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FDZ-Methodenreport

Methodological aspects of labour market data

Job Vacancies and Personnel Policy in Establishments – A Supplementary Survey on Applicant Selection

Survey Design, Survey Process and Data Quality Analyses

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"Job Vacancies and Personnel Policy in Establishments – A Supplementary Survey on Applicant Selection"

Survey Design, Survey Process and Data Quality Analyses

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Abstract

The online survey "Job Vacancies and Personnel Policy in Establishments – A Supplementary Survey on Applicant Selection" aims to investigate how a company's decision to fill vacancies is influenced by the applicants' individual characteristics on the one hand and by how the significance of these individual characteristics differs between professions on the other. The factorial survey design (vignette survey) was used for this purpose. It is particularly well suited for analyses set to determine the significance of individual determinants and their interactions.

Below, we will first detail the online survey design including the selection of the dimensions at the vignette level and at the professional level. The focus is on the technical implementation of the vignette module in the questionnaire. Afterwards, the sampling of the companies and the surveying procedure are documented. Subsequently, we describe analyses of the sample response rate and selectivity of the participants as well as the calculation of the resulting weighting factors. This is followed by data quality analyses. The Appendix giving a detailed specification of the materials used is provided only in the German version of this documentation. The questionnaire in German language is part of a separate <u>Appendix</u>.

Zusammenfassung

Mit der Onlinebefragung "Betriebliche Personalpolitik und offene Stellen – Ergänzungsbefragung zur Bewerberauswahl" soll untersucht werden, wie die betriebliche Entscheidung zur Besetzung offener Stellen einerseits von individuellen Merkmalen der Bewerber/innen abhängt, andererseits aber auch davon, wie sich die Bedeutung dieser einzelnen Merkmale zwischen Berufen unterscheidet. Zur Anwendung kam dabei das Faktorielle Survey Design (Vignettenbefragung). Es eignet sich besonders gut für solche Analysen, bei denen die Wichtigkeit einzelner Determinanten und ihre Wechselwirkungen herausgearbeitet werden sollen.

Im Folgenden wird zunächst das Design der Onlinebefragung ausführlich beschrieben, einschließlich der Auswahl der Dimensionen auf der Vignetten- und der Berufsebene. Der Fokus liegt auf der technischen Umsetzung des Vignettenmoduls im Fragebogen. Anschließend folgen die Dokumentation der Stichprobenziehung der Betriebe sowie des Befragungsverlaufs. Danach werden Analysen zur Ausschöpfung der Stichprobe und Selektivität der Teilnehmer/innen sowie zur Berechnung der sich daraus ergebenden Gewichtungsfaktoren beschrieben. Es folgen Analysen zur Bewertung der Datenqualität. Ein Anhang mit einer umfangreichen Darstellung der eingesetzten Materialien befindet sich nur in der deutschen Version dieser Dokumentation. Der deutschsprachige Fragebogen ist in einem gesonderten Appendix zu finden.

Keywords: filling vacancies, staff selection, factorial survey design, recruiting alternatives, labour market, establishment survey

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1 Research interest

The online survey "Job Vacancies and Personnel Policy in Establishments – A Supplementary Survey on Applicant Selection" (hereafter referred to as the "Applicant Selection Survey") conducted by the Federal Employment Agency's (BA) Institute for Employment Research (IAB) aims to investigate the decisions companies make to preselect eligible applicants for a job interview. While most literature on staff selection focuses on the aptitude test of the preselected applicants during the personal presentation, the bottleneck phase of preselection has hardly received any attention so far. Only Oechsler (2006: 224) describes the application documents – mostly different biographical data such as CV, school reports, training certificates and employment references – as the best single predictors for "initial indicators of the applicant's career and future development".

According to the information provided in the application documents, applicants' individual characteristics play a central role, for example, the level of education, the suitability of their professional qualification for the vacancy, the general and profession-specific labour market experience as well as employment references or salary expectations. On the other hand, the significance of these individual determinants depends on the vacancy and varies between professions. Depending on how strictly access to this profession is regulated, training certificates could be more important than professional experience or employment references (see Vicari/Zmugg 2017). The survey data will be used to determine which of these individual criteria are relevant for job interview preselection and whether they can be substituted with one another depending on the properties of the profession in question.

In the following, we will first describe the survey design including the selection of the dimensions at the vignette level and professional level as well as the technical implementation of the vignette module in the questionnaire. Afterwards, the sampling and surveying procedure will be documented followed by analyses of the response rate and selectivity as well as the calculation of the weighting factors. Subsequently, the data quality of the vignette module is verified. This report is completed by information on data access. A more comprehensive documentation of the German materials used is given in the Appendix of the German version; the questionnaire in German language is part of a separate <u>Appendix</u>.

2 Survey design

Given the fact that HR decision processes differ between professions, two analytical levels were considered both for constructing the survey instrument and for sampling: the level of professions and the level of individual determinants within each profession.

2.1 Selection of professions

At the profession level, structural characteristics were selected which allow professions to be combined into functional groups. In this context, the profession is defined as a multidimensional construct (Dostal et al. 1998) that uses different mechanisms in order to structure the matching between job-seekers and jobs. Initially, the professions were selected on the basis of three dimensions: The first structural characteristic for selecting the profession is the *standardisation of the professional qualification certificate*. According to the institutional theory approach, standardized professional qualification certificates reduce the costs of searching staff in the recruiting process by sending clear signals about the applicants' skills and abilities to employers (Damelang et al. 2015). A certificate is considered standardized if the professional qualification is based on training regulations that are identical or comparable at the government or federal state level with uniform curricula and final exams. Frequently, practising the profession is linked (in)formally to the presence of such a standardized certificate, as it proves the required qualification (Vicari 2014). In addition to professions with or without standardized qualification certificates, there are also legally regulated professional title, proof of a certified professional qualification must be furnished as prescribed by legal and administrative regulations (Bundesagentur für Arbeit 2013). This applies to professions that have to satisfy special quality standards for the sake of protecting the general public, e.g. doctors, lawyers or teachers.

For this reason, such professions are selected for the analyses that can be put into the categories "unstandardized", "standardized" and "regulated" according to the institutional property of *standardisation of the professional qualification certificate*. This approach assumes that the appropriate professional qualification certificate is very important in standardized professions and can be substituted only partly – or not at all in the case of regulated professions. In contrast, professions with non-standardized access are eligible for alternative recruiting – the professional experience should play a major role when selecting applicants here.

Besides that, the *requirement level* necessary to practise the profession was applied from the new German Classification of Professions 2010 (Paulus/Matthes 2013) as a structural characteristic of professions. The requirement level measures the complexity of the professional activity. In order to obtain a clear analytical delimitation, we included only requirement level 2 (specialist activities) for professions that require vocational training and requirement level 4 (highly complex activities) for university level professions into the design.

As a third structural characteristic, the *profession's gender composition* was considered. It measures whether more men or women work in the profession. The professional segregation of the genders and the resulting different working conditions, salaries and career prospects have been at a constant high level for years (Hausmann/Kleinert 2014). Among other factors, this can be put down to statistical discrimination: Due to anticipated career interruptions, women are rated less productive on average (Aigner/Cain 1977; Bielby/Baron 1986). We assume this discrimination to be particularly high in typical male and female professions. According to Matthes/Biersack (2009), the *gender composition* is divided into female professions (proportion of women > 0.7), mixed professions (proportion of women between 0.7 and 0.3) and male professions (proportion of women from the employment statistics as of 31 December 2012 were used.

These three dimensions determine the allocation of the professions in one of twelve subsamples in total.¹ Each cell of the dimension matrix should ideally be represented by an individual profession that satisfies all criteria of the dimension levels. Also, we had to make sure that there were sufficient alternatives for each profession in order to create the dimension *suitability of the formal qualification level* in a meaningful way (see section 2.3).

