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## Do employers use unemployment as a sorting criterion when hiring? Evidence from a field experiment

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Evidence from a Field Experiment**

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# **Do Employers Use Unemployment as a Sorting Criterion When Hiring? Evidence from a Field Experiment**

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## ABSTRACT

### **Do Employers Use Unemployment as a Sorting Criterion When Hiring? Evidence from a Field Experiment<sup>\*</sup>**

In this paper, we use unique data from a field experiment in the Swedish labor market to investigate how past and contemporary unemployment affect a young worker's probability of being invited to a job interview. In contrast to studies using registry/survey data, we have complete control over the information available to the employers and there is no scope for unobserved heterogeneity. We find no evidence that recruiting employers use information about past unemployment to sort workers, but some evidence that they use contemporary unemployment to sort workers. The fact that employers do not seem to use past unemployment as a sorting criterion suggests that the scarring effects of unemployment may not be as severe as has been indicated by previous studies.

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Keywords: scarring, unemployment, field experiment

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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 2010, the US unemployment rate was 9.6 percent and close to 30 percent had been unemployed for more than one year (OECD, 2011). 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.

For an individual worker, periods of unemployment may have important social and economic consequences, especially if recruiting employers use information about past or contemporary unemployment to sort workers. If employers prefer not to hire 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 to help unemployed workers compete for jobs. Hence, it is crucial for policymakers to be informed about the causal effects of experiencing unemployment.

In this study, we analyze to what extent employers use information about the job applicants' employment history to sort workers when hiring. Specifically, we investigate if they use information about past unemployment immediately after graduation, past unemployment between jobs, contemporary unemployment and/or labor market experience as sorting criteria. To this end, we use unique data from a large field experiment conducted in

the Swedish labor market where fictitious job applications were designed and randomly sent to employers advertising for workers in a number of selected occupations.

There are two main reasons why employers may use information about the workers' history of unemployment to sort workers: employers may believe that the workers' skills deteriorate during the unemployment spell or that unemployment is an indicator of unattractive worker characteristics (c.f. Phelps, 1972). If many employers use unemployment as a sorting criterion, this implies that severe long-term *scarring* effects of unemployment may arise.<sup>1</sup>

The risk of scarring effects has received a lot of attention from both economists and policymakers.<sup>2</sup> These effects are typically studied using registry/survey data on individual labor market outcomes. Most of these studies find that a worker's history of unemployment has clear effects on both wages and employment. However, identifying the causal effects of past or contemporary unemployment on labor market outcomes is very difficult due to problems with unobserved heterogeneity. In studies using registry/survey data, it is difficult to separate 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 is substantial. There are a number of approaches which can be used to handle this problem; e.g. making distributional assumptions about unobserved factors, or using instrumental variable techniques (e.g. Gregg, 2001). However, these

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<sup>1</sup> The effects of past unemployment on labor market outcomes are often referred to as *scarring* or *state dependence*. Heckman and Borjas (1990) distinguish between several types of state dependence; *occurrence dependence*, *duration dependence*, and *lagged 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.

<sup>2</sup> In 2001, scarring was even the topic of a special issue of the Economic Journal; see Arulampalam *et al.*, 2001.

approaches have inherent weaknesses; e.g. requiring strong distributional assumptions or the existence of appropriate instruments.<sup>3</sup> Therefore, it is unclear to what extent such studies can identify causal effects. To obtain better identification, some recent studies rely on exogenous events or sibling data (e.g. Åslund and Rooth, 2007, and Nordström Skans, 2011), but there are some problems with these approaches as well.<sup>4</sup> To further improve our understanding of the importance of scarring effects, there is a need for studies which use new approaches to eliminate unobserved heterogeneity and identify causal effects.

In order to identify the causal effects of past and contemporary unemployment, we use a different approach compared to previous studies and focus explicitly on how the recruitment behavior of employers affects the potential for scarring to occur. Scarring may take many forms, but clearly one of the most important factors determining its importance is the extent to which employers use information about the job applicants' employment history to sort workers.

The key advantage of using data from a field experiment instead of registry/survey data is that it becomes much easier to identify the causal effects of scarring. 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. Hence, using this approach we have complete control over the information available to the employers and there is no scope for unobserved heterogeneity. In addition, the worker attributes are randomly assigned to the applications so there are no interdependencies among the regressors. A limitation of our approach is that we only study

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<sup>3</sup> Heckman and Borjas (1990), Lancaster (1990), and Machin and Manning (1999) discuss these issues in detail.

