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ABSTRACT

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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.

JEL Classification: J64

Keywords: job search behavior, search effort, reservation wage, locus of control, unemployment duration

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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 expectation about the 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 rates¹, 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 highly 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

¹In 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.

²Hansemark (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. 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).

To our knowledge, there exist only three previous studies that assess the effect of locus of control on transitions from unemployment to employment.³ Gallo et al. (2004) 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, however, 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. In independent work, McGee (2010) takes a similar approach to ours to investigate job search among respondents in the 1979 National Longitudinal Survey of Youth (NLSY) and finds that young unemployed men with an internal locus of control search more and have higher reservation wages. Although he lacks a direct measure of individuals' beliefs about the payoffs to job search, McGee estimates models of the propensity to receive a job offer conditional on having made contact with an employer and finds results that are consistent with his assumption that locus of control influences search behavior through beliefs about the efficacy of job search rather than productivity per se.

Our paper advances this previous literature in two important ways. First, unlike McGee (2010), we directly examine the link between individuals' locus of control and their beliefs about the payoffs to job search. Second, 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. Thus, we are able to use our theoretical model to generate empirically testable predictions and to formally distinguish between alternative explanations of the link between locus of control and job search.

We test the implications of our model by estimating the impact of an individual's locus

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

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

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. This large number of observations allows us to apply non-parametric matching methods in addition to standard regression techniques. This is an advantage compared to data sources like the SOEP or the NLSY which usually contain a relatively small number of unemployment spells per year. The data are unique in providing us with detailed information about search behavior, reservation wages and different psychological traits including locus of control. Moreover, our survey data can be linked to administrative data containing detailed information about previous employment histories including previous wages and time spent in unemployment. This is important in our context because this information goes a long way towards capturing unobserved individual characteristics which might be correlated with both locus of control and current job search behavior.

The interviews were conducted approximately two months after individuals entered unemployment. The data allow us to observe the impact of the locus of control on job search behavior directly and thereby to discriminate between alternative 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. Thus concerns about potential reverse causality which is a particular challenge in studies of the relationship between noncognitive skills and labor market outcomes are reduced substantially. In contrast, in surveys like the SOEP and the NLSY the timing of the measurement of the locus of control and the beginning of unemployment spells typically varies substantially across individuals.

We find 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. 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 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, i.e., $\frac{\partial^2 \lambda^*(s, loc)}{\partial s \partial loc} > 0$. Our objective is to adopt a straightforward, parsimonious specification of the relationship between individuals' beliefs about 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:

$$V_e(w) = \frac{1}{1 + rdt} [w dt + (1 - q dt) V_e(w) + q dt V_u] \quad (1)$$

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

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

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

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 ($w dt$) plus the discounted expected future income stream. With probability $(1 - q dt)$ this is $V_e(w)$ and with probability $q dt$ 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. Taken 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

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

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 s^* such that $\partial\phi/\partial s = 0$. Specifically,

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

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:

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

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

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

See Appendix B for details.⁷ 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.⁸ 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.⁹

In contrast to the above model, the expected effect of search on the probability of

⁷These implications correspond to the theoretical results given by van den Berg and van der Klaauw (2006). They show in the context of a job search model with multiple search channels that an increase in search productivity—which corresponds to an increase in the subjective returns to search in our model—leads to a higher reservation wage and an increase in search effort.

⁸The implications are the same for a model in which individuals with an internal locus of control are more able to generate a wage offer above their reservation wage because they search more effectively.

⁹Note that the probability of receiving a job offer above the reservation wage is given by: $(\lambda(s) + f(loc)) \int_{\phi}^{\infty} V_e(w) dF(w) = \lambda(s) \int_{\phi}^{\infty} (1 + \frac{f(loc)}{\lambda(s)}) V_e(w) dF(w)$. 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.

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

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

Reservation wages are given by:

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

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, 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

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

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.¹⁰

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.

¹⁰The ability model and its implications are similar to the one presented by Fougere, Pradel, and Roger (2009). In their study the unemployed workers receive job offers via own search and via public employment service (PES), the latter is costless and independent of own search effort. They show that search effort is a decreasing function of the exogenous PES rate of job contacts, similar to our results with search being a decreasing function of the locus of control.

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 nine 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 twelve monthly cohorts are gathered. These survey data are then matched to administrative employment records of the Public Employment Services.¹¹ 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, expectations, and different personality traits 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 and time spent in employment 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.¹² In wave 1, 17,396 interviews were completed with individuals each of whom had 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. We further exclude those individuals whose reported hourly reservation wages and benefit levels were in the lowest or highest percentile of the distribution and who had missing values in key variables. This leaves us with an estimation sample of roughly 7,900 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

¹¹For those individuals who gave us their permission we are able to link the survey data with administrative records based on the 'Integrated Labour Market Biographies' of the Public Employment Services, containing relevant register data from four sources: employment history, unemployment support reciepience, participation in active labor market programs, and job seeker history.

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

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 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, 1966). 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.¹³

In the first step we standardize each item by subtracting the mean and dividing by the 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.

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.

INSERT TABLE 1 ABOUT HERE
INSERT FIGURES 1, 2 ABOUT HERE

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 are significantly more likely than others to believe that much of what happens in life is outside their control. Having higher educational attainment on the other hand is 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 levels of openness, conscientiousness, extraversion, and significantly lower levels of neuroticism. These differences imply that it will be important to carefully control for

¹³Piatek and Pinger (2009) also extract a single factor when measuring locus of control in the SEOP data.

individual characteristics when evaluating the effects of locus of control on job search outcomes.

INSERT TABLES 2 ABOUT HERE

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 0.71 months per year in unemployment, while those with an external locus of control have spend 0.85 months per year being unemployed. Moreover, an internal locus of control is associated with significantly higher months in employment in the years before entering unemployment, higher pre-unemployment wages and therefore also higher unemployment benefits. 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). In terms of intergenerational transmission we see that having a father with A-level qualifications or an employed father at age 15 is associated with a more internal locus of control. Finally, individuals with an internal locus of control are also 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 €7.72/hour on average, while those with an external locus of control have a reservation wage that is on average €0.39 lower. Individuals with an internal locus of control use slightly more search channels on average, but this difference is not significant.¹⁴ Finally, individuals who believe that much of what happens in life is under their own control search more intensively sending out nearly two (11 percent) additional applications on average than individuals who think that events are outside their control. The corresponding distributions of the reservation wage and and the search intensity are reported in Figure A.1 in the Appendix.

INSERT TABLE 3 ABOUT HERE

¹⁴McGee (2010) argues that the number of search channels might be an inadequate measure of search intensity since this does not capture the search intensity within each channel.

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 within the next six months, 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'.¹⁵ 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.¹⁶ This interaction term allows the relationship 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

¹⁵Probit 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.

