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Research Report

Immigrants' recruitment chances in the German labor market: Evidence from large-scale survey experiments

IAB-Forschungsbericht, No. 6/2025

Provided in Cooperation with:

Institute for Employment Research (IAB)

Suggested Citation: Jaschke, Philipp et al. (2025) : Immigrants' recruitment chances in the German labor market: Evidence from large-scale survey experiments, IAB-Forschungsbericht, No. 6/2025, Institut für Arbeitsmarkt- und Berufsforschung (IAB), Nürnberg, <https://doi.org/10.48720/IAB.FB.2506>

This Version is available at:

<https://hdl.handle.net/10419/315981>

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Results from the project work of the IAB

6|2025 Immigrants' recruitment chances in the German labor market: Evidence from large-scale survey experiments

Philipp Jaschke, Yuliya Kosyakova, Daniel Auer, Christian Hunkler, Zerrin Salikutluk, Maximilian Sprengholz, Alexander Kubis

Gefördert vom:



Bundesministerium
für Familie, Senioren, Frauen
und Jugend

ISSN 2195-2655

Immigrants' recruitment chances in the German labor market: Evidence from large-scale survey experiments

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In der Reihe IAB-Forschungsberichte werden empirische Analysen und Projektberichte größeren Umfangs, vielfach mit stark daten- und methodenbezogenen Inhalten, publiziert.

The IAB Research Reports (IAB-Forschungsberichte) series publishes larger-scale empirical analyses and project reports, often with heavily data- and method-related content.

In brief

- We study the hiring chances of fictitious applicants in almost 5,000 firms in Germany by using a vignette experiment to randomly vary applicants' origin countries and religious affiliations, keeping other characteristics constant.
- Our results show pronounced discrimination against Muslim applicants that is driven by small firms, firms operating in the primary and secondary sector, and those not hiring from abroad.
- Anti-Muslim discrimination is also confirmed by a list experiment that we conducted in parallel.
- Human capital investments increase recruitment chances, e.g., German language skills and professional experiences, especially if acquired in Germany.
- Labor shortages only increase hiring chances for advantaged groups (German and male applicants) but not for applicants born abroad and females.
- Our results suggest political action could improve the recruitment chances of applicants born abroad, by providing greater availability and easier access to language courses.
- Moreover, anti-discrimination measures and educational campaigns in companies could support the German government's strategy to recruit workers from outside Europe to alleviate domestic labor shortages.

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Summary

Members of certain minority groups are disadvantaged in different areas of society, such as the labor and housing market and the healthcare system. This is referred to as discrimination if people are disadvantaged solely based on their group membership (e.g., ethnic background or religious affiliation), even though the objective matching criteria are equal, e.g., regarding qualifications. In this research report, we analyze the recruitment chances of immigrants and members of religious minorities using a vignette experiment. For this purpose, we recontacted around 10,000 firms that had already taken part in the large-scale and representative IAB Job-Vacancy-Survey 1.5 years ago. Consequently, the follow-up survey as part of our study was very brief, requiring little additional effort by firms, as extensive information on a wide range of relevant information was already collected from their previous participation. This may explain the high response rate to our experiment of almost 50 percent. The analyses in this report are based on the responses of 4,883 firms. Vignette experiments are particularly suited to causally study determinants of hiring prospects because by collecting employers' assessment on sufficiently many vignettes (with randomized applicants' characteristics), they provide a controlled setting to account for all relevant applicant characteristics. Even though vignettes describe fictitious situations, experiment results have been shown to provide high congruence with real decision-making. We provided firms with descriptions of fictitious job applicants, randomly varying, among other traits (such as job experience, language proficiency), origin countries (Syria, Turkey, Ukraine, Russia with "is German" as baseline) and religious affiliation (Christian and Muslim compared to a baseline without religious signal). Holding qualifications constant, on average, we do not find lower hiring probabilities for applicants born abroad compared to German applicants. However, our results provide strong evidence of anti-Muslim labor market discrimination in Germany. This effect is driven by applicants from predominantly Muslim countries (Syria and Turkey in our case), which confirms previous results in the literature according to which discrimination against Muslims originating from countries that are generally perceived as more authoritarian and gender unequal is stronger. This is alarming given that – unlike in our vignette experiment – people in Germany born abroad are much more often Muslim than German-born people (almost a quarter compared to less than 2 percent). Looking at further applicants' characteristics, we find strong evidence in favor of the so-called 'motherhood penalty', according to which females are hired less frequently than males if they have children. Moreover, human capital can, at least partially, alleviate foreign applicants' hiring disadvantages: Applicants born abroad benefit from higher levels of German language skills and from professional experience – particularly if obtained in Germany. Regarding firm characteristics, small firms, firms operating in the primary and secondary sector, and firms that do not hire internationally discriminate more. Most relevant for policy, firms facing labor shortages only increase hiring chances for advantaged applicant groups (German applicants and males) but not for disadvantaged groups. These results suggest that firms in Germany do not consider recruiting from traditionally disadvantaged groups – even if equally qualified – as a way to overcome often lamented labor shortages. A list experiment conducted with firms in parallel cross-validates that a significant proportion of firms in Germany discriminate against refugees and Muslims. Taken together, our results provide multiple avenues for policy action.

Zusammenfassung

Minderheiten werden in verschiedenen Gesellschaftsbereichen benachteiligt, etwa auf dem Arbeits- und Wohnungsmarkt und im Gesundheitssystem. Von Diskriminierung spricht man, wenn Menschen lediglich aufgrund ihrer Gruppenzugehörigkeit (z. B. aufgrund ihrer ethnischen Herkunft oder ihrer Religionszugehörigkeit) benachteiligt werden, obwohl sie mit Blick auf objektive (auf dem Arbeitsmarkt produktivitätsrelevante) Kriterien, z. B. hinsichtlich der Qualifikationen, gleich sind. In diesem Forschungsbericht analysieren wir die Einstellungschancen von im Ausland geborenen Bewerberinnen und Bewerbern sowie von Angehörigen religiöser Minderheiten anhand eines sogenannten Vignettenexperiments. Zu diesem Zweck haben wir rund 10.000 Firmen, die bereits anderthalb Jahre zuvor an der groß angelegten und repräsentativen IAB-Stellenerhebung teilgenommen haben, erneut kontaktiert. Die Folgebefragung im Rahmen unserer Studie war sehr kurz und erforderte nur wenig Aufwand für die Firmen, da bereits umfangreiche Informationen zu einer Vielzahl relevanter Merkmale aus der vorherigen Teilnahme vorlagen. Dies könnte die hohe Rücklaufquote von fast 50 Prozent bei unserem Experiment erklären. Die Analysen in diesem Bericht basieren auf den Antworten von 4.883 Firmen. Vignettenexperimente sind für die kausale Untersuchung von Determinanten der Einstellungsentscheidungen von Arbeitgebern besonders geeignet, da sie bei Vorliegen ausreichend vieler Vignetten (mit randomisierten, also im Zufallsmodus variierenden, Bewerbermerkmale) einen kontrollierten Rahmen bieten, um alle relevanten Bewerbermerkmale zu berücksichtigen.¹ Obwohl sie fiktive Situationen beschreiben, weisen die Ergebnisse von Vignettenexperimenten nachweislich eine hohe Übereinstimmung mit realen Entscheidungen auf. Wir haben den Firmen zufällig ausgewählte fiktive Bewerberinnen und Bewerber vorgestellt, die sich neben anderen Merkmalen (wie Berufserfahrung oder Sprachkenntnisse) durch ihr Geburtsland (Syrien, Türkei, Ukraine, Russland mit „ist Deutsche/Deutscher“ als Vergleichskategorie) und ihre Religionszugehörigkeit (christlich und muslimisch im Vergleich zu Bewerberinnen und Bewerbern, die keine Religionszugehörigkeit signalisierten) unterscheiden. Bei gleichen Qualifikationen stellen wir im Durchschnitt keine geringere Einstellungswahrscheinlichkeit für im Ausland geborene Bewerbende im Vergleich zu „deutschen Bewerbenden“ fest. Unsere Ergebnisse liefern jedoch starke Belege für antimuslimische Diskriminierung auf dem deutschen Arbeitsmarkt. Dieser Effekt kommt aufgrund der Bewerberinnen und Bewerber aus überwiegend muslimisch geprägten Ländern (in unserem Fall Syrien und die Türkei) zustande und bestätigt damit frühere Forschungsergebnisse, wonach Diskriminierung gegenüber Musliminnen und Muslimen aus Ländern, die allgemein als autoritärer und geschlechterungleicher wahrgenommen werden, stärker ist. Dies ist besorgniserregend, da – anders als in unserem Vignettenexperiment – im Ausland geborene Menschen in Deutschland viel häufiger muslimisch sind als in Deutschland Geborene (fast ein Viertel im Vergleich zu weniger als 2 Prozent). Bei der Betrachtung weiterer Merkmale von Bewerberinnen und Bewerbern finden wir starke Belege für die sogenannte „Motherhood Penalty“, wonach Frauen seltener eingestellt werden als Männer, wenn sie Kinder haben.

¹ In Vignettenexperimenten werden Befragten kurze Beschreibungen von Bewerberinnen und Bewerbern vorgelegt, deren Merkmale entlang der interessierenden Dimensionen, etwa Qualifikation, zufällig variieren. Jede Vignette beschreibt eine bestimmte sich bewerbende Person mit ihren Merkmalen.

