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### **Citation**

Vogel, D., Döring, M., & Sievert, M. C. G. (2023). Motivational signals in public sector job advertisements and how they relate to attracting and hiring candidates. *Public Management Review*. doi:10.1080/14719037.2023.2291068

Version: Publisher's Version  
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Downloaded from: <https://hdl.handle.net/1887/3716549>

**Note:** To cite this publication please use the final published version (if applicable).

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**To cite this article:** Dominik Vogel, Matthias Döring & Martin Sievert (23 Dec 2023): Motivational signals in public sector job advertisements and how they relate to attracting and hiring candidates, *Public Management Review*, DOI: [10.1080/14719037.2023.2291068](https://doi.org/10.1080/14719037.2023.2291068)

**To link to this article:** <https://doi.org/10.1080/14719037.2023.2291068>



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Published online: 23 Dec 2023.



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# Motivational signals in public sector job advertisements and how they relate to attracting and hiring candidates

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## ABSTRACT

This study examines how motivational signals in job advertisements relate to public employers' recruitment success, testing hypotheses derived from signalling theory and person – environment fit theory. We combine job advertisements collected via web crawling with matched survey data on the recruitment process (1,863 recruiters), capturing Germany's public sector job market. Using quantitative text analysis, we identify motivational signals in the job advertisements and analyse to what extent they relate to indicators of recruitment success. Results show that prosocial signals positively relate to a higher quality of applications and a more qualified selected candidate. By contrast, extrinsic and intrinsic motivational signals did not exhibit statistically significant effects.

**ARTICLE HISTORY** Received 27 August 2022; Accepted 29 November 2023

**KEYWORDS** Signaling theory; recruitment success; quantitative text analysis; job advertisements

## Introduction

Recruitment and hiring are crucial elements in ensuring high-quality public services because public organizations are human resource – intensive organizations (Piatak et al. 2021). During the COVID-19 pandemic, the need to hire an adequate number of employees became even more apparent (e.g. Keppeler and Papenfuß 2021). In fact, recruitment is a challenge that governments around the globe are facing (Lavigna and Hays 2004). However, attracting and selecting skilled staff becomes more difficult for public organizations because they face increasing competition for such personnel (Linos 2018). Although researchers and practitioners acknowledge this problem (Asseburg et al. 2020; Lewis and Pitts 2018), public organizations often struggle to successfully implement sufficient recruitment practices. This circumstance exists partly because public organizations 'differ from private ones in terms of goals and institutional context, which influences how, for instance, recruitment and selection are performed' (Løkke 2021).

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Public recruiters operate in an intensely regulated and formalized environment, decreasing their ability to apply innovative recruitment practices and often limiting them to passive recruiting (Løkke, Ryom Villadsen, and Bach 2023; Sievert, Vogel, and Feeney 2022). Thus, focusing on how to improve passive recruiting strategies is particularly relevant to public organizations and recruiters. However, empirical studies testing what makes passive recruiting strategies successful are scarce (Keppeler and Papenfuß 2021; Linos 2018; Linos and Riesch 2020). We build on previous research suggesting that public-sector work's specific characteristics and motives can serve as signals to potential applicants increasing recruitment success (Asseburg and Homberg 2020; Weske et al. 2020). These arguments first and foremost apply to job advertisements (Rynes and Barber 1990). Several scholars note that the design and content of job advertisements can shape the success of attraction and hiring (e.g. Sievert, Vogel, and Feeney 2022). This is especially true for public organizations operating in a more restrictive framework of equal-treatment regulations, in which more active recruitment forms can only be complementary.

Besides serving an informational function, job advertisements can signal various explicit and implicit values and motives to job seekers. This perspective originates from signalling theory (Celani and Singh 2011; De Cooman and Pepermans 2012). Several studies have investigated how different signals in job advertisements affect individuals' willingness to apply. Job seekers may be affected by rational or inspirational framings (Asseburg, Homberg, and Vogel 2018), whereby the emphasis is on motivational factors (Weske et al. 2020) or the specific benefits associated with a job (Linus 2018). Previous research has mainly focused on isolating the impact of separate signals that appear in job advertisements using fictitious job advertisements in experiments (e.g. Asseburg et al. 2020), often featuring non-generalizable samples (e.g. Weske et al. 2020). A second stream of articles focused on the content of real advertisements, presenting descriptive results. These studies analysed published advertisements, indicative of signals used by recruiters (e.g. Waldner 2012). Both types of studies – experimental and descriptive – exhibit limitations, leaving a significant research gap. Despite offering strict causal inferences, most (survey) experiments lack realism because they are not conducted in real labour markets. Descriptive studies score high on authenticity but lack meaningful dependent variables with correlational or causal inferences. Hence, there is a need to combine the external validity of studying real-world job advertisements with meaningful outcome measures in the labour market. This study addresses this research gap by focusing on motivational signals in real job advertisements combined with an analysis of how they relate to indicators of recruitment success. Specifically, we ask: *How do motivational signals in public sector job advertisements relate to the subsequent number of applications, the quality of applications, and the quality of the selected candidate?*

We contribute to the public administration literature by combining signalling theory with person – environment fit (P – E fit) theory and by applying a unique methodological approach: using automated data crawling techniques, we collected public sector job advertisements in Germany ( $N = 58,668$ ), providing a realistic picture of current job advertisement practices. We subjected this unique dataset to quantitative text analysis (QTA) to identify different motivational signals present in these advertisements (extrinsic, intrinsic, and prosocial motives). Additionally, we collected survey data from a sample of the organizations that issued these job advertisements ( $n = 1,863$  recruiters). Our analytical approach introduces methodological strength to

recruitment research by combining the survey response with the QTA results of the advertisements and archival data about the organizations. This matching approach was possible because we explicitly surveyed the recruiters about the recruitment process following the specific job advertisement they issued. Thus, we could identify the number and quality of applications and, if applicable, the satisfaction with the selected candidate following each job advertisement.

The assessment of recruitment success in public organizations is a pressing topic for both scholars and practitioners. Our approach introduces considerable realism to the empirical assessment of the hypothesized signalling effects. The methodological approach provides generalizable and robust implications for scholars and practitioners. We provide empirical evidence for the effectiveness of different motivational signals in job advertisements. We find that neither extrinsic nor intrinsic signals significantly relate to the outcome variables. However, prosocial signals were linked with higher levels of recruiter satisfaction with the applicant pool and, subsequently, the chosen candidate.

### Recruitment processes and signalling theory

Recruitment processes refer to ‘all organizational practices and decisions that affect either the number, or types, of individuals that are willing to apply for, or to accept, a given vacancy’ (Rynes 1991, 429). For public organizations, external recruitment is the main source of finding new talent (Kravariti and Johnston 2020). The primary goal is to attract applicants in sufficient numbers and with adequate skills and qualifications (Ehrhart and Ziegert 2005). Therefore, organizations strive to attract a candidate pool as large as possible to ensure selecting from a broad range of candidates. Generally, this approach increases the likelihood of finding a qualified candidate. To achieve this, the recruitment toolkit includes active approaches such as targeted searches or network-based measures (Tufts, Jacobson, and Stevens 2015). In the case of public organizations, these active approaches constitute an exception for most recruiting processes. Instead, public organizations predominantly apply passive recruitment strategies focusing on the broad dissemination of vacant positions. This includes, among others, conventional advertisements or job postings that are communicated broadly but not directly to potential candidates (Sievert, Vogel, and Feeney 2022). We focus on such job advertisements referring to ‘documents acknowledged through public media for the company or the organization to find the right talents to fill in vacant positions’ (Fu 2012, 399).

For those considering public sector jobs, job advertisements are crucial to determine whether an application is worthwhile. This is because job advertisements are often the only reliable source of information about a job and the organization. Employment advertising and job descriptions contain relevant information, ultimately affecting an individual’s impression of the organization and the job (Schmidt, Chapman, and Jones 2015). Signalling theory (Uggerslev, Fassina, and Kraichy 2012), a literature stream in economics and management research that developed over the last few decades (Connelly et al. 2011), helps explain the underlying judgement processes. Signalling theory focuses on information asymmetries among different parties or actors and proposes mechanisms that help reduce them (De Celani and Singh 2011; Cooman and Pepermans 2012; Spence 1973). As information asymmetries are prevalent in recruitment and hiring, signalling theory is commonly applied in

research examining job advertisements (Connelly et al. 2011; Singh and Hardaker 2014). Signalling theory suggests that individuals use the information presented in job advertisements because interpreting them can reduce prevalent information asymmetries (De Carpentier, Van Hoye, and Weijters 2019; Cooman and Pepermans 2012; Spence 1973). Potential applicants tend to search for signals that offer crucial inferences about what the job and the workplace might be like (Turban 2001). Given that job seekers have incomplete information, the signals presented in job advertisements often constitute the most accessible type of inference (Carpentier, Van Hoye, and Weijters 2019; Rynes, Bretz, and Gerhart 1991). The literature proposes that recruitment success depends on the signals presented in job advertisements because individuals' attitudes towards a job and an employer are primarily based on this content (Connelly et al. 2011; Ehrhart and Ziegert 2005).