¹⁶Specifically, 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 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.

traits (i.e. openness, conscientiousness, extraversion, neuroticism).¹⁷

INSERT TABLE 4 ABOUT HERE

The main results in Table 4¹⁸ 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 0.2 (columns 1 and 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 columns 3 and 4), we find that the marginal effect of additional search on the expected probability of getting a job continues to be 0.01 percentage points 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 points 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 (in terms of reemployment probabilities) to investments in job search. This suggests that locus of control may influence economic decisions by affecting the perceived returns to various sorts of investments. Individuals, however, simultaneously choose their search effort and their reservation wage both of which affect the expected probability of finding an acceptable job. Consequently, this analysis—while suggestive—does not allow us to test the different implications of the two models directly. We turn to this issue below.¹⁹

4.2 Reservation Wages and Search Intensity

4.2.1 OLS Estimation

We begin by using OLS regression to estimate the effect of locus of control on both reservation wages and the number of applications that each individual 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. Table 5 summarizes the main OLS results, full estimation results are available in Tables A.2 and A.3 in the Appendix.

INSERT TABLE 5 ABOUT HERE

We find that reservation wages increase as individuals’ locus of control becomes more internal everything else equal (see upper part of Table 5). Specifically, a one standard

¹⁷The model also includes controls for demographic characteristics, human capital endowments, and previous employment histories.

¹⁸Full estimation results are available in Table A.1 in the Appendix.

¹⁹It 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.

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. The magnitude of these effects are consistent with McGee (2010) who finds that a one standard deviation increase in internality is associated with a 2.0 percent increase in young unemployed men's first reported reservation wage and with a 1.3 percent increase in reservation wages over all. 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. Moreover, 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 2.4 percent decrease in reservation wages. This effect becomes somewhat smaller (2.0 percent) once we control for an individual's personality traits, but remains strongly significant. Contrary to expectations, the extent to which an individual has an internal locus of control is also associated with a small, but significant, reduction in reservation wages once we control for personality traits and external locus of control (see column 4).

Individuals with a more internal locus of control also search for jobs more intensively (see lower part of Table 5). 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 0.8 (approximately 5.3 percent) additional job applications. Unlike the case of reservation wages, this effect is driven by the degree to which one 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 (approximately 9.4 percent) applications. In comparison, McGee (2010) estimates that a one standard deviation increase in internality increases the hours of job search by more than 19 percent, but has no significant effect on the number of search methods utilized. This diversity of results across alternative measures of search intensity indicates that individuals' locus of control may affect not only how intensively they search for new jobs, but also the way they go about finding them. Finally, as before, the magnitude of our 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 full 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 use propensity score matching (PSM) to assess the impact of the locus of control on job search behavior. The primary motivation for applying PSM in this context is to make internal and external individuals as comparable as possible in all other characteristics so that we can more

directly compare differences in their search behavior.²⁰

To this end, we use the three locus of control indexes defined above to create binary indicator variables to categorize individuals into two groups based on their locus of control. Specifically, individuals are coded as having a highly internal locus of control (internal = 1) if they have a higher than average score on the full index and are coded as not having an internal locus of control (internal = 0) otherwise. We then use our internal index to create a second indicator of internality to separate individuals who score above average versus below average on this scale. Finally, we use our external index to distinguish between individuals who have a higher than average degree of externality (external = 1) from those who do not (external = 0). This leaves us with two groups ('high' vs 'low') for each index. We then use these three indicator variables to estimate three separate logit models of the probability of being classified as either 'internal' or 'external' (see Table A.4 in Appendix A). As before we consider two specifications; one with (columns 4-6 in Table A.4) and one without (columns 1-3) other personality traits. In order to focus on the effect of locus of control we need to include as many relevant variables in our model as possible. In addition to socio-demographic information, we also include human capital, personality characteristics and intergenerational variables (analogous to our OLS estimation in Tables A.2 and A.3). Based on these estimations we predict the propensity scores (e.g. the probability of having an internal locus of control) and use these scores in the subsequent matching process. Figure A.2 shows the distribution of the propensity scores in the different groups. For example, the first row shows the propensity score distribution based on the full index. Individuals who are more internal are depicted in the upper half of each graph, individuals who are more external are depicted in the lower half. Looking at the specification without other personality traits on the left hand side shows that the distribution in both groups is quite similar. However, if we include other personality traits the distribution becomes more unequal (see right hand side). This highlights the importance of respecting the common support region, i.e., comparing only 'comparable' individuals.

INSERT TABLE 6 ABOUT HERE

Propensity score matching results are presented in Table 6.²¹ Concentrating first on the internal-external distinction based on the full index, we find that people who are more internal have much higher reservation wages. If we do not control for the other personality traits the marginal effect of being internal is 3.2 percent; controlling for personality traits reduces the effect slightly to 2.7 percent. These effects are both strongly significant and economically important. Moreover, the matching statistics show that the matching procedure was very successful in balancing the distribution of covariates in both groups. To be more specific, the mean and median standardized differences (biasaft and mdbaft) in the covariates after matching are reduced to below 1.5 (and even 1.0 in most of the cases).

²⁰See Caliendo and Kopeinig (2008) or Imbens and Wooldridge (2009) for more details on the method.

²¹Results presented here are 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.

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 reservation wages rather than an internal locus of control in increasing them. Consistent with the OLS results, we find a strong negative impact of being external (ranging from 4.4 to 2.7 percent) on reservation wages, whereas there is no significant difference in the reservation wages of those who do and do not score higher than average on the internal index. This suggests that previous studies which use a one-dimensional locus of control measure to link self-efficacy to human capital investments generally (Coleman and Deleire, 2003; Cebi, 2007) and job search in particular (McGee, 2010) may be somewhat misleading.

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 1.1 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 2.4 and 3.0 more applications.

Overall, the propensity score matching results confirm our OLS results and internal locus of control does not have a significant negative effect on reservation wages any longer. This is reassuring, since we allow here for non-linearities in the outcome equation and more importantly assign different weights to each individual. Whereas OLS assigns all individuals the same weight in the estimation, the matching procedure allows a finer comparison between individuals in different categories by adjusting for differences in the distribution of covariates in a more efficient way (see, e.g., Abadie, Diamond, and Hainmueller, 2007).

5 Conclusions

Designing sensible public policy to assist unemployed individuals requires that we know more about their own job search decisions. In particular, why do some unemployed individuals invest more than others in finding new employment? Does believing that life's events are outside one's control lead to a relative lack of search effort? If so, can we design policies to promote self-efficacy among the unemployed?

This paper analyzes the link between individuals' locus of control and their decisions to invest in job search. We advance standard job search theory by developing a search model which incorporates individuals' subjective beliefs about the effect of their job search effort on the job offer arrival rate. This subjective belief depends on individuals' locus of control, i.e., the extent to which one believes that his or her actions affect future outcomes. We empirically estimate the impact of locus of control on job search behavior using novel linked survey and administrative data for a large sample of newly-unemployed Germans. We find that having an internal locus of control is associated with the belief that investments in job search have a higher payoff in terms of reemployment probabilities. Moreover, 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. Taken together, these results are consistent with a model of job search in 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.