Darüber hinaus kann Humankapital die Nachteile ausländischer Bewerberinnen und Bewerber bei Einstellungsentscheidungen zumindest teilweise ausgleichen: Im Ausland geborene Bewerberinnen und Bewerber profitieren von guten Deutschkenntnissen und von vorhandener Berufserfahrung – insbesondere, wenn diese Kenntnisse in Deutschland erworben wurden. Im Hinblick auf Firmenmerkmale diskriminieren kleine Firmen, Firmen im Primär- und Sekundärsektor und Firmen ohne Vorerfahrungen mit internationaler Personalrekrutierung stärker. Hoch relevant für die aktuelle öffentliche und politische Debatte um den Arbeitskräftemangel ist der Befund, dass traditionell bevorteilte Gruppen – Deutsche und männliche Bewerber – auch nach der hier vorliegenden Analyse einen klaren Einstellungsvorteil haben. Denn nur sie haben in Firmen mit Arbeitskräftemangel bessere Chancen, eingestellt zu werden. Hingegen besteht zwischen Firmen mit und ohne Arbeitskräftemangel im Durchschnitt kein Unterschied in den Einstellungswahrscheinlichkeiten von traditionell benachteiligten Gruppen (im Ausland Geborene und Frauen). Diese Ergebnisse deuten darauf hin, dass Firmen in Deutschland das Arbeitsangebot von traditionell auf dem Arbeitsmarkt benachteiligten Gruppen – trotz gleicher Qualifikation – nicht als ein mögliches Potenzial sehen, um dem von vielen Firmen beklagten Arbeitskräftemangel entgegenzuwirken. Ein mit denselben Firmen durchgeführtes List-Experiment bestätigt, dass ein erheblicher Teil der Unternehmen in Deutschland Geflüchtete und muslimische Bewerberinnen und Bewerber diskriminiert. Hieraus leiten sich eine Reihe von politischen Schlussfolgerungen ab.²

Acknowledgements

This research was partially funded by the German Federal Ministry for Family Affairs, Senior Citizens, Women and Youth (BMFSFJ) through a grant to the "research association Discrimination and Racism" (FoDiRa) of the DeZIM-Research Community (German Center for Integration and Migration Research).

² In List-Experimenten geben Befragte die *Anzahl* zutreffender Merkmale aus einer vorgegebenen Liste anstatt Auskunft über das Zutreffen einzelner Merkmale zu geben. Durch Vergleiche der Angaben zwischen Gruppen mit unterschiedlichen Listen kann statistisch auf die mittlere Häufigkeit einzelner Merkmale geschlossen werden.

1 Introduction

A growing body of literature documents discrimination against certain societal groups, including women (Kübler, Schmid, and Stüber 2018; Birkelund et al. 2022), foreigners (Quillian et al. 2017; Heath and Di Stasio 2019), and religious minorities (Bartkoski et al. 2018; Weichselbaumer 2020). Research on labor markets shows that discrimination results in fewer employment opportunities (Adida, Laitin, and Valfort 2010; Wright et al. 2013), poorer professional positioning (Bergmann 1974) and lower earnings (Charles and Guryan 2008) for minorities compared to the majority population. Similar effects are observed in the housing market (Auspurg, Schneck, and Hinz 2019; Flage 2018), the credit market (Pager and Shepherd 2008), the healthcare system (Rivenbark and Ichou, 2020), and in terms of access to welfare support (Ratzmann 2022; Esmark and Liengaard 2024).

Vignette experiments have become a common research design to study discrimination in hiring decision-making, allowing causal estimation of the effect of certain applicants' characteristics on their hiring probability (Auspurg and Hinz 2015). These designs measure the success of fictitious applicants, e.g., the number of callbacks. Discrimination is defined as group mean difference in callbacks, whereas relevant personal characteristics, most importantly qualifications, are held constant (Quillian 2006). Importantly, expressed preferences in vignette experiments are consistent with real-world decisions (Hainmueller, Hangartner, and Yamamoto 2015; Gutfleisch, Samuel, and Sacchi 2021). To date, vignette experiments mostly relate to a single economic sector (Auer et al. 2018) or a few occupations (Di Stasio and de Vries 2023). By combining a vignette experiment with a list experiment in one of the follow-up surveys of the large-scale and representative IAB Job-Vacancy-Survey (IAB-JVS) with almost 5,000 actual German firms (Bossler et al. 2020), our study extends the generalizability of previous research. In our vignette design, among other traits, we randomly varied fictitious applicants' profiles in terms of origin countries (Syria, Turkey, Ukraine, Russia vs. "is German") and religious background.

Embedding our experiment within the IAB-JVS enables additionally an in-depth analysis of firm-specific hiring patterns toward minority applicants, particularly under conditions of labor shortages. Recent demographic shifts and sustained economic growth have notably tightened labor markets in many high-income countries, with the number of vacancies per job-seeking person increasing significantly (OECD 2023). As reported by the IAB-JVS, there were 2 million unfilled vacancies in Germany in late 2022 (Gürtzgen, Kubis, and Popp 2023), more than double the figure from a decade ago. Moreover, the German Federal Employment Agency (BA) classifies 45 percent of skilled-level occupations as bottleneck occupations (BA Statistik 2023). For firms, this scarcity of applicants raises search and recruitment costs (Beaudry, Green, and Sand 2018). In policy and public debates, immigration is often discussed as a way to alleviate the labor shortage problem (The Economist 2022; The Washington Post 2022). In response, Germany implemented comprehensive immigration reforms in 2020 and 2023 to facilitate immigration primarily from non-EU countries (Bundesregierung 2023). However, the success of such measures on a larger scale depends on host societies' willingness to welcome and integrate the newcomers (Di Iasio and Wahba 2023), most importantly, firms' willingness to hire immigrants.

We contribute to the literature in six ways. First, we conducted our experiment with actual firm representatives, i.e., factual “gatekeepers.” Thus, our findings should reflect hiring discrimination much more accurately. Second, by using the most frequent occupation in their respective firms, our results, span a wide and more representative range of occupations and not just single sectors. Third, we analyze the recruitment chances of immigrants compared to natives, distinguishing among immigrants from specific countries, which is still the exception in the literature (but see Di Stasio and de Vries 2023; Koopmans, Veit, and Yemane 2019). Fourth, we contribute to the literature on intersectionality and multiple discrimination (Ruwanpura 2008; Weichselbaumer 2020). Previous correspondence studies usually relied on comparing callback rates of applicants with different ethnic backgrounds that were, however, all originating from predominantly Muslim countries. It is, therefore, plausible that recruiters implicitly considered applicants to be Muslim, even if they did not specify their religious affiliation, which induces bias in estimated country-of-origin effects. By disentangling the effects of country of origin and religiosity in firms’ hiring decisions, our study design circumvents this “Muslim by default effect” (Di Stasio et al. 2021). Fifth, our approach identifies factors such as language proficiency that can mitigate discrimination, thus offering actionable insights for policy. Sixth, embedding our experiment within a large-scale, representative survey enables an in-depth analysis of firm-specific hiring patterns toward minority applicants, considering variables like firm size, economic sector, degree of internationalization, and firm’s labor shortages.

2 Data and method

2.1 IAB Job-Vacancy Survey and field work

As part of our study, we implemented a vignette experiment and a list experiment into the IAB Job-Vacancy Survey (IAB-JVS). The IAB-JVS is a representative firm survey in Germany that runs annually since 1989 (Bossler et al. 2020). The main goal is to collect information on the total number of vacancies in Germany and firms’ recruitment processes on an annual basis. Additionally, parts of the main annual questionnaire focus on current topics. For the IAB-JVS, about 100,000 firms are sampled annually and contacted in the 4th quarter. They can either fill in a paper and pencil questionnaire or answer online.

Vignette experiments are a common research design to study hiring decision-making (Auspurg and Hinz 2015). Although the literature has confirmed high consistency between preferences expressed in survey experiments and real-world decisions (Hainmueller, Hangartner, and Yamamoto 2015; Gutfleisch, Samuel, and Sacchi 2021), a common criticism of vignette experiments is that fictitious scenarios do not reflect realistic application scenarios: Designing vignette scenarios involves a central trade-off. On the one hand, the excessive complexity of the scenarios may induce respondent fatigue (Auspurg and Hinz 2015). On the other hand, if vignette experiments violate the information equivalence assumption due to lacking relevant information (e.g. on applicants’ characteristics), bias arises when respondents supplement information based on their own experiences and stereotypes (Dafoe, Zhang, and Caughey 2018).

To cross-validate our findings, we conducted a parallel list experiment with the same set of firms. In recent years, list experiments have become an increasingly popular research design to avoid social desirability in surveys on sensitive topics, such as racial attitudes (Kuklinski, Cobb, and Gilens 1997), voting behavior (Thomas et al. 2017) or, more recently, support for the war against Ukraine among Russians (Chapkovski and Schaub 2022). Instead of directly asking about sensitive topics, list experiments present a list of items asking respondents to indicate *how many* of these items apply (Glynn 2013). The list includes the sensitive item of interest and a set of non-sensitive control items to maintain respondents' privacy and avoid floor and ceiling effects. Assuming that respondents answer to the control items in the same way, regardless of whether the sensitive item is included or not, the proportion of firms that give an affirmative answer to the sensitive item can be inferred (Blair and Imai 2012).

For our study fielded in March until May 2023, we recontacted the 10,634 firms that had responded to the main IAB-JVS questionnaire in Q4-2021. For these firms, comprehensive information was already available from their previous participation, so the follow-up survey comprised only our short vignette experiment and the list experiment printed on a double-sided A4 page. During our 3-month field period, 5,104 firms responded (25 percent online), of which 4,883 provided valid data for the vignette experiment. We received 27 percent of responses within one week, 78 percent in the first 2 weeks and 89 percent in the first 3 weeks. In 11 percent of cases, responses took longer than 3 weeks, after the start of the field phase. For the list experiment, we have valid data for 4,720 observations.

2.2 Construction of the vignette and list experiment

In vignette experiments, respondents evaluate short descriptions of situations. The situation descriptions vary on a defined number of dimensions, which are randomly presented to the respondents. The randomization allows for causal statements about the influence of the dimensions on the evaluation of the situation (Auspurg and Hinz 2015). To empirically isolate causal effects on the hiring probability, employers' assessment of all possible (or sufficiently many) random combinations of applicant characteristics is obtained. In our setting, each firm received a single vignette presenting the characteristics of one hypothetical applicant.

Fehler! Verweisquelle konnte nicht gefunden werden. provides an overview of the dimensions that vary experimentally across the vignettes, which are (1) skill requirement of the position, (2) gender, (3) existence of children, (4) origin country, (5) legal status, (6) German language certificate, (7) recognition of foreign credentials, (8) duration and country of work experience, and (9) religious affiliation signaled by club membership. For each dimension, we have defined different levels addressing different sociodemographic profiles of the applicants and their fit to the job requirements. Note, that the applications relate to 1 out of 137 occupations (corresponding to the most frequent occupation in the firm. We used the 3-digit level of the 5-digit Bundesagentur für Arbeit (2024) KldB-2010 classification to determine the occupation). Table A 1 in the Appendix provides a more detailed overview of the formulation of the vignettes depending on the dimensions used and Table 1 provides four fully formulated vignette examples.