Eventually, the anticipated case numbers had to be considered for each subsample. In order to implement sufficient vignette ratings for all professions, the eligible professions were compared with estimated new recruitments from the IAB Job Vacancy Survey. If a profession was found that matched the criteria but already exhibited too few case numbers in the IAB Job Vacancy Survey, additional professions had to be searched for that cell. In this case, multiple professions having the same structural properties were assigned to one subsample. As can be seen in Table 1, 25 professions were ultimately selected and a separate vignette module was built for each of them. To assure the subsamples' comparability and joint analysability, the relative levels of the dimensions at the vignette level were created identically across all subsamples.

		regulated	standardized	unstandardized
Female profes-	AN 4	 Pharmacist Teacher (secondary school) 		Social worker
sion	AN 2	Preschool teacher	Office clerkHairdresser	
Mixed profes- sion	AN 4	ArchitectPhysicianLawyer		ControllerHR specialist
	AN 2	Curative education therapist	Bank tellerIndustrial clerkCook	
Male profes-	AN 4	Civil engineerElectrical engineerMechanical engineer		ChemistManagerSoftware developer
sions	AN 2	Paramedic	 Truck driver IT specialist Industrial mechanic 	

Table 1: Selected professions in the dimension matrix

2.2 Selection of the individual determinants

At the individual determinant level, the criteria decisive for selection are investigated in a quasi-experimental way. The identification of these determinants is based on information usually contained in the application documents. They are considered to be more or less objective criteria that help assess the applicants' productivity in the target dimensions of efficiency and motivation.

¹ Overall, only twelve cells of the matrix could be filled, as there are no standardized professions requiring university education that are not regulated at the same time. Neither are there any nonstandardized vocational training professions in the German labour market.

School reports and professional qualification certificates, for instance, are frequently used as a proxy to measure the efficiency in terms of general and profession-specific human capital. On the one hand, the educational institutions actually teach knowledge and skills necessary to practice a profession, and on the other hand, the act of obtaining the certificates itself is seen as a signal of efficiency and motivation (Spence 1973). As already illustrated, especially such signals that are sent in the form of professional qualification certificates can provide the necessary information to assess the productivity in relation to the minimum requirements for the vacancy. For this reason, only the *formal professional qualification* and not the general school leaving certificate was included in the study as a dimension.

In addition to the general and specific human capital acquired in educational institutions, the tools to measure productivity also include human capital acquired and developed "on the job", i.e. the professional experience, according to Mincer (1958). This capital in turn can be further divided into general and specific human capital. Given the fact that the applicants are always assessed in relation to a vacancy, two separate dimensions were taken into account, namely the professional experience in the wanted profession as the *professional experience* and the work experience in other jobs as the *general work experience*.

In addition to the investments into education, references from previous employers provide valuable information. While all sounding "well-meaning" at first glance, employment references contain encoded grades on the individual assessment aspects that can be decoded by an HR officer. Also the lack of employment references serves as a (negative) signal. Therefore, *employment references* presented another dimension of evaluating the productivity of applicants.

Moreover, the applicant's desired salary is also a measure of productivity (Franz 2009) according to the search theory, albeit not an objective one. When asked to specify their salary expectations in the application process, applicants will give a value that lies between their desired salary and the anticipated expectations of the company. This "poker game" corresponds to a subjective assessment of the applicant's own productivity so that it still gives the HR officer some clues as to the applicant's self-perception. Consequently, the *salary expectations* were included as a dimension.

Ultimately, also the applicants' *gender* plays a major role in staff selection, particularly in interaction with the gender composition of the profession.

In addition to the criteria already mentioned, which can be considered as "hard facts", there is a number of other imaginable criteria which are, however, not pursued any further for reasons of comparability: The age, for example, represents an almost linear transformation of professional experience in case of an uninterrupted employment history and hence includes little additional informative content. Even though other criteria such as language skills, soft skills or hobbies certainly influence the decision-making process, they are so varied across professions and industries that the inclusion of these "soft facts" would go beyond the scope of the study.

2.3 Vignette texts and dimensions

In the vignette module, HR officers are presented with eight fictitious, condensed CVs. As the respondents already select a profession at the beginning of the survey, all eight CVs refer to a vacancy described in the questionnaire's introductory section. The wanted profession thus remains constant from the HR officer's perspective.

The dimensions of the fictitious CVs (vignettes):

- gender,
- suitability of the formal professional qualification for the vacancy,
- duration of general labour market experience,
- professional experience,
- employment references and
- salary desired by the applicant

were constructed identically for each subsample from a relative viewpoint to make them comparable with one another. From an absolute perspective, some dimensions naturally differ in terms of wording dependent on the wanted profession. This concerns the dimension of the suitability of the formal professional qualification with the six levels: *fully matching pro-fessional qualification, professional specialisation qualification, qualification in an adjacent profession, professional qualification with a lower qualification level, professional qualification with a higher qualification level and inappropriate professional qualification.* Equally, the professional titles vary in the dimension of professional experience according to the selected profession or according to the title of the associated job advertisement.

All other dimensions do not differ with regard to their exact wording between professions. As evident from Table 2, the dimension "duration of general labour market experience" also includes six levels: *career starters* and gainfully *employed for 3, 5, 7, 9* or *11 years*. The dimension "professional experience" also has six levels with a slightly more complex structure. The first level means *no professional experience* with a distinction being made between career starters who cannot have professional experience as per definition and persons who have labour market experience but who have not yet worked in the profession in question. Other levels differ in terms of when and for how long professional experience was collected in the profession in question (*the first year, the first two years, the last year, and the last two years*). The last level stands for *consistent professional experience* in the profession in question.

The "employment references" dimension encompasses the three categories *no*, *good* and *excellent employment reference* from the last employer. Here, too, the first level distinguishes between career starters and persons who do not provide employment references in the sense of a negative signal. The last dimension "salary expectations" again comprises six levels: *not specified*, 5% and 10% *lower*, respectively, *higher than the gross salary budgeted for this position* and *corresponds the gross salary budgeted for this position*. This dimension is left out for the profession of a teacher, since this professional group is tied to labour agreements being employed exclusively in the public sector with many teachers being tenured civil servants. So the profession of a teacher only has five dimensions.

To make the CVs more realistic, the name of the applicant was introduced as an additional dimension. Eight typical German surnames were used to explicitly exclude any discrimination effects due to an alleged migration background. The dimension was stratified so that each of the eight surnames occurs once in each questionnaire.

These six (five for the profession of a teacher) analytical dimensions plus the name dimension were compiled to create descriptions which are as easy to read and realistic as possible and were presented to the respondents for evaluation. Appendix B in the German version of this documentation provides an overview of the text modules for the remaining 24 professions (in German language only).

Dimension	Lev.	Text modules for the subsample: Office clerk
D1 Gender	1	Mr
	2	Ms
Name	1	Schmidt
	2	Mayer
	3	Wagner
	4	Müller
	5	Weber
	6	Schneider
	7	Becker
	8	Fischer
D2 of the latter of the	1	has completed vecational training as an office clerk
DZ Suitability of the	2	has completed vocational training as a management assistant for office communi-
sional qualifica-	2	cation
tion	3	has completed vocational training as an industrial clerk
	1	has completed commercial vocational training and completed further training as an
	-	accountant.
	5	has not completed vocational training.
	6	has completed vocational training as a logistics assistant
D3 Duration of	1	He/she is a career starter
labour market	2	He/she has been employed for 3 years
experience	2	He/she has been employed for 5 years
	1	He/she has been employed for 7 years
	4	He/she has been employed for P years.
	5	He/she has been employed for 9 years.
D4 p 4 p 4	0	The/she has been employed for TT years.
D4 Professional	1	IF D2=5 & D3=1. and does not yet have any further professional experience.
experience		IF D2=ELSE & D3=1: and does not yet have any further professional experience
		IE D2-ELSE: Ho/sho has been employed consistently in the commercial sector since
		He/she has not vet worked as an <i>office clerk</i> .
	2	With his/her first employer, for whom he/she worked for one year, he/she was em-
	-	ployed as an <i>office clerk</i> .* Also afterwards, he/she has been employed consistently in
		the commercial sector.
	3	With his/her first employer, for whom he/she worked for two years, he/she was em-
		ployed as an office clerk.* Also afterwards, he/she has been employed consistently in
		the commercial sector.
	4	He/she has been employed consistently in the commercial sector since. With his/her
		last employer, for whom he/sne last worked for one year, he/sne was employed as an
	5	Unice cierk.
	5	last employer for whom he/she last worked for two years he/she was employed as
		an office management assistant.
* text from dimension 5	6	With his/her last employer, for whom he/she last worked consistently since entering
already inserted here!	-	into the labour market, he/she was employed as an office clerk.
D5 Employment	1	IF D3=1:
reference		IF ELSE: He/she has not enclosed an employment reference by the last/by this em-
		ployer.
	2	He/she has received an excellent employment reference by the last/by this employer.
	3	He/she has received a good employment reference by the last/by this employer.
D6 Salary expecta-	1	He/she has not specified his/her desired gross salary.
tions	2	His/her desired gross salary is 10% lower than what your company/department budg-
		eted for this position.
	3	His/her desired gross salary is 5% lower than what your company/department budg-
		eted for this position.
	4	His/her desired gross salary corresponds to what your company/department budget-
		ed for this position.
	5	His/her desired gross salary is 5% higher than what your company/department budg-
		eted for this position.
	6	His/ner desired gross salary is 10% higher than what your company/department