<sup>4</sup> 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.

the early stages of the hiring process since we do not know whom the employers eventually decide to hire. However, we believe that it is likely that easily observable characteristics, such as past or contemporary unemployment, should matter most in the early stages of the hiring process when the employers want to quickly get a shortlist of applicants to evaluate more carefully.

Our results show no evidence that recruiting employers use information about past unemployment, immediately after graduation or between jobs, to sort workers. However, we find some evidence that employers use contemporary unemployment – especially long-term unemployment – as a sorting criterion. In contrast, we find relatively clear evidence that employers use information about labor market experience as a sorting criterion. Moreover, we analyze some important subgroups, i.e. native Swedish men and women and ethnic minority men (with a Middle Eastern background), separately, and find that most of the results are similar across these groups. The fact that employers do not seem to use past unemployment as a sorting criterion suggests that the scarring effects of unemployment may not be as severe as has been indicated by previous studies.

As already mentioned, there are a number of empirical studies using registry/survey data on individual labor market outcomes to analyze the importance of scarring effects. Examples of studies investigating the effects of the workers' history of unemployment on wages and/or employment are Ellwood (1982), Concoran (1982), Heckman and Borjas (1990), 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 Raam 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 evidence of scarring 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 strong evidence of negative effects. Moreover, there is evidence from survey- and interview-based studies that some employers view unemployment as a negative signal (e.g. Atkinson *et al.*, 1996, and Bewley, 1999). It should be noted that studies using Swedish registry data find similar evidence of scarring as studies for other countries. For example, Nordström Skans (2011) show that an unemployment spell of more than 51 days subsequent graduation increases the probability of unemployment five years later by three percentage points.

We believe that our study offers several important contributions to the existing literature. In particular, our study is the first which uses data from a field experiment to analyze the effects of past or contemporary unemployment on labor market outcomes. This is important since this approach, as explained above, offers clear advantages in terms of identifying causal effects. Also, we explicitly separate the effects of different types of past and contemporary unemployment, and analyze the effects in important subgroups.

The rest of the paper is organized as follows. Section 2 presents the field experiment and gives some descriptive statistics. Section 3 discusses identification and estimation issues, and presents the results. Section 4 concludes the paper.

## **2. The field experiment<sup>5</sup>**

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 webpage of the Swedish Public Employment Service were collected. 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.

### **2.1 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 Swedish labor market, while at the same time getting a design that was feasible to implement in practice.

For the occupations, we wanted to include both high skill and medium/low skill occupations. Also, 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 in Sweden typically require secondary education: 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: accountant, computer professional, nurse, math/science teacher in upper compulsory school,

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<sup>5</sup> The field experiment was designed for a larger research project on discrimination in hiring and is also used in Rooth (2011) to study the importance of other characteristics.

language teacher in upper compulsory school, and teacher in secondary school. Finally, we chose to apply for jobs in cities all over Sweden. However, the majority of the jobs were located in the two biggest metropolitan areas, Stockholm (59 percent) and Gothenburg (24 percent).

## **2.2 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 job seeker 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 Swedish Public 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 the Appendix 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 the 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 given 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 included past and contemporary unemployment, labor market experience, 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' employment history, and do not explicitly analyze how the other attributes affect the probability of being invited to a job interview.<sup>6</sup> 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 (1-5 years of experience), 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 variables. 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.<sup>7</sup> This means

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<sup>6</sup> Since these attributes are randomly assigned to the applications, they do not affect the estimates which we are interested in.

<sup>7</sup> Hence, the difference between 1 and 2, and 2 and 3, years of work experience is identified by applicants having only one employer, while the difference between 3 and 4, and 4 and 5, years of work experience is identified by all applicants.

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 independent of all other variables. This is illustrated in Table 1, which shows the correlation matrix for the employment history variables.

Information about the workers’ history of unemployment was not explicitly stated in the applications, but could be extracted from the information given in the CV, i.e. unemployment were signalled by time gaps between the year of graduation<sup>8</sup>, employment spells etc. (see the Appendix for an example).<sup>9</sup> Figures 1a-c illustrate the applicants’ employment history for the three types of unemployment spells we focus on.

