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Do Employers Use Unemployment as a Sorting Criterion When Hiring?

Evidence from a Field Experiment



Abstract

The stigma associated with long-term unemployment spells could create large inefficiencies in labor markets. If employers discriminate against job seekers with employment gaps in their CVs, this will exacerbate high unemployment rates and suggests a role for policy interventions aimed at helping unemployed workers compete for jobs. While the existing literature points toward large stigma effects, it has proven difficult to estimate causal relationships. In this study, we use unique data from a field experiment where almost 8,500 fictitious job applications were sent to employers advertising for workers. All worker characteristics, including the worker's history of past and contemporary unemployment, are randomly assigned in the experiment. Our empirical analysis provides three important results concerning employers' hiring behavior. First, past spells of unemployment do not matter for employers, even spells in excess of one year. We interpret this as evidence that the opposite findings in the non-experimental literature are explained by unobserved heterogeneity rather than by (past) unemployment spells having a causal effect. Second, employers do not treat contemporary, short-term unemployment spells of up to 6 months differently, which suggests that employers understand that it takes time for workers to find a good worker/firm match. Third, strong non-linear patterns in the effects suggest that employers use heuristics when hiring. For low/medium skill jobs they ascribe a strong negative value to contemporary unemployment spells lasting at least 9 months, lowering the probability of receiving a callback for a job interview by twenty percent. In contrast, for high skill jobs employers ascribe a strong positive value to past employment spells of at least two years. These findings suggest that employers use different hiring strategies and signals depending on the skill level of the job. All of these results have important implications for policy focused on reducing unemployment.

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“This has never happened in the post-war period in the United States. They are losing the skills they had, they are losing their connections, their attachment to the labor force.”

–Ben Bernanke, *Chairman of the Federal Reserve*.

1 Introduction

Recently, the US labor market has started to resemble European labor markets with high unemployment and long unemployment spells. In 2011, the US unemployment rate was nine percent and more than 30 percent had been unemployed for more than one year (OECD, 2012). This rise in long-term unemployment is remarkable and the current fraction is more than two and a half times higher than in 2008. Also worrying, is the rise in youth unemployment. In many European countries, unemployment is close to ten percent and up to 50 percent are long-term unemployed.

Given these events, the stigma associated with long-term unemployment spells could create large inefficiencies in labor markets. If employers discriminate against jobseekers with a history of unemployment, unemployed workers will have a hard time finding jobs, it will be very difficult to bring down high unemployment, and there will be scope for policy measures aimed at helping unemployed workers compete for jobs. Hence, it is crucial for policymakers to be informed about the causal effects of experiencing unemployment.

The effects of unemployment on labor market outcomes have received a lot of attention in the literature.¹ Most of the existing studies, often using administrative/survey data on individual labor market outcomes, find that a worker’s history of unemployment has a clear negative association with both wages and employment. However, observational studies face the challenge of separating the effects of unemployment from the effects of other important worker characteristics which are observed by the recruiting firms but not included in the datasets. Thus, the risk of biased estimates due to unobserved heterogeneity is substantial. Researchers have used a

¹ In the literature, these effects are often referred to as scarring or state dependence. The negative effect of the length of the contemporary unemployment spell is usually referred to as duration dependence. An example of the attention the potential negative effects of experiencing unemployment has received is the 2001 special issue of the *Economic Journal*; see Arulampalam *et al.* (2001).

number of approaches to attempt to handle this problem; e.g. making distributional assumptions about unobserved factors, or using instrumental variable techniques (e.g. Gregg, 2001). However, these approaches have inherent weaknesses; e.g. requiring strong distributional assumptions or the existence of appropriate instruments.² To obtain better identification of the causal effects, some recent studies rely on exogenous events or sibling data (e.g. Åslund and Rooth, 2007, and Nordström Skans, 2011), but there are problems with these approaches as well.³

In this study, we provide new evidence on to what extent employers use information about job applicants' (un)employment history to sort workers when hiring. We conduct a field experiment where almost 8,500 fictitious job applications are designed and randomly sent to employers advertising for workers in a number of selected high and low/medium skill occupations.⁴ Information about the workers' employment history – past unemployment immediately after graduation, past unemployment between jobs, contemporary unemployment, work experience, and number of employers – are *randomly* assigned to the applications. Hence, we can identify the *causal effects* of all these factors on the probability of being invited to a job interview. The unemployment spell lengths were chosen to send strong and realistic signals. Our study is the first study which uses data from a field experiment to analyze the effects on the firms' recruitment decisions of all relevant aspects of the workers' employment history, and for jobs requiring different skill levels.⁵ The workers' employment history may affect them in many ways in the labor market, but clearly one of the most important effects is the extent to which employers use information about unemployment and work experience to sort workers when hiring.

The key advantage of using data from a field experiment instead of administrative/survey data is that it becomes less challenging to identify causal effects.

² Heckman and Borjas (1990), Lancaster (1990), and Machin and Manning (1999) discuss these issues in detail.

³ Such studies use exogenous events only affecting a particular subgroup (e.g. refugees), or use sibling data that take care of problems with unobserved characteristics which are common to the siblings but not other unobserved characteristics.

⁴ This is similar to the approach used in e.g. Bertrand and Mullainathan (2004) to study the effects of ethnicity.

⁵ Oberholzer-Gee (2008) and Kroft *et al.* (2012) investigate the effects of contemporary unemployment – i.e. duration dependence – using data from field experiments. These studies only consider low/medium skill jobs.

Since the employers make their choice of which applicants to invite to job interviews based only on the information in the applications, we can isolate the effect of each of the characteristics included in the applications. Since all relevant worker attributes are randomly assigned to the applications, there are no interdependencies among the regressors and there is no scope for unobserved heterogeneity. A limitation of this approach is that we only study the early stages of the hiring process since we do not know whom the employers eventually decide to hire. However, since it usually is too costly to interview all applicants, it is likely that easily observed characteristics, such as the workers' employment history, should matter most in the early stages of the hiring process when employers need to get a shortlist of applicants to evaluate more carefully.⁶

Our empirical analysis provides three important results concerning employers' hiring behavior. First, past spells of unemployment do not matter for employers, even spells in excess of one year. We interpret this as evidence that the opposite findings in the non-experimental literature are explained by unobserved heterogeneity rather than by (past) unemployment spells having a causal effect. Second, employers do not treat contemporary, short-term unemployment spells of up to 6 months differently, which suggests that employers understand that it takes time for workers to find a good worker/firm match. Third, strong non-linear patterns in the effects suggest that employers use heuristics when hiring. For low/medium skill jobs they ascribe a strong negative value to contemporary unemployment spells lasting at least 9 months, lowering the probability of receiving a callback for a job interview by twenty percent. In contrast, for high skill jobs, employers ascribe a strong positive value to past employment spells of at least two years. These findings suggest that employers use different hiring strategies and signals depending on the skill level of the job. All of these results have important implications for policy focused on reducing unemployment.

The rest of the paper is organized as follows. Section 2 contains a theoretical background and a discussion of the existing literature. Section 3 presents the field experiment and gives some descriptive statistics. Section 4 discusses identification and estimation issues, and presents the results. Section 5 concludes the paper and includes a policy discussion.

⁶ There is empirical evidence that recruiting employers often get many job applications. In a previous study, we asked Swedish employers how many job applications they typically receive per job opening: Approximately two thirds reported that they, on average, received more than 20 applications. For the US, studies show that firms often receive 10-30 applications per job opening (e.g. Barron *et al.*, 1997).

2 Theoretical background and previous studies

Before turning to the experiment and the empirical analysis, it is instructive to briefly consider why employers may use information about job applicants' (un)employment history when hiring, and to discuss the existing empirical literature in more detail.

There are several theoretical models explaining why employers may use information about *contemporary* unemployment to sort workers. Typically, the models emphasize skill loss and/or signaling effects (c.f. Phelps, 1972), and the focus is on why the exit rate from unemployment may fall with the length of the spell (i.e. duration dependence). Acemoglu (1995) formulates a model where it is costly for unemployed workers to maintain their skills and where employers cannot observe if the workers have done so. In the most likely equilibrium in his model, employers discriminate against the long-term unemployed, who, in reaction to this, let their skills deteriorate. Blanchard and Diamond (1994) propose an alternative explanation for duration dependence. In their model, employers who get many job applications per vacancy rank the applicants according to the length of their unemployment spell. One reason why employers may use such a hiring strategy is that they consider the length of the unemployment spell as a signal of low productivity. This idea is explored in Lockwood (1991).⁷ In his model, firms imperfectly test job applicants, and he shows that in equilibrium it is profitable for firms to condition their hiring decisions on the length of the applicants' unemployment spells.

