

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

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*The stigma associated with long-term unemployment spells could create large inefficiencies in labor markets. While the existing literature points toward large stigma effects, it has proven difficult to estimate causal relationships. Using data from a field experiment, we find that long-term unemployment spells in the past do not matter for employers' hiring decisions, suggesting that subsequent work experience eliminates this negative signal. Nor do employers treat contemporary short-term unemployment spells differently, suggesting that they understand that worker/firm matching takes time. However, employers attach a negative value to contemporary unemployment spells lasting at least nine months, providing evidence of stigma effects. (JEL E24, J23, J64, J71)*

*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<sup>1</sup>

Recently, the US labor market has started to resemble European labor markets with high unemployment and long-term unemployment spells. In 2011, the US unemployment rate was 9 percent, and more than 30 percent had been unemployed for more than one year (Organisation for Economic Co-operation and Development 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. In many European countries, unemployment is close to 10 percent, and up to 50 percent are long-term unemployed.

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<sup>1</sup> Martin Crutsinger, "Bernanke: Long-Term Unemployment a National Crisis," boston.com, September 28, 2011, [http://www.boston.com/business/articles/2011/09/28/bernanke\\_urges\\_us\\_to\\_learn\\_from\\_emerging\\_nations/](http://www.boston.com/business/articles/2011/09/28/bernanke_urges_us_to_learn_from_emerging_nations/).

Given these events, the stigma associated with long-term unemployment spells could create large inefficiencies in labor markets. If employers avoid job seekers 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.

In the literature, the issue of whether unemployment spells damage workers' future labor market careers has received quite a lot of attention.<sup>2</sup> Of particular interest has been the importance of duration dependence; i.e., if long-term spells of *contemporary* unemployment have adverse effects on re-employment probabilities. While it is clear that the exit rate from unemployment to work declines with the length of the spell in most countries (cf. Machin and Manning 1999), it has been difficult to show that this reflects "true" duration dependence rather than unobserved heterogeneity. Ljungqvist and Sargent (1998, p. 547) conclude that the evidence on duration dependence is "mixed and controversial." There are some studies which find duration dependence (e.g., Lynch 1989; van den Berg and van Ours 1996; Shimer 2008), but in a review of the literature, Machin and Manning (1999) conclude that there is little evidence of strong negative duration dependence.<sup>3</sup> There is also another strand of literature, mainly European, investigating whether *past* spells of unemployment have a negative effect on current (un)employment probabilities, often referred to as scarring effects.<sup>4</sup> The few US studies typically find little evidence of such effects (e.g., Heckman and Borjas 1980; Ellwood 1982; Ruhm 1991), while the European studies typically find strong negative effects (e.g., Arulampalam, Booth, and Taylor 2000; Gregg 2001; Burgess et al. 2003).<sup>5</sup> A potential explanation for this difference is that long-term unemployment until recently mainly has been a European phenomenon.

A major concern is that most existing studies are based on administrative/survey data where 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 by the researcher. Hence, the risk of biased estimates due to unobserved heterogeneity is substantial. A number of methods have been used to handle this problem; e.g., making distributional assumptions about unobserved factors or using instrumental variable techniques.<sup>6</sup> However, these approaches have inherent weaknesses; e.g., requiring strong assumptions about functional form, which according to Machin and Manning (1999, p. 3111) "have no foundation in any economic theory," or the existence of appropriate instruments. To obtain better identification of

<sup>2</sup> An example is the 2001 special issue of the *Economic Journal*; see Arulampalam, Gregg, and Gregory (2001).

<sup>3</sup> A related literature is studies of employed versus unemployed search; e.g., Blau and Robins (1990); Belzil (1996); Eriksson and Lagerström (2006, 2012). Survey- and interview-based evidence on firms' hiring strategies is found in, e.g., Atkinson, Giles, and Meager (1996), and Bewley (1999).

<sup>4</sup> There is a related US literature investigating the effects of job displacement and unemployment on future wages (e.g., Ruhm 1991; Jacobson, LaLonde, and Sullivan 1993; Farber 1993; Stevens 1997; Mroz and Savage 2006). European studies of wage effects include Arulampalam (2001), Gregory and Jukes (2001), and Gregg and Tominey (2005).

<sup>5</sup> Other European studies are Narendranathan and Elias (1993), Mühleisen and Zimmermann (1994), Arulampalam (2002), Raaum and Røed (2006), and Bell and Blanchflower (2011).

<sup>6</sup> Heckman and Borjas (1980), Lancaster (1990), Heckman (1991), and Machin and Manning (1999) discuss these issues in detail.

the causal effects, some studies rely on exogenous events or sibling data, but unobserved heterogeneity remains an issue with these approaches as well.<sup>7</sup>

In this study, we provide new evidence on to what extent employers actually use information about job applicants' (un)employment history to sort workers when hiring. The workers' employment history may affect them in many ways, but clearly one of the most important effects is the extent to which employers use information about unemployment and work experience as sorting criteria. To this end, we conducted a field experiment where we designed and randomly sent 8,466 fictitious job applications to employers. We included 12 occupations which cover around one-third of all jobs in Sweden. Many of these occupations are among the most frequent occupations in both Sweden and the United States. Hence, the external validity of our choice of occupations seems strong. Further, an analysis of Swedish administrative data on unemployment spells for the relevant time period indicates duration dependence in the outflow rate from unemployment to work for most of these occupations. The same data also suggest a negative association between the time unemployed in the past and the transition from unemployment to work for these occupations.

Information about the workers' employment history—contemporary unemployment, past unemployment immediately after graduation, past unemployment between jobs, work experience, and number of employers—are randomly assigned to the applications. Since the employers make their choice of whom to invite to job interviews based only on the information in the applications, we can isolate the causal effect of each of these randomly assigned characteristics: there are no interdependencies among the regressors, and there is no scope for unobserved heterogeneity with respect to worker characteristics. A limitation of our approach is that we study only 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 job applicants, it is likely that easily observed characteristics, such as their employment history, should matter most in the early stages of the hiring process when employers need to get a short list of applicants to evaluate more carefully.<sup>8</sup>

There are only a few experimental studies of these issues. Kroft, Lange, and Notowidigdo (2013) investigate the importance of duration dependence for medium/low skill jobs in 100 US cities, i.e., they vary the length of the current unemployment spell (0–36 months). They find clear evidence of duration dependence, and that it is stronger when the labor market is tighter. A similar approach is used by Oberholzer-Gee (2008), who find evidence of duration dependence for administrative assistants in Switzerland. Our study contributes to this literature in three ways. First, we analyze whether the length of the contemporary unemployment spell has a negative effect on the callback rate for both high and medium/low skill jobs. Second, we investigate whether long-term unemployment spells in the past leave scars in terms of a negative effect on

<sup>7</sup>These studies use exogenous events only affecting a particular subgroup (e.g., refugees; cf. Åslund and Rooth 2007), or use sibling data that take care of problems with unobserved characteristics which are common to the siblings (cf. Nordström Skans 2011).

