

# Skills and the graduate recruitment process

Citation for published version (APA):

Humburg, M., & van der Velden, R. K. W. (2015). Skills and the graduate recruitment process: Evidence from two discrete choice experiments. *Economics of Education Review*, 49, 24-41.  
<https://doi.org/10.1016/j.econedurev.2015.07.001>

**Document status and date:**

Published: 01/01/2015

**DOI:**

[10.1016/j.econedurev.2015.07.001](https://doi.org/10.1016/j.econedurev.2015.07.001)

**Document Version:**

Publisher's PDF, also known as Version of record

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# Skills and the graduate recruitment process: Evidence from two discrete choice experiments



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## ARTICLE INFO

### Article history:

Received 2 December 2013

Revised 1 July 2015

Accepted 2 July 2015

Available online 29 July 2015

### JEL:

I21

J24

### Keywords:

Human capital

Graduate recruitment

Discrete choice experiment

Employability

## ABSTRACT

In this study we elicit employers' preferences for a variety of CV attributes and types of skills when recruiting university graduates. Using two discrete choice experiments, we simulate the two common steps of the graduate recruitment process: (1) the selection of suitable candidates for job interviews based on CVs, and (2) the hiring of graduates based on observed skills. We show that in the first step, employers attach most value to CV attributes which signal a high stock of occupation-specific human capital indicating low training costs and short adjustment periods; attributes such as relevant work experience and a good match between the field of study and the job tasks. In line with the preferences in the first step, employers' actual hiring decision is mostly influenced by graduates' level of professional expertise and interpersonal skills. Other types of skills also play a role in the hiring decision but are less important, and can therefore not easily compensate for a lack of occupation-specific human capital and interpersonal skills.

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## 1. Introduction

The transition from university to work is a pivotal phase in graduates' lives. Graduates exchange the familiar world of education for the less familiar world of work. For most graduates, applying for jobs after graduation is the first time they get reliable information on the labour market value of their credentials and whether their investments were worth it in terms of getting the job they want.

Students who are concerned about their labour market success will invest in the skills which will enable them to take advantage of promising job opportunities. Students try to acquire observable characteristics, such as a higher educational degree or work experience, which increase their skills and/or reliably signal the skills they have to employers. Often, students are faced with decisions which involve potential

trade-offs. For example, students who work alongside their studies to gain work experience may find that they lack the time to get a high grade point average. Similarly, enrolling in a study programme which emphasizes generic academic skills may come at the expense of developing occupation-specific skills.

From the individual's perspective – but also from a higher education policy perspective – it is important to know which choices increase or decrease graduates' employability from the employers' perspective. Knowing the preferences which underlie employers' selection and hiring decisions can inform university students' educational choices and can enable higher education institutions to help graduates acquire the skills they need to be successful in the labour market.

Commonly, the graduate recruitment process is divided into two stages. In the first stage, employers screen graduates' CVs in order to decide which applicants to invite for a job interview. During the second stage, the job interview, employers assess applicants' skills to make a final hiring decision. The two stages are logically related as employers can be

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expected to screen applicants' CVs on the basis of the types and levels of skills they find most important in the hiring decision. This paper takes account of the two stage recruitment process by investigating how graduates' chances of getting invited to a job interview vary with the attributes on their CVs and how their chances of getting the job depends on the actual skills they possess. This two stage process allows us to make inferences about whether employers' priorities in the CV screening stage match their priorities in the hiring stage.

Evidence on the value of particular CV attributes for graduates' chances on the labour market is relatively scarce. Analysing data from graduate surveys [Allen and van der Velden \(2001, 2011\)](#), and [Mason, Williams, and Cranmer \(2009\)](#) find that graduates' chances of securing a graduate-level job are indeed associated with observable characteristics such as the degree, work experience, grades or study experience abroad. However, to our knowledge our study is the first which systematically investigates the relative importance of CV attributes from the employer perspective using a discrete choice experiment.