Table 2: Vignette dimensions and levels using the example of an office clerk

2.4 Sampling of the vignettes and distribution among the respondents

The entirety of all possible vignettes, the so-called "vignette universe", is obtained by combining all possible levels. It is calculated as the Cartesian product of the number of levels of the individual dimensions, i.e. 2x6x6x6x3x6 = 7,776 vignettes in the present case (the name dimension is not considered in this context). Excluding illogical cases (here: career starters with x years of professional experience; career starters with an employment reference; professional further training as a career starter), 6,540 vignettes are left in the universe.

To not ask too much of the respondents and cause them to cancel the survey, it was decided to present eight vignettes to each respondent for evaluation². The goal of the quasi experimental design is to be able to clearly separate respondent effects from vignette effects. Therefore, each vignette should ideally be evaluated by ten persons. To achieve that, 8,175 companies would have to participate in the survey assuming a full response rate of the vignette universe. For this reason, a deliberate selection of 144 different vignettes³ in total was sampled from the vignette universe. The D-efficient sampling procedure (Kuhfeld et al. 1994; Kuhfeld 2010) was used here to take into account that a) the dimensions are almost orthogonal to one another, i.e. exhibit as few correlations among themselves as possible and b) so-called level balance is achieved by distributing the levels as uniformly as possible (Frodermann et al. 2013).

The D-efficiency's potential range of values is 0 to 100 with the maximum value showing an absolutely efficient and fully orthogonal sample (Atzmüller/Steiner 2010; Dülmer 2014). By drawing the 144 vignettes, we obtained a value of D = 96.3 which attested a very high statistical efficiency of our sample. By correlating the individual dimensions, the quality of the experimental design can be verified additionally. If all respondents of the sample participated in the survey, the correlation matrix of the drawn vignette sample would be significant for assessing the quality. Since usually only a fraction of respondents is actually willing to participate, the design-related correlations between the dimensions may shift, however. Table 3 shows the correlation matrix of the implemented net sample. Here, the correlations between the individual dimensions that contain illogical combinations.⁴

To allocate the vignettes among the respondents, the 144 vignettes were initially divided randomly in 18 decks with eight vignettes each so that the respondents, too, could be randomly distributed among the decks. To minimise halo and order effects (Auspurg et al. 2009b), the order of vignettes was shuffled within the deck prior to distribution. For this purpose, each deck was increased tenfold and subsequently its eight vignettes were re-sorted at

² The pretest showed that respondents tire when presented with ten vignettes and are more inclined to cancel the entire survey. As a result, the number of vignettes per person had to be reduced to eight. For the pretest, see also section 3.1.

³ The number 144 can be divided by 2, 3 and 6 – the number of levels of our dimensions. This allows a balanced stratification of levels to be achieved.

⁴ By excluding these illogical combinations, the dimensions were confounded, but here, too, the values are lower than 0.19 according to amount. The original correlation matrix is not shown.

	Gender	Professional qualification	Duration of labour market experience	Professional experience	Employment reference	Salary expectations
Gender	1.0000					
Professional qualification	0.0037	1.0000				
Duration of labour market experience	-0.0009	-0.0000	1.0000			
Professional experience	-0.0057	0.0146	0.1860 *	1.0000		
Employment reference	-0.0209 *	0.0033	0.1418 *	0.1086 *	1.0000	
Salary expecta- tions	-0.0152	-0.0064	0.0105	-0.0110	-0.0117	1.0000

Table 3: Implemented correlation matrix of the dimensions

Rank correlation coefficients according to Spearman; N(vignettes) = 33,784; * level of significance p = 0.001

random. For technical reasons, the 180 decks thus created were randomly distributed among the just under 30,000 addresses prior to the survey already. The resulting random allocation of vignettes among respondents has the additional advantage of avoiding correlation between the vignette dimensions and the (unobserved) characteristics of the respondents. This in turn is a prerequisite for satisfying the methodical standards of experimental designs (Frodermann et al. 2013) and achieving high internal validity (Frings 2010).

2.5 Vignette module

The vignette module, the core of the "Applicant Selection Survey", started by selecting the profession and consequently by allocating the respondents to a subsample. The profession was selected with the following multiple choice question: "Which of the following professions exist in your company / your department? Please tick off the professions held by at least one employee" (see Figure 1). If the respondents chose more than one of the 25 professions, they were randomly assigned to one of the professions they had selected. The entire further course of the survey subsequently referred to this chosen profession. If respondents selected none of the listed professions, they were informed on the next page that choosing the profession is mandatory in order to answer the next questions and were asked to return to the selection of the profession. If they clicked the "Next" button nevertheless, they were taken to the end of the survey.



Bundesagentu für Arbeit	r Betriebliche Pers Ergänzungsbefr	sonalpolitik und offene Stell ragung zur Bewerberauswa	en Institut für Arbeitsma und Berufsforschung Die Forschungseinrichtung Bundesagentur für Arbeit						
Zuerst möchten wir wissen: Welche der folgenden Berufe gibt es in Ihrem Betrieb/Ihrer Dienststelle? Bitte kreuzen Sie die Berufe an, in denen mindestens ein/e Mitarbeiter/in beschäftigt ist. (Mehrfachnennung möglich)									
Fachinformatiker/	Berufskraftfahrer/ Berufskraftfahrerin	Maschinenbauingenieur/ Maschinenbauingenieurin	Arzt/ Ärztin	Controller/ Controllerin					
Informatiker/	Architekt/ Architektin	 Bankkaufmann/ Bankkauffrau 	Industriekaufmann/ Industriekauffrau	Erzieher/ Erzieherin					
Heilerziehungspfleger/ Heilerziehungspflegerin	Rettungsassistent/ Rettungsassistentin	Lehrer/	Friseur/ Friseurin	Apotheker/ Apothekerin					
Chemiker/ Chemikerin	Industriemechaniker/ Industriemechanikerin	Koch/ Köchin	Bauingenieur/ Bauingenieurin	Personalreferent/ Personalreferentin					
Geschäftsführer/ Geschäftsführerin	Rechtsanwalt/ Rechtsanwältin	Sozialpädagoge/ Sozialpädagogin	Bürokaufmann/ Bürokauffrau	Elektrotechnikingenieur/ Elektrotechnikingenieurin					
		Zurück Weiter							

The selection of the profession was followed by a job description tailored to the selected profession which described the fictitious vacancy in more detail, specifying both the activities to be performed and the skills expected of the applicants. The job advertisements were always based on the suitable professional qualification of the dimension suitability of the formal professional gualification. However, the required educational gualification was deliberately not named, because not only the professional qualifications were varied in the vignettes, but also the educational qualification level in terms of over-qualification or under-qualification. In order to create the job advertisements, information from BERUFENET⁵ and from current ads⁶ published in the BA's job portal "Jobbörse" was evaluated. All vacancies were full-time employment subject to social security contributions to be filled as soon as possible. All ads furthermore required the desired salary to be specified. Even though this is not customary in some industries, the sentence was introduced as a bridge to the dimension of salary expectations. The profession of a teacher was the only exception. Here, the specification of the salary expectations was omitted, because this dimension had caused major irritation in the pretest. At this point, the respondents were asked to imagine wanting to fill a vacancy as described in the job advertisement (see Figure 2). Appendix A of the German version contains a tabular overview of the job advertisements for all remaining 24 professions.

