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ABSTRACT

Productivity Signals and Disability-Related Hiring Discrimination: Evidence from a Field Experiment*

While hiring discrimination against disabled candidates is widely documented, the reasons for such discrimination and the mechanisms designed to reduce it are not well understood. This study aims to tackle these questions through a large-scale correspondence study. Fictitious job applications were sent to about 4,000 job vacancies for accountants and financial accounts assistants in the UK. Consistent with discrimination, we find a 5.6 percentage point (15%) gap in the employer callback rate associated with mobility impairment indicated by the use of a wheelchair, but substantial occupational heterogeneity. Productivity signals designed to reduce statistical discrimination, including the offer of a positive reference from a previous employer and, enhanced education and technical skills, do not reduce, and actually widen, the disability gap in callbacks. Our findings are suggestive of taste-based discrimination being a significant barrier to employment for disabled people that requires policy attention.

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1. Introduction

In the context of a significant and growing proportion of the working-age population reporting disability in many industrialised countries, pronounced differences in employment rates between disabled and non-disabled people (the so-called disability employment gap (DEG)) are attracting increasing policy attention.[1] A relatively small part of DEG can be explained by disability-related differences in personal characteristics (Jones, 2006), leaving a potentially important role for employer discrimination, which has been confirmed in evidence based on correspondence studies (see Lippens *et al*., 2023 for a meta-study). More specifically, among otherwise identical job applicants, employers have been shown to favour those who do not disclose disability based on impairments relating to mobility (Ameri *et al*., 2018; Bjornshagen and Ugrenunov, 2021; Bellemare *et al*. 2018, 2023), hearing (Baert, 2016; L'Horty *et al*., 2022), vision (Baert, 2016), depression (Baert *et al*., 2016), HIV status (Drydakis, 2010), facial disfigurement (Stone and Wright, 2013) and Asperger's Syndrome (Ameri *et al*., 2018) among others. However, little is known about the sources of such discrimination, particularly whether it can be considered predominately statistical in nature, related to employer beliefs of the applicant's productivity in the presence of incomplete information, or taste-based, reflecting employer preferences. This is a key question for policy and employer practice, and the focus of our analysis.

We extend the well-established correspondence study approach used in the literature whereby hypothetical applications are sent to real-world job vacancies, and a gap in employer callback rates between otherwise equivalent disabled and non-disabled applicants is used as a measure of hiring discrimination. Our focus is, however, on applying a credentials approach (see Bertrand and Mullainathan 2004; Oreopoulos, 2011; Kaas and Manger, 2012; Nunley *et al*. 2015 in the context of race) to explore the source of discrimination.[2] More specifically, we test the effectiveness of productivity signals that we hypothesise reduce the disability-related gap in callbacks in the presence of statistical discrimination where employers use the group characteristic, in this case disability, to infer lower individual productivity in the presence of incomplete information (Phelps, 1972). Our productivity signals are considered along two dimensions. As part of the application, we first randomly include the offer of a positive employer reference, and second, an enhanced set of education and technical skills, and explore

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[1] See, for example, the recent UK Work and Pensions Select Committee inquiry (New inquiry: Work and Pensions Committee to examine progress made in supporting disability employment – Committees – UK Parliament).

[2] A credentials approach involves randomly varying the quality of the application and exploring changes in the gap in callbacks. To our knowledge the only previous study to adopt this approach in the context of disability is Ravaud *et al*. (1992) who consider qualification levels.

the impact on the disability gap in callbacks. In short, we assess whether disabled individuals can influence the probability of callback disproportionately by enhancing their productivity signals, in line with these being more important for disadvantaged groups where productivity is more uncertain (Kaas and Manger, 2012; Abel *et al*., 2020; Heller and Kessler, 2021).

Our context is the UK, where disabled people, who represent nearly a quarter of the working-age population, are protected from discrimination under the 2010 Equality Act.[3] This anti-discrimination legislation is similar to several other countries, including the US and Australia, and means that disability-related discrimination in hiring is unlawful, and that job seekers (as well as workers) have the right to request reasonable adjustments. The latter is designed to prevent a disabled person from being disadvantaged at work, including during recruitment.[4] Despite this, disabled people experience pronounced and enduring labour market disadvantage in the UK, with the DEG currently about 29 percentage points.[5]

Consistent with the literature, we consider the influence of a specific type of (physical) disability (severe mobility problems indicated by use of a wheelchair) among male applicants within two occupations (certified accountant and financial accounts assistant) where such impairment is assessed to have no direct impact on worker productivity (Ameri *et al*., 2018; Bjornshagen and Ugrenunov, 2021; Bellemare *et al.,* 2018, 2023).[6] Our experiment involved submitting around 4,000 fictitious applications to job vacancies posted to a large online hiring platform between October 2022 and July 2023.

Consistent with evidence of disability-related discrimination, we find a 5.6 percentage point (15%) lower employer callback rate to applications from disabled relative to non-disabled job seekers. This is driven by applications to the less skilled role of financial accounts assistant, whilst no disability-related discrimination is evident for certified accountants. In contrast with our expectations, however, we find that neither of our productivity signals, the offer of a

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[3] Under the act a person has a disability if she or he has a physical or mental impairment which has a substantial and long-term adverse effect on that person's ability to carry out normal day-to-day activities.

[4] Unlike some other countries there is no quota system which requires employers hire a minimum number of disabled employees, and there is no policy of wage subsidies. Disabled people in work are entitled to welfare benefits to compensate for the additional cost of disability (currently personal independence payments).

[5] Figures calculated from A08: Labour market status of disabled people - Office for National Statistics (ons.gov.uk).

[6] In a similar manner to these studies, it is not possible to rule out the role of additional costs associated with hiring disabled workers. Albeit a requirement of equality legislation, this would not typically be thought of as a form of 'discrimination'. We believe the influence of this to be minimised in our context since the direct costs of accommodations are covered by the UK Access to Work Scheme (see Access to Work factsheet for employers – GOV.UK (www.gov.uk)). Bjørnshagen and Ugreninov (2021) and Bellemare *et al.* (2018, 2023) further show that workplace physical accessibility plays only a small role in explaining callback gaps among disabled job seekers.

reference from a previous employer, or enhanced education and technical skills, reduce the disability gap in callbacks. If anything, these signals are only valued for non-disabled job seekers, widening the disability gap. Our findings are therefore consistent with the presence of taste-based discrimination (Becker, 1971). This conclusion is supported by further analysis which demonstrates the disability gap in callbacks is larger among roles that require teamwork and involve contact with customers.

The contribution of our work is threefold. First, our analysis contributes to the literature on disability discrimination. We build on Ameri *et al*. (2018), Bjornshagen and Ugrenunov (2021), and Bellemare *et al.* (2023), among others, to show that the presence of disability discrimination is context-dependent, being absent for accountants in the UK which we hypothesize might be explained by particularly high labour demand during this period.[7]

Second, by incorporating productivity signals such as the availability of a reference letter upon request or the presence of enhanced education and technical skills into the applications, our study builds on conventional correspondence studies on disability discrimination. Leveraging this design aspect, we assess whether our productivity signals are effective mechanisms for reducing the disability gap in callbacks. We hypothesise that productivity signals reduce the disability gap in callbacks in case of statistical discrimination and therefore distinguish between statistical or taste-based sources of disability-related discrimination. Such focus on mechanisms designed to reduce disability discrimination relates our analysis to the recent work of Bellemare *et al.* (2023), who include a video of the applicant within the job application. While the literature on quality signals is not new (Bertrand and Mullainathan 2004; Oreopoulos, 2011; Nunley *et al*. 2015), the application of such signals to disability provides a distinct and novel contribution of this analysis.