These results advance our understanding of the role that individuals' self-efficacy plays in human capital investments generally, and job search in particular. At the same time, there are a number of challenges yet to be resolved. In particular, there is considerable divergence of results across uni- versus multi-dimensional notions of locus of control and alternative measures of search intensity (see McGee, 2010). It is important, therefore, to continue to refine our economic models of investment behavior to take these complexities into account. Moreover, there is a need for additional empirical research which estimates these key relationships for different labor market groups across a number of countries so that we can begin to understand how the institutional arrangements underpinning the unemployment benefits system might interact with individuals' sense of self-efficacy in driving job search. Finally, it would be useful to incorporate locus of control into dynamic models of the job search process. This would allow us to begin to understand the way that individuals' self-efficacy evolves over time in response to labor market events.

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Tables

Table 1: Components of Locus of Control

Variable	Mean	SD	Median
N	7896		
Components of Locus of Control (1: I do not agree at all, 7: I agree fully) ^(a)			
Q1. How my life takes course is entirely dependent on me	6.08	(1.27)	[7.00]
Q2. Compared to others, I have not achieved what I deserved	3.63	(1.94)	[4.00]
Q3. What one achieves is, in the first instance, a question of destiny and luck	3.45	(1.93)	[3.00]
Q4. When one is socially or politically committed, one can influence social circumstances ^(b)	3.85	(1.92)	[4.00]
Q5. I often experience that others make decisions about my life	2.82	(1.86)	[2.00]
Q6. Success is gained through hard work	6.26	(1.15)	[7.00]
Q7. When I encounter difficulties in life, I often doubt my abilities	3.37	(1.86)	[3.00]
Q8. The possibilities I have in life are dependent on social circumstances	4.49	(1.66)	[5.00]
Q9. More important than all efforts is to exercise one's own abilities	5.24	(1.40)	[5.00]
Q10. I have little control over things which happen in my life	2.67	(1.78)	[2.00]

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

^(a) Individuals were asked the following question: "The following statements characterize different attitudes towards life and the future. To what extent do you personally agree with these statements? Please answer on the basis of a scale of 1 to 7."

^(b) This item is observed for only 7,858 individuals.

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

Table 2: Selected Descriptive Statistics by Locus of Control

Variable	Full Index ^(a)		t-test p-value
	External	Internal	
N	3940	3956	
<i>Socio-Demographic Variables</i>			
West Germany	0.69	0.68	0.66
Female	0.53	0.48	0.00
German citizenship	0.94	0.96	0.00
Age	36.80	34.42	0.00
Married (or cohabiting)	0.41	0.38	0.00
One Child	0.19	0.19	0.82
Two (or more) Children	0.15	0.14	0.23
School Leaving Degree			
None, Special needs, other	0.03	0.02	0.02
Lower Secondary School	0.32	0.26	0.00
Middle Secondary School	0.42	0.44	0.05
Specialized upper Secondary School	0.23	0.28	0.00
<i>Employment History</i>			
Months in Unemployment (div. by age-18)	0.85	0.71	0.00
Months in Employment (div. by age-18)	8.20	8.16	0.80
Unemployment Benefit Recipient (yes)	0.79	0.80	0.34
Level of Unemployment Benefit in €/month (missings=0)	503.15	548.86	0.00
Employment status before Unemployment			
Employed	0.67	0.65	0.06
Subsidized Employment	0.07	0.06	0.22
School, Apprentice, Military, etc.	0.12	0.18	0.00
Maternity Leave	0.05	0.05	0.63
Other	0.09	0.06	0.00
Months in regular employment in Year $t - x$ Before Unemployment			
t-1	6.71	6.75	0.71
t-2	6.47	6.73	0.03
t-3	6.06	6.28	0.07
Ln(Wage) in Euro in Year $t - x$ Before Unemployment			
t-1	2.81	2.77	0.31
t-2	2.63	2.67	0.33
t-3	2.41	2.46	0.27
<i>Other Personality Traits and Intergenerational Transmission</i>			
Big-5 (7 = completely applies, 1 = does not apply) ^(b)			
Openness	4.96	5.07	0.00
Conscientiousness	6.13	6.39	0.00
Extraversion	5.48	5.86	0.00
Neuroticism	4.56	3.85	0.00
Intergenerational: Father has A-Level qualifications?			
Not known	0.06	0.06	0.54
Yes	0.14	0.16	0.03
No	0.80	0.79	0.12
Intergenerational: Father in employment when interviewee was 15 years old?			
Not known (or already dead)	0.11	0.10	0.24
Yes	0.84	0.85	0.07
No	0.06	0.05	0.19
<i>Other Variables</i>			
Available Means of communication:			
Landline Phone	0.86	0.85	0.86
Mobile	0.91	0.95	0.00
Computer	0.83	0.87	0.00
Printer	0.75	0.79	0.00
Internet	0.73	0.78	0.00
Email	0.70	0.77	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. Descriptive statistics for all variables are available on request from the authors.

(a) The 'Full Index' aggregates all standardized answers in the following way: "Q1 + Q6 + Q9 - (Q2 + Q3 + Q5 + Q7 + Q8 + Q10)" (see also Figure 1). Individuals are coded as having an internal (external) locus of control if they score higher (lower) than average on the standardized index.

(b) The fifth BIG-5 item "agreeableness" is not observed for all of the individuals.

Table 3: Job Search Behavior by Locus of Control

Variable	Full Index		t-test
	External	Internal	p-value
N	3940	3956	
Hourly Reservation Wage (in Euro)	7.33	7.72	0.00
Log(Reservation Wage)	1.94	1.99	0.00
Number of Search Channels (Mean)	5.10	5.11	0.72
Number of Own Applications (Mean)	14.96	16.68	0.00
0	0.06	0.04	0.00
1-4	0.21	0.19	0.09
5-9	0.21	0.21	0.88
10-19	0.25	0.25	0.59
20-29	0.14	0.15	0.31
30+	0.14	0.16	0.00
Expected probability of finding a job in the next 6 month (1=very probable, 4=very improbable) ^(a)	1.78	1.58	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	0.10

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.

^(a) This information is observed for 3,539 individuals with external locus of control and 3,566 individuals with internal locus of control.

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

	(1)	(2)	(3)	(4)
Number of Own Applications	-.001***	-.002***	-.0005	-.0006
Number of Own Applications x LOC (Full Index, Dummy)	0.002***	0.002***		
Number of Own Applications x LOC (Internal Index, Dummy)			0.0009*	0.001*
Number of Own Applications x LOC (External Index, Dummy)			-.001***	-.001***
Full Index (Standardized)	0.063***	0.052***		
Internal Index (Standardized)			0.042***	0.03***
External Index (Standardized)			-.052***	-.046***
Including Control Variables ^(a)	Yes	Yes	Yes	Yes
Including Other Personality Traits ^(b)	No	Yes	No	Yes
Obs.	7105	7105	7105	7105
Pseudo R-2	0.084	0.089	0.084	0.09
log-Likelihood	-4510.948	-4483.402	-4509.012	-4482.807

Note: ***/**/* indicate significance at the 1%/5%/10%-level. Indices are standardized in the following way: $Index_i^{st} = (Index_i - Mean(Index))/SD(Index)$.