⁵ BERUFENET is the BA's online information portal which provides comprehensive and systematic information on some 3,200 current professions among other services (see: <u>http://berufenet.arbeitsagentur.de/berufe/</u>).

⁶ See: <u>http://jobboerse.arbeitsagentur.de/</u>

	Bundesagent für Arbeit	ur Betriebliche Personalpolitik und offene Stellen Ergänzungsbefragung zur Bewerberauswahl	Institut für Arbeitsmarkt- und Berufsförschung Die Forschungseinrichtung der Bundesagentur für Arbeit
Stellen Lokalpr Bitte st	Sie sich vor, Ihr Bei esse und mehreren ellen Sie sich vor, S	trieb/Ihre Dienststelle sucht eine/n Bürokaufmann/-frau Online-Stellenportalen die folgende Stellenausschreibung v ie möchten eine solche Stelle besetzen, selbst wenn es die	ı . Dafür haben Sie in der veröffentlicht. beschriebene Tätigkeit bei Ihnen so
nicht gi	bt.	, 	_
Stelle	nangebot	Burokaufmann/Burokauffrau	
Angeb	ootsart	Sozialversicherungspflichtige Beschäftigung	
Stelle	nbeschreibung	Sie übernehmen kaufmännische Aufgaben in den Bereicher Buchführung und Rechnungsbearbeitung. Außerdem erledigen Sie organisatorische Büroarbeiten: Sie koordinieren Termine, bereiten Besprechungen vor und bearbeiten den Schriftverkehr. Sie verfügen über sehr gute Fachkenntnisse im Rechnungswesen, haben gute MS-Office-Kenntnisse und beherrschen die deutsche Sprache sehr gut in Wort und Schrift, haben Spaß am selbstständigen und eigenverantwortlichen Arbeiten, treten sicher und kundenorientiert auf und verfügen über eine ausgeprägte Teamfähigkeit.	n
		Interessiert? Dann freuen wir uns über Ihre aussagekräftig Bewerbung (einschließlich frühester Verfügbarkeit und Gehaltsvorstellungen) per E-Mail oder postalisch.	je
Arbeit	szeit	Interessiert? Dann freuen wir uns über Ihre aussagekräftig Bewerbung (einschließlich frühester Verfügbarkeit und Gehaltsvorstellungen) per E-Mail oder postalisch. Vollzeit	je

Figure 2: Screenshot – example of a job advertisement for an office clerk

The job advertisement was followed by a general work instruction that was the same for all respondents. Their task to evaluate the eight brief CVs was explained to the respondents, giving them some additional background information that was constant for all vignettes. The pretest already demonstrated how important an accurate work instruction is to correctly fill in the vignettes, as the short CVs give only a very limited picture of the fictitious applicants. For example, it was pointed out that all application documents were formally correct and that all letters of motivation were convincing. Moreover, it was emphasised that some CVs among the eight seem inappropriate for the job to prevent respondents from wondering about certain combinations of characteristics of the vignettes causing irritation that could cause them to abort the survey. Finally, the respondents were instructed to not compare the CVs with one another but to evaluate each application separately (see Figure 3).

Figure 3: Screenshot – work instruction

Bundesagentur für Arbeit	Betriebliche Personalpolitik und offene Stellen Ergänzungsbefragung zur Bewerberauswahl	Institut für Arbeitsmarkt- und Berufsforschung Die Forschungseinrichtung der Bundesagentur für Arbeit					
Auf die ausgeschriebene Stelle	haben sich innerhalb der Bewerbungsfrist acht Per	sonen beworben.					
Wir möchten gerne von Ihnen v sehen Sie auf den nächsten Sei kurz zusammengefasst.	Wir möchten gerne von Ihnen wissen, ob Sie diese Bewerber/innen zum Vorstellungsgespräch einladen würden. Dazu sehen Sie auf den nächsten Seiten erneut die Stellenanzeige sowie die wichtigsten Informationen aus den Bewerbungen kurz zusammengefasst.						
Die Beschreibungen der Bewerb auf diese Angaben. Gehen Sie o Bewerber/innen ihr Interesse a	per/innen enthalten nur "harte Fakten" . Bitte bez lavon aus, dass alle Bewerbungsunterlagen gewiss n der ausgeschriebenen Stelle überzeugend begrür	iehen Sie Ihre Bewertung ausschließlich enhaft erstellt wurden und dass alle idet haben.					
Trotzdem können für die Stelle	ungeeignete Bewerbungen darunter sein.						
Lesen Sie bitte jede einzelne Bewerbung genau durch und bewerten Sie diese vor dem Hintergrund Ihrer eigenen Erfahrung mit Stellenbesetzungen. Es ist nicht das Ziel, die Bewerbungen in eine Reihenfolge zu bringen oder untereinander zu vergleichen, sondern sie individuell hinsichtlich ihrer Passung zu bewerten. Daher gibt es in diesem Teil der Umfrage auch keinen Zurück-Button.							
	Zurück Weiter						

Subsequent to the work instruction, eight vignettes were presented in which the levels of the dimensions varied according to the vignette plan. Each vignette again showed a brief version of the job advertisement. So the respondents did not need to go back to reread the job advertisement. Also this was intended to animate them to compare the CV directly with the job advertisement and not with other CVs. For the same reason, there was no Back button between the second and the eighth vignette.

(Translation of the sample vignette in Figure 4:

Ms Wagner has a completed vocational training as an office clerk. She has been employed for 11 years. With her first employer, for whom she worked for one year, she was employed as an office clerk. She has not enclosed an employment reference by this employer. Also afterwards, she has been employed consistently in the commercial sector. Her desired gross salary is 10% higher than what your company/department budgeted for this position.)

The respondents were prompted to assess the vignettes with the question "Would you invite *X* for a job interview?" with the gender and the name taken from the corresponding vignette text (see Figure 4). The respondents had to select their answer on an eleven-stage scale from 0"by no means" to 10 "by all means". By doing so, we heeded a recommendation by Auspurg/Hinz (2015: 66), namely to use a rating scale with more options than usual to by-pass censoring problems. Such problems occur when respondents select a maximum rating already in the first vignette and consequently cannot give a more positive or negative rating in subsequent vignettes even though this would reflect their judgement.

	Ergänzu	ungsbefragur	ipolitik und ig zur Bew	erberaus	wahl _B	e Forschungseinrich indesagentur für Ar	ntung der tbeit	AB 📼	
Stellenangebot	Bürol	kaufmann/I	3ürokauffrau						
Stellenbeschreib	ung Sie üb Rechn koord Sie ve Kennt Spaß	ernehmen k ungsbearbei inieren Term rfügen über nisse und be am selbststä	aufmännische A tung. Außerden ne, bereiten Be sehr gute Fachl herrschen die o ndigen und eige	ufgaben in c n erledigen S sprechunger kenntnisse ir leutsche Spr enverantwor n über eine a	len Bereiche Sie organisa n vor und b n Rechnung rache sehr g tlichen Arbe usgeprädte	en Buchfüh torische Bü earbeiten d gswesen, ha gut in Wort eiten, treter e Teamfähig	rung und roarbeiten: en Schriftve aben gute M und Schrift sicher und keit.	Sie erkehr. 1S-Office- t, haben	
ewerbung 4: Trau Wagner hat ei em sie zwei Jahre uch danach war s r Betrieb/Ihre Die	kunde Intere frühes ne abgeschlos lang tätig war, e durchgehend ststelle für die	ssiert? Dann ster Verfügba sene Ausbilk hat sie als E d im kaufmär se Position v	freuen wir uns arkeit und Geha lung als Büroka lürokauffrau gea nischen Bereich orgesehen hat	über Ihre an Itsvorstellun uffrau. Sie is Irbeitet. Sie I n tätig. Ihre V	ussagekräft gen) per E- t seit 11 Jah nat kein Arb orstellunger	ige Bewerb Mail oder p nren erwerb eitszeugnis n über das B	ung (einsch ostalisch. stätig. Bei if vom dieser Bruttogehalt	ließlich nrem erste n Arbeitg liegen 10	en Arbeitgeber, t eber mitgeschict % über dem, wa
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Figure 4: Screenshot – sample vignette of an office clerk

To clarify the different levels specific to the individual professions in the vignettes, Table 5 shows the same vignette from the same deck for eight different professions. The presented vignette is composed of the following combination of levels: the gender is *male* (level: 1), the formal professional qualification is *professional specialisation* (level: 2), the duration of general labour market experiences is *11 years* (level: 6), the specific professional experience was collected in the *first two years* (level: 3), the employment reference is *excellent* (level: 2) and the desired salary is *minus five percent* (level: 3).