A related question is if we should expect that employers use information about *past* unemployment to sort workers.⁸ In principle, there is no reason why employers should view past unemployment spells any differently than contemporary spells and, thus, the same theoretical models should apply. Therefore, we may expect employers to consider the total time spent in unemployment as the relevant sorting criterion. However, the fact that *past* unemployment spells are, by definition, followed by spell(s) of employment may offset their negative effect: Work experience may reverse the skill loss that has occurred during unemployment, and the value of the negative signal may

⁷ A similar model is Vishwanath (1989).

⁸ Heckman and Borjas (1980) distinguish between several types of state dependence; *occurrence dependence*, *lagged duration dependence*, and *duration dependence*. By these concepts, they mean that the probability of remaining unemployed depends on the number of past unemployment spells, the length of past unemployment spells, and the length of the current unemployment spell, respectively.

become less informative with time. Therefore, it is possible that past unemployment spells are less important for firms than contemporary spells.

In contrast to the potential negative effects of unemployment, work experience should be considered as a positive characteristic by recruiting employers: Work experience may provide workers' with general human capital through on-the-job training (c.f. Becker, 1964), and/or be viewed as a signal of attractive worker characteristics (c.f. Lockwood, 1991).⁹

Finally, the number of employers could have both a positive and a negative effect on the employers' sorting decisions. Experience from several firms may indicate that workers are flexible and have acquired many forms of general human capital, but may also indicate that they have a high propensity to quit or that they have been fired.

In the empirical literature, there are many studies using administrative/survey data on individual labor market outcomes to analyze the importance of the workers' (un)employment history. Examples of studies investigating the effects of the workers' history of unemployment on wages and/or employment are Heckman and Borjas (1980), Ellwood (1982), Concoran (1982), and Mroz and Savage (2006) using US data, Narendranathan and Elias (1993), Arulampalam *et al.* (2000), Arulampalam (2001, 2002), Gregory and Jukes (2001), Gregg (2001), Burgess *et al.* (2003), Gregg and Tominey (2005), and Bell and Blanchflower (2011) using UK data, Muhleisen and Zimmermann (1994) using German data, and Raaum and Røed (2006) using Norwegian data. Two studies using Swedish data are Åslund and Rooth (2007) that analyze an exogenous placement policy for refugees, and Nordström Skans (2011) that use sibling data. Most of these studies find negative effects, but the size of the effects varies. Examples of studies investigating the effects of contemporary unemployment include Blau and Robbins (1990), Belzil (1996), and Eriksson and Lagerström (2006, 2011), which all find evidence of negative effects. Oberholzer-Gee (2008) and Kroft *et al.* (2012) use data from field experiments to study how the duration of a contemporary unemployment spell affect the probability of getting a job interview. They find that employers view long spells of contemporary unemployment as a negative factor when recruiting for low/medium skill jobs, but they do not consider other aspects of the workers' employment history. We will return to the results in the latter study in Section 4. Also, there is evidence from survey- and interview-based studies that some

⁹ Lockwood (1991) focuses on the negative signal of spells of contemporary unemployment, but mentions in a note that spells of employment may be a similar positive signal.

employers view unemployment as a negative signal (e.g. Atkinson *et al.*, 1996, and Bewley, 1999). It should be noted that studies using Swedish administrative data typically find similar evidence of negative effects of unemployment as studies for other countries. For example, Nordström Skans (2011) show that being unemployed for more than 51 days after graduation, a spell length much shorter than the ones we consider, is associated with an increase in the probability of unemployment five years later by three percentage points.

Overall, the theoretical models suggest that there are strong reasons to expect that a worker's (un)employment history should affect the employers' hiring decisions, but do not give clear predictions about the relative importance of its various components. Moreover, given the problems with unobserved heterogeneity, the existing empirical literature does not give any definite answers to these important questions.

3 The field experiment¹⁰

The data we use is from a field experiment conducted in the Swedish labor market between March and November 2007. During this period all employment advertisements in selected occupations found on the website of the Swedish Public Employment Service were collected.¹¹ A clear majority of the employers posting vacancies on this site states that they prefer to get job applications by e-mail. In total, 8,466 job applications were sent by e-mail to 3,786 employers. Invitations to job interviews were received by telephone (voice mailbox) and e-mail. To minimize any inconvenience to the employers, all invitations were promptly declined. In this section, we describe how the occupations/regions included in the study were chosen and how the applications were designed. Then, we present some descriptive statistics.

3.1 The choice of occupations and regions

The objective when choosing which occupations and regions to include in the study was to get a representative picture of the labor market, while at the same time getting a design that was feasible to implement in practice.

¹⁰ The field experiment is part of a larger research project on discrimination in hiring. This particular experiment was designed to study the importance of various job applicant characteristics in the hiring process. Rooth (2011) investigates the effects of physical fitness and leisure sports activities using data from this experiment.

¹¹ This is biggest job search website in Sweden. In 2007, around 50 percent of all vacancies were reported to the Employment Service.

For the occupations, we wanted to include both high skill and low/medium skill occupations. Moreover, to get a high response rate, we chose to include only occupations with a relatively high demand for labor. In total thirteen occupations were included. We chose seven occupations which typically require primary or secondary education (low/medium skill jobs): Business sales assistant, cleaner, construction worker, machine operator, motor-vehicle driver, restaurant worker, and shop sales assistant. We chose six occupations which typically require university education (high skill jobs): Accountant, computer professional, nurse, math/science teacher in upper compulsory school, language teacher in upper compulsory school, and teacher in secondary school. Finally, we chose to apply for jobs in cities all over Sweden, but the majority of the jobs were located in the two biggest metropolitan areas, Stockholm (59 percent) and Gothenburg (24 percent).

3.2 The design of the job applications

The job applications were designed with the following considerations: First, the applications were constructed to appear realistic for a typical jobseeker looking for the advertised type of job. Second, to get a reasonably high response rate, the applications were designed to signal a well-qualified applicant. To implement this strategy in practice, we used a number of examples of applications on the website of the Employment Service as templates and adjusted them to suit our purposes. The applications consisted of a quite general biography on the first page and a detailed CV on the second page (see Appendix A for an example). Hence, Swedish job applications typically contain more information than what is common in countries such as the UK and the US, thus making Sweden an ideal country for conducting this type of field experiment in.

The typical approach in field experiments using the correspondence testing methodology is to vary only one characteristic in the applications, e.g. the ethnicity or gender of the applicant (c.f. Rich and Riach, 2002, and Carlsson and Rooth, 2007). However, in our experiment, we used a more general approach by randomly varying a number of characteristics. This allows us to measure the labor market return of different skills and attributes (c.f. Bertrand and Mullainathan, 2004, and Rooth, 2011).

The job applications were designed for young workers who search for a job a few years after graduating from secondary school or university. The applicants were randomly assigned a number of attributes which typically are included in (Swedish) job

applications and are expected to be important for the probability of being invited to a job interview. These attributes include past and contemporary spells of unemployment, work experience, formal education, characteristics intended to capture important personality traits, leisure activities, gender, and ethnicity.

In this study, we focus on the effects of the first three of these attributes, i.e. the applicants' (un)employment history, and do not explicitly analyze how the other attributes affect the probability of being invited to a job interview.¹² To investigate how employers respond to different types of information about the job applicants' employment history, five variables were randomly assigned to the job applications: Unemployment for a year immediately after graduating from secondary school or university (0/1), unemployment between jobs for a total of one year (0/1), contemporary unemployment (0, 3, 6 or 9 months), years of work experience (1, 2, 3, 4 or 5 years), and number of employers (1 or 3).