Our choices of unemployment spell lengths were made to include signals which were both strong and realistic. Nordström Skans (2011) shows that 22 percent of his sample of Swedish youth had unemployment spells longer than 51 days subsequent graduation. For unemployment between jobs and contemporary unemployment we use 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 choice of the spell lengths for all our types of unemployment are longer than the average duration, they correspond to important margins and should induce strong signals in the CVs.<sup>10</sup>

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

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<sup>8</sup> In Sweden, the school year for both secondary schools and universities ends in June.

<sup>9</sup> In another project, we interviewed employers about their hiring practices. Anecdotal evidence from that project indicates that a substantial fraction of the employers looked for time gaps in job applicants’ CVs in the hiring process.

<sup>10</sup> The total history of the unemployment spells in the CVs varies between zero and 33 months.

history.<sup>11</sup> This means that applicants applying for high skill jobs were 23-32 years old, and applicants applying for medium/low skill jobs were 20-31 years old. However, most of the applicants' were in a much narrower age range.<sup>12</sup> As will be discussed below, this design implies that age cannot be included as a variable in the regressions since it is perfectly linearly correlated with the employment history variables (c.f. Section 3.1).

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 native- 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 the applications).<sup>13</sup> The rest of the attributes were randomly assigned. For personality traits, two measures were used; agreeable (e.g. willingness to cooperate) and extrovert (e.g. hardworking).<sup>14</sup> 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

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<sup>11</sup> 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 university education and time spent abroad during secondary school.

<sup>12</sup> 95 percent of the high skill group were 24-30 years old, and 93 percent of the low/medium skill group were 20-27 years old.

<sup>13</sup> 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.

<sup>14</sup> This was signalled by a short text in the biography; c.f. Rooth (2011) for the details.

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.<sup>15</sup> A more detailed description of these attributes can be found in Rooth (2011).

### **2.3 Descriptive statistics**

In total, 8,466 job applications were sent to 3,786 employers. Each employer was sent either one or three applications. 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. Also, the applications were given different layouts (randomly assigned) and were sent to employers over a period of a few days (in random order).<sup>16</sup>

Table 2 presents descriptive statistics for the jobs which applications were sent to. Approximately 37 percent of the applications were sent to firms with high skill jobs and 63 percent were sent to firms with medium/low skill jobs. Also, 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. past and contemporary unemployment, and labor market experience. Around 20 percent of the job 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.

In total, the applicants got 2,083 invitations to interviews from employers. Table 4 presents some descriptive statistics for the probability of getting an invitation to an interview

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<sup>15</sup> More education than required is that a worker with a university education applies for a medium/low skill job.

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 medium/low skill jobs (0.21). There are some differences between workers depending on their employment history: Workers with past or contemporary 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 labor market experience have received more responses, especially for medium/low skill jobs.

### **3. Estimation and results**

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

#### **3.1 Identification and estimation**

Due to the design of the field experiment, identification of the causal effect of the workers' employment history on their probability of being invited to a job interview is very straightforward. First, we have complete control over the information available to the employers. This is the key advantage of using data from a field experiment: The employers' choices are based only on the information in the written applications and there is, by construction, no unobserved heterogeneity. Second, the worker attributes are randomly assigned to the applications meaning that there are no interdependencies among the regressors (c.f. Section 2.2). These features imply that we can estimate the model with the workers' employment history, gender and ethnicity as the only explanatory variables.

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<sup>16</sup> Employers in Stockholm and Gothenburg were sent three applications, while employers in the rest of Sweden were sent one application.



However, since we have a finite sample, we also estimate models which include all other worker characteristics included in the applications. Both of these approaches 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 2.2). Thus, 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.<sup>17</sup> In the case of our unemployment variables, applicants with and without a particular unemployment spell will in fact differ less than a year in age. Consider two applications with the same labor market experience, but where one application signals one year of unemployment and the other no unemployment. Then, the first applicant must be one year older than the second, but we assume that employers do not consider this small difference in age as important when hiring.

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

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<sup>17</sup> In studies using registry/survey data, age is often used as a proxy variable for labor market experience. In our experiment, we randomly assign a worker with both labor market experience and spells of past and contemporary unemployment. Thus, age should only be an important worker characteristic if employers' view it as important for given levels of experience and unemployment spells.

differently for workers with different skill levels. As a robustness check, we also consider each of the occupations in separate regressions.