Table 5: Examples of different professions - vignette 8 respectively, deck: 96

Example: Physician (Specialist in general practice)

Mr Mayer has a PhD in human medicine with a license to practice and further training as a specialist in general practice and acupuncture. He has been employed for 11 years now since obtaining his degree in general practice. In his first two years as a physician, he worked in ambulatory GP care. He got an excellent employment reference by this employer. Afterwards he changed to clinical research where he has been working until recently. His desired gross salary is 5% lower than what your company/department budgeted for this position.

Would you invite Mr Mayer to a job interview?

Example: Truck driver

Mr Mayer has completed vocational training as a commercial driver in passenger transportation. He has been employed for 11 years. With his first employer, for whom he worked for two years, he was employed as a truck driver. He got an excellent employment reference by this employer. Also afterwards, he has been employed consistently in the transportation sector. His desired gross salary is 5% lower than what your company/department budgeted for this position.

Would you invite Mr Mayer to a job interview?

Example: Preschool teacher

Mr Mayer has completed vocational training as a teacher for youth and institutional care. He has been employed for 11 years. With his first employer, for whom he worked for two years, he was employed as a preschool teacher. He got an excellent employment reference by this employer. Also afterwards, he has been employed consistently in the educational sector. His desired gross salary is 5% lower than what your company/department budgeted for this position.

Would you invite Mr Mayer to a job interview?

Example: Manager

Mr Mayer has a university degree in industrial business economics. He has been employed for 11 years. With his first employer, for whom he worked for two years, he was employed as a manager. He got an excellent employment reference by this employer. Also afterwards, he has been employed consistently in management. His desired gross salary is 5% lower than what your company/department budgeted for this position.

Would you invite Mr Mayer to a job interview?

Example: Teacher (mathematics / other subject - for secondary school)

Mr Mayer has a university degree in teaching of your school type with second state examination (mathematics/history) and further training as a teacher to promote the gifted and talented. He has been employed for 11 years. With his first employer, for whom he worked for two years, he was employed as a maths teacher at your type of school. He got an excellent employment reference by this employer. Also afterwards, he has been employed consistently in the educational sector.

Would you invite Mr Mayer to a job interview?

Example: Mechanical engineer (construction engineer)

Mr Mayer has a university degree in applied mechanics. He has been employed for 11 years. With his first employer, for whom he worked for two years, he was employed as a construction engineer. He got an excellent employment reference by this employer. Also afterwards, he has been employed consistently in mechanical engineering. His desired gross salary is 5% lower than what your company/department budgeted for this position.

Would you invite Mr Mayer to a job interview?

Example: Cook

Mr Mayer has completed vocational training as a pastry chef. He has been employed for 11 years. With his first employer, for whom he worked for two years, he was employed as a cook. He got an excellent employment reference by this employer. Also afterwards, he has been employed consistently in the hotel and catering sector. His desired gross salary is 5% lower than what your company/department budgeted for this position.

Would you invite Mr Mayer to a job interview?

Example: Social worker

Mr Mayer has a university degree in educational science. He has been employed for 11 years. With his first employer, for whom he worked for two years, he was employed as a social worker. He got an excellent employment reference by this employer. Also afterwards, he has been employed consistently in the social sector. His desired gross salary is 5% lower than what your company/department budgeted for this position.

Would you invite Mr Mayer to a job interview?

The vignette module was completed by two additional assessments. First, respondents were asked how appropriate they found the job advertisement. The five-stage response scale ranged from "*much too general*" to "*just right*" and "*much too specific*" and was complemented by a text field for free text entry. Subsequently, they had to evaluate the difficulty of vignette assessment ("How difficult did you find it to assess the applicants with regard to their eligibility for the advertised position overall?"). The eleven-stage scale was designed similarly to the vignette assessment ranging from "0 - not at all difficult" to "10 - very difficult". Entering free text in a special text field was possible here as well. This question aimed to verify the respondents' cognitive stress level as caused by the survey and is recommended as a good predictor of the consistency of responses.

To be able to assess the data quality of the vignette module, the response times for the individual vignette pages were recorded. This allows recognising methodical problems such as response sets or quasi refusals at least afterwards (haphazard assessment without having read the text) (Frodermann et al. 2013).

2.6 Surveying instrument

The questionnaire (see separate <u>Appendix</u>) was designed as a pure web survey and programmed using the GlobalPark software. It is structured as follows:

- Introductory text and data privacy statement
- Vignette module
 - Selection of the professions
 - Job advertisement
 - Vignette assessments
 - Assessment of job offers and vignettes
- Company recruitment
- Company characteristics
- Individual characteristics of the respondent(s)
- Responsibilities in the recruitment process

The vignette module described above was preceded by an *introductory text*, which established a link to the IAB Job Vacancy Survey, and detailed data privacy and confidentiality specifications.

The questionnaire also asked the respondents to consent to the linking of the anonymous survey results with (equally anonymous) process data of the Federal Employment Agency. By way of experiment, this linking question was placed in three different locations: Respond-

ents were randomly divided into three groups. The first third of respondents saw the question directly after the start, the second third in the middle of the questionnaire before the block about individual characteristics and the final third at the end of the questionnaire.

The vignette module was immediately followed by some questions on the company's approach to recruiting which all referred to the profession selected in the subsample. The first question was about the current applicant situation for the selected profession followed by a question about the staff search channels and an assessment of aspects which the respondent deems important when selecting applicants for a job interview. This set of items included questions about the vignette dimensions as well as other possible aspects mentioned frequently in the pretest. For methodical reasons, the individual items were displayed in a random order both for the question about the staff search channels and for the question about the aspects.

This was followed by three brief questions about company characteristics: Whether a person who is working in the selected profession is paid according to a pay scale, whether the company employs an equal opportunities officer and who reports the job role code to the company's social insurance. Other characteristics such as company size, industry affiliation and site were omitted in favour of keeping the questionnaire as short as possible. This was possible, because these data were already included in the (anonymous) participant data.⁷

The next questionnaire part was about the correspondents' individual characteristics. These include gender and age, the highest general school qualification, the highest vocational qualification, the exact job title of the specified professional qualification, the designation of the present position, whether the respondent has changed jobs, the position in the job, whether the respondents work in an HR department and whether they have managerial responsibility.

Finally, the respondents' responsibilities in the recruiting process were surveyed. The purpose was to establish who is responsible for job advertising, invitation to the job interview and making the final recruitment decision in the company. The possible answers were "*You alone*", "*You together with other colleagues*" and "*Other colleagues*". If the surveyed persons were involved in the processes, they were asked for the number of cases in the last year and their seniority in this role ("*For how many years...*").