Crucial to the individual application decision are motivational factors and whether job advertisements indicate the fulfilment of related employment attributes in the prospective job and organization (Asseburg et al. 2020). Following previous research, we focus on extrinsic, intrinsic, and prosocial motivational signals (Asseburg et al. 2020; Mergel, Bellé, and Nasi 2021). They constitute a set of 'distinguishable high-level motives' often cited by employees (Mergel, Bellé, and Nasi 2021, 345) that also originate from well-established motivation theories, such as self-determination theory (Breaugh, Ritz, and Alfes 2018; Ryan and Deci 2000). Previous research defines these motives by comparing them to one another. Extrinsic motives concern tangible rewards, such as 'money, prestige, or job security' (Kroll and Porumbescu 2017, 469). In contrast, prosocial and intrinsic motives differ from extrinsic motives because they are not concerned with external rewards. To distinguish intrinsic and prosocial motives, we can focus on what they entail. Intrinsic motives entail 'an individual's interest in their work as well as personal meaning attached to one's job, whereas the latter is about other-orientation and altruism' (Kroll and Porumbescu 2017, 470). Following these definitions, we can summarize: Extrinsic motives are primarily geared towards career aspects or material benefits (Asseburg et al. 2020). Intrinsic motives relate to self-efficacy and the fulfilment of individual needs (Asseburg et al. 2020; Ryan and Deci 2000). Finally, prosocial motives refer to helping someone else and are subsumed as other-oriented motives (Mergel, Bellé, and Nasi 2021).

### **Intrinsic, extrinsic, and prosocial signals in public sector job advertisements**

Job advertisements offer the opportunity to strategically communicate such motivational factors, thus reducing information asymmetries (De Cooman and Pepermans 2012). The main goal is to attract sufficiently qualified applicants with a high P - E fit (Ehrhart and Ziegert 2005).

#### ***Signal strength***

We argue that applicants interpret motivational signals in job advertisements and incorporate them into application decisions. Our arguments combine signalling theory and P - E fit theory (De Cooman and Pepermans 2012; Jones, Willness, and Madey 2014; Schmidt, Chapman, and Jones 2015). The latter theorizes and conceptualizes the interplay of individuals with aspects of their (work) environment.

Thus, person – environment fit (...) is generally defined as the compatibility between individuals and their environment” (Van Vianen 2018, 76). High P – E fit is generally seen as desirable, given positive outcomes for individuals and organizations (Kristof-Brown et al. 2005). Misfit, despite complex conceptual considerations (Englert et al. 2023), is often seen as undesirable (Follmer et al. 2018). Previous research indicates that signals about intangible aspects, such as work-related values, can affect an individual’s perception of P – E fit, thus affecting perceived job attractiveness (Lievens and Highhouse 2003). This is because once organizations reveal key aspects through signals, potential applicants can effectively assess their perceived fit with the organization and the job (Ehrhart and Ziegert 2005; Schmidt, Chapman, and Jones 2015).

The decision to apply primarily depends on an individual’s fit with the organization (e.g. regarding values) and job (e.g. related to responsibilities). The literature on P – E fit emphasizes that candidates self-select themselves into the recruitment process (Breugh and Starke 2000). Specifically, ‘a good fit between a person’s needs/wants, and the attributes (rewards) a job offers (...) will result in a sense of value attainment’ (Breugh 1992, 159). Since motivational factors are crucial for assessing fit, congruence with the motives a job speaks to should positively affect application decisions. Thus, perceived congruence between individual motivation and the signalled motivational factors should increase the likelihood of applying (Barrick and Parks-Leduc 2019).

We argue that the signal strength of displayed motives in each job advertisement positively affects the number of applications in the recruitment process. Signal strength is conceptualized as the overall number of signals in each category of motivational factors displayed in a job advertisement. For instance, a job advertisement might display five extrinsic signals, two intrinsic signals, and one prosocial signal. Following our conceptualization, this example exhibits higher signal strength for the extrinsic motives than for the intrinsic and prosocial motives. In our hypothesizing, we do not distinguish between extrinsic, intrinsic, and prosocial motives but rather consider the effects of motivational signals in general. This is because if job advertisements put a stronger emphasis on motivational factors, regardless of them being extrinsic, intrinsic, or prosocial, this should increase potential applicants’ ability to assess their individual fit. If more relevant signals are available to help the potential applicants assess their potential fit, it would decrease the information asymmetry for them. Moreover, it would also increase the overall number of individuals who see a fit between themselves and the offered job. Advertisements with a lower signal strength might deter individuals because they cannot adequately examine the perceived fit, regardless of their congruence with the job. Since in that case, it is more difficult or even impossible for potential applicants to assess fit, they likely refrain from applying. Thus, we argue that higher signal strength will likely lead to higher application numbers:

**H1a:** The job advertisement’s emphasis on extrinsic motives positively relates to the number of applications.

**H1b:** The job advertisement’s emphasis on intrinsic motives positively relates to the number of applications.

**H1c:** The job advertisement's emphasis on prosocial motives positively relates to the number of applications.

Second, the arguments derived from P – E fit and signalling theory also point to an impact on the quality of the applicant pool (Cable and Turban 2003). Since individuals assess their fit based on the displayed motivational signals, we argue that signal strength also affects who ultimately applies. Thus, reducing information asymmetries would affect the overall composition of the applicant pool. If individuals can better self-select themselves into the recruitment process, we expect a higher share of well-fitting individuals. Suppose applicants can make better assessments because, for instance, extensive extrinsic rewards are disclosed, we expect stronger self-selection of individuals focusing on these motives (Schneider 1987). Individuals preferring strong extrinsic rewards will be more likely to apply for positions offering them. Similarly, prosocially motivated individuals will avoid jobs characterized solely by extrinsic motives. Hence, job advertisements that exhibit stronger motivational signals should positively affect the resulting quality of applications through informed self-selection:

**H2a:** The job advertisement's emphasis on extrinsic motives positively relates to the quality of applications.

**H2b:** The job advertisement's emphasis on intrinsic motives positively relates to the quality of applications.

**H2c:** The job advertisement's emphasis on prosocial motives positively relates to the quality of applications.

Similarly, these arguments should be extendable to outcomes of the recruitment process, primarily the hiring decision. If job advertisements' signals attract potential applicants with desirable skills and values, the applicant pool will improve. Since the future employee is selected from this pool, higher numbers of qualified candidates lead to the selection of a more qualified candidate. Therefore, we propose that recruiters will be more satisfied with the appointment because it will be easier to find a candidate they perceive as a good fit within a high-quality applicant pool than an applicant pool with less-qualified applicants (Cable and Judge 1997). Thus, organizations would be more likely to hire satisfactory candidates if the applicant pool consists of more individuals attracted by the motivational signals. Simultaneously, applicants will be less likely to exit the application process (e.g. after an interview) if job advertisements have provided sufficient information for them to assess their fit (Ryan et al. 2000):

**H3a:** The job advertisement's emphasis on extrinsic motives positively relates to the organization's satisfaction with the selected candidate.

**H3b:** The job advertisement's emphasis on intrinsic motives positively relates to the organization's satisfaction with the selected candidate.

**H3c:** The job advertisement's emphasis on prosocial motives positively relates to the organization's satisfaction with the selected candidate.

### **Signal Content**

Decades of research on public service motivation (PSM; Perry and Wise 1990; Ritz, Brewer, and Neumann 2016) has highlighted that public employees are especially receptive to prosocial and altruistic motives (Piatak and Holt 2020; Weske et al. 2020). Studies have found significantly higher levels of PSM in workers employed in the public sector (Ritz, Brewer, and Neumann 2016). These arguments extend to the proposition that individuals who exhibit such motivations should be more likely to self-select themselves into public service (Christensen and Wright 2011). The general orientation towards the common good inherent in most public organizations may attract individuals who share such values (Kjeldsen and Jacobsen 2013). Public organizations often provide services in a social setting (e.g. schools or universities) and for vulnerable groups (e.g. social work), which fulfils prosocial needs (Asseburg et al. 2020). Consequently, scholars have advised practitioners to implement prosocial and PSM-related signals in job advertisements to improve sector attractiveness and application behaviour (Ritz, Brewer, and Neumann 2016; Weske et al. 2020). Thus, public organizations employing these signals are expected to attract more applicants who fit the organizational mission better. Moreover, we expect extrinsic signals to be less relevant and that prosocial signals outperform them. Furthermore, stereotypical expectations may affect potential applicants' expectations. For example, individuals often assume that public sector jobs are highly bureaucratic, resulting in bureaucratic hierarchies with little autonomy (Sievert, Vogel, and Feeney 2022). Therefore, we argue that potential applicants might view intrinsic motives displayed in job advertisements as less trustworthy. Prior expectations would reduce the impact of these signals compared to prosocial signals. Thus, intrinsic motives might be less relevant than prosocial signals:

**H4a:** The effect of prosocial motives on the number of applications is stronger than the effect of intrinsic or extrinsic motives.

**H4b:** The effect of prosocial motives on the quality of applications is stronger than the effect of intrinsic or extrinsic motives.

**H4c:** The effect of prosocial motives on the recruiters' satisfaction with the selected candidate is stronger than the effect of intrinsic or extrinsic motives.

### **Data and methods**

Our theoretical framework explicates how micro-level mechanisms (i.e. individual application behaviour) coalesce into meso-level outcomes (i.e. recruitment success), commonly defined as a transformational mechanism (Hedström and Ylikoski 2010). To subject these claims to a robust empirical test, we must rely on adequate

quantitative research (Hedström 2009) using data from multiple sources (Favero and Bullock 2015). First, we need real job advertisements to assess the prevalence of motivational signals and gain insights into the labour market. Second, additional data about the recruitment success of isolated recruitment processes (i.e. linked to a specific job advertisement) then allows investigating the relation between X: extrinsic, intrinsic, and prosocial motives and Y: number of applications, the quality of applications, and the quality of the selected candidate. Analysing this relation requires ruling out potential confounders (Z), achieved by considering control variables (Bernerth and Aguinis 2016). Experiments and single-source observational studies cannot accomplish this. Therefore, we developed a research design based on three independent data sources in line with best practice recommendations (Favero and Bullock 2015).

