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# Do anonymous job application procedures level the playing field?

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IFAU – INSTITUTE FOR
LABOUR MARKET POLICY
EVALUATION

# Do anonymous job application procedures level the playing field?

Olof Åslund
Oskar Nordström Skans

WORKING PAPER 2007:31

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# Do anonymous job application procedures level the playing field?*

by

Olof Åslund[A] and Oskar Nordström Skans[B]

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**Abstract**

Anonymous application procedures (AAP) are increasingly promoted as a way to combat employment discrimination. The idea gets support from theory and experimental evidence, but virtually nothing is known about its real-life effects. We present empirical evidence building on micro data collected in the Swedish city of Gothenburg, where AAP was used in parts of the local administration. Difference-in-differences estimates, with extensive controls for qualifications, suggest that AAP increased the chances of advancing to interviews for both women and individuals of non-Western origin. Women also experienced a higher probability of being offered a job, but no such effect is found for immigrants.

Keywords: Anonymous applications, discrimination, employment
JEL-codes: J71, J78

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# 1 Introduction

Throughout the industrialized world, women continue to earn less than men and ethnic minorities often exhibit drastically lower employment rates than the native populations. Politicians and researchers in many countries today turn their eyes to ethnic and gender discrimination in the hiring process as a cause of these disparities. This has led to calls for using anonymous application procedures (AAP) where, e.g., the name, gender and country of origin of the applicant is hidden from the recruiter in the initial stages of the hiring process. Yet, very little is known about the practical consequences of this way of combating discrimination. We present empirical evidence from a Swedish pilot using the method on a substantial number of actual job openings.

Recent experimental studies appear to have raised the interest in employment discrimination among both scholars and politicians. Although not a new phenomenon (see Riach & Rich 2002 for a survey), the convincing discrimination testing performed by Bertrand & Mullainathan (2004) sparked the debate in many countries. This is certainly the case in Sweden, where the obstacles facing large parts of the immigrant population have become one of the top issues on the political agenda. Indeed, "residual" economic evidence on ethnic discrimination has been around for some time (le Grand & Szulkin 2002, Arai & Vilhelmsson 2004, Rooth 2002). Studies have also revealed discrimination through laboratory experiments, indicating the influence of "foreign" and "native" names in different types of settings (Holm 2000, Ahmed 2005). A recent field experiment also resulted in conclusions very similar to what has been found in the US: an application carrying a "Middle Eastern" name gives substantially worse payoff in terms of the callback rate than an application carrying a Swedish name (Carlsson & Rooth 2007).[1,2]

There is also direct scientific evidence that "blindfolding" the employer can affect the hiring process. The most well-known example is Goldin & Rouse (2000), who found that female musicians have a higher probability of getting

[1] See also Eriksson (2007) for a general overview of studies on immigrants in the Swedish labor market.

[2] In addition, new evidence from psychological tests (Rooth, 2007) suggest that recruiting managers (and others) may suffer from negative "implicit attitudes" towards people with foreign-sounding names. This means that people *unknowingly to themselves* may have negative attitudes towards applicants from certain groups, perhaps providing some additional justification for AAP as a viable policy.

hired when auditions are made behind a curtain. Edin & Lagerström (2006) use Swedish online job searcher databases where applicants can choose whether to reveal names and other personal characteristics, and find that selection on gender information reduces the chances of getting contacted by an employer by 15 percent for women. Eriksson & Lagerström (2007) estimates that a "non-Nordic" name in a Swedish online CV gives 25 percent fewer contacts from employers.

There is thus striking evidence that gender and ethnicity matters in the hiring process even though this is considered discrimination by current legislation. What is not known, however, (at least not outside auditions for symphonic orchestras) is whether a hiring practice based on AAP is an effective, let alone efficient, way of combating such discrimination. The data we use come from the city of Gothenburg, where two districts forming parts of the local government administration implemented AAP to sort out applicants to interviews during 2004–2006. We have collected information on 3,529 applicants to a total of 109 positions from two participating districts and from one comparison district. The data contain unusually detailed information on the applicants' education and labor market experience matched to the requirements given in the ads for the respective jobs. We are able to follow the hiring process through its different stages: who applies for the job in question, who is considered qualified by the employer, who is interviewed, and who is offered the job.

For job openings where AAP was used, we find that gender and region-of-origin do not affect the probability of being offered an interview. As would be expected from previous research, these factors do matter for the comparison jobs using "normal" procedures. Consequently, AAP is estimated to increase the probability of being interviewed for both non-Western immigrants and women.

In contrast to many of the discrimination studies listed above,[3] we are also able to study how AAP affects the job offer arrival rates of different groups. For women we find that the AAP regime significantly increases the chances of receiving a job offer, but no such effect is found in the region-of-origin dimension, suggesting that the interview stage may wash away the positive effects in the first stage of the hiring process for this group.

[3] Exceptions are "audit studies" (also called "situation tests") where actors are sent to interview sessions (see Riach and Rich 2002) as well as Goldin and Rouse (2000).

The remainder of the paper is outlined as follows. Section 2 gives some background and institutional detail. Section 3 describes the data collection and presents some characteristics on the relevant job openings and applicants. Section 4 outlines the empirical approach and section 5 presents the results. Section 6 gives some concluding remarks.

# 2 Some general background

This section presents background and general facts regarding the AAP policy pilot studied in this paper.[4] First, however, we give a very brief Swedish institutional background. Swedish law prohibits discrimination on gender, religion, ethnicity, sexual orientation or disabilities. Preferential treatment of underrepresented applicants ("affirmative action") is allowed with respect to gender (when credentials are equal), but not with respect to ethnicity. Since the job openings we are to study are all in the public sector it is important to note that the process of filling a vacancy in the public sector in Sweden does not differ much from the corresponding private sector process. The main differences is an obligation to publish vacancies and a stricter compliance with the law stating that all vacancies (private and public) are to be posted at the Public Employment Service (PES).

The policy pilot took place within the administration of the city of Gothenburg, Sweden's second largest city. The Gothenburg municipality has a population of approximately 500,000, and the total metropolitan area is home to about 900,000 people. The ethnic variation in Gothenburg, as in Sweden in general, is to a large degree generated by immigration in the last three decades. Employment rates for immigrants are far below those for natives, particularly for groups originating outside Europe. In greater Gothenburg, 15 percent of the population is foreign-born which is above the national average of 13 percent, but somewhat lower than the immigrant shares of Stockholm and Malmö, the other two major cities of Sweden.

The municipal administration in Gothenburg is divided into 21 city districts and about 20 specialized offices. Typically, each district or office has a small personnel department which deals with the general administration of personnel issues. Importantly for our study, the personnel offices may affect the

[4] The presentation primarily draws on the implementation study by Sibbmark (2007).

*procedures* used during the hiring process (such as implementing AAP) but they are *not* involved in the actual choices of who to interview or hire. This latter part is decentralized to the responsible managers of each production unit.

In February 2004 the Gothenburg city council decided that AAP was to be implemented as a policy pilot. After an extension in October 2005 the pilot came to run from October 1, 2004 to June 30, 2006. The primary reason for implementing the pilot was to enhance the hiring probability of immigrants into municipal jobs. We study data from job openings within "Centrum" and "Kortedala", the two city districts that were chosen for the pilot. We also use data on job openings from the "Gunnared" district which continued with normal recruitment practices and therefore generated the comparison jobs used in our analysis.