We estimate the following equation using the Probit model (reporting marginal effects from the `dprobit` command in Stata, and clustering standard errors on the job advertisement level):<sup>18</sup>

$$Callback_i = \alpha + \beta_1 U_i^{\text{After graduation}} + \beta_2 U_i^{\text{Between jobs}} + \beta_3 U_i^{\text{Contemporary}} + \beta_4 X_i + \varepsilon_i \quad (1)$$

where  $Callback_i$  is an indicator which equals one if application  $i$  resulted in an invitation to a job interview,  $\alpha$  is the intercept,  $\beta_1$  gives the difference in the callback rate for applicants with one year of unemployment immediately after graduation relative to applicants who were employed immediately after graduation,  $\beta_2$  gives the difference in the callback rate for applicants with a year of unemployment between jobs relative to applicants with a consecutive employment spell,  $\beta_3$  gives the differences in the callback rate for applicants with 3, 6 or 9 months of contemporary unemployment relative to on-the-job searchers, and  $\beta_4$  is a vector with the coefficients of the explanatory variables included in  $X$ .

We estimate two main specifications: In the first,  $X$  contains only years of work experience, the number of employers (as a 0/1 variable for 1 or 3 employers), an ethnic minority indicator, and a female indicator. In the second,  $X$  also contains all the other worker attributes described in Section 2.2 as well as a fixed effect for each of the occupations.

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<sup>18</sup> Using a linear probability model yields almost identical estimates.

### 3.2 Results

In Table 5, we present the results for the probability of being invited to a job interview (the callback rate). The first two columns report the results for high skill jobs. In the first column, none of the measures of past or contemporary unemployment have a statistically significant effect on the callback rate: The coefficients are mostly negative, but far from statistically significant. In contrast, labor market experience has a positive and statistically significant effect on the callback rate, while the number of employers has no statistically significant effect.<sup>19</sup> Also, ethnic minority applicants get fewer callbacks than native Swedish applicants, and female applicants get more callbacks than male applicants. In the second column, we include all the other worker attributes included in the applications, and find the results to be very similar to the results in the first column. This confirms that the sample is big enough for the randomization of worker attributes to work. The next two columns report the corresponding results for medium/low skill jobs. Most of the results are similar to the results for the high skill jobs, except that the negative effect from a long spell of contemporary unemployment is now statistically significant: Workers with nine months of current unemployment get fewer callbacks. Overall, the results indicate that employers do not use information about past unemployment, immediately after graduation or between jobs, as a sorting criterion, but that some employers use long spells of contemporary unemployment to sort workers. In contrast, labor market experience seems to be important for most employers.

In Table 6, we present the results of the same regressions for the three subgroups in our experiment; native Swedish male and female workers, and ethnic minority male workers. The following results are worth noting. First, past unemployment, immediately after graduation or between jobs, has no statistically significant effect in any of the groups. Second, long periods

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<sup>19</sup> The effects are similar if we include labor market experience as discrete dummy variables.

of contemporary unemployment have a negative effect in some groups. However, the effect of contemporary unemployment varies across the groups, and sometimes we even get a positive effect from short periods of contemporary unemployment.<sup>20</sup> A potential explanation for this, somewhat surprising, result is that some employers may believe that short-term unemployed workers are able to start a new job more quickly and/or are willing to accept a lower wage than employed applicants. Third, we see that labor market experience has positive effects in most groups, although this effect is not always statistically significant. Thus, our results indicate that the effects of past and contemporary unemployment are quite similar in the three subgroups.

To check the robustness of our results, we have considered a number of alternatives to the baseline specification.<sup>21</sup> First, we have run separate regressions for each of the occupations. The results indicate that none of the occupations differ significantly from the others. However, there is some tendency that the negative effect of long periods of contemporary unemployment is stronger for workers in occupations typically involving extensive customer contacts; e.g. shop sales assistants. The fact that the results are similar in different occupations suggests that differences in labor demand (i.e. unemployment) between the occupations should not affect the results. Second, we have experimented with including interaction effects between the worker attributes, especially between the employment history variables; past unemployment (immediately after graduation and between jobs), contemporary unemployment and labor market experience. However, we find no statistically significant differences.

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<sup>20</sup> Considering the surrounding estimates, we expect the extreme point estimates for native Swedish males and ethnic minority males for high skilled jobs to be statistical artefacts.

