Locus of Control and Job Search Strategies

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Abstract

Standard job search theory assumes that unemployed individuals have perfect information about the effect of their search effort on the job offer arrival rate. In this paper, we present an alternative model which assumes instead that each individual has a subjective belief about the impact of his or her search effort on the rate at which job offers arrive. These beliefs depend in part on an individual's locus of control, i.e., the extent to which a person believes that future outcomes are determined by his or her own actions as opposed to external factors. We estimate the impact of locus of control on job search behavior using a novel panel data set of newly-unemployed individuals in Germany. Consistent with our theoretical predictions, we find evidence that individuals with an internal locus of control search more and that individuals who believe that their future outcomes are determined by external factors have lower reservation wages.

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1   Introduction

Standard job search theory assumes that unemployed individuals have perfect information about the effect of their search effort on the job offer arrival rate. In this paper, we present an alternative model which assumes instead that each individual has a subjective belief about the impact of his or her search effort on the rate at which job offers arrive. This subjective belief depends in part on individuals' 'locus of control', which is defined as a generalized expectancy about internal versus external control of reinforcement (Rotter, 1966). A person whose external locus of control dominates tends to believe that much of what happens is beyond his or her control. Life's outcomes are instead attributed to other forces, like fate or luck, rather than to ones own actions. In contrast, a person with an internal locus of control sees future outcomes as being contingent on his or her own decisions and behavior.

It is quite intuitive that people who believe that success in life largely depends on their own actions and efforts rather than on luck or other "external" forces in turn expect different returns to their own behavior—particularly with respect to investment decisions like educational choices—than individuals with a more external locus of control. Given this, it seems sensible to expect that locus of control will have an important effect on many economic outcomes and in particular, that internality will be positively correlated with economic success.

In fact, several empirical studies do conclude that locus of control is correlated with labor market success, in particular wages. An early example is Andrisani (1977, 1981) who examines National Longitudinal Survey data and finds that individuals with an internal locus of control in 1968 had significantly higher hourly wages two years later. Similarly, Osborne Groves (2005) analyzes data from the National Longitudinal Survey of Young Women and concludes that women with an internal locus of control earn more than women with an external locus of control. Semykina and Linz (2007) also find a positive association between the locus of control and wages for Russian women, though not for Russian men. The evidence from studies based on the Panel Study of Income Dynamics (PSID) is more mixed. For example Duncan and Morgan's (1981) replication study of Andrisani (1977) fails to produce evidence of a strong link between locus of control and wage rates[1], though Duncan and Dunifon (1998) find that an internal locus of control is positively related to wages some 20-25 years later. Using German data Anger and Heineck (2009) find a wage penalty for individuals with a high external locus of control.

Investment decisions also appear to be linked to individuals' locus of control. In particular, Coleman and Deleire (2003) conclude that locus of control affects education decisions primarily by influencing teenagers' expectations regarding the return to human capital investments.[2] Cebi (2007), however, is not able to replicate these results using a different data set once cognitive ability is controlled for. Still, the potential link between individuals' locus of control and their human capital investments raises questions about the extent

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[1] In a reply to this article Andrisani (1981) argues that Duncan and Morgan actually failed to disprove his results and cites several other studies that confirm his findings.

[2] Hansemark (2003) finds evidence for a positive impact of internal locus of control on the probability of starting a new business for men, but not for women.

to which locus of control affects wages directly via productivity versus indirectly through skills acquisition. Piatek and Pinger (2009), for example, conclude that locus of control affects wages only indirectly through the schooling decision. In contrast, Heckman et al. (2006) use indicators of self-esteem and locus of control to construct a one-dimensional, latent factor representing noncognitive skills. They find that noncognitive skills have both a direct wage effect (via productivity) and an indirect wage effect (via schooling and work experience).

In this paper we develop a job search model which incorporates individuals' subjective beliefs about the effect of their search effort on the job offer arrival rate. Specifically, individuals with an internal locus of control believe that job search is associated with a relatively large increase in the probability of finding a job, while those with an external locus of control believe that search has little effect on the job offer arrival rate. Unemployed individuals who believe that labor market success depends on their own efforts are consequently expected to search more and have higher reservation wages. Like Coleman and Deleire (2003), we contrast these predictions to those from an alternative model in which locus of control is viewed as a form of ability that has a direct impact on the productivity of the worker. In this alternative model, individuals with a more internal locus of control have a higher job arrival rate, independent of their search effort, because they are more able. They are expected to have higher reservation wages, but to search less.

To the best of our knowledge, there exist only two studies that assess the effect of locus of control on transitions from unemployment to employment.[3] Galloetal2003 and Uhlendorff (2004) analyze the German Socio Economic Panel (SOEP) and conclude that a higher sense of internal control is associated with a higher probability of reemployment and with shorter spells of unemployment, respectively.[4] Neither study is able to distinguish between the effect that locus of control, as a form of unobserved ability, has in directly affecting the probability of receiving a job offer and the role that locus of control might play in shaping expectations about the return to investments in job search.

We test the implications of our model by estimating the impact of an individual's locus of control on his or her search intensity and reservation wage using a novel panel data set of newly unemployed individuals in Germany. Specifically, our data are from the first wave of the IZA Evaluation Data Set (see Caliendo et al., 2009, for details). This data set is based on approximately 17,000 individuals who became unemployed between late 2007 and early 2008. The data are unique in providing us with detailed information about search behavior, reservation wages, social networks and different psychological traits including locus of control. The interviews were conducted approximately six weeks after entering unemployment. The data allow us to observe the impact of the locus of control on job search behavior directly and thereby to discriminate between different potential models of the mechanism through which locus of control affects job search. Additionally, all individuals are interviewed at the same point in time during their unemployment spell. This reduces the problem of potential reverse causality which is a particular challenge in

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[3]Job search strategies have been linked to workers' impatience, however (see Della Vigna and Paserman 2005).

[4]Uhlendorff (2004) finds this effect only for West Germany.

studies of the relationship between noncognitive skills and labor market outcomes.

Our results show that the marginal effect of an additional job application on individuals' propensity to report that they are very likely to get a job in the next period is higher among those job seekers with an internal locus of control. Moreover, individuals with a more external locus of control have lower reservation wages and search less intensively. Taken together, these results are consistent with locus of control affecting search behavior through individuals' subjective beliefs about the payoff to job search rather than simply through individuals' unobserved ability.

The outline of this paper is as follows. Section 2 presents the theoretical model, while Section 3 describes the data in detail. In Section 4, we present our estimation strategy and the results before Section 5 concludes.

2 Theoretical Framework

We begin by assuming that each unemployed individual searches sequentially for a job in a stationary environment. Job offers arrive for a given search effort s with arrival rate $\lambda(s)$. This arrival rate depends positively on individuals' search effort and the marginal return to search effort is decreasing (i.e. $\lambda' > 0$ and $\lambda'' < 0$). Job offers represent independent draws from a wage distribution $F(w)$ which is known by the unemployed. Each unemployed individual receives unemployment benefits b and and faces search costs $c(s)$ which are increasing in search effort (i.e. $c' > 0$ and $c'' > 0$).

Each time a job offer arrives, individuals must decide whether to accept the offer or to reject it and to search further. The optimal search strategy will rest in part on choosing a reservation wage, i.e. the wage at which the benefits of continued search are just equal to the additional search costs.[5] Any wage offer above the reservation wage is accepted, while any offer below the reservation wage is rejected.

2.1 Locus of Control and the Return to Search Effort

Unlike the standard search model, we assume that individuals do not know the exact relationship between their own search effort s and the job offer arrival rate $\lambda(s)$. Instead, we assume that each individual has a subjective belief—given by $(\lambda^*(s, loc))$—about the effect of s on λ which depends on the extent to which an individual has an internal locus of control (loc).[6] Individuals with an internal locus of control believe that increased search effort results in a relatively large increase in the job offer arrival rate. In contrast, individuals who feel that their own behavior does not influence future outcomes believe that additional search effort has little effect on the rate at which job offers arrive. In other words, $\frac{\partial \lambda^*(s, loc)}{\partial s}$ is assumed to be higher for those with a more internal locus of control than for those with a more external locus of control. Our objective is to adopt a straight-forward, parsimonious specification of the relationship between individuals' beliefs about

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[5]For a description of job search models see . Mortensen and Pissarides (1999) or Cahuc and Zylberberg (2004). An overview of the empirical research is given by Eckstein and van den Berg (2007).

[6]In other words, we measure locus of control such that higher values of loc are associated with a more internal locus of control.

the job arrival rate and the degree to which they have an internal locus of control which is consistent with this assumption. Consequently, we model individuals' subjective beliefs about arrival rates as $\lambda^*(s, loc) = \lambda(s)f(loc)$, with $f'(loc) > 0$.

If a job-seeker receives no job offer at time t, he or she continues searching. If, however, a job offer with wage w is received, he or she accepts that job offer so long as the corresponding discounted expected utility associated with being hired at that wage ($V_e(w)$) exceeds the discounted expected utility (V_u) of remaining unemployed and continuing to search. The reservation wage ϕ defines the "stopping rule" and corresponds to the wage offer for which $V_u = V_e(\phi)$ implying that every wage offer above ϕ will be accepted while every wage offer below ϕ will be rejected.