The participating districts were not chosen randomly. All parts of the city administration were asked whether they wanted to participate and the actual participants were selected among seven districts and specialized offices which expressed an interest for participation. The stated reasons for the choice were that the districts were of different sizes and had expressed strong interest in the pilot.[5] Gunnared was chosen as the comparison district since its personnel department was willing to help with the pilot. They were skeptical towards the AAP method since they considered it a hinder in their active work towards ethnic diversity among the districts' personnel. Thus, personnel administration officers in both the AAP districts and the comparison district appear to value the work towards ethnic diversity.

It is quite clear that our data are not generated by a randomized experiment, which suggests that we should worry about selection effects. Furthermore, it is clear that the location and resident population differ between the districts:[6] The Centrum (AAP) district is located in the city center, with a population of 54,000. Kortedala (AAP) and Gunnared (comparison) are located quite close to each other in the north east, with populations of 27,000 and 22,000 respectively. As is typical for European cities, the city center is socially advantaged: welfare dependence[7] and unemployment both stood at 3 percent in 2006. The fraction foreign-born—which is often considered a good indicator of

[5] The "culture" office was also selected to participate but the office had very few job openings and failed to document them properly.
[6] The statistics come from the Gothenburg city administration and pertain to 2006.
[7] By welfare dependence we here mean social assistance, which is the means-tested "last resort" of the Swedish social security system. See Åslund & Fredriksson (2005) for further details.

an area's socioeconomic status—is about 15 percent. Of the three, the comparison district of Gunnared is the most socially disadvantaged. Unemployment is 5.6 percent, 23 percent of the population live in a welfare-receiving household, and 48 percent are foreign-born. Kortedala falls somewhere in between with an unemployment (welfare dependence) rate of 4 (9) percent, and a fraction foreign-born of 28 percent.

The three city districts have the same responsibilities: child care, schools, health services and care for the elderly, social services etc. Statistics from the city council also suggest that the stocks of employees are quite similar in many ways. The number of full-year workers is between 1,500 and 1,850, and approximately 85 percent of the employees are women. Given the differences in the resident population it is not unexpected that Gunnared has a larger fraction foreign-born among the employees. Turnover is 5 percent in Kortedala and Gunnared, somewhat higher (6.6 percent) in Centrum. Sick leave rates are between 11 and 12.6 percent in the different administrations, and the age distribution of the employees is also quite similar.

There are thus similarities as well as differences between the AAP districts and the comparison district. The question is then whether we can expect the data from job openings in Gunnared to serve as a description of what would have happened at job openings at Centrum and Kortedala, had they not used AAP? The main threats to identifying the effects of the AAP are if the applicants of different groups (men/women, Swedish/non-Swedish origin) vary in unobserved credentials between the jobs in the different regimes, and/or if the managers in the different districts differ in their behavior relative to the applicants.

There are three reasons as to why we consider the comparison to be accurate. First, our judgment is that the districts act in the same local labor market and thus roughly attend to the same group of job seekers. The main reason is geographical. It is noteworthy that Statistics Sweden considers the whole of greater Gothenburg as a common local labour market and these districts are far from the borders of this area. Centrum can be reached by public transport within less than half an hour from both Gunnared and Kortedala. The same is true for the two latter districts, which are located quite close to each other; a map search suggests a car (or bike) trip of less than 8 kilometers. For those registered at the PES in Gothenburg, an instruction to apply for a relevant job opening is as likely to arrive regardless of which district it is in. It therefore

seems fair to argue that the districts are located on a common labor market, even for potential applicants who are hesitant towards long commutes.

Second, it is important to note that the selection into the AAP pilot was based on decisions made by the personnel offices at each district council. Thus, the actual recruiting managers who in general are further down in the local hierarchy, serving as e.g. managers at day care centers, did not have a direct say in the decision to participate. Available evidence does not suggest that AAP managers have a more positive view of AAP than comparison managers. Although Sibbmark (2007) surveyed the managers in all three districts after the AAP pilot, it is interesting to note that approximately the same fraction (one third of the recruiting managers) in both the AAP and comparison samples stated that they expected the AAP-model to increase the chances for immigrants to be interviewed and hired. Furthermore, managers in the comparison data expressed a more positive view of AAP than managers in the AAP districts.[8]

The third argument concerns "applicant selection effects" as a result of the AAP scheme; i.e. if people choose to apply for positions at administrations using their preferred hiring method. This would mean that we estimate the joint effect of AAP on who applies for the job and on how the recruiting managers change their behavior as a result of AAP; a problem intrinsic to all "partial" policies, i.e. as long as the entire economy does not switch to AAP applicants may sort themselves between jobs. We address this issue by including very detailed information about the applicants' credentials relative to the job opening in our models (see Section 3 below for details) and in Section 4 we also present some tests of the identifying assumption.[9]

[8] The responses of participating (and comparison) managers suggested that 24 percent (32 percent) had a positive view and 60 percent (20 percent) a negative view of AAP.

[9] In section 4 we discuss some attempts to test the identifying assumption. We are however unable to study selection on unobserved characteristics. Goldin & Rouse (2000) report that *less* "skilled" (in terms of fixed effects) women applied for orchestra positions when "blind" orchestra auditions were used. If this result would hold for our (admittedly very different) setting it would mean that our results would be downward biased, i.e. we would underestimate the effects of AAP.

# 3 Data description

## 3.1 AAP implementation and data collection

In Gothenburg, the AAP aimed at preventing recruiting managers from seeing the full content of applications when deciding on whom to interview. The procedure was therefore designed so as to block information revealing gender or ethnicity (with the latter factor being the primary reason for initiating the scheme). Naturally, gender and ethnicity is typically revealed during the interviews, so all information was disclosed to the recruiting managers once the interviewees were selected.

The job ads stated if a position was subject to the AAP and, if so, applicants were informed that they needed to fill in an "anonymous application form" asking for relevant credentials (see below).[10] This form was to be submitted alongside the conventional application. Once the applications and forms arrived to the districts the forms were screened for identifying information, numbered to match with the rest of the applications, and separated from the applications by the personnel staff.[11] The anonymous application forms were then sent to the recruiting managers who were to base their interview selection solely on this information.

The anonymous application form requested that the applicant provided information on education, labor market experience, current employment, and (optional) additional relevant information. The applicants were specifically instructed not to reveal "identifying" information revealing gender or ethnicity. Note that it was explicitly stated that this included information regarding which school/university one had attended, since such information would reveal the ethnicity of many immigrant applicants.

Once the interviewees were chosen by the managers, the central administration provided the managers with the second (i.e. "normal") part of the

[10] During the initial stages of the trials, the participating administrations were given basically full freedom in exactly how to implement the procedure. After some time it was clear that e.g. methods based on having an employee manually converting standard applications to anonymous ones was much too inefficient. The participating administrations then decided to follow the more formalized and uniform procedure described here. The robustness checks presented in section 5 include some variations pertaining to the implementation of the AAP.

[11] Public administrations are obliged to register and maintain all incoming documents; so this was not a major change from normal procedures.

applications. This included all standard material such as an application letter, personal data and typically also a "standard" CV.

### 3.1.1 Data collection and preparation

We collected data covering the entire recruitment process. This included ads, information given by managers (on written forms prepared by us and distributed by the personnel offices in the three districts), and all components of the individual applications from the districts. We then matched the individual information to the criteria given in the job ads and converted the printed material into a database. Below we describe the details on how the material was collected and organized.

Recruiting managers were asked to evaluate the candidates by grading them on a scale A to D before (or during) the selection of interviewees: the grades were A – "will be offered an interview"; B – "no interview offer in the first round but possibly later"; C – "formally qualified but of no interest"; D – "not qualified". The managers were also asked to state whether he/she was able to identify who the applicant was.

During the interview stage, the managers were asked to indicate whether the applicant was (i) offered the job and (ii) hired.[12] They were also asked if the applicant was already employed by Gothenburg city. The recruiting managers responsible for the comparison jobs were asked for the corresponding information.