Table 1: Dimensions and levels in the vignette experiment

(1)	Skill requirement of position	Assistant Skilled
(2)	Gender	Female Male
(3)	Children	no kids 2 kids
(4)	Origin country	“Is German” Syria Ukraine Russia Turkey
(5)	Legal status	(empty for German) has a valid residence permit holds German citizenship
(6)	German language certificate	[empty for German] and has everyday German language proficiency (certified B1). and has very good German language proficiency (certified C1).
(7)	Recognition of foreign credentials	(empty for German) (empty for assistant position) Educated in [origin country] Educated in [origin country] (recognized as equivalent in Germany)
(8)	Duration and country of work experience	No professional experience as [occupation] (Only German): several years of professional experience as [occupation] (Only born abroad): several years of professional experience as [occupation] exclusively in [origin country] several years of professional experience as [occupation] exclusively in Germany several years of professional experience as [occupation] both in Germany and [origin country]
(9)	Religious affiliation	Muslim cultural club Church club Sports club

Source: Factorial survey experiment in the IAB Job-Vacancy Survey.

Table 1: Fully formulated example vignettes (the varying dimensions are underlined)

(1)	Imagine you receive the following application for an advertised assistant position in your company in the field of administration. The person is male, 37 years old and has no kids. He was born in Turkey, has a valid residence permit and has everyday German language proficiency (certified B1). He has several years of professional experience in the field of administration exclusively in Germany. In his free time, he is involved in a Muslim cultural club.
(2)	Imagine you receive the following application for an advertised assistant position in your company in the field of technical media design. The person is male, 37 years old and has two children. He is German. He has no professional experience in the field of technical media design. In his free time, he is involved in a Muslim cultural club.
(3)	Imagine you receive the following application for an advertised skilled position in your company as a lecturer. The person is male, 37 years old and has two children. He was born in Syria, has a valid residence permit and has very good German language proficiency (certified C1). He was educated in Syria (recognized as equivalent in Germany) and has several years of professional experience as a lecturer exclusively in Germany. In his free time, he is involved in a Muslim cultural club.
(4)	Imagine you receive the following application for an advertised skilled position in your company as a winemaker. The person is male, 37 years old and has no kids. He was born in Ukraine, has a valid residence permit and has everyday German language proficiency (certified B1). He was educated in Ukraine (recognized as equivalent in Germany) and has several years of professional experience as a winemaker in both Germany and Ukraine. In his free time, he is involved in a sports club.

Note: The texts were translated from German into English.

Source: Factorial survey experiment in the IAB Job-Vacancy Survey.

Regarding dimensions (1) applicants are either applying for an assistant or skilled position in 1 out of 137 occupations (the most frequent occupational group in the firm, see above). Assistant (German: “Helfer”) positions do not have any formal skill requirement and, thus, employees are typically trained on-the-job within a few weeks. For skilled positions (German: “Fachkraft”), in Germany, usually a two to four-year vocational training is required. Regarding demographic characteristics – dimensions (2)–(4) – applicants are female or male, all were described as 37 years old, and they either have no or two children. Applicants are either described as “is German” or were depicted as being born in Syria, Ukraine, Russia or Turkey.³ Dimensions (5)–(8) relate to immigrant-specific factors such as labor market hurdles associated with legal status, (lack of) language skills, country of work experiences, and the recognition of credentials. Hence, in vignettes, where the applicant is not “German”, they either hold a valid residence permit (signaling uncertain prospects of staying) or German citizenship.⁴ We further distinguish between those speaking German on B1-level suitable for everyday life communications (as issued after successful completion of an integration course provided by the Federal Office for Migration and Refugees, BAMF) or on high C1 competence level (corresponding to proficient language skills, allowing to grasp demanding, longer texts and their implicit meanings). Information on formal qualifications is not shown in applications for helper positions and always shown for skilled positions: German applicants are educated in Germany and applicants born abroad in their origin country. For applicants born abroad, we randomly vary the recognition of foreign education credentials by mentioning successful recognitions or not mentioning the issue. Regarding work experience, applicants have either no or several years of professional work experience. For applicants born abroad, we specify whether the experience was obtained in Germany, abroad or in both countries. Finally, to signal religious affiliation (9), we provide information on whether the applicant engages either in a Muslim cultural club, a church club or a sports club in her or his free time.

In the list experiment, we asked firms to provide the *number* of applicants’ characteristics from a provided list that would prevent recruitment. The exact question was: “When selecting applicants, many firms weigh up the benefits of diversity against the risk of cultural or social conflict. How many of the following applicant characteristics would prevent them from being hired in your company?” It is important that we are only interested in the number of characteristics and not which characteristics these are exactly. Firms in the control group were presented with a list of five items in randomized order, most of which are non-sensitive:

- Older person (50+),
- No job experience,
- Does not speak German,
- Long commuting distance,
- Poor school leaving certificate.

³ We compare persons born abroad with the reference category described as „Is German“ for reasons of vignette plausibility. Technically, the latter includes persons born abroad who have obtained German citizenship, however, we believe that “is German” will in most cases invoke the imagination of a person born in Germany. In the remainder of the paper, we either use origin country names or the terminology *Syrian*, *Turkish*, *Ukrainian* or *Russian* to simplify the notation.

⁴ We recode the non-varying and non-displayed dimensions among German applicants (legal status, German language certificate, recognition of foreign credentials, work experience) to the highest (most favorable) level.

Firms in the treatment groups were randomly presented one additional item out of the following five sensitive items:

- Muslim
- Refugee
- Wears a religious symbol (e.g., kippah, hijab, rood)
- Non-white
- Non-vaccinated for COVID-19

While firms in the control group could answer with a number between 1 and 5, the possible answers in the treatment groups ranged from 1 to 6.

2.3 Variables and statistical method

In the vignette experiment, our dependent variable was constructed based on respondents' answers concerning the likelihood of hiring the person described in the experimentally varied vignette. Our dependent variable varies from 1 ("very unlikely") to 10 ("very likely"). Correspondingly, we applied an OLS model with robust standard errors in the multivariate analyses.

We constructed binary indicators ("dummy variables") to measure the experimentally varied dimensions in applicant profiles (see Section 2.2). To approximate the degree of occupational regulation in the applied position, we merge the degree of regulation at the level of 3-digit occupations (Vicari 2014). The indicator measures the share of regulated occupations (5-digit level) within the occupational group (3-digit level) for which the individual is applying. In Germany, regulated occupations may only be carried out if proof of a certified professional qualification is provided (Neal and Morgan 2000). Well-known examples include doctors, lawyers or teachers, who must pass highly formalized state examinations. We dichotomize this variable based on the median.

For a heterogeneity exercise, we assign the task structure by Autor and Dorn (2013) to the 3-digit occupations based on Dengler et al. (2014), distinguishing between analytical non-routine, interactive non-routine, cognitive routine, manual routine and manual non-routine tasks. At the firm-level, we additionally account for firm size with a binary indicator equal to 1 if a firm's number of employees is above the median size of 25 employees in our sample. Furthermore, we distinguished firms' economic sector through 9 categories and add an indicator for firms' location either in East or West Germany. Additionally, we differentiate between *internationally hiring* firms (if firms report having (i) searched for personal abroad in the previous 12 months or (ii) recruited refugees in the previous 12 months, or both), only *domestically hiring* firms in the previous 12 months and firms *without hires* in the previous 12 months. The presence of a labor shortage at the firm level is measured via a binary indicator equal to 1 if a firm reported a lack of suitable workers in the past 12 months during their previous participation in the IAB-JVS in Q4-2021.

To handle missing values among the non-experimental explanatory variables, we applied multiple imputation methods using chained equations (van Buuren 2012). We estimated 50 imputed datasets with complete information. Following Rubin's (1987) approach, we combined

the results of the analyses performed on each dataset, considering the imputation variances within and between the imputed data sets. Respondents with missing information on the vignette response and on the list experiment were included in the multiple imputation but not in the corresponding analyses. Table 2 in the section 2.4 illustrates that missing information was present to varying degrees in the control measures.

In the list experiment, the dependent variable is the reported number of impediments to recruitment, scaled from 0–5 in the control group and from 0–6 in treatment groups. We regress on a factor variable indicating firms' assigned group in the experiment, either a control group or 1 out of 5 treatment groups. We apply OLS estimation with no further control variables and robust standard errors (Blair and Imai 2012).

2.4 Descriptive statistics

Table 2 summarizes the variables used to analyze the vignette experiment. The mean hiring score is 7.0 on a scale of 1 “very unlikely” to 10 “very likely”, suggesting a rather high hiring probability. This score is notably higher compared to previous findings by Kübler, Schmid and Stüber (2018), where 3,000 fictitious applicants received mean scores of 5.2 for females and 6.1 for males. These evaluations were conducted by a representative sample of German firms and focused on the likelihood of applicants being invited to the next step in the hiring process for apprenticeship positions. The discrepancy in mean hiring scores could stem from several factors. The higher scores in our study might reflect a broader range of job positions beyond apprenticeships, which could carry different expectations and biases. Additionally, changes in the labor market conditions or shifts in societal attitudes towards immigrants since the 2018 study could influence these outcomes.

In our vignette experiment, the randomization applied ensures an equal distribution of key applicant characteristics such as origin country, gender, children, skill level of the applied position and religious affiliation. About 30 percent of applicants either have no professional experience or have only gained experience in Germany; 20 percent of the applicants have professional experience acquired abroad or in both domestic and international contexts. The proportion of applicants with explicit statements that their foreign educational degree is recognized as equivalent in Germany amounts to only 28 percent, because only those born abroad and those applying for a skilled position have relevant formal qualifications. In 50 percent of cases, individuals apply for a highly regulated occupation. 60 percent of applicants hold German citizenship, and the remaining 40 possess a valid residence permit. Regarding language proficiency, we assigned a C1 level of German to half of the applicants born abroad. For German applicants, who did not provide language proficiency details, we assume a high proficiency, assigning C1 level. This contrasts with 40 percent of applicants who are documented with a B1 proficiency level.