More specifically, the utilities associated with accepting a job offer and with continued search are given by the following:

$$V_e(w) = \frac{1}{1+rdt}[wdt + (1 - qdt)V_e(w) + qdtV_u] \tag{1}$$

$$V_u = \frac{1}{1+rdt}[(b - c(s))dt + \lambda(s)f(loc)dt(\int_0^\phi V_u dF(w) + \int_\phi^\infty V_e(w)dF(w)) \\ + (1 - \lambda(s)f(loc)dt)V_u] \tag{2}$$

where r is the real instantaneous rate of interest, dt describes a short interval of time t, and the job separation rate is q. The discounted expected utility of being hired is equal to the income received in the period (wdt) plus the discounted expected future income stream. With probability $(1 - qdt)$ this is $V_e(w)$ and with probability qdt this is V_u. The discounted expected utility of continuing to search is the net income $((b - c(s))dt)$ received in the period plus the discounted expected utility of receiving a future job offer. Together the discounted expected utilities associated with being unemployed (V_u) and with being hired at wage w ($V_e(w)$) implicitly define the reservation wage for a given search effort s. In particular, using equations (1) and (2) we can show that the reservation wage offer ϕ at which $V_u = V_e(\phi)$ is given by

$$\phi = b - c(s) + \frac{\lambda(s)f(loc)}{r+q}\int_\phi^\infty (w - \phi)dF(w). \tag{3}$$

Unemployed individuals choose both their search effort s and reservation wage ϕ so as to maximize their discounted expected utility V_u over an infinite horizon. Substituting the constraint that $V_u - V_e(\phi) = 0$ into this optimization problem, we can show that optimal search behavior is determined by the maximization of $V_u = \phi/r$ with respect to s. This implies that we can solve for the optimal search effort s^* by differentiating the relation (3) with respect to s and solving for the s^* such that $\partial\phi/\partial s = 0$. Specifically,

$$c'(s^*) = \frac{\lambda'(s^*)f(loc)}{r+q} \int_\phi^\infty (w - \phi)dF(w) \tag{4}$$

Equation (4) implies that individuals choose their optimal search effort by equating the marginal cost of job search with the marginal benefits associated with additional search, i.e. an increased probability of receiving a job offer paying more than their reservation wage.

Combining equations (3) and (4) we can solve for individuals' reservation wage at the optimal level of search s^* as follows:

$$\phi = b - c(s^*) + \frac{\lambda(s^*)}{\lambda'(s^*)}c'(s^*) \tag{5}$$

Reservation wages are increasing in unemployment benefits and the job offer arrival rate, but decreasing in the costs of job search. Finally, higher marginal search costs raise reservation wages, while reservation wages are lower the greater is the marginal effect of job search on the job offer arrival rate.

We now consider the effect that individuals' beliefs about the offer arrival rate have on their optimal search behavior. In particular, we are interested in the effect of a change in individuals' locus of control on ϕ and s^*. It can be shown that individuals who have a more internal locus of control, i.e. those who believe that their own efforts have relatively large effects on future outcomes, have higher reservation wages and search more intensively than those with a more external locus of control. Specifically, we find that

$$\frac{\partial \phi}{\partial loc} > 0 \quad \text{and} \quad \frac{\partial s^*}{\partial loc} > 0. \tag{6}$$

See Appendix B for details. The implications are quite intuitive. Conditional on search intensity, individuals with a highly internal locus of control expect more future job offers. For them remaining unemployed and waiting for new job offers has a higher expected utility, which leads to a higher reservation wage. For a given amount of search and a specific reservation wage, the subjective marginal returns of search are also higher for individuals with a highly internal locus of control. So, in order to equalize marginal returns and marginal costs of search, they search more.

For simplicity, the model is based on the assumption that the locus of control is stable over time, i.e., that the unemployment duration itself does not have any impact on $f(loc)$ and that individuals do not update their beliefs about the impact of their search effort on the probability of receiving a job offer. This simplifying assumption allows us to maintain tractability and focus attention on the key relationships of interest. In the empirical analysis, we analyze the effect of locus of control on job search behavior by comparing only individuals who are at the same point in the unemployment spell. Thus, our estimates are unaffected by any subsequent updating of beliefs as individuals' unemployment spells progress.

2.2 Locus of Control as a Measure of Ability

Thus far we have assumed that locus of control affects individuals' search behavior through their perceptions of the effect of job search on the probability of finding a job. Specifically, we have assumed that $\frac{\partial \lambda^*(s^*, loc)}{\partial s^*}$ is higher for those with a more internal locus of control than for those with a more external locus of control. In short, individuals with an internal locus of control have a higher subjective probability of receiving a job offer at any given level of search intensity because they believe the payoff to search is higher.

The predictions of this model can be compared to an alternative model in which locus of control is a component of overall ability. Individuals with an internal locus of control may simply be more productive and therefore have a higher expected probability of receiving a job offer, perhaps because they believe that potential employers can observe their locus of control by interviewing them.[7] We consider this possibility by specifying an alternative model in which the relationship between job offer arrivals and an individual's locus of control is given by $\lambda_a(s, loc) = \lambda(s) + f(loc)$ with $f'(loc) > 0$. In this case, individuals with an internal locus of control have a higher probability of receiving a job offer for any given search intensity because they are more productive.[8]

Consequently, our model in which an internal locus of control increases the offer arrival rate is equivalent to a model in which individuals who have an internal locus of control receive higher wage offers. In contrast to the above model, the expected effect of search on the probability of receiving a job offer is independent of an individuals' locus of control, i.e., $\frac{\partial \lambda_a(s, loc)}{\partial s} = \frac{\partial \lambda(s)}{\partial s}$.

Solving for the optimal search effort implies that

$$c'(s^*) = \frac{\lambda'(s^*)}{r+q} \int_\phi^\infty (w - \phi) dF(w). \tag{7}$$

Reservation wages are given by:

$$\phi = b - c(s^*) + \frac{\lambda(s^*)}{\lambda(s^*)'} c'(s^*) + \frac{f(loc)}{r+q} \int_\phi^\infty (w - \phi) dF(w). \tag{8}$$

Unlike the case when locus of control operates through beliefs about the payoff to additional search effort (see equation (4)), here an individual's locus of control affects his or her optimal search level only through the effect that it has on his or her reservation wage ϕ. Reservation wages are higher the more internal an individual's locus of control is because, for a given search effort s^*, the probability of receiving an acceptable job offer is higher. Given this framework, it can be shown that, in contrast to the previous model,

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[7]The implications are the same for a model in which individuals with an internal locus of control may simply be more able to generate a wage offer above their reservation wage because they search more effectively.

[8]Note that the probability of receiving a job offer above the reservation wage is given by: $(\lambda(s) + f(loc)) \int_\phi^\infty V_e(w) dF(w) = \lambda(s) \int_\phi^\infty (1 + \frac{f(loc)}{\lambda(s)}) V_e(w) dF(w)$.

when an internal locus of control results in a higher job offer arrival rate independent of the search effort, individuals with a more internal locus of control are expected to search less. Specifically, we find that

$$\frac{\partial \phi}{\partial loc} > 0 \quad \text{and} \quad \frac{\partial s^*}{\partial loc} < 0 \tag{9}$$

See Appendix B for details. The intuition behind the reservation wage result is the same as before. For a given search effort, remaining unemployed and waiting for new job offers has a higher expected utility for individuals with a highly internal locus of control leading them to have a higher reservation wage. In contrast to the previous model, here the marginal returns to search are independent of the locus of control. Instead, as a result of the higher reservation wage, the expected marginal returns to search evaluated at a given search intensity are lower for individuals with a highly internal locus of control. This leads to a lower optimal search intensity for them.

Having a more internal locus of control has an ambiguous effect on the length of time an individual spends being unemployed irrespective of the model considered. In particular, the expected unemployment duration is given by $T_u = 1/[\lambda(s^*)(1 - F(\phi)]$. Having a more internal locus of control increases the reservation wage in both models which tends to increase the duration of unemployment. When locus of control is related to subjective beliefs about the payoff to search, individuals with a highly internal locus of control search more, which leads to a higher job arrival rate and decreases the time spent in unemployment. In the simple ability model, those with an internal locus of control search less, but have a higher probability of receiving a job offer. Neither model implies a clear prediction on the impact of the locus of control on unemployment duration. This underscores the importance of observing job search behavior directly.

3 The IZA Evaluation Data Set

The data come from the IZA Evaluation Data Set which targets a sample of individuals entering unemployment between June 2007 and May 2008. In particular, from the monthly unemployment inflows of approximately 206,000 individuals identified in the administrative records, a 9 percent random sample is selected for interview. These individuals constitute the gross sample from which representative samples of approximately 1,450 individuals are interviewed each month, so that after one year 12 monthly cohorts are gathered. These survey data are then matched to administrative employment records. The IZA Evaluation Data Set is ideal for our purposes because individuals are interviewed shortly after they become unemployed and are asked a variety of non-standard questions

about attitudes and expectations including locus of control (see Caliendo et al., 2009, for details). Unlike other researchers, we are able to compare a large number of individuals with similar, short unemployment durations which reduces concerns about the potential for reverse causality to affect the analysis. Moreover, access to administrative data on employment histories (including previous wages, *what else?*) allows us to carefully control for differences in human capital endowments which affect individuals' reservation wages and the likelihood of receiving a job offer.

We restrict our sample to individuals who are 16 to 54 years old, and who receive or are eligible to receive unemployment benefits.[9] In wave 1, 17,396 interviews were completed with individuals begun an unemployment spell approximately two months earlier. We restrict our analysis to individuals who were still unemployed and actively searching for a job at the time of interview. That is, we exclude individuals who had already found a job or were not searching for other reasons. This leaves us with a preliminary estimation sample of 8,300 individuals from which we further exclude those individuals whose reported hourly reservation wages and benefit levels were in the lowest or highest percentile of the distribution. Finally, we exclude individuals with missing values for any key variables. This leaves us with an estimation sample of roughly 7,200 individuals.

3.1 Measuring Locus of Control

We measure an individual's locus of control using his or her responses to ten separate items from the Rotter (1966) scale. Locus of control refers to a general expectation about internal versus external control of reinforcement (Rotter, 1966). People with a more external locus of control believe that much of what happens in life is beyond their control, while people with an internal locus of control see life's outcomes as dependent on their own decisions and behavior. Psychologists argue that these beliefs are central to understanding a person's motivation and the way that he or she makes decisions and sets goals. Those with an external locus of control are more likely to avoid situations in which they feel unable to cope, while those with an internal locus of control tend to set higher goals, persevere in challenging situations, and be more likely to achieve successful outcomes (Strauser, Ketz, and Keim, 2002).

The ten separate items underlying the Rotter scale are summarized in Table 1. For each item respondents were asked to answer on a scale from '1: I do not agree at all' to '7: I fully agree'. As a first step in creating a measure of individuals' locus of control, we used factor analysis to identify the number of common factors underlying our ten items. Our factor analysis (see upper part of Figure 1) indicated that items 1, 6 and 9

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[9]To generate a claim for unemployment benefits workers have to be employed for at least 12 months in the last three years before entering unemployment.

