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Anonymous Job Applications in Europe

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ABSTRACT

Anonymous Job Applications in Europe^{*}

Numerous empirical studies find a substantial extent of discrimination in hiring decisions. Anonymous job applications have gained attention and popularity to identify and combat this form of discrimination. To test whether their intended effects result in practice, in several European countries such as Sweden, France and the Netherlands field experiments were recently conducted. Also in Germany, a large field experiment has examined the practicability and potentials of this approach. Against the background of the recent German findings as novel evidence, this paper discusses the advantages and disadvantages of this new policy proposal.

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1 Introduction

Discrimination is present in many markets around the world. It has, for example, been documented in a broad range of consumer markets (Yinger, 1998). However, labor market discrimination has received the most attention, both in the academic literature as well as in the policy debate. The main focus is on characteristics such as gender, race and ethnicity, and differences in employment patterns and earnings by these characteristics that cannot be attributed to other (observable) characteristics. More recently, an emerging strand of the literature explores the role of “beauty” in determining labor market outcomes. Attributes such as weight, size or attractiveness appear to matter for a broad range of labor market outcomes, including earnings, and are also able to explain sorting behavior into different occupations (see, e.g., Hamermesh and Biddle, 1994; Biddle and Hamermesh, 1998).

A crucial dimension of labor market discrimination is the access to jobs. Unequal access to employment opportunities across population groups has important implications for the short- and long-term labor market outcomes of individuals who are affected. Indeed, a large number of empirical studies document a substantial extent of discrimination in hiring decisions. Examples for such studies that typically use correspondence tests include Bertrand and Mullainathan (2004) for the United States, Carlsson and Rooth (2007) for Sweden, and Kaas and Manger (2012) for Germany. Discrimination in recruitment decisions is a market failure because it should be in the employers’ own interest to hire the most productive workers—irrespective of their gender, race or ethnicity.

Anonymous job applications gain attention and popularity as an attractive policy intervention to reduce or even eliminate discrimination in hiring. Discrimination becomes impossible if applicants’ characteristics which employers may discriminate against are unknown and it is not possible to deduce these characteristics indirectly. However, the concept is not a fundamentally new idea. Anonymous or “blind” procedures have already been used in other areas. For example, Blank (1991) analyzes the effects of double-blind and single-blind reviewing processes at an economic journal. Goldin and Rouse (2000) investigate the impacts of blind auditions to select members of symphony orchestras. These experiences show that it is generally possible to decide anonymously.

However, anonymity appears in stark contrast to the zeitgeist. Millions of individuals increasingly use virtual social networks and similar pages on the internet, where they provide extensive information about themselves—which is moreover often publicly available. The amount of information goes even beyond the amount that is included in very comprehensive application documents. Similarly, in Asian countries such as South Korea, providing very detailed and extensive information in application forms is the standard. On the other hand, there are countries like the

United States where applications include much less information than what is typically the case in European countries. Hence, any discussion about anonymous job applications is also related to the question of the optimal amount of information included in application documents.

This paper contributes to the ongoing and lively debate about anonymous job applications. Can this instrument prevent employers from hiring discrimination? And if so, what are the related costs? We first summarize the main findings of experiments with anonymous job applications in Europe in Section 2 and present novel empirical results from the recent German experiment in Section 3. Against this background, we then comprehensively discuss and analyze the potentials and limits of anonymous job applications in Section 4. Finally, we conclude in Section 5.

2 Recent Experiments in European Countries

What are the effects of anonymous job applications on the callback rates of minority applicants? To answer this question, a number of field experiments have recently been conducted in European countries, including relatively large-scale experiments in France, the Netherlands and Sweden.

The French government initiated an experiment in 2010 and 2011 which was implemented by the French public employment service. It involved about 1,000 firms in eight local labor markets and it lasted in total for about ten months (Behaghel et al., 2011). The experiments' main findings can be summarized as follows. First, women benefit from higher callback rates with anonymous job applications—at least if they compete with male applicants for a job. However, for roughly half of the vacancies included in the experiment only female candidates or only male candidates applied. Second, migrants and residents of deprived neighborhoods suffer from anonymous job applications. Their callback rates are lower with anonymous job applications than with standard applications. Third, recruiters who tend to invite candidates with similar characteristics to them are not able to continue to do so. This conscious or unconscious behavior of “homophily” is therefore prevented with anonymous job applications, importantly with persistent effects in later stages of the recruitment process.

In the Netherlands, two experiments took place in the public administration of one major Dutch city in 2006 and 2007. The experiments focus on ethnic minorities. More specifically, a distinction is made between applicants with and without foreign (i.e., non-Western) sounding names. Bøg and Kranendonk (2011) emphasize in their study the lower callback rates for minority candidates with standard applications, but their analysis also reveals that these differences disappear with anonymous job applications. With regards to job offers, however, the authors do not detect any

differences between minority and majority candidates—irrespective of whether or not their resumes are treated anonymously. This indicates that even with standard applications, discrimination against minorities in interview invitations disappears at the job offer stage.

Åslund and Nordström Skans (2012) analyze an experiment conducted in parts of the local administration in the Swedish city of Gothenburg between 2004 and 2006. Based on a difference-in-differences approach, the authors find that anonymous job applications increase the chances of an interview invitation for both women and applicants of non-Western origin when compared to standard applications. These increased chances for minority candidates in the first stage also translate into a higher job offer arrival rate for women, but not for migrants.

Next to these relatively large-scale experiments, a smaller-scale experiment provides additional insights on the effects of anonymous job applications. Krause et al. (2012a) analyze a randomized experiment at a European economic research institution. Data on interview invitations is empirically analyzed for a particular labor market of economists who apply for post-doctoral positions. Results indicate that anonymous job applications are in general not associated with a different invitation probability. However, whereas female applicants have a higher probability to receive an invitation than male applicants with standard applications, this difference disappears with anonymous job applications. The underrepresented gender is thus hurt by anonymous job applications. Small-scale applications of anonymous job applications can also be found in other countries such as Switzerland and Belgium. However, these applications have in common that no rigorous empirical evaluations are available (yet).

The results on the effects of anonymous job applications from experiments in Europe are therefore in general encouraging. In most cases, anonymous job applications lead to the desired effect of increasing the interview invitation probabilities of disadvantaged groups. However, some results point into the direction that anonymity prevents employers from favoring minority applicants when credentials are equal—at least in the initial stage of the hiring process.¹ Results from a recent experiment in Germany provide additional insights. Effects may be different since in Germany, application documents contain a lot of information of the applicant. These documents typically include a cover letter and a CV, usually covering personal characteristics such as the name, contact details, date and place of birth as well as a picture of the applicant.

