

Protsch, Paula

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Employers' recruitment contexts and hiring preferences in the German youth labor market

Author: Paula Protsch

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Abstract

This article examines whether and to what extent employers' hiring preferences regarding male and female applicants' cognitive and noncognitive skills signals vary with the regional and occupational recruitment context. According to the job-competition model, supply and demand might increase or decrease young people's opportunities over and above the effect of inequalities linked to individuals' ascribed characteristics and education. Few studies have considered the interrelatedness of regional and occupation-specific supply and demand and how this affects employers' hiring preferences in youth labor markets. I analyze a factorial survey experiment conducted on the German apprenticeship market, which was integrated into a larger representative employer survey. Employers evaluated a randomly assigned set of résumés and indicated how likely it was that each applicant would be invited to a job interview or employment test. Statistics on regional and occupational supply and demand and the occupational gender composition were matched to the employers. The results indicated that employers favored applicants with better skills signals and preferred male applicants in male-dominated occupations. Further, employers who encountered or anticipated recruitment difficulties in their region and occupation rated applicants with the same skills signals more positively than employers in contexts with applicant oversupply. However, female applicants did not receive significantly higher ratings in male-dominated occupations in contexts with excess employer demand, nor did the gender gap in ratings decrease considerably.

1. Introduction

A smooth transition from school to work is very decisive for an individual's life course. Choosing an occupation is regarded as a crucial youth developmental task and it is also highly consequential for future labor market success and related social inequalities (Buchmann, 2011). In Germany and similar countries, such as Austria or Switzerland, the dual apprenticeship system is the major entry point into occupational labor markets for young people who are not eligible for or do not want to pursue tertiary-level education. Vocational qualifications (or alternatively university degrees) are tremendously important for finding gainful employment (Gangl, 2001; Müller & Shavit, 1998). Consequently, labor market entry in Germany might be defined by participation in apprenticeship training programs, which combine general schooling and training-on-the job for a specific occupation (Kerckhoff, 1995). Employer demand for workers with these intermediate-level qualifications continues to be high (Czepek et al., 2015).

When young people in Germany are about to graduate from high school and would like to start an apprenticeship, they have to apply to individual employers who are offering training places in their preferred occupations. Employers who hire apprentices in such youth labor markets typically base their decisions on limited and uncertain information about applicants (Mueller & Wolter, 2014). In theories based on the idea of statistical discrimination, employers are assumed to use educational credentials as easily observable signals of applicants' skills and are expected to also use gender and other ascribed characteristics as indicators of productivity (Spence, 1973; Thurow, 1975). Yet, other scholars have argued that employers treat gender differently. Young women and men's labor market opportunities should be affected by status-based discrimination rather than statistical discrimination—due to strong occupational sex segregation and the related gender stereotypes (Correll & Benard, 2015; Ridgeway & Correll, 2004). In line with statistical discrimination, the job-competition model proposed by Thurow (1975) predicts that employers' hiring preferences regarding both skills signals and ascribed characteristics such as gender are relative to the supply and demand in their recruitment contexts. Extending the idea of labor and job queues, Reskin & Roos (1990) have argued that employers' prevailing gender preferences are unlikely to change in the short run but that the supply and demand conditions might give rise to hiring situations in which employers act upon these preferences to a lesser degree. Employers' gender preferences might, however, also change in an absolute sense. In this instance, women would gain steady access to formerly male-dominated occupations because these occupations would become less attractive to

men. Employers would no longer differentiate between male and female applicants or even rerank the applicants in the labor queues.

Based on these theoretical approaches, I will argue that employers' hiring preferences and therefore young people's labor market opportunities may not just vary with their educational credentials, ascribed characteristics, and search and application efforts, but also with their labor market contexts. In recent times, employers in the German apprenticeship system have reported increasing difficulties in finding (good) matches for their apprenticeships (DIHK, 2019; BIBB, 2020). If employers face excess demand for apprentices in their region and occupation, or alternatively, if they benefit from applicant oversupply, this might increase or decrease young people's opportunities over and above the effects of inequalities linked to individuals' ascribed characteristics and education. Against this backdrop, I investigate whether and to what extent the *regional and occupational supply and demand situation* impacts on employers' hiring preferences regarding skills signals and applicant gender in the German dual apprenticeship system.

Previous research has shown that the reasons why employers use education as a hiring criterion differ across countries (Di Stasio & van der Werfhorst, 2016; Humburg & van der Velden, 2015). In addition, a growing number of studies are investigating employer discrimination based on gender and other ascribed characteristics such as ethnicity (cf. Baert, 2018). However, while significant progress has been made in the research on employer hiring in general, research on its contextual variations has not yet been conducted to any significant extent (see also Bills, Di Stasio, & Gërkhani, 2017, p. 296). More specifically, the question of whether and how employers' hiring preferences depend on supply and demand conditions has been rarely studied using actual employer-level data. The few studies that have considered the employers' recruitment contexts have found mixed results and did not include research on school-to-work transitions. As I will discuss, previous studies that investigated variations in skill requirements and employer discrimination have either focused on general labor market conditions or selected occupations (cf. Baert et al. 2015; Bills, 1988; Birkelund, Heggebø, & Rogstad, 2017; Midtbøen, 2015; Modestino, Shoag & Balance, 2016; Weichselbaumer, 2004). Yet, looking at occupation-specific supply and demand without considering the regional dimension or vice versa might lead to incorrect conclusions regarding employers' actual recruitment contexts. As Fernandez and Su (2004, p. 546) have emphasized “[s]patial areas form a kind of backdrop, the boundary of the arena within which

the competition for labor takes place.” Arguably, employers hiring apprentices for attractive occupations in regions with generally more vacancies than applicants will find it less difficult to recruit young people than employers hiring apprentices for less attractive occupations under the same regional conditions.

In this article, I will analyze a factorial survey experiment on how employers evaluated male and female applicants with better and worse cognitive and noncognitive skills signals in different regional-occupational contexts across Germany. In the factorial survey experiment, more than 500 employers were asked to evaluate a randomly assigned set of five short résumés from fictitious applicants as part of a larger representative survey. The respondents were asked to rate how likely it was that a particular applicant would be invited to participate in a follow-up selection stage in their hiring process for a particular occupation. With respect to applicant characteristics, the factorial survey circumvents the problems of endogeneity that are usually present in nonexperimental research designs. In addition, unlike many other studies, the present study is able to consider the regional *and* occupational supply and demand situation and to control for relevant organizational-level characteristics.

2. The German apprenticeship system—a major youth labor market

The German dual apprenticeship system can be regarded as a major youth labor market. For many young people, starting an apprenticeship is their first consequential step in their school-to-work transition. The linkage between education and future labor market success is strong, even at this very first transition point, which is when young people graduate from the tracked high school system and try to enter either vocational training (apprenticeships) or tertiary-level education (DiPrete et al., 2017; Gangl, 2001; Müller & Shavit, 1998). More than 50 percent of all school leavers start an apprenticeship and large proportions of these enter the occupational labor market via apprenticeship programs (BIBB, 2020, p. 167). Apprentices attend vocational schools for one or two days a week and are trained on the job for skilled work for about three years in more than 300 different occupations. The training programs lead to intermediate-level vocational qualifications (level 3 according to the International Standard Classification of Education ISCED). Internationally comparative studies often fail to grasp the importance of this very first transition in the German context and define the first significant job after training as labor market entry (Kerckhoff, 1995).

Institutional regulations in the dual system are a tripartite responsibility. The relevant actors are employers' organizations, trade unions, and public authorities at the federal and state level. The curricular and regulatory frameworks for occupational training are all developed and legislated for at the federal level. Yet, employers can freely decide on whether they want to participate in the dual apprenticeship system and offer training positions in the occupations they need. They also set their own hiring standards and decide on whom they want to hire as apprentices. Employers make a considerable effort when recruiting apprentices, because after a short trial period, apprentices enjoy very high levels of dismissal protection. Training contracts are usually concluded for three years and many apprentices are hired as regular employees after the training period (Witte & Kalleberg, 1995). Applicants typically submit written application documents, including a short cover letter, a résumé, and copies of their recent school report cards. These report cards provide information on the level of schooling, school grades, and some so-called noncognitive skills, such as punctuality, absenteeism, and social skills and working habits in school (including team-working ability, reliability, and politeness). Young people who are just about to leave school do not have any occupation-specific skills, which are extremely important for finding employment in the German labor market. For this reason, employers evaluate applicants' potential cognitive and noncognitive skills by screening their school report cards. Promising candidates are then invited to participate in follow-up selection stages, which mostly involve employment tests and job interviews (Authors).

While all groups of school leavers can participate in the dual apprenticeship system, the main group that employers want to attract is young people with intermediate-secondary-school certificates, which is also the largest graduating group. The schooling system differentiates between three school-leaving certificates: the lower secondary school-leaving certificate (*Hauptschulabschluss*), the intermediate secondary school-leaving certificate (*Mittlerer Schulabschluss*), and the upper secondary school-leaving certificate (*Abitur*). Students wishing to study at a university require the latter certificate. These students spend two to three years longer in high school than students with lower or intermediate secondary school-leaving certificates.

