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The success of job applications: a new approach to program evaluation

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Abstract

This paper suggests a novel approach to program evaluation that allows identification of the causal effect of a training program on the likelihood of being invited to a job interview under weak assumptions, i.e., by measuring the program-effects by pre- and post-treatment data that are very close in time for the same individual.

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1. Introduction

The best solution to the evaluation problem lies in improving the quality of the data on which evaluations are conducted and not in the development of formal econometric methods to circumvent inadequate data. (Heckman et al., 1999, p. 1869)

There is no doubt that in the presence of tight government budgets credible policy evaluation is very important. There is also no doubt, however, that the evaluation of policy programs involves fundamental methodological difficulties. In this paper we suggest a

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new approach to the evaluation of labour market programs that relies on a novel approach and on self-collected data that help to identify the causal program effect under rather weak assumptions.

We analyse the impact of participation in active labour market programs that are offered to unemployed individuals as part of the Swiss labour market policy. Since the second revision of the national unemployment insurance act in 1997, the unemployed are supposed to take an active part in improving their skills and their job fitness. The different measures can be divided into three broad categories: training programs, public employment programs and wage subsidies.¹ This paper focuses on a particular training program, which is meant to improve basic computer skills. These courses last between 2 and 3 weeks and teach basic word processing or spreadsheet calculation skills. Participating individuals receive a course certificate upon completion of the course.

To assess the impact of the program, our procedure was as follows: First, we recruited unemployed persons who participated in the computer courses. Then we sent out job applications for these people before they had finished their course. A second wave of applications was sent after the participants had successfully completed the course and had received a certificate. The new set of applications were identical to the old set of applications, the only exception being that the new set of applications mentioned the certificate in the cover letter and contained a copy of the certificate. The impact of the program is measured by the firms' responses. We check whether the probability of becoming invited for a job interview is different for the applications with certificate than for those without.

In comparison to the existing literature the method suggested in this paper has at least four advantages. First, with our method we can calculate individual treatment effects. This is possible because we have several outcome observations (invitation or no invitation) in each treatment state. Individual treatment effects inform about potential differences across individuals concerning the impact of a particular labour policy program. Such information is required, for instance, in order to target these programs on those individuals that benefit most from the program. This precise targeting is hard to achieve with typical evaluation studies since in these studies the data do not permit estimating individual treatment effects. Second, the application process is not influenced by the participants. The set-up of our study rules out any changes in search intensity and/or wage aspirations because the researcher controls the application process. Previous studies have shown that the search intensity may be influenced negatively by course participation ("locking-in effect"). The same holds for changed reservation wages or aspiration levels in general. It may well be that participating in a policy measure raises the aspirations for a new job. Third, studies based on cross-section data at the level of the individual typically contain only little, if any, information at the level of the vacancy. In contrast, the data generated by our method is highly informative about both vacancies and individuals. Fourth, the time span between applications without certificates and with certificates is very short in our study. This time proximity ensures that job chances of the individuals are not significantly different between treatment and control states. In comparable studies based on before-after

¹ For details on the programs see, e.g. the evaluation studies by Gerfin and Lechner (2002) or Lalive et al. (2004).

estimations, however, this cannot as easily be assumed since in these studies the time span between control and treatment states is typically quite long.

According to our results, the effect of computer training on the probability of becoming invited to a job interview is, on average, negative but insignificant. Moreover, we find that a significant negative mean impact of the program can be assessed for vacancies that require good computer skills (compared to vacancies that do not require such skills). This result is counterintuitive on first sight. A possible explanation, however, is that the participation in a very basic computer course may actually inform the hiring firm about the absence rather than about the presence of profound computer skills.

In the next section we describe the procedure and the design of our study. Section 3 reviews some of the related literature and discusses briefly our identifying assumptions. Section 4 describes the data and contains results on the effect of computer courses on the probability of being invited to a job interview. Section 5 concludes.

2. Design of the study

Our study is designed to investigate the effect of computer courses on the chances to be invited to a job interview. These computer courses are part of the active labour market policy in Switzerland. They last for about 2–3 weeks and teach basic computer skills, e.g., the use of operating system software and an introduction to word processing or spreadsheet calculation programs. Assessing the effectiveness of the programs is interesting as the aim of the Swiss active labor market policy is fast re-integration of job seekers into the “primary” labor market. Thus, when we evaluate the chances of being invited to a job interview, we shed light on the first stage of the process by which computer courses may affect re-integration.