¹ If, for example, gender or ethnicity were a signal of labor costs, higher callback rates may be resulting from an employers' perception of cheaper labor costs for minority workers. In this case, higher callback rates of minority workers in the initial situation may be due to lower expected wages, and not due to affirmative action. Although it appears unlikely that such a mechanism is present, we cannot rule out that it is the case.

3 The German Experiment

In early 2010, the publication of a correspondence testing study for Germany (Kaas and Manger, 2012) triggered a lively public debate about discrimination in the hiring decisions of German firms. The study finds that applicants with a Turkish-sounding name are on average 14 percentage points less likely to receive an invitation for a job interview than applicants with a German-sounding name who are otherwise similar. In small- and medium-sized firms, this difference is even larger and amounts to 24 percentage points. Against this background and inspired by experiments in other European countries, the Federal Anti-Discrimination Agency initiated a field experiment with anonymous job applications in Germany to investigate their potential in combating hiring discrimination.

3.1 Project Setup and Evaluation Design

The German experiment officially commenced in November 2010 and lasted for twelve months in each of the participating organizations (Krause et al., 2012b). In total, eight organizations *voluntarily* joined the experiment. Among those organizations were four international companies, one medium-sized firm, and three public administrations. These organizations committed themselves to review anonymous job applications in specific departments for different types of jobs. The vacant jobs included apprentices, students, specialists as well as management positions. The characteristics that were made anonymous include the applicant's name and contact details, gender, nationality, date and place of birth, disability, marital status and the applicant's picture. Additionally, any information about professional experience should only indicate the duration of employment spells and not their actual start date or end date.² Importantly, applications were treated anonymously only in the first stage the recruitment process, i.e., when recruiters decide about which candidates to invite for a job interview. However, as soon as the interview invitations had been sent out, the candidates' identity was revealed.

The goal of this project was twofold. First, a qualitative evaluation should shed light on the practicability of anonymous job applications. For this purpose, structured interviews with the respective recruiters and a survey among the applicants were conducted. The practicability of four different methods was examined which are in principal suited to make sensitive information anonymous: a) standardized application forms in which sensitive information is not included; b) refinements of existing online application forms such that sensitive information is disabled; c) copying applicant's non-sensitive information into another document;

² This procedure should ensure that the risk of deducing minority group membership status (and age) from other characteristics is minimized in the experiment.

and d) blackening sensitive information in the original application documents. Results on practicability are reported in Section 3.2.

As a second goal of the experiment, the effects of anonymous job applications on interview invitation probabilities should be empirically investigated. The necessary data on applicants was collected by the participating organizations during the project. To empirically investigate the effects of anonymous job applications on interview invitation probabilities, we conduct a two-step analysis. In both steps, we apply linear probability models.

First, using data on anonymous job applications only, we analyze whether interview invitation probabilities systematically differ by gender and migration background when these characteristics are unknown to the recruiters. Our hypothesis is that, if the anonymization is effective, the applicants' anonymous characteristics cannot determine the interview invitation probability. Such influence could only be present in two cases. One possibility is that recruiters are able to deduce minority group membership status from other characteristics. Another possibility is that minority group membership status is correlated with other characteristics such as, for example, educational attainment or professional experience.

Second, to detect possible effects of introducing anonymous job applications, we compare the situation of anonymous job applications with a counterfactual situation, i.e., a comparable situation with standard job applications. Theoretically, three different effects are possible if we assume that anonymous job applications eliminate any differential treatment of minority groups. First, anonymous job applications may cause the interview invitation probabilities of minority groups to increase and to equalize with those of majority groups. In this situation, minority groups are discriminated against with standard applications. Second, if discrimination is not present with standard applications, anonymous job applications have no effect on interview invitation probabilities. Third, if instruments such as affirmative action are applied through which minority groups actually benefit from higher interview invitation probabilities with standard applications, the introduction of anonymous job applications may cause interview invitation probabilities of minority groups to decrease. Given that the hiring processes are very heterogeneous (sometimes even within the same organization) with respect to the type of vacancy, the method that is used to make sensitive information anonymous and the number of applicants, we conduct our analysis separately for each hiring process. Results on the effects of anonymous job applications are for one example recruitment process reported in Section 3.3, and for all processes in Section 3.4.

An overview of all hiring processes is given in Table 1. For nine processes are data on the anonymous job applications available. Additionally, the organizations

provided data on control groups for seven out of nine processes. The number of applications range from 27 to over 800 per hiring process which provides some indication for the heterogeneity between the different processes. Copying non-sensitive information into another document is used only once as method of anonymization, whereas blackening is the most frequent method. Certain descriptive statistics of processes 1, 4, 8 and 9 stand out. 93 percent of the applicants in process 1 are female, whereas this applies to only 2 percent of the applicants in process 4. Migrants usually make up at least 17 percent of the applicants. However, in process 8 this number is only 3 percent. Finally, the callback rate in process 9 is 93 percent, which is unusually high. The organization explains this number with a surprisingly high incidence of refusals by the candidates, a generally rather less qualified cohort of applicants and a slow progression of the recruitment process. Most control groups come either from recruitment processes of similar vacancies in the past (e.g., from the preceding year) or from hiring processes for similar vacancies, which take place simultaneously to the anonymous hiring process. Process 7 is an exception in this regard, as in this organization the applicants were reviewed in the standard way without anonymization which led to interview invitations. These same applications were subsequently anonymously reviewed by other recruiters, which are similar in demographic characteristics and experience to the first recruiter team according to the organization. This second review represents the control group for this process, although it did not lead to any interview invitation, but was entirely fictitious. This situation is difficult, given that the recruiters knew about their fictitious review, and needs to be taken into account in the empirical analysis.

3.2 Results on Practicability

The results of the qualitative evaluation can be summarized as follows.³ Both, recruiters and applicants do not report major practical problems in implementing anonymous job applications. In particular, the use of a standardized application form appears as a very efficient method—at least, once such a form is developed. As a non-negligible side effect, a standardized application form increases comparability between the applicants. Organizations which used this method even consider continuing with anonymous job applications after the experiment. In contrast, in particular the method of blackening the applications is a very time-consuming and error-prone technique. Irrespective of the implementation method, most recruiters appreciate being forced to reconsider their own recruitment practices as well as the

³ The qualitative evaluation was conducted by the *Kooperationsstelle Wissenschaft und Arbeitswelt an der Europa-Universität Viadrina* (KOWA). Krause et al. (2012b) discuss the results in more detail.

stronger focus on qualifications and skills that results with anonymous job applications. Recruiters regard particularly the removal of the applicant's picture as a positive development, since pictures often lead to misleading first impressions in the reviewing process. Moreover, when hiring anonymously, the organizations can present themselves as open-minded employers that aim at objective selection processes. Several recruiters rate this as a benefit for their corporate image.