Third, we contribute to the scarce literature on the power of references as quality signals (see Abel *et al.*, 2020). The existing evidence suggests that reference letters improve the job market outcomes of disadvantaged groups such as ethnic minorities in Germany (Kass and Manger, 2012), youth in the US (Heller and Kessler, 2021), and women in developing countries (Abel *et al.*, 2020). Whether reference letters or a signal of their presence can disproportionately benefit disabled applicants, to the best of our knowledge, is not known.

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[7] See, for example: https://www.hays.co.uk/career-advice/article/4-accountancy-and-finance-roles-in-demand#:~:text=Part%20and%20newly%20qualified%20accountants,accountants%20is%20only%20going%20up. Using data on vacancies posted during the study period from GlobalData scraped from company websites and data on the number of individuals in an occupation from the Annual Population Survey in 2021 taken from Nomis, we can calculate the ratio of workers per vacancy. During our study period, we find a ratio of 45 workers per vacancy for accountants and a ratio of 84 for financial accounts assistants.

The remainder of the paper is structured as follows. In Section 2 we describe our experimental design. Section 3 outlines our results in terms of disability discrimination and the influence of productivity signals and Section 4 briefly concludes.

2. Experimental design

The aim of our experiment is to assess the impact of productivity signals on the disability gap in callbacks. This requires several careful experimental design choices, including the choice of disability and occupations, the design of credible CVs and cover letters, nature of disability signal in the job application, which productivity signals to employ and how to introduce these, how to identify vacancies and submit applications, how to measure callback, and what employer and job characteristics to measure and explore. This section details all these aspects.

Disability and occupation choice. We focused on wheelchair users, since disabled and non-disabled candidates with this type of mobility impairment are equally productive in many settings. Furthermore, this disability is easily understandable meaning the accessibility requirements are more likely to be known and already addressed. We selected the occupations of accountants and financial accounts assistants, because such impairment is assessed to have no direct impact on worker productivity in these occupations given the low physical requirements (Ameri *et al.*, 2018; Bellemare *et al.*, 2023).[8]

CVs and cover letters. The application materials – fictitious CVs and cover letters – were designed to mirror industry standards and were constructed based on examples stored by real job seekers on the online hiring platform who were searching for employment in the same occupations. Applications varied across two key dimensions, the presence of (i) disability and (ii) signals of enhanced productivity. Otherwise, applications were kept similar. Applicants were intended to be credible for the role, with appropriate (but not outstanding) qualifications and work experience tailored to the occupation and city. For example, those applying for an accountant had obtained a degree level qualification and were a certified chartered accountant. Applicants were designed to be white British males with everyday sounding names, at an early career stage, employed, and with no gaps in the employment history.[9,10]

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[8] Search terms to capture financial accounts assistants included *financial accounts assistant*, *bookkeeper*, and *credit controller*.

[9] We used four names – Daniel, Jack, James, Thomas – and four surnames – Brown, Jones, Smith, Taylor – to form random combinations.

[10] Existing studies have shown that employment gaps related to ill-health reduce employment prospects (see, for example, Namingit *et al.*, 2020).

Disability signal. While the decision to disclose a disability at work, as well as during job seeking, is highly personal (von Schrader *et al.*, 2014), it is often helpful in requesting reasonable adjustments entitled to disabled people under the UK Equality Act. Following a well-established approach in the literature (e.g., Bellemare *et al.*, 2018, 2023; Bjornshagen and Ugrenunov, 2021), we disclose wheelchair use in the cover letter among a randomly selected half of the applications: "*If invited to attend an interview in person, I would like your reassurance that your building will be accessible to my needs since I use a wheelchair.*" Discussions with our third sector partners confirmed this was a natural choice since it would need to be discussed at the next step in the hiring process.[11]

Productivity signals. Our productivity signals take two forms, which we refer to as references and enhanced skills. In other contexts, attaching a positive reference letter has been shown to provide employers with a positive signal of productivity that affects hiring disproportionately for disadvantaged groups (Kaas and Manger, 2012; Abel *et al.*, 2020). Equality Legislation in the UK precludes employers from considering a reference as part of the interview selection process and so instead a statement was included within the cover letter of a randomly selected half of disabled and non-disabled applications: "*I have letters of reference available from previous line managers, who can vouch for my past performance and productivity in my previous roles, my transferable skills, and the added value I create for the companies I work in.*" The signal was designed to offer a credible indication of individual productivity within the occupation since the previous line manager should be closely familiar with the individual's work. Furthermore, we argue that it provides a positive signal since applicants would be more likely to offer the reference letter if they believe their line manager is favourable about their performance.

For the enhanced skills, we focus on four occupation-specific skills designed to provide a positive productivity signal. For certified accountants, these skills included having a first class undergraduate degree to signal a higher academic achievement, having knowledge of relevant accounting software to signal technical fluency, having knowledge of coding data in structured query language (SQL) to signal coding skills, and being certified in advanced data analytics for accountants to signal additional upskilling. For financial accounts assistants, these skills included having an undergraduate degree to signal higher qualifications, having advanced

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[11] Our experiment was designed with guidance from two third sector partners, Scope and the Business Disability Forum (BDF). Scope provides different employment advice services for disabled people (including support with writing CVs and preparing for interviews) and BDF advise and support businesses in relation to disability inclusion. They were therefore able to provide expertise from the perspective of a disabled job seeker and employer, respectively.

knowledge of computer and accounting software to signal computer literacy, and having certified knowledge of financial reporting to signal upskilling.[12] Additionally, for both occupations, we emphasized the applicants' strong attention to detail and good communication/presentation skills. To add the enhanced skills to the CVs, we follow Neumark *et al*. (2019) and, within each application type (by occupation, city, disability, and reference), we created four high skill profiles and four low skill profiles. Low skill profiles had none of the additional four occupation specific skills. The enhanced skill profiles randomized three from the set of four possible enhanced occupation-specific skills. This strategy allows us to address the Heckman critique (see Neumark, 2012; Neumark, 2018), where differences in the *variances* of unobservables between disabled and non-disabled applicants might bias the findings (see Section 3.3). An example CV and cover letter for each occupation is provided in Appendix B.

In summary, we have applicant profiles that differ in the presence of disability and productivity signals, that is, we have disabled candidates with and without productivity signals, and non-disabled candidates with or without productivity signals. We hypothesize that if discrimination against disabled applicants is taste-based, the productivity signals should have no effect on the difference in callback rates between disabled and non-disabled candidates. In contrast, if discrimination is at least partly statistical in nature, a signal which transmits meaningful information about employee productivity should disproportionately benefit disabled applicants and reduce a disability gap in callbacks (see Nunley *et al*., 2015 for corresponding arguments in relation to taste-based racial discrimination).

Finding vacancies and submitting applications. Our search was constrained to occupations within 25 miles of 5 large UK cities (London, Birmingham, Manchester, Edinburgh, Cardiff) and covered the period from October 2022 to July 2023. We sent fictitious job applications to 4,004 job vacancies posted on a large online hiring platform. Several filters were applied to identify suitable vacancies. First, applications were sent to vacancies posted by an employer (and not a recruitment agency) in the last three days. This was done to ensure that multiple applications were not sent to the same employer in the same city, as recruitment agencies often refrain from indicating the employers' details in the job advertisements. Second, only the vacancies that required application documents (CV and a cover letter) to be submitted via the

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[12] Similarly, Bertrand and Mullainathan (2004) use labour market experience/employment history, a certified degree, foreign language skills, or external recognition. Oreopoulos (2011) use language fluency, multinational experience, selective school education, and extracurricular activities. Nunley *et al*. (2015) use business degrees, internship experience, and infield work experience.

platform were selected. Third, our search was restricted to permanent vacancies in the private sector. The last two filters ensured greater homogeneity in the nature of employers and the required documentation and recruitment process. Applications were also tailored for each city to enhance credibility.