Regarding the non-experimental explanatory variables, 47 percent of firms reported experiencing labor shortages. The majority of firms (61 %) operate in the tertiary sector.⁵ 57 percent of firms hired only domestically, 22 percent internationally, and 21 percent did not hire in the previous 12

⁵ More precisely, “other services” make up 30 %, followed by manufacturing (22 %) education/health/social services (14 %), and agriculture, forestry, mining/energy (13 %).

months. Geographically, 71 percent of firms are in West Germany. Figure A 1 maps the mean reported hiring scores by firms in our sample across the 38 German NUTS-2 regions, illustrating a tendency for higher hiring probabilities in West compared to East Germany.

Table 2: Summary statistics on vignette experiment

	Mean	SD	Min	Max	Median	N
Vignette score (1 - 10)	7.003	2.651	1	10	8	4,883
Origin country: Germany	0.195		0	1		4,883
Syria	0.200		0	1		4,883
Turkey	0.199		0	1		4,883
Ukraine	0.202		0	1		4,883
Russia	0.205		0	1		4,883
Male	0.494		0	1		4,883
Female	0.506		0	1		4,883
No kids	0.498		0	1		4,883
Two kids	0.502		0	1		4,883
C1 certified German	0.600		0	1		4,883
B1 certified German	0.400		0	1		4,883
German citizenship	0.598		0	1		4,883
Valid legal status	0.402		0	1		4,883
Recognition of qualification not mentioned	0.715		0	1		4,883
Recognized qualification	0.285		0	1		4,883
Low regulated occupation	0.505		0	1		4,883
Highly regulated occupation	0.495		0	1		4,883
No job experience	0.302		0	1		4,883
Job experience abroad	0.199		0	1		4,883
Job experience in Germany	0.294		0	1		4,883
Both abroad and in Germany	0.204		0	1		4,883
Religious affiliation: Sports club	0.337		0	1		4,883
Church club	0.336		0	1		4,883
Muslim cultural club	0.327		0	1		4,883
Unskilled position	0.505		0	1		4,883
Skilled	0.495		0	1		4,883
Firm size: small	0.502		0	1		4,883
Large	0.498		0	1		4,883
No lack of suitable workers (self-reported in Q4-2021)	0.531		0	1		4,182
Lack of suitable workers (labor shortage)	0.469		0	1		4,182
Firm's economic sector: ¹⁾ Primary/Secondary	0.393		0	1		4,883
Tertiary	0.607		0	1		4,883
Only domestic hiring in previous 12 months	0.571		0	1		4,765
International hiring (also)	0.221		0	1		4,765
No hiring in previous 12 months	0.208		0	1		4,765
West Germany	0.705		0	1		4,883
East Germany	0.295		0	1		4,883

Note: ¹⁾ Firms' economic sector aggregated into an indicator for tertiary sector is used for heterogeneity analyses in section 3.2.2. In the remaining multivariate models, a disaggregated version based on 9 categories is used (not shown).

Source: Own calculations based on a factorial survey experiment in the IAB Job-Vacancy Survey.

In the list experiment, the mean number of reported impediments to recruitment is 2.48 (2.37 in the control group and 2.51 averaged over treatment groups). Table 3 shows the distribution of answers in the list experiment for the control group and the five treatment groups. The small share of both very low and very high responses reassures us that floor and ceiling effects are of no concern. Strong floor (ceiling) effects would indicate that the control items are very uncontroversial (controversial), therefore allowing indirect inferences about individual affirmative answers to one of the sensitive items (Blair and Imai 2012).

Table 3: Distribution of answers in list experiment across control and treatment groups

Response in list experiment	Group					
	Control	Refugee	Muslim	Non-white	Wears religious symbol	Non-vaccinated for COVID-19
0	2.9	3.2	3.5	3.6	2.2	3.6
1	17.6	13.1	13.8	14.5	13.3	13.4
2	36.4	33.8	35.2	36.7	31.0	35.2
3	29.3	34.6	29.3	33.4	33.6	33.2
4	10.8	10.4	12.2	8.1	15.0	11.5
5	3.0	3.0	4.2	2.5	3.8	2.2
6	0.0	2.0	1.7	1.2	1.1	1.0

Note: The table shows the percentage of each answer in the list experiment within the control group and the treatment groups based on 4,720 observations.

Source: Own calculations based on a list experiment in the IAB Job-Vacancy Survey.

3 Results

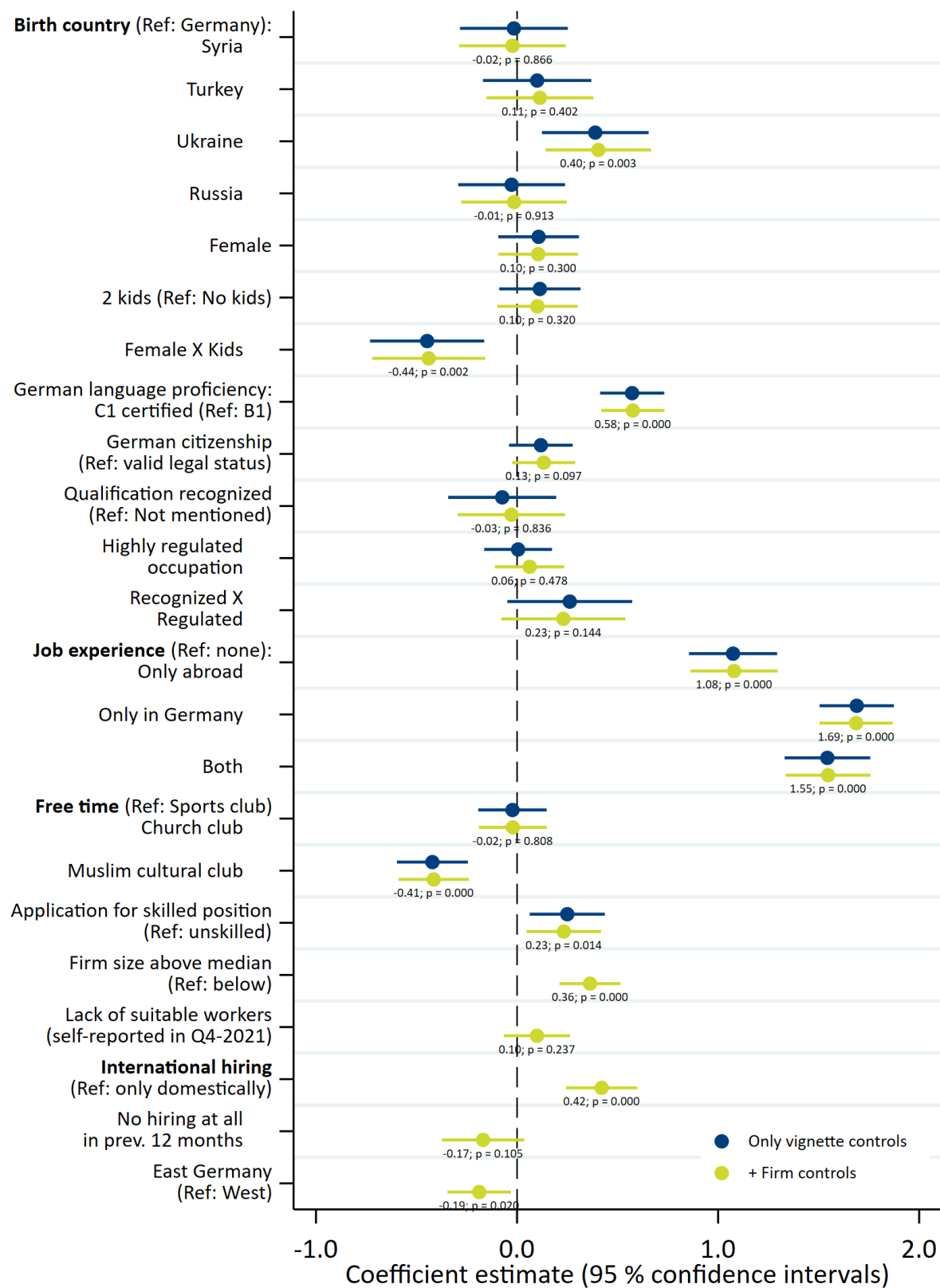
In this section, we first estimate the effect of applicant and firm characteristics on the vignette hiring scores. Second, we analyze the list experiment. In both analyses, we apply OLS regressions with robust standard errors.

3.1 Strong anti-Muslim discrimination

Average marginal effects (AME) from multivariate regressions of the vignette hiring score are reported in Figure 1. AME represent the average change in the dependent variable for a one-unit increase in the considered explanatory variable while holding the remaining variables constant. The blue dots and bars refer to a specification including all experimentally varied dimensions from the vignettes as regressors. The second specification depicted with yellow dots and bars adds firm-specific explanatory variables.

Conditional on all covariates (second specification) – including religious affiliation – compared to “Germans” the hiring score is larger for Ukrainians (0.40 points on the 1-10 scale) and statistically significant at the 1 percent level. This needs to be contextualized because of the field period of our survey from March to May 2023 (section 2.1), during which the German population was very welcoming towards refugees from Ukraine (Dollmann, Jacobsen, and Mayer 2023). For applicants born in the other countries, the hiring scores are not significantly different from “German” applicants.