To recruit participants for our study we contacted various educational institutions that offer the courses and asked for the permission to recruit their course participants. We then went to the corresponding courses and informed the course participants about our study. This information included a short description of the aims of the study and all procedural details. Course participants were also informed that in case of participating in our study they were to receive a compensation of CHF 200 (~ € 130).

All individuals interested in participating in the study were individually invited to our institute for a first appointment. They had to bring their CV, copies of diplomas, other relevant certificates and letters of recommendation, i.e., all documents that are enclosed in a typical job application in Switzerland. Together with each participant we discussed what kind of jobs he or she usually applies to. Given the individual profile we searched for vacancies on the internet and in “*Tages-Anzeiger*”, the main newspaper in the Zurich area, for the type of jobs that participants in the study were looking for. Specifically, during a period of one week, we recorded all vacancies that fit to the individual profile of the participant. We then prepared his or her job applications including a cover letter, the CV and all documents about educational background and previous positions. Prior to sending the application to the corresponding firms, the applicant looked through all applications and signed them. This first set of applications was sent without a computer course certificate.

After a participant had finished his or her course and had received the course certificate we prepared a second set of applications. These applications were *exactly the same* as before, with the only exception that now the just recently acquired basic computer skills were mentioned in the application letter and a copy of the relevant certificate(s) was included. Again the participant looked through the applications and signed them before they were sent to the firms.

The participants in our study had to keep track of all firm responses. To standardize this information, participants were given a form where they had to insert the firm's name they had applied to, the date at which the firm reacted, and whether the firm wished an interview or not. In case a participant received an invitation, it was of course the participant's discretion to accept the interview or to deny it. After the participant sent us the completed form the person was paid CHF 200. Most firms that received an application letter usually answered within a period of 3 weeks (83%).²

Together with the applicant's CV and the completed forms we have the following data: (i) The firm's response (wishes an interview, wishes no interview, wants further information, no response after three weeks), (ii) individual characteristics of the applicant, (iii) the firm's job advertisement (including special requirements for applicant, like computer or language skills, blue collar or white collar job, firm's name and type of industry/sector, size of the advertisement in the newspaper, demanded hours of work), (iv) the date we sent the application to the firm, and (v) the date the firm contacted the applicant.

3. Relation to previous literature

The design of this study is similar to the so-called 'correspondence testing' method. According to the latter, matched pairs of applicants apply for the same vacancy. The two applicants differ only with respect to a treatment variable like sex or race. The researcher checks, whether the invitations of the two persons differ and takes this as evidence for a treatment effect. These studies have been conducted to study discrimination issues, such as racial discrimination (e.g., Firth, 1981; Riach and Rich, 1991), gender discrimination (e.g., Neumark, 1996; Riach and Rich, 1995; Weichselbaumer, 2004) and unemployment stigma (Oberholzer-Gee, 2000). To our knowledge, the 'correspondence testing' method has not yet been applied to program evaluation.³

Our procedure differs from the correspondence testing approach in two important ways. First, we do not send matched pairs of applicants to firms. Instead, we send applications of the *same* person with and without a basic computer course certificate to *different* firms. This allows perfect control for individual characteristics that is missing in the studies

² In case it took longer we told the participants to stop waiting and to send us the completed form without those firms. This restriction changes the interpretation of the dependent variable. We evaluate the effect of computer courses on the firms' responses *within the first 3 weeks* since the application has been sent out.

³ There is a related empirical literature, based on *employer surveys*, that studies the importance of unemployment and ALMPs as hiring devices for employers. See Behrenz (1998) and Agell and Lundborg (1995, 2003) for recent papers.

mentioned above. While these studies put much effort in keeping the two applicants as similar as possible (except for the characteristic of interest), they are of course not completely alike. This has given rise to criticism. In his related critique of audit studies, Heckman (1998) notes, e.g., that the chances that all characteristics that might affect productivity are perfectly matched are rather low (p. 108).

The second important difference to the existing correspondence-testing studies is that our study involves no fake or deception. In many previous studies the applicants are completely faked, i.e., the applicants do not really exist. This is problematic for various reasons. Most importantly, there is a substantial lack of control. For instance, firms may detect the deception when contacting a former employer of the applicant. Moreover, deception makes it impossible to write complete applications. This is of particular importance in Switzerland where a meaningful application includes copies of school and diploma degrees. By using fictitious persons it is not possible to provide such information in a legal and credible way.

For each participant we study the probability of getting an invitation to a job interview *with* course certificate with the respective probability *without* course certificate. The “effect of treatment on the treated” is consistently estimated under the assumption that, conditional on the identity of the job seeker as well as observable characteristics of the job offers, an application letter containing the computer course certificate is independent of the probability of invitation (the “conditional independence assumption”, CIA). CIA is likely to hold, first because the *same* individual applies with and without certificate. Second, the allocation of job offers to the treatment was entirely under the control of the researcher. In this sense, our procedure estimates the treatment effect under rather weak assumptions.