### ***Data source 1: digital job advertisements***

Our first data source relates to the independent variables of interest (X) as well as potential confounders (Z) and comprises digital job advertisements posted by public organizations. To obtain the textual data, primarily the main-body text and supporting information, we used the most prolific websites for public sector job advertisements in Germany ([www.service.bund.de](http://www.service.bund.de)). This site has three relevant features. First, it allows only public organizations to publish job advertisements, filtering out private and non-profit organizations. Second, it contains advertisements from across all government levels and all geographic areas, providing us with a great variety of organizations and vacant jobs. Third, it automatically integrates advertisements posted on other major public sector job sites.

We implemented an automated web crawler to collect the digital advertisements and supporting information. The crawler downloaded all posted job advertisements for nine months (17 June 2020 to 17 March 2021). This approach resulted in a database of 58,668 job advertisements. Subsequently, we assessed whether both the main-body text and supporting information were successfully obtained. Since the website allows organizations to post only a PDF or a link to another website, some entries could not be gathered automatically. In these cases, we manually extracted the text. Finally, we excluded job advertisements that did not contain contact information. This step was necessary because we needed the email addresses of the responsible recruiters to contact them with a subsequent survey. Our final dataset included 33,642 complete job advertisements.

For the statistical analyses, we extracted key characteristics of the advertisement from the text. This information is usually posted with the advertisement on the website. This meta-data included information about the contract type, such as full-time vs. part-time, permanent vs. non-permanent, the required education, and the type of job (i.e. sub-sector). The type of job was indicated by the hiring organization by selecting 1 of 18 categories (e.g. general administration, IT, or education). The obtained variables all constitute potential confounding factors, indicated by the causal structure. For example, different types of organization (Z) may affect which types of motivational signals are used (X), while simultaneously affecting recruitment success because some sectors may be more attractive than others (Y). Thus, including them in our analysis allows strengthening the robustness of the statistical inferences (Wysocki, Lawson, and Rhemtulla 2022).

The German public sector is characterized by strong job security and (at least for the past 15 years) high demand for well-educated applicants – especially in technical sectors, such as IT (Fuchs et al. 2021). This situation remained unchanged during the COVID-19 pandemic. The public sector did not experience layoffs but rather a stable demand for new employees in various sub-sectors. Moreover, Germany is facing similar macroeconomic challenges in their public service labour market as numerous countries worldwide (Lavigna and Hays 2004; Reichard and Schröter 2021). Hence, despite our data being collected during the pandemic, we expect the results to be generalizable.

### ***Data source 2: Recruiter survey***

Our second data source relates to the dependent variables of interest (Y) and comprises original survey data collected from the recruiters responsible for the posted job advertisements. The survey was used to assess the recruitment process that followed the job advertisement posting. We contacted the recruiters using the email addresses posted with the advertisements. We restricted our sample to one advertisement per email address to limit the burden on recruiting organizations (random drawing, if necessary). This left us with a sample of 7,026 job advertisements that were ultimately used to contact the recruiters. We contacted the recruiters in April 2021 and invited them to participate in the survey. We matched the invitation to the job advertisement to combine both textual and survey data. The invitation email indicated that the survey was being conducted to follow up on the single, referenced job advertisement. Thus, recruiters knew that they would be required to answer the survey items on the recruitment process for the referenced advertisement. We sent a reminder after three weeks to increase the number of responses. In 215 cases, the email address provided was no longer valid. Of the remaining 6,811 recruiters, 1,863 filled out the survey completely, resulting in a response rate of 27.4%. Based on the high diversity of job advertisements in our database, we could cover the diversity of organizations and recruiters in the German public sector.

The survey was implemented online and conducted in German. Therefore, we translated validated items and discussed critical cases among the research team and a practitioner. We applied two steps before collecting the data to ensure meaningful inferences from the survey instruments. First, we interviewed a public sector recruiter to cover relevant aspects of recruitment success. Second, we pre-tested the survey instruments with colleagues and public sector professionals. These steps led to alterations in the survey items but did not affect the structure of the validated scales.

The survey questionnaire started with the participants' data protection rights and informed consent about the use of the collected data for scientific purposes. As mentioned above, the survey also referenced the individual job advertisement (ID number and title) to remind the recruiter about the recruitment process of interest. Then, we included the following three survey instruments to assess recruitment success. All items, unless stated otherwise, were measured on a 7-point Likert scale (1 = fully disagree, 7 = fully agree). [Appendix A](#) presents all the items. Multi-item constructs were aggregated using a mean score. The included survey instruments are as follows:

### ***Number of applicants***

We accounted for the theoretical argument that a greater number of applicants is beneficial. The number of applicants reflects the input quantity for the subsequent recruitment process. The survey used an open-question item asking about the overall number of applicants for the referenced position.

### ***Satisfaction with the applicant pool***

We measured the quality of the applicant pool by asking the recruiters how satisfied they were with the quality of the applications. This measure reflects the quality of the input for the recruitment process. The scale included four items (Cronbach's  $\alpha = .85$ ) from previous studies applying similar measures (Collins and Han 2004; Dineen and Allen 2016).

### ***Satisfaction with the selected candidate***

To holistically capture the recruitment process's success, we also included a measure for its outcome. In that, we asked recruiters whether the process led to an appointment. Thereby, we accounted for the possibility that recruitment processes were either not yet completed or were unsuccessful. If recruiters indicated a successful appointment following the recruitment process ( $n = 1,401$ ), we asked them about their satisfaction with the respective candidate. This single-item evaluation of the selected candidate deviates from previous research (Higgins and Judge 2004) because we examined actual recruitment decisions. Often, recruitment studies ask only about hypothetical decisions. We suppose that the recruiter's satisfaction with the selected candidate reflects the success of the recruitment process because this individual has a good command of the expectations and requirements of the job.

### ***Data source 3: register data***

The third data source extends our data by considering additional potential confounders (Z). To increase the validity of our analyses, we included supplementary register data about the organizations, again justified by the causal structure (Wysocki, Lawson, and Rhemtulla 2022). First, we checked whether the job was located within or outside Germany. Second, we relied on data from the Federal Statistical Office of Germany to control for the population density of the municipality where the recruited person was supposed to work. We did so because jobs in densely populated areas might attract more and better-educated candidates. Third, we manually coded the recruiting organization according to the governmental level it belonged to (federal, state, local, social security administration – which is independently organized in Germany – and others).

### ***Statistical analysis***

Our quantitative research design allows analysing the relation between X (motivational signals) and Y (recruitment success), while controlling for Z (confounders). Initially, we analysed the job advertisements' content using automated text analysis (QTA) based on predefined dictionaries (Riffe et al. 2019). We created three dictionaries for the motivational signals (prosocial, extrinsic, and intrinsic) and built the dictionaries following two separate approaches. First, all authors coded a sample of 150 job advertisements that were not included in the survey procedure. This sampling strategy

is widely used when developing new dictionaries for text analyses (Guo et al. 2016; Haselmayer and Jenny 2017). Here, we explicitly searched for verbal reflections of the different motives. This approach ensured that we captured the three concepts realistically. Then, we complemented the dictionaries with a deductive approach by searching for previous measurement approaches and definitions of these motivational factors (Ji, Raney, and Gruebner 2020). We included additional words that were not identified in the 150 job advertisements. Additionally, we used keyword-in-context analysis to ensure that we covered all keyword spellings and excluded keywords that covered unrelated aspects, such as specifics of a certain job. [Appendix B](#) presents the final dictionary. Disagreement among the authors was solved by discussing critical cases. Then, we analysed the 1,863 job advertisements in our matched dataset. Using R v. 4.1 and the *quanteda* package v. 3.0.0 (Benoit et al. 2018), we analysed whether the words and phrases captured in the dictionaries occurred in the job advertisements and then counted the hits per advertisement. Therefore, the main independent variables reflect how many extrinsic, intrinsic, and prosocial signals were present in a certain job advertisement.

First, we conducted a descriptive analysis of the job advertisements' content and the survey responses. Second, we ran hierarchical linear regression models to analyse the impact of motivational signals (X) on the three dependent variables collected with the recruiter survey (Z), controlling for the confounders (Z). The hierarchical regression models include the information on the individual advertisements and recruiter responses as level 1 ( $n = 1,863$ ) and that on the recruiting organizations ( $k = 1,025$ ) as level 2. The resulting intercept-only models include the covariates to account for variation related to the recruitment process, the job, and the organization.

## Results

The descriptive analysis ([Table 1](#)) indicates an average of 22.35 applications following the job advertisements ( $SD = 30.40$ ). In addition, recruiters indicate a mean satisfaction of 4.24 for the applicant pool ( $SD = 1.51$ ) and 6.1 for the selected candidate ( $SD = 1.50$ ). Furthermore, the descriptive statistics indicate a high variability of jobs and organizations in our sample. [Figure 1](#) illustrates the distribution of extrinsic, intrinsic, and prosocial signals across the job advertisements. The distribution of motivational signals differs, with the extrinsic motives being used to a greater extent ( $M = 8.29$ ,  $SD = 5.81$ ). Intrinsic ( $M = 1.61$ ,  $SD = 1.52$ ) and prosocial motives ( $M = 0.29$ ,  $SD = 0.62$ ) being less frequent. A table with all the correlations is displayed in [Appendix C](#).