With regard to graduates' actual skill profile, there is no consensus among researchers about which types of skills have the highest relative importance for graduates' employability. Especially the contrast between generic and (occupation-) specific skills has been the subject of scholarly debate. While some authors emphasize the role of types of skills transferable across jobs for graduates employability, such as problem-solving skills, interpersonal skills, and the ability to learn ([Autor, Levy, & Murnane, 2003](#); [Biesma, Pavlova, van Merode & Groot, 2007](#); [Felstead, Gallie, Green & Zhou, 2007](#); [Kiong-Hock, 1986](#); [Teijeiro, Rungo, & Freire, 2013](#)) others point to the importance of occupation-specific, technical skills ([Elish, O'Connell & Smyth, 2010](#); [Heijke, Meng & Ris, 2003](#); [Mason, 1998, 1999](#)). Our paper contributes to this line of the literature by analyzing data which are particularly suited for investigating the relative importance of different types and levels of skills in the recruitment process: we conducted two stated choice experiments – one for each of the two recruitment stages – among 903 employers<sup>1</sup> in nine European countries. With this method, respondents are presented a number of vignettes with hypothetical job applicants who differ in important attributes. By asking respondents to choose the hypothetical graduate they prefer (or none of them) they are forced to trade off some characteristics for others. This trade-off situation simulates a very realistic decision-making environment often missing with standard survey questionnaires. Moreover, we use a semi-experimental setting, thus avoiding problems of unobserved heterogeneity that often hampers conclusions based on cross-sectional data.

We find that employers prefer hiring graduates with higher levels of professional expertise – content-specific knowledge and skills needed to solve occupation-specific problems. Accordingly, employers' selection of graduates for

job interviews is most influenced by CV attributes signalling a high stock of occupation-specific human capital, such as a good match between the field of study and the job tasks, and relevant work experience. We also find that interpersonal skills are as important as professional expertise for graduates' chances of getting the job.

The remainder of this paper is structured as follows: [Section 2](#) reviews the literature on the role of skills in graduates' transition from university to work. [Section 3](#) presents the data and methodology of the study and [Section 4](#) the econometric model used to estimate employers' preferences. In [Section 5](#) we present the results of the first stated choice experiment and the results of the second stated choice experiment are presented in [Section 6](#). We then draw conclusions in [Section 7](#).

## 2. Literature review and theoretical framework

Rational, profit-maximizing employers hire graduates on the basis of their human capital. [Becker \(1962\)](#) thinks of human capital as the stock of knowledge and skills which enter individuals' (and firms') production function directly. Both cognitive and non-cognitive skill endowments contribute to individuals' human capital stock and consequently to their productivity ([Heckman, Stixrud, & Urzua, 2006](#)).

When selecting candidates for job interviews, employers face the challenge that human capital is not perfectly observable. Often, employers must rely on limited information contained on CVs to assess the value of job applicants to the firm. Employers will therefore exploit a correlation between productivity and observable characteristics, such as the obtained credentials and grade point averages, to make inferences about applicants' productivity. The signalling value of the observable characteristic to employers will depend on their demand for the type of skill associated with the signal, and the differing cost structure between high and low skilled graduates ([Spence, 1973](#)). The greater the difference of the costs associated with obtaining a particular credential between low and high skilled graduates, the higher the credential's signalling value will be.

Given the very negative social consequences for the groups concerned, a substantial part of the literature on employers' use of observable characteristics as signals in the recruitment process focuses on statistical discrimination against particular groups of applicants, such as older applicants or applicants belonging to particular ethnic or religious minorities ([Aigner & Cain, 1977](#); [Altonji & Pierret, 2001](#); [Arrow, 1998](#); [van Beek, Koopmans, & van Praag, 1997](#); [Eriksson, Johansson, & Langenskiöld, 2012](#); [Phelps, 1972](#)). Our paper deviates from this line of research in that it explores the signalling value of credentials which are the result of individuals' educational or work-related investments, such as grade point average or relevant work experience. A relationship between such credentials and graduates' chances of securing a graduate-level job has been found by previous studies analysing data from graduate surveys ([Allen & van der Velden, 2001, 2011](#); [Mason, Williams, & Cranmer, 2009](#)) but has never been systematically analyzed from the employers' perspective.