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load onto one factor (interpretable as 'internal'), while items 2, 3, 5, 7, 8, and 10 load onto another factor (interpretable as 'external'). Item 4 did not load on to either factor and was discarded. We conducted a parallel factor analysis for a representative sample of respondents in the German Socio-Economic Panel (SOEP, see lower part of Figure 1). We found that these ten items load onto two factors in exactly the same way in the two samples indicating that our distinction between internal and external control is not specific to unemployed individuals, but rather is representative of the German population more generally. Consequently, we use this factorization to create separate indexes of internal and external locus of control. At the same time, our theoretical model is consistent with the early psychological literature in conceptualizing internal and external locus of control as being opposite ends of the same spectrum (see Rotter 1954). Moreover, Rotter (1975) argues that factor analysis in and of itself is not useful in identifying whether the true structure of locus of control is uni- or multi-dimensional. Therefore, we also construct a single index of locus of control which combines both the internal and external indexes.[10]

In a first step we standardize each item by subtracting the mean and dividing them by their standard deviation. In a second step we construct the corresponding average of the items. This gives us indexes with a mean 0 and a variance 1. In an alternative specification we make use of the factor loadings for constructing the indexes.

The distribution of each of these measures is given in Figure 2. In later analysis, we also use these indexes to distinguish people with an internal as opposed to an external locus of control. In each case, the threshold is set at approximately 50 percent of the distribution (indicated by a red line in Figure 2). In alternative specifications we compare the upper quartile with the lower quartile of the corresponding distribution.

<center>Insert Table 1 about here</center>
<center>Insert Figures 1, 2 about here</center>

Table 2 compares the demographic, human capital, and personality characteristics of individuals with an internal as opposed to external locus of control based on the joint index. Women, immigrants, married individuals, and older workers (especially those aged 45 - 54) are significantly more likely than others to believe that much of what happens in life is outside their control. Having higher educational attainment or having a relatively educated father, on the other hand, are both associated with a more internal locus of control. Interestingly, there also appears to be a relationship between personality traits and locus of control. Those with an internal locus of control report significantly higher

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[10]Piakek and Pinger (2009) also extract a single factor when measuring locus of control in the SEOP data.

<center>10</center>

levels of openness, conscientiousness, extraversion, and significantly lower levels of neuroticism. These differences imply that it will be important to carefully control for individual characteristics when evaluating the effects of locus of control on job search outcomes.

<div align="center">Insert Tables 2 about here</div>

One of the advantages of the IZA Evaluation Data Set is that we have detailed information about individuals' previous labor market experiences making it apparent that those with an internal locus of control have somewhat more favorable employment histories. Those with an internal locus of control, for example, are significantly less likely to have entered unemployment from employment (or subsidized employment) and are significantly more likely to have entered from education or other pathways. Since turning 18, those with an internal locus of control have spent on average 0.70 months per year in unemployment, while those with an external locus of control have spend 0.88 months per year being unemployed. Moreover, an internal locus of control is associated with significantly higher unemployment benefits indicating that the pre-unemployment wages of these individuals was higher. These relationships are consistent with previous evidence that having an internal locus of control is correlated with labor market success (Andrisani 1977, 1981; Osborne Groves 2005; Semykina and Linz 2007; Duncan and Dunifon 1998). Finally, individuals with an internal locus of control are significantly more likely to have access to a number of communication modes including mobile phones, computers, the internet, and e-mail. This, along with their advantaged employment history, is expected to facilitate job search.

Importantly, there are no significant differences across the two groups in either the month of entry into the sample or in the period between entry and first interview which is consistent with random sample selection.

3.2 Locus of Control and Job Search Behavior

Table 3 provides information about the reservation wages and search strategies for individuals in our sample. The results indicate that people with an internal locus of control have higher reservation wages and send out more job applications. In particular, those with an internal locus of control report a reservation wage of €7.74 on average, while those with an external locus of control have a reservation wage that is on average €0.38 lower. Individuals with an internal locus of control use slightly more search channels on average, though this effect is only marginally significant. Finally, individuals who believe that much of what happens in life is under their own control search more intensively sending out more than two (12.4 percent) additional applications on average than individuals who think that events are outside their control.

<div align="center">11</div>

Interestingly, individuals with an internal locus of control are more optimistic about their chances of finding a job in the next period despite having higher reservation wages. Fully, 56 percent of those with an internal locus of control report that it is very likely that they will take up a job, while only 42 percent of those with an external locus of control report the same. This degree of optimism is perhaps not surprising given that those with an internal locus of control also have more favorable job histories and are less likely to be in a disadvantaged labor market group, (i.e., women, migrants, low educated).

4 Estimation Approach and Results

Our interest is in understanding whether individuals' beliefs about the extent to which they control life's outcomes affect the way they search for jobs. We are particularly interested in understanding whether any effect of locus of control operates through individuals' perceptions of the return to their own search efforts or solely as a dimension of ability. Our strategy to discriminate between these two alternative explanations is twofold: First, we directly analyze the effect of locus of control on individuals' beliefs about the probability of receiving an acceptable job offer. This allows us to assess whether those with an internal locus of control do in fact perceive a higher return to their job search investments. Second, we formally test the empirical predictions of the two competing models discussed in Sections 2.2 and 2.3 using both OLS and propensity score matching methods.

4.1 The Probability of Finding a Job

Coleman and Deleire (2003) conclude that locus of control affects individuals' education decisions primarily by altering their expectations regarding the return to investments in human capital. If a similar process operates here, we should expect to see a relationship between a person's locus of control and the return that he or she expects from greater search effort. We test this by using probit regression to estimate the effect of search intensity (as measured by the number of applications submitted) on the likelihood that an individual believes the probability that he or she will receive an acceptable job offer is 'very high'[11] Our model includes controls for the number of applications submitted, one of two different indicators for whether or not the individual has an internal locus of control, and the interaction between them.[12] This interaction term allows the relationship

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[11]Probit estimation on the probability that an individual believes getting a job is 'likely' or 'very likely' and OLS estimation on all four response categories lead to very similar results.

[12]Specifically, we use two indicator variables to identify those with an internal locus of control using 1) the full index and 2) the internal index. Individuals are coded as having an internal locus of control on

between search intensity and the perceived pay off of job search (i.e., the probability of finding a job) to differ between those with an internal locus of control and those without. We then estimate the model separately with and without controls for other personality traits.[13]

The results in Table 4 show that the effect of an additional application on the belief that one is "very likely" to receive a job offer is significantly higher amongst those with an internal locus of control. In particular, the marginal effect of search intensity in terms of one additional application is between 0.1 (model 1) and 0.2 (model 2) percentage points higher for those individuals with an internal locus of control. These results are based on our full index which treats internal and external locus of control as opposite ends of the same spectrum. When we control for individuals' internal and external locus of control separately (see models 3 and 4), we find that the marginal effect of additional search on the probability of getting a job continues to be 0.1 percentage point higher for those with a highly internal locus of control. Moreover, the marginal effect of additional search on the reemployment probability is 0.1 percentage point lower for those with a highly external locus of control. Having an internal locus of control therefore appears to be associated with the belief that there is a higher return to investments in job search in terms of reemployment probability. This suggests that locus of control may influences economic decisions by affecting the perceived returns to various sorts of human capital investments. Individuals, however, simultaneously choose their search effort and their reservation wage both of which impact on the expected probability of finding an acceptable job. Consequently, this analysis – while suggestive – does not allow to test the different implications of the two models directly. We turn to this issue below.[14]

4.2 Reservation Wages and Search Intensity

4.2.1 OLS Estimation

We begin by using OLS regressions to estimate the effect of alternative locus of control measures on both reservation wages and the number of applications that each individual

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these measures if they score higher than average on the corresponding standardized index. The full index is used in models 1 and 2, while models 3 and 4 control for internal and external locus of control separately.

[13]The model also includes controls for demographic characteristics, human capital endowments, and previous employment histories.

[14]It is also interesting that, in models 1 and 2, the overall number of applications submitted is negatively related to the probability that an individual believes finding a job is very likely. This seems to point to some reverse causality highlighting the correlational nature of the estimates. Full results are available upon request.

has submitted. Using OLS allows us to include our internal and external indexes separately, but restricts us to controlling for differences in other characteristics in a linear, parametric way. We consider two specifications: one without and one with controls for other personality traits. Tables 5 AND 6 summarize the OLS results

INSERT TABLE 5 ABOUT HERE

We find that reservation wages increase as individuals' locus of control becomes more internal everything else equal (see Table 5). Specifically, a one standard deviation increase in the extent to which an individual has an internal locus of control is associated with a 1.3 - 1.9 percent increase in his or her reservation wage. It is important to note that this effect is highly significant and is net of a number of other variables (e.g. human capital characteristics, employment history, etc.) which serve to control for disparity in individuals' ability. Inclusion of the external and internal indexes separately makes it clear that this overall effect is mainly driven by the degree to which one believes that he or she is unable to control future outcomes (i.e., has a relatively strong external locus of control). Specifically, a standard deviation increase in the extent to which one has an external locus of control is associated with a 2.3 percent decrease in reservation wages. This effect becomes becomes somewhat smaller (-1.9 percent)—once we control for an individual's personality traits. Contrary to expectations, once we control for personality traits, the extent to which an individual has an internal locus of control is also associated with a small, but significant, reduction in reservation wages (see model 4).

INSERT TABLE 6 ABOUT HERE

Individuals with a more internal locus of control also search for jobs more intensively (see Table 6). Each standard deviation increase in the degree to which an individual sees life's events as under his or her own control results in the submission of 0.9 additional job applications. Unlike the case of reservation wages, this effect is driven by the degree to which has an internal locus of control. When both the internal and external indexes are included as separate factors (rather than opposite ends of the same scale) we find that a one standard deviation increase in the internal index is associated with the submission of an additional 1.5 applications. As before, the magnitude of the locus of control effect falls once we control for personality traits indicating a correlation between an individual's locus of control and dimensions of his or her personality. Although the overall index remains positive, it is no longer significant. The internal index, however, continues to have a large, positive effect on the number of job applications submitted.

4.2.2 Propensity Score Matching

In order to improve the efficiency and precision of our estimates we also apply propensity score matching (PSM) to assess the impact of the locus of control on job search behavior. The basic idea of applying PSM in this context is to make internal and external individuals as comparable as possible in all other characteristics and then compare their differences in search behavior.