3 Survey procedure

3.1 Pretest

To pilot test the questionnaire, several pretests were conducted. The first pretest was performed by the IAB's project members (ProIAB). The pretest was linked to the testing of the IAB Job Vacancy Survey and was carried out in combination with the latter. A combined letter of address announced both test blocks to the companies. For the pretest, 20 professions were implemented as questionnaires; the test was done on paper for technical reasons. One to two companies were found for testing of each of the 20 professions. The questionnaires

⁷ For details, see section 3.2 on the design of the company sample.

were completed by the HR managers in the presence of a ProIAB member. This allowed verifying the comprehensibility and completeness of the questionnaires through selective inquiries. The surveyed companies were selected for the pretest by means of a stratification across company size (up to 9 employees/up to 250 employees and more than 250 employees) and industry (technical/commercial). The pretest phase took place from 30 March to 9 May 2014. The ProIAB members collected feedback on the professions not tested in the field so that valuable information could be gained for them as well.

After incorporating the pretest results, the questionnaires were programmed using the GlobalPark survey software by Questback. Subsequently, the survey was checked again for correct content, filter guidance and proper description of the professions in the job advertisements and the levels of the dimension *suitability of the formal professional qualification for the vacancy*. This was accomplished through a web survey of 42 persons including factorial survey experts and representatives from the individual professions.

3.2 Design of the company sample

Public and private companies and departments were contacted that had already participated in the IAB Job Vacancy Survey from 2010 to 2012 (net sample of the IAB Job Vacancy Survey). The company addresses were compiled (postal and electronic) in anonymised form by the IAB department for IT and Information Management (ITM). Only such companies and departments were included that had employees working in the selected professions to avoid contacting ineligible respondents as far as possible. In addition to the address details, the industry affiliation (WZ 2008, one-digit codes) and the number of employees subject to social insurance contributions in the company were provided. These key data are used for both the actual analysis and the calculation of the selectivity due to non-response (see chapter 5). After anonymising the company numbers, the addresses were transferred by ITM. After checking for overlaps with the simultaneous autumn survey of the IAB Job Vacancy Survey currently in the field, a total of 29,514 company addresses could be used for the "Applicant Selection Survey".

3.3 Modes of invitation

The fashion of inviting companies and departments to participate in the survey was another methodical experiment. In a first step, a distinction was made between companies for which only a postal address was available and those that had specified an e-mail address as well. The contacts in the companies had voluntarily provided their e-mail address during the IAB Job Vacancy Survey for further questions.

There were three invitations modes in total which were further divided into subgroups (see Figure 5). 80 percent of the companies for which only a postal address was available were invited in the standard way with a letter of invitation including a link to the survey and a password. They belonged to distribution group 1 (DG1). The subsequent reminder was also sent postal in this group. The remaining 20 percent of randomly drawn companies from the postal-only group were asked to write down their e-mail addresses on an enclosed response card to be returned to us in a postpaid envelope for them to be invited by e-mail. Having accommodated this request, the companies received an electronic invitation and later also a

reminder including a link and password (DG2). If the response card was not returned, the companies received a reminder including a link and password by post (DG3).

Companies for which an e-mail address was also available were divided into four groups. DG 4 received a postal invitation and a postal reminder. Companies in DG5 received a postal invitation but an electronic reminder later on. It was the other way round in DG6 and DG7. In both groups, an electronic invitation was sent first. In DG6, the reminder was sent by post later on. If the invitation was returned as not deliverable in DG6 and DG7, these companies received the invitation by post as well as a postal reminder later on (DG8).





3.4 Field time and field control

Due to the different modes of invitation, the field start, too, had to be staggered for dispatchrelated reasons. The 1,771 invitations of DG2 were sent first on 17 November 2014. The 17,917 invitations of DG1, DG4 and DG5 were sent on 17 and 18 November 2014. Since electronic mail usually is the first to arrive, DG6 and DG7 were sent last into the field on 19 November 2014 in the form of 7,540 e-mail invitations.

A total of 26,814 reminders were sent to companies that had not responded by 18 December 2014 and whose address had not been identified as undeliverable according to their distribution group, of which 7,562 via e-mail and 19,252 by post. The field period was closed on 23 January 2015 after 10 weeks. During this time, the questionnaire was opened 5,543 times; 4,611 of those questionnaires had been filled in completely including some questionnaires without the wanted profession. Most accesses (22.5 percent) were made in the first week already (see Figure 6). After sending the reminder, the access numbers again soared to 17.5 percent directly after dispatch and again to 16.2 percent in the first working week of the New Year.



Figure 6: Field progress in calendar weeks (started/completed questionnaires)

4 Response rate

The gross sample comprised 29,514 cases. Of this cohort, 3,456 companies could not be contacted due to incorrect addresses (3,414 cases, 11.6 percent) or technical problems (42 cases, 0.1 percent). In 770 cases (2.6 percent), it turned out that the addressed companies did not belong to the target group, because they were unable to provide information about any of the wanted professions or did not (or no longer) employ any staff in the selected professions. Of the remaining 25,288 companies that were contacted, 20,517 (69.5 percent) refused to participate at all. An additional 548 respondents (1.9 percent) started the survey but broke it off. Hence, net participation amounted to 14.3 percent (4,223 cases). This high rate of participation for an online company survey can surely also be explained by the fact that great efforts were made to contact the companies by using the different modes of invitation and reminder. The response rate is detailed in Table 6. It additionally shows the response rate as well as the cooperation and refusal rate.

Categories	Percentage
I Interview completed	14.3
II Contacted, but no (complete) interview	
a) Interview cancelled	1.9
b) Interview refused / not participated	69.5
III Not delivered	
a) Address incorrect	11.6
b) Technical problems	0.1
IV Does not belong to the target group	2.6
Response rate = I/(I+II+III)	14.5
Cooperation rate = $I/(I+II)$	16.7
Refusal rate = IIb/(I+II+III)	71.4
Absolute number (N)	29,514

Table 6: Sample response rate by distribution group (percentages in the columns)

5 Selectivity

In order to be able to make statements about how characteristics are interrelated and to confer the findings on the statistical population, we first have to verify whether the net sample is selective, i.e. whether it differs systematically from the gross sample. For each company in the gross sample, we have information about the company size, the company site (at the federal state level) and the industry sector (WZ-08, sections). Also, we know the year when a company address was randomly drawn from the BA's⁸ establishment file for the IAB Job Vacancy Survey. Based on these data, we can thus verify whether and to what extent participation depended on these characteristics.

For the selectivity analysis, multivariate logistic regressions were estimated. Table 7 documents the average marginal effects of these estimations. They indicate how the probability P(Y=1) changes if the value of the categorical variable changes from 0 to 1 while all other variables in the model are kept constant, i.e. correspond to their mean value. For variables with more than two levels, the change is calculated in comparison to the corresponding reference category.

In addition to the participation probability (category I as compared to the categories II – IIIa in Table 6), also the probability of contacting (category I – II as compared to category IIIa) and the probability of participation under the condition of contacting (category I as compared to category II) were investigated. Participation can be regarded as the product of availability and participation as conditional upon availability:

Pr(T) = Pr(E) * Pr(T|E)

⁸ The companies are drawn at random from the BA's establishment file which includes about two million companies. This establishment file is generated from the employment statistics for which employers report all employees subject to social security contributions under their company's number.