In addition to examining the signalling value of CV attributes, this paper investigates the relative impact different

<sup>1</sup> Note that about 25% of the respondents in our survey are co-workers involved in recruitment rather than employers in the formal sense of the word such as individuals working in general management or in human resource departments (see [Table 1](#)). However, for convenience and comprehensibility we will use the term 'employer' to denote all respondents.

types and levels of skills have on graduates' chances of getting a graduate-level job. Differences in the importance of types of skills are based on the idea that economically important skills are not unidimensional and that the extent to which skills are productive depends on the match between workers' skills and the requirements of the job (Hartog, 1992; Sattinger, 1993). Graduates' skill profiles differ with respect to their emphasis on particular types of skills, such as interpersonal, commercial or professional skills. Their chances of securing the job they are applying for therefore depend on the importance of particular types of skills these individuals have for performing the job tasks. In an analysis of the demand for engineering and science graduates in the UK Mason (1998, 1999) identifies work readiness – the knowledge, skills and commercial understanding which make graduates deployable soon after hiring – as one of the most important hiring criteria used by employers. In support of this finding Heijke et al. (2003) show that a high level of field-specific skills is positively related to graduates' chances of finding a job which matches their field of study. Looking at higher education graduates' earnings rather than their probability of being employed, Elish et al. (2010) find that in Ireland technical skills generate wage returns of around 4% while other skills, such as communication skills, team skills or leadership skills do not have an effect on earnings.

Other studies, however, point to the importance of interpersonal and other transferable skills for graduates' employability. For example, Kiong-Hock (1986) finds that Malaysian employers put most emphasis on problem solving and affective skills (personality). Autor, Levy, and Murnane (2003) argue that computers substitute routine analytical and interactive tasks but strongly complement non-routine analytical and interactive tasks. They subsequently show for the US that the declining price of computer capital in recent decades raised the relative demand for workers who have a comparative advantage in the ability to combine analytic and interactive tasks. Moreover, Biesma et al. (2007) show that for Dutch master-level graduates in the field of public health, problem-solving skills, creativity and interpersonal skills are more important than flexibility and public health knowledge. For the UK, Felstead et al. (2007) find that problem-solving, communication and persuasion skills are rewarded over and above the premium of education and training. Creating a measure of proximity between employers' preferences for, and graduates' attainment of, various skills, Teijeiro et al. (2013) find that only the proximity of systemic skills, such as the ability to learn or the ability to work independently, influence graduates' likelihood of employment. In their sample, the proximity between employers' preferences for interpersonal and instrumental skills and graduates' attainment of these skills does not influence graduates' employability.

Besides investigating the relative importance of different types of skills, we also explore the effect of the skill level on graduates' chances of getting hired. Based on the findings of earlier studies which suggest that the occupational production function with respect to individuals' skill level is concave (Borghans & de Grip, 2000; Knight, 1979), we expect decreasing marginal returns to skills with regard to graduates' employability.

### 3. Data and methodology

We simulate two common stages of the graduate recruitment process – the selection for job interviews and the hiring stage – using two stated choice experiments.<sup>2</sup>

The use of stated choice experiments to estimate respondents' preferences originated in market research (Carroll & Green, 1995; Cattin & Wittink, 1982) but is increasingly being applied in various fields of economics such as transport economics, health economics and labour economics (van Beek et al., 1997; Biesma et al., 2007; Borghans, Romans, & Sauermann, 2010; Eriksson et al., 2012; Louviere, Hensher, & Swait, 2000; Pouliakas & Theodossiou, 2010; Ryan, 2004). The recent increase in the use of stated choice experiments in economics can be attributed in part to recent studies dispelling doubts that stated preferences reliably predict real market behaviour, and showing that parameter estimates based on stated preference data match those based on revealed preference data quite well (Louviere et al., 2000).