In order to do so we use the three indexes defined above and separate individuals for each index in a 'internal' and 'external' group (according to the threshold defined in Table 1). Than we estimate logit models of the probability of belonging to the 'internal' group (see Table A.1 in Appendix A). Once again we use two specifications; one with (specification 3) and one without (specification 4) other personality traits. In order to focus on the effect of locus of control we need to include as many relevant variables as possible. Besides socio-demographic information we also include human capital, personality characteristics and intergenerational variables (in analogy to our OLS estimation in Tables 5 and 6). Based on these estimations we predict the propensity scores (i.e., the probability of having an internal locus of control) and use them for the further matching process. Figure A.1 shows the distribution of the propensity scores in the different groups. For example, the first row shows the PS-distribution based on the full index. Individuals who are more internal are depicted in the upper half, individuals who are more external are depicted in the lower half. Looking at specification 4 shows, that the distribution in both groups is quite similar. However, if we include other personality traits the distribution gets more unequal. This highlights the importance of respecting the common support region, i.e. only comparing 'comparable' individuals.

<div align="center">Insert Table 7 about here</div>

Matching results are presented in Table 7.[15] Concentrating first on the internal-external distinction based on the full index we can see that people who are more internal have much higher reservation wages. If we do not control for the other personality traits the effect is 3.95 percent; controlling for personality traits reduces the effect slightly to 3.2 percent. These effects are strongly significant and the matching statistics (biasaft and mdbaft) show that the matching procedure was very successful in balancing the distribution of covariates in both groups. Consideration of our internal and external locus of control indexes makes it clear that our results are driven by the effect of an external locus of control in reducing

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[15]Results presented here a based on a kernel matching algorithm with an epanechnikov kernel function, a bandwidth of 0.06 and common support; standard errors are based on 100 bootstrap replications. Results are not sensitive to the choice of the matching algorithm. Sensitivity analysis are available on request from the authors.

reservation wages rather than an internal locus of control in increasing them. Consistently with the OLS results, we find a strong negative impact of being external (ranging from -4.8 to -2.8 percent), whereas the results for the internal index are not significant.

Individuals with a more internal locus of control also submit more applications everything else equal. In this case, the effect stems from a positive effect of an internal locus of control on the submission of applications rather than from a negative effect of an external locus of control. When we do not control for personality, people who are more internal (based on the full index) submit an additional 1.2 applications. Once we account for differences in individuals' personality traits the effects remains positive but becomes insignificant. Separating our joint index into its two specific components indicates that—unlike the case for reservation wages—it is the extent to which one has an internal locus of control that is most closely related to search intensity. People who are more internal (based on the internal index) submit between 1.2 and 1.6 more applications.

Overall, the matching results are stronger than the OLS results which can be directly related to the non-linearity in the outcome equation and more importantly, the different weight assigned to each individual. Whereas with the OLS all individuals receive the same weight, the matching procedure allows a better comparison between individuals in the different groups by adjusting for the differences in the covariate distributions in a more efficient way.

4.2.3 Summary

Taken together, these results are consistent with the perspective that locus of control affects search behavior by influencing the perceived payoffs to job search. Those who believe that they have control over what happens in their lives set higher reservation wages and search more intensively than those who feel little control over their lives. This is consistent with a model of job search which incorporates individuals' subjective beliefs about the offer arrival rate (see Section 2.2), but is inconsistent with a job search model in which locus of control is a dimension of ability (See Section 2.3).

5   Conclusions

In this paper we present a model based on the assumption that each individual has a subjective belief about the impact of the search effort on the job offer arrival rate. This subjective belief depends on her locus of control, i.e., the extent to which a person believes that her actions affect future outcomes. We estimate the impact of locus of control on job search behavior using a novel data set consisting of individuals interviewed shortly after entering unemployment in Germany. The results show that individuals who have

a more internal locus of control have a higher reservation and search more intensively than otherwise similar individuals with a more external locus of control. These results are consistent with a model of job search which locus of control affects individuals' subjective beliefs about the offer arrival rate, but is inconsistent with a job search model in which locus of control is a dimension of ability.

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Tables

Table 1: Locus of Control Variables

Variable	Mean	SD	Median	Threshold
N	8861			
Locus of Control (1: do not agree, 7: agree)				
Life depends on me	6.07	(1.27)	[7.00]	
Compared to others, not achieved	3.63	(1.95)	[4.00]	
Faith/Luck important	3.47	(1.93)	[3.00]	
Engagement can change things	3.84	(1.92)	[4.00]	
Other determinemy life	2.82	(1.87)	[2.00]	
Work hard for success	6.24	(1.15)	[7.00]	
Doubt myself when problems	3.38	(1.86)	[3.00]	
Social circumstances important	4.48	(1.67)	[5.00]	
Skills not effort important	5.23	(1.40)	[5.00]	
No control over my life	2.68	(1.79)	[2.00]	
Internal Index	17.55	(2.69)	[18.00]	18.00
External Index	20.45	(6.73)	[20.00]	20.00
Full Index	45.10	(7.01)	[45.00]	46.00

Source: *IZA Evaluation Data Set*, own calculations.

[a] The `Internal Index` aggregates the standardized answers in the following way: "Q1 + Q6 + Q9".

[b] The `External Index` aggregates the standardized answers in the following way: "Q2 + Q3 + Q5 + Q7 + Q8 + Q10".

[c] Finally, the `Full Index` aggregates all standardized answers in the following way: "Q1 + Q6 + Q9 - (Q2 + Q3 + Q5 + Q7 + Q8 + Q10)".

All numbers are shares unless stated otherwise; p-value refers to a two-sided t-test of mean equality between both groups.

Table 2: Socio-Demographics and Other Explanatory Variables

Variable	Full Index		t-test
	External	Internal	p-value
N	4479	4431	
West Germany	0.69	0.68	0.26
Female	0.53	0.48	0.00
German citizenship	0.94	0.96	0.00
Migrant 1	0.22	0.18	0.00
Migrant 2	0.17	0.13	0.00
Age (in years)	36.79	34.43	0.00
Married (or cohabiting)	0.41	0.38	0.00
One Child	0.19	0.19	0.83
Two (or more) Children	0.15	0.14	0.29
Unemployment Benefit Recipient (yes)	0.78	0.80	0.12
Level of UB (Missings=0)	499.04	547.40	0.00
School Leaving Degree			
None, Special needs, other	0.03	0.02	0.01
Lower Secondary School	0.33	0.27	0.00
Middle Secondary School	0.41	0.43	0.06
Specialized upper Secondary School	0.23	0.28	0.00
Professional Training			
None	0.12	0.08	0.00
Internal or external professional training, others	0.72	0.71	0.44
Technical college or university degree	0.17	0.21	0.00
(Lifetime) Months in Unemployment (div. by age-18)	0.88	0.70	0.00
(Lifetime) Months in Employment (div. by age-18)	8.13	8.21	0.54
Employment status before Unemployment			
Employed	0.67	0.65	0.06
Subsidized Employment	0.07	0.07	0.43
School, Apprentice, Military, etc.	0.12	0.17	0.00
Maternity Leave	0.05	0.05	0.61
Other	0.09	0.06	0.00
Big-5 (7 = completely applies, 1 = does not apply)			
Openness	4.95	5.08	0.00
Conscientiousness	6.12	6.39	0.00
Extraversion	5.47	5.86	0.00
Neuroticism	4.58	3.85	0.00
Intergenerational:			
Father has upper secondary Schooling			
Not known	0.07	0.06	0.55
Yes	0.14	0.16	0.01
No	0.80	0.78	0.06
Father worked at age 15			
Not known (or already dead)	0.11	0.10	0.32
Yes	0.83	0.85	0.06
No	0.06	0.05	0.09
Living Situation			
Own appartement/house	0.37	0.37	0.82
Rent	0.58	0.58	0.59
Untermiete	0.05	0.04	0.65
Other	0.01	0.00	0.17
Without	0.00	0.00	0.25
Available Communication:			
Phone (Festnetz)	0.85	0.85	0.63
Mobile	0.91	0.94	0.00
Computer	0.82	0.87	0.00
Printer	0.74	0.78	0.00
Internet	0.73	0.77	0.00
Email	0.69	0.76	0.00

Source: *IZA Evaluation Data Set*, own calculations.

Note: All numbers are shares unless stated otherwise; p-value refers to a two-sided t-test of mean equality between both groups.

Table 3: Variables Describing Job Search Behavior 36

Variable	Full Index		t-test
	External	Internal	p-value
N	4448	4401	
Reservation Wage (in Euro)	7.36	7.74	0.00
Log(Reservation Wage)	1.95	1.99	0.00
Number of Search channels	5.09	5.15	0.08
Number of Own Applications (Mean)	14.96	17.07	0.00
Number of Own Applications:			
0	0.06	0.04	0.00
1-4	0.21	0.19	0.02
5-9	0.20	0.21	0.78
10-19	0.25	0.25	0.39
20-29	0.14	0.15	0.09
30+	0.14	0.17	0.00
Expected probability of finding a job in the next 6 month[1]			
Mean (1=very probable, 4=very improbable)[1]	1.78	1.57	0.00
very probable	0.42	0.56	0.00
probable	0.42	0.34	0.00
improbable	0.12	0.07	0.00
very improbable	0.04	0.03	0.04

Source: *IZA Evaluation Data Set*, own calculations.

Note: All numbers are shares unless stated otherwise; p-value refers to a two-sided t-test of mean equality between both groups.

[1] This information is observed for 4,025 individuals with LOC=0 and 4,012 individuals with LOC=1.