<sup>8</sup>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 received, on average, more than 20 applications. For the United States, studies show that firms often receive 10–30 applications per job opening (e.g., Barron, Berger, and Black 1997).

the callback rate, and if this varies by the skill level of the job. Third, we study the effect of work experience on the callback rate, and if it varies by the skill level of the job.

Our empirical analysis indicates that some of the findings of strong negative effects in the nonexperimental literature may be explained by unobserved heterogeneity rather than by unemployment spells having a causal effect. First, employers do not perceive short-term contemporary unemployment spells negatively, that is, spells lasting six months or less. This suggests that employers understand that worker/firm matching takes some time. However, employers attach a strong negative value to unemployment spells lasting at least nine months for medium/low skill jobs. This suggests that employers perceive such spells as a negative signal, and is supportive of the existence of stigma effects. For high skill jobs, we find no corresponding negative effect. Second, long-term spells of unemployment in the past do not matter for employers, irrespective of the skill level of the job. This suggests that subsequent work experience eliminates this negative signal. Finally, work experience seems to be an important signal of productivity for employers, especially for high skill jobs.

The rest of the article is organized as follows. Section I gives a theoretical background. Section II describes the field experiment and gives some descriptive statistics. Section III discusses identification and estimation issues and presents the results. Section IV concludes.

## I. Theoretical Background

Before turning to the experiment and the empirical analysis, it is instructive to briefly consider why recruiting employers may use information about job applicants' (un)employment history.

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 (cf. Phelps 1972). 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 spells. 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).<sup>9</sup> 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 spells to sort workers.<sup>10</sup> It may be argued that employers should view past and contemporary spells similarly. Then, the same theoretical models

<sup>9</sup> A similar model is Vishwanath (1989).

<sup>10</sup> 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.

should apply, and we may expect employers to consider any experience of unemployment as a relevant sorting criterion. However, the fact that past unemployment spells are, by definition, followed by spell(s) of employment may offset their negative effect: subsequent work experience may reverse the skill loss that has occurred during unemployment and/or the fact that someone has hired the worker after those spells may convince employers that the worker does not have undesirable inherent characteristics. Hence, past unemployment spells may be less informative about worker productivity than contemporary spells, and therefore matter less.

The factors discussed so far all suggest that unemployment spells should be considered negatively by employers. However, there are some factors that may mitigate these effects. First, in search-matching models (cf. Pissarides 2000), workers choose their search intensity and reservation wage. High productivity workers may choose to apply to only high quality jobs and/or set high reservation wages, and this may lengthen their unemployment spells. If this is the case, employers may not consider the spell length informative, at least until it gets too long. This consideration may be especially important for high skill jobs where the quality of the worker/firm match often is crucial. Second, the fact that a worker is currently unemployed may be interpreted by some employers as an indication that the worker can start a new job immediately. This may be an advantage, especially for low skill jobs where it may be more important to fill the job quickly than to find the best worker/firm match.

In contrast to the potential negative effects of unemployment, work experience should always be seen as a positive characteristic by recruiting employers: work experience may provide workers with general human capital through on-the-job training (cf. Becker 1964), and/or be viewed as a signal of attractive worker characteristics (cf. Lockwood 1991).<sup>11, 12</sup>

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.

## II. The Field Experiment

The data we use come from a field experiment conducted in the Swedish labor market between March and November 2007. To illustrate the context of this period, Figure 1 shows the unemployment rate in Sweden and the United States. In 2007, unemployment was actually higher in Sweden, even though the US rate had begun to increase rapidly.

In the experiment, all vacancies in selected occupations posted on the website of the Swedish Public Employment Service were collected. This is the biggest job search website in Sweden, where in 2007 around 50 percent of all vacancies were posted. As will be explained below, the occupational mix of these vacancies is very

<sup>11</sup> 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.

<sup>12</sup> 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.

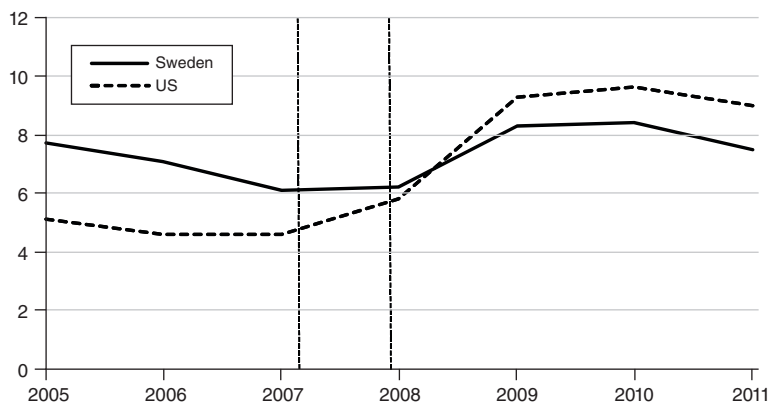


FIGURE 1. UNEMPLOYMENT IN SWEDEN AND THE UNITED STATES

*Note:* The figure shows the OECD harmonized unemployment rate, OECD (2012).

similar to the occupational mix of employed workers. In total, 8,466 job applications were sent by e-mail to 3,786 employers. Most Swedish employers nowadays prefer to get job applications by e-mail. 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 experiment were chosen and how the applications were designed. Then, we present some descriptive statistics.

### *A. The Choice of Occupations and Regions*

Our objective when choosing which occupations and regions to include in the experiment was to get a representative picture of the labor market, while at the same time designing a study that would be feasible to implement in practice.