		Mean values	Participa- tion AME	Contacted AME	Participation if contacted AME
Number of employees	(ref.: more than 500)				
1 - 9		26.3	-0.10***	-0.02	-0.11***
10 - 49		49.9	-0.06***	-0.00	-0.07***
50 - 249		18.3	-0.01	-0.00	-0.01
250 - 499		3.1	-0.01	0.01	-0.02
Industry sector	(ref.: tertiary sector)				
Primary sector		2.2	-0.02	0.05***	-0.04**
Industry sector		27.9	-0.03***	0.00	-0.04***
Construction indust	ry	4.2	-0.05***	0.05***	-0.06***
Eastern Germany		36.9	-0.01**	0.01	-0.02***
Year of drawing the add	ress (ref.: 1988 - 1999)				
2000 - 2004		9.3	0.00	-0.01	0.00
2005 - 2010		17.8	-0.02**	-0.04***	-0.1
2011 - 2013		54.2	-0.01***	-0.03***	-0.01*
Observations		29,514	28,702	28,702	25,288
Pseudo R ²			0.013	0.005	0.014
Log likelihood			-11,829.7	-1,0414.9	-1,1251.1

Table 7: Average	marginal	effects	(AME) fo	or p	articipation,	availability	and	conditional	partici-
pation									

Significance level ***p = 0.01; **p = 0.05; *p = 0.1

Column 1 of Table 7 first shows the results of the participation probability. Here, we can observe the following effects:

- Smaller companies with fewer than 50 employees participated much less frequently in the survey than companies with more than 500 employees. Very small companies have the highest negative effect on participation in this context.
- Companies in the industry sector and in the construction sector which were included into the model as a separate level due to high case numbers in the gross sample – participated in the survey significantly less frequently than companies from the tertiary sector. The non-significant result of the primary sector may be attributable to the low case number.
- East German companies participated significantly less frequently in the survey than West German companies.
- Companies whose addresses were randomly drawn for the IAB Job Vacancy Survey after 2005 participated significantly less frequently than companies whose addresses are comparably old.

Also, we were interested in whether these different participation probabilities can be put down to difficulties of contacting or lacking willingness to participate of companies with specific characteristics (column 2 and 3 in Table 7):

- The lower participation probability of very small to small companies can in fact be attributed to their lower willingness (or capacity) to participate, because the availability was comparable for all company sizes.
- Compared with companies from the tertiary sector, companies from other sectors (including the construction industry) were significantly less frequently willing to participate in the survey. The lower participation probability of these companies can be explained exclusively by their willingness to participate. After all, both companies in the construction sector and in the primary sector were significantly easier to contact than companies of the reference category.
- The lower participation probability of East German companies is equally attributable to their lower willingness to participate, as they were no more difficult to contact than West German companies.
- The less frequent participation of companies whose addresses were drawn randomly in the past ten years can also be ascribed to the fact that they are more difficult to contact. For the latest company addresses (2011 to 2013), this effect can additionally be put down to their decreased willingness to participate.

Overall, the effects described here are rather small so that the selectivity of the net sample compared to the gross sample can be assessed as low. This also becomes evident when looking at the low explanatory power of the models. Despite the low selectivity, it is recommended to estimate weights to analyse the content in order to make the results more generalizable.

6 Weighting factors

6.1 Calculation

The weighting factors are calculated as the inverse value of the respective estimated participation probabilities:

$g(X) = 1/(\widehat{Pr(T)})$

This means that each observed unit is weighted with the inverse value of the response probability, thus being "projected" in a manner of speaking from the observed part of the net sample to the gross sample drawn originally. In this case, we obtain the total weight as a product of the partial weights of the four explanatory variables (number of employees, industry sector, region and year of address drawing) in Table 8. The table shows the central measures of the partial and of the total weight. The partial weights take on values between 5 and 9; the total weight takes on values between 1470 and 4536.

	Mean value	Std. dev.	Min	Max	Observations
gcompany-size(X)	7.05	1.41	5	9	29,514
g _{east} (X)	7.37	0.48	7	8	29,514
$g_{ind.sectors}(X)$	7.38	0.57	7	9	29,514
g _{date} (X)	6.72	0.45	6	7	29,514
g _{total} (X)	2,583.68	628.43	1,470	4,536	29,514

Table 8: Estimated weighting factors for the participation probability

6.2 Example evaluation

Based on the frequency count of the characteristic "evaluation of the company's current applicant situation", Table 9 illustrates in how far the weighting affects the results. It becomes evident here that the weighted and non-weighted values are very similar. This is another indicator of the net sample's low selectivity. But even if the influence of the different company characteristics on participation seems to be low, weighting the data is recommended for further evaluations.

Table 9: Weighted and non-weighted shares of the variable	"evaluation of the company's
current applicant situation" (N = 4,223)	

Current applicant situation in the com- pany	In percent Non-weighted	In percent Weighted with g(x)
A great many applicants	6.78	6.69
Many applicants	33.60	32.88
Few applicants	38.44	38.62
Very few applicants	19.67	20.07
No applications	1.52	1.73
Total	100.00	100.00

The research report on the study (siehe Vicari/Zmugg 2017) gives a descriptive overview of the survey results of all surveyed characteristics.

7 Data quality

Experimental designs have the advantage of very high internal validity. It is achieved if the variance of the dependent variables is actually generated by changing the stimulus experimentally. In vignette experiments, the internal validity may be disturbed, e.g. if the random distribution of the vignettes to respondents has not worked or if the vignette dimensions are confounded with respondent characteristics (Auspurg/Hinz 2015: 113 f.). The internal validity may also be adversely affected by the respondents' systematic response behaviour such as order effects or response sets caused by cognitive overload for example. For this reason, we will subject the survey data to a series of methodological verifications that will provide us with more insight on evaluating the data quality in addition to the selectivity analysis described above.

7.1 Randomising the vignette and deck allocation

We start by checking the composition of the vignette sample (net sample) implemented from the participation. The individual vignette decks were randomly distributed among the 29,514 companies prior to the survey. This means that the levels of the vignette dimensions were not correlated with the company characteristics in the gross sample. In order to test whether this non-correlation also exists in the net sample, we will employ the company characteristics already used in the selectivity analysis: company size, industry sector, site and year of address drawing. Ordinal scaled characteristics are first dichotomised to be able to use them as a dependent variable in logistic models. According to its effects in the selectivity analysis, the company size is divided into "small companies" (fewer than 50 employees) and larger companies. The characteristic "industry sector" is divided into "service sector" (tertiary sector) vs. other sectors and the characteristic "year of address drawing" is split into "address drawn before 2005" and after.

To verify the randomisation of each of these characteristics, a logistic regression model with average marginal effects is calculated in which the levels of the vignette dimensions represent the explanatory variables. Ideally, the levels have not influence whatsoever on the probability to belong to one of the two groups of characteristics.

Figure 7 shows combined coefficient plots for all four models. The dots indicate the size of the effects; the horizontal lines on the left and right map the respective confidence intervals. If a dot is located left of the zero line, the effect is negative; to the right of the zero line it is positive. If the confidence intervals cut the zero line, the effect is not significant. The figure shows that not a single significant effect exists in all four models, i.e. specific vignette levels were not assigned significantly more or less frequently, e.g. to small companies. Moreover, none of the four models has any explanatory power (pseudo R^2 at <0.000). Hence, we can assume that the allocation of the individual vignettes to the individual companies is in fact random and that the vignette dimensions do not correlate with respondent characteristics.

Figure 7: Randomization of the vignette allocation in the net sample (AME; N = 33,784)



Besides, verifying the randomisation of the vignette characteristics, Auspurg/Hinz (2015: 115) recommend testing whether the decks correlate with the survey characteristics or here with the company characteristics. First, we are interested in whether all decks were used with comparable frequency in the first place. As Figure 8 shows, the individual frequencies deviate only slightly from the theoretical value of even distribution (234.6).



Figure 8: Frequency distribution of the decks (N = 4,223)

Figure 9 depicts the result of the random allocation of decks to companies with different characteristics. In fact, some decks were assigned to specific companies with significant more or less frequency. This stems from the fact that while being balanced overall, the vignette levels are not balanced at the respective deck level which could have an impact on the calculation of the interaction effects. It is therefore recommended to check whether the deck number also has an impact on the vignette assessment. This being the case with decks 9, 10, 12 and 16 having a significantly negative influence (see Figure 10), the deck variable should also be checked in multivariate analyses to partial out these effects.



Figure 9: Randomization of the deck allocation in the net sample (AME; N = 33,784)

Figure 10: Impact of the decks on the vignette assessment (OLS; N = 33,784)



7.2 Statistical efficiency of the net sample

In addition to successfully randomising the vignettes to respondents, a high statistical efficiency is an important quality criterion of internal validity. As described in section 2.4, a D-efficient sampling procedure was used to achieve a maximally orthogonal and levelbalanced vignette sample. The efficiency is D = 96.3 and the correlation of the individual dimensions among each other has a maximum value of r = 0.19 for dimensions affected by the exclusion of illogical cases and r = 0.02 for all other dimensions (see Table 3 in section 2.4). Consequently, we can assume that the levels are almost orthogonal. The figures 11a) to f) show the verification of the level balance of the implemented sample.