4. Results

In this section we describe the dataset, report estimates referring to the effect of basic computer course certificates on the chances of getting a job interview and investigate the heterogeneity in the effect of computer programs with respect to skills required on the new job.

4.1. Data

The study was conducted in Zurich between December 1999 and March 2000. We contacted a total of about 100 individuals who were taking part in 12 computer courses. These courses were organised by the three leading providers of official ALMP courses in Zurich. Twenty individuals expressed an initial interest in participating in the study. Five individuals decided against participation due to reasons unknown to us. We decided to reject five additional candidates because they were either (i) older than 60, (ii) looking for a very specific type of position that was in very short supply (i.e., musician), or (iii) were under the impression that we would advise them in job search. We ended up with a group of 10 individuals. A total of 191 job applications was sent out, 95 without computer course certificate, 96 with computer course certificate. On average, we sent out

the treated application 21 days after sending out the control application. The time span between the date of publishing and the date of sending out the application was not more than 1 week.

The data contain detailed information about the type of job offer. The first type of information refers to skills required on the vacancy: computer skills, knowledge of a second language and ability to work in a team. These three variables were coded as dummy variables, taking the value 1 if the job offer mentions the item and 0 otherwise. Second, a distinction was made between white-collar jobs and blue collar jobs. Third, there is information about the industry of the firm seeking to hire (government, retail, and other services are the largest three industries), hours of work (as a share of a full time job), the size of the job advertisement in the newspaper (in cm²), and the date when the vacancy was published. The last characteristic is important because all treated applications were sent out later than the control applications. These characteristics are the set of observables used in this study.

With respect to individuals, the data are informative on education, age, sex, previous work history, quality of the application, etc. As the data contain multiple observations for each individual, both in the treated and in the non-treated state, it is possible to account for such individual differences by way of person effects.

The dependent variable is whether an application letter leads to an invitation within three weeks after sending out the job application. We find that 83% of the firms responded within this time period - evidence that the response period was chosen sufficiently long. Note that the fraction of missing responses was identical across treatment states. The variable “invitation to a job interview” is coded as a dummy taking the value 1 if the hiring firm invites the job seeker, and 0 otherwise. Note that the 0-outcome refers to the response that the firm does not wish an interview (76% of all zero entries), the firm wants further information (4%), and no response on the part of the hiring firm (20%).

Table 1 contains a cross-tabulation of the share of invitations by individual and treatment status (first cell) as well as the number of applications (second cell). Three observations are important. First, a number of individuals have zero invitations both, before and after treatment (individual nos. 2, 4, 5, 6, and 7). Two interpretations are possible. Either the characteristics of these five individuals were so poor that they would never get an invitation *or* the number of applications drawn for these individuals was too small. Second, while the number of applications with certificate is not identical to the number of applications without certificate for each individual, these numbers are balanced for the entire dataset (see final row). Third, the *prima facie* effect of adding a course certificate to a job application appears to be negative. Whereas 17.8% of all applications without a certificate led to an invitation, only 11.4% of the applications with a certificate were followed by an invitation.⁴

⁴ Note that the average *prima facie* effect of course certificates on invitations in the subgroup containing only individuals for whom we observe at least one invitation (individual nos. 1, 3, 8, 9, 10), is – 5.4 percentage points. This number is very similar to the respective number derived from the full sample (– 6.4 percentage points). This suggests that the low average treatment effect is unlikely due to the fact that characteristics of the never-invited are too poor.

Table 1
The share of invitations by individual and treatment status

Individual no.	Without certificate	With certificate	Total
1	0.21 (19)	0.06 (18)	0.14 (37)
2	0.00 (7)	0.00 (22)	0.00 (29)
3	0.14 (7)	0.23 (13)	0.20 (20)
4	0.00 (5)	0.00 (5)	0.00 (10)
5	0.00 (5)	0.00 (6)	0.00 (11)
6	0.00 (5)	0.00 (6)	0.00 (11)
7	0.00 (11)	0.00 (7)	0.00 (18)
8	0.53 (15)	0.71 (7)	0.59 (22)
9	0.29 (14)	0.20 (5)	0.26 (19)
10	0.00 (7)	0.14 (7)	0.07 (14)
Total	0.18 (95)	0.11 (96)	0.15 (191)

First cell contains the share of invitations in total applications, the second cell contains the number of observations in parentheses.

