthcoming) reported.[10] The effect of a one standard deviation increase in internality is comparable to increasing the highest grade completed by more than half a grade level or increasing work experience by 18 weeks; in contrast, a one standard deviation increase in cognitive ability is associated with an estimated increase in reservation wages of just 0.5%. Some controls in column 2, such as highest grade completed and work experience, may be influenced by locus of control, but the estimated relationship between locus of control and reservation wages without these controls in column 3 (0.010) is essentially the same as that in column 2—suggesting that most of the effect of locus of control on reservation wages is unrelated to its relationship to human capital formation.

A potential problem is that some respondents already had experience with unemployment when locus of control was measured in 1979. If respondents had unobserved characteristics that led them to be unemployed prior

[10]Appendix C reports coefficient estimates for the remaining controls for a selection of the regressions.

Table 2. Ordinary Least Squares Estimates for Log–Reservation Wage and Search Hours Models

	Model variations					
	(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*
A. Reservation wage model						
Variable	Dependent variable: Log-Reservation wages					
Locus of control score	0.024***	0.011***	0.010**	0.010*	0.016***	0.013***
	(0.004)	(0.004)	(0.004)	(0.005)	(0.005)	(0.004)
R^2	0.008	0.146	0.106	0.161	0.148	0.148
Number of observations	5,615	5,615	5,615	2,894	3,046	3,291
B. Search intensity model						
Variable	Dependent variable: Total search hours in the previous week					
Locus of control score	0.351	0.418	0.497	−0.100	−0.162	
	(0.466)	(0.486)	(0.488)	(0.944)	(0.602)	
R^2	0.001	0.087	0.047	0.141	0.139	
Number of observations	386	386	386	128	215	
Controls						
Demographics[a]	No	Yes	Yes	Yes	Yes	Yes
Family characteristics[b]	No	Yes	No	Yes	Yes	Yes
Human capital measures[c]	No	Yes	No	Yes	Yes	Yes
AFQT, self-esteem, and attitude at interview	No	Yes	Yes	Yes	Yes	Yes
Residence characteristics[d]	No	Yes	Yes	Yes	Yes	Yes
Work history[e]	No	Yes	No	Yes	Yes	Yes

Notes: Standard errors in parentheses are robust to the nonindependence of observations at the respondent level. Column 1, model with no controls; column 2, model with full set of controls; column 3, model with controls for highest grade completed and work experience omitted. Columns 4, 5, and 6 report estimates from specifications identical to that in column 2 when the sample is restricted to respondents who had never been unemployed when interviewed in 1979 (column 4), respondents who had been unemployed for six weeks or less when interviewed (column 5), and the first observation from each respondent (column 6). AFQT, 1980 Armed Forces Qualifying Test.

[a]Demographic controls include male, black, and Hispanic indicators and the mother's highest educational grade completed.

[b]Family characteristics include an indicator for married and the number of members of the respondent's family.

[c]Human capital measures include highest grade completed and number of weeks of work experience.

[d]Regional controls include dummies for region of residence (South, Northeast, and West), an indicator for whether the respondent's residence is urban or rural, and the local unemployment rate.

[e]The work history controls include weeks ever spent unemployed, weeks spent unemployed when interviewed, weekly unemployment insurance receipts, and prior membership in a union.

***Significant at 1%, ** significant at 5%, * significant at 10%.

to the 1979 interview and these unemployment experiences affected their Rotter scores, then locus-of-control scores may be correlated with this unobserved heterogeneity. In column 4, I restrict the sample to observations from respondents who had not experienced unemployment prior to the 1979 interview. While this restriction eliminates almost half of my sample, the estimated coefficient of locus of control (0.010) is statistically indistinguishable from that in column 2.

Dynamic selection may influence my estimates if respondents who were unemployed for long periods because of some unobserved characteristic(s) were more likely to be interviewed while unemployed and if this unobserved heterogeneity is correlated with locus of control. Caliendo et al. avoided this selection issue by using a random sample of newly unemployed workers. Even though mine is not a random sample of the newly unemployed, I can restrict my sample to respondents who had been unemployed for six weeks or less when interviewed. The estimate in column 5 (0.016) is similar to that in column 2 and nearly identical to that obtained by Caliendo et al. Similarly, some respondents contributed more observations than others, and this may pose a problem if respondents who were more frequently observed to be unemployed differed in some unobserved way that affected their search behavior and if this heterogeneity is correlated with locus of control. In column 6, I restricted the sample to the first observation contributed by every respondent and obtained an estimated coefficient of locus of control of 0.013. The estimates in column 5 and 6 suggest that, if anything, these sample-selection and composition problems lead to underestimates of internality's relationship to reservation wages.