When coding the information from the applications, we aimed to document everything open to the eyes of the recruiting manager at different steps of the process. We therefore separately documented merits as they appeared in the anonymous application forms and later in the full CV. We also documented various peculiarities in the printed material, e.g. margin comments by the manager, poor language or an odd application, or information revealing gender or ethnicity. In order to document each candidate's merits in a way which was meaningful to the recruiting manager we strived to base our coding on how well the qualifications met the requirements stated in the job ad. The data therefore contain unusually rich information on how strong the applicants' merits are for the specific position in question (see 3.4 for a description of the exact variables).

[12] The form also asked for a ranking of the interviewees, information which we do not use below.

When coding education, we did thus not only include the level, but also whether the applicant possesses the *type* of education requested. We tried to follow the spirit of the job ads in doing this. Thus, if a job ad asks for e.g. a "pre-school teacher", it suffices to have completed any such education for this criterion to be met. But if the ad asks for "pre-school teachers specialized in Montessori learning", it is not enough to have a general pre-school teacher education. Similar criteria were used for experience, where we separated experience in the occupation one applied for from "other relevant experience". There is admittedly some arbitrariness in what constitutes the latter. Our basic rule was that the experience must be directly relevant for the job, either through the requirements given in the ad, or for other obvious reasons. If you e.g. apply for a headmaster position, it is obviously relevant to have worked as a teacher, and if the ad asks for leadership skills, any management experience is counted as relevant. Although this procedure by nature will have an arbitrary component, it was simplified by the fact that the city districts' responsibilities limit the variation in job types included in our data. Also, the empirical model we use accounts for any systematic differences between occupations.

Our first key variable is region of origin, which in the Swedish context is a fair approximation of ethnicity. We split information on origin into three broad categories: Sweden (reference), (other) Western countries, the non-Western; as well as a residual "unknown" category. We tried to let people define their own region of origin as much as possible. If somebody writes "my mother tongue is X", or "my nationality is X", we let X define the origin, otherwise we use place of birth. Typically, the information is found in the application letter, but some also include it in their CV, and in a few cases people do not disclose their region of origin at all. [13]

Our second key variable is gender which we code using information on name or information from the personal identification number which most applicants include in their application. The group with "gender unknown" consists of applications where first names are either missing or are judged most likely not to be known to the recruiter (i.e. unusual foreign names) and where there is no other information identifying gender.

[13] Applications can be classified as "origin unknown" for several reasons, the most common being that the application was incomplete to begin with or that we were unable to get hold of the full application. In 65 cases where there was no direct origin information, but where the name gave a suggestion that "non-Western" was the appropriate region of origin, we assigned the observation to this category. See Section 5.3 for robustness checks.

We include the "unknown gender" and "unknown ethnicity" groups in the baseline analysis, but pay little attention to them due to the interpretational difficulties. The sensitivity analyses include varying the rules for group assignment and imposing restrictions on the estimation sample; we will return to this in section 5.

In addition to these variables we coded a "poor language" variable taking the value one if there are relatively strong deficiencies in the writing. These errors are more common among—although not limited to—applicants of non-Swedish origin. We also documented if the applicant included a photograph, whether he or she was already employed somewhere in the Gothenburg administration, or if he or she was listed as having a rehire "priority" due to a redundancy at a previous employment within the Gothenburg administration.

As is likely to happen in real-world hirings, not everybody adhered strictly to the instructions. Some applicants provided only non-anonymous applications for jobs that were advertised as being AAP jobs. The city districts' personnel officers had to deal with these cases somehow before sending the AAP forms to the recruiting managers. The solutions ranged from contacting applicants urging them to fill in the correct form (correctly) to hiding identifying information in the applications (using whiteout). In some cases they completed the application forms manually themselves. Sibbmark (2007) also presents further evidence that applicants occasionally contacted the manager by phone, managers state that they can identify some of the applicants already at the "anonymous" stage, and it is clear that indicators on e.g. ethnicity in some cases slipped through to the recruiter.[14]

Whether these examples of non-compliances should be a major concern or not depend on the interpretation of the estimates. If one is interested in the effects of the policy, they may not be a big problem since non-compliances are likely to feature in any real-life application of an AAP. However, if we interpret the estimates as quantifying discrimination, then non-compliances with the method (most likely) lead to attenuation bias. We have therefore tried to address these issues as best we can to see whether they affect our results (more on this in the robustness section below).

[14] For example, about 11 percent of the "anonymous" forms contained information on place of education.

## 3.2 Outcome variables: interview offers and job offers

We study how AAP affects the interview offer probability and the job offer probability. Below we discuss our main strategy in generating these variables. In the robustness section we will discuss the sensitivity of our results to some aspects of the definitions.

Interview offers measure whether AAP has an impact on various groups' chances of passing the first stage of the hiring process. Managers were asked to code whether the individual was at least offered an interview, using an A on the A to D scale described in Section 3.1.1. We code those who either received an A or were interviewed as having a positive outcome. The reason for not only using the grades is that they are missing for some positions; we are then limited to using information on actual interviewees. Obviously, applicants for jobs where no grades were given and who declined an interview will be misclassified. However, judging on the cases where we do have complete information, this is a minor problem.[15] Also, as long as these classification errors are not correlated with gender or ethnicity, the problem is handled by the inclusion of hiring fixed effects, as described in section 4.

Our second outcome is the job offer probability, which directly measures how AAP affects the final outcome of the hiring procedure. This allows us to study whether an impact on the selection of interviewees is offset by selection after the interviews. Similar to interview offers, we use explicit data on offers rather than acceptances since we do not like to classify applicants turning down jobs as unsuccessful.

## 3.3 The job openings

*Table 1* presents the job openings included in the data. Note that by a "job opening" we actually mean a single ad with a unified hiring process; on some occasions the opening actually pertained to several similar jobs. The positions have been divided into six broader categories: pre-school staff, teachers, social service staff, managers, health service staff and other. The left part of the table shows the distribution of the jobs, the right part displays the applicant distribution. The latter is more relevant for the empirical analysis, since we focus on effects on the chances of an average applicant with given charac-

[15] 87 percent of those who received an A were also interviewed. For grades B, C and D, the fractions were 8, 1 and 1 percent respectively.

teristics. There are some notable differences between the AAP jobs and the comparison jobs. First, there is only one opening as a manager among the comparison jobs, and the fraction of candidates applying to this type of job is close to one 10th of the corresponding fraction on the AAP jobs. There are also substantial differences in the categories teachers and health. Due to these patterns, we will re-weight the comparison jobs so to conform to the distribution of job types among the AAP jobs

**Table 1** Description of job openings included in the data

| | # job openings | | | # applicants (total) | | |
|---|---|---|---|---|---|---|
| | Comparison | AAP | Total | Comparison | AAP | Total |
| *Type* | | | | | | |
| Pre-school | 10 | 15 | 25 | 306 | 260 | 566 |
| Teachers | 10 | 6 | 16 | 408 | 105 | 513 |
| Social service | 11 | 6 | 17 | 459 | 144 | 603 |
| Managers | 1 | 11 | 12 | 29 | 174 | 203 |
| Health | 7 | 16 | 23 | 329 | 431 | 760 |
| Other | 8 | 8 | 16 | 590 | 294 | 884 |
| Total | 47 | 62 | 109 | 2,121 | 1,408 | 3,529 |

It is possible that the AAP will lead to more people being interviewed. Since it is harder to separate applicants when some information is hidden, the recruiter may invite everybody who fulfils certain criteria. Alternatively, managers may wish to circumvent the AAP by interviewing a larger number of individuals in order to see their full characteristics. At first glance, *Table 2* gives support to such a hypothesis. The fraction offered an interview is much higher for AAP jobs: 38 percent, compared to 17 percent for comparison jobs. But further inspection suggests that this is rather a result of a smaller number of applicants[16] than of a larger number of interviewees. One possible reason for the difference in the number of applicants is that the anonymous procedure is more demanding; it does not suffice to send just one's ordinary CV with a slightly modified application letter. Individuals who believe their chances are poor, or who are not so interested in the position may then find the cost of applying higher than the expected gains.