Figure 11: Distribution of the levels of the six dimensions (in percent; N = 33,784)

We observe an even distribution of the levels in the dimensions gender, suitability of the formal professional qualification and salary expectations which were not affected by the exclusion of illogical cases in the vignette design (Figure 11a, b and f). For the dimensions duration of general labour market experience, professional experience and employment reference, we see the effects of excluding specific combinations of characteristics for the level "career starters"/"no experience" (see section 2.4), while the other levels of these three dimensions are correspondingly almost evenly distributed (Figure 11c, d and e). We can thus confirm a level-balanced sample and affirm that the vignette design has an overall high statistical efficiency.

7.3 Response trends

In the next section, we will verify whether there were any methodological problems on the part of the respondents' response behaviour which could impair the internal validity (Auspurg/Hinz 2015: 113 f.). For this purpose, we will first check whether all levels of the response scale are populated or whether respondents systematically tend towards the middle or towards extreme responses (Bogner/Landrock 2015). As we can see in Figure 12, all response categories were used for the question about the invitation probability with a slight trend towards positive ratings.



Figure 12: Invitation probability (in percent; N = 33,784)

As the applicants were always assessed in relation to an advertised vacancy, we have to consider how much the respondents thought that the job advertisement was to the point - in addition to the distribution of the invitation probability. In total, 50 percent of respondents felt that the job advertisement was a bit to general (see Figure 13). From testing the even distribution of the levels we already know that the levels with more positive properties were not overrepresented in the net sample. So we must assume that a certain measure of "information underload" (Auspurg et al. 2009a: 66) is responsible for the slightly positive trend of vignette assessment. However, the two characteristics correlate only marginally (r < 0.06).



Figure 13: Subjective specificity of the job advertisement (in percent; N = 3,983)

While so far the response distribution was investigated across all respondents, we have to look at the response patterns of the individual respondents in order to estimate potential response sets. Table 10 shows how often respondents selected the extreme values or the centre value of the scale. One percent of respondents exhibited a systematic trend towards extreme values, i.e. the scale value 0 ("by no means") for at least six out of eight vignettes. 2.5 percent selected 10 on the scale ("by all means"). Since respondents tend to avoid the extreme ends of a scale (Hui/Triandis 1985), such a response pattern indicates that these judgements were made independently of the vignette's content or of their own opinion and are thus equivalent to a kind of response refusal. Multivariate analyses show that respondents older than 60 years tended significantly more frequently to choose extreme values which could be interpreted as a signal of being stressed cognitively by the vignette design. The trend towards the middle can also be attributed to the so-called satisficing (Krosnick 1991) meaning an arbitrary evaluation for the purpose of reducing survey-related cognitive stress. In the given study, only 0.7 percent of respondents selected the scale value of 5 at least six times so that this type of response set does not play a noteworthy role.

Frequen-	Scale		Scale value 5 Scale		Scale v	10 مىلە	Same ra	Same ratings	
cv	M		N	0/2	NI NI	0/	N	ری 0/	
Cy	IN	/0	IN	/0	IN	/0	IN	/0	
0	2,989	70.8	1,952	46.2	2,206	52.2	-	-	
1	609	14.4	1,268	30.0	744	17.6	16	0.4	
2	293	6.9	624	14.8	524	12.4	1,131	26.8	
3	165	3.9	239	5.7	324	7.7	1,540	36.5	
4	79	1.9	78	1.9	202	4.8	811	19.2	
5	46	1.1	29	0.7	117	2.8	394	9.3	
6	14	0.3	10	0.2	55	1.3	156	3.7	
7	11	0.3	9	0.2	23	0.5	86	2.0	
8	17	0.4	14	0.3	28	0.7	89	2.1	
Sum	4,223	100.0	4,223	100.0	4,223	100.0	4,223	100.0	

Table 10: Extreme values	s, middle category and	same ratings per	respondent (N = 4,223)
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The systematic response trends that have a negative impact on the internal validity include the insufficiently graded ratings. The right column of Table 10 shows how often respondents used the same scale value for the eight vignettes. 2.1 percent of respondents chose an identical rating eight times; however, we see a low grading of at least six times the same scale value for 7.8 percent in total. Though, no specific group of respondents can be identified that grade responses insufficiently with significantly greater frequency.

We also asked directly whether respondents had difficulties with the vignette design (see Figure 14). This seems not to have been the case with most respondents; only about 20 percent rated the difficulty as 6 or higher. Only 3.6 found the vignette module to be "very difficult" (value 9 and 10). A quarter of respondents in contrast rated the design as "not at all difficult" (value 1 and 2). The multivariate model, however, shows that respondents who had difficulties with the vignette assessments also graded their responses significantly less frequently, which amounts to a quasi-refusal of the response.



Figure 14: Difficulties with the vignette assessment (in percent; N = 4,051)

Measurement of the response time of each vignette is another indicator of cognitive overload or disinterest in the survey topic, along with arbitrary answers. As usual for factorial surveys, respondents needed much longer to complete the first vignette as they read it much more thoroughly and respondents have to get acquainted with the assessment task first. Afterwards, the average processing time drops distinctly due to learning progress (see Figure 15).



Figure 15: Average response time per vignette in seconds (without extreme values; N = 33,784)

The mean response time for all eight vignettes together is 4.03 minutes (SD = 2.1) ranging from 0.3 to 21.6 minutes⁹. Long durations, however, do not indicate comprehension difficulties but that the survey was paused temporarily. Very short response times, in contrast, make it very unlikely that the respondents actually read the vignette text thoroughly. Rather it seems likely that they have simply "clicked through" the vignette hastily giving arbitrary responses. However, it does not seem to be true that the processing time depends on the felt difficulty of vignette assessment. Figure 16 shows that only those respondents who chose the maximum value on the difficulty scale needed even longer on average to complete the assessment – however, only 2 percent of respondents did so.

⁹ Excluding extreme values of up to several days due to survey interruptions and hence did not deliver a meaningful value.





Finally, we want to verify whether the learning effects, as are evident from the shorter response time of later vignettes, have an impact on the significance of the individual vignettes. For this purpose, we look at the explanatory power of the estimations with one vignette respectively. Table 11 shows the model quality criterion adjusted R² of the OLS estimation of the vignette assessment for only one vignette per respondent, corresponding to their position number when processing the module. The vignette dimensions under control of the deck number are regressors here. It becomes evident that the R² value neither drops dramatically nor varies excessively. The variations can be attributed to random vignette combinations, but they are no indicators of tiring effects due to the number of vignettes. Rather, they confirm the impression already gained by looking at the response times, namely that the respondents treated the last vignettes as thoroughly as the first vignettes.

					(-1		
Vignette rating cal- culated for the xth vignette only	Vig 1	Vig 2	Vig 3	Vig 4	Vig 5	Vig 6	Vig 7	Vig 8
R ²	0.197	0.185	0.227	0.208	0.202	0.208	0.183	0.203
R ² - adjusted	0.189	0.177	0.220	0.201	0.194	0.200	0.175	0.195
Ν	4,223	4,223	4,223	4,223	4,223	4,223	4,223	4,223

Fable 11: Explanator	y power of the	respective xth	vignette (N	N = 4,223)
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Since we can additionally exclude so-called order effects given the vignettes' random order within the decks, systematic response trends of the respondents can be rated as relatively low overall. Depending on the research interest, it is, however, recommended to check for

the influence of the decks and of the response times or to exclude participant groups with very short response times from the analyses. Beyond that, the data quality can be classified as very good.

8 Data access

So far, the data of the online survey has only been available to project members. But it is planned to make the data accessible to external scientists through the BA's Research Data Centre (Forschungsdatenzentrum - FDZ) at the Institute for Employment Research. For up-to-date information on the FDZ's data offer, visit the homepage of the FDZ: <u>http://fdz.iab.de</u>.

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