Search Intensity

To test the prediction that internality and search intensity are positively related, I estimated using OLS the search intensity model

$$s_{it} = \alpha^s l_i + X_{it}\beta^s + \varepsilon^s_{it},$$

where s_{it} is the number of hours respondent i spent searching in the last week of looking for work. Panel B of Table 2 reports the coefficient estimates for locus of control from different specifications of the search intensity model. Because respondents were only asked about their time spent looking for work in 1981, this sample is small, and the resulting estimates are imprecise. Although never precisely estimated, internality is positively correlated with the number of hours spent looking for work, as the model predicts in columns 1–3. In a sample in which respondents reported spending just 6.4 hours per week searching for employment, a one standard deviation increase in internality is associated with an estimated increase of 0.35 hour of search without other controls in column 1, 0.42 hour with all controls in column 2, and 0.50 hour with all but the controls potentially influenced by locus of control in column 3. By contrast, search hours are negatively correlated with cognitive ability (−0.99) but positively correlated with ASVAB coding scores (conscientiousness) and respondents' attitudes (cooperativeness).

Column 4, again, reports the estimated coefficient of locus of control when the sample is restricted to respondents who had never been unemployed when interviewed in 1979. This restriction reduced the sample to 128 respondents, and internality and search hours are uncorrelated in this subsample of observations. Likewise, internality and search hours are uncorrelated when I restricted the sample to the 215 respondents who had been

unemployed for six weeks or less when interviewed in 1981 (column 5). Whether this is due to the extremely small samples after imposing these restrictions or to unobserved heterogeneity is unclear. The estimates are too imprecise for us to draw conclusions from, but the positive correlation between search hours and internality in columns 1–3 is consistent with the positive correlation between internality and search intensity observed in Kanfer et al.'s (2001) meta-analysis, Caliendo et al.'s (forthcoming) finding that more-internal searchers submit more job applications, and McGee and McGee's (2011) finding that internality is positively correlated with search effort in the laboratory.

Like Caliendo et al. (forthcoming), I examined whether locus of control affects job search differently for men and women. Also like those authors, I am unable to reject the hypothesis that locus of control is related to search behavior in the same way for men and women in every specification reported in the study; also like those authors, I note that the coefficient estimates indicate that locus of control may be unrelated to search effort for women. Whereas a one standard deviation increase in internality is associated with a 0.81 hour increase in search hours for men, the same increase is associated with a −0.29 hour decrease for women. This small sample precludes inferring that a gender difference exists, but future investigation of potential gender differences in the roles of locus of control and other psychological factors seems warranted.

Exit Rate from Unemployment

To examine the relationship between internality and the exit rate from unemployment, I estimated using maximum likelihood a proportional hazard function of the form

$$\lambda_i(t) = \theta_i \lambda_0(t) \exp[f(l_i) + X_i \beta^h]$$

where $\lambda_0(t)$ is the baseline hazard, θ_i is the unobserved individual heterogeneity independent of the other covariates, and the other controls are identical to those used in the reservation-wage and search-intensity samples.[11] I estimated the model using a flexibly parametric baseline hazard that estimates the baseline hazard in each of 24 six-week periods. I assume θ_i is drawn from a gamma distribution with mean 1; the log-likelihood function for this specification of the hazard function is given in Meyer (1990).

The model predicts that an increase in internality will increase an individual's reservation wage and search intensity—effects that work in opposite directions where the exit rate from unemployment is concerned. Because there is no reason to expect these offsetting effects to result in a linear

[11] I excluded from X_{it}, the number of weeks a respondent was unemployed when interviewed and the total weeks of prior unemployment experience because these are mechanically related to the unemployment duration. I also exclude unemployment insurance (UI) benefits because UI benefits cannot be determined for weeks other than the interview week. The estimates are not sensitive to these exclusions.

relationship between internality and the exit rate from unemployment, in Table 3 I report the estimated hazard ratios for locus of control in which locus of control enters linearly (column 1), as part of a quadratic (column 2), and as part of a cubic (column 3).[12] The estimates imply that a one standard deviation increase in internality is associated with predicted increases in the probability of exiting unemployment conditional on having been unemployed for 12 weeks ranging from 0.5 percentage points in the linear specification to 0.9 percentage points in the cubic specification; however, none of these estimates is statistically significant. By contrast, one standard deviation increases in cognitive ability, conscientiousness, and cooperativeness are associated with predicted increases in the probability of exiting unemployment of 5.8, 2.2, and 2.3 percentage points, respectively, in column 1—effects that are precisely estimated. Whereas cognitive ability, personality and other noncognitive factors evidently matter to the duration of unemployment, the competing effects of locus of control on reservation wages and search intensity appear to offset each other where the exit rate from unemployment is concerned.