Figure 1: Determinants of hiring score (average marginal effects)



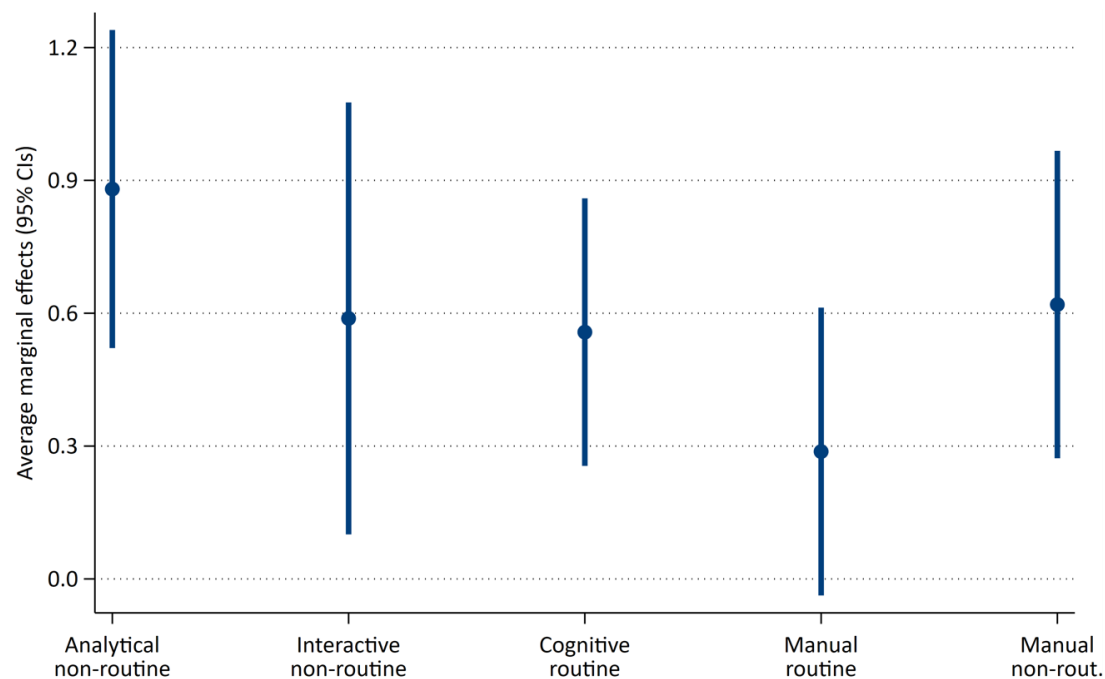
Note: The figure plots average marginal effects from OLS regressions with robust standard errors based on 4,883 observations. The outcome variable is the vignette hiring score, scaled from 1 (low) to 10 (high). Beyond the indicators shown, the second (yellow) additionally controls for the firm's economic sector (9 categories). Dots refer to the point estimates and bars denote the corresponding 95 % confidence intervals (CIs).

Source: Own calculations based on a factorial survey experiment in the IAB Job-Vacancy Survey.

Regarding other socio-demographics, we interact applicants' gender with the presence of children. The estimated main effect of female is close to zero in magnitude, indicating no difference in hiring scores between female and male applicants without children.⁶ The main effect of children is not statistically significant, indicating no effect of children on hiring chances of fathers. However, the strongly negative and statistically significant interaction term indicates that the presence of children strongly lowers hiring chances of female applicants. This finding is in line with the literature, which has identified the so-called motherhood penalty, i.e., the adverse effects of children on mothers' but not fathers' hiring chances (Correll, Benard, and Paik 2007).

Next, the results show that German language proficiency is highly valued by employers: Applicants with a C1 certificate score 0.58 points higher compared to those with a B1 certificate. Figure 2 additionally shows that having obtained a C1 relative to a B1 German language certificate is least valued when applying for occupations with a high degree of manual-routine tasks,⁷ which may be because these occupations are highly concentrated in agriculture, manufacturing, and logistics, which are often rather uncommunicative. Furthermore, naturalization increases hiring prospects statistically significantly at the 10 percent level by 0.13 points compared to holding a valid residence permit.

Figure 2: Average marginal effects of C1 German language certificate across occupation tasks



Note: The figure is based on an OLS regression model with robust standard errors based on 3,932 observations (excluding German applicants). The specification is similar to the setup in Figure 1 (incl. firm-level controls), adding dummies for the main task of the occupation to which the applicant applies (Autor and Dorn 2013) and their interactions with the C1 German language certificate dummy. Vertical bars refer to 95 % confidence intervals.

Source: Own calculations based on a factorial survey experiment in the IAB Job-Vacancy Survey and Dengler et al. (2014).

⁶ In linear regression, the main (i.e., non-interacted) regression coefficient denotes the average marginal effect when the interaction variable is in its base.

⁷ Only the interaction effect between "Manual routine" and "C1 certificate" is statistically significant, with "Analytical non-routine" and "B1 certificate" as base categories.

We randomly varied the recognition of equivalence of foreign educational degrees among the foreign-born applicants who applied for a skilled position (see **Fehler! Verweisquelle konnte nicht gefunden werden.**). In the specifications shown in Figure 1, we interact a dummy variable indicating successful recognition with a dummy variable indicating whether the applied occupation is highly regulated. Coefficients on both main effects are statistically insignificant, suggesting that (i) recognition of foreign educational degrees has no impact on the hiring score for individuals applying for an unregulated position, and (ii) there is no difference in hiring scores between applying for a regulated or unregulated occupation when applicants do not explicitly report about a successful recognition of a foreign educational degree. The positive interaction effect shows that – although not statistically significant at conventional levels – hiring chances increase if applicants with a recognized foreign educational degree apply for a highly regulated occupation.

Regarding work experience, applicants in our experiment have either no or several years of professional work experience. If they have experience, we differentiate whether it was obtained only abroad, only in Germany or in both countries (see **Fehler! Verweisquelle konnte nicht gefunden werden.**). The results in Figure 1 confirm that professional experience is highly valued by employers, indicating a 1.1 point and statistically significant increase in the hiring score on the 1-10 scale for applicants with professional experience acquired abroad compared to applicants without experience. In line with the literature showing that particularly human capital acquired in the destination country improves labor market integration (Zwysen 2019), the effect is even larger (corresponding to about 0.6 standard deviations) if professional experience was partly or fully acquired in Germany.

Regarding religious affiliation signaled by club membership, we do not observe a statistically significant difference in hiring scores between applicants engaging in a church club compared to a sports club. However, applicants engaging in a Muslim cultural club score 0.41 points lower on the 1-10 scale compared to sports club members. Recalling that the model, among other traits, accounts for origin countries, this effect captures the effect of religion net of country effects. Lower hiring probabilities for Muslim applicants are in line with related studies that have identified anti-Muslim discrimination in different areas of life, e.g., the labor market (Bartkoski et al. 2018), housing (Auspurg, Schneck, and Hinz 2019; Flage 2018), or the healthcare system (Rivenbark and Ichou 2020), across different countries (see Di Stasio et al. 2021 for a European comparative study).

In line with higher labor demand for qualified positions (IAB-Stellenerhebung 2024), recruitment is more likely for skilled rather than unskilled positions. Additionally, hiring is more likely in large firms, those who have reported a lack of suitable workers in the past (though not statistically significant) and have hired internationally in the previous 12 months.⁸ Finally, West German firms are, on average, more likely to hire than East German firms.

⁸ Note that the model additionally controls for firms' economic sector in order to control for the unequal distribution of labor shortages across sectors (Causa et al. 2022).

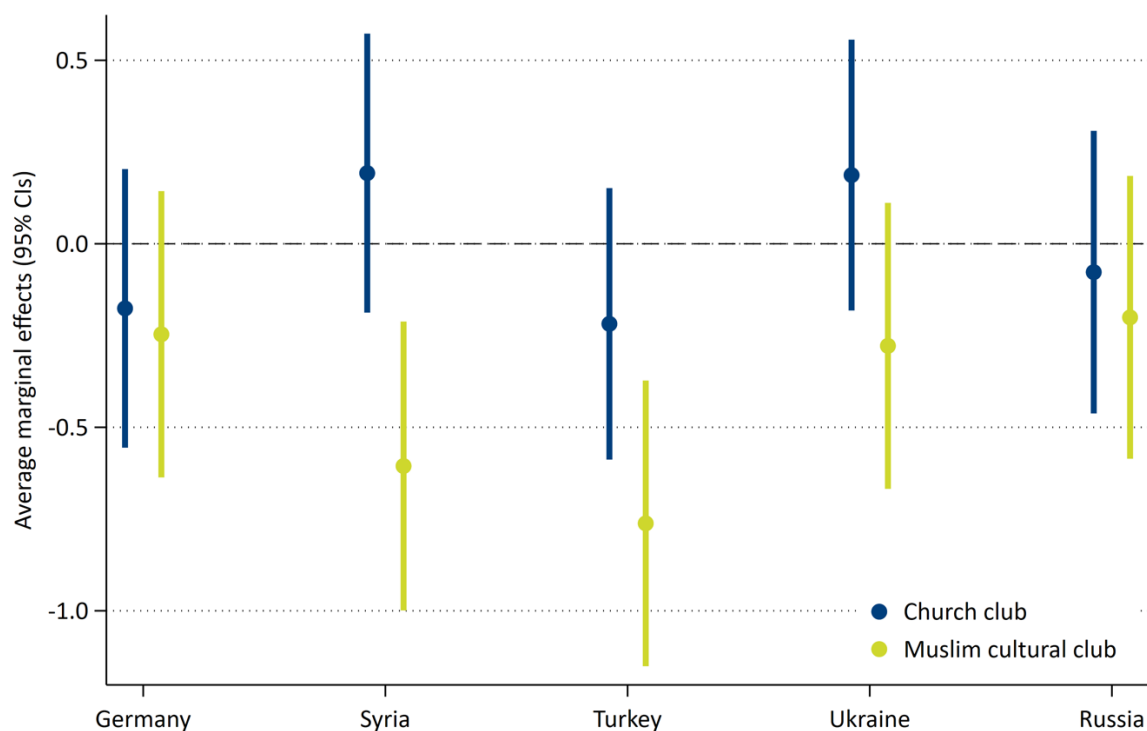
3.2 Heterogeneities in anti-Muslim discrimination

We have so far found robust evidence showing discrimination against Muslims. In this section, we examine effect heterogeneities.

3.2.1 Anti-Muslim discrimination by origin countries

First, we ask whether lower hiring chances of Muslim applicants vary by origin country. We run a regression similar to the specification used for Figure 1, augmented by interaction effects between country and religious affiliation (as signaled by club membership). Figure 3 plots the average marginal effects of engaging in a church and Muslim cultural club relative to a sports club on applicants' hiring scores across the set of countries.

Figure 3: Average marginal effects of religious affiliation (relative to sports club) across countries



Note: The figure is based on an OLS regression model with robust standard errors based on 4,883 observations. The specification is similar to the setup in Figure 1 (incl. firm-level controls), adding interaction terms between origin country and free time engagement. Vertical bars refer to 95 % confidence intervals.

Source: Own calculations based on a factorial survey experiment in the IAB Job-Vacancy Survey.