To get a representative picture of the labor market, we wanted to include both high skill and medium/low skill occupations. This is crucial since there could be important differences depending on the skill level of the job. For each skill type, we included some of the most common occupations. In total 12 occupations were included. We chose seven occupations which typically require primary or secondary education (medium/low skill jobs): (i) Sales representatives and buying/purchasing agents, (ii) retail sales persons and cashiers, (iii) installation, maintenance, and repair occupations, (iv) construction laborers and carpenters, (v) bus, truck, and taxi drivers, (vi) janitors and cleaners, and (vii) food serving staff. We chose five occupations which typically require university education (high skill jobs): (i) Computer occupations, (ii) accountants and auditors, (iii) registered nurses, (iv) middle school teachers, and (v) secondary school teachers. Table 1 presents the shares of total employment in Sweden and the United States for these occupations in the same age group as in the experiment, i.e., 23–32-year-olds.<sup>13</sup>

<sup>13</sup> In the online Appendix we explain these calculations in detail and present the corresponding table for the full prime-age working population. The numbers are very similar for the two age groups. The reason we do not include



TABLE 1—SHARES OF TOTAL EMPLOYMENT/UNEMPLOYMENT BY OCCUPATION IN SWEDEN AND THE UNITED STATES, 23–32-YEAR-OLD WORKERS (*percent*)

Occupational categories	Share in Sweden in 2005		Share of US total employment in 2000	Share of Swedish vacancies in 2007	Occupational rank in Sweden
	Employment <sup>b</sup>	Unemployment			
<i>High skill occupations</i>					
Computer occupations	2.3	1.1	2.0	2.2	7
Accountants and auditors	1.2	0.8	1.0	1.0	26
Registered nurses	1.7	0.6	0.8	2.9	22 <sup>a</sup>
Middle school teachers	2.7	2.5	1.5	1.7	5 <sup>a</sup>
Secondary school teachers	1.0	1.0	0.3	1.4	29
All other high skill occupations	20.8	13.1	n.a. <sup>c</sup>	14.4	
<i>Medium/low skill occupations</i>					
Sales representatives and buying and purchasing agents	3.9	2.2	1.2	11.3	3
Retail sales persons and cashiers	9.0	9.4	2.9	3.5	2
Installation, maintenance, and repair occupations	2.2	1.7	1.6	1.7	24 <sup>a</sup>
Construction laborers and carpenters	2.3	3.6	1.8	1.5	8
Bus, truck, and taxi drivers	2.1	2.0	1.9	4.0	12
Janitors and cleaners	1.6	2.9	0.8	1.5	18
Food serving staff	4.3	6.5	1.6	3.3	9 <sup>a</sup>
All other medium/low skill occupations	44.9	52.6	n.a. <sup>c</sup>	49.6	
Total share	100	100		100	

*Notes:* The Swedish occupational shares in total employment/unemployment are based on own calculations using (i) the population 23–32 years old employed in 2005 (LISA database, Statistics Sweden) and (ii) the population 23–32 years old starting an unemployment spell in 2005 (see the online Appendix for a description of this data). The US occupational shares of total employment (defined as those with an occupational code) are calculated using the 5 percent extraction of the US Census (using the weights found at [www.ipums.org](http://www.ipums.org); cf. Ruggles et al. 2010) for the same age group, while the occupational shares for vacancies are calculated using all vacancies lasting more than ten days reported to the Swedish Public Employment Service in 2007. The occupational categories are taken from the Swedish occupational register, which includes 115 different occupational groups according to SSYK (Standard for Swedish Occupational Classification), a three-digit occupational classification code similar to the international classification (ISCO). For the US occupational categories, we have used those (sub)categories that correspond the closest to the Swedish SSYK definitions and are found at [www.ipums.org](http://www.ipums.org). The occupational rank is based on the ranking among the 115 categories in SSYK for total employment.

<sup>a</sup> These occupational categories are made up of two separate occupations, and the ranking is for the one with the largest share in total employment.

<sup>b</sup> Employed is defined as having information about the occupational code, which is the case for around 88 percent of the total population in this age category.

<sup>c</sup> The US occupational coding does not correspond to a distinct classification into high/medium/low skill occupations as does the Swedish coding and, therefore, these shares have not been calculated.

Overall, the occupations we include cover around one-third of all employed workers; 30 percent (8.9/29.7) for high skill occupations and 36 percent (25.4/70.3) for medium/low skill occupations. The occupational shares for employed and unemployed workers are rather similar (columns 1 and 2). Six of our occupations are among the top ten most common occupations, and another four are on the top 25 list (column 5). As a comparison, eight of the occupations are on the US top 25 list. The shares of total employment by occupation in Sweden are very similar to the corresponding shares in the United States (columns 1 and 3). Finally, the

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20–22-year-olds in these calculations is that very few of them would have finished a university education which, in most cases, is a requirement to get a high skill job.

occupations we include cover around 36 percent of all vacancies reported to the Employment Service (column 4). The fact that the occupational shares of the vacancies are very similar to the corresponding shares of employed workers indicates that the vacancies reported to the Employment Service should be rather similar to all vacancies. Hence, the external validity of our choice of occupations seems strong.

Concerning the location of the jobs, 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). This should make our sample rather representative of where the jobs are located since most jobs are in these two metropolitan areas (around 35 and 17 percent of all vacancies reported to the Employment Service are located in these two counties).<sup>14</sup>

### *B. 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 searching for the advertised type of job. Second, to get a reasonably high callback 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 the Appendix for an example).

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 (cf. Riach and Rich 2002; Carlsson and Rooth 2007). However, in our experiment, we used a more general approach by randomly varying several characteristics. This allows us to measure the labor market return of different skills and attributes (cf. Bertrand and Mullainathan 2004; 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 job applications and are expected to be important for the probability of being invited to a job interview. These attributes include contemporary and past spells of unemployment, work experience, education, gender, ethnicity, and some other characteristics.<sup>15</sup>

We focus on the effects of the (un)employment history attributes.<sup>16</sup> We randomly assigned five such variables to the applications: contemporary unemployment (zero, three, six, or nine months), 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), years of work experience (one, two, three, four, or five years), and number of employers (1 or 3).

<sup>14</sup>The difference in the unemployment rate is rather small between these two counties: in 2007, the unemployment rate was 5.6 and 6.0 percent, respectively. The overall unemployment rate was 6.1 percent, and it varied between 4.1 and 7.8 percent across the 21 Swedish counties.

<sup>15</sup>A list of all attributes is in the notes to Tables 6–9. The design of these attributes is described in Rooth (2011).