^(a) Full estimation results are available in Table A.1 in the Appendix.

^(b) Openness, Conscientiousness, Extraversion, Neuroticism.

Table 5: OLS Estimation Results: Log(Reservation Wage and Search Intensity (Number of Own Applications))

	(1)	(2)	(3)	(4)
<i>(A) Log Reservation Wage</i>				
Full Index (Standardized)	0.019***	0.013***		
Internal Index (Standardized)			-0.002	-0.006*
External Index (Standardized)			-0.024***	-0.020***
Obs.	7896	7896	7896	7896
Adjusted R-2	0.310	0.315	0.311	0.316
<i>(B) Search Intensity (Number of Own Applications)</i>				
Full Index (Standardized)	0.840***	0.304		
Internal Index (Standardized)			1.482***	1.031***
External Index (Standardized)			-0.160	0.241
Obs.	7896	7896	7896	7896
Adjusted R-2	0.022	0.027	0.025	0.028
Including Control Variables ^(a)	Yes	Yes	Yes	Yes
Including Other Personality Traits ^(b)	No	Yes	No	Yes

Note: ***/**/* indicate significance at the 1%/5%/10%-level. Indices are standardized in the following way: $Index_i^{st} = (Index_i - Mean(Index))/SD(Index)$.

^(a) Full estimation results are available in Tables A.2 and A.3 in the Appendix.

^(b) Openness, Conscientiousness, Extraversion, Neuroticism.

Table 6: Propensity Score 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	0.0321	0.0080	4.0126	3956	3940	0	0.6907	0.5559
	yes	0.0273	0.0083	3.2801	3956	3940	14	0.9919	0.7486
Internal Index ^b	no	-0.0012	0.0061	-0.1996	3860	4036	2	0.6647	0.4997
	yes	-0.0050	0.0077	-0.6526	3860	4036	1	1.3926	1.2231
External Index ^c	no	-0.0439	0.0081	-5.4181	3975	3921	0	0.6463	0.4785
	yes	-0.0273	0.0091	-3.0103	3975	3921	2	0.8617	0.5841
Outcome Variable: Search Intensity									
Full Index ^a	no	1.0601	0.4959	2.1374	3956	3940	0	0.6907	0.5559
	yes	0.1726	0.5826	0.2962	3956	3940	14	0.9919	0.7486
Internal Index ^b	no	3.0245	0.5398	5.6034	3860	4036	2	0.6647	0.4997
	yes	2.4024	0.6039	3.9779	3860	4036	1	1.3926	1.2231
External Index ^c	no	-0.5025	0.5522	-0.9099	3975	3921	0	0.6463	0.4786
	yes	0.0301	0.5674	0.0531	3975	3921	2	0.8617	0.5841

Note: Results presented here are 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.

^(a,b,c) Individuals are coded as having an internal locus of control if they score higher than average on the standardized 'Full Index' and 'Internal Index'. Individuals are coded as having an external locus of control if they score higher than average on the standardized 'External Index'. We compare the 'high' and the 'low' groups within each index.

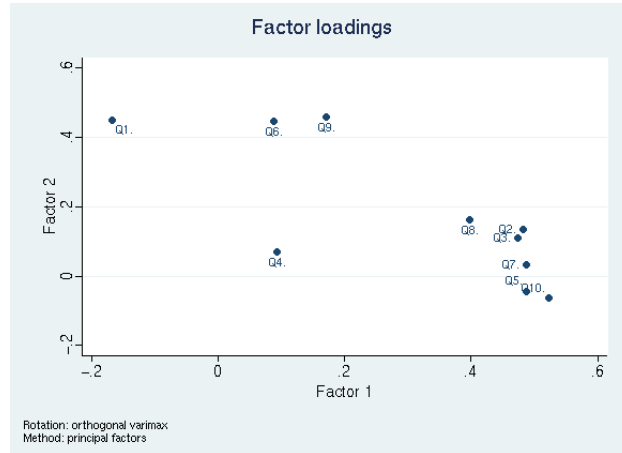
⁽¹⁾ The first specification does not include other personality traits as explanatory variables in the propensity score estimation; the second specification does (see Table A.4 for details and Figure A.2 for score distributions).

⁽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 and median standardized bias after matching.

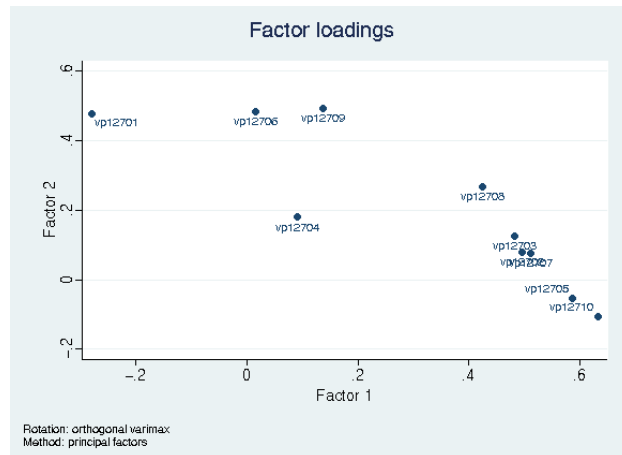
Figures

Figure 1: Factor Loadings of the LOC Variables

Our Sample



Representative Population Sample (SOEP)