All applicants who applied via an anonymous standardized application form were asked to answer a short survey about their experiences with this application method. As only the candidates who were reviewed with this method actively take notice of the anonymous job applications, this survey population displays a selection out of all applicants that were part of the experiment. About 41 percent of the applicants self-evaluate their chances to receive an interview invitation as higher with anonymous job applications and about 33 percent rate their chances to be equal between anonymous and non-anonymous hiring methods. About 48 percent of the respondents generally prefer anonymous job applications over standard ones, whereas 31 percent prefer the opposite. Moreover, a majority of 44 percent do not rate the time spent for the application process as being different between anonymous and standard applications, whereas 31 percent claim to need more time for standard applications. In addition, more than half of the applicants (54 percent) declare that the potential to present themselves is higher with anonymous job applications or that it is at least not different from that with standard applications.

3.3 Quantitative Effects: Example Recruitment Process

We first describe the effects of anonymous job applications for one specific recruitment process in detail (see Table 1, process 8). We select this process as an example because of a relatively large sample size and because data on two different control groups are available. We have information about 809 applicants whose applications were anonymously reviewed during the experiment. About half of these applicants are female, about 3 percent have a migration background and their average age is 20 years. The applicants have on average less than one year of work experience, report less than one previous employer, and completed two internships. About one third receives an interview invitation as the outcome of the first stage in this hiring process.

Table 2 shows the analysis of the determinants of the interview invitation probability with anonymous job applications in this example. In this first step, we only consider those candidates whose applications were anonymously reviewed. Both potentially disadvantaged groups of female applicants and applicants with a migration background have a slightly higher probability to be invited for interview

compared to men and natives, respectively.⁴ However, these differences are not statistically significant in column (1). When controlling for additional characteristics of the applicants such as age, educational attainment and number of internships in column (2), the coefficient of the female dummy drops and becomes virtually zero. The coefficient of the migrant dummy slightly increases, but remains statistically insignificant. In this example, it thus appears that female applicants and applicants with a migration background do not face systematically different interview invitation probabilities when their applications are anonymously reviewed.

In the second part of our empirical analysis we analyze the effects of introducing anonymous job applications. To compare the situation of anonymous job applications with the counterfactual situation of standard applications, data for two potential control groups is available in the example of this specific recruitment process. The first potential control group consists of applicants who applied for the same vacancy in the previous year using standard applications. This group would represent an appropriate control group if no other changes had occurred between the two years besides the fact that applications were anonymously reviewed in 2011. The group of applicants in 2010 consists of 1,357 individuals and is therefore by about 500 applicants larger than in 2011 when applications were anonymously reviewed. However, there are no significant differences in the shares of female or migrant applicants, or in the applicants' average age. In both groups, equal shares of applicants have completed the general qualification for university entrance or the qualification for technical college entrance. Only the number of internships is significantly different as candidates in 2010 report on average only one internship.

Table 3 displays the results of the comparison between the two recruitment processes in 2010 and 2011. Results in the first row of columns (1) and (2) indicate that the interview invitation probability is about 6 to 8 percentage points higher for applicants who are anonymously treated. However, this difference might be related to the different number of applicants. Fewer individuals applied in 2011 when applications were anonymously reviewed, which could result in a higher overall share of interview invitations. Results in columns (1) and (2) moreover show that female applicants are significantly more likely to be invited for an interview—irrespective of whether they belong to the treatment or control group. Results in column (3) include, in addition to the treatment dummy and the dummy variables for the two demographic groups, two interaction terms between these variables. The coefficient on the interaction term between women and anonymous job applications indicates that female applicants are about 9 percentage points less likely to receive an interview invitation when their applications are anonymously

⁴ Since the variation in the applicants' age is relatively small within the hiring processes in the experiment, our analysis solely focuses on effects by gender and migration background.

reviewed. To estimate the causal effect of anonymous job applications on the interview invitation probability for female applicants compared to female applicants who were recruited with standard applications, we calculate the sum of the treatment dummy and the interaction term. This overall effect of anonymous job applications for female applicants is not statistically significant, and hence we do not find a systematic effect of anonymous job applications for this group. Applicants with a migration background are more likely to receive an interview invitation with anonymous job applications as indicated by the coefficient on the interaction term for migrants. Although this difference is not statistically significant, there is a positive significant overall effect of anonymous job applications for applicants with a migration background. With about 30 percentage points this effect is moreover quite substantial. Therefore, the comparison with this control group reveals no effect of anonymous job applications for women, but migrants benefit from higher interview invitation rates when applications are anonymously reviewed.

The second potential control group consists of applicants which are part of the same cohort of applicants as the treatment group, with the only difference that their applications were not anonymously reviewed. The treatment group was made artificially smaller since the organization started to anonymously review applications only after the recruitment process had already started. This first part of the cohort of applicants in 2011 thus constitutes a second potential control group. It includes 129 individuals and is therefore substantially smaller than the treatment group. However, applicants' characteristics are similar in both groups and do not significantly differ. The only exception is the share of individuals with a migration background, which is 7 percent in the control group and thus exceeds the respective share in the treatment group by about 4 percentage points.

Table 4 displays the results of the comparison in interview invitation rates between these two groups. Columns (1) and (2) show that interview invitation probabilities do not significantly differ by treatment status, gender and migration background. When additionally including interaction terms in column (3), we find that female applicants are more likely to receive an interview invitation with standard applications. Female applicants' advantage, however, disappears with anonymous job applications. Our analysis moreover reveals a negative overall effect of anonymous job applications for women. More precisely, the chances of female applicants to be invited for an interview decrease with anonymous job applications by about 14 percentage points when compared to standard applications. In contrast to the results from the analysis with the first control group, we do not detect any significant effects of anonymous job applications for migrants. This could, however, be due to the smaller sample size of this control group.

The effects of anonymous job applications in this organization can therefore be summarized as follows. First, female applicants and individuals with a migration background have the same chances to receive an interview invitation with anonymous job applications. Second, the effects of introducing anonymous job applications differ for female applicants and applicants with a migration background. The latter group seems to benefit from anonymous job applications. The interview invitation probability of migrants is significantly higher when their applications are anonymously reviewed, at least based on the comparison with the previous year's recruitment process. This result could be interpreted as the first type of a causal effect, namely that previously existing discrimination is eliminated. However, our results indicate the opposite effect for female applicants. At least when we use the second potential control group in this example, women are significantly less likely to receive an interview invitation with anonymous job applications than with standard applications. This could indicate that previous affirmative action to promote the chances of female applicants is not possible anymore when the applicant's gender is unknown. The effects of anonymous job applications therefore depend by and large on the initial situation.