<sup>21</sup> These results are available upon request.

To summarize, we find no evidence that the employers' decision of whom to invite to a job interview is negatively affected by past unemployment, some evidence that it is negatively affected by contemporary unemployment, and relatively clear evidence that it is positively affected by labor market experience.

#### **4. 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 long-term consequences by creating *scars* negatively affecting workers' future labor market careers. For policymakers, it is important to know if workers experiencing unemployment suffer serious negative long-term consequences and how serious these *scars* are. The existing empirical literature analyzing the effects of past and contemporary unemployment indicates that these scarring effects may be substantial. However, many of the existing studies may be affected by serious problems with unobserved heterogeneity exaggerating the impact of past and contemporary unemployment.

In this paper, we use unique data from a large field experiment in the Swedish labor market to take a new look at this important issue. Scarring effects may take many forms, but clearly one of the most important factors determining its importance is the extent to which employers use information about the job applicants' employment history as a sorting criterion. To investigate this, fictitious job applications were designed and sent to a large number of employers advertising for workers. The applications were randomly assigned spells of past and/or contemporary unemployment in order to capture their causal impacts. The spell lengths were chosen to send strong and realistic signals of unemployment.

Our results show no evidence of a negative effect of past unemployment immediately after graduation or between jobs, but some negative effects of long spells of contemporary

unemployment. In contrast, we find a relatively clear positive effect of labor market experience. This may be interpreted as an indication that recruiting employers care more about the job applicants' positive characteristics (i.e. labor market experience) than their negative characteristics (i.e. history of unemployment).

A limitation of our analysis is that we can only investigate the effects of unemployment in the early stages of the hiring process. Thus, we do not know if the workers' history of unemployment matter in the later stages of the hiring process in terms of hiring and/or wages. However, we believe that it is likely that easily observable characteristics, such as past or contemporary unemployment, should matter most in the early stages of the hiring process when the employers want to quickly get a shortlist of applicants to evaluate more carefully.

The fact that employers do not seem to use information about past unemployment as a sorting criterion suggests that the scarring effects of unemployment may not be as severe as has been indicated by previous studies. Workers with a history of unemployment may suffer from having less labor market experience, but employers do not seem to avoid contacting them because they have been unemployed. One explanation of why we find less evidence of scarring effects than previous studies may be problems with unobserved heterogeneity in studies using registry/survey data. Another explanation may be that scarring matters more for wages than employment. Also, scarring may affect other important variables, such as labor force participation and job search. Clearly, more studies are needed to analyze the importance of scarring effects. From a methodological perspective, it would be beneficial if future studies use unconventional methods, such as field experiments, to bypass some of the problems with unobserved heterogeneity and better identify causal effects.

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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. Labor market experience				1.000	0.523
5. Number of employers					1.000

Note: The matrix includes all 8,466 applications. ‘Unemployment between jobs’, ‘labor market experience’ and ‘number of employers’ is, by construction, highly correlated. However, conditional on the ‘number of employers’ these variables are uncorrelated. Conditional on having three employers, the correlation between ‘unemployment between jobs’ and ‘labor market 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>Medium/low 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

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

Table 3. The workers' employment history in the job applications

	High skill jobs (%)	Medium/low skill jobs (%)
<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>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

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

Table 4. Callback rates for workers' with different attributes

	All	High skill jobs	Med/low skill jobs
All	0.25	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>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 medium/low skill jobs refer to jobs typically requiring secondary education. Workers who have '3 employers' always have 3-5 years of labor market experience, while workers with '1 employer' have 1-5 years of labor market experience (c.f. Section 2.2).

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

Variable	High skill jobs		Medium/low skill jobs	
	Model A	Model B	Model A	Model B
Past unemployment after graduation	-0.012 [0.020]	-0.017 [0.020]	-0.003 [0.014]	-0.004 [0.014]
Past unemployment between jobs	0.010 [0.025]	0.005 [0.025]	0.010 [0.017]	0.011 [0.017]
Contemporary unemployment 3 months	-0.001 [0.021]	-0.001 [0.022]	0.009 [0.015]	0.007 [0.015]
Contemporary unemployment 6 months	-0.010 [0.025]	-0.015 [0.025]	0.014 [0.017]	0.007 [0.016]
Contemporary unemployment 9 months	0.013 [0.023]	0.008 [0.024]	-0.039** [0.016]	-0.039** [0.015]
Labor market experience	0.014* [0.008]	0.017** [0.008]	0.008 [0.005]	0.009* [0.005]
Number of employers	-0.018 [0.024]	-0.016 [0.024]	0.019 [0.016]	0.017 [0.015]
Ethnic minority male	-0.098*** [0.015]	-0.099*** [0.016]	-0.095*** [0.010]	-0.095*** [0.010]
Native Swedish female	0.036** [0.015]	0.039** [0.016]	0.018* [0.011]	0.019* [0.011]
Other attributes	No	Yes	No	Yes
Number of observations	3,158	3,158	5,308	5,308