<sup>16</sup>Since all attributes are randomly assigned to the applications, the other attributes should not affect the estimates which we focus on. However, to gain efficiency in the estimation, we include them in the regressions.



The first two 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.<sup>17</sup> 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. This is illustrated in Table 2, which shows the correlation matrix for the employment history variables.<sup>18</sup> Figure 2 illustrates the applicants' employment history for the three types of unemployment spells we focus on.

Information about the workers' history of unemployment was not explicitly stated in the applications since this is unlikely to be the case when real job applicants write their CVs. However, this information could easily be extracted from the information given in the CV, i.e., unemployment was signaled by time gaps between the year of graduation,<sup>19</sup> employment spells, etc. (cf. the Appendix). 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 held informal discussions with a number of employers not participating in the experiment and conducted a student experiment.<sup>20</sup> The participants easily found this information. Given these results, we are confident that our signals of unemployment are easily found in the CVs.

Our choices of unemployment spell lengths were made to include signals which are both strong and realistic. To illustrate that the margins we chose are relevant, we use administrative data from the Employment Service on all unemployment spells for 23–32-year-old workers who became unemployed in 2005 and are followed until 2007 to estimate Kaplan-Meier survival functions for transitions from unemployment to work. We did this separately for workers employed in medium/low and high skill occupations, both for the occupations included and not included in the experiment. This estimation is described in detail in the online Appendix, and the survival functions are illustrated in Figure 3.

The survival functions are very similar for all four groups: the outflow from unemployment to work is somewhat faster for high skill occupations, but the differences are rather small. After nine months of unemployment, around 70 percent of the workers have left unemployment for work (three, six, and nine months are marked by vertical lines in Figure 3). In the online Appendix, we show that the survival

<sup>17</sup>Hence, the difference between 1 and 2, and 2 and 3, years of experience is identified by applicants having one employer, while the difference between 3 and 4, and 4 and 5, years of experience is identified by all applicants.

<sup>18</sup>This is also illustrated in Table F1 in the online Appendix, where the means of the variables are presented for the different unemployment categories.

<sup>19</sup>In Sweden, students in both secondary schools and universities typically graduate in June.

<sup>20</sup>Twenty-nine students were given a number of CVs and were asked to report the number of months as unemployed “today” and in “the past.” For the CVs containing spells of contemporary unemployment the expected answer was nine months, while for the CVs containing spells of past unemployment the expected answer was 10–14 months depending on what month was given as “end of school.” For contemporary unemployment, 27 students gave an answer of more than eight months (mean 8.0 and standard deviation 1.6). For past unemployment, 27 students gave an answer of more than 11 months (mean 13.8 and standard deviation 3.9).

TABLE 2—CORRELATION MATRIX FOR THE EMPLOYMENT HISTORY VARIABLES

Variable	1.	2.	3.	4.	5.
1. Contemporary unemployment	1.000	0.020	-0.020	0.002	-0.017
2. Past unemployment after graduation		1.000	-0.013	-0.034	-0.007
3. Past unemployment between jobs			1.000	0.312	0.602
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” are, 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.

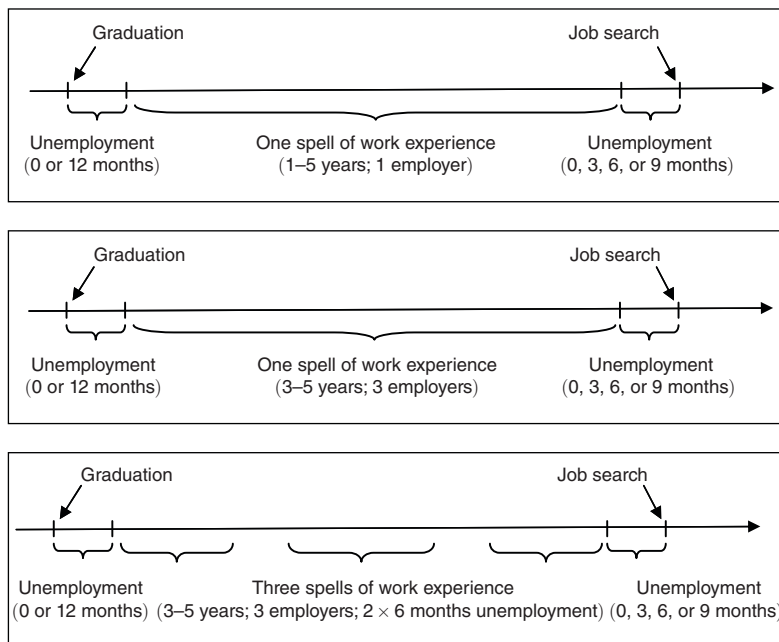


FIGURE 2. A WORKER'S EMPLOYMENT HISTORY

*Notes:* Only one employer (top); three employers and no unemployment spells between jobs (center); and three employers and two unemployment spells between jobs (bottom).

functions for each of the individual occupations in the experiment are also very similar. Given these estimates, we expect that our choices of spell lengths 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 contemporary spells lasting more than nine months. The total time spent in unemployment in the CVs varies between zero and 33 months.

In order to establish the descriptive patterns in the Swedish unemployment data, and to highlight their similarity to the United States, we use Swedish administrative data to estimate the effects of contemporary and past unemployment spells. With the same data as above, we estimate the hazard rate for transitions from unemployment to work using the piecewise constant exponential model. We find clear indications of

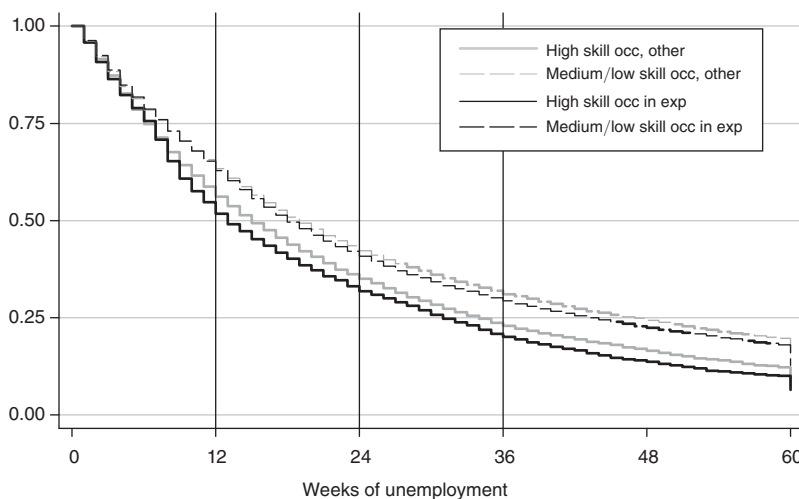


FIGURE 3. KAPLAN-MEIER SURVIVAL ESTIMATES FOR THE TRANSITION FROM UNEMPLOYMENT TO WORK BY TYPE OF OCCUPATION, 23–32-YEAR-OLD WORKERS, WEEKS OF UNEMPLOYMENT