Alternative Roles for Locus of Control in Job Search Models

Locus of control influences re-employment wages (w_{it}^{next}) directly if employers pay for internality and indirectly through reservation wages. To illustrate, consider a simple, two-equation model:

$$\ln\left(w_{it}^{r}\right) = \gamma l_i + X_{it}\Gamma + \epsilon_{it}$$

$$\ln\left(w_{it}^{next}\right) = \theta l_i + X_{it}\Theta + \pi \ln\left(w_{it}^{r}\right) + \nu_{it}$$

I estimate the reduced-form log–reemployment wage model as

$$\ln\left(w_{it}^{next}\right) = b_1 l_i + X_{it}\mathrm{B} + e_{it}.$$

As a function of the structural parameters, the reduced-form coefficient of locus of control is $b_1 = \theta + \pi\gamma$. Reservation wages should be positively related to re-employment wages ($\pi > 0$), and the estimates in Table 2 (as well as the model) indicate that internality is positively related to reservation wages (i.e., $\gamma > 0$). Thus, the reduced-form estimate b_1 provides an upper bound on the direct effect of internality on the wages paid by employers to new hires (θ).

Table 4 reports the coefficient estimates for the re-employment wage model. Without other controls in column 1, a one standard deviation increase in internality is associated with an estimated increase in re-employment wages of 2.0%, but the estimated coefficient falls to 0.003 once the controls are added in column 2. Given that this near-zero estimate represents an

[12]Even more flexible specifications lead to similar conclusions.

Table 3. Estimates for the Proportional Hazard Model of the Probability of Exiting Unemployment

	Model variations		
Variable	*(1)*	*(2)*	*(3)*
Locus of control	1.023	1.023	1.065
	(0.331)	(0.344)	(0.082)
Locus of control^2		0.999	0.991
		(0.949)	(0.589)
Locus of control^3			0.986
			(0.142)
Number of observations	3,291	3,291	3,291
Log-likelihood	−7,826.09	−7,826.08	−7,825.00
Probability predictions			
(a) Probability of exiting unemployment between 12 and 16 weeks for an individual with average locus of control ($l = 0$)	0.265 (0.022)	0.266 (0.022)	0.267 (0.022)
(b) Probability of exiting unemployment between 12 and 16 weeks for an individual with locus of control one standard deviation higher than average ($l = 1$)	0.271 (0.022)	0.271 (0.023)	0.277 (0.023)
(b) − (a)	0.005	0.005	0.009
p-value of test of (b) = (a)	[0.335]	[0.492]	[0.240]
Controls			
Demographics[a]	Yes	Yes	Yes
Family characteristics[b]	Yes	Yes	Yes
Human capital measures[c]	Yes	Yes	Yes
AFQT, self-esteem, and attitude at interview	Yes	Yes	Yes
Residence characteristics[d]	Yes	Yes	Yes
Work history[e]	Yes	Yes	Yes

Notes: The table reports exponentiated coefficient estimates (hazard ratios). Column 1, locus of control in a linear expression; column 2, locus of control in a quadratic expression; column 3, locus of control in a cubic expression. The p values of the test of the equality of the coefficient estimate with zero are reported in parentheses. The predicted probabilities are evaluated at sample means and modes for the remaining regressors. AFQT, 1980 Armed Forces Qualifying Test.

[a]Demographic controls include male, black, and Hispanic indicators and the mother's highest educational grade completed.

[b]Family characteristics include an indicator for married and the number of members of the respondent's family.

[c]The human capital measures include highest educational grade completed and number of weeks of work experience.

[d]Regional controls include dummies for region of residence (South, Northeast, and West), an indicator for whether the respondent's residence is urban or rural, and the local unemployment rate.

[e]Work history controls include prior membership in a union.