The first and third variables – the spells that start and end a worker's employment history – were randomly assigned irrespective of the other variables. Hence, these variables are, by construction, independent of all other attributes. Concerning the randomization of the other three variables, the applications were first randomly given one or three employers. If given one employer, 'years of work experience' was randomly given a value between one and five, while 'unemployment between jobs' was always given the value zero. If given three employers, 'years of work experience' was randomly given a value between three and five, while 'unemployment between jobs' was randomly given the value zero or one.¹³ This means that these three variables, by construction, are correlated. However, conditional on the variable 'number of employers', the variables 'unemployment between jobs' and 'years of work experience' are also independent of all other attributes. This is illustrated in Table 1, which shows the correlation matrix for the employment history variables.¹⁴

¹² Since these attributes are randomly assigned to the applications, they should not affect the estimates which we focus on. However, we include these variables in the regressions as a robustness check (c.f. Section 4.2).

¹³ Hence, the difference between 1 and 2, and 2 and 3, years of work experience is identified by applicants having one employer, while the difference between 3 and 4, and 4 and 5, years of work experience is identified by all applicants.

¹⁴ This is also illustrated in Table A1 in Appendix B where the means of some of the variables are presented for the different unemployment categories.

Information about the workers' history of unemployment was not explicitly stated in the applications, but could easily be extracted from the information given in the CV, i.e. unemployment was signalled by time gaps between the year of graduation¹⁵, employment spells etc. (c.f. Appendix A). If employers consider this information to be important, they should be able to find it in the CVs. To ensure that this information was easy to find, we conducted an experiment where 29 students in economics were presented with four CV's varying only in the information given about the duration of past and contemporary unemployment spells.¹⁶ Their task was to report the number of months as unemployed in the past and 'today' for each CV, amounting to eight tasks for each participant. For the CVs containing spells of past unemployment, the expected answer was 10 to 14 months depending on what month was given as 'end of school', while for the CVs containing spells of contemporary unemployment the expected answer was 9 months.¹⁷ Almost all participants were able to find this information.¹⁸ For past unemployment, 27 students gave an answer of more than 11 months, with a mean of 13.8 and a standard deviation of 3.9. For contemporary unemployment, 27 students gave an answer of more than 8 months, with a mean of 8.0 and a standard deviation of 1.6. In addition, informal discussions with a number of employers not participating in the experiment suggest that they had no difficulty finding this information in the CVs. Given these results, we are confident that our signals of unemployment are easily extracted from the CV's used in the experiment.

Our choices of unemployment spell lengths were made to include signals which are both strong and realistic. Nordström Skans (2011) shows that 22 percent of his sample of Swedish youth had unemployment spells longer than 51 days after graduation. For unemployment between jobs and contemporary unemployment, we used data on average unemployment spells as a guide. In 2007, the average completed spell length was 10 weeks for 16-24 year olds and 16 weeks for 25-54 year olds, while the corresponding uncompleted spell lengths were 13 and 27 weeks, respectively (SCB, 2011). Hence, since our choices of spell lengths are longer than the average duration for

¹⁵ In Sweden, the school year for both secondary schools and universities typically ends in June.

¹⁶ The mean age of the participants was 23 years and 61 percent were male.

¹⁷ The information on contemporary unemployment could be extracted from the month the last job ended until 'today's' date, while the information on past unemployment could be extracted from the year of graduation until the month the applicant started his or her first job or by time gaps between jobs (c.f. Appendix A).

¹⁸ Two students gave nonsense answers.

all types of unemployment we consider, they correspond to important margins and should induce strong signals in the CVs. However, in order to focus on typical unemployment spells, we did not include very long durations, such as e.g. contemporary unemployment spells lasting more than nine months. The total time spent in unemployment in the CVs varies between zero and 33 months.

A potential drawback with our approach is that we do not explicitly state that the gaps in the CVs are due to unemployment and hence some employers may perceive the time gaps as signals of absence for other reasons; e.g. travel, parental leave, etc. However, in Sweden, most job seekers explicitly state the reason for time gaps for such reasons in their CVs.¹⁹ Hence, we label the time gaps as unemployment throughout this paper, but the reader should keep in mind that some employers may perceive the gaps differently. Figures 1a-c illustrate the applicants' employment history for the three types of unemployment spells we focus on.

Given the design of the experiment, the applicants' age could not be randomly assigned. Instead, the applicants were given an age which fitted with their employment history.²⁰ This means that applicants applying for high skill jobs were 23-32 years old, and applicants applying for low/medium skill jobs were 20-31 years old. However, most of the applicants' were in a narrower age range.²¹ As will be discussed below, this design implies that age cannot be included as a variable in the regressions since it is perfectly collinear with the employment history variables (c.f. Section 4.1).

Concerning the workers' other characteristics, formal education was chosen to match the requirements of the advertised jobs. The workers' place of residence was chosen so that workers applying for jobs in all cities except Gothenburg were given an address in Stockholm, while applicants applying for jobs in Gothenburg were given an address in Gothenburg. The applicants were randomly assigned a male or a female name, which could be either a Swedish- or a foreign-sounding name (Middle Eastern). The names signaled a native Swedish male (one third of the applications), a native Swedish female (one third of the applications) and an ethnic minority male (one third of

¹⁹ The Employment Service strongly encourages job seekers to mention the reason for such time gaps.

²⁰ The age of the applicant can be found by calculating backwards from the date when the application was constructed, using time spent in employment, time spent in unemployment, time spent in education and time spent abroad during secondary school.

²¹ 95 percent of the applicants for high skill jobs were 24-30 years old, and 93 percent of the applicants for low/medium skill jobs were 20-27 years old.

the applications).²² The rest of the attributes were randomly assigned. For personality traits, two measures were used; agreeable and extrovert.²³ For leisure activities, a number of activities were included; individual sports (tennis, golf, running and swimming) and team-sports (soccer and basketball) at the competitive or recreational level, and other activities (socializing and cultural activities). We also included experience as a visiting high school student in the US, work experience during the summer breaks, and having more education than required.²⁴

3.3 Descriptive statistics

In total, 8,466 job applications were sent to 3,786 employers. Each employer was sent either one or three applications.²⁵ When three applications were sent to the same employer, one signaled a native Swedish male, one a native Swedish female and one an ethnic minority male. Moreover, the applications were given different layouts (randomly assigned) and were sent to employers over a period of a few days. Since the applications were sent in random order, the fact that we sent more than one application to some employers should not affect the results.²⁶

Table 2 presents descriptive statistics for the jobs we applied to. Approximately 37 percent of the applications were sent to firms with high skill jobs and 63 percent were sent to firms with low/medium skill jobs. The clear majority of the jobs were located in Stockholm or Gothenburg.

Table 3 presents the distribution of the attributes which are the focus in this paper; i.e. the job applicants' employment history. Around 20 percent of the applicants were assigned a period of unemployment immediately after graduation, 23 percent a period of unemployment between jobs, and 50 percent a period of contemporary unemployment.

²² The names used were Erik, Anna and Mohamed. In previous experiments, we included more names without finding any name effects, and we therefore decided upon using only these names in this experiment to simplify the experimental procedure.

²³ This was signalled by a short text in the biography; c.f. Rooth (2011) for the details.

²⁴ More education than required is that a worker with a university education applies for a low/medium skill job.

²⁵ Employers in Stockholm and Gothenburg were sent three applications, while employers in the rest of Sweden were sent one application. This was done to avoid suspicion among employers in small cities who typically receive few job applications.

²⁶ By using information about the order the applications were sent to the employers, we tested whether ordering effects are important and find them not to be. Carlsson and Rooth (2007) find similar evidence of no ordering effects in a study using a similar experimental design.

This means that around 70 percent of the applicants were assigned at least one spell of unemployment. The fractions were chosen to ensure that we should be able to estimate any economically significant effects of these attributes (i.e. based on power calculations).

In total, the applicants got 2,083 invitations to job interviews from employers. Table 4 presents some descriptive statistics for the probability of getting an invitation to an interview for workers with different attributes. The overall response rate is 0.25, but the response rate is higher for high skill jobs (0.30) than for low/medium skill jobs (0.21).²⁷ There are some differences between workers depending on their employment history: Workers with spells of unemployment have received fewer responses, but the differences are rather small; i.e. in the range 0.01 to 0.02. Also, workers with more work experience have, in general, received more responses.

4 Estimation and results

Our objective is to analyze the importance of the workers' (un)employment history on their probability of being invited to a job interview. In this section, we describe the identification/estimation strategy and present the results.