Vocational training programs within the dual apprenticeship system and beyond are highly sex segregated. Male-dominated training occupations are overrepresented in the dual apprenticeship system, while some quantitatively important female-dominated training occupations (e.g., nursing)

are institutionally located outside the dual system and are thus not covered by its regulations. Young people's occupational aspirations also tend to be largely but not entirely sex segregated (Author; Malin & Jacob, 2018). Young women applying for apprenticeship offers in male-dominated occupations often encounter barriers. Their chances of finding an apprenticeship place would be higher if they applied for a female-dominated occupation instead (Imdorf, 2012; Beicht & Walden 2015). At the same time, nationwide corporate initiatives such as *Girls' Day* (and the more recently initiated *Boys' Day*) aim to motivate young people to choose nontypical occupations. These initiatives are supported by all actors involved in the dual apprenticeship system, including employers' organizations. The aim is to open up opportunities for young women and to prevent skill shortages in the respective occupational fields.¹

Over the last decade, it has become more difficult to match young people to apprenticeships due to demographic aging and continuing educational expansion (BIBB, 2020; Jacob & Solga, 2015). While many lower-educated school leavers do not manage to secure an apprenticeship at all, higher-educated school leavers either tend to pursue tertiary education rather than vocational training or at least do not pursue training in less attractive occupations. As a result, employers are increasingly facing challenging recruitment situations and are finding it hard to get (good) candidates for their vacancies (DIHK, 2019). In 2019, more than 50,000 apprenticeship training places were not filled, a figure that has more than doubled over the last decade (BIBB, 2020). Moreover, regional mismatches in the apprenticeship market are problematic. In the general labor market, individuals might opt to move from one region to another to improve their job opportunities if it is less costly than changing occupation (Reichelt & Abraham, 2017). By contrast, regional mobility in the apprenticeship market is limited. Only a small group of apprenticeship applicants can afford to move out of their parents' home, because apprentices are typically quite young and apprenticeship wages are rather low (BIBB, 2016, 101).

3. Previous research: employers' hiring preferences in context

In the literature on labor market transitions and school-to-work transitions, there has been a growing interest in demand-side processes and the types of skills signals that employers use as

¹ For more information see www.girlsday.de.

hiring criteria. Employers have consistently been found to prefer applicants with higher educational credentials or better cognitive and noncognitive skill signals in various institutional settings (Di Stasio & van der Werfhorst, 2016; Dörfler & van de Werfhorst, 2009, Gaddis, 2015; Humburg & van der Velden, 2015). In the present study, which looks at the German apprenticeship market, school-leaving certificates and school grades were used as signals of cognitive skills and teachers' reports on students' social skills and working habits were used as signals of noncognitive skills (Author). Likewise, there are many studies that have investigated employer discrimination based on ascribed characteristics such as gender. According to these studies, employers' preferences for either male or female applicants appear to be dependent on the occupations considered; this is often linked to the gender composition of the occupation (Baert, 2018; Campero & Fernandez, 2019; Imdorf, 2012; Kübler, Schmid, & Stüber, 2018). More generally, across the globe, labor markets are characterized by educational and occupational sex segregation (see Charles, 1992; Charles & Grusky, 2004, Iannelli & Smyth, 2008), with vocational training programs tending to be more strongly sex segregated than university-level programs (Imdorf et al., 2015).

By contrast, there is comparably little empirical research on how employers' hiring preferences vary with supply and demand in different contexts. Research on education and skill requirements has focused on demand shocks or recessions; such studies have used individual-level survey or administrative data instead of employer-level data. Notable exceptions include a comprehensive qualitative case study by Bills (1988) and a study based on job advertisements by Modestino, Shoag, & Ballance (2016). Bills (1988, p. 87) concluded that managers changed hiring standards in line with labor market conditions but had less scope to adjust wage offers. In a study that likewise looked at the U.S. labor market, Modestino, Shoag, and Ballance (2016) found that employers upgraded and downgraded their skill requirements depending on labor market tightness and recovery during and after the Great Recession. Of course, the skill requirements listed in job advertisements may or may not closely mirror actual hiring decisions. However, the literature on overeducation also suggests that employers tend to increase their skill requirements when they can recruit from larger applicant pools. Studies on a number of countries found that young people are more likely to be overeducated when they enter the labor market during recessions or at times when highly educated job seekers are in oversupply (cf., Devereux, 2002; Verhaest & van der Velden, 2013).

Yet, supply and demand do not just vary over time within given institutional settings. Occupation-specific conditions can also be expected to impact employers' hiring preferences. Baert et al. (2015) and Midtbøen (2015) found that employers discriminate less against ethnic minority applicants in a number of occupations with recruitment difficulties, while Birkelund, Heggebø, and Rogstad (2017) showed that employer discrimination did not vary according to occupation-specific supply and demand. A study by Weichselbaumer (2004) indicated that employers did not discriminate against female applicants for positions as computer programmers, although this is a male-dominated occupation with labor shortages. In this respect, several historical case studies on "women's inroads into feminizing male occupations" in the United States identified a similar pattern: Women gained access to formerly male-dominated occupations when the supply of male applicants was exhausted (Reskin & Roos, 1990, p. 63). In the German apprenticeship market, too, slowly evolving processes of occupational desegregation have been observed. We do not know whether these processes have at least partly been caused by policy initiatives such as *Girls' Day* (see Section 2). Haverkamp and Runst (2015, p.197), however, have argued that occupational desegregation is the result of favorable demand conditions, which opened up opportunities in more attractive occupations for young men and women.

In addition to the occupation-specific situation, regional factors may also explain within-country variations in supply and demand and thus for variations in employers' hiring preferences and young people's opportunities at a given time point. For instance, various studies have found that regional unemployment rates are associated with young people's transitions to apprenticeships and the labor market (Muja et al., 2019; Kleinert & Jacob 2013; Scherer, 2005; Weßling, Hartung, & Hillmert, 2015). There is also regional variation in the likelihood that young people will aspire to gender-typical occupations and in the proportion of male and female employees working in male-dominated and female-dominated occupations (Malin & Jacob, 2018). In fact, both dimensions of the recruitment context—the regional and the occupational dimension—should jointly contribute to creating the conditions under which employers make their hiring decisions (see also Reichelt & Abraham (2017) on the occupational and regional dimension of job mobility). It is much easier to hire young people for less attractive occupations in regions with a general oversupply of applicants than in regions with excess demand for apprentices. Conversely, it is more difficult to hire young people for attractive occupations in regions with general excess demand for apprentices than in regions with applicant oversupply. Moreover, occupational sex segregation might have an

independent impact. The interrelatedness of the occupational and regional recruitment context and the question of whether and how it affects hiring preferences and thus young people's opportunities has been largely disregarded by previous research on employer's recruitment behavior.

4. Theoretical considerations

To understand how the regional-occupational recruitment context impacts employers' hiring standards, I will discuss theoretical expectations regarding possible variations in the relative and absolute ranking of applicants based on the job-competition model. According to Thurow (1975), employers rank applicants based on both educational credentials and gender (or other ascribed characteristics). These applicant characteristics are seen as easy-to-observe signals or indicators of a job applicant's potential "trainability," which is in turn associated with productivity or actual competence.² More highly educated applicants are preferred over lower educated ones because they are expected to have higher cognitive and noncognitive skills and thus should be easier to train. Similarly, ascribed characteristics such as the applicant's gender might serve as indicators of productivity-related characteristics, which are used by employers to rank candidates "in the labor queue" (Thurow, 1975, p.94). Reskin & Roos (1990) further developed the queuing perspective by highlighting occupational sex segregation and emphasizing that labor queues are in fact gender queues. This implies that employers would prefer male applicants in male-dominated occupations and female applicants in female-dominated occupations (see also Campero & Fernandez, 2018; Correll & Benard, 2015; Glick et al., 1988; Ridgeway & Correll, 2004). Yet, the "relative magnitudes of the demand for and supply of qualified workers can prevent employers from acting on their [actual gender] preferences in filling jobs" (Reskin 1993, p.251). Accordingly, employers in recruitment contexts with applicant oversupply act on their typical gender preferences in hiring, while employers in recruitment contexts with excess demand for workers are more likely to accept lower-ranked applicants of the nontypical gender. As Reskin and Roos (1990, p. 34) stated: "labor shortages can create a chain of opportunities for progressively lower-ranked groups in the labor

² Standard economic approaches building on human capital theory also predict that the higher an individual's education, the higher their productivity, and, thus, the better the individual's labor market opportunities. These approaches, however, do not explain why employers' hiring preferences might differ with their recruitment context. The model of taste-based discrimination (Becker, 1971) adds the assumption that some employers with a so-called "taste for discrimination" will prefer to hire applicants of a certain gender (or race) even if other applicants were equally or even more productive. The mechanism behind these employer differences in taste remains unspecified, which leaves the question as to why some employers discriminate and others do not unanswered.

queue.” In this scenario, employers’ gender preferences are not expected to change in an absolute sense. Instead, the decisive factors in the basic job-competition model are the individual’s relative position compared to others interested in the same type of jobs and the number of available jobs (Bills, 1988, 2016; Di Stasio, Bol, & van der Werfhorst, 2016; Sørensen & Kalleberg, 1981). As highlighted by Sørensen and Kalleberg (1981, p.67) this implies that: “whenever there is a change in the labor and job queues, persons with similar characteristics will tend to be hired into different jobs and persons in similar jobs may have different personal characteristics.” According to this line of argument, employers can be expected to adapt their hiring standards to regional and occupational supply and demand conditions. This should be particularly true in markets with limited regional job mobility, where employers cannot easily recruit from other parts of the country. The following two assumptions and hypotheses are plausible. First, employers can generally be expected to prefer applicants with better cognitive and noncognitive skills signals. Moreover, employers who encounter or anticipate recruitment difficulties in their regional-occupational contexts should rate applicants with the same level of skills more positively than employers who can choose from larger applicant pools (*Hypothesis 1*). Second, we can assume that, in markets with high levels of occupational sex segregation, employers will prefer applicants whose gender is typical for the respective occupation. However, if employers face excess demand for apprentices in their region and occupation, lower-ranked applicants in the labor queue might be more likely to be invited for job interviews. Thus, analogously to Hypothesis 1, we can expect that in contexts with excess demand, employers will evaluate applicants with the nontypical gender for the occupation in question more positively than employers who can choose from larger applicant pools (*Hypothesis 2*).