*Note:* The vertical lines represent three, six, and nine months of unemployment.

duration dependence for almost all of the occupations; see Tables B2 and B3 in the online Appendix. For half of the occupations, the hazard rate in the interval three–six months as unemployed is more than 50 percent higher than the corresponding rate in the interval 9–12 months. Interestingly, even occupations dominated by the public sector (i.e., teachers and nurses) exhibit clear indications of duration dependence. We also show that there is a statistically significant negative association between the time unemployed in the past, i.e., in the period 2001–2004, and the transition from unemployment to work. We find that having been unemployed one additional month in the past is associated with a 4 percent lower exit rate from unemployment to work; see Table C1 in the online Appendix. Given these estimates, we expect that the 12-month spell of past unemployment we use in the experiment should be perceived as a strong signal by employers. In addition to motivating our choices of spell lengths, this analysis clearly shows that the empirical regularities for duration dependence and scarring found in the nonexperimental literature hold for Sweden in the time period when the experiment was conducted.

A potential drawback with our approach is that we do not explicitly state that the time gaps in the CVs are due to unemployment and, hence, some employers may perceive the gaps as signals of absence for other reasons; e.g., travel, parental leave, etc. However, most job seekers state the reasons for such time gaps in their CVs (this is strongly encouraged by the Employment Service). 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.

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.<sup>21</sup> This means that applicants applying for medium/low skill jobs were 20–31

<sup>21</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, unemployment, and education.

years old, and applicants applying for high skill jobs were 23–32 years old. However, most of the applicants were in a narrower age range.<sup>22</sup> 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 (cf. Section IIIA).

Concerning the workers' other characteristics, 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), a native Swedish female (one-third), and an ethnic minority male (one-third).

### *C. Descriptive Statistics*

In total, 8,466 job applications were sent to 3,786 employers. Each employer was sent either one or three applications.<sup>23</sup> 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. Controlling for order effects, however, does not affect the results since the applications were sent in random order.

Table 3 presents descriptive statistics for the jobs we applied to. Around 63 percent of the applications were sent to firms with medium/low skill jobs, and 37 percent were sent to firms with high skill jobs.

Table 4 presents the distribution of the employment history attributes in the applications: around 50 percent were assigned a period of contemporary unemployment, 20 percent a period of unemployment immediately after graduation, and 23 percent a period of unemployment between jobs. 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 5 presents descriptive statistics for the probability of getting an invitation to an interview for workers with different attributes. The overall callback rate is 0.25, but the callback rate is higher for high skill jobs (0.30) than for medium/low skill jobs (0.21).<sup>24</sup> There are some differences between workers depending on their employment history: workers with spells of unemployment received fewer

<sup>22</sup>Ninety-three percent of the applicants applying for medium/low skill jobs were 20–27 years old, and 95 percent of the applicants applying for high skill jobs were 24–30 years old.

<sup>23</sup>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 often receive few job applications.

<sup>24</sup>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 (cf. Bertrand and Mullainathan 2004). A partial explanation for this difference is that we include high skill jobs which have higher callback rates, while most US studies include only medium/low skill jobs. In addition, our applicants are always well qualified—in terms of education and work experience—for the jobs they apply for.

TABLE 3—THE JOBS INCLUDED IN THE FIELD EXPERIMENT

Occupation	Number of applications	Fraction of all applications ( <i>percent</i> )
All	8,466	100
<i>High skill jobs</i>	3,158	37
Computer occupations	988	12
Accountants and auditors	624	7
Registered nurses	443	5
Middle school teachers	656	8
Secondary school teachers	447	5
<i>Medium/low skill jobs</i>	5,308	63
Sales representatives and buying/purchasing agents	1,511	18
Retail sales persons and cashiers	1,130	13
Installation, maintenance, and repair occupations	368	4
Construction laborers and carpenters	471	6
Bus, truck, and taxi drivers	701	8
Janitors and cleaners	553	7
Food serving staff	574	7
<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 medium/low skill jobs refer to jobs typically requiring primary or secondary education.

TABLE 4—THE JOB APPLICANTS' EMPLOYMENT HISTORY (*percent*)

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

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

TABLE 5—THE CALLBACK RATES FOR WORKERS WITH DIFFERENT  
(UN)EMPLOYMENT HISTORY ATTRIBUTES

	All jobs	Medium/ low skill jobs	High skill jobs
All	0.25	0.21	0.30
<i>Ever unemployed</i>			
No	0.24	0.22	0.30
Yes	0.25	0.21	0.30
<i>Contemporary unemployment</i>			
No	0.25	0.22	0.30
3 months	0.25	0.23	0.30
6 months	0.25	0.23	0.29
9 months	0.23	0.18	0.31
<i>Past unemployment after graduation</i>			
No	0.25	0.22	0.30
Yes	0.24	0.21	0.29
<i>Past unemployment between jobs</i>			
No	0.24	0.21	0.30
Yes	0.26	0.24	0.30
<i>Work experience</i>			
1 year	0.21	0.19	0.25
2 years	0.24	0.20	0.30
3 years	0.25	0.22	0.31
4 years	0.27	0.24	0.31
5 years	0.25	0.22	0.30
<i>Number of employers</i>			
1 employer	0.24	0.20	0.30
3 employers	0.26	0.23	0.30

*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 primary or secondary education. Workers who have “3 employers” always have three to five years of work experience, while workers with “1 employer” have one to five years of work experience (cf. IIB).

responses, but the differences are rather small; i.e., in the range 0.01–0.02. In general, workers with more work experience received more responses.

### III. 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.

#### A. Identification and Estimation

Due to the design of the 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: the worker attributes are randomly assigned to the applications, and we have complete control over the information available to the employers.