4.1 Identification and estimation

Due to the design of the field experiment, identification of the causal effect of the workers' (un)employment history on their probability of being invited to a job interview is very straightforward. All worker attributes are randomly assigned to the applications and we have complete control over the information available to the employers. The fact that all relevant worker attributes are randomly assigned means there are no interdependencies among the regressors (c.f. Section 3.2), while the fact that the employers' choices are based only on the information in the written applications means that there is no unobserved heterogeneity. These features imply that we can estimate the model with the measures of the applicants' employment history as the only explanatory variables. However, since we have a finite sample, we include all other worker

²⁷ These callback rates are similar to the callback rates found in previous Swedish studies, e.g. Carlsson and Rooth (2007), but somewhat higher than the callback rates found in US studies (c.f. Bertrand and Mullainathan, 2004). A partial explanation for this difference is that we include high skill jobs with much higher callback rates, while most US studies only include low/medium skill jobs. In addition, our applicants are always well-qualified – in terms of formal education and work experience – for the jobs they apply for.

attributes in most regressions. This should give us unbiased estimates of how a worker’s employment history affects his or her probability of being invited to a job interview.

An important issue is how we should handle the fact that age, by construction, is highly correlated with the employment history variables. The key to identification of the employment history variables is that they were randomly assigned to the applications. Then, the applicants’ age was calculated given their employment history (c.f. Section 3.2). Therefore, identification of all the employment history variables is ensured as long as we do not include age in the regressions. The underlying assumption is that employers do not consider the applicants’ age as an important variable beyond its effect on their employment history.²⁸ In the case of our unemployment variables, applicants with and without a particular unemployment spell will always differ less than a year in age. As an example, consider two applications with the same work experience, but where one signals one year of unemployment and the other no unemployment. Then, the first applicant must be one year older than the second, and, hence, for identification we rely on the assumption that employers do not consider this small difference in age as important when hiring.

We do the estimation on the full sample as well as on two separate subsamples; jobs typically requiring a university education (high skill jobs) and jobs typically requiring a primary or secondary education (low/medium skill jobs). The reason for this division is that the design of the applications differs somewhat between high skill and low/medium skill jobs. Also, the labor market may function differently for workers with different skill levels.

We estimate the following baseline equation using the Probit model (reporting marginal effects²⁹, and clustering standard errors on the job advertisement level):

$$Callback_i = \alpha + \beta_1 U_i + \beta_2 EXP_i + \beta_3 EMP_i + \beta_4 X_i + \varepsilon_i, \quad (1)$$

²⁸ In studies using administrative/survey data, age is often used as a proxy variable for work experience. In our experiment, we randomly assign a worker with both work experience and spells of unemployment. Therefore, age should only be an important worker characteristic if employers view it as important for given levels of work experience and unemployment spells.

²⁹ The marginal effects are estimated using the `dprobit` command in Stata11. Using the linear probability model yields almost identical estimates.

where $Callback_i$ is an indicator which equals one if application i resulted in an invitation to a job interview, α is the intercept, β_1 gives the effect on the callback rate of unemployment (as a 0/1 variable or as the total time spent in unemployment in years), β_2 gives the effect on the callback rate of work experience (in years), β_3 gives the effect on the callback rate of the number of employers (1 or 3 employers), and β_4 is a vector with the coefficients of the explanatory variables included in X . The vector X always includes an ethnic minority indicator and a female indicator. In most regressions, we also include all the other worker attributes described in Section 3.2 and fixed effect for each of the occupations and regions.

To further analyze the effects of unemployment and work experience, we also estimate two additional equations. First, to investigate the effect of different types of unemployment, we estimate an equation with unemployment divided into its components; past unemployment immediately after graduation (0 or 12 months), past unemployment between jobs (0 or 2x6 months), and contemporary unemployment (0, 3, 6 or 9 months). Second, to investigate if work experience has a non-linear effect, we estimate an equation with work experience divided into three discrete categories (1, 2 or 3-5 years of work experience).

4.2 Results

In this section, we analyze how the job applicants' (un)employment history affects their probability of being invited to a job interview (the callback rate). The main results for the full sample are presented in Tables 5 and 6, while Tables 7 and 8 contain the results when we divide the data by the skill level of the job. We focus on the effects of the employment history variables, but it should be noted that we find a strong negative effect for ethnic minority males in all regressions, and mostly a positive effect for native Swedish females.³⁰

Total unemployment

In the specification in Table 5, we assume that employers consider all unemployment

³⁰ The ethnicity and gender effects are similar to the results in previous Swedish correspondence studies (e.g. Carlsson and Rooth, 2007). The somewhat unexpected result that women have a higher callback rate may partially be explained by the fact that several of the included occupations are female-dominated in Sweden.

spells as similar irrespectively of when they have occurred, i.e. that unemployment spells in the past contain the same negative signal as a contemporary unemployment spell. In the first two columns, we measure the applicants' total unemployment as a 0/1 variable. This means that we compare the two thirds of the applicants with an unemployment spell against the one third of the applicants without an unemployment spell, and find that there is no statistically significant difference in the callback rate. In the next two columns, we consider whether total time spent in unemployment matters; i.e. total time in years spent as unemployed since graduation. This variable has no statistically significant effect on the callback rate, and this does not change if we use a more flexible functional form in the estimation. In fact, all coefficients for unemployment are very close to zero and precisely estimated. This suggests that the results would not change even if we had conducted a much larger experiment. In contrast, we find that the benchmark variable, work experience, has a statistically significant positive effect in all regressions, increasing the callback rate by around one percentage point per year of work experience. The number of employers, i.e. 1 or 3, has no statistically significant effect. Moreover, the results do not change if we include all other worker attributes in the regressions (model A vs. model B).³¹ This confirms that the sample is large enough for the randomization of worker attributes to work as intended.³²

Interestingly, and opposite to what might be expected, these results suggest that employers do not use information about time spent in unemployment to sort workers, despite the fact that unemployment varies from three months to almost three years. Instead, our results suggest that employers use information about work experience as a sorting criterion. Hence, information about positive employment history characteristics seems to be more important for employers than negative employment history characteristics. However, this analysis hides important heterogeneities in the effect of different types of unemployment spells which we turn to next.

Past and contemporary unemployment

³¹ In the rest of the tables, we do not include the Model A specification since it always produces very similar estimates. These results are available upon request.

³² The sample size does not permit a subgroup analysis, but it is still reassuring that the point estimates for the three subgroups of native Swedish males and females and ethnic minority males are similar to the results for the full sample. These results are available upon request.

Table 6 presents the results for total unemployment divided into its different components. First, the finding in the previous section is confirmed since none of the measures of past spells of unemployment – either immediately after graduation or between jobs – have a statistically significant effect on the callback rate in any of the regressions. Also, these coefficients are fairly precisely estimated. Hence, employers do not seem to use information about past spells of long-term unemployment, i.e. spells in excess of one year, when hiring. One interpretation of this finding is that employers consider the skill loss which may have occurred during unemployment as reversible and/or that the negative signal of unemployment fades with time. If this is the case, we may expect that past unemployment should matter more for applicants with short durations of work experience. We have investigated this possibility by including interaction effects between the unemployment variable and the work experience variable, but find no statistically significant effect.³³ These results suggest that one year of work experience is enough to reverse the negative signal of one year of past unemployment.

Next we turn to whether the callback rate depends on the time spent in contemporary unemployment. Including this variable linearly (0, 3, 6 or 9 months) in the regression, we find no statistically significant effect on the callback rate. However, although the estimate of contemporary unemployment is not statistically significant, it is negative. Therefore, we investigate whether the effect differs non-linearly depending on the length of the unemployment spell. When we include separate measures for 0, 3, 6 and 9 months of contemporary unemployment, we find that the callback rate do not differ between the first three measures, but that it decreases, and almost becomes statistically significant at the ten percent level ($t=1.44$; $p=.14$) at 9 months of unemployment. This result suggests that long spells of contemporary unemployment may be considered as a negative signal. Next, we analyze if the results differ depending on the skill level of the job.