***Significant at 1%, ** significant at 5%, * significant at 10%.

upper bound on the direct effect of internality on wages, one can conclude that either employers do not pay new hires for internality ($\theta \cong 0$) or that employers value externality in new employees ($\theta < 0$).[13] The latter may be the case if, for instance, external workers are viewed as more willing to take

[13]Internality's effect through reservation wages on re-employment wages may be small if reservation wages have little effect on re-employment wages (i.e., π is small), an effect that depends on the distribution of wages.

Table 4. Ordinary Least Squares Estimates for Log–Re-Employment Wage Model

	Model variations	
Variable	*(1)*	*(2)*
Locus of control	0.020***	0.003
	(0.006)	(0.006)
R^2	0.003	0.100
Number of observations	4,646	4,646
Controls		
Demographics[a]	No	Yes
Family characteristics[b]	No	Yes
Human capital measures[c]	No	Yes
AFQT, self-esteem, and attitude at interview	No	Yes
Residence characteristics[d]	No	Yes
Work history[e]	No	Yes
Completed duration of unemployment spell	No	Yes

Notes: Standard errors in parentheses are robust to the nonindependence of observations at the respondent level. Column 1, model with no controls; column 2, model with full set of controls. AFQT, 1980 Armed Forces Qualifying Test.

[a]Demographic controls include male, black, and Hispanic indicators and the mother's highest educational grade completed.

[b]Family characteristics include an indicator for married and the number of members of the respondent's family.

[c]The human capital measures include highest educational grade completed and number of weeks of work experience.

[d]Regional controls include dummies for region of residence (South, Northeast, and West), an indicator for whether the respondent's residence is urban or rural, and the local unemployment rate.

[e]Work history controls include number of weeks ever spent unemployed, number of weeks spent unemployed when interviewed, weekly unemployment insurance receipts, and prior membership in a union.

***Significant at 1%, ** significant at 5%, * significant at 10%.

direction, but the notion that externality is a skill valued by employers is difficult to square with the positive correlation between internality and reservation wages. By contrast, the respondent's highest grade completed, experience, and AFQT score are positively and significantly related to re-employment wages. That internality is unrelated to re-employment wages is surprising given that internality has been shown to be positively correlated with wages in general (Andrisani 1977, 1981; Osborne-Groves 2005). One possibility is that internal workers may pursue more aggressively opportunities for advancement or training once hired and enjoy larger returns to tenure as a result. Alternatively, more-internal workers may be more active in job searches while employed and experience larger wage gains from mobility than their less-internal peers. A study of whether the returns to tenure and mobility vary with psychological factors would be useful to shed light on these issues.

In the section on Other Roles for Locus of Control, I also discuss alternative job search models that could incorporate roles for locus of control. One possibility is that internal workers enjoy a comparative advantage in some occupations or industries and direct their search toward these industries and

occupations. If job seekers engage in this directed search, internality should be correlated with particular industries or occupations in which job seekers find employment. In Table 5, I add controls for the industry (column 1) and occupation (column 2) in which the respondents ultimately found employment to the log-reservation wage and search intensity models in column 2 of Table 2. The estimated coefficients of locus of control are virtually identical to those in Table 2, even though the coefficients of the industry and occupation dummies are statistically different from 0; this suggests that locus of control is uncorrelated with industry and occupation upon re-employment, in contrast to what one would expect in a directed search model. If internal workers hold out for higher wages only when directing their search toward industries or occupations in which they enjoy a comparative advantage, then more appropriate models of reservation wages and search hours include interactions between locus of control and the re-employment industry or occupation. In such specifications, however, I failed to reject the equality of the relationships of locus of control to reservation wages and search hours across re-employment industries and occupations (estimates available from the author).[14] On the whole, the estimates do not support the notion that internal workers direct their search toward particular industries or occupations.

Alternatively, internality might improve a searcher's efficiency using some job-search methods but not others. I examined whether internality is related to how job seekers spend their time by estimating the search intensity model in column 2 of Table 2 separately for hours spent contacting employers directly (column 3 of Table 5) and for hours spent using all other methods of looking for work (column 4). Although internality is unrelated to the number of hours a job seeker spends contacting employers directly—the search method to which job seekers devote the most time—internality is positively related to the number of hours job seekers spend on tasks such as contacting friends and relatives, looking in newspapers, and visiting employment agencies. The entire increase in search hours associated with a one standard deviation increase in internality reported in Table 2 appears to result from an increase in time spent using methods other than directly contacting employers.