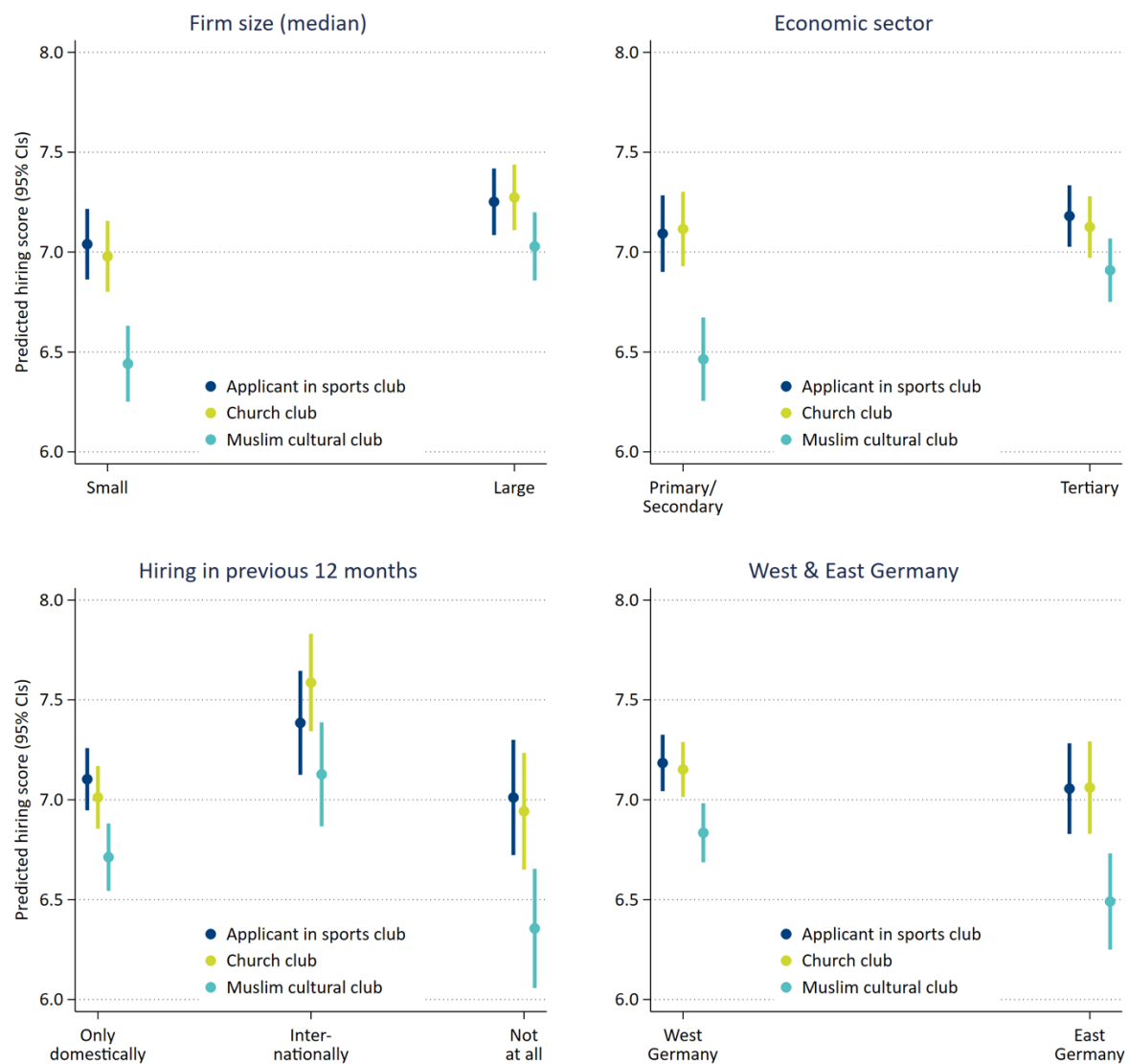
For Syrian and Turkish applicants, the hiring score is lower (statistically significant at the 1 percent level) if they engage in a Muslim cultural club compared to a sports club. Additionally, Syrians suffer the largest Muslim penalty if compared to church club applicants. These results are in line with Di Stasio and de Vries (2023), who find stronger discrimination against Muslims – particularly males – from generally more authoritarian and gender-unequal countries. These countries are perceived as culturally incompatible and may induce a greater need for security in the majority population. Additionally, we verified in additional analyses (not shown) that, on average, no statistically significant difference in hiring scores prevails between German and foreign-born applicants within sports clubs and church clubs. This finding is consistent with the

results of Di Stasio et al. (2021), who found only a weak, if any, Muslim-by-default effect for Germany.

3.2.2 Anti-Muslim discrimination by firm characteristics

Regarding firm characteristics, Figure 4 plots predicted hiring scores from four separate regression models in which we sequentially interact religious affiliation with the firm characteristic depicted in the figure's panel title (firms' size, economic sector, international orientation, and location). These models extend our baseline regression specification by including firm-level covariates, as detailed in Figure 1.

Figure 4: Firm-level heterogeneity in Muslim penalty (predicted hiring scores)



Note: The figure plots linear predicted hiring scores from OLS regressions that sequentially interact free time engagement with the firm characteristics as indicated in the panel header. Vertical bars indicate 95 % confidence intervals. Outcome variable is the vignette hiring score, scaled from 1 (low) to 10 (high). The set of control variables is similar to those reported in Figure 1 (incl. firm-level controls). Estimation based on 4,883 observations with robust standard errors.

Source: Own calculations based on a factorial survey experiment in the IAB Job-Vacancy Survey.

Starting with firm size depicted in the top-left panel of Figure 4, the effects show that the “Muslim penalty” – a term we use to describe reduced hiring probabilities for Muslim applicants – occurs predominantly in smaller firms. This may be attributed to larger firms having more professional and standardized recruitment processes (Kaas and Manger 2012). This is in line with classic reasoning: if discriminating firms are driven out of the market in the long run due to a competitive disadvantage (Becker 1971), then large firms may have become large precisely because of their non-discriminatory recruitment behavior in the past.

The top-right panel shows that the Muslim penalty is more pronounced in the primary and secondary sectors compared to the tertiary sector, reflecting stronger discriminatory practices in labor-intensive sectors. The bottom-left panel of Figure 4, depicts the variation of the Muslim penalty between internationally and domestically oriented firms. The results suggest that

domestically oriented firms and those without recent hiring activities exhibit higher levels of discrimination against Muslims. In contrast, internationally oriented firms show no such discrimination.⁹ This is generally consistent with the contact hypothesis (Allport 1954), which posits that greater exposure to diverse groups can reduce prejudice. As depicted in the bottom-right panel, the Muslim penalty is larger for firms located in East (0.57 points compared to church club) than in West Germany (0.32 points compared to church club), however the difference is not statistically significant. This suggests that location within Germany does influence discriminatory hiring practices less than the other factors.

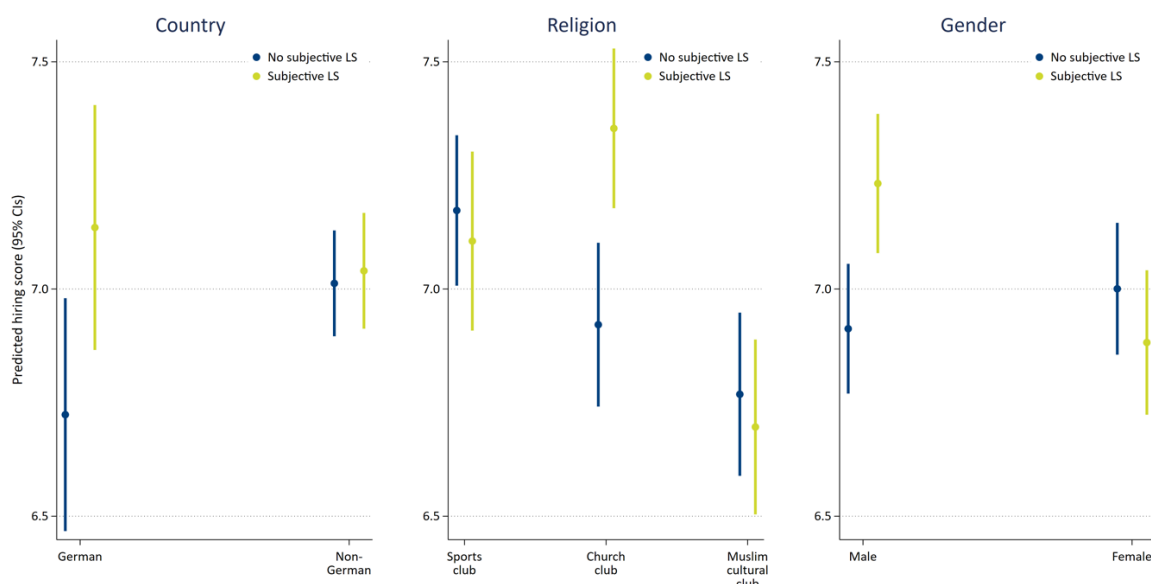
3.3 Labor shortages and hiring prospects

In this section, we ask whether the hiring probabilities of applicants who are traditionally disadvantaged in the labor market vary depending on whether firms face labor shortages. Drawing on classic discrimination theories, we hypothesize that firms may exhibit less discrimination when faced with labor shortages, because they lack alternative candidates. This prediction applies regardless of whether discrimination is statistical, where employers misjudge the productivity of applicants of particular groups due to inaccurate generalizations about assumed group productivity (Phelps 1972), or taste-based Becker (1971), reflecting employers' individual prejudices and deeply embedded institutional and cultural norms (Reskin 2000; Guryan and Charles 2013). If labor supply is scarce, firms may lower their applicant selectivity based on stereotypical or biased recruitment patterns (Biddle and Hamermesh 2013). However, particularly if firms discriminate taste-based, employers might be willing to pay a high price for avoiding contact with members of the disfavored group, e.g., through the opportunity cost of longer time to fill vacancies (Biddle and Hamermesh 2013). One manifestation could be the perpetuation of discriminatory hiring practices, despite acute labor shortages. As a result, current labor shortages could be partly attributable to firms' historical discriminatory practices.

Figure 5 plots predicted hiring scores from three separate regression in which we sequentially interact the labor shortage dummy (self-reported at the firm-level, see section 2.3) with the applicant characteristic depicted in the panel title (country, religion, gender). The remaining model setup resembles our baseline regression from Figure 1 with firm-level covariates.

⁹ Internationally oriented firms are arguably large firms. In unreported results, we verified that the difference between domestic and international firms regarding the Muslim penalty is largely driven by small firms (below the 1st tertile).