3.4 Quantitative Effects: Overview

Including the example of the previously discussed specific recruitment process in one organization, data are available for a total of nine different recruitment processes that were part of the German experiment. For most of these processes, data on potential control groups are also available. Tables 5 and 6 display the results for these recruitment processes obtained from the same two-step empirical analysis as in case of the previously discussed specific recruitment process.

Accordingly, Table 5 displays the analysis of interview invitation probabilities only for those applicants that were anonymously treated in these recruitment processes. Next to dummy variables indicating gender and migration background, the regressions include additional control variables depending on data availability. Assuming that sensitive information was effectively removed from the applications and that we control for relevant qualifications and skills in our regressions, we expect no significant differences in the interview invitation probabilities for minority groups. And indeed, this is the case for nearly all recruitment procedures. Exceptions are three procedures, where female applicants have higher chances to receive an interview invitation and one case where migrants are less likely to be invited for an interview. There are, however, plausible explanations for these results. For example, the share of female applicants in recruitment process 1 is about 93 percent and therefore any results regarding the applicants' gender should be interpreted with caution. The positive effect for female applicants in procedure 3 could be due to

omitted variables, i.e., variables that the recruiters observe, but we do not have information about—such as grades in high school diplomas. These grades might be on average higher for females than for males in Germany (see, e.g., BMFSFJ, 2004). A similar argument holds for the negative effect for migrants, since recruiters might have information about the qualification of the applicants that we do not have, which can lead to a seemingly lower interview invitation probability.

Table 6 displays the results of the effects of introducing anonymous job applications. The data on potential control groups stem from either past or simultaneous recruitment processes for vacancies that are comparable to the vacancies for which the organizations anonymously recruited. The results of the empirical analysis can be categorized into the previously discussed three different effects: a) elimination of discrimination, b) no effect because no discrimination was present initially, and c) elimination of affirmative action. For instance, the results for recruitment processes 5 and 6 may be viewed as examples for the elimination of discrimination against female applicants. Interestingly, the applicants' average work experience in these recruitment processes is between 6 and 8 years, which could be a crucial period in a women's typical working life. Recruiters might anticipate a possible desire to have children, which could have a negative effect on their invitation probability if gender is known. Process 8a may also be viewed as an example for this type of effect of anonymous job applications, but in this case for individuals with a migration background. In contrast, the recruitment processes 1 and 7 may be viewed as examples for the second type of effects ("no effect because no discrimination was present initially"). Finally, the recruitment processes 2 and 8b may be viewed as examples for the last category of causal effects, i.e., a situation in which affirmative action is no longer possible. This seems to be the case for migrant applicants in the former recruitment process and for female applicants in the latter recruitment process. Special cases in our analysis are the recruitment processes 9a and 9b since in both cases, the interview invitation probability with anonymous job applications amounts to 93 percent. Hence, virtually *all* applicants are invited which makes the interpretation of any effects basically impossible.

We find for most recruitment processes statistically significant differences in the interview invitation probabilities between anonymous and standard applications for *all* applicants. However, the direction of the effect is not consistent. The interview invitation probability is higher when applicants are anonymously reviewed in some cases, and it is lower in other cases. These differences are unexpected and it is not clear why such differences should exist. Possible explanations include a certain lack of familiarity with the new method, which should disappear after some time. Other factors that may serve as explanations include a different number of applicants or a

different number of vacant jobs that are to be filled in the recruitment processes underlying our treatment and control groups.

Altogether, we find that once applicants are anonymously reviewed, the interview invitation probability is in general not influenced by gender and by migration background. This confirms our initial hypothesis that when information about minority group membership is unknown, minority applicants *cannot* face systematically different interview invitation probabilities. It furthermore appears that the introduction of anonymous job applications can lead to a reduction of discrimination—if discrimination is present in the initial situation. Anonymous job application can also have no effects if no discrimination is present initially, and they can stop measures such as affirmative action that may have been present before. In any case, the effects of anonymous job applications depend on the initial situation.⁵

There are, however, certain limitations to the analysis of the German experiment that should be kept in mind when interpreting the empirical results. First, the participating organizations voluntarily joined the experiment and appear as a positive and non-representative selection of German firms and administrations. Most of them had already applied measures such as affirmative action to promote minority groups before joining the experiment. Second, it was not possible to design the experiment as a truly randomized experiment. Hence, our evaluation relies on non-experimental evidence from a comparison with potential control groups. Third, data on these potential control groups were of relatively poor quality and doubts remain whether they adequately approximate the counterfactual situation. Fourth, we restrict our analysis on the effects of anonymous job applications on the interview invitation probabilities for female applicants and applicants with a migration background. Given the number of observations in the experiment, it is not possible to investigate effects on job offer rates, and also not if effects result in terms of other characteristics employers may discriminate against (e.g., age). Due to these limitations our results should be interpreted with caution and should be viewed as indications of possible effects.

Nevertheless, the German experiment shows that anonymous job applications can be practically implemented without excessive costs. Additionally, they can lead to equal opportunities for minority groups of applicants. Because the participating organizations are a positive selection of German firms, it seems moreover plausible to assume that the effects of anonymous job applications would be even larger in a representative sample of German firms.

⁵ We do not detect any systematic pattern in our results regarding the different methods of anonymization.

4 Potentials and Limits of Anonymous Job Applications

Anonymous job applications are based on a very straightforward intuition: Removing information about characteristics employers may discriminate against should reduce or even eliminate discrimination. Making a decision about who should be invited for an interview based on unknown information about minority group membership status becomes impossible. Discrimination is thus prevented, at least in the initial stage of the recruitment process.⁶

Both, the results of the various European experiments and of the German experiment predominantly show that anonymous job applications can lead to the desired effect of increasing the interview invitation probabilities of disadvantaged groups. However, there are indications for exactly the opposite effect, namely that anonymity prevents employers from *favoring* minority applicants. In particular, our analysis of the heterogeneous data from the German experiment shows that the initial situation is crucial. Three different conditions can initially exist: discrimination, affirmative action, and equality of opportunity. Not surprisingly, the effects of anonymous job applications are as heterogeneous as the initial situation to be changed. This result is in line with findings from the various European experiments. It often appears that the introduction of anonymous job applications is beneficial for a particular minority group in a given experiment, whereas another minority group does not benefit to the same extent—although the setting is the same.