What remains to be determined is whether internal job seekers spend more time searching using these other methods merely because they believe these methods to be more effective than do external job seekers (as in the section on the Structure of the Model) or because they actually are better at converting search hours into job offers. To examine this issue, I estimated a linear probability model of the probability of receiving a job offer conditional on the number of search hours:

$$\Pr\left(Offer = 1 | s_i\right) = \alpha^p l_i + \delta_0 s_i + \delta_1 s_i \cdot l_i + \varepsilon_i^p .$$

If $\delta_1 > 0$, then internal workers are more effective at converting search hours into job offers.

[14] I also estimated multinomial logit models and found no significant relationships between locus of control and the probability of finding employment in any particular industry or occupation.

Table 5. Additional Specifications of the Log-Reservation Wage and Search Hour Models

	Model variations			
	(1)	*(2)*	*(3)*	*(4)*
A. Reservation wage model				
Variable	Dependent variable: Log-Reservation wage			
Locus of control	0.011***	0.010***		
	(0.004)	(0.004)		
R^2	0.157	0.159		
Number of observations	5,615	5,615		
B. Search intensity model				
Variable	Dependent variable			
	Total search hours in the previous week		Hours spent directly contacting employers	Hours spent using all other search methods
Locus of control	0.426	0.451	−0.064	0.482
	(0.519)	(0.508)	(0.200)	(0.400)
R^2	0.105	0.102	0.091	0.071
Number of observations	386	386	386	386
Controls				
Demographics[a]	Yes	Yes	Yes	Yes
Family characteristics[b]	Yes	Yes	Yes	Yes
Human capital measures[c]	Yes	Yes	Yes	Yes
AFQT, self-esteem, and attitude at interview	Yes	Yes	Yes	Yes
Residence characteristics[d]	Yes	Yes	Yes	Yes
Work history[e]	Yes	Yes	Yes	Yes
Industry when re-employed	Yes	No	No	No
Occupation when re-employed	No	Yes	No	No

Notes: Standard errors in parentheses are robust to the nonindependence of observations at the respondent level. Column 1, full controls with industry in which found employment added; column 2, full controls with occupation in which found employment added; column 3, hours spent contacting employers directly; column 4, hours spent using all other methods of looking for work. AFQT, 1980 Armed Forces Qualifying Test.

[a]Demographic controls include male, black, and Hispanic indicators and the mother's highest educational grade completed.

[b]Family characteristics include an indicator for married and the number of members of the respondent's family.

[c]Human capital measures include highest educational grade completed and number of weeks of work experience.

[d]Regional controls include dummies for region of residence (South, Northeast, and West), an indicator for whether the respondent's residence is urban or rural, and the local unemployment rate.

[e]Work history controls include number of weeks ever spent unemployed, number of weeks spent unemployed when interviewed, weekly unemployment insurance receipts, and prior membership in a union.

***Significant at 1%, ** significant at 5%, * significant at 10%.

Table 6. Estimates from Linear Probability Models of the Probability of Receiving a Job Offer

	Model variations			
Variable	*(1)*	*(2)*	*(3)*	*(4)*
Search hours	0.008***		0.008***	
	(0.002)		(0.002)	
Directed search hours		0.011*		0.010
		(0.006)		(0.006)
Nondirected search hours		0.007**		0.008**
		(0.003)		(0.003)
Locus of control score			0.029	0.028
			(0.026)	(0.026)
Locus of control score × Search hours			−0.004	
			(0.002)	
Locus of control score × Directed search hours				−0.003
				(0.006)
Locus of control score × Nondirected search hours				−0.004
				(0.003)
R^2	0.028	0.029	0.034	0.034
Number of observations	386	386	386	386
Controls				
Demographics	No	No	No	No
Family characteristics	No	No	No	No
Human capital measures	No	No	No	No
AFQT, self-esteem, and attitude at interview	No	No	No	No
Residence characteristics	No	No	No	No
Work history	No	No	No	No

Notes: Standard errors in parentheses are robust to the nonindependence of observations at the respondent level. Column 1 controls only for number of hours spent looking to work; column 2 allows the returns to time spent directly contacting employers and time spent using other search methods to differ; column 3 allows the return to total search hours to depend on the respondent's locus of control; column 4 allows the returns to time spent directly contacting employers and time spent using other search methods to depend on locus of control.
***Significant at 1%, ** significant at 5%, * significant at 10%.