Table 4: Probit Estimation Results: Probability to Find a Job is Very High (Marginal Effects)

	(1)	(2)	(3)	(4)
search-own	-.001***	-.002***	-.0005	-.0007
Number of Own Applications x LOC-Full36 (Dummy)	0.001***	0.002***		
Number of Own Applications x LOC-Internal3 (Dummy)			0.0009*	0.001**
searchown-ext6			-.001***	-.001***
Internal Index (36, Standardized)			0.04***	0.028***
External Index (6, Standardized)			-.055***	-.046***
Full Index (36, Standardized)	0.065***	0.052***		
Openness		0.023***		0.023***
Conscientiousness		0.012		0.012
Extraversion		0.02***		0.02***
Neuroticism		-.012***		-.012***
Local UE Rate at Interview (below 5%)				
5-10%	-.058***	-.059***	-.058***	-.060***
10-15%	-.067***	-.072***	-.068***	-.073***
15+%	-.114***	-.121***	-.115***	-.121***
selfempl				
West Germany	0.05**	0.043*	0.051**	0.043*
Female	-.114***	-.118***	-.115***	-.117***
German citizenship	-.044	-.035	-.044	-.035
Married (or cohabiting)	-.053***	-.050***	-.053***	-.050***
Children				
No Children				
One Child	0.004	0.005	0.005	0.005
Two (or more) Children	-.047**	-.045**	-.047**	-.046**
Unemployment Benefit Recipient (yes)	-.005	-.002	-.004	-.0007
Level of UB (log(ben+1),mis=0)	0.007*	0.007*	0.007*	0.007*
Age (17-24 years)				
Age (25-34 years)	0.055***	0.052***	0.055***	0.053***
Age (35-44 years)	-.001	-.005	-.0008	-.005
Age (45-55 years)	-.112***	-.114***	-.113***	-.114***
School Leaving Degree				
None, Special needs, other				
Lower Secondary School	0.028	0.023	0.027	0.022
Middle Secondary School	0.04	0.034	0.041	0.033
Specialized upper Secondary School	0.063	0.057	0.067*	0.057
Vocational training None				
Internal or external professional training, others	0.001	0.003	0.002	0.003
Technical college or university degree	0.031	0.032	0.033	0.033
Months in Unemployment (div. by age-18)	-.011***	-.010***	-.011***	-.010***
Months in Employment (div. by age-18)	0.002*	0.002*	0.002*	0.002*
Intergen.: Father upper Schooling				
Not known				
Yes	-.011	-.014	-.011	-.016
No	0.004	0.002	0.004	0.0008
Intergenerational: Father worked at age 15				
Not known (or already dead)				
Yes	-.003	-.0006	-.003	-.00008
No	-.022	-.018	-.022	-.017
Living Situation				
Own appartement/house				
Rent	0.002	-.001	0.002	-.001
Untermiete	0.033	0.032	0.034	0.033
Other	0.099	0.107	0.096	0.104
Without	-.088	-.098	-.092	-.102
Available Communication:				
Phone (Festnetz)	-.038*	-.033*	-.038*	-.033*
Mobile	0.038	0.026	0.038	0.027
Computer	-.011	-.013	-.011	-.012
Printer	-.036*	-.036*	-.036*	-.036*
Internet	0.023	0.027	0.021	0.025
Email	0.016	0.007	0.017	0.008
Employment status before Unemployment				
Employed				
Subsidized Employment	-.040*	-.040*	-.040*	-.039*
School, Apprentice, Military, etc.	-.037*	-.036*	-.037*	-.036*
Maternity Leave	-.230***	-.230***	-.230***	-.230***
Other	-.086***	-.084***	-.087***	-.085***
Obs.	8005	8005	8005	8005
R2̂	0.074	0.08	0.075	0.081
log-Likelihood	-5135.258	-5102.117	-5132.998	-5101.016

Note: Additional control variables used in the estimation: Months of entry into unemployment (June 2007 - April 2008) and time between entry and interview (in weeks). Full estimation results are available on request by the authors.
∗∗∗/∗∗/∗ indicate significance at the 1%/5%/10%-level.

Table 5: OLS Estimation Results: Log(Reservation Wage)

	(1)	(2)	(3)	(4)
Full Index (36, Standardized)	0.019***	0.013***		
Internal Index (36, Standardized)			-.001	-.006**
External Index (6, Standardized)			-.023***	-.019***
Openness		0.015***		0.016***
Conscientiousness		-.0005		0.002
Extraversion		0.005*		0.006**
Neuroticism		-.011***		-.008***
Local UE Rate at Interview (below 5%)				
5-10%	-.030***	-.031***	-.030***	-.031***
10-15%	-.034***	-.036***	-.033***	-.035***
15+%	-.026*	-.029*	-.026*	-.029*
West Germany	0.155***	0.15***	0.153***	0.148***
Female	-.126***	-.122***	-.124***	-.122***
German citizenship	0.004	0.008	0.004	0.009
Married (or cohabiting)	-.007	-.005	-.007	-.004
Children				
No Children				
One Child	0.026***	0.026***	0.026***	0.026***
Two (or more) Children	0.058***	0.059***	0.056***	0.057***
Unemplomyent Benefit Recipient (yes)	-.054***	-.052***	-.054***	-.052***
Level of UB (log(ben+1),mis=0)	0.013***	0.013***	0.013***	0.013***
Age (17-24 years)				
Age (25-34 years)	0.094***	0.094***	0.094***	0.094***
Age (35-44 years)	0.148***	0.146***	0.148***	0.147***
Age (45-55 years)	0.159***	0.16***	0.16***	0.161***
School Leaving Degree				
None, Special needs, other				
Lower Secondary School	0.037**	0.037**	0.037*	0.036*
Middle Secondary School	0.053***	0.051***	0.05***	0.047**
Specialized upper Secondary School	0.137***	0.133***	0.129***	0.125***
Vocational training None				
Internal or external professional training, others	0.076***	0.076***	0.074***	0.075***
Technical college or university degree	0.227***	0.226***	0.224***	0.222***
Months in Unemployment (div. by age-18)	-.012***	-.012***	-.012***	-.012***
Months in Employment (div. by age-18)	0.001**	0.001**	0.001**	0.001**
selfempl	0.054***	0.049***	0.055***	0.05***
Intergen.: Father upper Schooling				
Not known				
Yes	0.036**	0.032**	0.034**	0.031**
No	0.003	0.0007	0.002	0.0002
Intergenerational: Father worked at age 15				
Not known (or already dead)				
Yes	0.002	0.004	0.002	0.004
No	0.009	0.01	0.008	0.01
Living Situation				
Own appartement/house				
Rent	-.005	-.007	-.005	-.007
Untermiete	-.036**	-.037**	-.035**	-.036**
Other	-.019	-.015	-.017	-.013
Without	-.010	-.009	-.010	-.009
Available Communication:				
Phone (Festnetz)	-.024**	-.021**	-.024**	-.020**
Mobile	0.034***	0.03***	0.035***	0.03***
Computer	-.005	-.005	-.005	-.005
Printer	-.003	-.005	-.004	-.005
Internet	0.026*	0.029**	0.026*	0.028*
Email	0.032**	0.027**	0.032**	0.026**
Employment status before Unemployment				
Employed				
Subsidized Employment	-.008	-.007	-.007	-.006
School, Apprentice, Military, etc.	-.044***	-.044***	-.045***	-.045***
Maternity Leave	-.023	-.021	-.023	-.022
Other	-.009	-.008	-.010	-.008
Obs.	8910	8910	8910	8910
R̂2				
log-Likelihood	-879.419	-844.393	-869.026	-832.271

Note: Additional control variables used: Month of entry into unemployment (June 2007-May2008) and time between unemployment entry and interview (7-14 weeks). Full estimation results are available on request by the authors.

$***/**/*$ indicate significance at the 1%/5%/10%-level.

[a] Indices are standardized in the following way: $Index_i^{st} = (Index_i - Mean(Index))/SD(Index)$.

Table 6: OLS Estimation Results: Search Intensity (Number of Own Applications)

	(1)	(2)	(3)	(4)
Full Index (36, Standardized)	0.911***	0.346		
Internal Index (36, Standardized)			1.542***	1.034***
External Index (6, Standardized)			-.210	0.19
Openness		0.461*		0.41*
Conscientiousness		1.383***		1.205***
Extraversion		0.588**		0.52**
Neuroticism		-.355*		-.519***
Local UE Rate at Interview (below 5%)				
5-10%	0.731	0.698	0.696	0.671
10-15%	2.500**	2.332**	2.393**	2.272**
15+%	2.726*	2.564*	2.726*	2.575*
West Germany	2.919***	2.690***	3.128***	2.863***
Female	-.846	-1.146**	-1.042*	-1.151**
German citizenship	-3.031**	-2.699*	-3.075**	-2.767*
Married (or cohabiting)	-.478	-.398	-.532	-.424
Children				
No Children				
One Child	-.738	-.756	-.718	-.740
Two (or more) Children	-2.003**	-1.934**	-1.865**	-1.852**
Unemplomyent Benefit Recipient (yes)	0.638	0.736	0.628	0.718
Level of UB (log(ben+1),mis=0)	-.158	-.169	-.156	-.166
Age (17-24 years)				
Age (25-34 years)	-2.580***	-2.704***	-2.623***	-2.710***
Age (35-44 years)	-2.968***	-3.146***	-2.994***	-3.161***
Age (45-55 years)	-3.726***	-3.843***	-3.835***	-3.917***
School Leaving Degree				
None, Special needs, other				
Lower Secondary School	0.505	0.332	0.586	0.429
Middle Secondary School	0.2	-.093	0.543	0.196
Specialized upper Secondary School	-.474	-.683	0.239	-.138
Vocational training None				
Internal or external professional training, others	-.928	-.962	-.820	-.862
Technical college or university degree	0.726	0.697	1.056	0.938
Months in Unemployment (div. by age-18)	0.136	0.158	0.123	0.149
Months in Employment (div. by age-18)	0.059	0.048	0.057	0.049
selfempl	-.032	-.258	-.160	-.328
Intergen.: Father upper Schooling				
Not known				
Yes	0.293	0.309	0.429	0.394
No	-.336	-.330	-.290	-.308
Intergenerational: Father worked at age 15				
Not known (or already dead)				
Yes	0.898	0.944	0.918	0.959
No	1.370	1.568	1.463	1.614
Living Situation				
Own appartement/house				
Rent	0.975*	0.884	0.976*	0.89
Untermiete	1.787	1.728	1.680	1.650
Other	-1.489	-1.390	-1.706	-1.513
Without	0.312	0.381	0.27	0.394
Available Communication:				
Phone (Festnetz)	-2.528***	-2.327***	-2.530***	-2.340***
Mobile	2.588**	2.278**	2.492**	2.237**
Computer	-2.402*	-2.381*	-2.414*	-2.394*
Printer	2.885***	2.878***	2.946***	2.889***
Internet	2.252*	2.341*	2.317*	2.413*
Email	0.38	0.12	0.445	0.165
Employment status before Unemployment				
Employed				
Subsidized Employment	3.170***	3.172***	3.092***	3.100***
School, Apprentice, Military, etc.	0.338	0.483	0.421	0.532
Maternity Leave	-3.377**	-3.120**	-3.314**	-3.090**
Other	0.58	0.763	0.605	0.759
Obs.	8873	8873	8873	8873
R̂2				
log-Likelihood	-40930	-40905.23	-40918.98	-40898.92

Note: Additional control variables used: Month of entry into unemployment (June 2007-May2008) and time between unemployment entry and interview (7-14 weeks). Full estimation results are available on request by the authors.