4.1 The Limited Scope of Anonymous Job Applications

Any discussion about the potentials and limits of anonymous job applications should therefore start by asking what their goal and purposes should exactly be. The answer which is most often given is that anonymous job applications aim at reducing discrimination of disadvantaged groups in the hiring process, which is sometimes connected with the objective to increase diversity at the workplace. This goal relies on the assumption that discrimination is present in the initial situation, and that it is based on characteristics which are not included in anonymous job applications. Another goal which is often mentioned is that firms should hire the most productive workers irrespective of personal information and preferences. This goal also relies on the assumption of discrimination, but in this case it can arise from two directions as no applicant should either be discriminated or favored, but solely reviewed and assessed according to his or her skills and qualifications. Although the two different goals can overlap, they are not necessarily the same.

⁶ It may also be the case that applications are not completely anonymous, e.g., if certain information such as episodes of maternity leave or military service allow drawing indirect conclusions on minority group membership. Although this risk has been minimized in the German experiment, one should in general be aware of this possibility.

An example can illustrate this argument. Assume that a firm wants to hire the most qualified workers and, at the same time, aims at increasing diversity among its employees. This goal cannot be accomplished if any structural differences exist *before* individuals enter the labor market or in their previous labor market experience. For example, is there equal access for individuals from minority groups to education? How would such differences that are due to the education system translate into differences in previous labor market experience, which is one main source of information about productivity that is included in application documents? Firms cannot hire the most qualified workers *and* simultaneously increase diversity if minority groups have on average lower education outcomes. This example illustrates the limited scope of anonymous job applications. Anonymous job applications cannot eliminate any form of discrimination. They target at hiring decisions and shift the focus towards the applicants' skills and qualifications. However, if discrimination in other instances leads to differences in this regard, solving this problem is beyond the scope of anonymous job applications.

4.2 Employers' Incentives to Hire Anonymously

With anonymous job applications, applicants are reviewed only based on objective criteria. Firms can thus be confident to hire the most productive workers, and they can credibly signal to do so. Once an efficient method of making applications anonymous is developed and firms use for example a standardized application form, comparability between applicants increases and, hence, recruiters spent less time with the reviewing process. Another advantage of anonymous job applications from the employers' perspective is that the number and diversity of applicants may increase. Some individuals, in particular those that are members of minority groups, could be encouraged to apply because they anticipate to be anonymously reviewed. With standard applications, they might not apply because they fear to be discriminated against. Finally, if anonymous job applications reach their intended goal and eliminate discrimination in hiring, this may increase diversity among employees, which can in turn enhance productivity (Alesina and La Ferrara, 2005; Hoogendoorn and van Praag, 2012).

However, the method of how applications are made anonymous is crucial, especially from the employers' perspective. A suboptimal implementation can be very costly, time-consuming and error-prone. But even in the case of an optimal implementation, firms have to change their established hiring routines. This obviously involves a certain amount of investment. However, these investments can at the same time lead to benefits such as a more efficient and less time-consuming reviewing process. Firms that are committed to incorporate affirmative action are prevented from doing so with anonymous job applications. This argument, however,

only holds for the first stage of the hiring process. Firms can still favor applicants from minority groups in the interviewing stage—given that these applicants reach this second stage.

Opponents of anonymous job applications often argue that discrimination is not eliminated, but only postponed to later stages in the hiring process. This might be true if employers consciously discriminate. Anonymous job applications' potential would then indeed be limited to the initial stage. However, it appears that discrimination is mostly due to implicit and unconscious behavior (Ziegert and Hanges, 2005). Discrimination is moreover found to be the strongest in the first stage of the recruitment process, i.e., when employers decide about interview invitations (Cediey and Foroni, 2008). Therefore, it seems reasonable to assume that once candidates reach the second stage and a personal interview takes place, discrimination will not be as relevant anymore. Exposure to prejudiced groups seems to reduce thinking in stereotypes (Beaman et al., 2009), from which minority applicants should benefit in the interview stage. Anonymous job applications could thus have important effects beyond the first stage, e.g., on job offer rates.

4.3 The Optimal Context for Anonymous Job Applications

Considering the future perspective of anonymous job applications naturally leads to the following questions: When do anonymous job applications work? And when do they not work? It is generally true that the instrument of anonymous job applications only has potential if there is a relevant initial size of discrimination. Additionally, as mentioned before, one should keep in mind that anonymity shifts the focus towards skills and qualifications. However, do minority groups have equal access to those? Anonymous job applications are clearly not a universal remedy to any type of discrimination related to the professional life.

As the method of how applications are made anonymous is crucial, the implementation of anonymous job applications may be easier—and less costly—in countries where applications include less information. International differences in this respect are substantial. For example, Shackleton and Newell (1994) investigate management selection methods in several European countries and conclude that a country's culture, tradition and habits influence the methods of selection in a given company. This suggests first, that (national) recruitment cultures exist, and second, that it might be difficult to reform these historically developed cultures. One crucial factor in this regard is the amount of information in applications that is usually provided by the candidates and the amount of information that is required by firms. On the one hand, for example in Germany, application documents contain a lot of information of the applicant. These documents typically include a cover letter and a CV, usually covering personal characteristics such as the name, contact details, date

and place of birth as well as a picture of the applicant. In particular, including a picture in the application seems to be culturally determined and, for example, specific to German recruitment habits. Moreover, it can consciously or unconsciously lead to good or bad impressions of the applicant, which in turn do not necessarily reflect a correct assessment of the applicant. It may therefore come as no surprise that removing the picture from the applications during the German experiment led to positive assessments of the recruiters. Besides a cover letter and a CV, applicants also include copies of the most important certificates and references. Whereas this practice provides a rather comprehensive impression of the applicant, standards are different in other countries. For example, the information that is provided by applicants in the United States is rather limited. Due to a fear of getting sued for discrimination, most firms do not even ask for detailed personal characteristics. Suing employers for discrimination is rather common in the United States and it can thus be seen as part of the recruitment culture. Explicitly asking for a certain race or gender has been illegal since the 1960s (Darity and Mason, 1998).