By contrast, theories of status-based discrimination propose that employers’ gender preferences are very deeply rooted, unlikely to change, and thus contribute to the persistence of occupational sex segregation. Employers are said to be cognitively biased due to widely shared beliefs about gender-specific competences and occupational stereotypes, which disadvantage women more often than men (Correll & Benard, 2015; Ridgeway & Correll, 2004). Yet, Reskin and Roos (1990, p. 48) have argued that under certain circumstances, occupational desegregation can happen and employers might revise their productivity-related presumptions in an absolute sense. Such reranking processes—in which women actually gain regular access to formerly male-dominated occupations—might start when occupations become less attractive to men because the wages or

working conditions decline. Processes of occupational desegregation have likewise been observed in the German apprenticeship market (Haverkamp & Runst, 2015). In addition, prominent policy initiatives are trying to encourage young people to choose a nontypical occupation. If employers in regional and occupational contexts with excess demand do, in fact, (partly) revise their gender biases, they should differentiate between male and female applicants less than employers who can choose from larger applicant pools (*Hypothesis 3*).

5. Research Design

5.1 Data

I employed a factorial survey experiment that involved assigning short descriptions of fictitious applicants (the vignettes) to employers for evaluation. The factorial survey was integrated into the BIBB Training Panel 2014—an employer survey administered by the German Federal Institute of Vocational Education and Training (doi: 10.7803/371.14.1.2.10). The BIBB Training Panel is representative of employers in Germany with at least one employee. More than 3,000 employers were interviewed based on a disproportionate stratified random sampling design (Gerhards, Mohr, & Troltsch, 2016). The respondents were company owners, managing directors, or employees involved in their firms' human resource activities. The majority of respondents were interviewed by means of a computer-assisted personal interview (CAPI). However, if respondents were short on time, interviewers left a paper-and-pencil version of the questionnaire at the firm (this was the case for about 25 percent of respondents). As a subsample of the overall sample, employers who employed and/or were recruiting apprentices in the year of the survey and participated in the CAPI interview were randomly assigned to participate in one of two independent factorial survey experiments on (simulated) hiring situations.³ In the experiments, respondents assigned their own ratings after reading five vignettes—descriptions of fictitious applicants. The response rate was quite high. Only 5 out of the 680 employers who were randomly assigned to the current factorial survey experiment evaluated none of the vignettes and only 22 had missing values on single vignettes. The current study's actual analytical sample consisted of 2,809 vignette ratings by 565

³ The second factorial survey experiment is about employers' hiring preferences concerning Spanish immigrants (Protsch & Solga, 2017).

employers. This reduction in sample size is due to listwise deletion of observations with missing values on firm-specific controls and the exclusion of those employers who trained apprentices outside of the dual apprenticeship system.

To measure employers' regional and occupational supply and demand situation and the occupational gender composition, I added information derived from the Federal Employment Agency's *Apprenticeship Market Statistics* and the Federal Institute for Vocational Education and Training's *BIBB Statistics on Newly Concluded Apprenticeship Contracts at September 30* (short: *BIBB Statistics*) (BIBB, 2020, p.12f.).

5.2 Estimation method

The data has multiple observations per respondent—each employer received five applicant vignettes. To address this hierarchical data structure, which entailed nesting vignette ratings within respondents, I estimated linear random-intercept models. These multilevel models included variables at the level of the vignettes and the level of respondents and accounted for the fact that the respondent-level error terms are not independent. In addition, since employers were nested in regional-occupational contexts and employers in the same contexts should be more similar to each other than to other employers, I estimated cluster-robust standard errors at this level. A failure to account for the hierarchical data structure and the resulting interdependencies of the error terms might lead to regression coefficients that are wrongly estimated as significant (Auspurg & Hinz, 2015; Hox et al., 1991).

5.3 The factorial survey experiment

Factorial surveys are increasingly being applied to study decision-making processes in education and labor markets (cf. Damelang et al., 2019, Di Stasio & van der Werfhorst, 2016; Finger, 2016; Humburg & van der Velden, 2015; Karpinska et al., 2015). In contrast to deceptive field experiments, such as audit studies or correspondence tests, factorial survey experiments enable researchers to more efficiently study employers' hiring preferences based on multiple applicant characteristics at lower cost and to collect much more information on employer characteristics via the accompanying survey. A standard criticism of the factorial survey experiment approach is that it presents respondents with hypothetical situations. However, the current experiment included actual employers, and the applicant-rating task they performed was very similar to the typical tasks

they encounter at work. In fact, the external validity of factorial surveys can be quite high if the right population is targeted (Hainmueller, Hangartner, & Yamamoto, 2015).

As recommended by Auspurg and Hinz (2015, p.75f.), the current factorial survey was self-administered, meaning that interviewers advised respondents to read an introductory note and a set of five applicant profiles (the vignettes) by themselves. They were also advised to go back and forth while evaluating the vignettes and to correct ratings if they felt this was necessary. The vignette dimensions chosen for the current factorial survey were largely similar to the information employers could derive from young people's written application documents. A d-efficient sample of 250 vignettes was drawn from the vignette universe, which is the Cartesian product of all vignette characteristics. The vignette sampling ensured that I could independently estimate the effects of the vignette dimensions and their interactions on the employers' applicant ratings could be estimated independently (for details, see Auspurg and Hinz (2015, p.16ff.)). The vignette sets were randomly assigned to the employers. To avoid ordering effects, I randomized the order in which the vignettes were presented. The introductory note asked respondents to imagine that the young people in question had submitted applications for an apprenticeship in the occupation for which the firm trains the highest number of apprentices or had the highest number of vacancies. The note also informed respondents that all applicants were of German origin and that they had submitted appealing cover letters (for descriptive statistics, the introductory note, and a sample vignette, see online Appendix A, tables A1 to A3).

5.4 Dependent variable: employer ratings

Employers were asked to evaluate based on the information presented in the vignettes how likely each applicant was to be invited to their firm for a follow-up selection stage, which usually is an employment test or job interview. They could provide ratings on a ten-point-scale from 1 (very unlikely) to 10 (very likely). The wide-ranging scale, the random ordering of vignettes, and the fact that respondents could go back and forth between the vignettes while rating should have prevented respondents from disproportionately choosing the bottom or top end of a rating scale (Auspurg & Hinz, 2015). This worked as expected (see online Appendix A, figure A1).

5.5 Independent variables

5.5.1. Vignette dimensions: applicant characteristics

The vignette dimensions were the independent variables and controls at the applicant level. The following measures of cognitive and noncognitive skills signals were of particular interest for the current study: a) average school grades, with two values: “poor grades” (grade point average as per the German grading system: 3.4) and “good grades” (grade point average as per the German grading system: 2.8);⁴ b) number of unexplained absences from school, with values of “three days” versus “no days”; c) teachers’ report on the applicant’s social skills and working habits in school, with values of “mostly good” versus “very good”. There were two values for applicants’ gender: male versus female applicants. Since gender might be especially likely to prompt employer ratings biased by social desirability, this dimension only varied between respondents rather than within them. In general, factorial surveys have been shown to be less affected by social desirability bias than other survey methods. Yet, it is still unclear whether they sufficiently reduce social desirability bias related to sensitive issues. Between-subject designs appear to perform best in reducing social desirability bias but have comparably less statistical power than within-subject designs in terms of detecting significant effects of the vignette dimensions in question (Walzenbach, 2019). This did not appear to be an issue for the current study (see Table 1).

The vignettes contained further variables that are usually present in young people’s application documents and might affect employers’ hiring decisions. They were regarded as controls and included the applicant’s date of birth, (prospective) year of graduation from high school, activity since leaving school if applicable, and parents’ occupations. In addition, the level of schooling and ethnicity were held constant across the vignettes. All applicants were German and had obtained or were set to obtain the intermediate secondary school-leaving certificate before the apprenticeship started.