[16] In section 4 we discuss whether differences in the number of applicants may affect the results.

**Table 2** Number of applicants and interviewed per job opening.

| | | Comparison | AAP | Total |
|---|---|---|---|---|
| Pre-school | Number of applicants | 30.6 | 17.3 | 22.6 |
| | Number invited to interview | 6.6 | 6.1 | 6.3 |
| | Fraction invited to interview | 0.23 | 0.46 | 0.37 |
| Teachers | Number of applicants | 40.8 | 17.5 | 32.1 |
| | Number invited to interview | 3.3 | 5.0 | 3.9 |
| | Fraction invited to interview | 0.09 | 0.41 | 0.21 |
| Social service | Number of applicants | 41.7 | 24.0 | 35.5 |
| | Number invited to interview | 5.0 | 8.3 | 6.2 |
| | Fraction invited to interview | 0.13 | 0.40 | 0.23 |
| Managers | Number of applicants | 29.0 | 15.8 | 16.9 |
| | Number invited to interview | 7.0 | 6.0 | 6.1 |
| | Fraction invited to interview | 0.24 | 0.37 | 0.36 |
| Health | Number of applicants | 47.0 | 26.9 | 33.0 |
| | Number invited to interview | 8.6 | 6.9 | 7.4 |
| | Fraction invited to interview | 0.32 | 0.36 | 0.35 |
| Other | Number of applicants | 73.8 | 36.8 | 55.3 |
| | Number invited to interview | 6.9 | 7.3 | 7.1 |
| | Fraction invited to interview | 0.12 | 0.26 | 0.19 |
| Total | Number of applicants | 45.1 | 22.7 | 32.4 |
| | Number invited to interview* | 5.9 | 6.5 | 6.2 |
| | Fraction invited to interview | 0.17 | 0.38 | 0.29 |

*Notes*: * The difference between AAP and comparison is statistically insignificant.

This illustrates the obvious but important fact that the probability of a successful outcome depends strongly on the number of competitors. Also, each hiring is unique: the number interviewed ranges from 1 to 19, and the fraction interviewed ranges from less than 3 percent to a full 100. As will be described below, our model includes a fixed effect for each hiring to account for such differences.

## 3.4 Description of the applicants

The first two rows of *Table 3* show the two outcomes considered in the analysis: being offered an interview and being offered a job respectively. As discussed above, the probability of success is lower in the comparison location, which is a result of the larger number of applicants.

About one in five applicants are men. 81 percent of the applicants to AAP jobs are of Swedish origin; for comparison jobs the figure is 74 percent. Among non-Swedish applicants, the non-Western category is by far the largest, encompassing 16 percent of the total sample. The average applicant is about 35 years old. The level of education is high: three out of four has at least two years of tertiary education. 64 percent of the applicants possess the requested type of education. 42 percent have experience from working in the kind of position they applied for; with the average amount of experience being 1.7 years (i.e. 4 years conditional on having any experience). As seen in the table, we also include dummies for experience given through work on hourly basis (which is typically hard to convert into work years from a CV) and internships.

**Table 3** Description of the applicants

| | AAP | Comparison | Total |
|---|---|---|---|
| Interview offer | .29 | .13 | .19 |
| Job offer | .07 | .03 | .05 |
| Female | .81 | .76 | .78 |
| Gender unknown | .03 | .06 | .05 |
| Region of origin (Sweden ref) | | | |
| Western | .02 | .03 | .03 |
| Non-Western | .12 | .19 | .16 |
| Unknown | .05 | .04 | .05 |
| *X-variables* | | | |
| Age | 37.12 (10.49) | 33.72 (9.90) | 35.14 (10.29) |
| Level of education: At most secondary (high school)* | .20 | .18 | .19 |
| Tertiary, <2 years | .03 | .03 | .03 |
| Tertiary ≥ 2 years | .72 | .73 | .73 |
| Graduate | .01 | .01 | .01 |
| Missing | .03 | .05 | .04 |
| Requested education: yes | .69 | .60 | .64 |
| Requested edu: overqualified | .00 | .01 | .01 |
| Experience in position in question (years) | 2.56 (4.83) | 1.15 (3.16) | 1.71 (3.97) |
| Has experience in position in question | .48 | .38 | .42 |
| Has exp. on hourly basis | .10 | .07 | .08 |
| Has exp. from internship | .14 | .20 | .18 |
| Other relevant experience (years) | 2.29 (5.16) | .64 (2.67) | 1.30 (3.95) |
| Has other exp. | .32 | .17 | .23 |
| Has other exp. on hourly basis | .04 | .03 | .03 |
| Has other exp. from internship | .02 | .03 | .03 |
| Photograph included | .04 | .09 | .07 |
| Poor language | .03 | .04 | .04 |
| Employed by Gothenburg city | .11 | .03 | .06 |
| Priority | .01 | .00 | .01 |
| # observations | 1,408 | 2,121 | 3,529 |

Notes: Standard deviations of continuous variables are in parentheses. Variables are as indicated by CV and letter. *Only 10 applicants have less than secondary education.

# 4 Empirical approach

The main purpose of the analysis is to investigate whether AAP changes the influence of two individual characteristics in the hiring process: gender and ethnicity (as captured by region of origin).[17] A natural starting point is therefore to compare men and women, and applicants of different origin, who applied to positions under the AAP. We thus start by estimating

$$y_{ij} = \beta X_{ij} + \gamma^{f}\, female_{ij} + \gamma^{o} ori_{ij} + \alpha_{j} + \varepsilon_{ij} \qquad (1)$$

where *y* is either an interview offer or a job offer, *i* indexes the individual and *j* the job opening. All our estimations include hiring fixed effects, $\alpha_j$. Thus, the analysis acknowledges that the probability of success is unique to each job opening, and may be so for any number of unobserved reasons. If AAP works as intended, we should see no effect of gender or ethnicity once controlling for all *X*-variables observed by the employer in the "anonymous" stage.

However, to see if the policy had any *impact*, we need to establish a counterfactual, i.e. what would the role of gender and ethnicity had been if normal application procedures had been used? To this end we use the comparison jobs. We start by estimating equation (1) for these jobs to show how the characteristics affect the outcomes under normal circumstances. We then proceed to estimating a model where we can formally test whether AAP had an impact on these estimates. Here we include all jobs, AAP or not, and estimate how AAP changes the role of gender and ethnicity. In practice, we estimate models of the following form:

$$\begin{aligned} y_{ij} = {} & g^{f}\, female_{ij} + \mathrm{g}^{o} ori_{ij} \\ & + \delta^{f}\, female_{ij} \cdot D_{ij}^{AAP} + \delta^{o} ori_{ij} \cdot D_{ij}^{AAP} \\ & + \beta^{AAP} \cdot D_{ij}^{AAP} \cdot X_{ij} + \beta^{Comp.} \cdot (1 - D_{ij}^{AAP}) \cdot X_{ij} + a_{j} + e_{ij} \end{aligned} \qquad (2)$$

[17] One could of course consider also discrimination/selection along other dimensions e.g. age. Estimates in Table A1 show that age discrimination is not an issue in our setting.