An important issue is how we should handle the fact that age, by construction, is highly correlated with the employment history variables. As was explained above, the applicants' age was calculated given their employment history (cf. Section IIB). Therefore, we can find the causal effects of all the employment history variables as long as we do not include age in the regressions. Our underlying assumption is that employers do not consider the applicants' age as an important variable beyond its effect on their employment history. 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 both work experience and spells of unemployment. Therefore, age should be an important worker characteristic only if employers view it as important for given levels of work experience and unemployment spells. In the case of the unemployment variables, applicants with and without a particular unemployment spell will always differ no more 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 estimate the following baseline equation using the probit model (reporting marginal effects,<sup>25</sup> and clustering standard errors on the job advertisement level):

$$(1) \quad \text{Callback}_i = \alpha + \beta_1 U_i^{\text{Contemporary}} + \beta_2 U_i^{\text{After graduation}} \\ + \beta_3 U_i^{\text{Between jobs}} + \beta_4 \text{EXP}_i + \beta_5 \text{EMP}_i + \mathbf{X}_i' \beta_6 + \varepsilon_i,$$

where  $\text{Callback}_i$  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 effect on the callback rate of contemporary unemployment (as a zero-, three-, six-, or nine-month spell),  $\beta_2$  gives the effect on the callback rate of past unemployment immediately after graduation,  $\beta_3$  gives the effect on the callback rate of past unemployment between jobs,  $\beta_4$  gives the effect on the callback rate of work experience (in years),  $\beta_5$  gives the effect on the callback rate of the number of employers (1 or 3 employers), and  $\beta_6$  is a vector with the coefficients of the explanatory variables included in  $\mathbf{X}$ . To gain efficiency in the estimation, the vector  $\mathbf{X}$  includes all the other randomly assigned worker attributes and fixed effects for each of the occupations and regions. However, since all employment history variables are randomly assigned to the applications, we get very similar estimates if these other attributes are excluded (these results are available on request).

## B. 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 are presented in Table 6, while Tables 7–9 contain additional results.

<sup>25</sup> The marginal effects are estimated using the `dprobit` command in Stata12. Using the linear probability model yields almost identical estimates.

TABLE 6—THE EFFECTS OF THE WORKERS' ATTRIBUTES ON THE CALLBACK RATE  
(*Marginal Effects*), MAIN RESULTS

	All jobs	Medium/ low skill jobs	High skill jobs
Contemporary unemployment 3 months	0.005 (0.012)	0.007 (0.015)	−0.001 (0.022)
Contemporary unemployment 6 months	0.000 (0.014)	0.007 (0.016)	−0.015 (0.025)
Contemporary unemployment 9 months	−0.019 (0.013)	−0.039** (0.015)	0.008 (0.024)
Past unemployment after graduation	−0.009 (0.012)	−0.004 (0.014)	−0.017 (0.020)
Past unemployment between jobs	0.010 (0.014)	0.011 (0.017)	0.005 (0.025)
Average callback rate	0.25	0.21	0.30
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 Stata12. All regressions also include control variables for work experience, number of employers, gender, ethnicity, 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 no contemporary unemployment and no history of past unemployment. The standard errors (in parentheses) are clustered at the job advertisement level.

\*\*\*Significant at the 1 percent level.

\*\*Significant at the 5 percent level.

\*Significant at the 10 percent level.

**Main Results.**—Table 6 presents the results when we include all measures of contemporary and past unemployment.

We start by investigating whether the callback rate depends on the time spent in *contemporary* unemployment by including separate measures for zero, three, six, and nine months of unemployment. We find that the callback rate does not differ between the first three measures, but that it decreases, and almost becomes statistically significant at the 10 percent level ( $t = 1.45$ ;  $p = 0.15$ ) at nine months of unemployment (column 1). This suggests that long-term spells of contemporary unemployment may be considered as a negative signal. To analyze this issue further, we do the analysis by the skill level of the job. Due to power issues in small samples, it is not possible to run the regressions for each occupation separately, but we can do a similar analysis by using the two categories medium/low and high skill jobs.

For medium/low skill jobs, we now find a clear negative effect of long-term spells; the callback rate decreases dramatically at nine months of unemployment (column 2). This effect is both statistically and economically significant. In size, it corresponds to the effect of four years of work experience on the callback rate (cf. Table 9). Also, there is an indication, although not statistically significant, that at short durations searching while unemployed may be considered positively by employers relative to searching while employed. This may reflect that some employers consider it important that a worker can start work immediately. The results indicate that employers do not view job applicants with unemployment spells lasting up to six months negatively, while the callback rate is reduced by around 20 percent (0.039/0.21) for applicants who have been unemployed for a longer period. This

suggests that employers understand that worker/firm matching takes some time but get suspicious about a worker's productivity when the spell length gets too long. Hence, our results are suggestive of a stigma effect associated with long-term spells of contemporary unemployment. Comparing our results to the US results in Kroft, Lange, and Notowidigdo (2013), who consider similar types of medium/low skill jobs, there are both similarities and differences: they find a rather weak decline in the callback rate in the first few months of the spells (up to around three months), a sharp drop in the callback rate for mid-long spells (up to around eight months), and essentially no further decline in the callback rate for longer spells. Hence, the results are similar for very short spells, but in our experiment the negative effect appears later. However, compared to Oberholzer-Gee (2008) the negative effect appears earlier. Interestingly, we do not find a corresponding negative effect of long-term spells for high skill jobs (column 3). The difference in the estimate for nine months of unemployment between the two skill categories is statistically significant at the 10 percent level ( $t = 1.68$ ,  $p = 0.094$ ). One interpretation of this difference is that employers recruiting for high skill jobs find the spell lengths we are considering less informative since these spell lengths could signal either a low productivity or a high reservation wage. The results suggest that the hiring procedure is different for medium/low and high skill jobs, which is an issue we will return to below.

Next, we turn to the effects of having been unemployed in the *past*. Our results show that none of the measures of past spells—either immediately after graduation or between jobs—have a statistically significant effect on the callback rate. All of the coefficients are fairly precisely estimated. Hence, employers do not seem to use information about past spells of long-term unemployment, i.e., spells of at least 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 consider the fact that someone has hired the worker after those spells as evidence that the worker does not have undesirable inherent characteristics. In other words, subsequent work experience may eliminate the negative signal of past unemployment. 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.<sup>26</sup> Our results suggest that one year of work experience is enough to reverse the negative signal of one year of past unemployment.