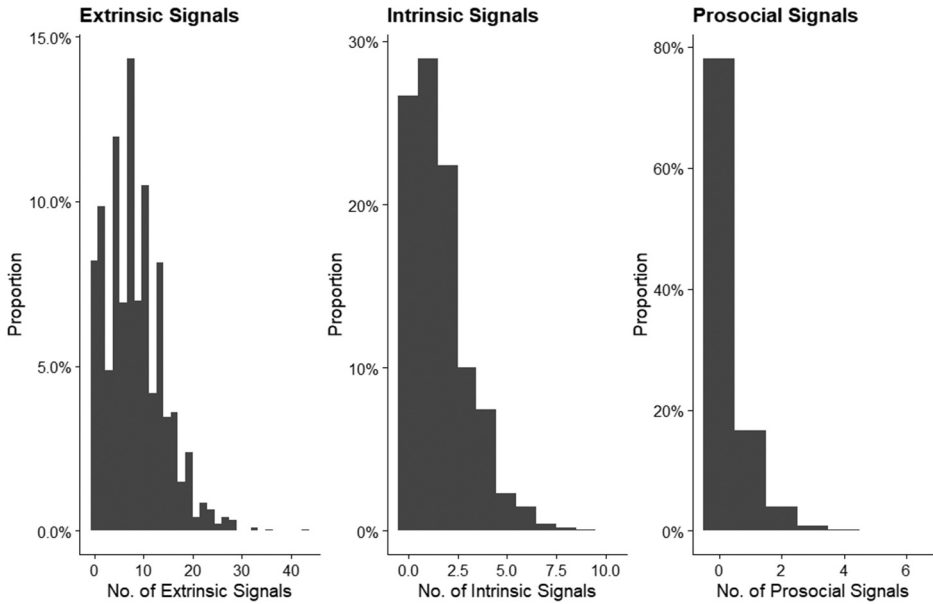
Second, [Table 2](#) summarizes the results from our hierarchical linear regression analyses. The complete results table with all the control variables is displayed in [Appendix D](#). Model 1 describes the main effect of extrinsic, intrinsic, and prosocial signals in the assessed job advertisements on the number of applications for the respective position. Model 2 shows the results for the recruiters' perceived overall quality of applications, while Model 3 provides the results for the recruiter's satisfaction with the selected candidate. Both intrinsic and extrinsic signals show no (or only a negligible) effect on our dependent variables. Job advertisements highlighting the benefits of working in the respective jobs attracted neither more applications nor more suitable applicants. Hence, our data found no support for H1a, H2a, and H3a. The same results can be found for intrinsic motives, providing no support for H1b, H2b, and H3b. Prosocial signals also fail to attract significantly more applications, providing

**Table 1.** Descriptive statistics.

Variable	<i>n</i>	Mean/%	<i>SD</i>	Min	Max
Number of applications	1,863	22.345	30.399	1	600
Satisfaction with quality of applications	1,863	4.235	1.505	1	7
Satisfaction with selected candidate	1,401	6.036	1.503	1	7
Extrinsic signals	1,863	8.314	5.831	0	43
Intrinsic signals	1,863	1.607	1.519	0	10
Prosocial signals	1,863	0.286	0.619	0	6
Population density	1,863	166.7	2,735.3	0.0002	111,111.0
Foreign country	39	2.1%			
<i>Type of contract</i>					
Part-time contract	469	25.2%			
Full-time contract	795	42.7%			
Full-time or part-time contract	599	32.2%			
Permanent contract	1,058	56.8%			
<i>Education required for position</i>					
No graduation	82	4.5%			
Professional training	435	23.9%			
Bachelor's degree	769	42.3%			
Master's degree	533	29.3%			
Top-level leadership position	12	0.6%			
Foreign local staff	32	1.7%			
<i>Governmental level</i>					
Federal	229	12.3%			
State	716	38.4%			
Local	664	35.6%			
Social security administration.	23	1.2%			
Other	231	12.4%			
<i>Job type</i>					
General administration	489	26.2%			
Education	165	8.9%			
Health, sports, and social	71	3.8%			
Craft work and production	8	0.4%			
IT	57	3.1%			
Arts and culture	18	1.0%			
Agriculture	7	0.4%			
Public relations	19	1.0%			
Law	26	1.4%			
Security	28	1.5%			
Translation	6	0.3%			
Technical administration	117	6.3%			
Environmental administration	12	0.6%			
Traffic, transport, and logistics	2	0.1%			
Business, finance, and marketing	34	1.8%			
Science and technology	175	9.4%			
Internal services	22	1.2%			
Others	607	32.6%			

no support for H1c. However, we found positive effects of prosocial signals when it comes to the recruiters' satisfaction with both the general applicant pool ( $b = 0.119$ ;  $p = .041$ ) and the selected candidate ( $b = 0.143$ ;  $p = .033$ ). Thus, our data support H2c and H3c. These effects remain stable when controlling for various potentially confounding variables, such as job type, government level, and type of contract. Furthermore, our results show a severe lack of qualified workers in technical jobs, specifically IT and technical administration (e.g. engineers and architects). In these sub-sectors, employers receive fewer applications and are less satisfied with the applicant pool.

Regarding hypothesis H4, we find mixed evidence. While neither signal in our dataset affected the number of applications (H4a), prosocial motives substantially



**Figure 1.** Distribution of the extrinsic, intrinsic, and prosocial signals.

**Table 2.** Hierarchical linear regression models testing the effects of extrinsic, intrinsic, and prosocial signals on the number of applications, recruiters' satisfaction with the quality of applications, and recruiters' satisfaction with the selected candidate (condensed output).

	Number of Applications (1)	Satisfaction with quality of applications (2)	Satisfaction with the selected candidate (3)
Extrinsic signals	0.248 + (0.141)	-0.007 (0.007)	0.013 (0.008)
Intrinsic signals	0.103 (0.495)	-0.015 (0.025)	-0.004 (0.029)
Prosocial signals	1.679 (1.170)	0.119 * (0.058)	0.143 * (0.067)
n (job advertisements)	1,863	1,863	1,401
n (employers)	1,025	1,025	811
logLik	-8855.857	-3397.333	-2568.545
AIC	17785.715	6868.666	5211.091

Hierarchical linear model with restricted maximum likelihood estimator. Standard errors in parentheses. The model controls for several covariates. The full model is displayed in [Appendix D](#). \*\*\*  $p < 0.001$ ; \*\*  $p < 0.01$ ; \*  $p < 0.05$ ; +  $p < 0.1$ .

affected the recruiters' satisfaction with applicants and the selected candidate than intrinsic and extrinsic signals (H4b). Except for the difference between prosocial and extrinsic signals in the third model, these differences are also significant.

## Discussion

Our empirical findings merit a discussion about the role of job advertisements because they provide both promising and sobering insights. First, we look at the hypotheses not supported by our research. The absence of significant effects for extrinsic signals is surprising, especially considering that most employers use these signals extensively

(see Figure 1). The notion that jobs in the public sector are often valued for extrinsic aspects, such as expected job security, remains a common argument (Lewis and Frank 2002; Linos 2018). However, our results indicate that focusing on them does not motivate more people to apply and does not affect the quality of applicants or selected candidates. This might be because the public sector in Germany provides little variation in offered extrinsic benefits. Particularly, all employers outline extrinsic signals in their job advertisements, which tend to be very similar in public sector jobs. Thus, while some advertisements laid a heavy focus on benefits, many of these benefits are common to most jobs in this sector. It is important to note that public employers are only legally required to define the salary tier of the respective position. Other extrinsic benefits that were mostly mentioned in our sample were common benefits that result from collective labour agreements or legal regulations.

We argue that extrinsic signals constitute generic signals that potential applicants do not interpret as distinguishing markers. This observation has theoretical relevance because it points to the need to study applicants' job-search behaviour and screening of job advertisements. We propose that extrinsic motives lose their distinctiveness if potential applicants are confronted with similar signals in multiple advertisements. Since we studied job advertisements and their impacts on a real job market, we assume that potential applicants were confronted with a broad range of advertisements. Previous research has primarily focused on artificial settings, mostly within survey experiments. Here, participants are confronted with one distinctive job advertisement (Asseburg and Homberg 2020; Weske et al. 2020), intentionally minimizing the impact of contextual factors. Thus, these studies tend to overestimate the relevance of extrinsic motives. Our analysis emphasizes the need to study signalling effects in more realistic settings to account for realistic job-search behaviour. The absence of positive signalling effects for extrinsic motives likely depends on the saturation of such signals in a given job market. We did not explicitly study signal saturation, but several arguments hint at its relevance. Since potential applicants encounter them in nearly every advertisement, extrinsic signals might not constitute an appropriate signal for assessing P – E fit. From a public management perspective, these insights suggest that recruiters must consider their position in the respective labour market. Professionals should be aware of competitors' job advertisements and the signals they send. Signal saturation reduces the usefulness of motivational signals.

Like the extrinsic motives, we also did not find positive effects for intrinsic signals. Although studies found that intrinsic motives constitute a vital driver for motivation in the public sector (Park and Word 2012), these signals did not play a role in recruitment success. We observed intrinsic signals less frequently than extrinsic ones based on the descriptive findings. Potential applicants might not encounter intrinsic signals to the extent that would reduce their distinctiveness. However, it could also be that there are, in general, fewer possibilities to highlight the intrinsic aspects of a job. Therefore, saturation has already been reached with very few intrinsic signals. There might be another reason for the missing effect of intrinsic signals. Given the focus on public sector job advertisements, we argue that perceptions of signal sincerity may cause this observation. Potential applicants will predominantly incorporate signals they judge as trustworthy when assessing the perceived or anticipated fit. However, intrinsic signals relate to considerable uncertainty because potential applicants may not perceive them as guaranteed. Unlike extrinsic benefits, intrinsic signals are often intangible, and individuals cannot be sure whether these promises will hold. Thus, they cannot

reach a reliable judgement of the signals' sincerity. Instead, they might interpret respective phrases and formulations as token terms and catchwords.

Despite the scarcity of prosocial elements in most job advertisements, our results indicate that prosocial signals may attract better applicants and result in a satisfactory hiring decision. However, they do not increase the applicant pool size. Thus, prosocial motives increase the likelihood of hiring well-suited employees. The positive signalling effects observed in our study reinforce the theoretical arguments regarding signal qualities. Prosocial signals were comparatively rare within the observed labour markets. Thus, despite encountering various job advertisements, potential applicants did not encounter a saturation of these signals. Furthermore, prosocial signals align with implicit assumptions regarding public sector employment (Leisink and Steijn 2008; Rose 2013). Combining these two perspectives helps illustrate the overall findings. Unlike extrinsic and intrinsic signals, prosocial motives act as unique selling propositions (Lievens and Slaughter 2016) and are trustworthy. Thus, potential applicants interpret prosocial signals as a good reference point when assessing fit.