We adopted an unmatched approach so that either a disabled or a non-disabled application profile was submitted to each suitable vacancy.[13] Drawing from a pool of 16 disabled applicant profiles per city (differing based on the productivity signals discussed above) and 16 non-disabled applicant profiles per city, we randomized the order of profiles and used one disabled applicant profile and one non-disabled applicant profile each day, with the profiles varying across cities.[14] For each vacancy posted on the same day, one application was sent alternating between the disabled and the non-disabled candidate profile.[15]

Measuring callback. Each candidate profile had a unique account in the platform with an associated email and phone number (through which employers were directed to the applicant's voicemail). Employer responses were collected via these channels. Responses were recorded as positive where an invitation to interview was received, negative where the applicant was rejected or no response was received within six weeks and ambiguous where there was, for example, a response with a request for more information. Written requests for further information and invitations to attend interviews were declined using a pre-specified template within 24 hours to minimise the impact on employers. As is standard in the literature, the outcome variable in the main analysis is the aggregate callback rate, which combines positive and ambiguous responses. However, our findings are not sensitive to instead focusing on only positive responses (see Section 3.3).

Employer and job characteristics. Aligned to evidence of the importance of corporate culture for disability-related gaps in employee outcomes (Schur *et al*., 2009) we manually recorded several employer and job characteristics based on the text of the job advertisement. Specifically, we identify whether the advert referred to equalities/equal opportunities/welcoming diversity of applicants which we refer to as pro-equality and whether there was a specific reference to disability equality, such as mentioning Disability Confident,

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[13] This avoids spillover effects (Phillips, 2019) associated with a matched design, where application documents for both disabled and non-disabled candidates are submitted for each suitable vacancy.

[14] The 16 types are formed as follows: half (8) included the offer of a reference. Within each half a further half (4) had no enhanced skills. Three of the four occupation specific skills were randomly included within the remaining half (4).

[15] In all cities on odd calendar days, the profile of a non-disabled applicant was used for the first suitable vacancy, followed by the profile of a disabled applicant for the second suitable vacancy. For the third suitable vacancy, the profile of the non-disabled applicant was used again. On even calendar days, the order was reversed.

the government accreditation scheme, mentioning being disability inclusive, or referring to reasonable accommodations being available for interview.[16] We focus on an aggregate measure of employer equality defined as the presence of any one of these four characteristics but explore the role of the separate components by way of sensitivity analysis in Section 3.3. Given the potential for different forms of taste-based discrimination, particularly from co-workers and customers we further recorded job requirements relating to (i) teamwork and (ii) contact with clients/customers. Given the recent debate about the potential for working from home to support disability-related labour market equality (Hoque and Bacon, 2022) we also recorded the potential for remote work being mentioned in the vacancy.

3. Estimating hiring discrimination

3.1 Identifying disability discrimination

Consistent with the existing literature (Bellemare *et al.,* 2023), we measure disability-related hiring discrimination as the gap in callback rates between otherwise comparable disabled and non-disabled applicants. Table 1 provides the rates of employer callback by disability separately by occupation. The overall callback rate is 34.5%. Consistent with the existing literature, we find evidence of an overall disability gap in callbacks, whereby the employer callback rate is lower for disabled applications relative to non-disabled applications. The magnitude of this gap, at 5.6 percentage points (or 15% of the non-disabled call-back rate) provides our first evidence of disability discrimination in hiring. In comparison to the existing literature for wheelchair use, albeit in different contexts, our estimates appear relatively conservative, perhaps reflecting the buoyancy of the UK labour market at that time. Disability is found to reduce the probability of call back by 26% in the US (Ameri *et al*., 2018), 48% in Norway (Bjornshagen and Ugrenunov, 2021) and 50% in Canada (Bellemare *et al.,* 2018). In a meta-analysis Lippens *et al*. (2023) find a disability gap in callbacks of 41%.

The aggregate callback rate masks considerable variation across occupations, with lower rates of callback among accountants (24.3%) than financial accounts assistant (41.0%). Moreover, there is stark occupational variation in the disability gap, with the aggregate gap driven by the gap among financial accounts assistants (9.4 percentage points (21%)). In contrast, there is no significant gap among certified accountants with the rate of callback being one percentage point higher for disabled relative to non-disabled applicants. This contrasts with US evidence from Ameri *et al*. (2018), who also consider accountants, but is consistent with previous evidence of

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[16] For details see: <u>Disability Confident employer scheme - GOV.UK (www.gov.uk)</u>

lower discrimination among more highly qualified (Ravaud *et al.*, 1992) and skilled (Bellemare *et al.,* 2018) occupations respectively.

[Table 1 here]

We more formally test these relationships by estimating the following linear probability model, where employer callback C_i to job application i is modelled as a function of disability (D_i) as follows:[17]

$$C_i = \alpha + \beta D_i + X_i \delta + \varepsilon_i \qquad (1)$$

We control for both applicant and vacancy characteristics (X_i), where applicant characteristics include the presence/absence of the reference and details of enhanced skills, and vacancy characteristics include city, occupation, month of posting, and details relating to the role/employer extracted from the text of the job advertisement such as equality, teamworking, customer/client contact, remote working and full/part-time. Descriptive statistics relating to the control variables are provided in Appendix Table A1 by occupation and disability. They reveal several interesting patterns. The number of vacancies referring to either equality or remote working is relatively low at 11.3% and 5.0% respectively. Comparisons by occupation also highlight differences in the nature of the jobs, with higher rates of teamwork required in accounting relative to financial accounts assistant occupations and higher rates of client/customer contact in vacancies for financial accounts assistants than accountants. Our interest is in β, the average disability gap in callback. A significant negative coefficient would be consistent with evidence of disability-related discrimination in hiring, that is a lower rate of callback among disabled relative to non-disabled applicants and would reflect the combined influence of taste-based and statistical discrimination.

We estimate the model for all applications, and for accountant and financial accounts assistant vacancies separately. In additional specifications, we explore heterogeneity in disability discrimination, allowing the disability coefficient to vary by vacancy characteristics by introducing interactions between disability and the relevant characteristic.[18] For example, if reference to equality within job advertisements reveals a less discriminating employer, we would expect the interaction between disability and equality to be positive and at least partially offset any negative disability gap in callbacks.

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[17] The signs and significance of the estimates are similar if instead probit models are used.
[18] Given spatial variation in the DEG, we also explored the interaction between disability and city, but found no evidence that the disability gap in callbacks varies across the UK (results available upon request).

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We present the coefficient estimates for disability in Table 2.[19] In Panel A we consider all vacancies, whist accountants are considered separately to financial accounts assistants in Panels B and C respectively. For each, we present two set of coefficients, one raw disability gap and one which adjusts for the applicant and vacancy characteristics noted above. Since the inclusion of controls has a minimal influence on our results, in the remaining specifications, we present only the adjusted estimates including the controls. Consistent with Table 1, we find evidence of a negative relationship between disability and employer callbacks (column (2)). This is aligned with the presence of disability discrimination in hiring in the UK despite it being unlawful under the Equality Act.

Turning to Panel B and Panel C which present the corresponding estimates for accountants and financial accounts assistants respectively we find the negative gap in callbacks is driven entirely by applications to financial accounts assistant roles, where the gap is 9.4 percentage points (21%). In contrast, there is no evidence of a disability-related gap in call backs for certified accountants, possibly reflecting particularly high labour demand in this occupation over the period.

[Table 2 here]

In Table 3 we present the estimates for disability and its interaction with job/employer characteristics. We find no evidence for either occupation of a significant interaction between our measure of equality and disability-related hiring discrimination (column (1)), aligned to concerns that indicators of pro-disability equality are 'empty shells' (Hoque and Noon, 2004), a dimension of 'marketing' by the company, or that such practices are ineffective in improving the hiring of disabled people.[20] In this respect, our findings align to concerns regarding the effectiveness of Disability Confident (see Hoque and Bacon, 2024).