Figure 5: Subjective labor shortage and discrimination (predicted hiring scores)



Note: The figure plots linear predicted hiring scores from OLS regressions that sequentially interact a firm-specific subjective labor shortage dummy with the applicant characteristic as indicated in the panel header. Vertical bars indicate 95 % confidence intervals. The outcome variable is the vignette hiring score, scaled from 1 (low) to 10 (high). The set of model covariates corresponds to those reported in Figure 1, incl. firm-level controls. Estimation based on 4,883 observations with robust standard errors.

Source: Own calculations based on a factorial survey experiment in the IAB Job-Vacancy Survey.

First, we examine whether German versus non-German applicants face better hiring chances depending on firms' labor shortage. Correspondingly, we recode the origin country information into a dummy indicator, coded as 0 when the applicant was described as "is German" and 1 for applicants described as being born abroad. According to the results depicted in the left panel of Figure 5, the hiring score of foreign-born applicants is not statistically different between firms with or without self-reported labor shortage. By contrast, the hiring score of German applicants is almost half a point and statistically significantly higher in conditions of labor shortages,¹⁰ *ceteris paribus*, compared to firms without reported shortages. Taken together, this suggests a possible bias favoring domestic candidates by firms who reported a labor shortage.

Looking at religious affiliation, the middle panel indicates that while applicants who are active in church clubs have a statistically significant higher likelihood of being hired by firms experiencing labor shortages, this does not hold for Muslim applicants. The similarity in hiring probabilities for applicants in sports clubs regardless of labor shortage status suggests that the effect of religious affiliation on hiring decisions may be nuanced and warrants cautious interpretation.

Lastly, regarding gender (right panel), male applicants are shown to have a 0.3-point higher hiring likelihood in firms with labor shortages, a statistically significant difference compared to firms without shortages. In contrast, female applicants' chances do not increase in firms reporting labor shortages.

Collectively, these findings suggest that while firms facing labor shortages exhibit a higher willingness to hire, this openness does not uniformly extend to applicants from traditionally

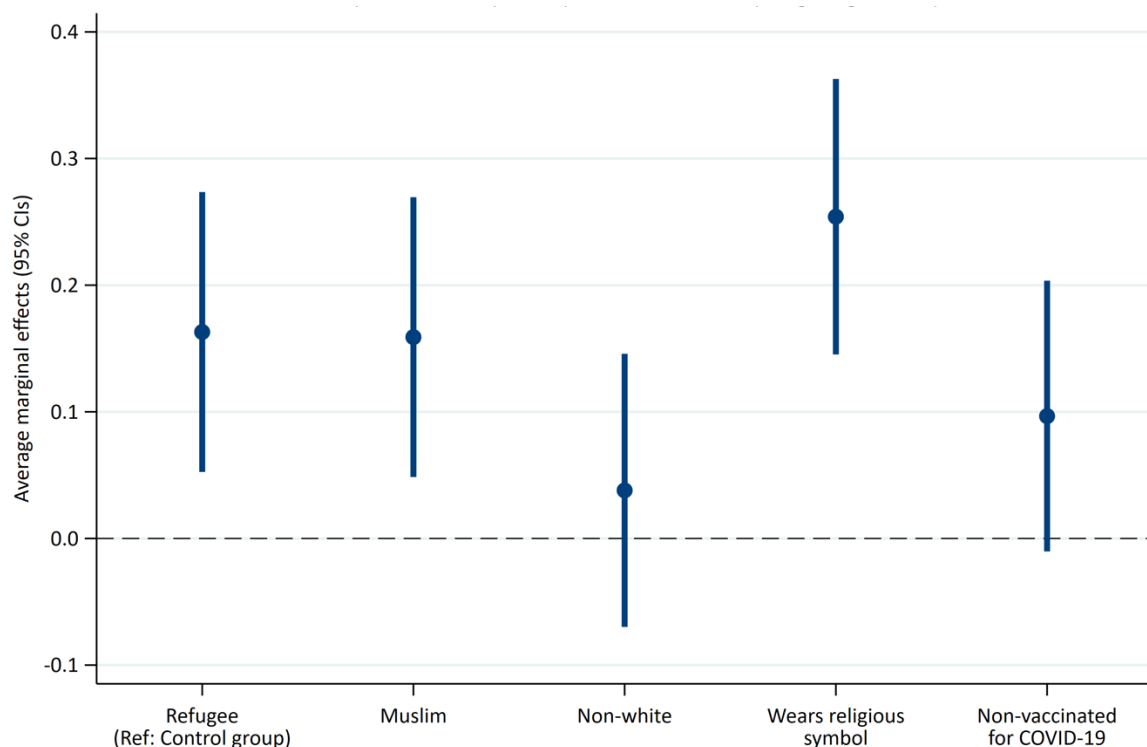
¹⁰ The difference between hiring scores is 0.41 and significant on the 5 % level ($SE = 0.178, p = 0.021$).

disadvantaged groups in the labor market. We interpret this selective hiring as evidence for taste-based discrimination, reflecting underlying biases or systemic inequalities that persist even during periods of high labor demand.

3.4 Cross-validation with list experiment

In this section, we cross-validate our vignette study findings using the list experiment methodology outlined in section 2.2. Figure 6 illustrates the regression coefficients from an OLS model with robust standard errors, where we regress the reported number of impediments to recruitment (scaled from 1 to 6) on group indicators (with the control group as the reference category), without further explanatory variables. Each coefficient gives the share of firms who evaluate the respective applicant characteristic as an impediment to recruitment.

Figure 6: List experiment: Number of reported impediments to recruitment (average marginal effects)



Note: The figure plots coefficient estimates from an OLS regression of the number of reported impediments to recruitment on group indicators. Vertical bars indicate 95 % confidence intervals. No additional control variables are included. Estimation based on 4,720 observations with robust standard errors.

Source: Own calculations based on a list experiment in the IAB Job-Vacancy Survey.

The results from the list experiment reveal significant resistance towards hiring certain minority groups: The coefficients for refugee, Muslim, wearing religious symbols are all positive and statistically significant at the 1 percent level. This indicates a robust and substantial hiring bias within the surveyed firms. Specifically, 16 percent of firms view refugee applicants as a hiring impediment, 16 percent show reluctance to hire Muslims, and a quarter display resistance towards applicants who wear religious symbols. These findings corroborate our earlier results

and underscore the persistent challenges faced by these groups in the labor market. The association with religious symbols, such as headscarves, appears particularly strong, aligning with previous research that documented negative impacts of wearing a headscarf on hiring probabilities (Weichselbaumer 2020).

The coefficient of not being vaccinated against COVID-19 is also positive, albeit statistically significant only at the 10 percent level, suggesting some firms view this as a hiring impediment. However, the relatively small and statistically insignificant effect size for non-white applicants contrasts with the findings of correspondence studies, which typically report lower callback rates for this group (Quillian et al. 2019). This discrepancy suggests that the list experiment might capture different aspects of hiring biases or that these biases manifest differently in explicit versus implicit measurement contexts.

4 Discussion and conclusion

We implemented a vignette experiment into the large-scale and representative IAB Job-Vacancy-Survey in Germany, randomly varying, among other relevant traits, fictitious applicants' origin country, and their religious affiliation. Vignette experiments are a significant methodical improvement compared to traditional observational studies in identifying recruitment chances because they allow for controlled comparisons by holding constant all relevant applicant characteristics. The literature has confirmed high consistency between preferences expressed in survey experiments and real-world decisions (Hainmueller, Hangartner, and Yamamoto 2015; Gutfleisch, Samuel, and Sacchi 2021).

Concerning the applicants' origin countries, our findings do not reveal any general bias against those born abroad compared to German applicants, indicating that discrimination is not uniformly applied based on foreign origin alone. However, we observed significant anti-Muslim labor market discrimination in Germany. This effect is particularly driven by Syrian and Turkish applicants, confirming previous results in the literature according to which discrimination against Muslims from countries that are generally perceived as more authoritarian and gender unequal is stronger (Di Stasio and de Vries 2023). The disadvantage for Muslims is large, corresponding in magnitude to two-thirds of the reduction in German language skills from C1 to B1 level. These insights are especially pertinent considering the demography in Germany, where almost 1 million residents are Syrian, comprising 7 percent of the foreign population as of the end of 2023 (Destatis 2024a), and Muslims make up between 6 and 7 percent of the overall population in Germany (Pfündel, Stichs, and Tanis 2021). Furthermore, religious affiliation is not equally distributed between real-life applicants born in different countries. According to our analyses based on the Socio-Economic Panel and integrated IAB-BAMF-SOEP Survey of Refugees and IAB-SOEP Migration Sample studies, 22 percent of the adult population in Germany born abroad was Muslim in 2019 (IAB-BAMF-SOEP 2023; IAB-SOEP 2023; SOEP 2023). Among those born in Germany, it is less than 2 percent. Consequently, people born in Syria or Turkey are highly affected by anti-Muslim discrimination, highlighting the need for targeted interventions to address these biases. Such discriminatory practices not only harm the affected individuals but also hinder the broader societal and economic integration efforts within Germany.

Looking at further applicants' characteristics, our findings corroborate the substantial literature identifying a so-called 'motherhood penalty' in the labor market (Anderson, Binder, and Krause 2002; Budig and England 2001; Correll, Benard, and Paik 2007), where we observe a significant decrease in hiring probabilities for female applicants with children compared to their male counterparts. This gender-specific bias underscores the persistent challenges faced by job-seeking mothers and the need for targeted interventions to support equal employment opportunities.

Additionally, our study reveals that job experience, particularly when obtained in Germany, significantly boosts hiring chances for immigrants. This is also true for naturalization and German language proficiency. Collectively, these factors demonstrate that enhancing human capital attributes can mitigate some of the disadvantages faced by foreign-born applicants in the hiring process.

There is room for political action here beyond general information campaigns that can make the majority population aware of the frequency of immigrants' experiences of discrimination and the associated negative effects on society as a whole (Taran, Zegers de Beijl, and McClure 2004). Further targeted interventions, such as educational programs aimed at reducing prejudices and misconceptions about Muslims and foreigners and stronger enforcement of anti-discrimination laws, are necessary. Furthermore, less bureaucratic and faster naturalization processes, recognition procedures for foreign educational and professional qualifications as well as the comprehensive availability of and easier access to language courses may help to reduce bias and promote a more inclusive labor market. We, therefore, strongly advise against the proposed halving of funds available for integration courses in the federal budget for 2025 (Süddeutsche Zeitung 2024). Additionally, to improve access to the labor market, specific programs such as mentoring, job coaching or internships could be introduced for Muslims and other groups facing discrimination.