$***/**/*$ indicate significance at the 1%/5%/10%-level.

[a] Indices are standardized in the following way: $Index_i^{st} = (Index_i - Mean(Index))/SD(Index)$.

Table 7: Matching Results

Index	PT[1]	Effect	s.e.	t	TN[2]	NT[2]	Off[2]	biasaft[2]	mdbaft[2]
Outcome Variable: Log(Reservation Wage)									
Full Index[a]	no	0.0310	0.0072	4.2985	4431	4479	0	0.7378	0.5960
	yes	0.0246	0.0088	2.8091	4431	4479	17	1.1434	0.8333
Internal Index[b]	no	-0.0021	0.0060	-0.3453	4340	4570	4	0.7213	0.5454
	yes	-0.0066	0.0067	-0.9749	4340	4570	2	1.3921	1.0386
External Index[c]	no	-0.0416	0.0065	-6.3984	4478	4432	3	0.7073	0.4783
	yes	-0.0241	0.0083	-2.8988	4478	4432	3	0.9025	0.7200
Outcome Variable: Search Intensity									
Full Index[a]	no	1.3991	0.5130	2.7276	4417	4456	0	0.7892	0.7303
	yes	0.4621	0.6712	0.6884	4417	4456	17	1.1281	0.8846
Internal Index[b]	no	3.1916	0.5372	5.9409	4325	4548	4	0.6974	0.5571
	yes	2.5231	0.5782	4.3638	4325	4548	2	1.4019	1.0896
External Index[c]	no	-0.4194	0.5335	-0.7862	4457	4416	3	0.6901	0.4700
	yes	0.1323	0.5339	0.2479	4457	4416	3	0.9240	0.7122

Note: Results presented here a based on a kernel matching algorithm with an epanechnikov kernel function, a bandwidth of 0.06 and imposition of common support; standard errors are based on 100 bootstrap replications.

[1] The first specification does not include other personality traits as explanatory variables in the propensity score estimation; the second specification does (see Table A.1 for details and Figure A.1 for score distributions).

[2] TN and NT indicate the number of individuals in the 'high' and 'low' group; Off counts the number of individuals outside the common support region. biasaft and mdbaft summarize the mean (median) standardized bias after matching.
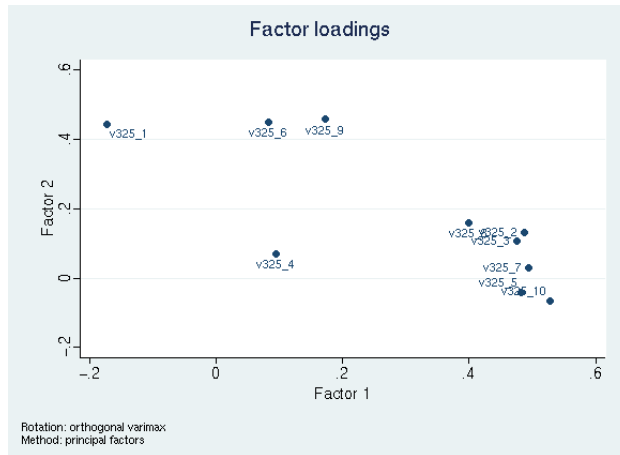
[a] Full Index: High vs Low.

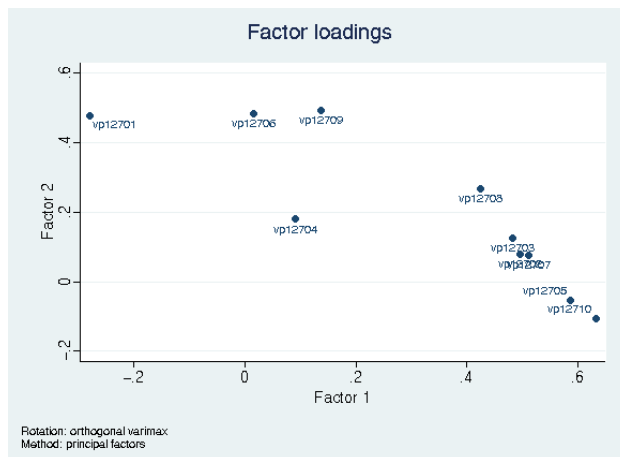[b] Internal Index: High vs Low.

[c] External Index: High vs Low.

Figures

Figure 1: Factor Loadings of the LOC Variables
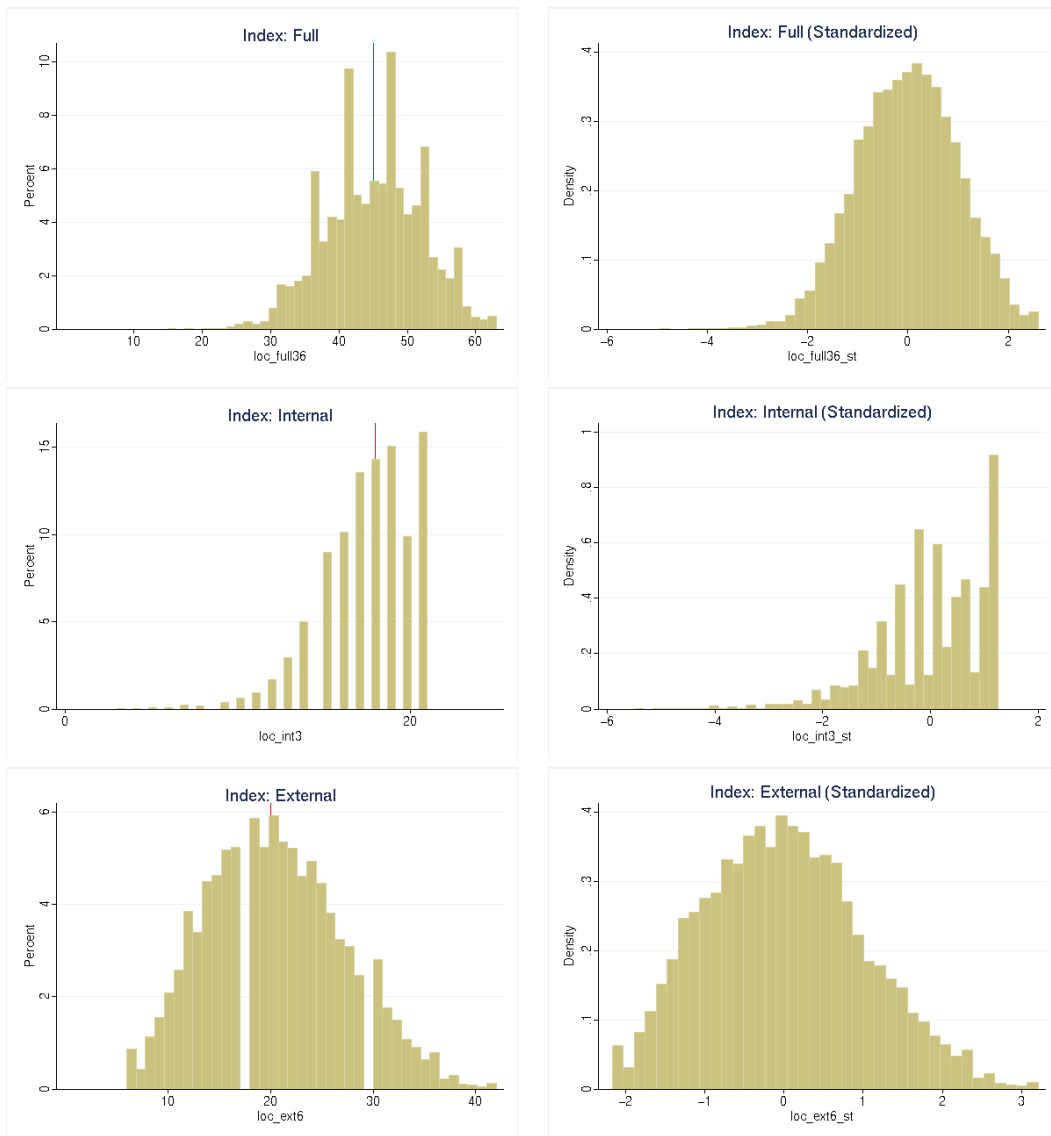
Our Sample


Representative Population Sample (SOEP)

Note: Factor 1 is interpreted as `External Locus of Control`; Factor 2 as `Internal Locus of Control`. The variable "Social/Political engagement can change things" loads on a third factor and is not used.

Figure 2: Distribution of the Different Indices

Note: Red Line indicates the threshold (High vs. Low).