These findings offer relevant implications. First, they highlight that passive recruiting is limited in increasing recruitment success. Our results give some reason to doubt the effectiveness of job advertisements in general. While most job advertisements used extrinsic and, to a certain extent, intrinsic signals, neither type showed relevance in attracting more or better applications. Unfortunately, public organizations often face many restrictions when preparing the wording and appearance of their job advertisements because of either regulatory restrictions or intra-organizational limitations (Løkke 2021; Sievert, Vogel, and Feeney 2022). Recruiters must often use predefined phrases and indicate job-related information even if they produce more noise than useful information. If a job advertisement contains more (irrelevant) information, potential applicants are less likely to identify the relevant details.

Moreover, our study provides empirical and methodological contributions. Most importantly, we present a unique and substantial dataset that gives evidence of the effects of job advertisements in the public sector. This approach allows us to study the real-world impact of signals on recruitment processes. Our approach goes beyond experimental research that solely focuses on individual application decisions, thus offering limited insights into the actual success of recruitment practices. Furthermore, we combine innovative techniques from QTA with established methods from the social sciences. We were able to collect a considerable number of job advertisements automatically from an online platform. This approach allowed for the construction of substantial datasets covering the entirety of public sector job advertisements in Germany. Apart from the opportunity to descriptively assess recruitment practices in the public sector, our analysis also allows explanatory inferences. We combined this technique with an original survey conducted among recruiters responsible for the job advertisements, resulting in a matched dataset with meaningful independent and dependent variables.

## Limitations and Future research

Our study comes with several limitations. First, there are limitations to our research design and analysis. Most importantly, we deliberately chose a quantitative research design using multiple sources. While this approach offers considerable advantages, it is subject to weaknesses. In particular, the design is limited because we cannot directly observe the

presumed micro-level mechanisms (i.e. individual application decision-making). The data does not account for why the isolated individuals in the labour market decided to apply (or not). The design allows solely to infer this micro-level mechanism indirectly because we rule out alternative applications and build on well-established theories showcasing that the mechanism exists in controlled conditions (e.g. Celani and Singh 2011). Still, focusing on the transformational mechanism is justified because it allows relevant implications for practitioners. Well-established research showcases the usefulness of our approach (e.g. Dineen and Allen 2016). Nonetheless, we acknowledge that our research design can only infer the cognitive processes and decision-making of individual applicants on the labour market(s) that we covered. Future studies should validate our findings and examine how individuals react to motivational signals. Future research could address this aspect by shifting the level of analysis to the individual job seeker. Among others, experience sampling methods (Fisher and To 2012) or diary intervention studies (Ohly et al. 2010) would allow for examining how job seekers search for job advertisements, how they analyse and interpret them, and which factors feed into their decision-making. Such approaches would also provide further evidence for job seekers' perceived P-E fit while navigating the labour market. We invite scholars to further explore these micro-level processes in future studies. For example, expectations about motivational signals will likely differ substantially depending on an individual's norms, attitudes, and expectations. While this question is beyond the scope of our study, it would provide additional insights into applicants' personality profiles that can be attracted with different job advertisements.

In addition to this overarching limitation, we acknowledge more detailed caveats. For instance, the applied coding procedure is inherently subjective. That is, the dictionaries reflect the authors' understanding of motivational factors. We limited bias by applying a blinded coding procedure and resolving critical cases afterwards. However, different coding schemes are possible. Hence, we suggest validating the motivational dictionaries in future research. Similarly, we also point to the limited analytical procedures applicable to job advertisements. The main body text contains repetitive content and often includes predefined phrases and officialese. While analysing the text corpus, we encountered problems using more elaborate techniques such as topic modelling. However, we are convinced that future research can develop additional techniques suited for this type of textual data.

Our survey-based approach exhibits some additional limitations. Since we sampled recruiters and asked about their perceptions, the dependent variables do not have objective recruitment outcomes besides the number of applications. While we argue that recruiters can judge the quality of the application pool and the selected candidate, these are still perceptual. Recruiters' assessments are subjective by nature and may be affected by various contextual factors. Therefore, what some organizations may deem satisfactory may be far from satisfactory for other organizations. Moreover, the assessment of the selected candidate was limited because we asked only the recruiter. Indeed, co-workers and supervisors might have different perspectives on employee quality. We were not able to capture such perceptions. Future research should consider examining the recruitment process and its output more holistically. It would be helpful to obtain data from both the responsible recruiter and the supervisor or department head to assess the agreement among different perspectives. Such insights might help to reduce potential bias within the dependent variables. Similarly, we suggest focusing on the duration of the hiring processes as an additional proxy for recruitment success. This indicator could also be linked to the motivational signals displayed in the job advertisements, e.g. because

self-selection could ease the burden recruiters face and speed up the selection procedure. Alternatively, more prolonged procedures (e.g. when job advertisements need to be reposted) could be linked to the absence of meaningful signals.

Second, the national context may affect the relevance of the examined signals. For example, German public organizations have relatively little leeway to provide substantially different extrinsic rewards (salary and number of holidays) because of the collective labour agreements and regulatory frameworks. However, differences can still be relevant depending on each state and the specific labour market (e.g. IT). We expect some job sectors and national job markets to face higher signal saturation than others. Thus, future research should replicate these findings in other public sector contexts and countries. Additionally, although the German civil service system can be classified as a 'classical European continental civil service model' (Reichard and Schröter 2021), it has some peculiarities, especially a relatively strong differentiation between the public and private sector and very limited ways to lay off personnel. Combined with an ageing workforce, these specifics lead to high demand for new hires. Further research should examine the relevance of such characteristics on the success of public sector job advertisements. In addition, the German public sector is characterized by high job security and stability of labour demand. While there are some legal requirements for the content of job advertisements (e.g. encouraging applicants with disabilities), employers have relatively broad discretion in deciding on the content. However, surprisingly few organizations in our sample made use of that. Accordingly, we expect our findings to replicate in other public sector labour markets. Future research should address the lack of prosocial signals prevalent in our sample. Replications in other countries with a higher presence of prosocial motives are essential. Furthermore, field experimental designs focusing specifically on such prosocial signals and their effectiveness could add robustness to causal inferences. Further research could also extend our design to include private and non-profit sector employers. Another research avenue would be to focus on specific jobs in the public sector and to test whether the motivational signals yield different effects for different jobs. Future research needs to provide additional data to be examined, as our study does not provide the necessary statistical power to derive robust conclusions from subgroup analyses.

## Conclusion

This study investigated the effect of extrinsic, intrinsic, and prosocial signals in job advertisements for public sector jobs. Our analysis indicates that neither extrinsic nor intrinsic signals relate to outcomes on the meso-level (i.e. the applicant pool). However, prosocial signals related to a more satisfying applicant pool, associated with higher satisfaction with the selected candidate, as indicated by the recruiters. Our theoretical reasoning points to two proposed mechanisms explaining these observations. Motivational signals can positively affect the recruitment process if they constitute unique selling propositions based on (1) the quality of the signal itself and (2) the saturation of the signal type within the job sector. Future research should further examine these propositions.

The presented results were surprising because years of research on prosocial and public service motivation seem to have failed to diffuse into the realm of practitioners, at least in Germany. Only a minority of job advertisements used prosocial

signals at all. However, we can show the positive impact of such signals. That scarcity might increase the unique selling point of those potential employers, reinforcing the idea that prosocial motives are central to public sector work (Vogel and Willems 2020).

## Acknowledgments

The authors thank Jessica Steenbock for her invaluable help in managing and cleaning the data.

## Disclosure statement

No potential conflict of interest was reported by the author(s).

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## Data availability statement

The data and code used in this article will be made available at Zenodo. We will include all the variables used for this article. However, we will not include the content of the job advertisements because it is not possible to anonymize them. Publishing identifying information with the survey data would violate the guarantee of privacy given to the participants.

## Human Subjects Research

According to the regulations of the first author's institution, survey-based research is not subject to human subjects research approval. The institution leaves it to the responsibility of the researchers to ensure that the research is conducted ethically. Contacting an internal review board was not possible. The authors carefully reviewed the study design for potential issues and consulted other colleagues to ensure the study was ethical.