5.5.2. Employers’ regional-occupational recruitment context

Information on the employers’ regional-occupational recruitment context was generated from the *Apprenticeship Market Statistics* by the Federal Employment Agency and the *BIBB Statistics* by the Federal Institute for Vocational Education and Training. In combination, these statistics show

⁴ The German school grading scheme spans from 1 (very good) to 6 (fail). Grades from 1 to 4 are classified as pass, while 5 and 6 as fail. Employers usually require “good school grades” which is equivalent to a grade point average between 2 and 3 (Author).

how many apprenticeship applicants and training places were registered in a given apprenticeship year (September to September) by *training occupation* and by *region* (BIBB, 2020, p.12f.). Such administrative data are collected every year for monitoring reasons. The regions in questions are public employment agency districts. The analytical sample for the current study covered 133 of the 156 employment agency districts. As mentioned earlier, in the dual system, employers can offer apprenticeships in more than 300 occupations. Yet, more than 50 percent of apprentices train in just 20 different occupations (BIBB, 2016, p.144). The sample covered 111 different training occupations at the 5-digit level of the *German Classification of Occupations 2010* (KldB 2010), which were grouped into 71 units at the 3-digit level. For the *BIBB Statistics*, employers are obliged to report how many male and female apprentices they hired, what occupation they hired them for, and how many vacancies were left unfilled. At the same time, the public employment agencies providing information for the *Apprenticeship Market Statistics* reported how many interested applicants were still unable to find a training position in their region and occupation in a given apprenticeship year. I used these administrative data to operationalize a simple but meaningful indicator that enabled me to directly account for both the regional and the occupational dimensions of the recruitment contexts. In a first step, the supply-and-demand ratio was calculated by occupation (i.e., the occupation that the employer was hiring for) and by region (i.e., the region in which the employer's firm was located). The general situation in the German apprenticeship market in 2013 was that there was an applicant oversupply, with an average ratio of 92 (95 in the sample). In other words, for every 100 applicants there were 92 training places. In a second step, I differentiated between two categories of employers: employers with an "oversupply of applicants" compared to the number of training places offered in their region and occupation (ratio values ≤ 100) and employers with "excess demand for apprentices" in their region and occupation (ratio values > 100). The former category included those cases in which an equal number of applicants and training places were registered. Applicant oversupply meant that employers could typically choose from large applicant pools, whereas excess demand implied that employers were likely to be experiencing or anticipating recruitment difficulties (see Section 6 for sensitivity analyses regarding the cut-off value and further robustness checks for this measure).

Occupational gender composition was the second dimension of the employers' recruitment contexts that needed to be considered. Employers were expected to evaluate male and female applicants differently depending on the gender composition of the training occupation in question.

I used the *Apprenticeship Market Statistics* to determine whether or not the training occupation for which the employers were recruiting was male dominated. Training occupations were defined as male dominated if at least 70 percent of apprentices in that occupation across Germany were male. Since the majority of occupations in the dual apprenticeship system are male dominated, I summarized female-dominated occupations and mixed-gender ones into one category (excluding observations with mixed-gender occupations from the sample does not change the results).

5.5.3. Employer-level controls

Arguably, the recruitment difficulties experienced by individual employers and the regional-occupational supply-and-demand situation might not be perfectly correlated. For instance, some employers might have a reputation of being an exceptionally good employer and thus receive a lot of applications despite offering training in less attractive training occupations in a region with few applicants. Hence, I controlled for self-reported firm-specific recruitment difficulties in the training occupation in question in the last three years. The variable has three values: 1 = no difficulties within the past three years; 2 = some difficulties, with no more than 25 percent training places vacant; 3 = substantial difficulties, with more than 25 percent training places vacant. This subjective indicator captured a longer time period than the objective indicator on the regional-occupational recruitment context. I also considered the firm's economic sector, its location in East or West Germany, its size, and its post-apprenticeship hiring rate as further employer-level controls. I defined firms that hired at least 75 percent of their apprentices after the completion of training in the previous years as having a high post-apprenticeship hiring rate and others as having a low rate. Some employers regard apprenticeships as a good way to recruit future employees and to invest in their skills. In this scenario, apprenticeships are seen as a trial employment period (Witte & Kalleberg, 1995). If employers follow this so-called investment motive, they can be expected to have a high post-apprenticeship hiring rate. Other employers may have less solid intentions to hire their apprentices as regular employees. Instead, they might regard apprentices as cheap labor or participate in the dual system because they feel that it is a social responsibility to contribute. In the latter two cases, employers can be expected to have a lower post-apprenticeship hiring rate. Since the different motives for hiring apprentices might have affected employers' applicant evaluations and might also have varied across occupations and regions, I added this variable as a control.

6. Findings

Table 1 shows regression estimates from multilevel models on the general associations between employers' evaluations of applicants, applicant characteristics, and the employer-level variables. Results for the applicant-level variables differ only minimally between Model 1, which excludes employer-level variables and Model 2, which includes employer-level variables. This proves that the correlations between vignette dimensions and employer-level variables are negligible and that the random assignment of vignette sets to employers was successful (see also online Appendix A., Table A2). According to models 1 and 2, employers rated applicants with good school grades about 0.7 points higher than applicants with poor school grades on the 10-point rating scale (see also Figure 1). Similar effects are evident for the two measures of noncognitive skills signals. Employers rated applicants with no absences in the past school year about 0.8 points higher than those who were absent on three days. Applicants with very good social skills and working habits according to their report cards received ratings that were about 0.45 points higher than those of applicants with mostly good behavior. Further, young women received significantly lower ratings than men, with ratings for men on average about 0.8 points higher.

- Table 1 about here -

Figure 1 differentiates the analysis by the occupational gender composition. The estimates are marginal predictions derived from a regression model that includes two-way and three-way cross-level interaction terms for occupational gender composition, applicant gender, and skills signals (see online Appendix A., Table A4). Cross-level interactions allow for straightforward and illustrative comparisons of the effects of applicant characteristics on employers' ratings across different groups of employers—even though we do not expect to find significant interaction effects. Moreover, to evaluate whether differences in employer ratings for certain applicant groups are significantly associated with the employers' contexts, I present significance tests for these contrasts in Table 2.⁵ The right hand side of Figure 1 shows that employers who were recruiting for male-dominated occupations had a significant preference for male applicants.⁶ In contrast, the left-hand side of Figure 1 clearly shows that employers who were recruiting for female-dominated or mixed-

⁵ I used the postestimation command `contrast` in Stata 15 (Mitchell, 2012, chapter 7).

⁶ In female-dominated occupations and mixed-gender occupations, male applicants received higher ratings too; the gender effect, however, was not significant.

gender occupations did not show a preference for female applicants. It appears that men have an advantage in male-dominated occupations, while women do not have that advantage in female-dominated occupations.

- Figure 1 and Table 2 about here -

To test *Hypothesis 1*, which concerns whether employers in contexts with fewer applicants than vacancies rated applicants with the same skill levels more positively than employers in contexts with applicant oversupply, I added two-way cross-level interaction terms for the regional-occupational context and the skills signals as an extension of Model 2 (see online Appendix A., Table A5). The marginal predictions and their contrasts presented in the upper part of Table 3 show that applicants with the same skills signals received higher ratings in regional-occupational recruitment contexts with excess employer demand. For instance, employers in contexts with applicant oversupply awarded applicants with good school grades an average of 5.8 points on the ten-point-rating scale, whereas employers in contexts with excess employer demand awarded the same applicants an average of 6.4 points. The tests for the contrasts are statistically significant for each of the different skills signals and thus confirm *Hypothesis 1*. In other words, employers facing excess demand rated applicants with the same cognitive and noncognitive skills signals significantly better than employers who could potentially choose from larger applicant pools. In that sense, the findings support what the job-competition model predicts. Hiring preferences regarding educational achievements are relative to the supply and demand conditions. The same educational achievements do not translate into equal chances of being considered for apprenticeship positions across recruitment contexts. At the same time, all employers differentiated between applicants with better and worse skills, although at different levels.

In occupationally sex-segregated labor markets, employers are typically expected to prefer male applicants in male-dominated occupations and female applicants in female-dominated occupations. Analogously to *Hypothesis 1*, *Hypothesis 2* stated that the applicant ranking should be relative. In contexts with fewer applicants than vacancies, employers should rate applicants with the nontypical gender for that occupation more positively than employers in contexts with applicant oversupply. Yet, given that occupational desegregation is occurring slowly, employers in contexts with excess demand might not only be evaluating the nontypical gender more positively but might actually be starting to revise their gender bias in an absolute sense. Thus, *Hypothesis 3* expected that employers

in contexts with excess demand would differentiate less between male and female applicants than employers in contexts with applicant oversupply.

As Figure 1 illustrates, gender bias seems to be present in male-dominated occupations but not in female-dominated (and mixed-gender) occupations. Since this rendered it unnecessary to test *Hypotheses 2* and *3* for female-dominated occupations, I restricted the sample to male-dominated occupations (for the regression model, see online Appendix A., Table A6). The lower section in Table 3 shows that male applicants received higher ratings than female applicants in both types of recruitment contexts. Furthermore, employers rated female applicants more positively when they were recruiting in contexts with excess demand for apprentices. On average, female applicants received ratings of 5.2 on the ten-point-rating scale as compared to average ratings of 4.7 in contexts with applicant oversupply. The contrast for these marginal predictions, however, is insignificant and thus fails to support *Hypothesis 2*. In addition, the lower section in Table 3 shows how employers in male-dominated occupations evaluated male *versus* female applicants under conditions of excess demand and oversupply. In contexts with applicant oversupply, male applicants received ratings that were on average 1.55 points higher than those of female applicants. In contexts with excess demand, the significant difference in ratings for male versus female applicants was 1.44 points. Although employers' gender bias in ratings decreased by about 0.11 points in the latter contexts, *Hypothesis 3* is not confirmed because this decrease is rather small and not significant. In sum, employers did not rate female applicants more positively when recruiting under excess demand conditions, and they still significantly preferred male applicants—although they were facing recruitment challenges in their regional-occupational context. These findings support theoretical perspectives that expect occupational sex segregation and employers' gender bias to be very persistent, deeply institutionalized, and thus unlikely to change (Correll & Benard, 2015; Ridgeway & Correll, 2004). On the other hand, before ultimately rejecting *Hypotheses 2* and *3*, it should be noted that the subgroup of employers who were recruiting for male-dominated occupations in contexts with excess demand only consisted of 69 employers. A larger sample size might have detected significant results even if the differences in how female applicants are evaluated are rather small.