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Figure 3: Distribution of the Outcome Variables

Reservation Wage

Search Intensity
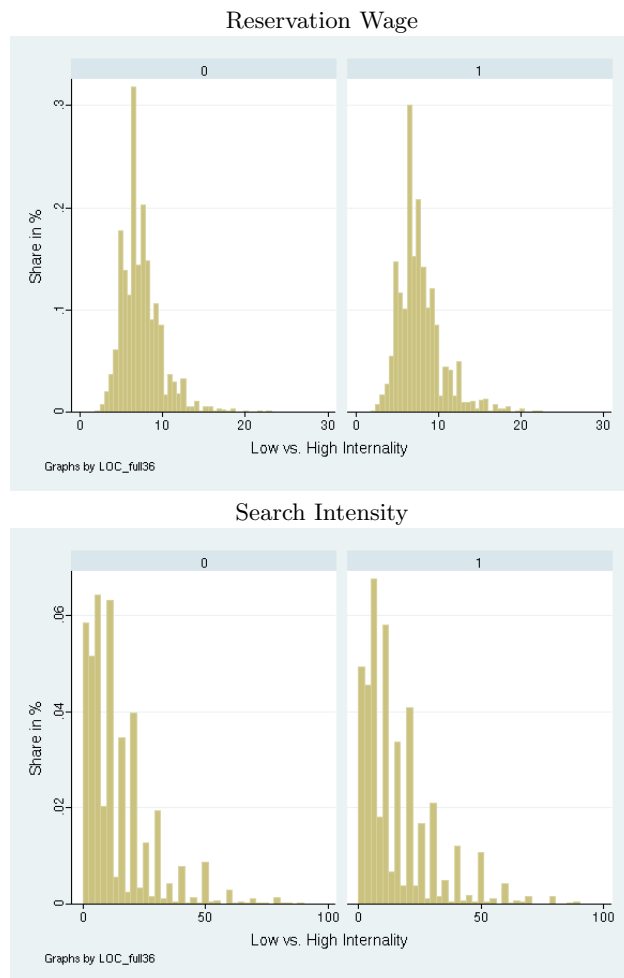
Note:

A   Supplementary Tables and Figures

Table A.1: Propensity Score Estimation Results

Index:	Without Other Personality Traits			With Other Personality Traits		
	Full (1)	Internal (2)	External (3)	Full (4)	Internal (5)	External (6)
West Germany	0.058	-.316***	-.215**	-.006	-.372***	-.178**
Female	-.204***	0.129***	0.352***	-.151***	-.101**	0.171***
German citizenship	0.114	0.032	-.019	0.199	0.127	-.051
Married (or cohabiting)	0.103*	0.123**	-.052	0.14**	0.108*	-.103*
Children						
No Children						
One Child	0.007	-.017	0.01	0.0001	-.024	0.021
Two (or more) Children	-.032	-.089	-.037	-.065	-.065	0.013
Unemploment Benefit Recipient (yes)	-.251**	-.023	0.082	-.225**	0.005	0.053
Level of UB (log(ben+1),mis=0)	0.054***	0.014	-.019	0.052***	0.01	-.017
Personality Traits						
Internal Locus of Control						
Local UE Rate at Interview (below 5%)						
5-10%	0.12*	0.093	-.086	0.112	0.085	-.076
10-15%	0.21**	0.151*	-.128	0.175*	0.097	-.109
15+%	0.098	-.002	-.124	0.066	-.029	-.099
Openness				-.051**	0.046**	0.082***
Conscientiousness				0.393***	0.509***	-.141***
Extraversion				0.239***	0.224***	-.160***
Neuroticism				-.356***	0.125***	0.467***
Yes	0.011	-.078	-.274**	0.009	-.035	-.278**
No	-.008	0.004	-.196*	-.015	0.028	-.200*
Intergen.: Father upper Schooling						
Not known						
Yes	0.01	-.069	0.074	0.017	-.070	0.074
No	-.104	-.174	0.081	-.058	-.116	0.056
-Iv63a-3						
Intergenerational: Father worked at age 15						
Not known (or already dead)						
Living Situation						
Own appartement/house						
Rent	-.037	-.010	0.006	-.066	-.038	0.022
Untermiete	-.133	0.044	0.269**	-.138	0.03	0.279**
Other	-.537	0.063	0.628*	-.483	0.015	0.558
Without	0.563	0.319	-.653	0.548	0.243	-.684
Available Communication:						
Phone (Festnetz)	-.111	-.133*	0.047	-.063	-.099	0.007
Mobile	0.276***	0.135	-.119	0.191**	0.042	-.058
Computer	0.133	-.121	-.012	0.148	-.127	-.007
Printer	-.060	-.039	0.021	-.127	-.0003	0.114
Internet	-.261**	-.030	0.006	-.198*	-.029	-.094
Email	0.455***	0.014	-.352***	0.346***	-.036	-.237**
Age (17-24 years)						
Age (25-34 years)	-.089	0.024	0.143**	-.102	-.019	0.134*
Age (35-44 years)	-.368***	-.137*	0.358***	-.427***	-.167**	0.406***
Age (45-55 years)	-.663***	-.159**	0.685***	-.686***	-.184**	0.703***
School Leaving Degree						
None, Special needs, other						
Lower Secondary School	0.004	-.015	-.039	-.044	-.106	-.022
Middle Secondary School	0.196	-.299**	-.327**	0.074	-.413***	-.238
Specialized upper Secondary School	0.207	-.790***	-.620***	0.088	-.857***	-.519***
Vocational training None						
Internal or external professional training, others	0.193**	-.159**	-.208**	0.185**	-.206**	-.223***
Technical college or university degree	0.349***	-.473***	-.529***	0.301***	-.493***	-.492***
Months in Unemployment (div. by age-18)	-.081***	0.009	0.085***	-.064***	0.015	0.072***
Months in Employment (div. by age-18)	0.01**	0.009**	-.007	0.006	0.005	-.005
Employment status before Unemployment						
Employed						
Subsidized Employment	0.01	0.004	0.133	-.013	0.01	0.179*
School, Apprentice, Military, etc.	0.146*	-.073	-.190**	0.186**	-.034	-.215**
Maternity Leave	0.012	-.051	-.171	0.092	0.02	-.240**
Other	-.248***	-.124	0.164*	-.209**	-.071	0.147
Obs.	8910	8910	8910	8910	8910	8910
R̂2	0.035	0.039	0.054	0.104	0.095	0.128
log-Likelihood	-5962.541	-5934.907	-5841.168	-5531.773	-5585.893	-5387.004
e(hitrate)	59.046	59.416	61.549	65.825	65.297	67.452

Note: The propensity score is estimated using a logit model. The groups are defined according to having a high (treated) or low (control) index value. See Figure 2 for the relevant thresholds. Columns 4-6 include other personality traits as explanatory variables; columns 1-3 do not.

Additional control variables used in the estimation: Months of entry into unemployment (June 2007 - April 2008) and time between entry and interview (in weeks). Full estimation results are available on request by the authors.

∗ ∗ ∗/ ∗ ∗/∗ indicate significance at the 1%/5%/10%-level.

Figure A.1: Propensity Score Distribution

Without PT   With PT

Full Index (High vs. Low)

Internal Index (High vs. Low)

External Index (High vs. Low)
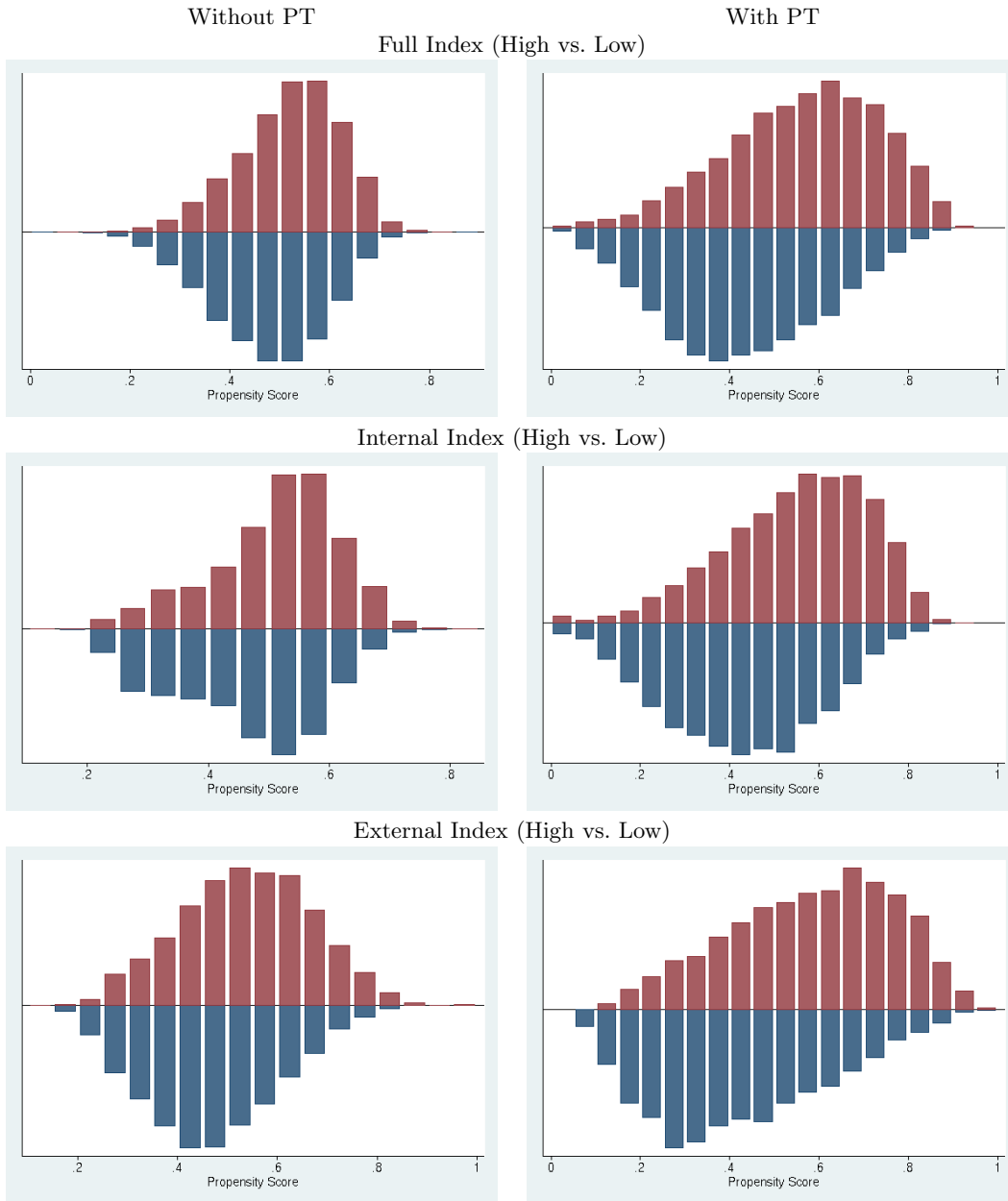
Note: Specification 3 includes other personality traits; specification 4 does not. See Table A.1 for detailed estimation results.

