How the Perception of Control Influences Unemployed Job Search

Andrew McGee
Department of Economics
Simon Fraser University
amcgee@sfu.edu

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Abstract: I consider how locus of control—the degree to which one believes one's actions influence outcomes—is related to unemployed job search. I find 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.

I. Introduction

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 as 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 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 likely uncertain about the extent to which time spent looking for work affects the probability that they will find a job. When uncertain about this return to search effort, general beliefs about the connection between one's effort and outcomes in life—one's 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 to provide

customized assistance to unemployed job seekers in order 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 beliefs about the arrival rate of job offers conditional on search effort. The model predicts that a job seeker with an "internal" locus of control who believes his efforts *will* influence outcomes searches more than a job seeker with an "external" locus of control who believes his efforts have little effect on outcomes because the "internal" job seeker believes the return to search effort to be higher. Because the more internal job seeker expects more offers conditional on search effort than does his less internal counterpart, he also sets a higher reservation wage. 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 locus of control's role 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) find small positive correlations between internality and search activities among college students and teenage job seekers, respectively, while Saks and Ashforth (1999) and Feather and O'Brien (1987) find insignificant correlations in samples of college seniors and Australian youth. Kanfer, Wanberg, and

Kantrowitz (2001) perform a meta-analysis of existing studies and find a small but positive and statistically significant correlation between internality and search intensity. These studies, however, make no attempt to disentangle locus of control's effects from the effects of human capital. More importantly, 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 considering 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 reemployment wages as it would if employers value 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 the independent work by Caliendo, Cobb-Clark, and

Uhlendorff (2012), who find 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 using different methods to identify "internal" and "external" respondents. They also avoid the selection issues present in my sample by studying a sample of *newly* unemployed workers. Perhaps most importantly, Caliendo et al. find that internal job seekers believe each application submitted increases the 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 locus of control is related to search behavior in a lab experiment 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 so similar despite using different measures of locus of control and search intensity in samples from different populations, countries and time periods.

By modeling locus of control's effect on beliefs that in turn affect decision-making, the 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 model 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 papers examine empirically how beliefs

about the search process affect search behavior. Important exceptions include Anderson (1992), who finds that higher recall expectations reduce the hazard rate from unemployment, and Spinnewijn (2009), who finds that searchers overestimate the arrival rate of job offers independent of search effort.

In the context of educational attainment, Lundberg (2013) suggests that policy-makers adapt school environments to suit the personality traits students already possess given that the traits themselves may be difficult to alter. Like personality traits, attempts to influence locus of control beliefs may be ineffectual, and policy-makers whose objective is to reduce the ranks of the unemployed might wish to provide job seekers with 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, while 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) find evidence in the lab that external searchers are more likely to become discouraged and quit searching, suggesting that—if 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 the 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 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) show 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.

II. Model of Unemployed Job Search

A. 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 $s_t \leq \dfrac{1-a_i}{b_i}$ and $g_i(s_t) = 1$ 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.

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 $[0, \bar{l}]$ 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.

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[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) finds that individuals overestimate this baseline arrival rate.

The job seeker chooses 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 the worker is 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 the above reservation wage policy, the optimal s^* solves the first-order condition

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

An individual's expected lifetime utility depends on his 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.

B. Predictions

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

C. Other Roles for Locus of Control

The model assumes that locus of control affects unemployed 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 individuals 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 section IV.

Alternative models of job search are also possible. For instance, one might consider a directed search model in which internal individuals 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 similar to those in the model presented in section II.A.

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), and 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 as 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 as internal job seekers would (correctly) expect more offers conditional on any amount of time spent searching. In section IV, I discuss whether these alternative modeling assumptions find support in the data.

III. Data

A. Samples

The data come from the 1979 National Longitudinal Survey of Youth (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 have been interviewed annually between 1979 and 1994 and biennially thereafter, providing information on their families, backgrounds, educational attainment, and labor market experiences.