Two examples of completely different approaches can be found in Asia. Kuhn and Shen (2009) study gender discrimination in internet job advertisements in China. They find that job posts are explicitly targeted at women or men, where the incidence of targeting at one of the two genders is almost equally likely. Moreover, in line with the findings of hiring discrimination being less prevalent in high-skilled occupations, gender-targeted job advertisements in China are also much less prevalent in jobs requiring more skills. This might be connected to the desire to find the best candidate for these jobs, which might get more difficult when skill requirements rise and the pool of potential candidates becomes smaller. However, gender preferences and required skills for a specific job do not seem to be related to each other—which is the case for other characteristics such as age, height and beauty. For example, when young, tall and attractive workers should be hired, job advertisements are usually targeted at women. Preferences for older workers lead to job advertisements that are targeted at male applicants. Also in South Korea, application forms can include very personal questions, such as having relatives living in North Korea, health status, smoking and drinking habits, height and weight, eyesight, blood type, financial status and homeownership (Hlasny, 2011). These examples show that recruitment practices can differ greatly between countries. An introduction of anonymous job applications would therefore present either a small and incremental change or a large and fundamental reform of current recruitment practices. It also implies that proponents and opponents of anonymous job applications are differently powerful in a discussion about a possible implementation in different countries.

4.4 A Mandatory Introduction of Anonymous Job Applications?

The previous discussion leads us to two follow-up questions. Does a mandatory country-wide implementation of anonymous job applications make sense? And are specific laws or amendments of existing laws needed? The first question is obviously related to our previous discussion of discrimination being not a uniform phenomenon. For example, discrimination appears lower in high-skilled and more competitive labor markets (Carlsson and Rooth, 2007; Krause et al., 2012a) and in larger firms (Kaas and Manger, 2012), and thus the effects of anonymous job applications are limited in such markets. Hence, a mandatory country-wide implementation of anonymous job applications does not seem desirable. It could nevertheless make sense to introduce anonymous job applications in specific sectors, industries, firms or occupations. But even then, for certain jobs and professions, anonymous hiring does not appear as a feasible solution. This includes, for example, jobs in the worlds of sports, arts and letters, as well as business leaders. More generally, recruitment processes in such “superstars jobs” (Rosen, 1981) work differently. It does not appear realistic that any firm would hire its future CEO based on an anonymous job application. In addition, the degree of competition in a particular labor market plays an important role for whether anonymous job application can unfold their full potential. For example, if the number of applicants for a vacant job is relatively low and virtually every applicant is invited for an interview, an anonymous reviewing process is clearly not needed.

So far and to the best of our knowledge, no mandatory legislation enforcing anonymous job applications on a country-wide level has been introduced. One noticeable exception is a law that has been passed in France in 2006 which made anonymous job applications mandatory for firms with more than 50 employees—at least in principle. As the law lacks more detailed conditions for its range of coverage and no sanctions are applied in case of noncompliance, the legislation has basically no practical importance (Behaghel et al., 2011). It is nevertheless interesting that from time to time laws are proposed that would introduce anonymous job applications, even in countries where applications already include only a relatively small amount of personal information. For example, Hausman (2012) proposes anonymous hiring to be introduced in the United States. His concrete policy proposal goes even beyond the standard approach as selection interviews should also be eliminated. Interestingly, rather than applying sanctions in case of noncompliance, incentives for firms to hire anonymously shall be provided. These incentives could take, for example, the form of reduced liability insurance premiums. Another proposal of an amendment regarding anonymous resumes was made by the Liberal Democrats in the United Kingdom in 2009. However, the proposal was rejected by the parliament.

5 Conclusions and Outlook

Anonymous job applications appear as an attractive policy instrument to combat hiring discrimination. Nevertheless, they are very controversially discussed in the public debate. Our paper backs this discussion by reconsidering the available empirical evidence from field experiments testing anonymous job applications in Europe. Against this background, we discuss the potentials and limits of this approach. We particularly focus on novel evidence from an experiment organized by the German Federal Anti-Discrimination Agency. Results show that anonymous job applications can be practically implemented, but they also show that the method of implementation is crucial. Standardized application forms which are completed by the applicants appear as the most effective and efficient way to make applications anonymous. Results show moreover that with anonymous job applications, all applicant groups have the expected equal chances to receive an interview invitation in nearly all recruitment processes. When analyzing the effects of introducing anonymous job applications, we find that anonymous hiring can reduce discrimination—if discrimination is present beforehand. Anonymous hiring can also have no effects if no discrimination exists initially, and it can even prevent the employer from applying measures such as affirmative action, at least in the first stage of the hiring process.

Any discussion about anonymous job application should therefore be based on the premise that their effects crucially depend on the initial situation in the respective organization. Policymakers, recruiters and applicants should bear in mind that anonymous hiring could make sense in a specific sector or in a certain job, whereas it might not be appropriate in another. Moreover, anonymous job applications specifically target at the initial stage of the recruitment process. Any preexisting structural differences, and discrimination that is based on such differences, can therefore *not* be overcome. Besides, context-specific information may be interpreted differently if information about the identity of the candidate is not available—and this can result in disadvantages for the applicant. For example, if recruiters are not aware of the applicant's family situation, migration background or disadvantaged neighborhood, this information cannot be taken into account to explain, e.g., below-average education outcomes, labor market experience or language skills.

Anonymous job applications may, however, eliminate important productivity potentials for companies and society. The more standardized application forms will be, the less chances creative individuals will have to expose their productive credentials. Avoided is also potential economically productive discrimination that would rely on the power of the positively discriminated factor. If diversity of workers leads to innovations and larger productivity, the creation of those external effects

should be wanted. At the end, any hiring is discrimination, e.g., selecting the good instead of the poor candidate.

The debate about anonymous job applications also shows an interesting trend in the policy approach towards it. Many European countries have conducted field experiments to thoroughly evaluate their actual effects. This new approach towards evidence-based policymaking should be used more often, also with respect to other possible reforms or amendments of existing laws. Nevertheless, its potentials with respect to anonymous hiring have not yet been completely utilized. For example, the empirical evidence on effects on job offer rates is still relatively scarce. Until now, to the best of our knowledge no reform or law exists which makes anonymous job applications mandatory with all necessary conditions. However, from our point of view this step is not necessary. It should be in the firms' own interest to hire discrimination-free, and with anonymous job applications, firms could credibly commit themselves to do so. For example, some organizations of the German experiment voluntarily continue to hire anonymously after the experiment ended.

What is the long-term perspective of anonymous job applications? This question leads to several related questions. For example, when labor markets continue to become more integrated and global, do application cultures inevitably converge? And if so, does a "globalized application culture" automatically move towards the United States' equilibrium with applications that contain little personal information? The current debate about anonymous job applications could initiate a change, or at least reconsideration, of existing recruitment practices. Whether or not this process will ultimately result in the introduction of anonymous job applications is not clear. It may be the case that applications will be designed that focus more strongly on the applicants' skills and qualifications. In any case, with an increasing global competition for talents and skilled workers, discrimination may automatically become less severe in the future. Reconsidering established recruitment cultures may nevertheless help achieving the goal of discrimination-free hiring even sooner.