*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. Columns labelled A includes only the variables included in the table, while columns labelled B also includes control variables for personality traits, leisure activities, foreign-high school, work experience during the summer breaks, having more education than required, and fixed effects for each of the occupations. The reference category is a native Swedish male with no history of 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 6. The effects of worker attributes on the callback rate (marginal effects), subgroups

Variable	Native Swedish males		Native Swedish females		Ethnic minority males	
	Model A	Model B	Model A	Model B	Model A	Model B
<i>High skill jobs:</i>						
Past unemployment after graduation	-0.027 [0.036]	-0.020 [0.037]	-0.034 [0.035]	-0.052 [0.035]	0.029 [0.034]	0.032 [0.034]
Past unemployment between jobs	0.032 [0.043]	0.029 [0.044]	0.012 [0.045]	0.012 [0.046]	-0.015 [0.037]	-0.022 [0.036]
Contemporary unemployment 3 months	-0.015 [0.036]	-0.027 [0.036]	0.061 [0.040]	0.063 [0.041]	-0.052 [0.032]	-0.047 [0.032]
Contemporary unemployment 6 months	-0.104** [0.041]	-0.114** [0.041]	-0.010 [0.045]	-0.021 [0.045]	0.072* [0.042]	0.068* [0.041]
Contemporary unemployment 9 months	-0.010 [0.040]	0.001 [0.041]	0.038 [0.043]	0.018 [0.044]	0.006 [0.038]	-0.004 [0.036]
Labor market experience	0.010 [0.014]	0.010 [0.014]	0.023* [0.014]	0.026* [0.014]	0.010 [0.012]	0.009 [0.012]
Number of employers	-0.007 [0.040]	0.011 [0.042]	-0.081 [0.042]	-0.077 [0.043]	0.030 [0.037]	0.027 [0.037]
Number of observations	1,058	1,058	1,055	1,055	1,045	1,045
<i>Medium/low skill jobs:</i>						
Past unemployment after graduation	0.007 [0.026]	0.011 [0.026]	-0.015 [0.026]	-0.022 [0.025]	-0.003 [0.021]	-0.002 [0.020]
Past unemployment between jobs	0.031 [0.032]	0.030 [0.031]	0.004 [0.031]	0.001 [0.031]	0.002 [0.024]	-0.002 [0.023]
Contemporary unemployment 3 months	-0.026 [0.026]	-0.035 [0.025]	0.003 [0.028]	-0.001 [0.027]	0.051** [0.024]	0.052** [0.023]
Contemporary unemployment 6 months	0.017 [0.030]	0.008 [0.030]	0.036 [0.032]	0.028 [0.032]	-0.005 [0.024]	-0.011 [0.022]
Contemporary unemployment 9 months	-0.053* [0.029]	-0.059* [0.029]	-0.031 [0.029]	-0.035 [0.028]	-0.032 [0.024]	-0.027 [0.022]
Labor market experience	0.001 [0.009]	0.006 [0.009]	0.009 [0.010]	0.007 [0.010]	0.013* [0.007]	0.015** [0.007]
Number of employers	0.014 [0.028]	0.006 [0.028]	0.035 [0.030]	0.036 [0.030]	0.009 [0.023]	0.007 [0.022]
Number of observations	1,774	1,774	1,775	1,775	1,759	1,759

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 Stata 11. Columns labelled A includes only the variables included in the table, while columns labelled B also includes control variables for personality traits, leisure activities, foreign-high school, , work experience during the summer breaks, having more education than required, and fixed effects for each of the occupations. The reference category is a native Swedish male with no history of 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.