- Table 3 about here -

I conducted a number of sensitivity analyses to prove the robustness of the findings presented. To measure regional and occupational supply and demand, I used a categorical distinction rather than a continuous measure because the *Apprenticeship Market Statistics* underestimate the supply side (the number of apprenticeship applicants) and this underestimation might vary across regions and occupations (Ulrich, 2012). Despite this being the very best available data to operationalize the regional-occupational recruitment context, it is important to note that a one unit change in the supply-and-demand ratio does not mean that there will be a one unit increase or decrease in the number of training places per applicant at each single point in the distribution for each region and occupation. Thus, grouping employers into two salient categories should be a good approximation of the actual differences in supply and demand. As robustness checks, I estimated a number of regression models with alternative specifications. First, I varied the cut-off value that defined low and high demand contexts according to the regional-occupational supply-and-demand ratio (see online Appendix A., Table A7). By setting the cut-off value at 110 and 115 instead of 100, I determined that the effect is stronger at the upper end of the distribution, while it becomes insignificant when the cut-off value is set at 90 or lower. This seems very plausible. Due to the underestimation of the supply side, a balanced supply-and-demand situation might actually emerge at values above the 100-point cut-off level. By differentiating into three categories instead of two—below 90, 90 to 110 (or 115), and higher than 110 (or 115)—I confirmed that employers in contexts with excess demand evaluated applicants significantly more favorably than employers in contexts with applicant oversupply; nevertheless, this analysis also shows that the middle categories do not clearly point in either direction. In sum, setting the cut-off value at 100 is a rather cautious operationalization. Second, I ran a regression model that included the regional and occupational recruitment context in terms of supply and demand as two separate independent variables (see online Appendix A., Table A8). This model indicated that both dimensions of the recruitment context are related to how employers evaluate applicants. Third, another issue with the occupational dimension is that the training and job requirements are likely to differ between occupations. Employers seeking to reduce the expected training costs might require higher initial skills for certain occupations. To test whether this confounds the association between supply and demand and employers' evaluations, I re-estimated the relevant analyses for those occupations that are in both excess demand and low demand regional-occupational contexts. The findings are consistent (see online Appendix A., Table A8).

7. Discussion and conclusion

Making the transition from school to work is widely considered a very important task in young people's lives and has far-reaching consequences for their future labor market trajectories. School-to-work transitions vary across countries with different education systems and labor market institutions. Likewise, within countries, young people's labor market opportunities might not only vary with their educational credentials and ascribed characteristics but also across occupations and regions, which constitute the recruitment contexts in which employers operate. Previous studies on the impact of context on employers' hiring behavior have focused on three aspects. They have either investigated cross-country differences regarding the questions of whether and why education is used in hiring (cf. Di Stasio & van der Werfhorst, 2016; Humburg & van der Velden, 2015); they have looked at how employment opportunities—and, to a lesser extent, skills requirements—change over time with demand shocks or recessions (Bills, 1988; Devereux, 2002; Modestino, Shoag, & Ballance, 2016; Reskin & Roos, 1990; Verhaest & van der Velden, 2013); or they have asked whether employer discrimination differs across selected groups of occupations (Baert et al., 2015; Birkelund, Heggebø, & Rogstad, 2017; Midtbøen, 2015; Weichselbaumer, 2004). I add to this research by conceptualizing employers' recruitment contexts at a given time in a given country as being generally defined by first, the interrelatedness of regional and occupation-specific supply and demand conditions and second, the gender composition of the occupations for which employers are recruiting. Most previous experimental research on employers' hiring preferences used convenience samples, which necessarily restricted studies to certain regions and selected occupations. The current study complements and extends this research by using a factorial survey experiment on hiring preferences in the German apprenticeship market, which was conducted using a subsample of a larger representative employer survey.

In line with previous research, this study showed that employers prefer applicants with better cognitive and noncognitive skills signals to those with worse signals. Furthermore, employers hiring for male-dominated occupations showed a preference for male applicants. However, female applicants were not preferred in female-dominated occupations. In addition to these applicant-level characteristics, the study found that employers' regional-occupational recruitment context had an impact on their hiring preferences. Employers who encountered or anticipated recruitment difficulties in their region and occupation had lower hiring standards regarding educational

achievements; they rated applicants with the same cognitive and noncognitive skill levels more positively than employers in regional-occupational contexts with applicant oversupply. In that sense, and, as predicted by the job-competition model (Reskin & Roos, 1990; Sørensen & Kalleberg, 1981; Thurow, 1975), opportunities increase if employers face challenges in finding apprentices and they decrease in contexts in which the competition for jobs is high. Yet, young women appear to have a similar disadvantage in male-dominated occupations in both types of recruitment context. Employers did not rate female applicants more positively in contexts with excess demand for apprentices in comparison to contexts with applicant oversupply. They also distinguished their ratings for female and male applicants to a similar degree. Two conclusions can be drawn from this. First, it appears that the recruitment context in which an employer operated did not affect how they treated applicant gender in a relative sense. This at least partly calls into question the job-competition model, which in, its basic form, suggests that supply and demand conditions will affect achieved and ascribed applicant characteristics alike. Second, this study did not find that employers with recruitment difficulties started to reduce their prevailing gender bias in an absolute sense. The findings rather showed that re-ranking processes did not happen. Corresponding to theoretical accounts of status-based discrimination (Correll & Benard, 2015; Ridgeway & Correll, 2004), the gender stereotypes seem to be too deeply institutionalized and are unlikely to change to a considerable degree in the absence of any more dramatic shifts in supply and demand.

To put these findings in perspective, the differences found in employer ratings by recruitment contexts for cognitive and noncognitive skills signals are significant but relatively moderate. A likely explanation is that the employers' recruitment situation in the German apprenticeship market in terms of applicant supply is still relatively good. This might also be the reason why employers do not to rethink their gender bias, both in a relative and absolute sense. Although the number of vacant training places has been constantly increasing over the past ten years, there are still many more young people who are unable to find an apprenticeship than vacant apprenticeship positions. If skill shortages and employers' recruitment difficulties in the German labor market continue to increase (Czepek et al., 2015), hiring preferences may change to a greater extent than is currently observed. Moreover, the subsample of employers recruiting for male-dominated occupations in context with excess demand for apprentices is rather small. Larger sample sizes might allow for a

more accurate testing of the hypotheses related to applicant gender. In addition, since the factorial survey simulated hiring situations, I may also have underestimated the extent to which employers in real hiring situations adapt their hiring preferences to the supply and demand conditions.

An important advantage of the empirical design I chose is its capacity to focus on demand-side processes. Yet, a caveat here is that I could not directly take relevant supply-side factors into account. I was able to operationalize whether employers were recruiting in regional-occupational contexts with excess demand or with oversupply and to control for other relevant employer-level characteristics. In addition, the fictitious applicants' résumés were designed in such a way that they resembled those of real young people searching for training positions. Nevertheless, the exact quantity and quality of the employers' applicant pools remained unknown. For instance, I know that processes of occupational desegregation have been observed in the German apprenticeship market and that young men and women are getting trained for occupations dominated by the opposite gender. What I do not know is what the gender compositions in the actual applicant pools for the employers studied in this sample look like (see Campero and Fernandez (2019) for a recent contribution).

In terms of social inequalities in youth, we can conclude that employers' education-related hiring preferences appear to be relative rather than absolute. This opens up opportunities for low-achieving students living in regions with many vacant apprenticeship positions. Yet, this implies that the same educational achievements do not translate into equal occupational opportunities. While adult workers may choose to move to regions with better opportunities if they cannot or do not want to change their occupation, young people's regional mobility is restricted. They have to stay in their home region, adapt their aspirations, and try to pursue a career in an occupation that they find less attractive. If they do not do so, they risk becoming jobless. The analyses suggest that this might be even more applicable to young women with an interest in male-dominated occupations.

More generally, educational and gender-related disadvantages during school-to-work transitions can have long-term consequences in countries with a strong "education-occupation linkage" (DiPrete et al., 2017, p.1897) and a high degree of occupational sex segregation, such as Germany, Switzerland, Austria, and the Netherlands. In countries with weaker school-to-work linkages, such as in the United States or the United Kingdom, employers rely less on school achievements as

hiring criteria (Rosenbaum & Binder, 1997), meaning that social stratification may be less severe because career mobility is less restricted (DiPrete et al., 2017; Müller & Shavit, 1998). Furthermore, we can expect employer gender bias to be less present in labor markets with weaker occupational sex segregation. It is important for future research to investigate such country-specific differences in employers' hiring preferences in youth labor markets and the consequences for social stratification.