References

- Alesina, A. and E. La Ferrara 2005. Ethnic Diversity and Economic Performance. *Journal of Economic Literature* 43(3): 762–800.
- Åslund, O. and O. Nordström Skans 2012. Do Anonymous Job Application Procedures Level the Playing Field? *Industrial and Labor Relations Review* 65(1): 82–107.
- Beaman, L., R. Chattopadhyay, E. Duflo, R. Pande and P. Topalova 2009. Powerful Women: Does Exposure Reduce Bias? *Quarterly Journal of Economics* 124(4): 1497–1540.
- Behaghel, L., B. Crépon and T. Le Barbanchon 2011. Do Anonymous Resumes make the Battlefield more even? Evidence from a Randomized Field Experiment, *mimeo*.
- Bertrand, M. and S. Mullainathan 2004. Are Emily and Greg more Employable than Lakisha and Jamal? A Field Experiment on Labor Market Discrimination. *American Economic Review* 94(4): 991–1013.
- Biddle, J. E. and D. S. Hamermesh 1998. Beauty, Productivity, and Discrimination: Lawyers' Looks and Lucre. *Journal of Labor Economics* 16(1): 172-201.
- Blank, R. 1991. The Effects of Double-Blind versus Single-Blind Reviewing: Experimental Evidence from the American Economic Review. *American Economic Review* 81(5): 1041-1067.
- BMFSFJ 2004. *Frauen in Deutschland – Von der Frauen- zur Gleichstellungspolitik*. Berlin: Bundesministerium für Familie, Senioren, Frauen und Jugend (BMFSFJ).
- Bøgg, M. and E. Kranendonk, 2011. Labor Market Discrimination of Minorities? Yes, but not in Job Offers. *MPRA Paper* No. 33332.
- Carlsson, M. and D.-O. Rooth 2007. Evidence of Ethnic Discrimination in the Swedish Labor Market Using Experimental Data. *Labour Economics* 14(4): 716–729.
- Cediey, E. and F. Foroni 2008. Discrimination in Access to Employment on Grounds of Foreign Origin in France. *International Migration Papers* 85E, ILO International Migration Programme.
- Darity, W. and P. Mason 1998. Evidence on Discrimination in Employment: Codes of Color, Codes or Gender. *Journal of Economic Perspectives* 12(2): 63–90.
- Goldin, C. and C. Rouse (2000). Orchestrating Impartiality: The Impact of “Blind” Auditions on Female Musicians. *American Economic Review* 90(4): 715–741.
- Hamermesh, D. S. and J. E. Biddle 1994. Beauty and the Labor Market. *American Economic Review* 84(5): 1174-1194.
- Hausman, D. 2012. How Congress Could Reduce Job Discrimination by Promoting Anonymous Hiring. *Stanford Law Review* 64(5): 1343-1369.
- Hlasny, V. 2011. Discriminatory Practices at South Korean Firms Quantitative Analysis Based on Job Application Forms. *European Journal of East Asian Studies* 10(1): 85–113.
- Hoogendoorn, S. and M. van Praag 2012. Ethnic Diversity and Team Performance: A Field Experiment. *IZA Discussion Paper* 6731, Institute for the Study of Labor (IZA), Bonn.
- Kaas, L. and C. Manger 2012. Ethnic Discrimination in Germany's Labour Market: A Field Experiment. *German Economic Review* 13(1): 1–20.
- Krause, A., U. Rinne, K. F. Zimmermann 2012a. Anonymous Job Applications of Fresh Ph.D. Economists. *Economics Letters* 117(2): 441–444.
- Krause, A., U. Rinne, K. F. Zimmermann, I. Bösch and R. Alt 2012b. Pilotprojekt "Anonymisierte Bewerbungsverfahren" - Abschlussbericht. *IZA Research Report* No. 44, Institute for the Study of Labor (IZA), Bonn.
- Kuhn, P. And K. Shen 2012. Gender Discrimination in Job Ads: Evidence from China. *Quarterly Journal of Economics*, forthcoming.
- Shackleton, V. and S. Newell 1994. European Management Selection Methods: A Comparison of Five Countries. *International Journal of Selection and Assessment* 2(2): 91-102.
- Rosen, S. 1981. The Economics of Superstars. *American Economic Review* 71(5): 845-858.
- Yinger, J. 1998. Evidence on Discrimination in Consumer Markets. *Journal of Economic Perspectives* 12(2): 23–40.
- Ziegert, J. C. and P. J. Hanges 2005. Employment Discrimination: The Role of Implicit Attitudes, Motivation, and a Climate for Racial Bias. *Journal of Applied Psychology*, 90(3): 553-562.

Table 1: Overview of Anonymous Job Applications in German Experiment

Process	# Applications	Anonymization	Basic Descriptives	Control Group(s)
1	27	Standardized Application Form	93 Percent Female 25 Percent Migrant 25 Percent Callback Rate	Subsequent Recruitment
2	593	Blackening	46 Percent Female 29 Percent Migrant 14 Percent Callback Rate	a) Past Recruitment b) Other Region (Simultaneous Recruitment)
3	719	Blackening	64 Percent Female 17 Percent Migrant 60 Percent Callback Rate	–
4	128	Copying non-sensitive information in other document	2 Percent Female 45 Percent Migrant 29 Percent Callback Rate	–
5a	318	Standardized Application Form	60 Percent Female 17 Percent Migrant 17 Percent Callback Rate	Past Recruitment
5b	89	Standardized Application Form	80 Percent Female 18 Percent Migrant 28 Percent Callback Rate	Past Recruitment
6a	505	Blackening	76 Percent Female 33 Percent Migrant 14 Percent Callback Rate	Simultaneous Vacancy
6b	179	Blackening	71 Percent Female 30 Percent Migrant 17 Percent Callback Rate	Simultaneous Vacancy
7	248	Blackening	21 Percent Female 34 Percent Migrant 22 Percent Callback Rate	Fictitious Review
8	809	Refinement of Online Application	53 Percent Female 3 Percent Migrant 32 Percent Callback Rate	a) Past Recruitment b) Same Vacancy, but Non-Anonymized Applications
9	92	Refinement of Online Application	27 Percent Female 46 Percent Migrant 93 Percent Callback Rate	a) Past Recruitment b) Other Region (Simultaneous Recruitment)

Table 2: Interview Invitation Probability with Anonymous Job Applications

	(1)	(2)
Female	0.017 (0.033)	0.008 (0.033)
Migrant	0.089 (0.100)	0.109 (0.101)
Control Variables	No	Yes
R ²	0.001	0.016
Number of Observations	809	809

*** significant at 1%; ** significant at 5%; * significant at 10%.

Linear probability model. Robust standard errors in parentheses. Further control variables in specification (2) are age, age squared, educational attainment and number of internships.