Turning to job characteristics, the potential for remote working also has no significant impact on the disability gap in callback rate in either occupation (column (4)). While only evident in about 5% of vacancies in these occupations, and albeit our focus is exclusively on hiring, this is aligned to recent evidence which questions whether working from home is a mechanism that will address disability-related inequality (Hoque and Bacon, 2022).[21] Interestingly, for financial accounts assistants discrimination is only evident if the role involves teamwork (48% of vacancies) (column (2)), consistent with employers being concerned about co-worker

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[19] Appendix Table A2 provides a full set of coefficient estimates for Table 2, column (2).
[20] The conclusions are the same if we use alternative measures of equality characteristics (see Section 3.3).
[21] Disabled people must work from home to do 'their duty', says UK minister | Benefits | The Guardian

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discrimination and/or the impact of unobserved productivity effects emerging within teams, e.g., through disruption and/or reduced social cohesion. Finally, consistent with evidence for race (Nunley *et al*., 2015), for accountants we observe discrimination only when the role involves contact with customers/clients (about 32% of accounting vacancies) (column (3)). Here, the magnitude of discrimination is sizeable at about 7 percentage points (29%). In a similar manner to teamwork, this perhaps reflects employer concerns around perceived customer discrimination and/or damage to the company reputation, although it could also reflect anticipation of broader barriers to mobility, e.g., when travelling to clients. The results are not sensitive if instead the interaction between disability and these employer characteristics are considered simultaneously (column (5)).

[Table 3 here]

3.2. Productivity signals

In this section we explore the role of productivity signals in the form of (i) a supporting reference and (ii) enhanced education and technical skills. The corresponding callback rates for disabled and non-disabled applicants by these characteristics are presented in Table 1. The results suggest that in contrast to our expectations the disability gap in callbacks for financial accounts assistants is greater among those with enhanced skills, particularly when combined with the offer of an employer reference. In this respect, productivity signals serve to widen rather than narrow disability discrimination. We explore this further by building on equation (1) to model the interaction between disability and the respective productivity signal (P_i) as follows:

$$C_i = \alpha + \beta D_i + \gamma P_i + \theta (D_i \times P_i) + X_i \delta + \varepsilon_i \qquad (2)$$

β now measures the disability gap in callback for applications without the productivity signal P_i. The change in callback rate for non-disabled applicants due to the productivity signal is given by γ, which will be positive for signals which increase the rate of callbacks. We are interested in whether the signal has a differential impact by disability, particularly whether disabled applicants benefit disproportionately, consistent with additional information reducing the disability gap in callbacks ($\theta > 0$) aligned to addressing statistical discrimination. In a similar way to equation (1), in additional specifications we estimate the model separately by occupation. The coefficient estimates for disability, the relevant signal and its interaction are presented in Table 4. The results for all applicants and for each occupation separately are reported in columns (1)-(2), (3)-(4), and (5)-(6), respectively.

We find no evidence that the offer of a reference, our first proposed productivity signal, increases the overall callback rate for non-disabled applicants. However, the combined sample analysis masks some heterogeneities. While the offer of a reference has no impact on the callback rate for disabled and non-disabled applicants to accountant vacancies, it increases the callback rate for non-disabled applicants to financial accounts assistant roles by 5.4 percentage points (13%). We nevertheless find no significant impact of the offer of a reference on the disability hiring gaps previously observed. Our evidence is therefore not consistent with the offer of a reference providing a disproportionately informative signal for disabled applicants in shortlisting. This might reflect employers discounting the self-reported nature of the statement.

The effect of enhanced skills, as measured by the presence of additional occupation specific skills on the CV, aligns with the previous literature which finds a positive effect of enhanced skills on the hiring of non-disabled applicants, with a 6.8 percentage point (20%) increase in the probability of being hired among all workers. The combined sample analysis again masks some heterogeneities. While enhanced skills increase the callback rate of non-disabled applicants to financial accounts assistant openings by 12.6 percentage points (31%), they have no effect on callback rates of accountants. We find that enhanced skills increase the disability hiring gaps for financial accounts assistants, with enhanced skills reducing the callback rates of disabled relative to non-disabled applicants by 10.2 percentage points (28%). This appears to operate predominately through skills relating to accounting software. For financial accounts assistant vacancies it therefore appears as though employers do not value the enhanced skills of disabled applicants in nearly the same way as for non-disabled applicants. In this respect our findings mirror Bertrand and Mullainathan (2004) who find employers seem to pay less attention or discount productivity signals for non-white relative to white groups.

[Table 4 here]

3.3 Robustness tests

As discussed in Neumark (2012) and Neumark *et al*. (2016), the variance of unobservables can be a problem for identifying discrimination due to CV quality being standardized in the experiment. If the quality of the CV is set low relative to those the employer observes, then the group with lower variance of unobservables is very unlikely to have high productivity and will not be invited to interview, and vice versa. Therefore, differences in the variance in unobservables between disabled and non-disabled applicants can bias our estimates of discrimination, and in an unknown direction.

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To address this, we estimate a heteroscedastic probit model that allows us to test the hypothesis of equal variances of unobservables between disabled and non-disabled applicants and corrects for any bias which may arise from differences in the variances of unobservables (see Neumark, 2012 for details). These estimates are presented in Table 5. Panel A presents the marginal effects from the standard probit model, where the estimates for accountants and for financial accounts assistants are provided in columns (2) and (3) respectively. These results confirm our benchmark findings, with evidence of a significant disability hiring gap for financial accounts assistants. The first row of Panel B reports the disability effect from the heteroscedastic probit estimates, which are nearly identical to the probit estimates presented above. We then report results from two diagnostic tests. First, we report the p-values from the overidentification test that the ratios of the skill coefficients between disabled and non-disabled applicants are equal across skills. The p-values are all high, showing that we can never reject the overidentification restrictions.[22] Second, we report the ratio of the standard deviations of the unobservables for disabled relative to non-disabled applicants and the p-value for the test whether the ratio equals one. The latter are universally high meaning we cannot reject equality of the variances of unobservables. In the final rows, we decompose the heteroskedastic probit estimates into the "Disability-level" effect, which is the unbiased estimate of the effect of disability on callback rates, and the "Disability-variance" effect which is the spurious effect introduced by the experimental design. For accountants, both effects are insignificantly different from zero, consistent with the absence of discrimination. For financial accounts assistants, there is a significant unbiased estimate of disability reducing callbacks of -11.5 percentage points, and there is no evidence of a significant effect of the variance on the callbacks. Overall, therefore, the results confirm our original estimates are not significantly biased by variation in the influence of unobservables.

[Table 5 here]

We further explore the impact of a series of changes in specification and measurement in Appendix Tables A3-A6. First, we test how our results differ if we cluster the standard errors at different levels. We compare clustering at the job title, applicant, and city levels. Results are reported in Appendix Table A3, but this makes little difference to our results. Second, we test how the results differ if we disaggregate callbacks into positive and ambiguous responses and compare the probability of each to a negative response. We report these results in Appendix

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[22] As can be seen in Table 4, there is a significant difference in the effect of accounting software skills for disabled and non-disabled applicants for financial accounts assistants. Including this skill in the model will result in the overidentification test to fail, so we have excluded it from the analysis.

Table A4. We find that the disability hiring gap is driven by a lower probability of positive (rather than ambiguous) responses consistent with the presence hiring discrimination.

Fourth, we test whether dropping applications and responses which violate our protocol due to research assistant error impacts the results. Less than 1% of applications were sent to the same firm in the same city, and 3% of responses were recorded as positive or ambiguous despite being received after 6 weeks. Appendix Table A5 shows that the results are unaffected by excluding these observations.