To maximize sample sizes, I use separate samples to estimate the relationships between locus of control and reservation wages, search intensity, the exit rate from unemployment, reemployment wages, and the productivity of search effort. All samples are 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 onwards and that locus of control is measured early in most respondents' labor market careers.

A respondent contributes a person-year observation to the reservation wage sample if when interviewed between 1979 and 1986 he/she was unemployed and reported a reservation wage. Respondents contribute multiple person-year observations if their unemployment spell spans multiple interviews or if they are interviewed in two distinct unemployment spells in this period. I drop 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 is 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

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

spent searching in the last week in which the respondent looked for work. The resulting sample, which is 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 are 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 upon completion of unemployment spells associated with observations in the reservation wage samples. Respondents contribute multiple person-year observations only if they were interviewed during separate unemployment spells in this period, and I also drop the top and bottom 1% of reemployment wages, resulting in a sample of 4,646 person-year observations from 3,157 respondents.[3]

B. 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]?" Asked of unemployed respondents who were looking for work or who had looked for work in the previous four weeks between 1979 and 1986, responses are converted to 1979 dollars using the consumer price index.

The search intensity measure sums the number of hours in the last week in which a

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[3] The sample is smaller than the reservation wage sample because some respondents are interviewed twice in a single (lengthy) unemployment spell, drop out of the survey before their reemployment wage can be observed, or are missing data on reemployment wages.

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 use responses concerning whether each 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 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, onwards.[4] I exclude 76 observations for which the calculated duration equals zero.[5] Approximately two percent of spell durations are right-censored because respondents drop out of the survey before their unemployment spell ends, and unemployment spells longer than 140 weeks are treated as if they are right-censored given the difficulty in estimating the baseline hazard in these periods.

Once unemployment spells are complete, respondents report wages with their new employers—the reemployment wage. Reemployment wages are also converted to 1979 dollars.

C. Independent Variables

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[4] Categories in the weekly status array also include cases in which out of the labor force versus unemployed cannot be determined and cases of employment with gaps in employment with the same employer when the dates of the gaps cannot be identified. When counting the weeks of unemployment, I include weeks when out of the labor force versus unemployment cannot be determined but not weeks associated with a period of employment with gaps. How one handles these ambiguous weeks does not affect the findings presented in the next section.

[5] Calculated duration can equal zero if the respondent indicated that they had looked for work in the previous four weeks but not in 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.

In the 1979 interview, respondents completed an abbreviated four-item version of Rotter's Internal-External Locus of Control Scale measuring *general* locus of control.[6] Each item consists of a pair of statements, 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 four when respondents indicate that the internal statement is "much closer" to their own views, three when this statement is only "slightly closer," two when the external statement is "slightly closer," and one 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.[7] I subtract birth year means to avoid confounding locus of control with age-at-test effects and divide by the standard deviation for all respondents to the NLSY79 (regardless of whether they are in my samples) to produce standardized locus of control scores.[8]

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, finds that labor market experiences have at most very small effects on measured locus of control using longitudinal data, while more recently Cobb-Clark and Schurer (2011) show using Australian data that locus of control is a mostly stable trait that largely does not respond to important life events. As such, I assume that locus of control measured in 1979 is representative

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[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 effort is the primary determinant of outcomes. This individual is internal in general, but is external in the context of a specific activity.

[7] All four paired statements are provided in Appendix B.

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

of locus of control in later periods. The potential for reverse causality is mitigated 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 score, the ASVAB coding test as a proxy for conscientiousness (Segal 2008), and the interviewers' assessments of the respondent's attitude.[9]

Additional controls for human capital include the respondent's highest grade completed and the number of weeks worked after the respondent turned 18 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, indicators for union membership in the previous job), differences in the opportunity costs of search (weekly unemployment insurance benefits, marital status, family size, whether the residence is urban), and differences in access to social and employment networks (race, gender, mother's highest grade completed). Finally, I include as additional covariates the total number of

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[9] I subtract birth year means and divide by the standard deviation of the full NLSY79 sample for the AFQT, self-esteem and 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 assign scores ranging from four for "friendly and interested" to one for "hostile." Interviewers, however, differ systematically in their perceptions of respondents' attitudes, so I subtract from the respondent's score the average score assigned by the interviewer, take the average of the respondent's interviewer-adjusted scores from 1979 and 1980, and divide by the sample standard deviation.

weeks the respondent had spent unemployed since entering the workforce as of the interview and the number of weeks unemployed in the current unemployment spell as of the interview.