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## Appendices

### Appendix A: Survey Items

Variable	Operationalization
Number of Applications	How many applications did you receive for the advertised position?
Satisfaction With Applicant Pool (Cronbach's $\alpha = .85$ )	The following statements refer to the pool of applicants who applied for the advertised position. How strongly do you agree or disagree with the following statements: (1 = do not agree at all; 7 = totally agree) <ul style="list-style-type: none"> <li>• The pool of applicants was characterized by a high quality.</li> <li>• Overall, the applicants met the requirements for the advertised position.</li> <li>• It was possible to choose between several applicants who met the requirements for the advertised position.</li> <li>• There were several applicants we would have liked to hire for the advertised position.</li> </ul>
Satisfaction With Selected Candidate	How satisfied are you with the selected candidate? (1 = very unsatisfied; 7 = very satisfied)

## Appendix B: Dictionary

### B.1 Extrinsic signals

German	English
alterssicherung*/altersversorgung*/altersvorsorge*	pension/retirement arrangement
angenehme* arbeitsatmosphäre	pleasant working atmosphere
*anreiz*	incentive
arbeiten von zu hause	home-office/working from home
arbeitsplatzsicherheit	job security
arbeitszeitabsprache*	working time agreement
arbeitszeitverkürzung	reduction of working hours
attraktiv* arbeitgeber	attractive employer
attraktiv* arbeitsplatz	attractive workplace
attraktiv* arbeitsumfeld	attractive working environment
*gehalt*	salary
*vergütung*	compensation
aufstiegsmöglichkeit*	career opportunity/opportunities
aus- und fortbildung*	education and training
aus- und weiterbildung*	education and further training
ausgezeichnet* infrastruktur	excellent infrastructure
beamtenverhältnis*	status as civil servant
befristet*	fixed contract
beschäftigungsumfang	volume of employment
besoldung	Salary
besoldungsgruppe*	pay grade
Besoldungsgruppen (a[]1*-a[]16*/w[]1-w[]3)	pay group
betr* kindergarten*/kinderkrippe*/kita*	on-site kindergarten/daycare
betrieb* gesundheitsförderung*	workplace health promotion
betrieb* gesundheitsmanagement*	workplace health management
betriebsrente*	company pension
betriebsport*	company sports
bildungsförderung	education promotion

(Continued)

German	English
*bonus*	bonus
bruttoentgelt*	gross pay
büroausstattung	office equipment
dienstfahrzeug*	company car
Entgeltgruppen (tv*/e[g] 1*-e[g] 15*/e[g]1*-e[g]15*)	pay groups
*eigene* kindergarten*/*eigene* kinderkrippe*/ *eigene* kita	own child care
einarbeitung*	orientation
einfache*/mittlere*/gehobene*/höhere* dienst*	service classes
einstiegsgehalt*	entry-level salary
eltern-kind-arbeitszimmer	parent-child office
entfristung	conversion to permanent employment
entgeltgruppe*	pay group
entgeltumwandlung	conversion of pay
entwicklungs- und karrierechance*	development and career opportunities
entwicklungsmöglichkeit*	development opportunity
entwicklungsperspektive*	development perspective
ergonomisch* arbeit*	ergonomic work
ergonomisch* ausgestattet* arbeitsplatz*	ergonomically equipped workplace
fahrradstellpl)*	bicycle parking space
fahrtkostenzusch*	commuting allowance
familienbewusst*	family-conscious
familienfreundlich* arbeitsplatz/dienststelle*	family-friendly workplace
familienfreundlich* arbeitszeit*	family-friendly working hours
familienfreundlichkeit	family-friendliness
ferienangebot*	holiday programme for kids
firmenfitness	company fitness
firmenticket*	company public transport ticket
firmen-ticket*	company public transport ticket
fitnessangebot*	fitness programme
fitnessprogramm*	fitness programme
fitnesstraining*	fitnesstraining
flexib* arbeitsplatz*	flexible workplace
flexib* arbeitszeit*	flexible working time
flexib* modelle	flexible models
förderplan*	development plan
fort- und ausbildungsangebot*	further education and training offers
fort- und weiterbildung*	training and further training
fortbildung*	training
führungskräftequalifizierung*	leadership development
führungsnachwuchskräftequalifizierung*	leadership talent development programme
gesundheitsangebot*/gesundheitsförder*	health promotion
gesundheitskurs*	health course(s)
gesundheitsmaßnahme*	health measure
gesundheitsvorsorge*	preventative health care
gleitende* arbeitszeit*	flexible working hours
gleitzeit*	flexi-time
grippeimpfung*	flu vaccinations
gut ausgestattete* arbeitspl)*	well-equipped workplace
gute* anbindung	good connection
gute* erreichbarkeit mit	good accessibility with
gute* führung	good leadership
gute* verkehrsanbindung*	good transport connections
gute* verkehrsinfrastruktur	good transport infrastructure
haustarif	in-company wage agreement
heimarbeit	home work/office
home office*/homeoffice*/home-office*	home office
individuelle einarbeitung	individual initial skill adaption training
individuelle* entwicklung*	individual development
inhoue-fortbildung*	in-house training

(Continued)

German	English
jahresarbeitszeit*	annual working time
job ticket*/jobticket*/job-ticket*	job ticket
jobsharing*	jobsharing
kantine*	canteen
*karriere*	career
kein* nachtschicht*	no night shifts
kein* wochenendschicht*	no weekend shifts
kinderferienbetreuung*	child holiday care
kiosk*	kiosk
kollegiale* fallberatung*	collegial case consultation
kosten* verpflegung	free catering
kostenlose* sozialberatung*	free social counselling
krisensicher* arbeitsplatz*	crisis-proof workplace
landesticket*	free state-wide public transport
langzeitperspektive*	long-term perspective
laufbahngruppe	service class group
leistungsanerkennung*	performance recognition
leistungsentgelt*	performance pay
leistungsgerecht*	performance-related
leistungsorientierte* bezahlung	performance-related pay
liberale* arbeitszeit*	liberal working time
mitarbeite*angebote*/mitarbeiterangebote*	employees offers
mobil* arbeit*/mobilarbeit	mobile working
mobil* und flexib* arbeit*	mobile and flexible working
modern* arbeitspl*/moderne* arbeitspl*	modern working place
modern* arbeitszeit*	modern working time
moderne* verwaltung*	modern administration
möglichkeit * teilzeitbeschäftigung	possibility of part-time employment
*nachsorge	follow-up care
parkmöglichkeit*/parkpl*	parking
*pension*	pension
personalentwicklung*/personalförderung	human resources development
personalrestaurant*	employees restaurant
*prämie*	Bonus
profitier*	profiteer
psychologische* beratungsdienst*	psychological counselling service
qualifizierungsangebot*	qualification offer
sabbat*	sabbatical
schulung*	training
sicher* arbeitsplatz	crisis-proof workplace
sicher* tätigkeit/sicher* stelle/sicher* job	crisis-proof employment
sicherstellung der kinderbetreuung	ensuring childcare
sold	pay
sonderkondition*	special conditions
*sonderzahlung*	bonus payment
sozialleistung*	social benefits
sportangebot*	sports offer
sportkurs*	sports course
sportveranstaltung*	sports event
standortsicherheit*	site safety/location remains secure
supervision*	supervision
tarifbeschäftigt*	tariff-employed
tarifvertrag*	wage agreement
teilzeit*	part time
telearbeit	teleworking
ticket*	ticket
übernahme bestehende* verpflichtung*	Assumption of existing obligation
übernahme bestehende* weiterbildungskosten	Assumption of existing training costs
übernahme in ein beamtenverhältnis	Transfer to a civil servant position
umzugskosten*	Moving costs

(Continued)

German	English
unbefristet*	permanenten
*urlaub*	holiday
vbl	Pension Institution of the Federal and State Governments
verbeamtung	civil servant status
verdienst*	Earnings
vereinbarkeit von *	compatibility of ( <i>family and work</i> )
vergünstigung*	discount
vergütung	compensation
verkehrsanbindung*	transport links
verkehrsgünstig*	conveniently located
vermögenswirksame* leistung*	capital-forming benefit
versorgungskasse	pension fund
vollzeit*	full-time
weihnachtsgeld*	Christmas bonus
weiterbeschäftigung	continue as regular employee
weiterbildung*	further training
weiterentwick*	further development
wlan nutzung/wlan-nutzung	wifi use
wohnangebot*/wohnraumangebot*	housing offer
wohnungssuche*	apartment search
work-life-balance	work-life-balance
zahlung des umzugs	payment of the move
zeitwertkonto*	working time account
zentral gelegen*	centrally located
zugang certified nursing education-portal	access to certified nursing education-portal
zukunftsorientierte* arbeitspl*	future-oriented workplace
zukunftsicher* arbeitsplatz/beschäftigung	future-proof employment
*zulage*	bonus payment
zusatzleistung*	Additional benefits
zusatzrente*	Supplementary pension
zusatzversorgung*	Supplementary pension scheme
zuschuss*	grant
*zuschuss* von höherqualifizierung*	grant for advanced training
zuschüsse	grants

\*= zero or more arbitrary character; italic words are added for clarification; characters in squared brackets are optional.

## B.2 Intrinsic signals

German	English
abwechslungsreich*	varied
alles andere als trocken	anything but dry
anspruchsvolle* tätigkeit*	demanding job
aufregend*	exciting
ausgeprägte* interesse *	strong interest
außergewöhnliche* projekt*	extraordinary project(s)
autonomie	autonomy
eigen* verantwortungsbereich*	own area of responsibility
eigeninitiativ*	self-initiated/self-initiative
eigenmotivation	self-motivation
eigenständig*	autonomous
eigenverantwortlich*	independent
entscheidungsbefugnis	decision-making authority
entscheidungsfrei*	autonomy

(Continued)

German	English
entscheidungsspiel*	leeway in decision-making
freiheitsgrad	degree of freedom
freude an */am *	joy in/at
freude bereite*/mach*	bring joy
gestalten	create
gestaltungsmöglichkeit*/gestaltungsspiel*	room to create something
initiative	initiative
innovationsfreude	innovative spirit
inspirierend*	inspiring
interessant* arbeitsplatz	interesting workplace
interessant* tätigkeit*	interesting activity
lernbereitschaft	willingness to learn
mitgestalt*	co-design
neugestalt*	re-design
selbst verwirklichen	Realize yourself
selbständig*	independent
selbstverwirklichung	self-realisation
spannend*	exciting
spaß an */spass an */spaß am */spass am *	fun at
spaß bereite*/spass bereite*/spaß mach*/spass mach*	be fun
umfassende* aufgaben*	comprehensive tasks
verantwortung*	responsibility
vielfältig* aufgabe*/tätigkeit*	diverse tasks
wechselnde* aufgaben*/tätigkeit*	changing tasks
wissbegierig*	eager for knowledge

\*= zero or more arbitrary character.