Finally, we examine whether our findings are sensitive to the precise measurement of employer equality characteristics. We disaggregate our overall measure of equality used in the baseline estimates into its four component parts and separately estimate the effect of the employer stating they are part of Disability Confident, mentioning disability inclusive, disability accessible and more general reference to being a pro-equal opportunities employer. We report the results in Appendix Table A6 but again our findings are robust.

4. Conclusion

Using a large-scale correspondence study in the UK, we test for the presence of hiring discrimination against disabled job seekers who use a wheelchair within two finance-related occupations. We extend the literature by exploring the extent to which gaps in employer callback rates can be addressed by introducing productivity signals within the application and therefore are likely to reflect statistical, as opposed to taste-based, discrimination.

Based on more than 4,000 applications we find evidence that applicants using a wheelchair have a 5.6 percentage points (15%) lower callback rate than otherwise comparable non-disabled job seekers. Despite nearly 30 years of equality legislation, this suggests that disability-related discrimination in hiring contributes to the sizeable and persistent DEG in the UK. In contrast with the prior literature, however, we find substantial occupational variation, with no evidence of disability-related discrimination against certified accountants. Our analysis of additional productivity signals suggests they are ineffective in addressing disability-related hiring discrimination. Neither the inclusion of the offer of a supporting reference from a previous employer nor enhanced occupation specific technical skills within the application narrow the disability gap in callbacks. To the extent that our signals relate to the dimensions on which statistical discrimination occurs our evidence suggests that disability-related discrimination in the UK is predominately taste-based.

In this respect, our findings are consistent with recent evidence of the ineffectiveness of video resumes for addressing disability discrimination in Canada (Bellemare *et al.,* 2023) and previous evidence of the detrimental impact of quality signals on racial gaps in callbacks in the US (Bertrand and Mullainathan 2004; Nunley *et al.* 2015). It also suggests disability hiring gaps are unlikely to be addressed through proactive steps undertaken by disabled employees in terms of enhancements in training and certification. We further find evidence that the nature of the job matters, with greater discrimination where teamwork (financial accounts assistants) and customer/client contact (accountants) is required, again consistent with the theories of taste-based discrimination. Despite recent policy attention, we also find that disabled applicants are no more likely to be interviewed for roles advertising remote working. We further find that equality statements with the job advert provide an uninformative signal, aligned to existing concern over the effectiveness of such practices (Hoque and Noon, 2004) and employer equality certification (Hoque and Bacon, 2024). In combination, our evidence points to the lack of effectiveness of a range of mechanisms which might be expected to mitigate disability-related discrimination in hiring. Alongside existing evidence of the ineffectiveness of video resumes (Bellemare *et al.,* 2023) and external mechanisms such as wage/hiring subsidies (Baert, 2016; Bellemare *et al.,* 2018) the evidence emphasises the challenge for policy in reducing disability-related discrimination.

Despite the advantages of correspondence studies in terms of identifying and quantifying hiring discrimination and exploring potential mechanisms to overcome this it inevitably comes at a cost of generalisability. Our findings relate to males with a specific mobility impairment, vacancies in two occupations and a period of high labour demand in the UK. Future research is therefore required to assess the extent to which they generalise across gender, disability types, occupations, countries with different institutional settings and, over time.

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Table 1. Employer callback rates by disability and occupation

	All		Accountants		Financial accounts assistants	
	N	%	N	%	N	%
All	4,004	34.54	1,545	24.27	2,459	40.99
No reference; no enhanced skills	942	32.06	396	27.53	546	35.35
Reference; no enhanced skill	1,073	33.01	397	22.53	676	39.75
No reference; enhanced skill	930	35.14	364	21.91	566	42.90
Reference; enhanced skill	1,059	37.49	388	25.00	671	44.71
Disabled	2,030	31.77	797	24.72	1,233	36.33
No reference; no enhanced skills	482	30.08	210	25.71	272	33.46
Reference; no enhanced skill	473	32.98	186	24.19	287	38.68
No reference; enhanced skill	515	32.62	208	24.62	307	38.11
Reference; enhanced skill	560	31.43	193	24.35	367	35.15
Non-disabled	1,974	37.39	748	23.80	1,226	45.68
No reference; no enhanced skills	460	34.13	186	29.57	274	37.23
Reference; no enhanced skill	457	33.04	178	20.79	279	40.86
No reference; enhanced skill	558	37.46	189	19.05	369	46.88
Reference; enhanced skill	499	44.29	195	25.64	304	56.25
Disability gap	-	5.62***	-	-0.92	-	9.35***
No reference; no enhanced skills	-	4.05	-	3.86	-	3.77
Reference; no enhanced skill	-	0.04	-	-3.41	-	2.18
No reference; enhanced skill	-	4.83	-	-5.47	-	8.77*
Reference; enhanced skill	-	12.86***	-	1.29	-	21.10***

Notes: (i) *p < 0.05, **p < 0.01, ***p < 0.001 relate to the significance of the disability gap.

Table 2. Disability gaps in employer callback, by occupation

	Panel A: All	
	(1)	(2)
Disability	-0.056*	-0.058***
	(0.027)	(0.016)
Controls	No	Yes
Adj R^2	0.004	0.064
N	4,004	4,004
	Panel B: Accountants	
Disability	0.009	-0.004
	(0.022)	(0.020)
Controls	No	Yes
Adj R^2	0.001	0.062
N	1,545	1,545
	Panel C: Financial accounts assistant	
Disability	-0.093***	-0.094***
	(0.024)	(0.019)
Controls	No	Yes
Adj R^2	0.009	0.065
N	2,459	2,459

Notes: (i) Estimates based on a linear probability model specified in equation 1. (ii) Controls include applicant (offer of reference, enhanced skills) and job characteristics (occupation, part-time, equality, teamwork, client/customer contact and remote working) and city and month fixed effects. (iii) Standard errors clustered at the level of applicant profile in parenthesis. (iv) *p < 0.05, **p < 0.01, ***p < 0.001.

Table 3. Disability gaps in employer callback, by employer characteristics and occupation

	(1)	(2)	(3)	(4)	(5)
Panel A: All					
Disability	-0.059**	-0.032	-0.031	-0.060***	-0.014
	(0.017)	(0.023)	(0.021)	(0.017)	(0.025)
Employer characteristics					
Equality	0.005	0.009	0.010	0.008	0.003
	(0.032)	(0.023)	(0.023)	(0.023)	(0.032)
Teamwork	-0.037	-0.015	-0.036	-0.037	-0.017
	(0.021)	(0.022)	(0.021)	(0.021)	(0.023)
Client/customers	-0.007	-0.007	0.024	-0.007	0.022
	(0.015)	(0.015)	(0.022)	(0.015)	(0.022)
Remote work	0.054	0.055	0.055	0.032	0.030
	(0.039)	(0.040)	(0.040)	(0.054)	(0.054)
Disability x equality	0.007	-	-	-	0.011
	(0.045)				(0.045)
Disability x teamwork	-	-0.042	-	-	-0.037
		(0.033)			(0.034)
Disability x client/customers	-	-	-0.061*	-	-0.057*
			(0.026)		(0.027)
Disability x remote work	-	-	-	0.042	0.046
				(0.074)	(0.076)
Adj R²	0.064	0.065	0.065	0.064	0.066
N	4,004	4,004	4,004	4,004	4,004
Panel B: Accountants					
Disability	-0.001	-0.026	0.030	0.002	0.008
	(0.023)	(0.053)	(0.022)	(0.024)	(0.053)
Employer characteristics					
Equality	0.044	0.033	0.035	0.033	0.049
	(0.047)	(0.037)	(0.038)	(0.037)	(0.052)
Teamwork	-0.008	-0.022	-0.008	-0.006	-0.025
	(0.050)	(0.051)	(0.051)	(0.050)	(0.052)
Client/customers	0.004	0.004	0.057	0.004	0.059
	(0.022)	(0.022)	(0.030)	(0.022)	(0.032)