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Table 1: Linear random-intercept regression models predicting employer ratings

	Model 1		Model 2	
	Coefficient	SE	Coefficient	SE
Applicant characteristics (vignette level)				
Average school grades: good grades (ref. poor grades)	0.74***	0.08	0.74***	0.08
Days unexplained absent from school: zero (ref. three)	0.83***	0.08	0.83***	0.08
Social skills and working habits according to report card: very good (ref. mostly good)	0.46***	0.07	0.45***	0.07
Applicant sex (ref. female)	0.87***	0.18	0.82***	0.18
Father's occupation (ref. warehouse clerk Insurance clerk)	0.01	0.08	0.01	0.08
Teacher	-0.02	0.08	-0.02	0.08
Employee in employer's firm	0.35***	0.13	0.35***	0.13
Mother's occupation: kindergarten teacher (ref. elderly care nurse)	0.10	0.07	0.10	0.07
Activity since leaving school, year of birth (ref. not applicable, applicant still student, 1997)				
Various activities = no gap, 1995	-0.94***	0.11	-0.94***	0.11
Gap in résumé, 1995	-0.82***	0.11	-0.81***	0.11
Various activities = no gap, 1993	-0.89***	0.12	-0.88***	0.12
Gap in résumé, 1993	-1.03***	0.11	-1.04***	0.11
Employer-level variables				
Regional-occupational context: excess employer demand (ref. oversupply of applicants/balanced)				
Excess demand			0.60***	0.23
Male-dominated occupation (ref. non male-dominated)			-0.28	0.22
Firm-specific recruitment difficulties (ref. no difficulties)				
Some difficulties ($\leq 25\%$ vacant training places)			0.15	0.30
Substantial difficulties ($> 25\%$ vacant training places)			0.70**	0.30
East Germany incl. Berlin (ref. West Germany)			-0.54***	0.22
Firm size (ref. 1 to 19 employees)				
20 to 99			0.36	0.24
100 to 199			0.04	0.31
200 and more			0.25	0.24
Economic sector (ref. agriculture, production, construction)				
Sales, maintenance, business support and other services			-0.26	0.23
Public sector, education, medical and care			-0.39	0.30
High post-apprenticeship hiring rate (ref. no/low hiring rate)			-0.30	0.20
<hr/>				
Constant	4.56***	0.19	4.68***	0.46
Log likelihood/BIC	-6088.5/12296.1		-6074.1/12354.7	
sd_employer	2.01		1.97	
sd_vignette	1.73		1.73	
Rho	0.57		0.57	
Number of vignettes/employers	2,809/565		2,809/565	

* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$; se = standard errors.

Dependent variable *employer ratings* is measured from 1 (very unlikely) to 10 (very likely) that applicants are invited for a follow-up selection stage.

Source: BIBB-Training Panel 2014, own calculations.

Figure 1: Employer ratings by occupational gender composition

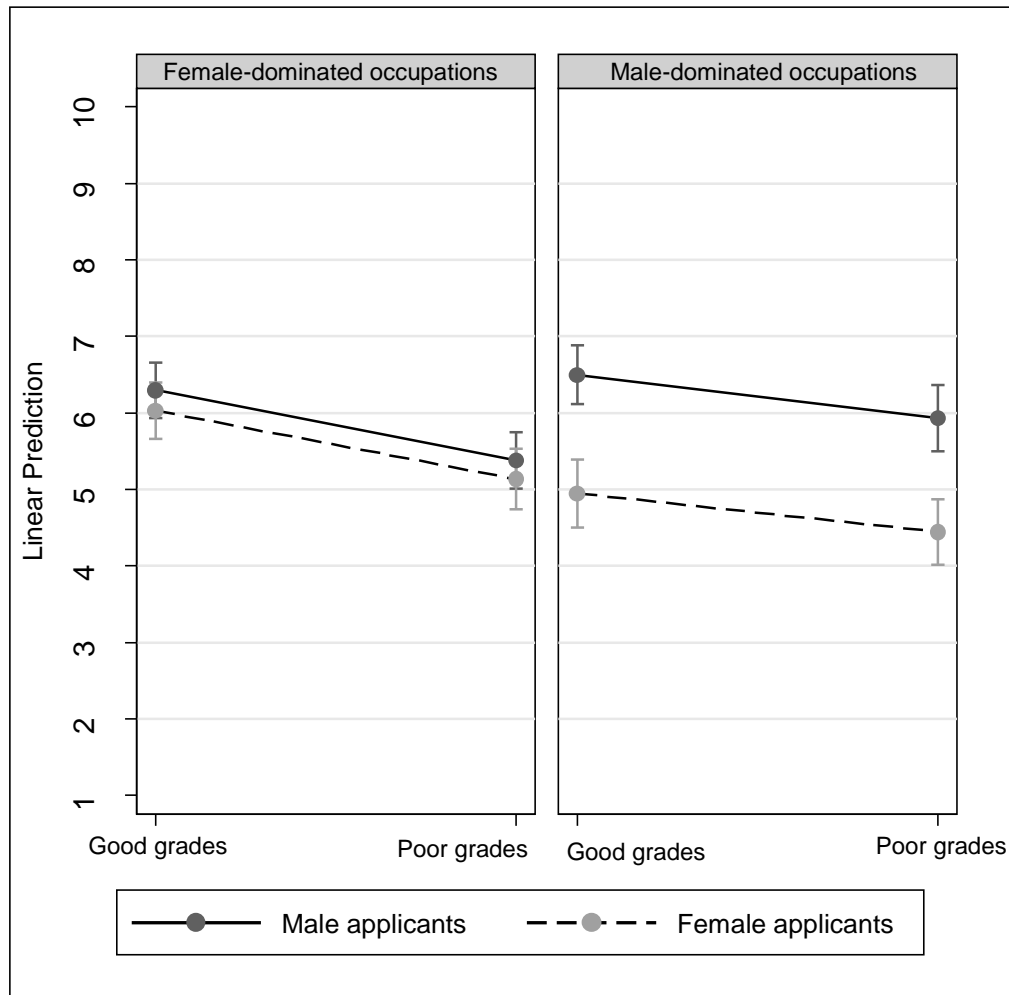


Figure shows predictive margins and 95% confidence intervals derived from a linear random-intercept regression model (online Appendix A., table A4). Dependent variable *employer ratings* is measured from 1 (very unlikely) to 10 (very likely) that applicants are invited to a follow-up selection stage. Number of observations: 2,809 (vignettes); 565 (employers). The category 'female-dominated occupations' includes mixed-gender occupations.

Source: BIBB-Training Panel 2014, own calculations

Table 2: Contrasts for marginal predictions presented in figure 1

	Contrast	SE
Male vs. female at female-dominated/mixed gender occupations	0.26	0.23
Male vs. female at male-dominated occupations	1.52***	0.26
Male vs. female with good grades at female-dominated/mixed gender occupations	0.27	0.25
Male vs. female with good grades at male-dominated occupation	1.55***	0.28
Male vs. female with poor grades at female-dominated/mixed gender occupations	0.24	0.26
Male vs. female with poor grades at male-dominated occupations	1.5***	0.29

* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$; se = standard errors.

These contrasts are estimated based on marginal predictions from a linear random-intercept regression model as presented in figure 1 (see also online Appendix A., table A4). Dependent variable *employer ratings* is measured from 1 (very unlikely) to 10 (very likely) that applicants are invited for a follow-up selection stage.

Source: BIBB-Training Panel 2014, own calculations.

Table 3: Employer ratings by regional-occupational recruitment context for skills signals and applicant gender (marginal linear predictions and contrasts)

	Margin	SE	Contrast	SE
School grades				
Good grades at applicant oversupply	5.82***	0.11		
Good grades at excess employer demand	6.36***	0.21		
Good grades at applicant oversupply vs. excess employer demand			0.54**	0.24
Poor grades at applicant oversupply	5.05 ***	0.11		
Poor grades at excess employer demand	5.72***	0.22		
Poor grades at applicant oversupply vs. excess employer demand			0.67***	0.25
Days unexplained absent from school				
No days at applicant oversupply	5.86***	0.11		
No days at excess employer demand	6.51***	0.22		
No days at applicant oversupply vs. excess employer demand			0.65***	0.25
Three days at applicant oversupply	5.05***	0.11		
Three days at excess employer demand	5.6 ***	0.22		
Three days at applicant oversupply vs. excess employer demand			0.55**	0.25
Social skills and working habits in school				
Good skills at applicant oversupply	5.67***	0.11		
Good skills at excess employer demand	6.3 ***	0.27		
Good skills at applicant oversupply vs. excess employer demand			0.63***	0.24
Poor skills at applicant oversupply	5.23***	0.17		
Poor skills at excess employer demand	5.8 ***	0.21		
Poor skills at applicant oversupply vs. excess employer demand			0.58**	0.24
Applicant gender, only male-dominated occupations				
Female applicant at applicant oversupply	4.66***	0.23		
Female applicant at excess employer demand	5.23***	0.46		
Female applicant at applicant oversupply vs. excess employer demand			0.57	0.52
Male applicant at applicant oversupply	6.21***	0.20		
Male applicant at excess employer demand	6.68***	0.32		
Male applicant at applicant oversupply vs. excess employer demand			0.47	0.38
	Contrast	SE	Difference	SE
Male vs. female applicant at applicant oversupply	1.55***	0.30		
Male vs. female applicant at excess employer demand	1.44***	0.56		
			0.11	0.63

* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$; se = standard errors.