### B.3 Prosocial signals

German	English
allgemeinheit	general public
angenommen wissen	feeling accepted
anliegen *	concerns
ansprechpartner* für* XXX*	contact person for XXX
arbeit für	work for
begleitung von bildungsprozessen	Accompaniment of educational processes
berat* XXX*	advice XXX
besondere* lebenslage*	special life situation
betreu* XXX*	take care of XXX
bürger* * helfen	help citizens
bürgerfreundlich*	citizen-friendly
bürgernah*	close to the people
bürgerorientiert*	citizen-oriented
dienstleistungen für	services for
einfühlungsvermögen*	empathy
freiheitlich-demokratisch* grundordnung	liberal-democratic order
gemeinwohl*	public good
gesellschaft* teilhabe*	social participation
gesellschaftlich* verantwortung	social responsibility
gesellschaftliche* auftrag	social mission
helfen* XXX*	help XXX
hilf*bedürftig*	need for help
hilf*bedürftigkeit beenden	end need for help
hilfe zu einem sinnerfüllten leben	help to live a meaningful life
hilfeplanung	assistance planning

(Continued)

German	English
hilfesuchend*	seeking help
höchste* gut	highest good
hohem leidensdruck	high level of suffering
kein* gefahr* für mensch*	no danger for humans
kinder- und jugendförderung	child and youth development
kontaktpflege	contact care
kundenorientier*	customer-oriented
mitmensch*	fellow human beings
partieverkehr	customer traffic
patientenversorgung	patient care
pflegebedürftige menschen	people in need of care
positiv* beeinfluss*/wirkung*/einfluss*	positive influence
positive* wirkung*	positive impact
schutz der würde	protection of dignity
sozialwesen	social services
umgang mit XXX*	deal with XXX
uneigen*	altruistic
unterstütz* XXX*	support XXX
vielschichtig* bedürfnis*	Multi-layered needs
wertvolle* aufgabe	valuable task
wohlergehen	well-being
wohlfahrt	welfare
zum nutzen zum wohl*	for the benefit of

\* = zero or more arbitrary character, XXX is replaced with the following words.

German	English
antragstell*	applicants
ausländ*	foreigners
bauherr*	builder
bedürftige*	deplorable
behindert*	disabled
betroffene*	affected
bewohner*	residents
bürger*	citizen
doktorand*/promov	PhD students
dozent/dozierend*	lecturers
Ehrenamtliche*	volunteers
einwohner*	residents
familie*	family
frau*	woman
gäste	guests
gefang*	inmates
internationale*	international
jugendl*	youth
kinder	children
kund*	customer
Lehre*	teacher
mensch*	human being
nutzer*	user
patient*	patients
schutz*	vulnerable group
stud*	students
teilnehme*	participants



## Appendix C: Correlations

### Part 1

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	
(1) Number of Applications																						
(2) Satisf. with Quality of Applications	0.25*																					
(3) Satisf. with selected candidate	0.07*	0.23*																				
(4) Extrinsic Signals	0.04	-0.05*	0.04																			
(5) Intrinsic Signals	0.03	-0.03	0.01	0.29*																		
(6) Prosocial Signals	0.03	0.04	0.06*	0.15*	0.10*																	
(7) Population Density	-0.02	-0.01	-0.06*	-0.05*	-0.05*	-0.01																
(8) Foreign Country	-0.04	0.03	-0.02	-0.17*	-0.09*	-0.04	0.42*															
(9) Part Time Contract	-0.02	0.06*	0.04	-0.10*	-0.06*	0.02	-0.02	-0.06*														
(10) Full Time Contract	-0.02	-0.01	0.01	-0.08*	0.03	-0.03	0.06*	0.14*	-0.50*													
(11) Full Time or Part Time Contract	0.04	-0.05*	-0.04	0.18*	0.02	0.00	-0.04	-0.09*	-0.40*	-0.59*												
(12) Non-Permanent Contract	-0.03	0.05*	0.01	-0.16*	-0.09*	-0.01	0.03	0.05*	0.24*	-0.10*	-0.12*											
(13) Permanent Contract	0.03	-0.05*	-0.01	0.16*	0.09*	0.01	-0.03	-0.05*	-0.24*	0.10*	0.12*	-1.00*										
(14) Master's Degree	-0.02	0.09*	0.06*	-0.08*	-0.06*	-0.09*	0.02	-0.04	0.08*	-0.04	0.21*	-0.21*										
(15) No graduation	0.08*	0.03	-0.02	-0.07*	-0.02	-0.02	-0.01	-0.01	0.17*	-0.07*	-0.08*	0.05	-0.05	-0.14*								
(16) Professional Training	0.10*	0.01	-0.02	-0.02	-0.04	0.04	-0.03	-0.08*	0.07*	-0.04	-0.02	-0.04	0.04	-0.35*	-0.12*							
(17) Bachelor's Degree	-0.08*	-0.13*	-0.03	-0.17*	0.12*	0.05*	-0.04	-0.11*	-0.17*	0.06*	0.10*	-0.18*	0.18*	-0.53*	-0.18*	-0.46*						
(18) Top-Level Leadership	-0.01	0.03	0.02	-0.03	-0.03	0.05*	0.00	-0.01	-0.05*	0.05*	-0.01	0.00	0.00	-0.05*	-0.02	-0.04	-0.07*					
(19) Foreign Local Staff	-0.04	0.03	-0.03	-0.16*	-0.08*	-0.03	0.22*	0.88*	-0.07*	0.14*	-0.08*	0.03	-0.03	-0.08*	-0.03	-0.07*	-0.11*	-0.01				
(20) Gov. Level: Federal	0.00	-0.02	-0.03	0.01	-0.10*	-0.04	0.06*	0.00	-0.02	-0.17*	0.20*	0.15*	-0.15*	0.15*	0.03	-0.03	-0.11*	-0.01	-0.05*			
(21) Gov. Level: Local	-0.07*	-0.07*	0.02	0.13*	0.07*	0.12*	-0.05	-0.11*	-0.08*	0.14*	-0.08*	-0.25*	0.25*	-0.29*	-0.02	0.14*	0.19*	-0.02	-0.10*	-0.28*		
(22) Gov. Level: State	0.01	0.04	0.00	-0.07*	-0.03	-0.06*	-0.05	-0.11*	0.07*	-0.07*	0.01	0.05*	-0.05*	0.21*	-0.07*	-0.07*	-0.09*	0.03	-0.10*	-0.30*	-0.59*	

(Continued)



(Continued).

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
(23) Gov. Level: Other	0.06*	0.05*	0.01	-0.11*	0.05*	-0.06*	0.07*	0.32*	0.04	0.08*	-0.13*	0.16*	-0.16*	-0.03	0.09*	-0.07*	-0.05*	-0.01	0.35*	-0.14*	-0.28*
(24) Gov. Level: Social Security Admin.	0.09*	0.03	0.03	0.03	-0.02	0.00	-0.01	-0.02	-0.04	-0.06*	0.10*	-0.03	0.03	-0.05*	0.02	-0.02	0.05*	-0.01	-0.01	-0.04	-0.08*
(25) Type General Administration	0.09*	0.03	-0.02	0.10*	0.04	0.03	-0.03	-0.08*	-0.06*	0.00	0.05*	-0.12*	0.12*	-0.18*	0.00	0.11*	0.10*	-0.03	-0.08*	-0.07*	0.08*
(26) Type Education	-0.06*	0.04	0.02	-0.09*	-0.03	0.01	0.09*	0.39*	0.06*	0.00	-0.05*	0.17*	-0.17*	0.08*	0.03	-0.06*	-0.15*	0.02	0.42*	0.11*	-0.16*
(27) Type Health, Sports, Social	-0.01	0.00	0.01	0.07*	0.03	0.13*	-0.01	-0.03	0.07*	-0.05*	0.00	-0.01	0.01	-0.01	-0.04	0.00	0.03	0.02	-0.03	-0.02	0.10*
(28) Type Craft Work, Production	-0.04	0.01	-0.01	-0.06*	-0.04	-0.02	0.00	-0.01	-0.04	0.06*	-0.03	0.06*	-0.06*	-0.04	0.03	0.10*	-0.06*	-0.01	-0.01	-0.02	0.02
(29) Type IT	-0.07*	-0.09*	0.01	-0.04	-0.03	-0.01	-0.01	-0.03	-0.05*	-0.09*	0.14*	-0.02	0.02	-0.05*	0.01	-0.05*	0.10*	-0.01	-0.02	0.06*	-0.09*
(30) Type Arts, Culture	0.08*	0.00	-0.01	-0.06*	-0.03	-0.04	-0.01	-0.01	0.02	0.00	-0.02	0.10*	-0.10*	0.01	0.06*	-0.04	0.01	-0.01	-0.01	0.05*	-0.07*
(31) Type Agriculture	-0.04	-0.02	0.01	-0.07*	-0.04	-0.03	0.00	-0.01	0.03	-0.04	0.01	0.03	-0.03	0.00	-0.01	-0.01	0.02	0.00	-0.01	0.03	-0.05*
(32) Type PR	0.06*	0.06*	0.00	-0.08*	-0.02	-0.04	-0.01	-0.01	-0.06*	0.04	0.01	0.03	-0.03	0.04	-0.02	-0.03	0.00	-0.01	-0.01	0.04	-0.05*
(33) Type Law	0.01	0.04	-0.04	-0.04	0.01	-0.04	-0.01	-0.02	-0.05*	0.01	0.04	-0.06*	0.06*	0.12*	-0.03	-0.02	-0.07*	-0.01	-0.02	-0.03	-0.07*
(34) Type Security	0.07*	-0.02	-0.01	0.00	0.03	-0.04	-0.01	-0.02	-0.04	0.03	0.01	-0.08*	0.08*	-0.05*	0.06*	0.05*	-0.01	-0.01	-0.02	-0.01	0.06*
(35) Type Others	-0.01	-0.03	-0.01	0.06*	0.05*	0.03	-0.04	-0.09*	0.02	0.07*	-0.09*	-0.04	0.04	-0.06*	0.01	0.06*	0.02	0.04	-0.09*	-0.14*	0.16*
(36) Type Translation	0.03	0.03	0.03	-0.03	-0.02	0.05*	0.02	0.12*	-0.03	0.03	0.00	0.05*	-0.05*	0.01	-0.01	0.04	-0.03	0.00	-0.01	0.12*	-0.04
(37) Type Technical Administration	-0.07*	-0.06*	-0.04	0.07*	0.01	-0.01	-0.02	-0.04	-0.09*	0.00	0.08*	-0.15*	0.15*	-0.07*	-0.01	-0.05*	0.12*	0.01	-0.03	-0.04	0.09*
(38) Type Environmental Admin.	-0.01	-0.01	0.00	-0.04	0.01	-0.03	0.00	-0.01	-0.02	0.01	0.00	-0.03	0.03	0.02	0.02	-0.01	-0.01	-0.01	-0.01	-0.03	-0.02
(39) Type Traffic, Transport, Logistics	0.01	-0.04	0.01	-0.03	0.03	-0.02	0.00	0.00	-0.02	0.04	-0.02	-0.03	0.03	-0.02	-0.01	0.02	0.01	0.00	0.00	-0.01	0.01
(40) Type Business, Finance, Marketing	-0.02	0.00	0.03	0.00	0.05*	0.00	-0.01	-0.02	-0.04	0.05*	-0.02	-0.07*	0.07*	0.02	-0.03	-0.03	0.02	-0.01	-0.02	-0.01	0.02
(41) Type Science, Technology	-0.02	0.03	0.03	-0.12*	-0.13*	-0.10*	0.07*	-0.02	0.15*	-0.08*	-0.06*	0.25*	-0.25*	0.33*	-0.02	-0.12*	-0.18*	-0.03	-0.04	0.21*	-0.23*
(42) Type Internal Services	0.04	0.02	0.02	-0.03	-0.03	-0.04	-0.01	-0.02	0.01	-0.06*	0.06*	-0.01	0.01	-0.03	0.02	0.01	0.01	-0.01	-0.01	0.02	-0.05*