The model examines whether immigrants (women) fare better relative to natives (men) when applications are anonymous than they do under "normal" circumstances. The model can thus be viewed as a Differences-in Differences (DD) model.[18]

Even though it is (supposedly) impossible for recruiting officers to identify gender and ethnicity, applicants from different groups may differ systematically in their disclosed credentials, and therefore in their hiring probabilities. It is thus important that the empirical model accounts for such differences in credentials. We therefore include a vector X in the models, which controls for the information that can be found in the application forms or the full application depending on specification. The explanatory variables included in *X* are the ones presented in *Table 3*, with the modification that age is included as dummies for five-year intervals (see also *Table A1*). Since it is possible that AAP changes the role of the covariates we allow the impact of the covariates to vary between the AAP jobs and comparison jobs.

The parameters $\gamma^m$ and $\gamma^o$ respectively capture the difference in the probability of success in the comparison locations between men and women, and between different region-of-origin groups. The parameters of primary interest are $\delta^m$ and $\delta^o$ which measure how the influence of gender and origin differs between the AAP jobs and the comparison jobs. The idea is that such differences can be interpreted as a causal effect of AAP on the different groups.

The identifying assumption for consistency of the point estimates is that there are no systematic differences (unrelated to the "experiment") in the hiring probabilities of men (natives) relative to women (immigrants) between the AAP and comparison jobs. Such problems can arise if there are differences in the pools of applicants across the regimes. We have investigated three possible problems: (i) that the impact of gender and/or ethnicity varies with the number of applicants (possibly as a result of recruiters turning to less informed sorting strategies); (ii) that it varies with the fraction of applicants belonging to different groups; (iii) that there are quality differences of the applicants in different groups in the two regimes. To address (i) and (ii) we ran regressions (including hiring fixed effects) for the comparison jobs only and included interaction terms between the group dummies and the number of applicants and

[18] Since job fixed effects are included in the models there is no need for a specific dummy variable for the AAP jobs.

the fraction females/foreign origin among the applicants. The results indicated that females fare just slightly worse the larger the number of applicants but are unaffected by the gender composition. Those with foreign background actually gain when there are more applicants and a larger fraction of non-Swedish origin. Thus, this phenomenon is unlikely to explain the gender results of the main analysis, and (if anything) give a downward bias in the estimated origin impact of AAP (given that there are fewer applicants and smaller fractions of foreign origin in the AAP jobs).

In order to investigate (iii) we ran regressions for the comparison jobs (leaving out group dummies in the dimension of interest but including all other covariates), and then compared the predicted values across regimes and gender/origin. There is no indication of differential selection on gender between AAP and comparison jobs, but a (non-significant) negative differential in the origin dimension, suggesting that ethnic minorities with lower credentials may have applied for the AAP jobs. Thus, if anything we would expect a negative bias in the main results regarding origin, assuming that selection on unobserved characteristics is correlated with observed characteristics.

But even when the identifying assumption is fulfilled, inference is complicated if the error terms are not independent. Specifically, we worry that different managers may have different preferences for hiring different groups. It cannot, for example, be ruled out that a certain manager treats all applications from Swedish males in a favorable way, whereas other managers do not. Then, we have a systematic correlation in the error terms within job-gender-origin clusters. We therefore correct our standard errors to allow for (arbitrary) correlations within such clusters.

# 5 Results

This section first presents the results from the baseline empirical analysis and then turns to discuss some robustness checks. We begin with how anonymity affects the probability of being offered an interview and then look at the final outcome of the hiring process, i.e. who is offered the job.

## 5.1 Interview offers

*Table 4* presents the estimates on interview offers. We start by estimating equation (1), where we only include AAP jobs, and look at whether gender or origin matter for the hiring probabilities when AAP is used. The specification controls for the covariates which can be observed in the interview selection stage of the AAP hiring process. The estimates show no significant effect of either gender or origin, and we can thus not reject that AAP works as intended.

The question then is whether gender or ethnicity would have mattered for the interview probability if AAP had not been used. To study this, column (ii) shows the corresponding estimates for the comparison jobs. In this case we control for the X-variables as observed in the CV and/or application letter. Here we see clear negative estimates from non-Western immigrants and positive estimates for males, just as we would expect from previous studies. Remember that about 20 percent of the applicants were offered an interview, which means that the point estimate of –0.09 for those of non-Western origin suggests close to 50 percent lower chances of being offered an interview. The order of magnitude is similar to what Carlsson & Rooth (2007) find in their correspondence testing, and is thus not an implausible baseline for a typical hiring. Immigrants from western countries do not appear to be significantly disfavored in the hiring process, something which is also broadly in line with previous research on ethnicity in the Swedish labor market (Lange 1999).

To formally test whether AAP had an impact we estimate equation (2) which is essentially a Differences-in-Differences (DD) model since we estimate whether the effects of gender and ethnicity are different when AAP is used than when it is not used. In *Table 4*, we see the estimates of the interaction parameter ( $\delta^r$ ) between the origin dummies and the AAP indicator in columns (iii) and (iv). Column (iii) uses "anonymous" X-variables for the AAP jobs and (iv) uses CV/letter information for both types of jobs. It is reassuring that the source of the covariates does not affect the estimates of main interest. For non-Western immigrants the AAP effects are positive and significant, suggesting that anonymous applications do increase the chances for individuals of non-Western origin by approximately 8 percentage points. The difference for the male dummy between AAP and comparison jobs is also statistically and economically significant: the estimate of $\delta^m$ suggests that anonymity increases the probability for women to be offered an interview by about 8 percentage points.

It is also of interest to see how AAP affects the importance of other covariates. These estimates, presented in *Table A1* in the appendix, are based on covariates as observed in the CV and/or application letter.[19] In general, the coefficients show an expected pattern which supports the variable definitions chosen. Level of education is more or less irrelevant, but having the requested education matters a great deal. Both experience measures ("requested" and "other relevant") matter, in the qualitative (yes/no) as well as the quantitative sense (years). The inclusion of the "poor language" indicator decreases the risk that the region-of-origin dummies actually capture selection on skills; the estimate also shows that language matters. As expected, having some sort of connection or priority greatly increases the chances of passing the first hurdle of the hiring process. The interaction estimates suggest (apart from gender and origin) that the AAP significantly increases the importance of: "requested education" and "less than 2 years tertiary education". This can be interpreted as saying that formal qualifications become more important when gender and origin as well as all "soft" indicators provided through application letters are concealed.

We interpret these results as strongly suggesting that an anonymous application procedure affects the chances for disadvantaged groups to be offered interviews on jobs they apply for. The patterns found in the comparison group are much in line with previous research suggesting that the processes generating interview offers is roughly similar to that of other jobs in the Swedish economy (as long as a "normal" procedure is used): conditional on a vast number of observed characteristics, women and ethnic minorities experience lower chances of advancing to the interview stage of the hiring process. Under the AAP regime these differences are no longer significant. Furthermore, the difference between the two regimes is significant, suggesting that an anonymous application procedure is a working tool to promote disadvantaged groups' probabilities of being offered job interviews.

[19] Estimates from the other models are available upon request.