*Additional Results.*—In Table 6, we include all the unemployment signals—i.e., all types of contemporary and past unemployment—separately. However, potentially we can learn more about these effects by considering four alternative specifications. Therefore, we include unemployment as (i) ever unemployed (0/1), (ii) contemporary unemployed (0/1), (iii) ever unemployed in the past (0/1), and (iv) total time spent in unemployment (in years). The first three alternatives correspond to unemployment at the extensive margin (i.e., measured as 0/1) rather than

<sup>26</sup> One potential reason for this is that we may analyze the wrong margin of experience. The right margin may be zero versus some experience, a case we cannot consider since all applicants have at least one year of experience.

TABLE 7—THE EFFECTS OF THE WORKERS' ATTRIBUTES ON THE CALLBACK RATE  
(*Marginal Effects*), ADDITIONAL RESULTS

	All jobs	Medium/ low skill jobs	High skill jobs
<i>Panel A</i>			
Ever unemployed	−0.007 (0.010)	−0.014 (0.012)	0.004 (0.019)
<i>Panel B</i>			
Contemporary unemployed	−0.004 (0.009)	−0.006 (0.011)	−0.001 (0.016)
<i>Panel C</i>			
Past unemployed	0.000 (0.011)	0.002 (0.013)	−0.003 (0.019)
<i>Panel D</i>			
Total duration of unemployment (in years)	−0.006 (0.008)	−0.006 (0.009)	−0.006 (0.014)
Average callback rate	0.25	0.21	0.30
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 Stata12. All regressions also include control variables for work experience, number of employers, gender, ethnicity, 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 standard errors (in parentheses) are clustered at the job advertisement level.

\*\*\*Significant at the 1 percent level.

\*\*Significant at the 5 percent level.

\*Significant at the 10 percent level.

at the intensive margin (i.e., measured as time spent in unemployment). The results are presented in Table 7 for all, medium/low skill, and high skill jobs, respectively.

None of the measures of unemployment has a statistically significant effect on the callback rate. All coefficients 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. These results clearly illustrate that, in order to get an accurate picture of the effects of unemployment spells on the callback rate, we need to allow for non-linear effects as well as do the analysis by the skill level of the job.

Next, we make a comparison of the effects in different demographic groups, i.e., we consider men versus women and native Swedes versus the ethnic minority. Due to power issues in small samples, we cannot draw sharp conclusions from an analysis of these subgroups. Hence, the results should be considered mainly as a sensitivity exercise, and we restrict the analysis to all jobs. Table 8 presents the results, and we focus on the effect of long-term spells of contemporary unemployment; i.e., being unemployed for nine months.

The estimate for men (−0.024) is higher than the corresponding estimate for women (−0.011), and the estimate for native Swedes (−0.022) is higher than the corresponding estimate for the ethnic minority (−0.016). One interpretation of these findings is that employers consider long-term spells of unemployment as a stronger negative signal for native men, perhaps because ethnic minorities and women more often are nonemployed than native men. However, we cannot exclude the possibility that the estimates are identical.

TABLE 8—THE EFFECTS OF THE WORKERS' ATTRIBUTES ON THE CALLBACK RATE  
(*Marginal Effects*), SUBGROUPS

	Men	Women	Natives	Ethnic minority men
Contemporary unemployment 3 months	−0.005 (0.014)	0.027 (0.023)	−0.001 (0.016)	0.016 (0.019)
Contemporary unemployment 6 months	−0.008 (0.016)	0.015 (0.027)	−0.008 (0.018)	0.013 (0.020)
Contemporary unemployment 9 months	−0.024 (0.015)	−0.011 (0.024)	−0.022 (0.017)	−0.016 (0.020)
Past unemployment after graduation	0.001 (0.014)	−0.031 (0.021)	−0.017 (0.015)	0.008 (0.018)
Past unemployment between jobs	0.012 (0.016)	0.007 (0.026)	0.018 (0.018)	−0.007 (0.020)
Average callback rate	0.22	0.29	0.28	0.17
Observations	5,636	2,830	5,662	2,804

*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 12. All regressions also include control variables for work experience, number of employers, 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 no contemporary unemployment and no history of past unemployment. The standard errors (in parentheses) are clustered at the job advertisement level.

\*\*\*Significant at the 1 percent level.

\*\*Significant at the 5 percent level.

\*Significant at the 10 percent level.

Finally, to investigate if some of the occupational groups are driving the results, we divide the data into medium/low and high skill jobs and then exclude one occupational group at a time. The results of this exercise are in Tables E1 and E2 in the online Appendix. The estimates are very stable irrespective of which occupation is excluded. This exercise clearly shows that our main results are not specific to just some of the occupational groups.

*Work Experience.*—The results so far indicate that employers respond differently to contemporary unemployment depending on the length of the spell and the skill level of the job: for medium/low skill jobs long-term spells are considered as a negative signal, while for high skill jobs we find no such effect. In light of these results, a natural question is if the applicants' employment history is considered irrelevant by employers recruiting for high skill jobs. To investigate this issue further, we now consider the importance of work experience. As was explained in Section IIIA, the design of the experiment allows us to estimate the effect on the callback rate of both work experience and unemployment spells. We do the analysis in two ways. We start by including work experience as a continuous variable measured in years. Then, we include it as 1, 2, and 3–5 years of experience (all applicants have at least one year of experience). We use these categories because the descriptive statistics indicate that these are the important margins (cf. Table 5), and because the results get less precise when we use all five categories. The results are presented in Table 9.

Work experience has a clear and statistically significant effect: the effect of one additional year of experience is 1.2, 0.9, and 1.7 percent for all, medium/low, and high skill jobs, respectively (panel A). In addition, all the discrete measures of work

TABLE 9—THE EFFECT OF THE WORKERS' WORK EXPERIENCE ON THE CALLBACK RATE  
(Marginal Effects)

	All jobs	Medium/ low skill jobs	High skill jobs
<i>Panel A</i>			
Work experience (in years)	0.012*** (0.004)	0.009* (0.005)	0.017** (0.008)
<i>Panel B</i>			
2 years of work experience	0.034** (0.017)	0.009 (0.020)	0.079*** (0.030)
3–5 years of work experience	0.050*** (0.015)	0.028 (0.018)	0.088*** (0.027)
Average callback rate	0.25	0.21	0.30
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 Stata12. All regressions also include all types of 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. In panel B, the reference category is a worker with one year of work experience. The standard errors (in parentheses) are clustered at the job advertisement level.