D. Summary Statistics

Table 1 presents the summary statistics for the reservation wage sample and for the dependent variables in the remaining samples.[10] The average reservation wage deflated to 1979 dollars ($3.11) is approximately 7% higher than the 1979 minimum wage and $0.26 less than the average reemployment wage. Unemployed job seekers spend on average just 6.4 hours per week looking for work—75% of which time they devote 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 spend just over 30 weeks before finding work. In terms of the controls, the average locus of control, AFQT, self-esteem, coding, and interview attitude scores in the NLSY79 as a whole are zero by construction, implying that the respondents contributing observations to the reservation wage sample are more external, less cognitively able, have lower self-esteem, demonstrate less "conscientiousness," and were less cooperative when interviewed than the average NLSY79 respondent.

IV. Findings

A. Reservation Wages

To test the prediction that internality and reservation wages are positively related, I estimate by 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 his/her locus of control, X_{it} the controls described in the previous section, and ε_{it}^w the econometric error term. I correct the standard

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

errors in the reservation and reemployment wage regressions to reflect the non-independence of the error terms resulting from having multiple observations from some respondents.

The top panel 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. (2012) report.[11] 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 work experience by eighteen weeks, while 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 with human capital formation.

A potential problem is the fact 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 to the 1979 interview and these unemployment experiences affected their Rotter scores, then locus of control score may be correlated with this unobserved heterogeneity. In column 4, I restrict the sample to observations

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[11] The table in Appendix C reports coefficient estimates for the remaining controls for a selection of the regressions.

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 are unemployed for long periods because of some unobserved characteristic(s) are more likely to be interviewed while unemployed and if this unobserved heterogeneity is correlated with locus of control. Caliendo et al. avoid this selection issue by using a random sample of newly unemployed workers. While mine is not a random sample of the newly unemployed, I can restrict my sample to respondents who have 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, the fact that some respondents contribute more observations than others may pose a problem if respondents who are more frequently observed unemployed differ in some unobserved way that affects their search behavior and if this heterogeneity is correlated with locus of control. In column 6, I restrict the sample to the first observation contributed by every respondent and obtain 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 with reservation wages.

B. Search Intensity

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

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

where s_{it} is the number of hours respondent i spent searching in the last week of looking for work. The bottom panel 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 imprecise. Though 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 report 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 hours of search without other controls in column 1, 0.42 hours with all controls in column 2 and 0.50 hours 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 coding scores ("conscientiousness") and respondents' attitudes ("cooperativeness").

Columns 4 again reports the estimated coefficient of locus of control restricting the sample to respondents who had never been unemployed when interviewed in 1979. This restriction reduces 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 restrict the sample to the 215 respondents who had been unemployed for six weeks or less when interviewed in 1981 in column 5. Whether this is due to the extremely small samples after imposing these restrictions or unobserved heterogeneity is unclear. The estimates are too imprecise to draw conclusions from on their own, 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 finding that more internal searchers submit more job applications, and McGee and McGee's finding that internality is positively correlated with search effort in the laboratory.

Like Caliendo et al., I also 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, but also like those authors I note that the coefficient estimates indicate that locus of control may be unrelated to search effort for women. While 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. While this small sample precludes inferring that a gender difference exists, future investigation of potential gender differences in the roles of locus of control and other psychological factors seems warranted.