Table 6 reports the coefficient estimates for different specifications of this linear probability model. Column 1 controls only for the number of hours spent looking for work. Each hour spent searching is associated with an estimated increase in the probability of receiving an offer by 0.8 percentage points. Column 2 allows the returns to time spent directly contacting employers and time spent using other search methods to differ. The estimated return to directly contacting employers is considerably higher than (although not statistically different from) that of other search methods—which perhaps explains why this was the search method to which respondents devoted the most time. Column 3 allows the return to total search hours to depend on the respondent's locus of control, and column 4 allows the returns to time spent directly contacting employers and time spent using other search methods to depend on locus of control. In both columns 3 and

4, the interactions between locus of control and time spent looking for work are negative.[15] Internal searchers do not appear to enjoy a comparative advantage in their ability to convert time spent looking for work into job offers, both overall and for particular search activities.[16]

That internal job seekers spend more time doing things other than directly contacting employers, even though they appear to be no better at converting this time into job offers than other searchers, suggests either that these job seekers (incorrectly) believe the returns to these activities to be higher than do more-external job seekers or that they find these tasks less taxing. The absence of a measure of search costs in my data leaves me unable to rule out the possibility that internal job seekers experience lower costs of job search. McGee and McGee (2011), however, reported results from a lab experiment in which subjects produced "offers" by exerting real effort. In one treatment, subjects knew the return to this effort, whereas in the other, subjects had no such information. They found that locus of control is positively correlated with effort and reservation wages only when subjects were not informed about the return to effort, which is inconsistent with locus of control affecting search through effort costs, given that the nature of the effort exerted was the same in both treatments.

Another possibility that my study cannot address is that the estimated effects of locus of control might result from its correlation with economic preferences and personality traits unobserved in my data (Becker et al. 2012). McGee and McGee (2011) and Caliendo et al. (forthcoming), however, showed that the relationships between locus of control and reservation wages and search effort are robust to controlling for risk preferences and personality traits.[17]

Conclusion

I have considered here how locus of control influences the reservation wages and search intensity of unemployed job seekers. In the model, internal job seekers, who believe that outcomes depend on their own efforts, are more likely to believe that their search effort will translate into a job offer than are external job seekers, who believe that outcomes have little to do with their efforts. As a result, internal job seekers search more intensively

[15]The estimates in Table 6 are robust to the inclusion of the full set of controls (X_i).

[16]A potential explanation for this finding is that the actual search technology—in contrast to the model presented in the section Structure of the Model—exhibits diminishing marginal productivity of search hours. In this case, the average (and marginal) search productivity for internal job seekers would be lower than for other searchers because internal job seekers spend more time searching. Specifications with nonlinear functions of search hours, however, indicate that the probability of having received an offer is, if not a linear function, then a convex function of search hours.

[17]Measures of risk and time preferences were first collected in the NLSY79 in 1993 and 2006, respectively. I do not control for these measures given that they were observed long after the unemployment spells in my sample ended, but the estimated relationships between locus of control and reservation wages and search hours are robust to the inclusion of these controls (estimates available from the author).

than their external counterparts—but internal job seekers also set higher reservation wages because they believe offers are more likely conditional on their search effort. These predictions are mostly borne out in the NLSY79 data. Unlike other cognitive and noncognitive factors, locus of control is not systematically related to the probability of exiting unemployment—probably because of the competing nature of its effects on reservation wages and search intensity.

I have also considered the possibility that locus of control is simply correlated with factors affecting on-the-job or search productivity by estimating the relationships between locus of control and re-employment wages and the search technology. I find that more-internal workers earn no more than their peers upon being re-employed, despite internality's effect on reservation wages, indicating that internality is not a skill for which employers are willing to pay. Similarly, I find no evidence that internal searchers are better than their peers at converting search effort into offers. Internal searchers may *believe* themselves to be better searchers than their peers, but the data indicate that, in fact, they are not.

The findings suggest that searchers rely in part on their general locus of control when forming beliefs about the return to search effort. Because job seekers informed by their locus of control maximize their expected utility given their beliefs, interventions leading them to correctly assess the return to search effort would be welfare-enhancing. Counseling and mentoring programs that provide unemployed job seekers with information regarding the job market have the potential to reduce individuals' reliance on general locus-of-control beliefs and avoid miscalculations in choosing their search effort and reservation wages. Furthermore, locus-of-control beliefs may be used by unemployment assistance programs to identify job seekers at risk of becoming discouraged and to tailor their assistance, with internal individuals being encouraged to not hold out for perfect jobs when acceptable jobs will do and external individuals being assisted in using job search methods beyond directly contacting employers.