**Table 4** AAP and interview offer probabilities

| | (i) AAP jobs | (ii) Comparison jobs | (iii) DD-1 | (iv) DD-2 |
|---|---|---|---|---|
| Female | .028 | –.060** | –.060** | –.060** |
| | (.026) | (.022) | (.022) | (.022) |
| AAP for females | | | .088* | .083* |
| | | | (.034) | (.035) |
| Non–Western origin | –.004 | –.089** | –.089** | –.089** |
| | (.033) | (.025) | (.025) | (.025) |
| AAP for non–Western | | | .084* | .082* |
| | | | (.041) | (.041) |
| Western origin | .003 | –.034 | –.034 | –.034 |
| | (.060) | (.057) | (.057) | (.057) |
| AAP for Western | | | .037 | .036 |
| | | | (.082) | (.089) |
| Observations | 1,408 | 2,121 | 3,529 | 3,529 |
| R–squared | .34 | .23 | .30 | .29 |
| X:s from AAP-form | Yes | No | AAP | No |
| X:s from CV and letter | No | Yes | Comparison | Yes |
| Covariates interacted with AAP | -- | -- | Yes | Yes |
| Hiring fixed effects | Yes | Yes | Yes | Yes |

*Notes*: Estimates from linear probability models, robust (clustered on job-gender-origin) standard errors in parentheses. The dependent variable takes the value 1 if the individual was offered an interview. The sets of control variables are presented in Table 3. AAP is an indicator that the hiring was made using the AAP procedure. Sweden (male) is the reference category for region of origin (gender). * (**) indicates significance at the 5(1)-percent level.

## 5.2 Job offers

We have so far established that AAP matters for the selection to interviews. The natural next step is to ask whether it affects who receives a job offer. From a methodological perspective, however, this poses a challenge since the absolute number of positive outcomes is small, especially when we are studying subgroups. The data contain 167 observations where a job offer was given, so there is bound to be substantial statistical uncertainty in the analysis.

Having said this, *Table 5* presents estimates corresponding to those discussed above, but with the dependent variable being an indicator of whether

the applicant received a job offer. Immigrants of non-Western origin experience a disadvantage in the probability of being offered a position using normal procedures, and there is nothing to suggest that AAP changes this. A negative estimate, which is actually larger than that for the "non-Western" group, is also found for the "Western" group but with a very low statistical precision.

Unfortunately, statistical uncertainty hinders firm conclusions on a possible backlash for the non-Western group at the interview stage. Although the positive impact of AAP on interview offers does not survive into job offers, we are unable to pin down a statistically significant effect on the job offer rate conditional on being invited to an interview (column v). Note also that the policy affects the first stage and that this will generate a sample selection problem in this specification: The distributions of unobserved factors among those chosen to the interviews are likely to differ systematically between the AAP jobs and the comparison jobs.[20] Therefore one should be extra careful in interpreting the estimates where the sampling is conditional on being interviewed.

For gender, we find a large coefficient in favor of men applying for comparison jobs, but this is almost turned around with the anonymous procedure. The tendency towards a more favorable treatment of women under AAP is in a relative sense much stronger here than in the interview selection stage since the average probability of a job offer is so much smaller. This is also evident in the last column of *Table 5*, which studies the job offer rates among those actually invited to interviews. The point estimates show that women succeed much more frequently in the interview stage if it is an AAP hiring. Note though that the estimates in the last column should be viewed with caution for the reasons listed above.

[20] For example, it is likely that those immigrants actually selected to interviews in the comparison jobs have better unobserved factors (on average) since managers appear more reluctant towards selecting immigrants under such procedures.

**Table 5** AAP and job offer probabilities

| | (i) AAP jobs | (ii) Comparison jobs | (iii) DD-1 | (iv) DD-2 | (v) DD-3 |
|---|---|---|---|---|---|
| Female | .029* | –.038* | –.038* | –.038* | –.157** |
| | (.014) | (.015) | (.015) | (.015) | (.058) |
| AAP for females | | | .067** | .065** | .241** |
| | | | (.021) | (.021) | (.085) |
| Non–Western origin | –.024 | –.021** | –.021** | –.021** | –.132 |
| | (.018) | (.008) | (.008) | (.008) | (.085) |
| AAP for non–Western | | | –.003 | –.004 | –.021 |
| | | | (.020) | (.020) | (.107) |
| Western origin | –.003 | –.039* | –.039* | –.039* | –.095 |
| | (.040) | (.017) | (.018) | (.018) | (.093) |
| AAP for Western | | | .036 | .030 | .136 |
| | | | (.043) | (.042) | (.210) |
| Observations | 1,408 | 2,121 | 3,529 | 3,529 | 684 |
| R–squared | .14 | .08 | .12 | .12 | .28 |
| X:s from AAP-form | Yes | No | AAP | No | No |
| X:s from CV and letter | No | Yes | Comparison | Yes | Yes |
| Covariates interacted with AAP | -- | -- | Yes | Yes | Yes |
| Hiring fixed effects | Yes | Yes | Yes | Yes | Yes |
| Conditional on interview offer | No | No | No | No | Yes |

*Notes*: Estimates from linear probability models, robust (clustered on job-gender-origin) standard errors in parentheses. The dependent variable takes the value 1 if the individual was offered an interview. The sets of control variables are presented in Table 3. AAP is an indicator that the hiring was made using the AAP procedure. . Sweden (male) is the reference category for region of origin (gender). * (**) indicates significance at the 5(1)-percent level.

## 5.3 Robustness checks and variations

This section discusses some robustness checks and variations on the baseline specifications. We begin with the definitions of outcome variables and key explanatory variables. Then we consider modeling aspects and restrictions on the sample. Finally, we discuss potential heterogeneous effects of the reform. Some of the results are presented in *Tables A2–A4* in the appendix and other results are available on request.

### 5.3.1 Dependent and explanatory variables

The outcome variables used above are quite natural; they respectively capture success in the first stage and the full hiring process. Still, the grading of the applicants give scope to alternative definitions, especially if one is interested in how the recruiter reacts to the applications present. It turns out that if we instead use only the "A", or "A or B" (thus including also those considered interesting but not to be interviewed in the first stage) grade, we get basically the same results as in the baseline case. Similarly, using an indicator for being hired instead of offered the job gives results that do not differ much from the ones presented above.

There are several signals that potentially may cause discrimination. Even though somebody does not explicitly say anything about a foreign background, names often reveal this information. As an alternative we therefore used a grouping of names that roughly corresponded to the regions of origin used in the baseline analysis. The results were qualitatively the same, but in general it seems that names have a smaller impact than does actual origin. We also tested using explicit immigrant status[21] instead of region of origin, an exercise which confirmed the baseline results.

### 5.3.2 Specification issues and sample restrictions

The baseline specification allows the X-variables to have a differential effect depending on whether the job is AAP or a comparison job. We believe that this is sensible given that the selection process may differ between the two regimes. However, the main results are not dependent on the interaction or sensitive to using a more restricted set of covariates (results available upon request).

The models presented above re-weight the sample of comparison jobs so as to match the occupational structure of the AAP jobs. Using unweighted data gives a smaller origin effect in the comparison jobs, even though the qualitative pattern remains. At face value, this suggests more selection on origin in the type of jobs included in the AAP. Since managers had negative views towards AAP, one could fear an opposite pattern (i.e. that they withheld hirings where they wished to select on origin), and it is not unlikely that the difference in job types is due to random variation in job openings.

[21] For immigrant status to be one, the application must contain some explicit information on this, e.g. "I was born in…" or "I came to Sweden in year…".

Our main results come from a linear probability model. This may appear problematic given that the probability varies so much across job openings. Such fears are unwarranted since using a probit confirms the baseline estimates.

Since the econometric model includes dummies for each job opening, we remove any particularities common to all applications to a specific job. The model thus handles, e.g., the possibility that many immigrants happened to apply for a vacancy that was already from the beginning to be filled by someone known by the manager, so that only this person was interviewed. We have nevertheless tried excluding all jobs where the forms indicate any form of inconsistency. This did not affect the basic results either. A related problem is how to deal with observations where there are indications that identifying information "leaked"; dropping these observations also gave results consistent with the ones presented above.