	(1)	(2)	(3)	(4)	(5)
Remote work	0.089	0.088	0.091	0.151	0.146
	(0.060)	(0.061)	(0.060)	(0.085)	(0.090)
Disability x equality	-0.020	-	-	-	-0.023
	(0.065)				(0.068)
Disability x teamwork	-	0.028	-	-	0.037
		(0.060)			(0.063)
Disability x client/customers	-	-	-0.104*		-0.108*
			(0.041)	-	(0.043)
Disability x remote work	-	-	-	-0.100	-0.092
				(0.107)	(0.110)
Adj R²	0.062	0.062	0.065	0.062	0.066
N	1,545	1,545	1,545	1,545	1,545
	Panel C: Financial accounts assistant				
Disability	-0.094***	-0.031	-0.083**	-0.100***	-0.042
	(0.020)	(0.025)	(0.026)	(0.019)	(0.028)
Employer characteristics					
Equality	-0.001	0.005	0.003	0.000	-0.009
	(0.046)	(0.030)	(0.030)	(0.030)	(0.046)
Teamwork	-0.020	0.046	-0.020	-0.019	0.052*
	(0.026)	(0.023)	(0.026)	(0.026)	(0.023)
Client/customers	-0.025	-0.024	-0.015	-0.025	-0.029
	(0.020)	(0.020)	(0.028)	(0.020)	(0.028)
Remote work	0.034	0.032	0.034	-0.032	-0.045
	(0.053)	(0.053)	(0.053)	(0.064)	(0.063)
Disability x equality	0.006	-	-	-	0.021
	(0.064)				(0.064)
Disability x teamwork	-	-0.131**	-	-	-0.140**
		(0.040)			(0.042)
Disability x client/customers	-	-	-0.020	-	0.010
			(0.031)		(0.033)
Disability x remote work	-	-	-	0.136	0.158
				(0.100)	(0.104)
Adj R²	0.065	0.069	0.065	0.066	0.071
N	2,459	2,459	2,459	2,459	2,459

Notes: (i) Estimates based on a linear probability model. (ii) All models include controls for applicant (offer of reference, enhanced skills) and other job characteristics

(occupation, part-time) and city and month fixed effects. (iii) Standard errors clustered at the level of applicant profile in parenthesis. (iv) *p < 0.05, **p < 0.01, ***p < 0.001.

Table 4. The influence of productivity signals on disability gaps in employer callback, by occupation

		All		Accountants		Financial accounts assistant	
		(1)	(2)	(3)	(4)	(5)	(6)
Disability		-0.012	-0.011	-0.021	-0.024	-0.016	-0.013
		(0.028)	(0.027)	(0.033)	(0.032)	(0.030)	(0.029)
	Reference	0.030	0.030	0.005	0.004	0.054*	0.056*
		(0.025)	(0.025)	(0.031)	(0.029)	(0.022)	(0.021)
	Enhanced skill	0.068**	-	-0.043	-	0.126***	-
		(0.024)		(0.029)		(0.021)	
	Disability x reference	-0.025	-0.026	0.003	0.008	-0.044	-0.049
		(0.031)	(0.030)	(0.040)	(0.035)	(0.032)	(0.028)
	Disability x enhanced skill	-0.063*	-	0.033	-	-0.102**	-
		(0.030)		(0.040)		(0.031)	
Enhanced skills							
	Education	-	0.023	-	-0.050*	-	0.059
			(0.029)		(0.023)		(0.034)
	SQL & Excel	-	0.019	-	0.021	-	0.010
			(0.037)		(0.036)		(0.023)
	Accounting software	-	0.021	-	-0.022	-	0.050*
			(0.031)		(0.035)		(0.022)
	Advanced certificate	-	0.028	-	-0.001	-	0.047
			(0.036)		(0.024)		(0.032)
	Disability x education	-	-0.027	-	0.010	-	-0.048
			(0.034)		(0.029)		(0.035)
	Disability x SQL & Excel	-	0.022	-	0.055	-	0.014
			(0.039)		(0.044)		(0.027)
	Disability x accounting software	-	-0.080*	-	-0.045	-	-0.098***
			(0.034)		(0.044)		(0.026)
	Disability x advanced certificate	-	0.005	-	0.024	-	0.003
			(0.039)		(0.036)		(0.040)
Adj R^2		0.066	0.067	0.062	0.067	0.068	0.070
N		4,004	4,004	1,545	1,545	2,459	2,459

Notes: (i) Estimates based on a linear probability model specified in equation 2. (ii) All models include controls for job characteristics (occupation, part-time, equality, teamwork,

client/customer contact and remote working) and, city and month fixed effects. (iii) Standard errors clustered at the level of applicant profile in parenthesis. (iv) *p < 0.05, **p < 0.01, ***p < 0.001.

Table 5. Heteroskedastic probit estimates for employer callbacks by disability status

	All	Accountant	Financial accounts assistant
	(1)	(2)	(3)
Panel A. Probit estimates			
Disability	0.058***	0.000	-0.093***
	(0.014)	(0.018)	(0.019)
Panel B. Heteroskedastic probit estimates			
Disability	-0.059***	-0.002	-0.092***
	(0.014)	(0.019)	(0.019)
Overidentification test: equal ratios of coefficients on skills for disabled relative to non-disabled (p-value)	0.176	0.792	0.409
Ratio of standard deviation of unobservables (disabled relative to non-disabled)	1.067	0.876	1.271
Test: ratio of standard deviations=1 (p-value)	0.779	0.488	0.609
Disability -level	-0.069*	0.028	-0.115**
	(0.034)	(0.044)	(0.043)
Disability -variance	0.010	-0.030	0.023
	(0.034)	(0.045)	(0.043)
N	4,004	1,545	2,459

Notes: See Neumark (2012) and Neumark *et al*. (2016) for details of the heteroskedastic probit and its implementation. (i) In column (3), the accounting software enhanced skill is dropped because its inclusion causes the overidentification test to fail. Results are robust to its inclusion. (ii) *p < 0.05, **p < 0.01, ***p < 0.001.

Online Appendix: Productivity Signals and Disability-related Hiring Discrimination: Evidence from a Field Experiment

Appendix A: Additional Tables of Results

Table A1. Sample means for explanatory variables by occupation and disability

%	All			Accountant			Financial accounts assistant		
	All	Disabled	Non-disabled	All	Disabled	Non-disabled	All	Disabled	Non-disabled
Disabled	50.7	-	-	51.6	-	-	50.1	-	-
City									
London	49.2	48.5	49.8	65.8	63.7	68.1	38.7	38.7	38.7
Cardiff	8.3	8.9	7.8	6.0	6.8	5.2	9.9	10.2	9.4
Edinburgh	5.6	5.6	5.7	3.5	3.6	3.3	7.0	6.9	7.1
Manchester	22.5	22.9	22.1	15.7	16.3	15.0	26.8	27.1	26.4
Birmingham	14.4	14.1	14.6	9.0	9.5	8.4	17.7	17.0	18.4
Accountant	38.6	39.3	37.9	-	-	-	-	-	-
Financial accounts assistant	61.4	60.7	62.1	-	-	-	-	-	-
Reference	49.7	50.1	48.4	48.7	47.6	49.9	50.3	53.0	47.6
Enhanced skills	53.3	53.0	53.6	50.8	50.3	51.3	54.8	54.7	54.9
Education	42.8	42.7	43.0	40.2	40.3	40.1	44.5	44.3	44.7
SQL & Excel	38.8	38.9	38.6	37.5	38.3	36.6	39.6	39.3	39.8
Accounting software	39.5	40.3	38.7	37.86	38.3	37.44	40.5	41.6	39.4
Advanced certificate	38.7	37.0	40.4	36.9	34.1	39.8	39.7	38.8	40.8
Full-time	79.2	79.1	79.2	89.3	89.5	89.0	72.8	72.3	73.3
Equality	11.3	12.3	10.2	15.3	15.1	11.9	9.8	10.5	9.1
Teamwork	61.4	61.9	60.9	83.2	83.2	83.3	47.7	48.2	47.3
Client/customer contact	44.2	44.2	44.2	32.4	31.9	33.0	51.6	52.2	51.0
Remote work	5.0	5.4	4.7	5.4	6.5	4.3	4.8	4.6	5.0
N	4,004	2,030	1,974	1,545	797	748	2,459	1,233	1,226