C. Exit Rate from Unemployment

To examine the relationship between internality and the exit rate from unemployment, I estimate by 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 unobserved individual heterogeneity independent of the other covariates, and the other controls identical to those used in the reservation wage and search intensity samples.[12] I estimate 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 one; the log-likelihood function for this specification of the hazard function is given in Meyer (1990).

The model predicts that increases in internality will increase an individual's reservation

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

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 relationship between internality and the exit rate from unemployment, table 3 reports 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).[13] 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, but 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 which are precisely estimated. While cognitive ability, personality and other noncognitive factors evidently matter to unemployment durations, 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.

D. 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 through reservation wages. To illustrate, consider a simple, two equation model:

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

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

I estimate the reduced-form log-reemployment wage model

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

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

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 ($\pi > 0$), while 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 reemployment wage model. Without other controls in column 1, a one standard deviation increase in internality is associated with an estimated increase in reemployment 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 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 ($\theta < 0$).[14] The latter may be the case if, for instance, external workers are viewed as more willing to take 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 search while employed and experience larger wage gains from mobility than their less

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[14] 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 which depends on the distribution of wages.

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.

Section III.C also discusses 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 respondent ultimately finds 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 while the coefficients of the industry and occupation dummies are statistically different from zero—suggesting 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 towards 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 re-employment industry or occupation. In such specifications, however, I fail to reject the equality of locus of control's relationships with reservation wages and search hours across re-employment industries and occupations (estimates available from the author).[15] On the whole, the estimates do not support the notion that internal workers direct their search towards particular industries or occupations.

Alternatively, internality might improve a searcher's efficiency using some job search

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[15] 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.

methods but not others. I examine 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). While 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, visiting employment agencies, and so on. 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 because they merely believe these methods to be more effective than do external job seekers (as in section II.A) or because they actually are better at converting search hours into job offers. To examine this issue, I estimate a linear probability model of the probability of receiving a job offer conditional on search hours:

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

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

Table 6 reports the coefficient estimates for different specifications of this linear probability model. Column 1 controls only for the number 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 (though not statistically different from) that of

other search methods—which perhaps explains why it is the search method to which respondents devote the most time. Column 3 allows the return to total search hours to depend on one's locus of control, while 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, the interactions between locus of control and time spent looking for work are negative.[16] 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.[17]

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 leave me unable to rule out the possibility that internal job seekers experience lower costs of job search. McGee and McGee (2011), however, report results from a lab experiment in which subjects produce "offers" by exerting real effort. In one treatment, subjects know the return to this effort, while in the other subjects have no such information. They find that locus of control is positively correlated with effort and reservation wages only when subjects are not informed about the return to effort, which is inconsistent with locus of control affecting search through effort costs given that the nature of

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

[17] A potential explanation for this finding is that the actual search technology—in contrast to the model in II.A—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.

the effort exerted is 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, Deckers, Dohmen, Falk, and Kosse 2012). McGee and McGee and Caliendo et al., however, show that the relationships between locus of control and reservation wages and search effort are robust to controlling for risk preferences and personality traits.[18]

V. Conclusions

I consider how locus of control influences the reservation wages and search intensity of unemployed job seekers. In the model, internal individuals 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 individuals who believe that outcomes have little to do with their efforts. As a result, internal individuals search more intensively than their external counterparts—but internal individuals also set higher reservation wages because they believe offers are more likely conditional on 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—likely because of the competing nature of its effects on reservation wages and search intensity

I also consider 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

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[18] 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 are observed long after the unemployment spells in my sample end, 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).

control and reemployment 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. While 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 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 not to hold out for perfect jobs where acceptable jobs will do and external individuals being assisted in using job search methods beyond directly contacting employers.