The skill level of the job

It is not possible to run the regressions for each occupation separately due to power issues in small samples. However, we can conduct a similar analysis by dividing the

³³ One potential reason for this is that we may analyze the wrong margin of experience. The right margin may be zero vs. some experience, a case we cannot consider since all applicants have at least one year of experience.

thirteen occupations into two broad categories; high and low/medium skill jobs (c.f. Section 3.1). Hence, in this section we estimate the same models as in Table 6, but divide the data according to the skill level of the job. The results are presented in Table 7. Since we now have fewer observations, especially for high skill jobs, we lose in precision, which should be kept in mind when interpreting the results. As in the previous section, we find no indication that employers view past unemployment spells negatively. This is true for both high and low/medium skill jobs. When we include contemporary unemployment linearly in the regressions, we find no effect for high skill jobs (column 1), but a negative effect for low/medium skill jobs (column 3; statistically significant at the ten percent level). However, this latter result hides an important non-linear effect: For low/medium skill jobs, the callback rate decreases dramatically at 9 months of unemployment. This effect is both statistically significant and important in magnitude. The effect corresponds to the effect of four years of work experience on the callback rate. Hence, employers do not seem to consider contemporary unemployment spells with a duration of up to 6 months as a negative characteristic, while a longer spell reduces the callback rate by around 20 percent (.039/.21). This non-linear effect is very similar to what has been found in a recent study using US data from a field experiment that only includes low/medium skill occupations (Kroft *et al.*, 2012). They find evidence of a 6 month threshold, with the callback rate decreasing by 50 percent at 6 months of unemployment and being stable afterwards. These results suggest that employers use heuristics when assessing job applicants' unemployment spells in these occupations, an issue that we will return to below.³⁴ Somewhat unexpectedly, we do not find a similar hiring threshold for long durations of contemporary unemployment for high skill jobs. In fact, the results suggest that the hiring procedure is inherently different for low/medium and high skill jobs. The difference in the estimate for 9 months of unemployment between the two categories is statistically significant at the ten percent level ($t=1.66$, $p=.097$). Next, we analyze the importance of work experience.

Thresholds for work experience

The results in the last section indicate that employers hiring for low/medium skill jobs use heuristics when they assess contemporary unemployment. Therefore, it is interesting to analyze if they use heuristics also for work experience. To analyze if this

³⁴ If we run the regressions occupation by occupation, a similar threshold is evident for each. Hence, the effect is not driven by a few occupations.

is the case, we divide the work experience variable into three separate measures; 1, 2 and 3-5 years of experience (all applicants have at least one year of experience). We use these categories both because the descriptive statistics indicate that these are the important margins (c.f. Table 3), and because the results get less precise when we divide the last category into three separate categories. The results in the first column in Table 8 do not indicate the existence of a specific threshold. However, these results hide an important difference between different types of jobs. Somewhat surprisingly, given the strong threshold effect for 9 months of contemporary unemployment for low/medium skill jobs, we do not find a similar threshold for work experience. The experience estimates are positive, but small in magnitude and rather imprecisely estimated. In contrast, for high skill jobs, there is a strong threshold effect between 1 and 2 years of work experience, where the callback rate increases by around eight percentage points. One interpretation of this result is then that an applicant for a high skill job must 'reach some hurdle', in terms of experience, to be considered interesting enough to warrant a job interview. The difference between low/medium and high skill jobs in the effects of 2 and 3-5 years of work experience are both statistically significant, with t-values of 1.97 (p-value=.05) and 1.85 (p-value=.06), respectively, once again suggesting that employers recruiting for low/medium and high skill jobs use inherently different hiring strategies in terms of the weights they put on information about unemployment and work experience.

Interpretation of the results

Our empirical analysis has provided three important results concerning employers' hiring behaviour. First, as long as the applicants' past spells of unemployment has been followed by at least one year of work experience, these spells do not seem to matter for employers. Hence, the negative signal of past unemployment spells seems to be offset by work experience, which may have reversed the skill loss that has occurred during unemployment. We interpret this as evidence that the opposite findings in the non-experimental literature are explained by unobserved heterogeneity rather than by past unemployment spells having a causal effect. Second, employers do not treat contemporary, short-term unemployment spells of up to 6 months differently. This suggests that employers understand that it takes time for workers to find a good worker/firm match. Third, strong non-linear patterns in the effects suggest that employers use heuristics when hiring: For low/medium skill jobs they ascribe a strong

negative value to contemporary unemployment spells lasting at least 9 months, while for high skill jobs they ascribe a strong positive value to past employment spells of at least two years. Our result for low/medium skill jobs is confirmed by a recent US study which finds a threshold for contemporary unemployment spells at 6 months (Kroft *et al.*, 2012). The US result suggests that the threshold may be related to the maximum duration of unemployment benefits, but our result contradicts this interpretation since Swedish unemployment benefits last for at least 60 weeks. However, a potential reason for the difference in the location of the threshold may be that a typical unemployment spell is shorter in the US.

These findings suggest that employers use different hiring strategies and signals depending on the skill level of the job. A potential explanation is that individual productivity matter more in high skill jobs. Hence, recruiting employers may be very concerned about finding the ‘best’ applicant and, therefore, use rigorous testing procedures for applicants who have ‘reached some hurdle’ in terms of work experience. For medium/low skill jobs individual productivity may matter less and employers may be more concerned about not hiring an applicant that is unable to do the job and, therefore, rely more on easily observed negative signals. Moreover, it may be that low skill jobs do not require that much experience, and, thus, that employers care more about whether applicants have zero or some experience, a margin we cannot analyze since all our applicants have at least one year of job experience.

*Robustness*³⁵

To check the robustness of the results, we have considered a number of alternatives and extensions. First, we have investigated if there are any correlations between the employment history variables and other applicant attributes. Such correlations should not exist since all applicant attributes are randomly assigned, but may arise in small samples. An analysis of this issue shows no sign of the existence of any such correlations (c.f. Table 1). To further ensure that all employment history variables are uncorrelated, we have run regressions with these variables as the dependent variable and all other relevant worker characteristics as explanatory variables. F-tests of joint significance show that we cannot reject the hypothesis that all coefficients are zero. In addition, we have experimented with including interaction effects between the applicants’ attributes, especially between the employment history variables. However,

³⁵ Detailed results are available upon request.

as in the previous section when work experience was interacted with past unemployment, we do not find any statistically significant interaction effects for other combinations. Second, we have investigated if differences in local labor market conditions between different occupational groups may affect the results. In Tables 5-8, fixed effects for each occupation and region were included, but we can extend this analysis by including interaction effects between the occupations and the regions in the regressions. Including such interactions do not affect the results. This indicates that differences in labor demand (i.e. unemployment) between occupations and regions do not affect how employers make decisions on whom to invite to a job interview. Third, we have investigated what happens if we include firm characteristics in the regressions. This should not affect the results since the applications are randomly assigned to the advertised jobs, still, we have tried including variables for some potentially important firm characteristics – sector, size and gender composition – in the regressions. Including these variables do not affect any of the results. Finally, we have run separate regressions for each of the occupations. For most occupations the samples are very small, and, therefore, the precision of the estimates is low and should be interpreted with caution. Still, we find that the qualitative picture is confirmed: For low/medium skill jobs, six of the seven point estimates of being unemployed for 9 months are negative, while for high skill jobs only two of six are negative. Overall, these robustness checks confirm that the main results appear stable across different specifications and extensions.

5 Concluding remarks

In the US, unemployment, especially youth and long-term unemployment, is reaching levels comparable to European countries. Economists have for a long time warned that unemployment may have both short and long-term consequences affecting workers' (future) labor market careers and, hence, the stigma associated with long-term unemployment spells could create large inefficiencies in labor markets. If employers discriminate against jobseekers with employment gaps in their CVs, this will exacerbate high unemployment rates and suggests a role for policy interventions aimed at helping unemployed workers compete for jobs. The existing empirical literature indicates that these stigma effects may be substantial, but it has proven difficult to estimate causal relationships.

In this study, we use unique data from a field experiment where almost 8,500 fictitious job applications were sent to employers advertising for workers. All worker

characteristics, including the worker's history of past and contemporary unemployment, are randomly assigned in the experiment. The spell lengths were chosen to send strong and realistic signals. The workers' employment history may have many effects, but clearly one of the most important effects is the extent to which employers use information about unemployment and work experience to discriminate between workers when hiring.

Our analysis provides three important results concerning employers' hiring behavior. First, past spells of unemployment do not matter for employers, even spells in excess of one year. Second, employers do not treat contemporary, short-term unemployment spells of up to 6 months differently. Third, strong non-linear patterns in the effects suggest that employers use heuristics when hiring: For low/medium skill jobs they ascribe a strong negative value to contemporary unemployment spells lasting at least 9 months, while for high skill jobs they ascribe a strong positive value to past employment spells of at least two years.