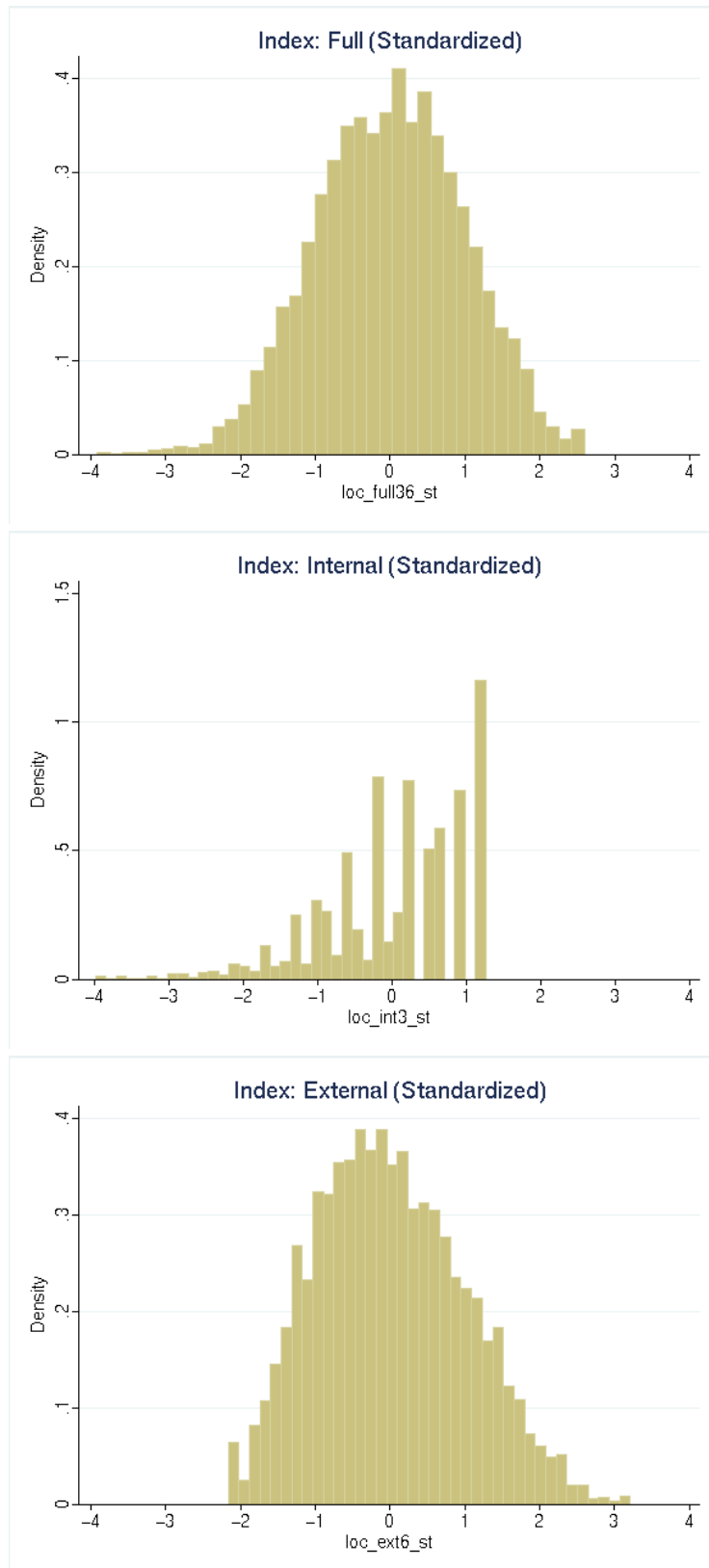


Note: Factor 1 is interpreted as ‘External Locus of Control’; Factor 2 as ‘Internal Locus of Control’.

- (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)”.

The variable Q.4: “Social/Political engagement can change things” loads on a third factor and is not used.

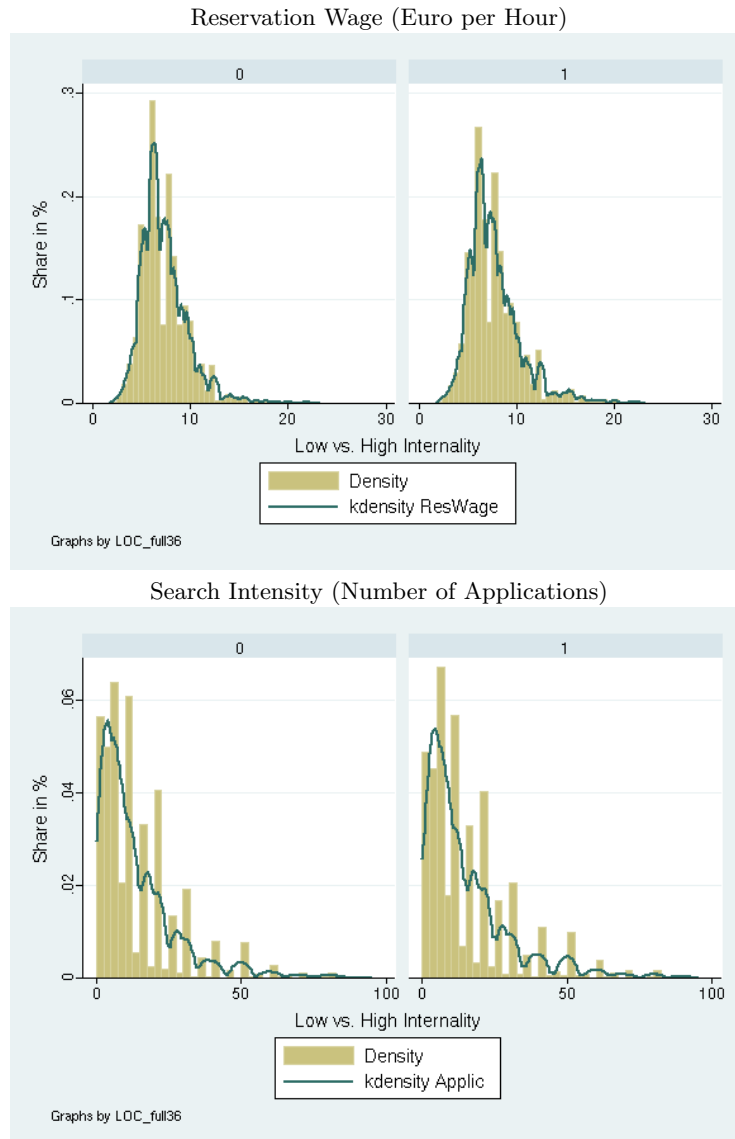
Figure 2: Distribution of Alternate Locus of Control Indices



Note: See Figure 1 for a definition of the different indices. Indices are standardized in the following way: $Index_i^{st} = (Index_i - Mean(Index))/SD(Index)$.