Regarding firm characteristics, our study uncovers that anti-Muslim discrimination in the German labor market is predominantly found in smaller firms, within primary and secondary economic sectors, and firms that do not engage in international hiring. Most relevant for policy, while we observe an increased firms' willingness to hire applicants who are traditionally privileged in recruitment processes (non-immigrant, male) during labor shortages, this openness does not extend to applicants from historically disadvantaged groups (foreign-born, female). One possible interpretation of this result is that some of the labor shortages lamented by many firms are at least partly self-inflicted, i.e. resulting from long-standing discriminatory hiring practices. This pattern indicates not just a market inefficiency but also a critical area for intervention. In light of these findings, it is imperative that any strategy by the German government to recruit workers from outside Europe to alleviate labor shortages should be accompanied by robust anti-discrimination measures and targeted educational campaigns to promote intercultural awareness and dismantle prejudices within companies to support its effectiveness. Moreover, it seems worthwhile to highlight the economic disadvantages firms incur from their discriminating behavior. The fact that predominantly smaller firms discriminate suggests that their discrimination might partly be an issue of available resources for recruitment in comparison to large firms which have human resource departments and standardized recruitment processes. Comprehensive trainings in anti-discriminatory recruitment might help smaller firms, but appear

only feasible when using existing institutions. For example, firms in skilled crafts and trade could benefit from integrating such trainings in the educational programs coordinated by the Chamber of Commerce and Industry (IHK) for prospective masters (Meister).

At first glance, the persistence of discriminatory hiring practices against disadvantaged groups during labor shortages in our study seems to contradict the studies by Baert et al. (2015 for Belgium) and Mergener, Maier (2019 for Germany). Both studies reported reduced discrimination towards minorities when labor is scarce. However, several key differences help reconcile these apparent discrepancies. Baert et al. (2015) focused on a much younger cohort (applicants aged 18 or 21) compared to the 37-year-old applicants in our study, which might influence employers' perceptions and biases differently. Additionally, Baert et al. (2015) measured labor shortages at the occupation level, which can capture broader industry trends, whereas our analysis at the firm-level offers a more direct assessment of immediate hiring needs and practices. Furthermore, the study by Mergener and Maier (2019), which was conducted with 485 firms in Germany in 2015, included a disproportionate number of large firms. As our results and additional analyses confirm, larger firms tend to exhibit less discrimination – a factor that could significantly skew comparative outcomes (section 3.2.2).¹¹

Furthermore, our findings are corroborated by a list experiment conducted concurrently with the vignette study, which provides robust evidence of widespread discrimination against minorities in the German labor market. This parallel experiment revealed that a significant proportion of employers explicitly refuse to hire applicants identified as refugees, Muslims, or those wearing religious symbols. The list experiment's design, which embeds these attributes within broader questions about recruitment challenges, effectively captures employers' implicit biases. This approach is particularly adept at uncovering genuine employer sentiments by minimizing the influence of socially desirable responses, thus providing additional support of the discrimination against minorities revealed in our vignette experiment. Given that the questionnaire explicitly referred to group attributes as potential *exclusion criteria*, we interpret this as indicative of taste-based discrimination, where biases are driven by personal prejudices rather than economic rationales or misconceptions about skill levels.

To conclude, while our study provides a critical examination of the initial stage of the recruitment process, it likely captures only the tip of the iceberg regarding workplace discrimination. Research demonstrates that discriminatory processes persist beyond the initial hiring phase, e.g., during the job interview and throughout the tenure of employment (Quillian, Lee, and Oliver 2020). Consequently, the biases identified here could be even more pervasive and entrenched than our findings suggest. Future research is needed to investigate the influence of different personal characteristics, such as human capital, across all stages of the recruitment process.

¹¹ The percentage of firms with at least 250 employees is 16.5 percent in their data and 6.5 percent in our sample. According to the Federal Statistical Office, 0.5 percent of the more than 3.2 million firms in Germany had at least 250 employees in 2021 (Destatis 2024b). Also, the deviation from the 'true value' of 1.8 percent in the 50-249 employee category is much greater in Mergener, Maier (2019) at 33% than in our sample at 22 percent.

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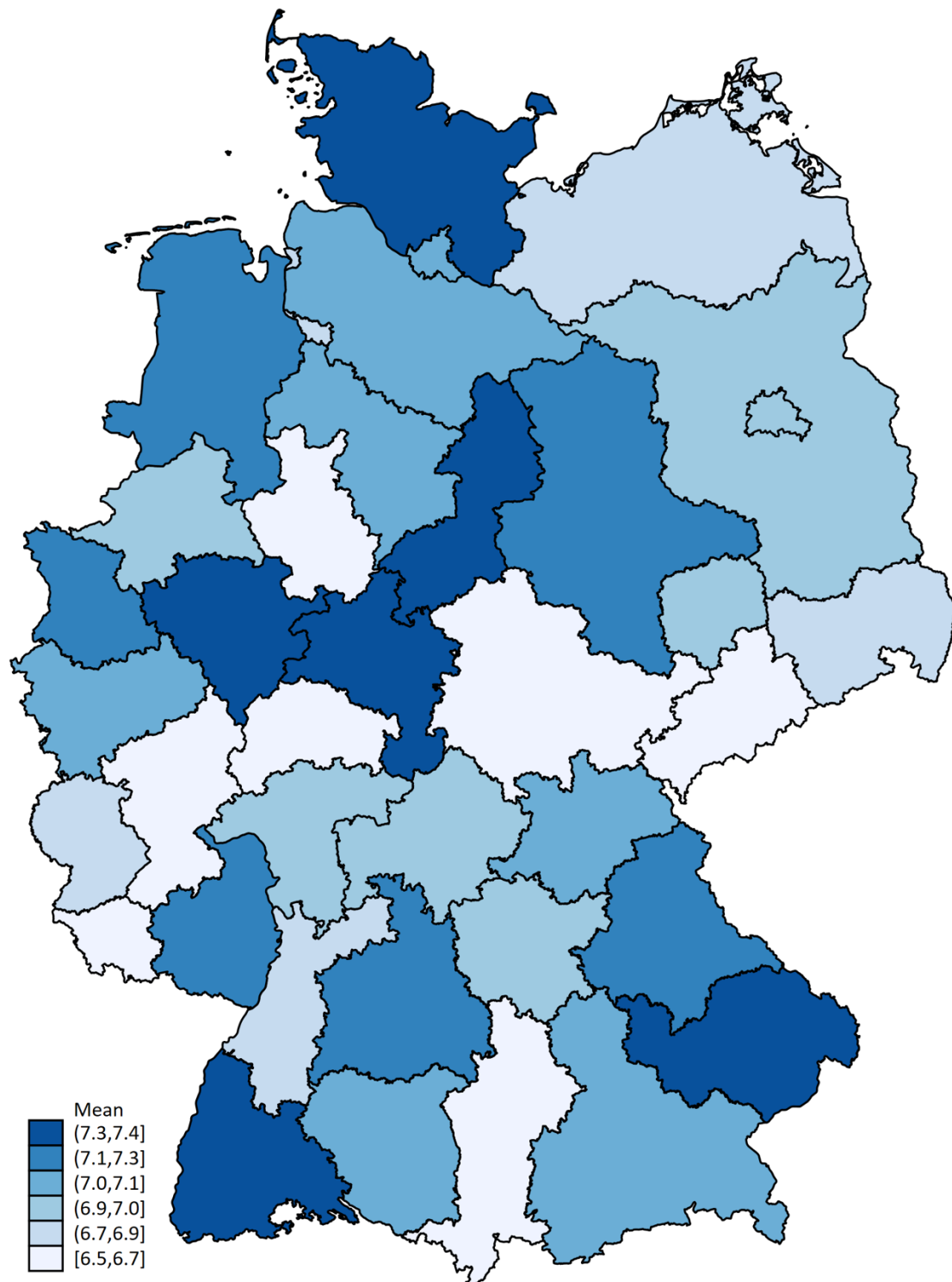
Appendix

Table A 1: Dimensions and levels in the vignette experiment with fill text

Imagine you receive the following application for an position advertised in your company as	Assistant skilled
The person is	[1 out of 137 occupations].
	Female
	male
, 37 years old and has	no kids.
	2 kids.
She/He is	German.
	born in Syria,
	born in Ukraine,
	born in Russia,
	born in Turkey,
	(empty for German)
	has a valid residence permit
	holds German citizenship
	[empty for German]
	and has everyday German language proficiency (certified B1).
	and has very good German language proficiency (certified C1).
She/He	was educated in Germany (fix for German)
	was educated in [origin country] (fix for born abroad)
	[empty for assistant position]
	. (empty)
	(recognized as equivalent in Germany).
	(empty for German)
	(empty for assistant position)
(Skilled): and has	otherwise no professional experience as [occupation].
(Assistant): She/He has	(Only German):
	several years of professional experience as [occupation].
	(Only born abroad):
	several years of professional experience as [occupation] exclusively in [origin country].
	several years of professional experience as [occupation] exclusively in Germany.
	several years of professional experience as [occupation] both in Germany and [origin country].
In her/his free time, she/he is involved	in a Muslim cultural club.
	in a church club.
	in a sports club.
Please indicate on a scale from 1 to 10 how likely you would hire the person in your company, where 1 stands for “very unlikely” and 10 for “very likely”.	

Source: Factorial survey experiment in the IAB Job-Vacancy Survey.

Figure A 1: Mean vignette hiring score from 1 (low) to 10 (high) at the NUTS-2 level



Source: Own calculations based on 4,883 observations from a vignette experiment in the IAB Job-Vacancy Survey and BKG (2018).

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Imprint

IAB-Forschungsbericht 6|2025

Date of publication

March 20, 2025

Publisher

Institute for Employment Research
of the Federal Employment Agency
Regensburger Str. 104
90478 Nürnberg Germany

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Website

<https://iab.de/en>

ISSN

2195-2655

DOI

[10.48720/IAB.FB.2506](https://doi.org/10.48720/IAB.FB.2506)

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