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Table 1: Summary Statistics

	Reservation wage sample	
Variable	Mean	Standard deviation
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
1 if black	0.41	
1 if Hispanic	0.16	
1 if male	0.53	
Mother's highest grade completed	9.40	4.61
1 if married	0.14	
Family size	4.26	2.33
1 if lives in South	0.38	
1 if lives in Northeast	0.17	
1 if lives in West	0.18	
1 if urban residence	0.59	
County unemployment rate (percent)	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 (UI) compensation ($ per week)	13.93	108.12
1 if previous job in union	0.11	
Residual 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	

	1981 search hours sample	
Variable	Mean	Standard deviation
Hours per week spent searching	6.44	9.17
Direct search hours	1.64	3.79
Non-direct search hours	4.81	7.47
Percentage receiving offers	0.24	
Number of individuals	386	

	Unemployment duration sample	
Variable	Mean	Standard deviation
Unemployment duration (in weeks)	30.77	39.07
Number of individuals	3,215	

	Reemployment wage sample	
Variable	Mean	Standard deviation
Reemployment wage (in 1979 dollars)	3.37	1.71
Number of observations	4,646	
Number of individuals	3,157	

Table 2: OLS estimates for log reservation wage and search hours models

Variable	(1)	(2)	(3)	(4)	(5)	(6)
	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
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	No	Yes	Yes	Yes	Yes	Yes
Family characteristics	No	Yes	No	Yes	Yes	Yes
Human capital measures	No	Yes	No	Yes	Yes	Yes
AFQT, self-esteem, and attitude at interview	No	Yes	Yes	Yes	Yes	Yes
Residence characteristics	No	Yes	Yes	Yes	Yes	Yes
Work history	No	Yes	No	Yes	Yes	Yes

Standard errors in parentheses are robust to the non-independence of observations at the respondent level. Demographic controls include male, black, and Hispanic indicators and the mother's highest grade completed. Family characteristics include an indicator for married and the number of members of the respondent's family. The human capital measures include highest grade completed and weeks of work experience. 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. The work history controls include weeks ever spent unemployed, weeks spent unemployed when interviewed, weekly unemployment insurance receipts, and prior membership in a union. Columns 4, 5 and 6 report estimates from specification identical to that in column 2 when the sample is restricted to individuals 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).
*** — significant at 1%   ** — significant at 5%   * — significant at 10%

Table 3: Estimates for the proportional hazard model of the probability of exiting unemployment

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
(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	Yes	Yes	Yes
Family characteristics	Yes	Yes	Yes
Human capital measures	Yes	Yes	Yes
AFQT, self-esteem, and attitude at interview	Yes	Yes	Yes
Residence characteristics	Yes	Yes	Yes
Work history	Yes	Yes	Yes

The table reports exponentiated coefficient estimates (hazard ratios). P-values of the test of the equality of the coefficient estimate with zero are reported in parentheses. Demographic controls include male, black, and Hispanic indicators and the mother's highest grade completed. Family characteristics include an indicator for married and the number of members of the respondent's family. The human capital measures include highest grade completed and weeks of work experience. 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. The work history controls include prior membership in a union. The predicted probabilities are evaluated at sample means and modes for the remaining regressors.

*** — significant at 1%   ** — significant at 5%   *   — significant at 10%

Table 4: OLS estimates for log reemployment wage model

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	No	Yes
Family characteristics	No	Yes
Human capital measures	No	Yes
AFQT, self-esteem, and attitude at interview	No	Yes
Residence characteristics	No	Yes
Work history	No	Yes
Completed duration of unemployment spell	No	Yes

Standard errors in parentheses are robust to the non-independence of observations at the respondent level. Demographic controls include male, black, and Hispanic indicators and the mother's highest grade completed. Family characteristics include an indicator for married and the number of members of the respondent's family. The human capital measures include highest grade completed and weeks of work experience. 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. 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%

Table 5: Additional specifications of the log-reservation wage and search hour models

Variable	(1)	(2)	(3)	(4)
	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		
	Dependent variable in columns 1-2: Total search hours in the previous week			
	Dependent variable in column 3: Hours spent directly contacting employers			
Variable	Dependent variable in column 4: 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	Yes	Yes	Yes	Yes
Family characteristics	Yes	Yes	Yes	Yes
Human capital measures	Yes	Yes	Yes	Yes
AFQT, self-esteem, and attitude at interview	Yes	Yes	Yes	Yes
Residence characteristics	Yes	Yes	Yes	Yes
Work history	Yes	Yes	Yes	Yes
Industry when re-employed	Yes	No	No	No
Occupation when re-employed	No	Yes	No	No