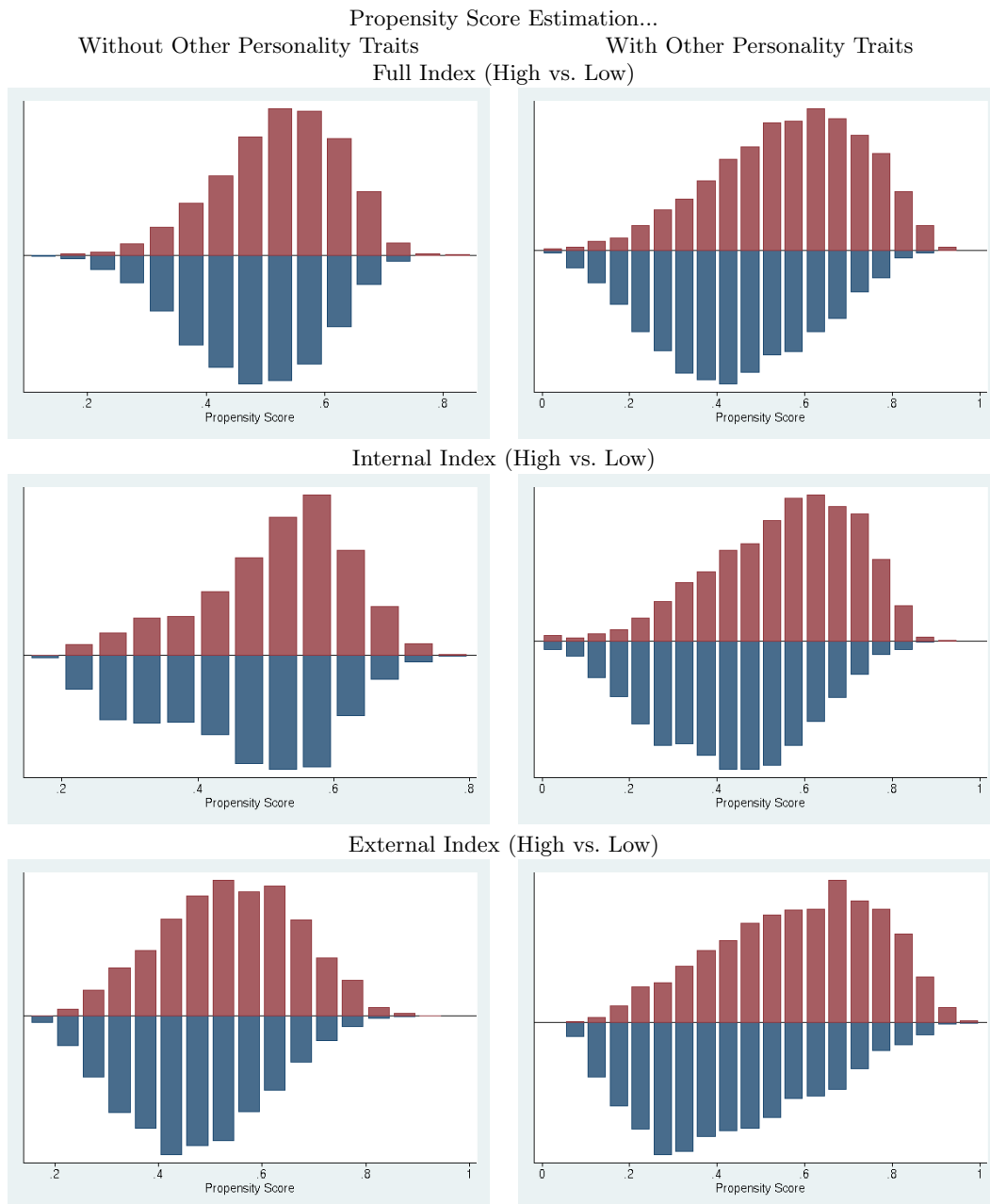
A Supplementary Tables and Figures

Figure A.1: Distribution of Reservation Wages and Number of Applications by Locus of Control



Source: *IZA Evaluation Dataset*, own calculations.
People with internal (external) locus of control based on the 'Full Index' are depicted on the right (left) hand side.

Figure A.2: Propensity Score Distribution



Note: The specification on the right hand side includes other personality traits (openness, conscientiousness, extraversion, neuroticism), in the propensity score estimation whereas the specification on the left hand side does not. See Table A.4 for detailed estimation results.

Table A.1: Probit Estimation Results: Probability of Finding a Job is Very High (Marginal Effects)

	(1)	(2)	(3)	(4)
Number of Own Applications	-0.001***	-0.002***	-0.0005	-0.0006
Number of Own Applications x LOC (Full Index, Dummy)	0.002***	0.002***		
Number of Own Applications x LOC (Internal Index, Dummy)			0.0009*	0.001*
Number of Own Applications x LOC (External Index, Dummy)			-0.001***	-0.001***
Full Index (Standardized)	0.063***	0.052***		
Internal Index (Standardized)			0.042***	0.03***
External Index (Standardized)			-0.052***	-0.046***
Openness		0.026***		0.026***
Conscientiousness		0.005		0.005
Extraversion		0.019***		0.019***
Neuroticism		-0.008*		-0.009**
West Germany	0.019	0.012	0.021	0.013
Female	-0.094***	-0.099***	-0.095***	-0.098***
German citizenship	-0.035	-0.028	-0.035	-0.028
Married (or cohabiting)	-0.057***	-0.054***	-0.058***	-0.055***
Children				
No Children				
One Child	0.007	0.008	0.008	0.008
Two (or more) Children	-0.032	-0.030	-0.031	-0.031
Age (17-24 years)				
Age (25-34 years)	0.038*	0.035*	0.037*	0.034*
Age (35-44 years)	-0.023	-0.026	-0.024	-0.027
Age (45-55 years)	-0.145***	-0.146***	-0.146***	-0.147***
School Leaving Degree				
None, Special needs, other				
Lower Secondary School	0.03	0.028	0.029	0.026
Middle Secondary School	0.043	0.04	0.046	0.041
Specialized upper Secondary School	0.066	0.064	0.072*	0.066
Vocational training				
None				
Internal or external professional training, others	0.001	0.004	0.002	0.005
Technical college or university degree	0.016	0.02	0.02	0.022
Months in Unemployment (div. by age-18)	-0.024***	-0.023***	-0.024***	-0.023***
Months in Employment (div. by age-18)	0.001	0.001	0.001	0.001
Unemployment Benefit Recipient (yes)	-0.013	-0.010	-0.014	-0.010
Level of UB (log(ben+1),mis=0)	0.004	0.004	0.004	0.004
Employment status before Unemployment				
Employed				
Subsidized Employment	-0.030	-0.030	-0.030	-0.030
School, Apprentice, Military, etc.	0.004	0.006	0.005	0.006
Maternity Leave	-0.165***	-0.165***	-0.164***	-0.165***
Other	-0.071***	-0.067***	-0.071***	-0.068***
Months in regular employment in				
t-1	-0.007***	-0.007***	-0.007***	-0.006***
t-2	0.001	0.001	0.0008	0.0008
t-3	-0.008***	-0.008***	-0.008***	-0.008***
Ln(Wage) in Euro in				
t-1	0.022***	0.021***	0.022***	0.021***
t-2	0.024***	0.024***	0.024***	0.024***
t-3	0.023***	0.023***	0.024***	0.024***
Intergenerational: Intergenerational: Father has A-level qualifications?				
Not known				
Yes	-0.014	-0.019	-0.015	-0.021
No	0.002	-0.002	0.001	-0.003
Intergenerational: Father in employment when interviewee was 15 years old?				
Not known (or already dead)				
Yes	-0.002	0.0004	-0.002	0.001
No	-0.019	-0.012	-0.017	-0.012
Living Situation				
Own appartement/house				
Rent	-0.006	-0.009	-0.006	-0.009
Subletting	0.048	0.046	0.047	0.046
Other	0.128	0.134	0.124	0.131
Without	-0.048	-0.057	-0.052	-0.060
Available Means of Communication:				
Landline Phone	-0.048**	-0.042**	-0.048**	-0.042**
Personal Mobile Phone	0.047*	0.037	0.047*	0.037
Computer	-0.015	-0.018	-0.014	-0.017
Printer	-0.034	-0.032	-0.033	-0.032
Internet	0.012	0.015	0.01	0.013
Email	0.028	0.022	0.031	0.024
Local UE Rate at Interview (below 5%)				
5-10%	-0.044**	-0.046**	-0.045**	-0.046**
10-15%	-0.059**	-0.064**	-0.061**	-0.065**
15+%	-0.112***	-0.117***	-0.113***	-0.118***
Obs.	7105	7105	7105	7105
R-2	0.084	0.089	0.084	0.09
log-Likelihood	-4510.948	-4483.402	-4509.012	-4482.807