\*\*\*Significant at the 1 percent level.

\*\*Significant at the 5 percent level.

\*Significant at the 10 percent level.

experience are statistically significant when we consider all jobs, but the effects are different for the different skill groups (panel B). For medium/low skill jobs, the estimates are positive, but small in magnitude and rather imprecisely estimated. In contrast, for high skill jobs, there is a strong effect between one and two years of experience, where the callback rate increases by around 8 percentage points. The difference between medium/low and high skill jobs in the effects of two and three to five years of work experience are both statistically significant, with  $t$ -values of 1.93 ( $p$ -value = 0.05) and 1.83 ( $p$ -value = 0.07), respectively. Another dimension of work experience is the number of employers. However, we find no statistically significant effect of this variable (these estimates are available on request).

These findings suggest that employers use different hiring strategies depending on the skill level of the job. One interpretation of these results is that the quality of the worker/firm match matters 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. Also, spells of unemployment may have an ambiguous interpretation for high skill workers. For medium/low skill jobs, individual productivity may matter less and employers may be more concerned about not hiring an applicant who is unable to do the job and, therefore, rely more on easily observed negative signals, such as unemployment spells. Moreover, it may be that low skill jobs do not require that much experience, and, hence, 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 work experience.

*Robustness.*—To check the robustness of the results, we have considered a number of alternatives and extensions (detailed results are available on request). First, we



have investigated if there are any correlations between the (un)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. 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, as was the case 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 6–9, fixed effects for each occupation and region are included, but we can extend this analysis by including interaction effects between the occupations and the regions in the regressions. Including such interactions does 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.<sup>27</sup> Finally, 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 included variables for some potentially important firm characteristics—sector, size, and gender composition—in the regressions. Including these variables does not affect any of the results. Overall, these robustness checks confirm that the main results appear stable across different specifications and extensions.

#### IV. Concluding Remarks

In the United States, unemployment—even long-term unemployment—is reaching levels comparable to European countries. Economists have for a long time warned that unemployment spells may damage workers' future labor market careers and, hence, the stigma associated with long-term unemployment spells could create large inefficiencies in labor markets. If employers avoid job seekers with employment gaps in their CVs, this will make it more difficult to bring down 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 data from a field experiment where 8,466 fictitious job applications were sent to employers advertising for workers. Several components of the workers' (un)employment history, including long-term spells of contemporary and past unemployment, were randomly assigned to the applications. The spell lengths were chosen to send strong and realistic signals. The workers' (un)employment history may

<sup>27</sup> The design of the experiment does not allow us to do a detailed analysis of whether the effects of the workers' employment history differ depending on the local unemployment rate since almost all the jobs are located in two local labor markets. Still, we have tried this avenue but essentially do not get any sensible results due to the very limited variation. This issue is explored in Kroft, Lange, and Notowidigdo (2013), who show that duration dependence is more severe in cities where unemployment is low.

have many effects, but clearly one of the most important effects is the extent to which employers use information about unemployment and work experience when hiring.

Our analysis provides several policy-relevant results concerning employers' hiring behavior. First, long-term spells of unemployment in the past do not matter for employers. This suggests that subsequent work experience eliminates this negative signal. Second, employers do not treat contemporary short-term unemployment spells differently. This implies that employers understand that worker/firm matching takes some time. Third, employers attach a negative value to contemporary unemployment spells lasting at least nine months for medium/low skill jobs. This suggests that employers perceive such spells as a negative signal and, hence, is supportive of the existence of stigma effects. Finally, work experience seems important to employers, especially for high skill jobs. Our results indicate that employers use different hiring strategies for medium/low skill and high skill jobs—relying more on negative signals (unemployment) for medium/low skill jobs and positive signals (work experience) for high skill jobs. Some potential reasons for this were discussed in Section IIIB, but this is an interesting question for future research.

An important issue is the validity of our results. There are several issues to consider. First, we can only investigate the effects of job applicants' unemployment 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 applicants' (un)employment history, should matter most in the early stages of the hiring process when employers need to get a short list 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, around half of all vacancies in Sweden are reported to the Employment Service, and the occupational mix of these vacancies is very similar to the occupational mix of employed workers both in Sweden and in the United States. This suggests that our choice of occupations and vacancies should be fairly representative. 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, if employers view unemployment as an important 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 in their CVs. Finally, it may be argued that the results are specific to Sweden and, therefore, not representative of the situation in other countries, such as the United States. However, nowadays the unemployment situation in Sweden is rather similar to the situation in other countries.<sup>28</sup> Moreover, using Swedish administrative data on unemployment spells, we show that the empirical regularities found in the nonexperimental literature hold for Sweden as well. Another argument is that differences in unemployment benefits between Sweden and other countries may affect how employers interpret

<sup>28</sup> It is not obvious that unemployment should be a stronger negative signal when unemployment is high (cf. Mueller 2012): 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. This issue is explored in Kroft, Lange, and Notowidigdo (2013).

unemployment spells. The Swedish social safety net is more generous than the US system. In Sweden, unemployed workers get unemployment benefits for 300 days at a replacement rate of up to 80 percent.<sup>29</sup> However, it is not obvious how such differences will affect employers' perception of unemployment spells. If more generous benefits cause workers to hold out for better worker/firm matches, employers may tolerate longer spells before becoming suspicious about worker productivity. This may explain why the negative effect of contemporary spells appears later in our experiment than in Kroft, Lange, and Notowidigdo (2013).

Overall, our results suggest that experiences of unemployment may not always lead to serious negative long-term consequences for the affected workers. One reason why we find less evidence of negative effects than previous studies may be problems with unobserved heterogeneity in studies using administrative/survey data. Moreover, it may be that these factors matter more for wages than for employment, or affect other important dimensions, 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.

#### APPENDIX: 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

<sup>29</sup> The replacement rate is 80 percent for day 1–200, 70 percent for day 201–300, and there is an income cap. For those with children under 18, the duration of benefits is 450 days. After the exhaustion of unemployment benefits, the worker can enter a labor market program and get additional benefits or social assistance.

## CV

Name: Erik Johansson  
 Address: 00 Street  
 00 Town  
 Telephone: 00-000-000  
 E-mail: erikjohansson@00.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

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