Table 3: Comparison with Standard Applications from Past Recruitment

	(1)	(2)	(3)
(a) Anonymous	0.057*** (0.020)	0.075** (0.035)	0.112*** (0.041)
(b) Female	0.063*** (0.019)	0.060*** (0.019)	0.093*** (0.024)
(c) Migrant	-0.013 (0.056)	-0.003 (0.057)	-0.084 (0.064)
(d) Anonymous x Female			-0.086** (0.041)
(e) Anonymous x Migrant			0.192 (0.119)
Control Variables	No	Yes	Yes
Δ: Sum (a) + (d)			0.026 (0.041)
Δ: Sum (a) + (e)			0.305** (0.121)
R ²	0.009	0.017	0.020
Number of Observations	2,166	2,166	2,166

*** significant at 1%; ** significant at 5%; * significant at 10%.

Linear probability model. Robust standard errors in parentheses. Further control variables in specifications (2) and (3) are age, age squared, educational attainment and number of internships.

Table 4: Comparison with Standard Applications from Present Recruitment

	(1)	(2)	(3)
(a) Anonymous	-0.075 (0.046)	-0.071 (0.046)	0.005 (0.064)
(b) Female	0.039 (0.031)	0.028 (0.031)	0.156* (0.085)
(c) Migrant	0.115 (0.086)	0.119 (0.087)	0.160 (0.161)
(d) Anonymous x Female			-0.148 (0.091)
(e) Anonymous x Migrant			-0.051 (0.190)
Control Variables	No	Yes	Yes
Δ : Sum (a) + (d)			-0.144** (0.067)
Δ : Sum (a) + (e)			-0.046 (0.189)
R ²	0.007	0.018	0.021
Number of Observations	938	938	938

*** significant at 1%; ** significant at 5%; * significant at 10%.

Linear probability model. Robust standard errors in parentheses. Further control variables in specifications (2) and (3) are age, age squared, educational attainment and number of internships.

Table 5: Interview Invitation Probability Anonymous Job Applications

	Female Dummy	Migrant Dummy	# Observations
Process 1	0.410*** (0.137)	-0.012 (0.150)	27
Process 2	0.030 (0.029)	-0.051* (0.029)	593
Process 3	0.114*** (0.040)	-0.083 (0.053)	719
Process 4	-0.016 (0.332)	-0.006 (0.086)	128
Process 5	0.168 (0.102)	0.016 (0.122)	89
Process 6	-0.007 (0.066)	-0.009 (0.062)	179
Process 7	-0.006 (0.069)	-0.014 (0.062)	248
Process 8	0.008 (0.033)	0.109 (0.101)	809
Process 9	0.063* (0.037)	-0.054 (0.052)	92

Source: Data provided by organizations taking part in German experiment.

*** significant at 1%; ** significant at 5%; * significant at 10%.

Linear probability model. Robust standard errors in parentheses. Regressions include a female dummy, a migrant dummy and control variables, including (if available) age, age squared, educational and vocational attainment, number of previous employers, experience (in years) and number of internships.

Table 6: Interview Invitation Probabilities in Comparison

	<i>Process 1</i>	<i>Process 2a</i>	<i>Process 2b</i>	<i>Process 5</i>	<i>Process 6</i>	<i>Process 7</i>	<i>Process 8a</i>	<i>Process 8b</i>	<i>Process 9a</i>	<i>Process 9b</i>
(a) Anonymous	-0.757 (0.503)	-0.090*** (0.030)	-0.275*** (0.046)	-0.016 (0.091)	0.147* (0.079)	-0.049 (0.049)	0.112*** (0.041)	0.005 (0.064)	0.457*** (0.101)	0.407*** (0.102)
(b) Female	-0.200 (0.500)	-0.034 (0.025)	-0.058 (0.048)	0.013 (0.035)	0.044 (0.055)	0.082 (0.071)	0.093*** (0.024)	0.156* (0.085)	0.096 (0.111)	0.029 (0.117)
(c) Migrant	0.118 (0.286)	-0.039 (0.028)	-0.122** (0.050)	-0.056*** (0.021)	0.013 (0.062)	-0.043 (0.059)	-0.084 (0.064)	0.160 (0.161)	-0.088 (0.105)	0.091 (0.112)
(d) Anonymous x Female	0.570 (0.526)	0.066* (0.038)	0.099* (0.056)	0.156 (0.101)	-0.056 (0.083)	-0.064 (0.097)	-0.086** (0.041)	-0.148 (0.091)	-0.022 (0.118)	0.048 (0.126)
(e) Anonymous x Migrant	-0.152 (0.326)	-0.013 (0.040)	0.072 (0.058)	0.118 (0.118)	-0.046 (0.085)	0.039 (0.081)	0.192 (0.119)	-0.051 (0.190)	0.019 (0.120)	-0.155 (0.124)
Δ: Sum (a) + (d)	-0.187 (0.178)	-0.024 (0.034)	-0.176*** (0.046)	0.140* (0.072)	0.091* (0.050)	-0.113 (0.093)	0.026 (0.041)	-0.144** (0.067)	0.436*** (0.114)	0.455*** (0.126)
Δ: Sum (a) + (e)	-0.909 (0.589)	-0.102** (0.041)	-0.204*** (0.060)	0.102 (0.121)	0.101 (0.087)	-0.009 (0.070)	0.305** (0.121)	-0.046 (0.189)	0.476*** (0.103)	0.252** (0.112)
R²	0.3149	0.0383	0.1138	0.1802	0.0449	0.0490	0.0201	0.0206	0.2772	0.2855
# Observations	48	1.545	920	238	340	496	2.166	938	190	155

Source: Data provided by organizations taking part in German experiment.

*** significant at 1%; ** significant at 5%; * significant at 10%.

Linear probability model. Robust standard errors in parentheses. Specification (1) includes a dummy for anonymous application, a female dummy, a migrant dummy and control variables and specification (2) includes a dummy for anonymous application, a female dummy, a migrant dummy, control variables and two interaction terms between anonymous and the female dummy as well as anonymous and the migrant dummy. Control variables include (if available) age, age squared, schooling degree, vocational degree, number of previous employers, work experience (in years) and number of internships. Processes 2a/b, 8a/b, 9a/b display analyses of the same treatment group with two different control groups. No data on control groups were available for processes 3 and 4.