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 A.2: OLS Estimation Results: Log(Reservation Wage)

	(1)	(2)	(3)	(4)
Full Index (Standardized)	0.019***	0.013***		
Internal Index (Standardized)				
External Index (Standardized)			-0.002	-0.006*
Personality Traits			-0.024***	-0.020***
Openness		0.015***		0.016***
Conscientiousness		-0.002		0.001
Extraversion		0.004		0.005*
Neuroticism		-0.010***		-0.008***
West Germany	0.143***	0.139***	0.141***	0.136***
Female	-0.111***	-0.108***	-0.109***	-0.108***
German citizenship	-0.011	-0.007	-0.009	-0.006
Married (or cohabiting)	-0.004	-0.001	-0.003	-0.001
Children No Children (Reference cat.)				
One Child	0.029***	0.029***	0.028***	0.029***
Two (or more) Children	0.063***	0.064***	0.062***	0.063***
Age (17-24 years)				
Age (25-34 years)	0.086***	0.085***	0.087***	0.086***
Age (35-44 years)	0.133***	0.132***	0.134***	0.133***
Age (45-55 years)	0.144***	0.145***	0.145***	0.146***
School Leaving Degree:				
None, Special needs, other (ref.)				
Lower Secondary School	0.039*	0.039*	0.037*	0.038*
Middle Secondary School	0.05**	0.049**	0.046**	0.045**
Specialized upper Secondary School	0.132***	0.13***	0.124***	0.121***
Vocational training				
None (ref.)				
Internal or external professional training, others	0.075***	0.076***	0.074***	0.074***
Technical college or university degree	0.224***	0.223***	0.22***	0.22***
Months in Unemployment (div. by age-18)	-0.018***	-0.017***	-0.018***	-0.017***
Months in Employment (div. by age-18)	0.0006	0.0006	0.0006	0.0006
Unemployment Benefit Recipient (yes)	-0.066***	-0.064***	-0.065***	-0.063***
Level of UB (log(ben+1),mis=0)	0.012***	0.012***	0.012***	0.012***
Seeking Self-Employment	0.048***	0.044***	0.049***	0.045***
Employment status before UE (Employed)				
Subsidized Employment	-0.002	-0.0008	-0.001	-0.00004
School, Apprentice, Military, etc.	-0.028**	-0.028**	-0.029**	-0.029**
Maternity Leave	0.002	0.004	0.002	0.004
Other	-0.0009	0.0009	-0.001	0.001
Months in regular employment in t-1	-0.005***	-0.005***	-0.005***	-0.005***
t-2	0.0005	0.0005	0.0005	0.0006
t-3	-0.001	-0.001	-0.001	-0.001
Ln(Wage) in Euro in t-1	0.011***	0.01***	0.011***	0.01***
t-2	0.012***	0.012***	0.012***	0.012***
t-3	0.011***	0.011***	0.011***	0.011***
Intergenerational: Father has A-level qualifications?				
Not known				
Yes	0.037**	0.033**	0.036**	0.032**
No	0.003	0.0007	0.003	0.0007
Intergenerational: Father in employment when interviewee was 15 years old?				
Not known (or already dead)				
Yes	0.005	0.006	0.004	0.006
No	0.015	0.017	0.013	0.016
Living Situation				
Own appartement/house				
Rent	-0.007	-0.009	-0.007	-0.009
Subletting	-0.036**	-0.038**	-0.035**	-0.036**
Other	-0.008	-0.003	-0.005	-0.001
Without	0.016	0.018	0.017	0.017
Available Means of Communication:				
Landline Telephone	-0.028***	-0.025**	-0.028***	-0.025**
Personal Mobile Phone	0.034***	0.03**	0.035***	0.031**
Computer	-0.009	-0.009	-0.009	-0.009
Printer	0.0004	-0.0004	-0.0005	-0.0008
Internet	0.022	0.024	0.021	0.023
Email	0.033**	0.029**	0.032**	0.028**
Local UE Rate at Interview (below 5%)				
5-10%	-0.030***	-0.031***	-0.030***	-0.031***
10-15%	-0.036***	-0.038***	-0.035***	-0.037***
15+%	-0.029*	-0.032*	-0.029*	-0.032*
Obs.	7896	7896	7896	7896
Adjusted R-2	0.31	0.315	0.311	0.316

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 A.3: OLS Estimation Results: Search Intensity (Number of Own Applications)

	(1)	(2)	(3)	(4)
Full Index (Standardized)	0.84***	0.304		
Internal Index (Standardized)			1.482***	1.031***
External Index (Standardized)			-1.160	0.241
Personality Traits				
Openness		0.265		0.213
Conscientiousness		1.443***		1.266***
Extraversion		0.534**		0.466*
Neuroticism		-0.345*		-0.510***
West Germany	2.047**	1.878*	2.259**	2.060**
Female	-0.415	-0.727	-0.612	-0.735
German citizenship	-0.891	-0.704	-1.001	-0.814
Married (or cohabiting)	-0.898	-0.842	-0.932	-0.857
Children No Children (Reference cat.)				
One Child	-0.901	-0.935	-0.890	-0.922
Two (or more) Children	-1.577*	-1.576*	-1.460	-1.502*
Age (17-24 years)				
Age (25-34 years)	-3.011***	-3.138***	-3.068***	-3.159***
Age (35-44 years)	-3.971***	-4.143***	-4.016***	-4.180***
Age (45-55 years)	-4.162***	-4.304***	-4.286***	-4.400***
School Leaving Degree:				
None, Special needs, other (ref.)				
Lower Secondary School	0.029	-0.009	0.144	0.101
Middle Secondary School	-0.397	-0.563	-0.009	-0.242
Specialized upper Secondary School	-1.202	-1.252	-0.433	-0.655
Vocational training				
None (ref.)				
Internal or external professional training, others	-0.030	-0.037	0.074	0.067
Technical college or university degree	1.590	1.610	1.915	1.860
Months in Unemployment (div. by age-18)	0.29	0.328	0.277	0.316
Months in Employment (div. by age-18)	0.051	0.042	0.049	0.042
Unemployment Benefit Recipient (yes)	-1.491	-1.422	-1.531	-1.472
Level of UB (log(ben+1),mis=0)	0.258	0.249	0.265	0.258
Seeking Self-Employment	0.215	0.11	0.107	0.043
Employment status before UE (Employed)				
Subsidized Employment	1.016	0.989	0.968	0.94
School, Apprenticeship, Military, etc.	0.387	0.506	0.454	0.551
Maternity Leave	-3.568**	-3.320**	-3.494**	-3.270**
Other	0.697	0.86	0.706	0.851
Months in regular employment in years $t - x$ before unemployment				
t-1	-0.282***	-0.276***	-0.284***	-0.277***
t-2	-0.014	-0.013	-0.016	-0.013
t-3	-0.046	-0.043	-0.046	-0.044
Ln(Wage) in Euro in $t-1$	0.502*	0.461	0.504*	0.465
t-2	0.272	0.272	0.269	0.27
t-3	-0.170	-0.173	-0.167	-0.170
Intergenerational: Father has A-level qualifications?				
Not known				
Yes	1.169	1.200	1.256	1.252
No	0.307	0.298	0.314	0.296
Intergenerational: Father in employment when interviewee was 15 years old?				
Not known (or already dead)				
Yes	0.43	0.473	0.465	0.495
No	1.221	1.434	1.348	1.500
Living Situation				
Own appartement/house				
Rent	1.094*	1.021*	1.088*	1.020*
Subletting	1.402	1.369	1.277	1.267
Other	-4.152	-4.102	-4.379	-4.250
Without	1.457	1.526	1.413	1.542
Available Means of Communication:				
Landline Telephone	-1.481	-1.301	-1.482	-1.313
Personal Mobile Phone	2.650**	2.419**	2.572**	2.388**
Computer	-1.749	-1.801	-1.789	-1.831
Printer	2.381**	2.430**	2.460**	2.453**
Internet	2.469*	2.491*	2.500*	2.553*
Email	-0.052	-0.188	0.051	-0.126
Local UE Rate at Interview (below 5%)				
5-10%	0.838	0.802	0.794	0.766
10-15%	1.766	1.628	1.660	1.566
15+%	1.752	1.652	1.748	1.662
Obs.	7896	7896	7896	7896
Adjusted R^2	0.022	0.027	0.025	0.028