Appendix A

Proposition

Let the subjective beliefs regarding the probability of getting a job offer conditional on search effort s and locus of control l be given by $g^E(s \mid l)$, where $g_s^E \geq 0$ and $g_l^E \geq 0$. It follows that $\frac{\partial w_r}{\partial l} \geq 0$. Assume as in the model that $g^E(s \mid l) = \hat{a}(X_i) + \hat{b}(X_i)ls$. It follows that $\frac{\partial s}{\partial l} \geq 0$ whenever $s > 0$. The comparative static with respect to the exit rate from unemployment depends on functional form choices, beliefs, and the distribution of wage offers.

Proof

The steady-state reservation wage and search intensity satisfy the following equations:

(1) $$c'(s) = \frac{\beta g_s^E(s \mid l)}{1-\beta} Q$$

(2) $$w_r = m - c(s) + \frac{B g^E(s \mid l)}{1-\beta} Q$$

where $Q = \int_{w_r}^{\infty} (w - w_r) f(w) dw$ and $\frac{\partial Q}{\partial l} = (F(w_r) - 1) \frac{\partial w_r}{\partial l}$.

Taking the derivative of Equation (2) with respect to l yields

(3) $$\frac{\partial w_r}{\partial l} = -c'(s)\frac{\partial s}{\partial l} + \frac{\beta g_s^E(s \mid l)}{1-\beta} Q \frac{\partial s}{\partial l} + \frac{\beta g_l^E(s \mid l)}{1-\beta} Q + \frac{\beta g^E(s \mid l)}{1-\beta} (F(w_r) - 1) \frac{\partial w_r}{\partial l}$$

From Equation (1), the first two terms on the right-hand side of Equation (3) are 0. The first part of the proposition follows directly from the assumption that $g_l^E \geq 0$.

Taking the derivative of Equation (1) with respect to l yields

(4) $$c''(s)\frac{\partial s}{\partial l} = \frac{\beta g_{ss}^E}{1-\beta} Q \frac{\partial s}{\partial l} + \frac{\beta g_{sl}^E}{1-\beta} Q + \frac{\beta g_s^E}{1-\beta} \frac{\partial Q}{\partial l}$$

The sign of $\frac{\partial s}{\partial l}$ will depend on the sign of the expression $(g_{sl}^E Q + g_s^E \frac{\partial Q}{\partial l})$, which depends on the functional form of g^E. Letting $g^E(s \mid l) = \hat{a}(X_i) + \hat{b}(X_i) ls$ and taking the derivative of Equation (1) with respect to l yields

(5) $$c''(s)\frac{\partial s}{\partial l} = \frac{\beta \hat{b}(X_i)}{1-\beta} Q + \frac{\beta \hat{b}(X_i) l}{1-\beta} \frac{\partial Q}{\partial l}$$

Given the functional form of g^E,

$$\frac{\partial w_r}{\partial l} = \frac{\beta(\hat{a}(X_i) + \hat{b}(X_i) ls)}{1-\beta} (F(w_r) - 1) \frac{\partial w_r}{\partial l} + \frac{\beta \hat{b}(X_i) s}{1-\beta} Q$$

which implies that

$$\frac{\partial w_r}{\partial l} + \frac{\beta \hat{a}(X_i)}{1-\beta}(1 - F(w_r)) \frac{\partial w_r}{\partial l} = \frac{\beta \hat{b}(X_i) ls}{1-\beta} (F(w_r) - 1) \frac{\partial w_r}{\partial l} + \frac{\beta \hat{b}(X_i) s}{1-\beta} Q \geq 0$$

We can make a substitution on the right-hand side of Equation (5), giving

$$c''(s)\frac{\partial s}{\partial l} = \frac{\frac{\partial w_r}{\partial l} + \frac{\beta a(X_i)}{1-\beta}(1-F(w_r))\frac{\partial w_r}{\partial l}}{\hat{s}} \geq 0$$

whenever $s > 0$. Because by assumption $c''(s) > 0$, it follows that $\frac{\partial s}{\partial l} > 0$.