Source: Own calculations.

4.2. Effect of treatment on the treated

The choice of the appropriate estimation strategy was guided by the trade-off between bias and variance. Non-parametric estimators, such as the method of matching, have the advantage - compared to parametric approaches - that no assumptions beyond CIA need to be invoked. This implies that the bias due to misspecification of the econometric model is reduced. However, it is well known that non-parametric estimators are biased in small samples. Moreover, non-parametric estimators are characterized by a slow speed of convergence to the asymptotic distribution. Considering the fact that the number of job applications in this study is small, we report estimates based on a parametric estimator.

The dependent variable, invitation to a job interview, is a binary variable. We apply a linear probability model to this indicator and we report robust standard errors to account with for heteroskedastic standard errors. Table 2 reports results regarding the effect of a computer course certificate on the probability of invitation to a job interview. All estimates control for individual effects and the observed characteristics of the vacancy mentioned in the previous subsection.⁵ Column A reports an estimate of the effect of treatment on the

⁵ For full estimation results see the Discussion Paper by Falk et al. (2004).

Table 2
The effect of a computer course certificate on invitation to a job interview

	A	B
With Certificate	– 0.033 (0.047)	0.043 (0.061)
With Certificate * Computer skills required		– 0.195 (0.093)**
Control Variables	Yes	Yes
Individual Fixed Effects	Yes	Yes
Observations	191	191
Adjusted R-squared	0.25	0.27

Dependent variable: Probability of being invited to a job interview.

Robust standard errors. ** denotes significance at the 5% level. Control variables: computer skills, second language, team skills, date vacancy was published, size, work hours, skill level, position, industry. See Falk et al. (2004) for the respective coefficient estimates.

Source: Own calculations.

treated based on the assumption that the effect of the course certificate neither differs by individual nor by the type of job offer.

According to the estimate in Column A, the effect of the computer course certificate on the success of job applications was negative but not significantly different from zero. The point estimate suggests a reduction of the probability of being invited for a job interview by 3.3 percentage points if a computer course certificate is added to the application. However, the result in Column A may be biased because the underlying assumption is that the treatment effect is constant across individuals and jobs. Therefore, it is important to relax this assumption.

Column B reports results allowing for differences in the estimated effect of computer courses depending on whether or not the job requires ‘computer skills’. The estimates in column B suggest that the effect of computer training on jobs that do not require computer skills is slightly positive but insignificant. Interestingly the effect for jobs that do require computer skills is significantly lower than the effect for jobs that do not require computer skills: The ‘invitation probability’ drops by 19.5 percentage points if job seekers disclose information on the recent completion of a basic computer course.

While this result appears puzzling at first sight, a potential explanation is that certificates actually convey two separate and opposing types of information. The first type of information refers to the new skill acquired and is likely to increase invitations. The second type of information is that the job seeker does not have prior work experience with the computer and that therefore the level of computer education is in fact rather low. This information may have a negative impact on the success of job applications. It is plausible that for some jobs, the first, positive effect dominates whereas for other types of jobs the second, negative effect dominates. The negative effect will, for instance, dominate in the case of vacancies stating computer skills as a requirement to do the job.⁶

⁶ We conducted two further sensitivity analyses. The first allows for heterogeneity along all dimensions and leads to the conclusion that the average effect of treatment on the treated is closely in line with the effect reported in column A. The second sensitivity analysis performs the analysis on the sub-sample with at least one invitation. The estimated effects are identical to those reported in Table 2 columns A and B both at the qualitative and at the quantitative level (A: “With Certificate” – 0.029 (0.114); B: “With Certificate” 0.126 (0.114), “With Certificate * Computer skills required” – 0.346 (0.169)**).

5. Conclusions

The main difficulty in the evaluation of social programs is to obtain credible estimates for the ‘counterfactual’, i.e., information for participants on the outcome in the state of non-participation. In this paper we suggest a new approach that allows assessing the effect of a program on invitation to a job interview. Being invited to an interview is a convincing and meaningful indicator for the success of active labour market policies since it sheds light on the first stage of the process by which programs may affect re-integration. Furthermore, invitations to a job interview can be observed both before and after the program has ended for each participant. Thus, it is possible to identify the effect of treatment on the treated conditional on *all* (observed or unobserved) individual characteristics.

We find that the effect of basic computer training on the job interview probability is, *on average*, negative but insignificant. Moreover, a significant negative mean impact of the program can be assessed for vacancies that require good computer skills (compared to vacancies that do not require such skills). A possible explanation is that participation in a very basic computer course may signal the *absence* (rather than the presence) of profound computer skills.

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