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 A.4: 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	0.053	-.325***	-.216**	-.010	-.378***	-.180**
Female	-.206***	0.122**	0.349***	-.160***	-.109**	0.173***
German citizenship	0.118	0.033	-.024	0.206	0.13	-.059
Married (or cohabiting)	0.096*	0.118**	-.046	0.131**	0.103*	-.096
Children						
No Children						
One Child	0.007	-.015	0.01	-.0006	-.023	0.022
Two (or more) Children	-.020	-.082	-.047	-.053	-.059	0.004
Unemployment Benefit Recipient (yes)	-.281***	-.051	0.087	-.263**	-.018	0.065
Level of UB (log(ben+1),mis=0)	0.052***	0.013	-.018	0.051***	0.01	-.016
Local UE Rate at Interview (below 5%)						
5-10%	0.119*	0.093	-.089	0.11	0.085	-.078
10-15%	0.211**	0.151*	-.130	0.174*	0.097	-.111
15+%	0.093	-.007	-.125	0.058	-.034	-.099
Personality Traits						
Openness				-.050**	0.047**	0.082***
Conscientiousness				0.393***	0.509***	-.141***
Extraversion				0.24***	0.223***	-.161***
Neuroticism				-.358***	0.124***	0.468***
Intergenerational: Father worked at age 15						
Not known (or already dead)						
Yes	0.008	-.081	-.270**	0.006	-.036	-.273**
No	-.011	0.0004	-.193*	-.020	0.026	-.196*
Intergenerational: Father upper Schooling						
Not known						
Yes	0.015	-.068	0.07	0.023	-.069	0.069
No	-.097	-.172	0.073	-.050	-.114	0.048
Living Situation						
Own appartement/house						
Rent	-.036	-.009	0.004	-.064	-.035	0.019
Subletting	-.129	0.046	0.272**	-.135	0.032	0.283**
Other	-.524	0.078	0.628*	-.469	0.028	0.556
Without	0.571	0.336	-.649	0.553	0.25	-.690
Available Means of Communication:						
Landline Phone	-.116	-.138*	0.051	-.068	-.103	0.012
Mobile	0.274***	0.132	-.119	0.19**	0.04	-.057
Computer	0.133	-.122	-.012	0.146	-.128	-.004
Printer	-.057	-.034	0.019	-.123	0.004	0.111
Internet	-.263**	-.034	0.006	-.198*	-.032	-.096
Email	0.459***	0.017	-.352***	0.349***	-.034	-.238**
Age (17-24 years)						
Age (25-34 years)	-.092	0.036	0.146**	-.101	-.005	0.133*
Age (35-44 years)	-.378***	-.127*	0.366***	-.433***	-.154*	0.412***
Age (45-55 years)	-.666***	-.142*	0.692***	-.683***	-.166*	0.705***
School Leaving Degree						
None, Special needs, other						
Lower Secondary School	0.008	-.011	-.040	-.038	-.100	-.024
Middle Secondary School	0.201	-.296**	-.329**	0.082	-.408***	-.241
Specialized upper Secondary School	0.215	-.784***	-.619***	0.099	-.849***	-.521***
Vocational training						
None						
Internal or external professional training, others	0.191**	-.164**	-.208**	0.183**	-.209**	-.224***
Technical college or university degree	0.358***	-.469***	-.536***	0.314***	-.488***	-.503***
Months in Unemployment (div. by age-18)	-.073***	0.013	0.08***	-.054***	0.02	0.065***
Months in Employment (div. by age-18)	0.009**	0.008*	-.007	0.005	0.004	-.004
Employment status before Unemployment						
Employed						
Subsidized Employment	0.017	0.013	0.141	-.005	0.015	0.185*
School, Apprentice, Military, etc.	0.123	-.086	-.153*	0.147*	-.058	-.165*
Maternity Leave	0.016	-.029	-.137	0.084	0.02	-.202
Other	-.252***	-.123	0.192**	-.220**	-.079	0.18*
Months in regular employment in						
t-1	0.011	0.003	0.005	0.017*	0.004	0.0009
t-2	0.01	0.013	-.014	0.014	0.011	-.019**
t-3	-.002	0.007	0.009	-.002	0.008	0.01
Ln(Wage) in Euro in						
t-1	-.060**	-.025	0.037	-.083***	-.034	0.055**
t-2	0.021	0.004	-.009	0.021	0.004	-.008
t-3	0.012	-.020	-.024	0.008	-.020	-.022
Obs.	8910	8910	8910	8910	8910	8910
R ²	0.036	0.039	0.055	0.106	0.096	0.129
log-Likelihood	-5956.52	-5930.809	-5837.284	-5523.382	-5582.509	-5381.61
e(hitrate)	59.012	59.495	61.268	66.049	65.432	67.486

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.

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:

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

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:

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

Rearranging the above expression yields:

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

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:

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

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

The reservation wage is given by:

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

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 respect 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

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

Substituting this expression into equation 15 we get:

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

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:

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

Rearranging the above expression yields:

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

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:

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

Rearranging the above expression yields:

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

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