These results have important implications for policy focused on reducing unemployment. For unemployment insurance, our results highlight the importance of giving unemployed workers strong incentives for finding work within six months or so. If unemployment insurance is too generous, unemployed workers may search too little and, hence, risk extending their spells to durations where employers are reluctant to hire them. This may be prevented by letting replacement rates decline with the duration of the spell or by imposing strict time limits for the duration of benefits. In Sweden, unemployed workers meet a declining replacement rate, but benefits are paid for a very long time (unemployed workers are eligible for benefits for at least 60 weeks). In the US, benefits do not decline with the duration of unemployment, but benefits typically expire after 26 weeks. However, the current extension of US benefits to up to 99 weeks may be problematic for these reasons.

For labor market policy towards the unemployed, our results have several implications. First, labor market policy should not target the short-term unemployed. Our results suggest that employers understand that it takes some time for unemployed workers to find a suitable worker/firm match and, therefore, do not consider such spells as a negative characteristic. Second, labor market policy measures may be needed for workers who remain unemployed after 6 or 9 months. Our results suggest that employers consider such workers unattractive to hire, and, therefore, these workers may need help in finding jobs. The measures used should focus on giving unemployed

workers work experience. Our results suggest that one year of employment in a relevant job is enough to remove the negative signaling effect of past unemployment. This can be achieved by e.g. subsidized employment schemes. Finally, labor market policy should target unemployed workers with unattractive characteristics rather than unemployed workers in general. In contrast to the findings in the non-experimental literature, our results suggest that it is unobserved heterogeneity rather than the workers' history of unemployment that makes them unattractive to hire. Therefore, it may be more effective to design schemes that identify these negative characteristics, and then use training activities to improve these characteristics.

Our results highlight a number of issues that should be considered in future studies. The results indicate that employers use heuristics when hiring; i.e. 9 months of contemporary unemployment for low/medium skill jobs and 2 years of work experience for high skill jobs. Hence, an obvious question is why employers use these particular thresholds in their hiring decisions. Moreover, our results indicate that employers use different hiring strategies for low/medium skill jobs and high skill jobs – relying more on negative signals (unemployment) for low/medium skill jobs and positive signals (work experience) for high skill jobs. Some potential reasons for this were discussed in Section 4.2, but this is an interesting issue for future research.

There are some remaining issues which should be discussed. First, we can only investigate the effects of job applicants' (un)employment history in the early stages of the hiring process. Hence, we do not know to what extent these factors matter in the later stages of the hiring process in terms of hiring and/or wages. However, it is likely that easily observed characteristics, such as job applicant' (un)employment history, should matter most in the early stages of the hiring process when employers need to get a shortlist of applicants to evaluate more carefully since it often is too costly to interview all applicants. Second, it may be that employers who view unemployment as a strong negative signal use other – more informal – channels to find workers. However, since up to half of all vacancies in Sweden are reported to the Employment Service, this search channel should be fairly representative of the Swedish labor market. Third, it may be that the employers were unable to find the information about unemployment from the applications, or that they perceived the time gaps as signals of other – more legitimate – gaps in the workers' employment history. However, the student experiment strongly suggests that this information was easy to find, and if employers view unemployment as a strong negative characteristic, we should expect them to very

carefully screen the applications for this information. Moreover, job seekers are often given the advice to explicitly explain time gaps due to travel, parental leave, etc. in their CVs. Finally, it may be that the results are specific to Sweden and, therefore, not representative of the situation in other countries, such as the US during the current financial crisis. However, Sweden had a relatively high unemployment rate already in 2007 (around six percent). Moreover, it is not obvious that unemployment should be a stronger negative signal when unemployment is high (c.f. Mueller, 2010): Recruiting employers may be more selective during recessions, but the average quality of unemployed workers may improve during recessions when many workers are laid off due to redundancies and plant closings.

Overall, our results suggest that it is wrong to assume that experiences of unemployment always lead to serious negative consequences for the affected workers. One reason of why we find less evidence of negative effects than previous studies may be problems with unobserved heterogeneity in studies using observational data. Moreover, it may be that these factors matter more for wages than for employment or affect other important factors, such as labor force participation and job search. Clearly, more studies are needed to analyze the importance of these effects. From a methodological perspective, it would be beneficial if future studies use unconventional methods, such as field experiments, to bypass the problems with unobserved heterogeneity and better identify causal effects.

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Appendices

Table 1 Correlation matrix for the employment history variables

| Variable | 1 | 2 | 3 | 4 | 5 |
|----------------------------------|-------|--------|--------|--------|--------|
| 1. Unemployment after graduation | 1.000 | -0.013 | 0.020 | -0.034 | -0.007 |
| 2. Unemployment between jobs | | 1.000 | -0.020 | 0.312 | 0.602 |
| 3. Contemporary unemployment | | | 1.000 | 0.002 | -0.017 |
| 4. Work experience | | | | 1.000 | 0.523 |
| 5. Number of employers | | | | | 1.000 |

Notes: The matrix includes all 8,466 applications. ‘Unemployment between jobs’, ‘work experience’ and ‘number of employers’ is, by construction, correlated. However, conditional on the ‘number of employers’ these variables are uncorrelated. Conditional on having three employers, the correlation between ‘unemployment between jobs’ and ‘work experience’ is -0.009. Conditional on having one employer, the correlation is, by construction, zero since these workers cannot be unemployed between jobs.

Table 2. The jobs included in the field experiment

| Occupation | Number of applications | Fraction of all applications (%) |
|---|------------------------|----------------------------------|
| All | 8,466 | 100 |
| <i>High skill jobs:</i> | 3,158 | 37 |
| Accountant | 624 | 7 |
| Computer professional | 988 | 12 |
| Nurse | 443 | 5 |
| Math-science teacher in upper compulsory school | 344 | 4 |
| Language teacher in upper compulsory school | 312 | 4 |
| Teacher in secondary school | 447 | 5 |
| <i>Low/medium skill jobs:</i> | 5,308 | 63 |
| Business sales assistant | 1,511 | 18 |
| Cleaner | 553 | 7 |
| Construction worker | 471 | 6 |
| Machine operator | 368 | 4 |
| Motor vehicle driver | 701 | 8 |
| Restaurant worker | 574 | 7 |
| Shop sales assistant | 1,130 | 13 |
| <i>Location:</i> | | |
| Stockholm | 5,032 | 59 |
| Gothenburg | 1,989 | 24 |
| Rest of Sweden | 1,445 | 17 |

Note: High skill jobs refer to jobs typically requiring a university education, while low/medium skill jobs refer to jobs typically requiring primary or secondary education.

Table 3. The job applicants' employment history

| | High skill jobs (%) | Low/medium skill jobs (%) |
|--|------------------------|------------------------------|
| <i>Unemployment:</i> | | |
| No | 29 | 31 |
| Yes | 71 | 69 |
| <i>Past unemployment after graduation:</i> | | |
| No | 79 | 81 |
| Yes | 21 | 19 |
| <i>Past unemployment between jobs:</i> | | |
| No | 76 | 78 |
| Yes | 24 | 22 |
| <i>Contemporary unemployment:</i> | | |
| No | 49 | 50 |
| 3 months | 21 | 20 |
| 6 months | 14 | 15 |
| 9 months | 16 | 15 |
| <i>Work experience:</i> | | |
| 1 year | 14 | 15 |
| 2 years | 20 | 19 |
| 3 years | 30 | 30 |
| 4 years | 21 | 21 |
| 5 years | 15 | 15 |
| <i>Number of employers:</i> | | |
| 1 employer | 54 | 56 |
| 3 employers | 46 | 44 |

Note: High skill jobs refer to jobs typically requiring a university education, while low/medium skill jobs refer to jobs typically requiring primary or secondary education.