## Part 2

	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41
(23) Gov. Level: Other	-0.30*																			
(24) Gov. Level: Social Security Admin.	-0.09*	-0.04																		
(25) Type General Administration	-0.01	-0.04	0.08*																	
(26) Type Education	-0.07*	0.25*	-0.03	-0.19*																
(27) Type Health, Sports, Social	-0.08*	0.00	0.00	-0.12*	-0.06*															
(28) Type Craft Work, Production	0.02	-0.02	-0.01	-0.04	-0.02	-0.01														
(29) Type IT	0.03	0.01	0.06*	-0.11*	-0.06*	-0.04	-0.01													
(30) Type Arts, Culture	-0.04	0.13*	-0.01	-0.06*	-0.03	-0.02	-0.01	-0.02												
(31) Type Agriculture	0.04	-0.02	-0.01	-0.04	-0.02	-0.01	0.00	-0.01	-0.01											
(32) Type Public Relations	-0.01	0.06*	-0.01	-0.06*	-0.03	-0.02	-0.01	-0.02	-0.01	-0.01										
(33) Type Law	0.09*	0.00	-0.01	-0.07*	-0.04	-0.02	-0.01	-0.02	-0.01	-0.01	-0.01									
(34) Type Security	-0.03	-0.03	-0.01	-0.07*	-0.04	-0.02	-0.01	-0.02	-0.01	-0.01	-0.01	-0.01								
(35) Type Others	0.03	-0.14*	-0.03	-0.41*	-0.22*	-0.14*	-0.05*	-0.12*	-0.07*	-0.04	-0.07*	-0.08*	-0.09*							
(36) Type Translation	-0.03	-0.02	-0.01	-0.03	-0.02	-0.01	0.00	-0.01	-0.01	0.00	-0.01	-0.01	-0.01	-0.04						
(37) Type Technical Administration	-0.02	-0.07*	-0.01	-0.15*	-0.08*	-0.05*	-0.02	-0.05*	-0.03	-0.02	-0.03	-0.03	-0.03	-0.18*	-0.01					
(38) Type Environmental Administration	0.05*	-0.01	-0.01	-0.05*	-0.03	-0.02	-0.01	-0.01	-0.01	0.00	-0.01	-0.01	-0.01	-0.06*	0.00	-0.02				
(39) Type Traffic, Transport, Logistics	0.01	-0.01	0.00	-0.02	-0.01	-0.01	0.00	-0.01	0.00	0.00	0.00	0.00	0.00	-0.02	0.00	-0.01	0.00			
(40) Type Business, Finance, Marketing	-0.03	0.05*	-0.02	-0.08*	-0.04	-0.03	-0.01	-0.02	-0.01	-0.01	-0.01	-0.02	-0.02	-0.09*	-0.01	-0.04	-0.01	0.00		
(41) Type Science, Technology	0.07*	0.03	0.04	-0.19*	-0.10*	-0.06*	-0.02	-0.06*	-0.03	-0.02	-0.03	-0.04	-0.04	-0.22*	-0.02	-0.08*	-0.03	-0.01	-0.04	
(42) Type Internal Services	0.01	0.05*	-0.01	-0.07*	-0.03	-0.02	-0.01	-0.02	-0.01	-0.01	-0.01	-0.01	-0.01	-0.08*	-0.01	-0.03	-0.01	0.00	0.00	-0.04

**Appendix D: Full Results**

	Number of Applications (1)	Satisfaction with quality of appl. (2)	Satisfaction with selected candidate (3)
Extrinsic Signals	0.248 + (0.141)	-0.007 (0.007)	0.013 (0.008)
Intrinsic Signals	0.103 (0.495)	-0.015 (0.025)	-0.004 (0.029)
Prosocial Signals	1.679 (1.170)	0.119 * (0.058)	0.143 * (0.067)
<i>Type of contract (ref.: part-time contract)</i>			
Full-Time Contract	1.233 (1.847)	-0.143 (0.093)	-0.055 (0.106)
Full-Time or Part-Time Contract	3.161 (2.014)	-0.154 (0.101)	-0.180 (0.115)
Permanent Contract	2.009 (1.570)	0.010 (0.079)	0.057 (0.092)
<i>Education required (ref.: Master's degree)</i>			
No graduation	10.203 ** (3.690)	-0.092 (0.185)	-0.309 (0.205)
Professional Training	5.743 ** (2.085)	-0.183 + (0.106)	-0.239 * (0.122)
Bachelor's Degree	-3.845 * (1.884)	-0.404 *** (0.095)	-0.245 * (0.111)
Top-Level Leadership	-7.358 (8.700)	0.342 (0.437)	0.376 (0.620)
Foreign Local Staff	-4.109 (12.374)	-0.145 (0.619)	-1.726 * (0.736)
Population Density	-0.000 (0.000)	-0.000 (0.000)	-0.000 ** (0.000)
<i>Government level (ref.: federal level)</i>			
Local	-7.711 * (3.327)	-0.034 (0.150)	0.305 * (0.154)
State	-3.315 (3.271)	0.116 (0.144)	0.189 (0.141)
Social Security Administration	15.416 * (7.564)	0.581 + (0.351)	0.639 + (0.361)
Other	2.625 (3.718)	0.152 (0.169)	0.253 (0.175)
Foreign Country (1 = yes)	-6.553 (11.821)	0.067 (0.594)	2.044 * (0.849)
<i>Type of job offered (ref.: general administration)</i>			
Education	-7.404 * (3.184)	0.048 (0.159)	0.289 (0.185)
Health, Sports, Social	-5.660 (3.826)	-0.135 (0.192)	-0.039 (0.228)
Craft Work, Production	-21.751 * (10.769)	-0.000 (0.538)	0.018 (0.627)
IT	-16.749 *** (4.240)	-0.794 *** (0.213)	0.315 (0.266)
Arts, Culture	17.498 * (7.434)	-0.208 (0.368)	0.111 (0.419)
Agriculture	-14.504 (12.308)	-0.584 (0.590)	0.501 (0.757)
Public Relations	13.624 + (7.022)	0.708 * (0.353)	0.139 (0.369)
Law	-2.949 (6.108)	0.292 (0.305)	-0.527 (0.379)
Security	10.778 +	-0.291	-0.125

(Continued)

	Number of Applications (1)	Satisfaction with quality of appl. (2)	Satisfaction with selected candidate (3)
Others	(5.799) -4.106 * (1.858)	(0.291) -0.142 (0.093)	(0.346) -0.001 (0.105)
Translation	11.753 (12.553)	0.561 (0.646)	0.814 (0.698)
Technical Administration	-11.565 *** (3.060)	-0.342 * (0.154)	-0.190 (0.194)
Environmental Administration	-9.581 (8.827)	-0.356 (0.439)	0.145 (0.509)
Traffic, Transport, Logistics	3.953 (20.929)	-1.574 (1.053)	0.620 (1.065)
Business, Finance, Marketing	-8.375 (5.245)	-0.065 (0.265)	0.293 (0.292)
Science, Technology	-3.441 (3.300)	-0.127 (0.160)	0.217 (0.174)
Internal Services	3.800 (6.450)	0.115 (0.327)	0.512 (0.366)
Intercept	24.573 *** (4.026)	4.667 *** (0.188)	5.847 *** (0.197)
SD level 2 resid.	11.151	0.322	0.000
SD level 1 resid.	27.549	1.449	1.496
n (job ads)	1863	1863	1401
n (employers)	1025	1025	811
logLik	-8855.857	-3397.333	-2568.545
AIC	17785.715	6868.666	5211.091

Hierarchical linear model with restricted maximum likelihood estimator. Standard errors in parentheses. \*\*\*  $p < 0.001$ ; \*\*  $p < 0.01$ ; \*  $p < 0.05$ ; +  $p < 0.1$ .