B Notes on Theoretical Framework

Proposition 1. *Individuals with a more internal locus of control have higher reservation wages and search more intensively than those with a more external locus of control, i.e., $\frac{\partial s^*}{\partial loc} > 0$ and $\frac{\partial \phi}{\partial loc} > 0$.*

Proof. Equation (5) gives the relationship between the reservation wage ϕ and the optimal level of search effort s^*. Differentiating equation (5) with respect to loc gives:

$$
\begin{aligned}
\frac{\partial \phi}{\partial loc} \quad &= \frac{\partial}{\partial loc}\left[\frac{\lambda(s^*)}{\lambda'(s^*)}c'(s)\right] - c'(s^*)\frac{\partial s^*}{\partial loc} \\
&= \frac{\lambda(s^*)}{\lambda'(s^*)}c''(s^*)\frac{\partial s}{\partial loc} + \frac{\lambda'(s^*)^2\frac{\partial s^*}{\partial loc} - \lambda(s^*)\lambda''(s)\frac{\partial s^*}{\partial loc}}{\lambda'(s^*)^2}c'(s^*) - c'(s^*)\frac{\partial s^*}{\partial loc} \\
&= \left[\frac{\lambda(s^*)}{\lambda'(s^*)}c''(s^*) - \frac{\lambda(s^*)\lambda''(s^*)c'(s^*)}{\lambda'(s^*)^2}\right]\frac{\partial s^*}{\partial loc}
\end{aligned}
\tag{10}
$$

The job arrival rate depends positively on an individual's search effort, but at a decreasing rate, i.e., $\lambda' > 0$ and $\lambda'' < 0$, while search costs are increasing in search effort, i.e., $c' > 0$ and $c'' > 0$. Thus, the expression in square brackets is positive which implies that $\partial \phi / \partial loc$ and $\partial s^* / \partial loc$ have the same sign.

Equation (4) shows that individuals choose their optimal search effort by equating the marginal cost of job search with the marginal benefits of additional search. Differentiating (4) with respect to loc gives:

$$
\begin{aligned}
c''(s^*)\frac{\partial s^*}{\partial loc} = \quad &\frac{\lambda'(s^*)f'(loc)}{r+q}\int_\phi^\infty (w-\phi)dF(w) + \frac{\lambda''(s^*)f(loc)}{r+q}\frac{\partial s^*}{\partial loc}\int_\phi^\infty (w-\phi)dF(w) \\
&+\frac{\lambda'(s^*)f(loc)}{r+q}\frac{\partial}{\partial loc}\int_\phi^\infty (w-\phi)dF(w) \\
= \quad &\frac{\lambda'(s^*)f'(loc)}{r+q}\int_\phi^\infty (w-\phi)dF(w) + \frac{\lambda''(s^*)f(loc)}{r+q}\frac{\partial s^*}{\partial loc}\int_\phi^\infty (w-\phi)dF(w) \\
&-\frac{\lambda'(s^*)f(loc)}{r+q}[1-F(\phi)]\frac{\partial \phi}{\partial loc}
\end{aligned}
\tag{11}
$$

Rearranging the above expression yields:

$$
\begin{aligned}
\frac{\partial s^*}{\partial loc}\left[c''(s^*) - \frac{\lambda''(s^*)f(loc)}{r+q}\int_\phi^\infty (w-\phi)dF(w)\right] = &-\frac{\lambda'(s^*)f(loc)}{r+q}[1-F(\phi)]\frac{\partial \phi}{\partial loc} \\
&+\frac{\lambda'(s^*)f'(loc)}{r+q}\int_\phi^\infty (w-\phi)dF(w)
\end{aligned}
\tag{12}
$$

The right-hand-side term in square brackets is positive. This implies that in order for equation (12) to hold $\frac{\partial s^*}{\partial loc}$ and $\frac{\partial \phi}{\partial loc}$ must both be positive. If they were both negative, the left-hand side of equation (12) would be negative while the right-hand side would be positive.

B.1 Alternative Model

We now consider an alternative model, in which a function of the locus of control contributes to the job arrival rate additively: $\lambda_a(s, loc) = \lambda(s) + f(loc)$. As before, we continue to assume that $f'(loc) > 0, c' > 0, c'' > 0, \lambda' > 0$ and $\lambda'' < 0$.

In this case, the utilities of accepting a job offer at wage w, $V_e(w)$ and of continuing job search, V_u, are given by:

$$V_e(w) = \frac{1}{1 + rdt}[wdt + (1 - qdt)V_e(w) + qdtV_u] \tag{13}$$

$$V_u = \frac{1}{1 + rdt}[(b - c(s))dt + (\lambda(s) + f(loc))dt(\int_0^\phi V_u dF(w) + \int_\phi^\infty V_e(w)dF(w))$$
$$+ (1 - (\lambda(s) + f(loc))dt)V_u] \tag{14}$$

The reservation wage is given by:

$$\phi = b - c(s) + \frac{\lambda(s) + f(loc)}{r + q} \int_\phi^\infty (w - \phi)dF(w)$$
$$= b - c(s) + \frac{\lambda(s)}{r + q} \int_\phi^\infty (w - \phi)dF(w) + \frac{f(loc)}{r + q} \int_\phi^\infty (w - \phi)dF(w) \tag{15}$$

Unemployed individuals choose their search effort and reservation wage so as to maximize V_u over an infinite horizon. The reservation wage defines the search stopping rule and thus satisfies the condition that $V_u = V_e(w)$. Substituting this constraint into the optimization problem, we can show that the optimal search behavior is determined by the maximization of $V_u = \phi/r$ with resoect to s. This implies that we can solve for the optimal search effort s^* by differentiating the previous equation with respect to (s) and solving for the s^* such that $\partial\phi/\partial s = 0$. Specifically, we find that

$$c'(s) = \frac{\lambda'(s)}{r + q} \int_\phi^\infty (w - \phi)dF(w) \tag{16}$$

Substituting this expression into equation 15 we get:

$$\phi = b - c(s) + \frac{\lambda(s)}{\lambda'(s)}c'(s) + \frac{f(loc)}{r + q} \int_\phi^\infty (w - \phi)dF(w) \tag{17}$$

Proposition 2. *In this alternative model, individuals with a more internal locus of control have higher reservation wages, but search less intensively than those with a more external locus of control, i.e., $\frac{\partial s^*}{\partial loc} < 0$ and $\frac{\partial \phi}{\partial loc} > 0$.*
Proof. Differentiating 16 with respect to loc gives:

$$c''(s)\frac{\partial s}{\partial loc} = \frac{\lambda''(s)}{r + q}\frac{\partial s}{\partial loc} \int_\phi^\infty (w - \phi)dF(w) + \frac{\lambda'(s)}{r + q}\frac{\partial}{\partial loc} \int_\phi^\infty (w - \phi)dF(w)$$
$$= \frac{\lambda''(s)}{r + q}\frac{\partial s}{\partial loc} \int_\phi^\infty (w - \phi)dF(w) - \frac{\lambda'(s)}{r + q}[1 - F(\phi)]\frac{\partial \phi}{\partial loc} \tag{18}$$

Rearranging the above expression yields:

$$\frac{\partial s}{\partial loc}\left[c''(s) - \frac{\lambda''(s)}{r+q}\int_\phi^\infty (w-\phi)dF(w)\right] = [-\frac{\lambda'(s)}{r+q}[1-F(\phi)]]\frac{\partial \phi}{\partial loc} \tag{19}$$

Given that $c'' > 0$, $\lambda' > 0$ and $\lambda'' < 0$, the expression in square brackets on the right-hand side is positive, while the expression in square brackets on the left-hand side is negative. Thus, equation (19) shows that $\frac{\partial s}{\partial loc}$ and $\frac{\partial \phi}{\partial loc}$ must have opposite signs. Moreover, differentiating the expression for the reservation wage in equation (17) with respect to loc gives:

$$
\begin{aligned}
\frac{\partial \phi}{\partial loc} &= \frac{\partial}{\partial loc}\left[\frac{\lambda(s)}{\lambda'(s)}c'(s)\right] - c'(s)\frac{\partial s}{\partial loc} \\
&+ \frac{f'(loc)}{r+q}\int_\phi^\infty (w-\phi)dF(w) + \frac{f(loc)}{r+q}\frac{\partial}{\partial loc}\int_\phi^\infty (w-\phi)dF(w) \\
&= \frac{\lambda(s)}{\lambda'(s)}c''(s)\frac{\partial s}{\partial loc} + \frac{\lambda'(s)^2\frac{\partial s}{\partial loc} - \lambda(s)\lambda''(s)\frac{\partial s}{\partial loc}}{\lambda'(s)^2}c'(s) - c'(s)\frac{\partial s}{\partial loc} \\
&+ \frac{f'(loc)}{r+q}\int_\phi^\infty (w-\phi)dF(w) + \frac{f(loc)}{r+q}\frac{\partial}{\partial loc}\int_\phi^\infty (w-\phi)dF(w) \\
&= \left[\frac{\lambda(s)}{\lambda'(s)}c''(s) - \frac{\lambda(s)\lambda''(s)}{\lambda'(s)^2}\right]\frac{\partial s}{\partial loc} \\
&+ \frac{f'(loc)}{r+q}\int_\phi^\infty (w-\phi)dF(w) - \frac{f(loc)}{r+q}[1-F(\phi)]\frac{\partial \phi}{\partial loc} \tag{20}
\end{aligned}
$$

Rearranging the above expression yields:

$$\frac{\partial \phi}{\partial loc}\left[1 + \frac{f(loc)}{r+q}[1-F(\phi)]\right] = \left[\frac{\lambda(s)}{\lambda'(s)}c''(s) - \frac{\lambda(s)\lambda''(s)}{\lambda'(s)^2}\right]\frac{\partial s}{\partial loc} + \frac{f'(loc)}{r+q}\int_\phi^\infty (w-\phi)dF(w) \tag{21}$$

In equation (21) the terms in square brackets are both positive. Thus, equation (21) only holds if $\frac{\partial s}{\partial loc} < 0$ and $\frac{\partial \phi}{\partial loc} > 0$.