Standard errors in parentheses are robust to the non-independence of observations at the respondent level. Demographic controls include male, black, and Hispanic indicators and the mother's highest grade completed. Family characteristics include an indicator for married and the number of members of the respondent's family. The human capital measures include highest grade completed and weeks of work experience. 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. 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%

Table 6: Estimates from linear probability models of the probability of receiving a job offer

Variable	(1)	(2)	(3)	(4)
Search hours	0.008***		0.008***	
	(0.002)		(0.002)	
Direct search hours		0.011*		0.010
		(0.006)		(0.006)
Non-direct 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* Direct search hours				-0.003
				(0.006)
Locus of control score* Non-direct 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

*** — significant at 1%   ** — significant at 5%   * — significant at 10%

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 $g^E(s\,|\,l)$ where $g_s^E \geq 0$ and $g_l^E \geq 0$. It follows that $\dfrac{\partial w_r}{\partial l} \geq 0$. Assume as in the model that $g^E(s\,|\,l) = \hat{a}(X_i) + \hat{b}(X_i)ls$. It follows that $\dfrac{\partial s}{\partial l} \geq 0$ 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:

$$c'(s) = \frac{\beta g_s^E(s\,|\,l)}{1-\beta} Q \qquad\qquad (1a)$$

$$w_r = m - c(s) + \frac{Bg^E(s\,|\,l)}{1-\beta} Q \qquad\qquad (2a)$$

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

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

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

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

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

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

The sign of $\dfrac{\partial s}{\partial l}$ will depend on the sign of the expression $(g_{sl}^E Q + g_s^E \dfrac{\partial Q}{\partial l})$, which depends on the

functional form of g^E. Letting $g^E(s\,|\,l) = \hat{a}(X_i) + \hat{b}(X_i)ls$ and taking the derivative of (1a) with

respect to l yields

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

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 (5a) giving us

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

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

The last part of the proposition follows directly from the definition of the per period exit rate

from unemployment given by

$$h(s^*, w_r) = \Pr(\textit{Offer} = 1\,|\,s^*)\Pr(w \geq w_r) \qquad\qquad (6a)$$

Taking the derivative of (6a) 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 $\dfrac{\partial h(s^*, w_r)}{\partial s^*} > 0$ and $\dfrac{\partial h(s^*, w_r)}{\partial w_r} < 0$, the sign of $\dfrac{\partial h(s^*, w_r)}{\partial l}$ will depend on the

functional form choices, beliefs, and the distribution of wage offers. □

APPENDIX B

Abbreviated 4-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: Supplementary coefficient estimates

	Dependent Variable			
Variable	Reservation wage	Search hours	Exit rate from unemployment	Reemployment 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)
1 if black	0.010	2.152*	0.578	-0.016
	(0.011)	(1.286)	[0.000]	(0.016)
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)
1 if male	0.095***	1.831*	1.016	0.121***
	(0.009)	(1.044)	[0.752]	(0.012)
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)
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)
UI compensation ($/week)	0.0001**	5.050◊		0.0001
	(0.0001)	(3.162)		(0.0001)
1 if previous job in union	0.036***	1.851	0.961	0.038**
	(0.013)	(1.414)	[0.583]	(0.017)
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)

Column 3 reports hazard ratios (exponentiated coefficients). Robust standard errors are reported in parentheses except for column 3, which reports p-values of the test of equality of the coefficient with zero in brackets. From left to right, the columns report the estimates for the specifications in column 2 of table 2 (top panel), column 2 of table 2 (bottom panel), column 1 of table 3, and column 3 of table 4. All regressions also included indicators for region of residence.

*** — significant at 1%   ** — significant at 5%   * — significant at 10%   ◊ — significant at 15%