The last part of the proposition follows directly from the definition of the per period exit rate from unemployment, given by

$$h(s^*, w_r) = \Pr(Offer = 1 \mid s^*)\Pr(w \geq w_r) \tag{6}$$

Taking the derivative of Equation (6) with respect to l yields

$$\frac{\partial h(s^*, w_r)}{\partial l} = \frac{\partial h(s^*, w_r)}{\partial s^*}\frac{\partial s^*}{\partial l} + \frac{\partial h(s^*, w_r)}{\partial w_r}\frac{\partial w_r}{\partial l}$$

Given that $\frac{\partial h(s^*, w_r)}{\partial s^*} > 0$ and $\frac{\partial h(s^*, w_r)}{\partial w_r} < 0$, the sign of $\frac{\partial h(s^*, w_r)}{\partial l}$ will depend on the functional-form choices, beliefs, and the distribution of wage offers.

Appendix B

Abbreviated Four-Item Rotter Internal–External Locus of Control Scale

A. What happens to me is my own doing.
B. Sometimes I feel that I don't have enough control over the direction my life is taking.

A. When I make plans, I am almost certain that I can make them work.
B. It is not always wise to plan too far ahead because many things turn out to be a matter of good or bad fortune.

A. In my case getting what I want has little or nothing to do with luck.
B. Many times we might just as well decide what to do by flipping a coin.

A. Many times I feel that I have little influence over the things that happen to me.
B. It is impossible for me to believe that chance or luck plays an important role in my life.

Appendix C

Table C.1. Supplementary Coefficient Estimates

	Dependent variable			
Variable	*(1) Reservation wage*	*(2) Search hours*	*(3) Exit rate from unemployment*[a]	*(4) Re-employment wage*
AFQT score	0.004	−0.878	1.249	0.014◊
	(0.006)	(0.736)	[0.000]	(0.009)
Highest grade completed	0.020***	0.181	1.036	0.027***
	(0.003)	(0.384)	[0.042]	(0.005)
Work experience (weeks)	0.0007***	−0.002	1.002	0.0006***
	(0.00008)	(0.015)	[0.000]	(0.0001)
Race (1 if black)	0.010	2.152*	0.578	−0.016
	(0.011)	(1.286)	[0.000]	(0.016)
Ethnicity (1 if Hispanic)	−0.018 ◊	3.164**	1.027	−0.002
	(0.013)	(1.512)	[0.718]	(0.018)
Mother's highest grade completed	0.000	-0.047	1.018	−0.001
	(0.001)	(0.119)	[0.003]	(0.001)
Gender (1 if male)	0.095***	1.831*	1.016	0.121***
	(0.009)	(1.044)	[0.752]	(0.012)
Marital status (1 if married)	0.012	3.095*	0.949	0.026◊
	(0.010)	(1.641)	[0.469]	(0.017)
Family size	0.003◊	−0.366*	1.013	−0.004◊
	(0.002)	(0.202)	[0.236]	(0.002)
Rural/urban (1 if urban)	0.007*	1.093	1.043	−0.000
	(0.004)	(1.287)	[0.081]	(0.006)
County unemployment rate (%)	−0.010***	−0.222	0.944	−0.010***
	(0.001)	(0.201)	[0.000]	(0.002)
Weeks unemployed at interview date	0.0002	−0.021		−0.0007◊
	(0.0003)	(0.040)		(0.0004)
Weeks ever spent unemployed	−0.0008***	0.060**		−0.0001
	(0.0001)	(0.026)		(0.0002)
Unemployment insurance compensation ($/week)	0.0001**	5.050◊		0.0001
	(0.0001)	(3.162)		(0.0001)
Union (1 if in union in previous job)	0.036***	1.851	0.961	0.038**
	(0.013)	(1.414)	[0.583]	(0.017)
ASVAB coding test score	−0.001	0.822	1.099	0.010
	(0.005)	(0.636)	[0.002]	(0.008)
Attitude at interview	−0.007 ◊	0.476	1.101	−0.017***
	(0.004)	(0.485)	[0.000]	(0.006)
Self-esteem score	0.011***	−0.455	0.988	0.021***
	(0.004)	(0.495)	[0.627]	(0.006)

Notes: Robust standard errors are reported in parentheses, except for column 3, which reports *p*-values of the test of equality of the coefficient with 0 in brackets. Column 1 reports the estimates for the specifications in Table 2 (column 2, panel A), column 2 reports the estimates for the specifications in Table 2 (column 2, panel B), column 3 reports the estimates for the specifications in of Table 3 (column 1), and column 4 reports the estimates for the specifications in Table 4 (column 2). All regressions also included indicators for region of residence.

[a]Column 3 reports hazard ratios (exponentiated coefficients).

***Significant at 1%; ** significant at 5%; * significant at 10%; ◊ significant at 15%.

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