While van Beek et al. (1997) and Eriksson et al. (2012) use stated choice experiments to examine employers' tendency to discriminate against job applicants on the basis of age, beauty and ethnicity, the study of Biesma et al. (2007) also investigates the relative importance of different types of skills. They do this for a small sample of public health graduates in the Netherlands. Our study adds to their findings in a number of ways. First, we examine employers' preferences for a more elaborate list of types of skills. Moreover, we do not restrict our sample to graduates in public health in the Netherlands. Instead, as will be discussed in detail below, our study investigates employers' preferences in seven occupational fields in nine European countries, making it possible to test for differences in preferences across occupational fields and countries. In addition, we adopt a two stage design (instead of focusing exclusively on the hiring stage) to investigate whether employers' preferences for CV attributes are related to the types of skills they prefer in the hiring stage. Our contribution is also methodologically as we include a no choice option which has been shown to be important in avoiding hypothetical bias (Hensher, 2010), and as our respondents evaluate 30 vignettes per stage which increasing the efficiency of the estimates and, more importantly, which allows us to derive individual level parameters and to estimate the standard deviation of the preference parameters. We also include a measure of price which enables us to attach a monetary value to attribute levels.

The experiments were conducted in June and July 2012 in nine European countries (Czech Republic, France, Germany, Italy, Poland, Spain, Sweden, The Netherlands and the United

<sup>2</sup> Another method which has been successfully implemented to study the preferences of employers for applicants' characteristics is the correspondence testing methodology. With this methodology, CVs are assembled by the researcher and sent to actual employers (e.g. Bertrand & Mullainathan, 2004). The correspondence testing methodology is a natural starting point when attempting to elicit employers' preferences as they have the advantage of eliciting revealed preferences, as opposed to stated preferences. However, their outcome variable is crude and mostly limited to call back frequencies. Other important outcomes, such as the hiring decision, cannot be assessed. As we are interested in the latter outcome in particular, we chose to implement the stated choice experiment methodology instead.

Kingdom). Individuals registered on consumer panels of a large international market research organization were invited to participate in an online survey, not knowing its subject. Filtering questions made sure that only individuals who had been involved in recruiting a higher education graduate in the past 5 years were eligible to participate in the experiments. In those countries with a binary tertiary education system, 'higher education graduate' was explicitly defined as someone who graduated from a university, and explicitly excluded graduates from universities of applied sciences.

Our study focuses on the recruitment of graduates in a selected number of occupational fields. In many occupational fields, recruitment is to a large extent governed by legally binding credentials. As we did not want our study to be confounded by legal requirements, we excluded professions in health and welfare as well as education and focused on seven occupational fields where most of the remaining graduates find work: Electro-technology, Engineering, Financial Services, ICT, Legal Services, Media and Communication, and Policy and Organization.<sup>3</sup>

20.2% of the panel members who received an e-mail responded to the invitation to participate in the survey. This number is not a response rate in the usual sense as data collection in each country was automatically halted as soon as 100 employers had completed the survey. 56.8% of individuals passed the first filter question (involved in recruiting higher education graduates in the past 5 years), and 71.2% of those passing filter 1 passed filter 2 (involved in recruiting in one of the seven occupational fields). 68.6% of those passing all filter questions completed both recruitment stages (discrete choice experiments). Data of those respondents who did not complete the survey was not stored and was not used in the analysis.

Our final sample contains 903 respondents, most of which hold management or HR recruitment positions in their organization. About half of the respondents have been responsible for, or involved in, the recruitment of one to five graduates in the past 5 years and 12% of respondents are very frequent recruiters with more than 25 graduate recruitments in the past 5 years. Table 1 shows the most important descriptive statistics of the sample.

In addition to respondents' position held in the organization and recruitment frequency in the past 5 years, we collected information on the occupational field they are recruiting for, the industry of the firm, the proportion of graduates in the firm, firm size and the scale of operations of the firm (local, regional, national, international). This information was mainly collected for descriptive purposes. Analysis showed that the results presented in this study are not affected by these background characteristics. They are

<sup>3</sup> The graduate surveys conducted in the frame of the REFLEX project (Research into Employment and Professional Flexibility, 2004) and the HEGESCO project (Higher Education as a Generator of Strategic Competencies, 2008) show that about three quarters of graduates employed in graduate jobs (ISCO 2 – professionals) 5 years after graduation, and who do not work as health or education professionals, work in these seven occupational fields. Detailed descriptive statistics evaluating the representativeness of our sample in the light of information from REFLEX and HEGESCO are presented in Tables A1 and A2.