Another issue is how to treat observations that have incomplete information or are hard to classify for other reasons. Some applications lack region of origin or gender; in the results presented above, these observations are included as separate categories (but not discussed). Dropping these observations does however not change the results. The problem of identifying gender deserves special attention since it is strongly correlated with region of origin (as long as there are names somewhere in the application). One could thus worry that the policy impact on the importance of origin is biased by the inclusion of the interaction of "missing gender" and the location dummy. We therefore estimated a model without the AAP-female interaction, and found that the estimates on region of origin were largely unaltered.

In the early stages of the pilot, the districts had discretion over how to implement the AAP, and which jobs to include. From November 2005 the implementation was harmonized across districts, and the policy was to include all jobs in the districts. In other words, there was less scope for selection effects. Using only hirings performed after this date confirms the baseline results.

### 5.3.3 Heterogeneity

It is possible that the impact of AAP varies within the categories used in the baseline analysis. For example, the origin coefficient could vary across gender or across countries within the non-Western group. We have therefore estimated models on different subsamples. However, sample size problems prevent

meaningful investigations along certain dimensions, and urges caution in the interpretation of other estimates due to statistical uncertainty even when we focus on interview offers.

Our region-of-origin groups are large, and there may be differences in the country of origin composition across the treatment and comparison groups, which pose a problem if the origin effect varies within the broader groups. To check this possibility and still have reasonable sample size, we tried using a special category for people from Iran and Iraq, two of the major non-Western groups of applicants. We found (results available upon request) that the effect of AAP in this group is similar to that in the remaining non-Western category, suggesting that this heterogeneity should not be a major concern.

A related issue is if there are differential effects in other dimensions, most notably the interaction between gender and ethnicity. Unfortunately there are too few immigrant males in the data to estimate interacted models with any precision. Attempts along these lines suggest that the gender impact is present in all groups, but that the impact on region of origin is driven by women.

The importance of anonymity may also differ depending on the applicants' credentials; e.g., whether you have a Swedish or a foreign education. Our estimations suggest that those with Swedish degrees benefit more from anonymity than those with foreign degrees. One interpretation is that the information on education in some cases is used as a signal on a foreign background, even though there is no direct information on place of education.

It is also possible that anonymity will have greater impact on some types of jobs than others. Our analysis (results available upon request) suggests that the gender impact is relatively uniform across occupation types. The origin effects appear to be strong for teachers (including pre-school). Unfortunately we have too few observations to study managerial positions separately.[22]

We have also investigated whether the effects of AAP differ across the two participating districts (results available upon request). As it turns out, the gender effects are very similar, but the policy impact on the influence of region of origin is somewhat stronger in the more immigrant dense district of Kortedala than in Centrum. This is reassuring, given that the resident population in Kortedala is more similar to Gunnared than is Centrum. So

[22] This would have been particularly interesting given that Eriksson & Lagerström (2007) find that a foreign name is a particular disadvantage for highly qualified positions.

judging by these estimates, differences in the resident population does not appear to be driving the results.

Another interesting variation is whether the AAP impact depends on the characteristics of the manager. Unfortunately, there are too few foreign-origin managers, and sample size is a problem also in the gender dimension (due to a small number of male managers). If one is nevertheless willing to interpret these estimates, they suggest that female managers drive the gender effect of AAP. It is also among female managers we find negative first stage treatment of people of non-Western origin in the comparison jobs, which is eliminated under AAP.

# 6 Concluding remarks

This paper investigates how anonymous job application procedures (AAP) affect discrimination in the hiring process. The policy pilot we analyze was implemented in the Swedish city of Gothenburg. The data include some 3,500 applications to more than 100 jobs. The results are quite striking: women and ethnic minorities, who are disadvantaged elsewhere in the economy, do not experience a penalty in the interview selection stage when applying to jobs using AAP. They thus receive substantially higher probabilities of being interviewed under AAP than in comparison jobs where normal hiring procedures were employed. These patterns are in line with expectations if AAP works as intended. In fact, one could argue that the comparison jobs are unnecessary. The absence of gender and ethnic differences in the jobs where anonymous application procedures are used is in itself a strong indicator of a policy impact, given previous research.

When studying job offers, the results are less clear. Immigrants do not appear to benefit in terms of job offers when AAP is used, but women do. Ultimately, the AAP policy appears to be effective in terms of affecting job opportunities mainly in the gender dimension and not so much so in the ethnic dimension. For women, our results concur with the findings of Goldin & Rouse (2000) for symphonic orchestras, but for a wider and more common set of occupations.

Given these results, is AAP a policy to be recommended? At first glance, the case for anonymous applications may seem strong: each applicant should be treated based on his/her credentials only. But the policy also comes at a cost

since also relevant factors may carry information about gender or ethnicity. Place of education and place of work experience must be hidden for ethnic anonymity, at least where ethnicity is correlated with being foreign-born. In addition, one must consider the fact that this policy may actually create an obstacle to some individuals supposed to benefit from the policy. An immigrant with a degree from a prestigious university combined with an international career will probably look worse to many employers when this information is concealed. Employers wishing to increase the representation of under-represented/disadvantaged groups may also consider anonymity an obstacle. Another practical concern is how the method is received by those involved; as Sibbmark (2007) shows, managers and administrators in Gothenburg were very displeased with the method, much due to the increased administrative burden.

These problems and drawbacks must then be weighed against the gains from using the method. The experiences from Gothenburg suggest that it is indeed possible to affect at least the first stage of the hiring process. One might argue that the effort is in vain since the most disadvantaged group did not experience any real improvement. On the other hand, equality of opportunity in advancing to the second stage may have a value in itself, or at least constitute a first step toward a fair hiring process. In the end, whether anonymous applications are to be considered a suitable means against discrimination depends on how different pros and cons are valued. Our results suggest, however, that it does affect the hiring practices of recruiting managers in the intended direction.

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# Appendix A: Additional results

**Table A1** Full set of estimates for specification (iv) of Table 4 and Table 5.

| | Interview offer | | Job offer | |
|---|---|---|---|---|
| | Comparison | Difference AAP-Comp | Comparison | Difference AAP-Comp |
| Western | –.034 | .036 | –.039* | .030 |
| | (.057) | (.089) | (.018) | (.042) |
| Non-Western | –.089** | .082* | –.021** | –.004 |
| | (.025) | (.041) | (.008) | (.020) |
| Unknown origin | –.003 | .143 | .060 | .028 |
| | (.070) | (.099) | (.046) | (.068) |
| Female | .060** | –.083* | .038* | –.065** |
| | (.022) | (.035) | (.015) | (.021) |
| Gender unknown | –.030 | –.027 | .010 | –.020 |
| | (.037) | (.078) | (.015) | (.043) |
| Tertiary, <2 years | –.008 | .150* | –.002 | –.012 |
| | (.035) | (.066) | (.012) | (.038) |
| Tertiary ≥ 2 years | .096+ | .018 | .040** | –.041+ |
| | (.051) | (.062) | (.014) | (.025) |
| Graduate | –.079 | .107 | .017 | .061 |
| | (.092) | (.125) | (.022) | (.120) |
| Missing education | .115** | –.004 | .025 | –.013 |
| | (.042) | (.076) | (.020) | (.043) |
| Requested education: yes | .088** | .116** | .027* | .009 |
| | (.026) | (.040) | (.011) | (.020) |
| Requested edu: overqualified | –.041 | .023 | –.031+ | –.093 |
| | (.073) | (.112) | (.016) | (.072) |
| Born 1950–54 (–1949 ref.) | –.093 | .202 | .007 | .048 |
| | (.128) | (.140) | (.013) | (.039) |
| 1955–59 | –.018 | .161 | .052* | .024 |
| | (.124) | (.139) | (.024) | (.043) |
| 1960–64 | .060 | .139 | .047* | .040 |
| | (.094) | (.110) | (.020) | (.038) |
| 1965–69 | .066 | .148 | .075 | .004 |
| | (.083) | (.104) | (.050) | (.059) |
| 1970–74 | .078 | .122 | .069** | .028 |
| | (.070) | (.091) | (.019) | (.039) |