Table 4. The callback rates for workers' with different attributes

| | All | High skill jobs | Low/medium skill jobs |
|--|------|-----------------|-----------------------|
| All | 0.25 | 0.30 | 0.21 |
| <i>Unemployment:</i> | | | |
| No | 0.25 | 0.30 | 0.21 |
| Yes | 0.24 | 0.30 | 0.21 |
| <i>Past unemployment after graduation:</i> | | | |
| No | 0.25 | 0.30 | 0.22 |
| Yes | 0.24 | 0.29 | 0.21 |
| <i>Past unemployment between jobs:</i> | | | |
| No | 0.24 | 0.30 | 0.21 |
| Yes | 0.26 | 0.30 | 0.24 |
| <i>Contemporary unemployment:</i> | | | |
| No | 0.25 | 0.30 | 0.22 |
| 3 months | 0.25 | 0.30 | 0.23 |
| 6 months | 0.25 | 0.29 | 0.23 |
| 9 months | 0.23 | 0.31 | 0.18 |
| <i>Work experience:</i> | | | |
| 1 year | 0.21 | 0.25 | 0.19 |
| 2 years | 0.24 | 0.30 | 0.20 |
| 3 years | 0.25 | 0.31 | 0.22 |
| 4 years | 0.27 | 0.31 | 0.24 |
| 5 years | 0.25 | 0.30 | 0.22 |
| <i>Number of employers:</i> | | | |
| 1 employer | 0.24 | 0.30 | 0.20 |
| 3 employers | 0.26 | 0.30 | 0.23 |
| <i>Ethnicity and gender:</i> | | | |
| Native Swedish male | 0.27 | 0.32 | 0.24 |
| Native Swedish female | 0.29 | 0.36 | 0.26 |
| Ethnic minority male | 0.17 | 0.22 | 0.15 |

Notes: The callback rate is the number of invitations to job interviews divided by the number of applications in each group. High skill jobs refer to jobs typically requiring a university education, while low/medium skill jobs refer to jobs typically requiring primary or secondary education. Workers who have '3 employers' always have 3-5 years of work experience, while workers with '1 employer' have 1-5 years of work experience (c.f. Section 2.2).

Table 5. The effects of the workers' attributes on the callback rate (marginal effects).

| Variable | Model A | Model B | Model A | Model B |
|---|----------------------|----------------------|----------------------|----------------------|
| Total unemployment | -0.004 (0.010) | -0.007 (0.010) | - | - |
| Total duration of unemployment (in years) | - | - | -0.001 (0.008) | -0.006 (0.008) |
| Work experience (in years) | 0.010** (0.004) | 0.012*** (0.004) | 0.010** (0.004) | 0.012** (0.004) |
| Number of employers | 0.013 (0.011) | 0.010 (0.011) | 0.013 (0.012) | 0.012 (0.012) |
| Native Swedish female | 0.024** (0.009) | 0.026*** (0.009) | 0.024*** (0.009) | 0.026*** (0.009) |
| Ethnic minority male | -0.096*** (0.008) | -0.087*** (0.008) | -0.096*** (0.008) | -0.097*** (0.009) |
| Other attributes | No | Yes | No | Yes |
| Number of observations | 8,466 | 8,466 | 8,466 | 8,466 |

Notes: The table reports marginal effects for the probability of being invited to a job interview based on Probit regressions estimated with the `dprobit` command in Stata11. Model A includes only the variables included in the table, while Model B also includes control variables for personality traits, leisure activities, visiting US high school, work experience during the summer breaks, having more education than required, and fixed effects for each of the occupations and regions. The reference category is a native Swedish male with no past or contemporary unemployment and one employer. The standard errors (in brackets) are clustered at the job advertisement level. *** and ** denote statistical significance at the 1 and 5 percent levels, respectively.

Table 6. The effects of the workers' attributes on the callback rate (marginal effects), past and contemporary unemployment.

| Variable | | |
|--------------------------------------|----------------------|----------------------|
| Past unemployment after graduation | -0.010 (0.012) | -0.009 (0.012) |
| Past unemployment between jobs | 0.010 (0.014) | 0.010 (0.014) |
| Contemporary unemployment (in years) | -0.019 (0.016) | - |
| Contemporary unemployment 3 months | - | 0.005 (0.012) |
| Contemporary unemployment 6 months | - | 0.000 (0.014) |
| Contemporary unemployment 9 months | - | -0.019 (0.013) |
| Work experience (in years) | 0.012*** (0.004) | 0.012*** (0.004) |
| Number of employers | 0.004 (0.013) | 0.004 (0.013) |
| Native Swedish female | 0.026*** (0.009) | 0.026*** (0.009) |
| Ethnic minority male | -0.097*** (0.008) | -0.097*** (0.009) |
| Number of observations | 8,466 | 8,466 |

Notes: The table reports marginal effects for the probability of being invited to a job interview based on Probit regressions estimated with the `dprobit` command in Stata11. All regressions also includes control variables for personality traits, leisure activities, visiting US high school, work experience during the summer breaks, having more education than required, and fixed effects for each of the occupations and regions. The reference category is a native Swedish male with no history of past unemployment, no contemporary unemployment and one employer. The standard errors (in brackets) are clustered at the job advertisement level. ***, ** and * denote statistical significance at the 1, 5 and 10 percent levels, respectively.

Table 7. The effects of the workers' attributes on the callback rate (marginal effects), past and contemporary unemployment

| Variable | Low/medium skill jobs | | High skill jobs | |
|--------------------------------------|-----------------------|----------------------|----------------------|----------------------|
| Past unemployment after graduation | -0.006 [0.014] | -0.004 (0.014) | -0.017 [0.020] | -0.017 (0.020) |
| Past unemployment between jobs | 0.011 [0.017] | 0.011 (0.017) | 0.005 [0.025] | 0.005 (0.025) |
| Contemporary unemployment (in years) | -0.034* [0.020] | - | 0.002 [0.029] | - |
| Contemporary unemployment 3 months | - | 0.007 [0.015] | - | -0.001 [0.022] |
| Contemporary unemployment 6 months | - | 0.007 [0.016] | - | -0.015 [0.025] |
| Contemporary unemployment 9 months | - | -0.039** [0.015] | - | 0.008 [0.024] |
| Work experience (in years) | 0.009* [0.005] | 0.009* (0.005) | 0.017** [0.008] | 0.017** (0.008) |
| Number of employers | 0.017 [0.015] | 0.017 (0.015) | -0.016 [0.024] | -0.016 (0.024) |
| Native Swedish female | 0.019* [0.011] | 0.019* (0.011) | 0.039** [0.016] | 0.039** (0.016) |
| Ethnic minority male | -0.095*** [0.010] | -0.095*** (0.010) | -0.100*** [0.016] | -0.099*** (0.016) |
| Number of observations | 5,308 | 5,308 | 3,158 | 3,158 |

Notes: The table reports marginal effects for the probability of being invited to a job interview based on Probit regressions estimated with the `dprobit` command in Stata11. All regressions also includes control variables for personality traits, leisure activities, visiting US high school, work experience during the summer breaks, having more education than required, and fixed effects for each of the occupations and regions. The reference category is a native Swedish male with no history of past unemployment, no contemporary unemployment and one employer. The standard errors (in brackets) are clustered at the job advertisement level. ***, ** and * denote statistical significance at the 1, 5 and 10 percent levels, respectively.

Table 8. The effect of the workers' work experience on the callback rate (marginal effects)

| | All jobs | Low/medium skill jobs | High skill jobs |
|-------------------------|---------------------|--------------------------|---------------------|
| 2 years of experience | 0.034** (0.017) | 0.008 (0.020) | 0.079*** (0.030) |
| 3-5 years of experience | 0.050*** (0.015) | 0.028 (0.018) | 0.088*** (0.027) |
| Number of observations | 8,466 | 5,308 | 3,158 |

Notes: The table reports marginal effects for the probability of being invited to a job interview based on Probit regressions estimated with the `dprobit` command in Stata11. All regressions also includes total unemployment as well as control variables for personality traits, leisure activities, visiting US high school, work experience during the summer breaks, having more education than required, and fixed effects for each of the occupations and regions. The reference category is a worker with one year of work experience. The standard errors (in brackets) are clustered at the job advertisement level. ***, ** and * denote statistical significance at the 1, 5 and 10 percent levels, respectively.