Dependent variable *employer ratings* is measured from 1 (very unlikely) to 10 (very likely) that applicants are invited for a follow-up selection stage. Estimates are based on linear random-intercept regression models see online Appendix A, tables A5 and A6. Number of observations for the skills signals: 2,809 (vignettes); 565 (employers); for applicant gender: 1,263 (vignettes); 254 (employers).

Source: BIBB-Training Panel 2014, own calculations.

Online Appendix A. to “Employers’ recruitment contexts and hiring preferences in the German youth labor market”

Table A1: Descriptive statistics of vignette-level and employer-level predictors

Applicant characteristics (vignette-level variables)	N: Vignettes	Percent
Average school grades		
Poor grades (gpa: 3.4)	1,364	48.56
Good grades (gpa: 2.8)	1,445	51.44
Days unexplained absent from school		
Three days	1,411	50.23
No days	1,398	49.77
Social skills and working habits according to report card		
Mostly good	1,400	49.84
Very Good	1,409	50.16
Applicant sex		
Female	1,387	49.38
Male	1,422	50.62
Father’s occupation		
Warehouse clerk	851	30.30
Insurance clerk	797	28.37
Teacher	787	28.02
Employee in employer’s firm	374*	13.31
Mother’s occupation		
Kindergarten teacher	1,425	50.73
Elderly care nurse	1,384	49.27
Activity since leaving school/birth date		
Not applicable, applicant still student, 1997	893	31.79
Various activities = no gap, 1995	539	19.19
Gap in résumé, 1995	441	15.70
Various activities = no gap, 1993	426	15.17
Gap in résumé, 1993	510	18.16
Employer-level variables	N: Employers	Percent
Regional-occupational recruitment context		
Oversupply of applicants	433	76.64
Excess employer demand	132	23.36
Gender composition of occupation		
Non male-dominated (percentage of male apprentices < 70)	311	55.04
Male-dominated (percentage of male apprentices ≥ 70)	254	44.96
Firm-specific recruitment difficulties		
No difficulties	413	73.10
Some difficulties (≤25% vacant training places)	74	13.10
Substantial difficulties (>25% vacant training places)	78	13.81
East/West Germany		
West Germany	397	70.27
East Germany including Berlin	168	29.73

Table A1 continued

Firm size		
1 to 19 employees	142	25.13
20 to 99 employees	155	27.43
100 to 199 employees	79	13.98
200 and more employees	189	33.45
Economic sector		
Agriculture, production, construction	217	38.41
Sales, maintenance, business support and other services	242	42.83
Public sector, education, medical and care	106	18.76
Post-apprenticeship hiring rate		
Low rate: < 75 % of graduates hired	308	54.51
High rate: >= 75% of graduates hired	257	45.49

*This vignette level was deliberately subsampled to create more realistic vignette sets.

Source: BIBB Training Panel 2014, own calculations.

Table A2: Correlation matrix of vignette dimensions and employer-level variables

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. School grades	1													
2. Days unexplained absent	-0.023	1												
3. Social skills	-0.0069	-0.0117	1											
4. Applicant sexr	0.0064	0.0075	-0.0061	1										
5. Father's occupation	-0.0389	0.0363	0.0160	-0.0199	1									
6. Mother's occupation	-0.0271	-0.0259	0.0202	0.0023	0.018	1								
7. Activity since leaving school, age	0.0318	0.0202	0.0010	0.0010	0.0400	0.0005	1							
8. Regional-occu. recruit context	-0.0042	0.0058	-0.0033	-0.0435	0.0047	0.0064	0.0028	1						
9. Firm-specific recruit. difficulties	-0.0021	0.0019	-0.0076	-0.0381	-0.0048	0.0067	0.0085	0.2598	1					
10. East/West Germany	-0.0101	0.0056	0.0044	-0.0051	-0.0048	0.0009	-0.0186	0.1828	0.2476	1				
11. Firm size	-0.0029	0.0047	-0.0054	0.0163	0.0311	-0.0126	0.0154	-0.0985	-0.1625	-0.0558	1			
12. Economic sector	0.0050	0.0022	0.0216	-0.0871	-0.0121	-0.0009	-0.0056	-0.1180	-0.0848	0.0701	0.0568	1		
13. Post-apprenticeship hiring rate	-0.0008	-0.0057	-0.0056	0.0900	0.0336	-0.0181	0.0203	-0.052	-0.1526	-0.1259	0.3384	-0.1213	1	
14. Male-dominated occupation	-0.0076	-0.0106	-0.0121	0.0635	0.0129	0.0025	0.0144	0.083	0.0896	0.0713	0.0039	-0.4408	0.0251	1

Source: BIBB-Training Panel 2014, own calculations.

Table A3: Introductory sentences and note to the factorial survey with sample vignette

[English translation]

Finally, we would like you to answer a few questions regarding the training occupations for which your firm trains the highest number of apprentices or offers the highest number of training places. We also ask you to rate five short applicant profiles.

[other questions]

We want to come back to the applicant profiles we mentioned earlier. Here, we would like to ask you to read the following introductory note on the laptop by yourself and then to rate the five profiles. You may go back and forth between the profiles using the blue arrow keys in case you want to change your evaluations.

We present you with short descriptions of five fictitious individuals. Imagine that these individuals submitted written or online applications for a training place at your firm for the occupation of [insertion of occupation that was mentioned or inserted as response to Question EV1 or insertion of occupation from question EV3].

Given the information from the respective résumés, please evaluate how likely each applicant is to be invited to the follow-up selection stage after reading the application documents. You can select your rating on a scale from 1 to 10 (very unlikely to very likely).

The applicants differ in a number of characteristics. They all have in common that they are from Germany and have written an appealing cover letter.

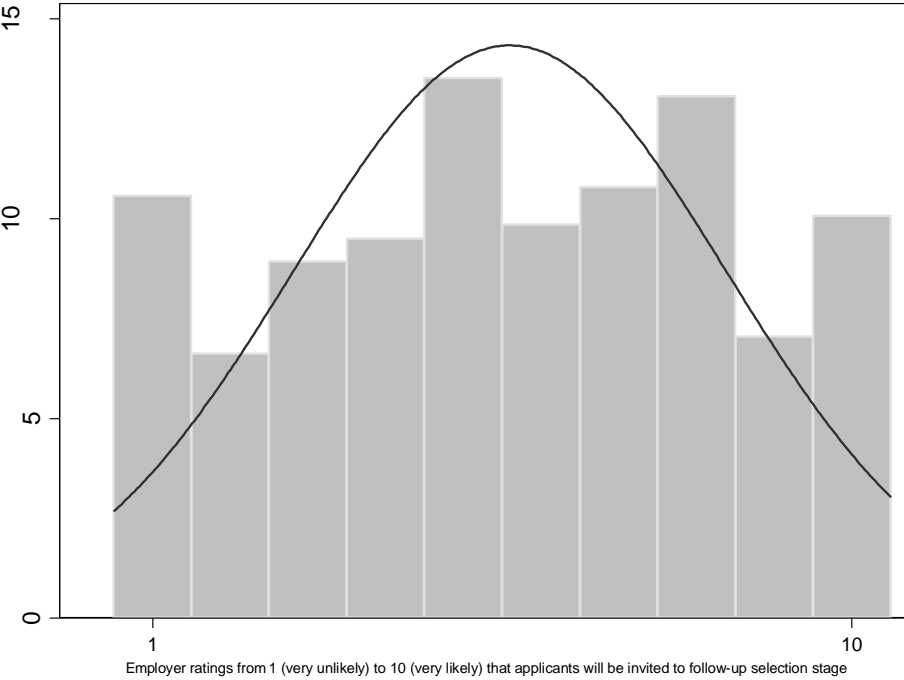
Sample vignette

<p>Sex: Female Date of birth: November 24, 1997 Fathers' occupation: Insurance clerk Mother's occupation: Elderly care nurse</p>	<p>Education: intermediate-sec school-leaving certificate, expected 2014 Current GPA: 3.4 Social skills and working habits according to report card: Very good Days absent from school without explanation: Three days Activity since leaving school: Not applicable, still in school.</p>
---	---

How likely is this applicant to be invited to the next selection stage in the hiring process?

Very unlikely	1	2	3	4	5	6	7	8	9	10	Very likely
	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	

Figure A1: Distribution of vignette ratings



Source: BIBB-Training Panel 2014, own calculations.