| | Interview offer | | Job offer | |
|---|---|---|---|---|
| | Comparison | Difference AAP-Comp | Comparison | Difference AAP-Comp |
| 1975–79 | .072 | .139 | .061** | .012 |
| | (.088) | (.107) | (.018) | (.037) |
| 1980–84 | .021 | .136 | .044* | .067+ |
| | (.087) | (.103) | (.021) | (.040) |
| 1985– | .002 | .183 | .041* | .009 |
| | (.102) | (.135) | (.021) | (.043) |
| Birth year missing | .076 | .006 | .038+ | .004 |
| | (.063) | (.088) | (.021) | (.037) |
| Photograph included | –.022 | –.025 | –.006 | –.038 |
| | (.028) | (.055) | (.012) | (.027) |
| Experience in position (years) | .012+ | .006 | .001 | .003 |
| | (.007) | (.007) | (.002) | (.003) |
| Has exp. on hourly basis | .037 | –.002 | –.006 | –.022 |
| | (.037) | (.054) | (.013) | (.029) |
| Has exp. from internship | .053* | –.026 | .037* | –.028 |
| | (.025) | (.053) | (.015) | (.028) |
| Has experience in position | .117** | –.029 | .020 | .015 |
| | (.041) | (.051) | (.014) | (.022) |
| Other relevant exp. (hours) | .006* | .005 | .002 | –.002 |
| | (.003) | (.004) | (.001) | (.002) |
| Other exp. from internship | –.004 | .106 | –.019 | .013 |
| | (.058) | (.095) | (.026) | (.042) |
| Other exp. on hourly basis | –.005 | .101 | –.002 | –.070* |
| | (.038) | (.079) | (.016) | (.029) |
| Has other relevant experience | .018 | –.056 | –.005 | –.002 |
| | (.039) | (.050) | (.015) | (.024) |
| Poor language | –.072* | –.002 | –.018* | –.027 |
| | (.029) | (.053) | (.008) | (.020) |
| Employed by Gothenburg city | .159* | .091 | .072 | –.003 |
| | (.068) | (.079) | (.056) | (.062) |
| Priority | .542* | –.319 | –.019 | .214 |
| | (.224) | (.259) | (.051) | (.142) |

Note: Qualifications are as they appear in the full application including CV and application letter; i.e. specification (iv) of Tables 4 and 5

**Table A2** Robustness checks: Alternative outcomes

| | Interview offers | | Job offers |
|---|---|---|---|
| | Graded A | Graded A or B | Hired |
| Female | –.051* | –.060* | –.038* |
| | (.021) | (.024) | (.015) |
| AAP for females | .054+ | .076* | .076** |
| | (.031) | (.035) | (.019) |
| Non–Western origin | –.084** | –.133** | –.019** |
| | (.026) | (.043) | (.007) |
| AAP for non–Western | .074+ | .103+ | –.011 |
| | (.039) | (.054) | (.018) |
| Observations | 3529 | 3529 | 3529 |
| R-squared | .26 | .38 | .10 |

*Notes*: Graded A (or B) means that applicant is coded as having a positive outcome if graded with A (or B), see Section 3 for details. The baseline specification in the main text includes those either graded with A or interviewed as positive outcomes. Hired means that the applicant was eventually hired, the baseline specification in the main text was based on offers. + (*) {**} indicates significance at the 10(5){1}-percent level.

**Table A3** Variations in specifications and sample restrictions

| | Drop inconsistent applicants and hirings | Drop jobs before November 2005 | Drop obs. With identifying information | No weighting | Probit instead of LPM |
|---|---|---|---|---|---|
| | | | *Interview offers* | | |
| Female | –.043+ | –.058* | –.058** | –.056** | –.083** |
| | (.023) | (.026) | (.022) | (.018) | (.028) |
| AAP for females | .073* | .104** | .121** | .080* | .110** |
| | (.036) | (.036) | (.041) | (.032) | (.038) |
| Non–Western origin | –.101** | –.075** | –.084** | –.046** | –.088** |
| | (.031) | (.021) | (.024) | (.016) | (.021) |
| AAP for non–Western | .129** | .076+ | .105* | .040 | .133+ |
| | (.049) | (.040) | (.048) | (.036) | (.070) |
| Observations | 3046 | 3149 | 3037 | 3529 | 3506 |
| R-squared | .31 | .32 | .29 | .30 | |
| | | | *Job offers* | | |
| Female | –.039* | –.019+ | –.035* | –.022* | –.023** |
| | (.017) | (.011) | (.015) | (.010) | (.007) |
| AAP for females | .059** | .065** | .094** | .050** | .040** |
| | (.023) | (.018) | (.025) | (.017) | (.013) |
| Non–Western origin | –.029** | –.023** | –.021* | –.008 | –.009** |
| | (.009) | (.007) | (.008) | (.008) | (.002) |
| AAP for non–Western | .007 | –.001 | –.011 | –.017 | .004 |
| | (.024) | (.022) | (.025) | (.020) | (.009) |
| Observations | 3046 | 3149 | 3037 | 3529 | 3179 |
| R-squared | .13 | .13 | .13 | .11 | |

*Notes*: Restrictions are described in the main text. Table entries for the probit model are the estimated effect of a discrete change from 0 to 1 in the variable of interest. + (*) {**} indicates significance at the 10(5){1}-percent level.

**Table A4** Heterogeneous effects

| | By gender | | By origin | | By place of education | |
|---|---|---|---|---|---|---|
| | Males | Females | Sweden | Non-western | Sweden | Abroad |
| | | | *Interview offers* | | | |
| Female | -- | -- | –.050* | –.063* | –.056* | –.053* |
| | | | (.024) | (.027) | (.025) | (.022) |
| AAP for females | -- | -- | .076* | .115+ | .092* | .065+ |
| | | | (.037) | (.066) | (.037) | (.035) |
| Non–Western origin | –.055 | –.104** | -- | -- | –.069* | –.107** |
| | (.038) | (.028) | | | (.033) | (.031) |
| AAP for non–Western | –.058 | .128* | -- | -- | .129* | .038 |
| | (.067) | (.050) | | | (.053) | (.059) |
| Observations | 770 | 2,596 | 2,699 | 634 | 3,215 | 3,013 |
| R-squared | .43 | .33 | .31 | .54 | .30 | .30 |
| | | | *Job offers* | | | |
| Female | -- | -- | –.040* | –.030+ | –.039* | –.037* |
| | | | (.016) | (.016) | (.016) | (.016) |
| AAP for females | -- | -- | .068** | .023 | .074** | .060** |
| | | | (.022) | (.039) | (.022) | (.021) |
| Non–Western origin | –.025 | –.026** | -- | -- | –.012 | –.036** |
| | (.017) | (.007) | | | (.010) | (.010) |
| AAP for non–Western | –.035 | .012 | -- | -- | .030 | –.045+ |
| | (.047) | (.021) | | | (.033) | (.023) |
| Observations | 770 | 2,596 | 2,699 | 634 | 3,215 | 3,013 |
| R-squared | .32 | .14 | .14 | .41 | .13 | .12 |

*Notes*: Place of education excludes/includes people of non-Swedish origin depending on where education is taken. Those of Swedish origin are included regardless of place of education. + (*) {**} indicates significance at the 10(5){1}-percent level.

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