Table A2. Identifying disability-related discrimination, full set of coefficient estimates

	All	Accountants	Financial accounts assistants
	(1)	(2)	(3)
Disabled	-0.058***	-0.004	-0.094***
	(0.016)	(0.020)	(0.019)
Enhanced skills	0.036*	-0.026	0.074***
	(0.016)	(0.020)	(0.019)
Reference	0.016	0.006	0.030
	(0.016)	(0.021)	(0.019)
Accountant	-0.114***	-	-
	(0.020)		
Birmingham	-0.035	-0.118*	-0.012
	(0.029)	(0.046)	(0.036)
Cardiff	-0.014	0.072	-0.029
	(0.033)	(0.045)	(0.038)
Edinburgh	-0.100**	-0.090	-0.070
	(0.033)	(0.075)	(0.035)
London	-0.166***	-0.213***	-0.134***
	(0.024)	(0.041)	(0.033)
February	0.012	0.006	0.006
	(0.023)	(0.045)	(0.025)
March	-0.008	-0.006	-0.015
	(0.026)	(0.042)	(0.033)
April	-0.058*	-0.086*	-0.034
	(0.027)	(0.036)	(0.036)
May	0.017	-0.026	0.044
	(0.028)	(0.047)	(0.035)
June	-0.067	-0.027	-0.089
	(0.034)	(0.047)	(0.048)
July	-0.000	-0.032	0.026
	(0.029)	(0.039)	(0.041)
October	0.098	0.065	0.120
	(0.060)	(0.072)	(0.095)
November	-0.017	0.013	-0.054
	(0.032)	(0.054)	(0.039)
December	0.011	0.054	-0.007
	(0.039)	(0.050)	(0.052)
Remote work	0.055	0.090	0.035
	(0.039)	(0.060)	(0.053)
Equality	0.004	0.040	-0.026
	(0.029)	(0.040)	(0.046)
Part-time	-0.006	-0.042	0.025
	(0.023)	(0.037)	(0.028)
Teamwork	-0.036	-0.006	-0.019
	(0.021)	(0.050)	(0.026)
Client/customer contact	-0.007	0.003	-0.025
	(0.015)	(0.022)	(0.020)
Bookkeeper	-	-	0.151***
			(0.020)

Credit controller	-	-	-0.069
			(0.057)
Adj R^2	0.064	0.062	0.065
N	4,004	1,545	2,459

Notes: (i) Estimates based on a linear probability model specified in equation 1. (ii) Standard errors clustered at the level of applicant profile in parenthesis. (iii) *$p < 0.05$, **$p < 0.01$, ***$p < 0.001$.

Table A3. Disability gaps in employer callback, by occupation, robustness to alternative clustering of standard errors

	Cluster by job title (1)	Cluster by applicant (2)	Cluster by city (3)
Panel A. All			
Disabled	-0.058***	-0.058***	-0.058**
	(0.017)	(0.016)	(0.011)
No of clusters	965	64	5
N	4,004	4,004	4,004
Panel B. Accountants			
Disabled	-0.004	-0.004	-0.004
	(0.016)	(0.020)	(0.010)
No of clusters	312	32	5
N	1,545	1,545	1,545
Panel C. Financial accounts assistants			
Disabled	-0.094***	-0.094***	-0.094***
	(0.020)	(0.019)	(0.010)
No of clusters	684	32	5
N	2,459	2,459	2,459

Notes: (i) Job titles are those in the job advert. (ii) Controls include applicant (offer of reference, skill vector) and job characteristics (occupation, part-time, equality, teamwork, client/customer contact and remote working) and city and month fixed effects. (iii) *p < 0.05, **p < 0.01, ***p < 0.001.

Table A4. Disability gaps in employer callback, by occupation for different response types

	Ambiguous responses (1)	Positive responses (2)
Panel A. All		
Disabled	0.015	-0.074**
	(0.012)	(0.018)
Adj R^2	0.055	0.057
N	3,352	3,273
Panel B. Accountants		
Disabled	0.003	0.001
	(0.013)	(0.016)
Adj R^2	0.012	0.095
N	1,324	1,391
Panel C. Financial accounts assistants		
Disabled	-0.024	-0.102***
	(0.018)	(0.016)
Adj R^2	0.083	0.052
N	2,028	1,882

Notes: (i) An ambiguous response is a request for more information about the applicant without asking the individual to attend an interview. A positive response is an invitation to an interview. A negative response is a lack of callback or a callback informing the individual they will not be offered an interview. Of the 1,383 callbacks, 53% were ambiguous and 47% positive. (ii) We compare ambiguous responses to negative responses in column (1), and positive responses to negative responses in column (2). (iii) Controls include applicant (offer of reference, enhanced skills) and job characteristics (occupation, part-time, equality, teamwork, client/customer contact and remote working) and city and month fixed effects. (iv) Standard errors clustered at the level of applicant profile in parenthesis. (v) *$p < 0.05$, **$p < 0.01$, ***$p < 0.001$.

Table A5. Disability gaps in employer callback, by occupation, removing protocol violations

	Removing duplicate applications (1)	Remove late callbacks (2)	Remove all violations (3)
Panel A. All			
Disabled	-0.058***	-0.056***	-0.057***
	(0.016)	(0.017)	(0.017)
Violations	39	19	53
Adj R^2	0.065	0.064	0.065
N	3,965	3,985	3,951
Panel B. Accountants			
Disabled	-0.004	-0.001	-0.001
	(0.020)	(0.020)	(0.020)
Violations	16	7	31
Adj R^2	0.061	0.062	0.061
N	1,529	1,538	1,516
Panel C. Financial accounts assistants			
Disabled	-0.094***	-0.094***	-0.093***
	(0.019)	(0.020)	(0.020)
Violations	23	12	32
Adj R^2	0.065	0.065	0.065
N	2,426	2,447	2,427

Notes: (i) Column (1) drops the second application sent to the same company in the same city. Column (2) drops all callbacks recorded as being received after 6 weeks (even in cases of research assistants transcribing dates incorrectly by switching days and months). Column (3) drops both types of errors. (ii) Controls include applicant (offer of reference, enhanced skills) and job characteristics (occupation, part-time, equality, teamwork, client/customer contact and remote working) and city and month fixed effects. (iii) Standard errors clustered at the level of applicant profile in parenthesis. (iv) *p < 0.05, **p < 0.01, ***p < 0.001.