Table A4: Linear random-intercept regression model predicting employer ratings

	Model A4	
Applicant characteristics (vignette level)	Coefficient	SE
Average school grades: good grades (ref. poor grades)	0.90***	0.17
Days unexplained absent from school: zero (ref. three)	0.84***	0.08
Social skills and working habits according to report card: very good (ref. mostly good)	0.45***	0.07
Applicant sex (ref. female)	0.24	0.26
Father's occupation (ref. warehouse clerk)		
Insurance clerk	0.01	0.08
Teacher	-0.02	0.08
Employee in employer's firm	0.36***	0.13
Mother's occupation: kindergarten teacher (ref. elderly care nurse)	0.10	0.07
Activity since leaving school, year of birth (ref. not applicable, applicant still student, 1997)		
Various activities = no gap, 1995	-0.93***	0.11
Gap in résumé, 1995	-0.81***	0.11
Various activities = no gap, 1993	-0.87***	0.12
Gap in résumé, 1993	-1.03***	0.11
Employer-level variables		
Regional-occupational context: excess employer demand (ref. oversupply of applicants/balanced)	0.59***	0.22
Male-dominated occupation (ref. non male-dominated)	-0.69**	0.30
Firm-specific recruitment difficulties (ref. no difficulties)		
Some difficulties ($\leq 25\%$ vacant training places)	0.15	0.29
Substantial difficulties ($> 25\%$ vacant training places)	0.63**	0.30
East Germany incl. Berlin (ref. West Germany)	-0.56***	0.21
Firm size (ref. 1 to 19 employees)		
20 to 99	0.40*	0.23
100 to 199	0.06	0.31
200 and more	0.22	0.24
Economic sector (ref. agriculture, production, construction)		
Sales, maintenance, business support and other services	-0.24	0.23
Public sector, education, medical and care	-0.35	0.30
High post-apprenticeship hiring rate (ref. no/low hiring rate)	-0.28	0.19
Two-way and three-way interactions		
School grades X applicant sex	0.02	0.22
Applicant sex X male-dominated occupation	1.24***	0.39
Applicant sex X school grade X male-dominated occupation	0.04	0.32
<hr/>		
Constant	4.92***	0.47
Log likelihood/BIC		-6063.7/ 12365.7
sd_employer	1.93	
sd_vignette	1.72	
Rho	0.56	
Number of vignettes/employers	2,809/565	
<hr/>		

* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$; se = standard errors.

Dependent variable *employer ratings* is measured from 1 (very unlikely) to 10 (very likely) that applicants are invited for a follow-up selection stage.

Source: BIBB-Training Panel 2014, own calculations.

Table A5: Linear random-intercept regression model predicting employer ratings

	Model A5	
Applicant characteristics (vignette level)	Coefficient	SE
Average school grades: good grades (ref. poor grades)	0.77***	0.09
Days unexplained absent from school: zero (ref. three)	0.81***	0.09
Social skills and working habits according to report card: very good (ref. mostly good)	0.44***	0.08
Applicant sex (ref. female)	0.88***	0.25
Father's occupation (ref. warehouse clerk)		
Insurance clerk	0.012	0.09
Teacher	-0.02	0.13
Employee in employer's firm	0.11***	0.07
Mother's occupation: kindergarten teacher (ref. elderly care nurse)	0.10	0.07
Activity since leaving school, year of birth (ref. not applicable, applicant still student, 1997)		
Various activities = no gap, 1995	-0.94***	0.11
Gap in résumé, 1995	-0.81***	0.11
Various activities = no gap, 1993	-0.88***	0.12
Gap in résumé, 1993	-1.04***	0.11
Employer-level variables		
Regional-occupational context: excess employer demand (ref. oversupply of applicants/balanced)	0.59**	0.28
Male-dominated occupation (ref. non male-dominated)	-0.28	0.22
Firm-specific recruitment difficulties (ref. no difficulties)		
Some difficulties ($\leq 25\%$ vacant training places)	0.16	0.30
Substantial difficulties ($> 25\%$ vacant training places)	0.70**	0.30
East Germany incl. Berlin (ref. West Germany)	-0.54**	0.22
Firm size (ref. 1 to 19 employees)		
20 to 99	0.36	0.24
100 to 199	0.04	0.31
200 and more	0.25	0.24
Economic sector (ref. agriculture, production, construction)		
Sales, maintenance, business support and other services	-0.25	0.24
Public sector, education, medical and care	-0.38	0.31
High post-apprenticeship hiring rate (ref. no/low hiring rate)	-0.29	0.24
Two-way interactions		
School grades X regional-occupational context	-0.13	0.19
Days absent X regional-occupational context	0.10	0.2
Social skills and working habits X regional-occupational context	0.05	0.17
<hr/>		
Constant	5.23***	0.4
Log likelihood/BIC		-6073.5/12377.4
sd_employer	1.97	
sd_vignette	1.73	
Rho	0.57	
Number of vignettes/employers	2,809/565	

* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$; se = standard errors.

Dependent variable *employer ratings* is measured from 1 (very unlikely) to 10 (very likely) that applicants are invited for a follow-up selection stage.

Source: BIBB-Training Panel 2014, own calculations.

Table A6: Linear random-intercept regression model predicting employer ratings

	Model A6	
Applicant characteristics (vignette level)	Coefficient	SE
Average school grades: good grades (ref. poor grades)	0.54***	0.12
Days unexplained absent from school: zero (ref. three)	0.83***	0.12
Social skills and working habits according to report card: very good (ref. mostly good)	0.29***	0.10
Applicant sex (ref. female)	1.55***	0.30
Father's occupation (ref. warehouse clerk)		
Insurance clerk	-0.01	0.12
Teacher	-0.27**	0.13
Employee in employer's firm	0.34*	0.18
Mother's occupation: kindergarten teacher (ref. elderly care nurse)	0.13	0.09
Activity since leaving school, year of birth (ref. not applicable, applicant still student, 1997)		
Various activities = no gap, 1995	-1.02***	0.16
Gap in résumé, 1995	-0.70***	0.15
Various activities = no gap, 1993	-0.85***	0.19
Gap in résumé, 1993	-0.90***	0.16
Employer-level variables		
Regional-occupational context: excess employer demand (ref. oversupply of applicants/balanced)	0.57	0.52
Firm-specific recruitment difficulties (ref. no difficulties)		
Some difficulties ($\leq 25\%$ vacant training places)	-0.12	0.46
Substantial difficulties ($> 25\%$ vacant training places)	0.34	0.44
East Germany incl. Berlin (ref. West Germany)	-0.44	0.35
Firm size (ref. 1 to 19 employees)		
20 to 99	0.73**	0.37
100 to 199	0.17	0.49
200 and more	0.69*	0.36
Economic sector (ref. agriculture, production, construction)		
Sales, maintenance, business support and other services	-0.27	0.32
Public sector, education, medical and care	-0.13	0.69
High post-apprenticeship hiring rate (ref. no/low hiring rate)	-0.47	0.30
Two-way interaction		
Applicant sex X regional-occupational context	-0.11	0.63
<hr/>		
Constant	4.63***	0.56
Log likelihood/BIC		-2694.5/5575
sd_employer	2.03	
sd_vignette	1.67	
Rho	0.6	
Number of vignettes/employers	1,263/254	

* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$; se = standard errors.

Dependent variable *employer ratings* is measured from 1 (very unlikely) to 10 (very likely) that applicants are invited for a follow-up selection stage. Sample only includes those observations referring to male-dominated occupations.

Source: BIBB-Training Panel 2014, own calculations.

Table A7: Robustness checks 1, variations of the cut-off value for defining excess employer demand, linear random-intercept regression models predicting employer ratings

Regional-occupational context: excess employer demand vs. applicant oversupply	Coefficient	SE
Model 2: cut-off at 100 of the supply-and-demand ratio (see table 2)	0.60***	0.23
Model 2a: cut-off at 110	0.94**	0.38
Model 2b: cut-off at 115	0.81***	0.23
Model 2c: cut-off at 90	-0.04	0.19
Model 2d: ref. <90		
>= 90 & <=110	-0.19	0.19
>110	0.82**	0.34
Model 2e: ref. <90		
>= 90 & <=115	-0.12	0.19
>115	0.73*	0.40

* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$; se = standard errors.

Dependent variable *employer ratings* is measured from 1 (very unlikely) to 10 (very likely) that applicants are invited for a follow-up selection stage. Models include all vignette- and employer-level variables as in model 2, table 1 of the main document. Number of vignettes/employers: 2,809/565.

Source: BIBB-Training Panel 2014, own calculations.

Table A8: Robustness checks 2, linear random-intercept regression models

	Model A8a		Model A8b		Model A8c	
	Coefficient	SE	Coefficient t	SE	Coefficient	SE
Applicant characteristics						
Average school grades: good grades (ref. poor grades)	0.74***	0.10	0.74***	0.09	0.76***	0.11
Days unexplained absent from school: zero (ref. three)	0.83***	0.07	0.84***	0.09	0.83***	0.14
Social skills and working habits according to report card: very good (ref. mostly good)	0.46***	0.07	0.43***	0.08	0.38***	0.10
Applicant sex (ref. female)	0.87***	0.20	0.89***	0.20	0.94***	0.28
Employer-level variables						
Regional-occupational context: excess employer demand (ref. oversupply of applicants/balanced)			0.62**	0.25	0.57*	0.47
Regional context: excess demand (ref. oversupply of applicants)	0.36*	0.20				
Occupational context: excess employer demand (ref. occupational oversupply of applicants)	0.92***	0.25				
Two-way interactions						
School grades X recruitment context					-0.08	0.21
Days absent X recruitment context					0.07	0.22
Social skills X recruitment context					0.19	0.19
Constant	3.90***	0.62	4.58***	0.52	5.773***	0.45
Log likelihood/BIC	-6070.8/12355.9		-4869.5/9939.7		-4878.5/9812.9	
sd_employer	1.96		1.99		2.0	
sd_vignette	1.73		1.74		1.74	
Rho	0.56		0.57		0.58	
Number of vignettes/employers	2,809/565		2,243/451		2,243/451	

* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$; se = standard errors.

Dependent variable *employer ratings* is measured from 1 (very unlikely) to 10 (very likely) that applicants are invited for a follow-up selection stage. Models include all vignette- and employer-level variables as in table 2. Model A8b and A8c include only those observations referring to training occupations that are in both excess demand and oversupply-contexts.

Source: BIBB-Training Panel 2014, own calculations.