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

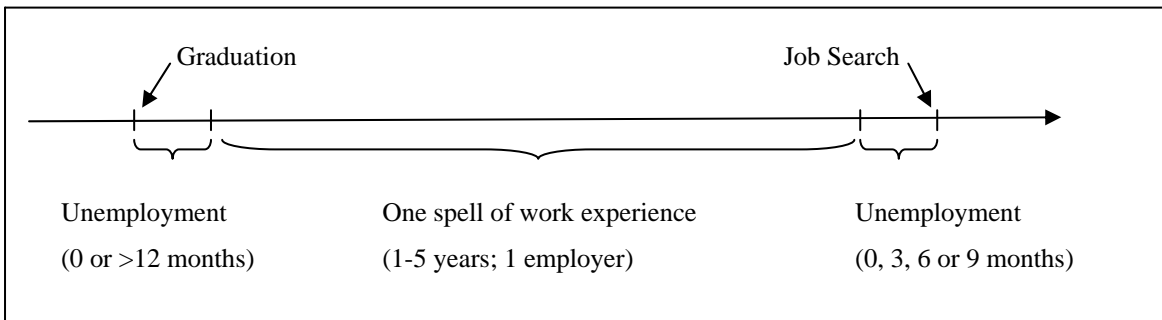


Figure 1b. A worker's employment history if no unemployment spells between jobs

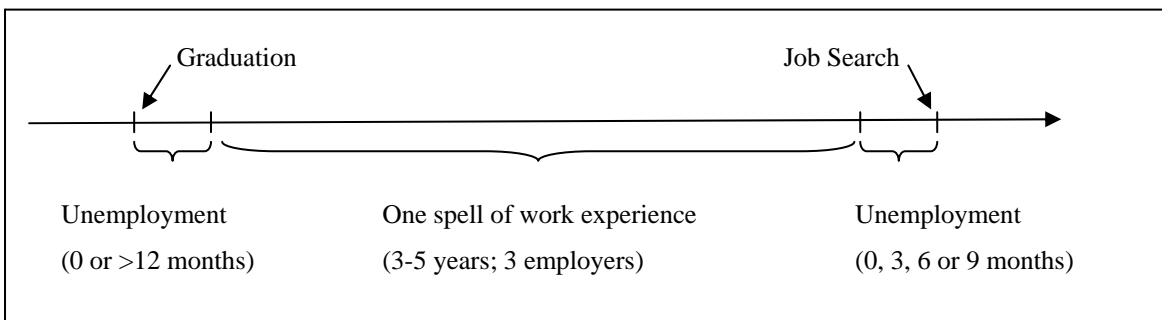
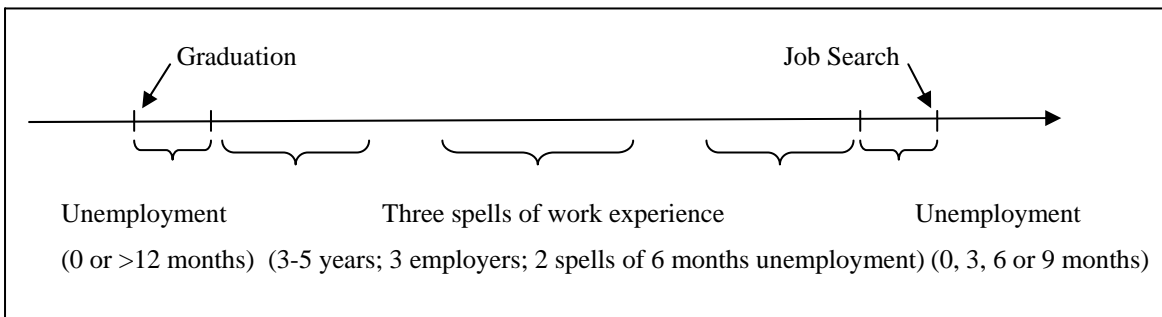


Figure 1c. A worker's employment history if unemployment spells between jobs



## **Appendix: Example of an application (translated from Swedish)**

Hi,

My name is Karl 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 jogging. 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

Karl Johansson



## CV

Name: Karl Johansson  
Address: Eiravägen 4 F  
18260 Djursholm  
Telephone: 08 - 208 127  
E-mail: KarlJohansson4@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 ends his university studies in June 2002 and starts his first employment already in April the same year, that is, he has no unemployment spell subsequent graduation. He has three jobs from April 2002 until 'today' and is 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.