Table A6. Disability gaps in employer callback, by occupation, and equality characteristics

	All				
	(1)	(2)	(3)	(4)	(5)
Disabled	-0.059***	-0.058***	-0.058***	-0.057***	-0.057***
	(0.016)	(0.017)	(0.017)	(0.017)	(0.017)
Disabled x Disability Confident	0.063	-	-	-	0.205
	(0.098				(0.120)
Disabled x disability inclusive	-	0.000	-	-	0.003
		(0.059)			(0.075)
Disabled x disability accessible	-	-	-0.088	-	-0.144
			(0.148)		(0.168)
Disabled x pro-equality	-	-	-	-0.009	-0.017
				(0.046)	(0.057)
Adj R²	0.065	0.065	0.065	0.064	0.066
N	4,004	4,004	4,004	4,004	4,004

Notes: (i) There is a low prevalence of several of the equality characteristics (e.g. Disability Confident and disability accessibility). Therefore, we do not estimate these models at the occupation-level. (ii) See text for definitions of equality characteristics. (iii) Controls include applicant (offer of reference, enhanced skills) and job characteristics (occupation, part-time, the relevant equality characteristic, teamwork, client/customer contact and remote working) and city and month fixed effects. (iv) Standard errors clustered at the level of applicant profile in parenthesis. (v) *p < 0.05, **p < 0.01, ***p < 0.001.

Appendix B: Example CVs and cover letters

B1. Accountant (disabled, reference and enhanced skills, London)

Dear Hiring Manager,

I am responding to the advertised position you posted on [name of the hiring platform]. I graduated from the Queen Mary University of London[1] with a B.Sc. Accounting and Finance in 2016, and obtained my ACCA accreditation in 2020.

Presently, I am a management accountant at [city-specific company]. In my role as a management accountant, I prepare annual budgets, cashflow forecasts, periodic financial reports and budget variance analyses for use by internal and external stakeholders. Part of my duties include creating statutory accounts and annual audits in line with IFRS, FRS 102 and UK GAAP. I have also supported the continuous improvements to accounting and reporting processes, staying up to date with industry best practices.

With over five years of experience working as an accountant, I am positioned to exceed in this role and substantially benefit your organisation. I'm eager for the opportunity to share more examples of my work and discuss how my talents can be used to benefit your organisation.

I hope you will consider my application. If invited to attend an interview in person, I would like your reassurance that your building will be accessible to my needs since I use a wheelchair.

I have letters of reference available from previous line managers, who can vouch for my past performance and productivity in my previous roles, my transferable skills, and the added value I create for the companies I work in.

I look forward to hearing from you so that we can discuss my skills and experience in more detail.

Sincerely,

Thomas Smith

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[1] Cardiff University for Cardiff applications, University of Edinburgh for Edinburgh applications, University of Birmingham for Birmingham applications, University of Manchester for Manchester applications.

Thomas Smith[2]

[email]   **[phone number]**

Experience

MANAGEMENT ACCOUNTANT | [city-specific company]| AUGUST 2020 to PRESENT

- I prepare annual budgets, cashflow forecasts, periodic financial reports and budget variance analyses for use by internal and external stakeholders.
- I support the production of Management Accounts, as well as assist with preparing and submitting VAT returns.
- I prepare statutory accounts and annual audits in line with IFRS, FRS 102 and UK GAAP. This includes consolidated sets of accounts.
- I support the continuous improvements to accounting and reporting processes, staying up to date with industry best practices.

JUNIOR MANAGEMENT ACCOUNTANT | [city-specific company]| SEPTEMBER 2019 TO AUGUST 2020

- I assisted in the preparation of month-end and year-end management and financial accounts.
- I processed invoices and prepared and processed payments. I also was required to regularly reconcile balance sheets.
- I helped senior accountants with budgeting and forecasting, business analysis and other ad hoc duties as required.

TRAINEE ACCOUNTANT | [city-specific company] | JULY 2016 TO SEPTEMBER 2019

- As a trainee accountant, I gained hands-on experience in a wide range of tasks.
- I worked with limited companies to help prepare and settle annual accounts, manage quarterly VAT returns and complete payroll and PAYE submissions.
- I assisted with self-assessment and personal tax returns.
- I assisted in the completion of HMRC submissions, communications and compliance on the client's behalf.

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[2] The enhanced productivity signals are underlined here (but not in the original application) for clarity. For this specific CV "Advanced knowledge of data analytics (received an ACCA Certificate in Data Analytics in July 2021)" skill is missing by design. Please consult the experimental design section of the manuscript for further details. For CVs without productivity signals the underlined skills are missing.

Education
BSC ACCOUNTING AND FINANCE <u>(FIRST CLASS)</u> | JULY 2016 | QUEEN MARY UNIVERSITY OF LONDON

ACCA QUALIFIED CHARTERED ACCOUNTANT | JULY 2020

Skills & Abilities

- <u>Proficient in a wide range of accountancy software programs, including Oracle, Sage, QuickBooks, Fidelio, and IRIS</u>
- <u>Expert in Microsoft Excel and SQL</u>

- Strong attention to detail
- Good communication and presentation skills

B2. Financial Accountants Assistant (disabled, reference and enhanced skills, London)

Dear Hiring Manager,

I am responding to the advertised position you posted on [name of the hiring platform]. Presently, I am a financial accounts assistant at [city-specific company]. In my role as a financial accounts assistant, I am responsible for the management of the accounts inbox. I process supplier invoices, checked supplier statements and requested copies invoices as required. I also manage the purchase order system, ensuring that all purchase orders and invoices were accounted for. With over five years of experience working as a financial accounts assistant, I am positioned to exceed in this role and substantially benefit your organisation. I'm eager for the opportunity to share more examples of my work and discuss how my talents can be used to benefit your organisation.

I hope you will consider my application. If invited to attend an interview in person, I would like your reassurance that your building will be accessible to my needs since I use a wheelchair.

I have letters of reference available from previous line managers, who can vouch for my past performance and productivity in my previous roles, my transferable skills, and the added value I create for the companies I work in.

I look forward to hearing from you so that we can discuss my skills and experience in more detail.

Sincerely,

Thomas Smith

Thomas Smith[3]

[email]   [phone number]

Experience

FINANCIAL ACCOUNTS ASSISTANT | [city-specific company] | AUGUST 2020 TO PRESENT

- I am responsible for the management of the accounts inbox. I process supplier invoices, check supplier statements and request copies invoices as required.
- I manage the purchase order system, ensuring that all purchase orders and invoices are accounted for. I identify, investigate and resolve any discrepancies.
- I am responsible for credit control, chasing customer payments, sending out statements, and handling all queries.
- I assist in the continuous improvement to reporting processes, staying up to date with industry best practices.

ACCOUNTS ASSISTANT | [city-specific company] | SEPTEMBER 2019 to AUGUST 2020

- I handled all the entering of all invoices and payments into the system (SAP Business One), as well as managed the reconciliation of all bank accounts and company credit cards.
- I prepared weekly reports for review by Account Managers and Head of Account Management, managing the automated reporting systems and working closely with Account Managers to resolve invoicing queries. I also assisted with ad-hoc reporting as required.
- I analysed payroll and helped with project accounting analyses.

TRAINEE ACCOUNT HANDLER | [city-specific company] | JULY 2016 to SEPTEMBER 2019

- I was responsible for data entry, credit control and resolving queries as appropriate with the support technicians.
- I processed date on relevant systems to support the client service team and facilitate analyses and reporting.
- I served as the liaison for clients and worked to handle their queries and develop a plan to support their demands and needs. This allowed me to build strong relationships with stakeholders and ensure that service delivery met expectations.

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[3] The productivity signals are underlined here (but not in the original application) for clarity. For this specific CV "Advanced knowledge of financial reporting (received an ACCA Diploma in International Financial Reporting in July 2020)" skill is missing by design. Please consult the experimental design section of the manuscript for further details. For CVs without productivity signals the underlined skills are missing.

Education
<u>BSC ACCOUNTING AND FINANCE | JULY 2016 | QUEEN MARY UNIVERSITY OF LONDON</u>

Skills & Abilities
- <u>Advanced knowledge of Excel</u>
- <u>Proficient in various accounting software packages including QuickBooks Plus and Xero.</u>

- Strong attention to detail
- Good communication and presentation skills

Education