Figure 1a. A worker's employment history if only one employer

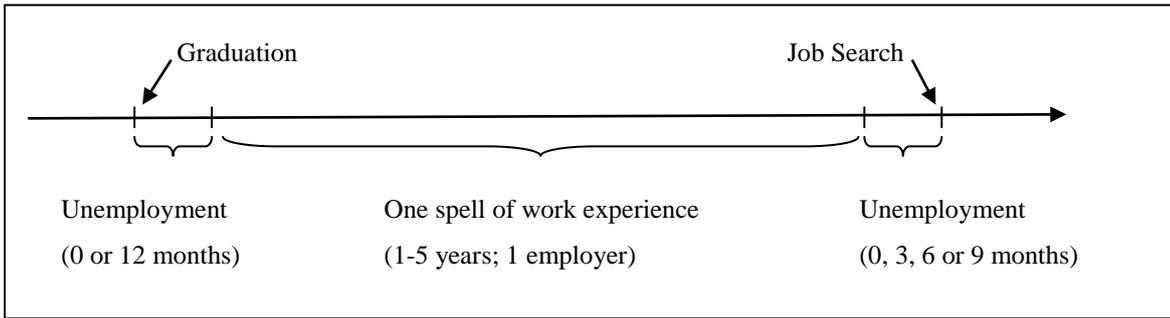


Figure 1b. A worker's employment history if no unemployment spells between jobs

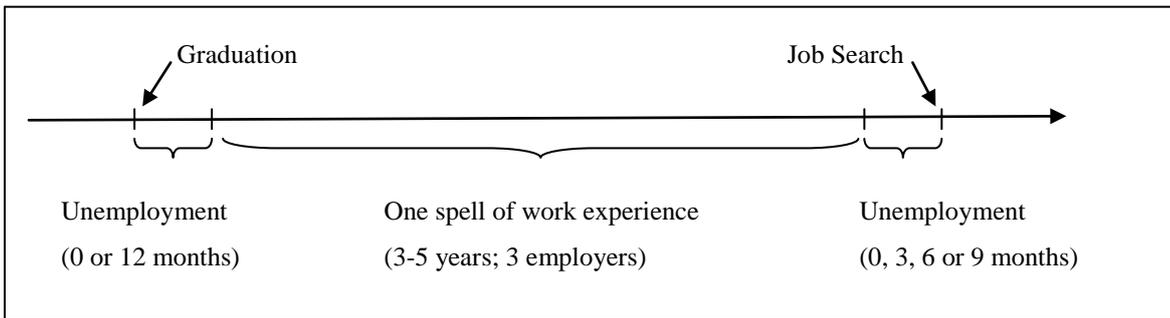
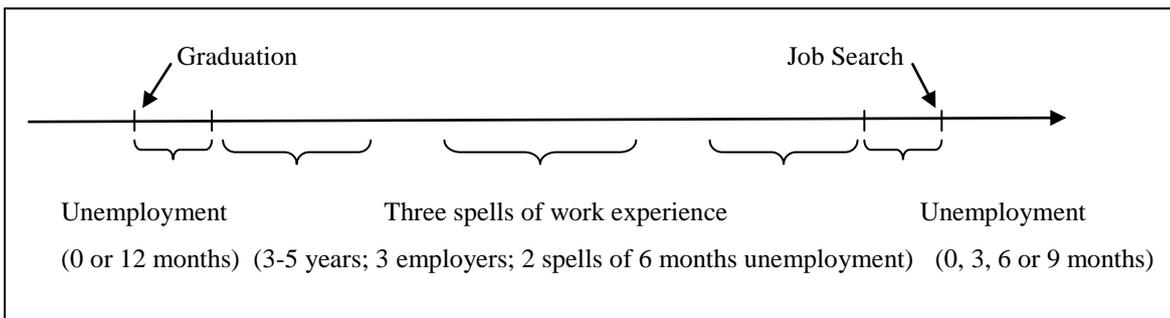


Figure 1c. A worker's employment history if unemployment spells between jobs



Appendix A: Example of an application (translated from Swedish)

Hi,

My name is Erik Johansson and I am 27 years old. I live in Stockholm with my girlfriend Anna. I work as a system designer at Telenor AB in an environment based on win2000/SQL Server. I participate in three different projects and my work involves development, maintenance and everyday problem-solving. Development work is done in ASP, C++ and Visual Basic and we use the development platform .Net and MS SQL. In addition, I have experience in HTML, XML, J2EE and JavaScript.

I enjoy working on development and problem-solving, and I now hope that I will develop further at your company. To my personal characteristics, one could add that I find it easy to work both on my own and in a group. I am a dynamic person who likes challenges. I really like my occupation, which I think is mirrored in the work I do. I have a degree in computer engineering. I graduated with good grades from Stockholm University.

I also like running. It is important for me to keep my body in shape by exercising regularly. Anna and I also like to socialize with our friends during weekends.

I look forward to being invited to an interview and I will then have my certificates and diplomas with me.

Best regards

Erik Johansson

CV

Name: Erik Johansson
Address: Eiravägen 4 F
18260 Djursholm
Telephone: 08 - 208 127
E-mail: ErikJohansson4@hotmail.com

Education:

1998 - 2002 Stockholm University, Stockholm, Computer Engineering, Masters Degree

1995 – 1998 Blackeberg High School, Stockholm, Natural Science Program

Job history:

0506 - 0704 Telenor AB, system designer

0306 - 0411 Dynacom AB, system designer

0204 - 0301 Freba AB, system designer

Other:

Languages: Swedish and English

Driving License: Yes

Operating Systems: Win 95/98/ME/2000/XP

Programming Languages: JSP, C++, Visual Basic, Erlang, Small Talk, ASP

Applications: Word, Excel, Microsoft Visual Studio 6.0, .Net, MatLab

Databases: SQL, ODBC

Note: From the information in this CV we conclude the following: He ended his university studies in June 2002 and started his first employment already in April the same year, that is, he had no unemployment spell immediately after graduation. He had three jobs from April 2002 until 'today' and was unemployed for a total of one year between these jobs. Finally, since he (we) applied for the new job in April 2007, he is currently employed, which is also mentioned in the biography.

Appendix B: Additional descriptive statistics

Table A1. The means of other characteristics by unemployment categories.

| Variables | All | Contemporary unemployment | | | | Past unemployment | |
|------------------------|-------------|---------------------------|-------------|-------------|-------------|-------------------|-------------|
| | | 0 months | 3 months | 6 months | 9 months | No | Yes |
| Work experience | 3.02 (1.27) | 3.02 (1.27) | 3.02 (1.25) | 3.07 (1.29) | 3.00 (1.27) | 2.82 (1.30) | 3.34 (1.14) |
| Native Swedish male | 0.33 (0.47) | 0.34 (0.47) | 0.35 (0.48) | 0.33 (0.47) | 0.32 (0.47) | 0.34 (0.47) | 0.32 (0.47) |
| Native Swedish female | 0.33 (0.47) | 0.33 (0.47) | 0.33 (0.47) | 0.32 (0.47) | 0.36 (0.48) | 0.33 (0.47) | 0.35 (0.48) |
| Ethnic minority male | 0.33 (0.47) | 0.33 (0.47) | 0.32 (0.47) | 0.35 (0.48) | 0.32 (0.47) | 0.33 (0.47) | 0.33 (0.47) |
| High skill job | 0.37 (0.48) | 0.36 (0.48) | 0.39 (0.49) | 0.35 (0.48) | 0.40 (0.49) | 0.36 (0.48) | 0.39 (0.49) |
| Low/medium skill job | 0.63 (0.48) | 0.64 (0.48) | 0.61 (0.49) | 0.65 (0.48) | 0.60 (0.49) | 0.64 (0.48) | 0.61 (0.49) |
| Stockholm | 0.59 (0.49) | 0.58 (0.49) | 0.59 (0.49) | 0.62 (0.49) | 0.61 (0.49) | 0.59 (0.49) | 0.60 (0.49) |
| Gothenburg | 0.23 (0.42) | 0.24 (0.43) | 0.23 (0.42) | 0.22 (0.42) | 0.23 (0.42) | 0.24 (0.43) | 0.23 (0.42) |
| Rest of the country | 0.17 (0.38) | 0.18 (0.38) | 0.17 (0.38) | 0.16 (0.37) | 0.16 (0.37) | 0.17 (0.37) | 0.18 (0.38) |
| Number of observations | 8,466 | 4,207 | 1,737 | 1,245 | 1,277 | 5,249 | 3,217 |

Notes: Past unemployment includes unemployment immediately after graduation or between jobs. Standard deviations within parentheses.