**Table 1**  
Descriptive statistics of the sample.

	N	Percent
<i>Country</i>		
Czech Republic	64	7.09
France	100	11.07
Germany	100	11.07
Italy	100	11.07
Netherlands	147	16.28
Poland	92	10.19
Spain	100	11.07
Sweden	99	10.96
United Kingdom	101	11.18
<i>Occupational field</i>		
Electro-technology	58	6.42
Engineering	186	20.6
Financial Services	160	17.72
ICT	171	18.94
Legal Services	133	14.73
Media and Communication	122	13.51
Policy and Organization	73	8.08
<i>Firm size</i>		
<20	301	33.33
20–49	140	15.50
50–99	114	12.62
100–249	137	15.17
>250	211	23.37
<i>Scale of the market firm is operating on</i>		
Local	142	15.73
Regional	219	24.25
National	324	35.88
International	218	24.14
<i>Respondent's position in the firm</i>		
General management	442	48.95
HR management/-staff	234	25.91
Other	227	25.14
<i>Respondent's type of involvement in past graduate recruitments</i>		
Responsible	491	54.37
Involved	412	45.63
<i>Number of graduate recruitments respondent has been involved in during past 5 years</i>		
1–5	446	49.39
6–10	233	25.80
11–25	116	12.85
>25	108	11.96

therefore not further discussed in the remainder of this paper.

Before starting the first choice experiment, respondents were asked to imagine a situation in which they recruit a recent higher education graduate in the occupational field they indicated to be recruiting for. Respondents were instructed that the vacancy they are recruiting for in the experiment is a full-time junior position which can be characterized as structural in the sense that it has a longer time horizon. Seasonal work and short-term replacement positions were excluded. We chose this reference frame to make it clear to respondents that the hiring decision they were going to make represents a commitment and investment for the firm. This means that the characteristics of the reference person respondents had in mind will depend on the kind of entry position employers usually have on offer. Differences in the characteristics of this position, for example the required level of education, will be captured by differences in preferences for particular choice attributes,

Of these 3 candidates, which one would you invite to a job interview? Remember this is a junior position for a recent higher education graduate			
<b>Degree:</b> Bachelor (BA, BSc) <b>Match of field of study and job tasks:</b> Field of study related to job tasks but no exact match <b>Relevant work experience:</b> No <b>Study abroad:</b> No <b>Grade Point Average:</b> Above average <b>Type of university:</b> Average ranked university <b>Starting Salary:</b> Average for this position	<b>Degree:</b> Master (MA, MSc) <b>Match of field of study and job tasks:</b> Field of study unrelated to job tasks <b>Relevant work experience:</b> 2 years <b>Study abroad:</b> Partly <b>Grade Point Average:</b> Average <b>Type of university:</b> Average ranked university <b>Starting Salary:</b> 25% below average for this position	<b>Degree:</b> Doctorate <b>Match of field of study and job tasks:</b> Field of study matches job tasks completely <b>Relevant work experience:</b> 1 year <b>Study abroad:</b> Entirely <b>Grade Point Average:</b> Below average <b>Type of university:</b> Top ranked university <b>Starting Salary:</b> 25% above average for this position	None of these

Fig. 1. Choice set example CV attributes.

for example the value employers attach to a bachelor's degree.

Respondents were told that when choosing the graduate profiles in the experiment they should think of a position in their organization that has these characteristics, and to keep the same position in mind for the entire exercise. Fig. 1 presents a choice set example from the first recruitment stage.

In the first experiment, only CV attributes which are the result of graduates' human capital investment were included, excluding indices such as age, gender, ethnicity, beauty or religion used in other studies (van Beek et al., 1997; Eriksson et al., 2012). Besides not being the focus of this study, excluding indices makes the evaluation of hypothetical graduates value-free and avoids hypothetical bias.

The following common attributes and their levels are included in the profiles of the first experiment:

- (1) **Degree:** bachelor's degree, master's degree, doctorate.
- (2) **The match between the field of study and the job tasks:** field of study matches job tasks. completely, field of study related to job tasks but no exact match, field of study unrelated to job tasks.
- (3) **Relevant work experience:** no, 1 year, 2 years.
- (4) **Study abroad:** no, partly, entirely.
- (5) **Grade point average:** below average, average, above average, upper 10%.
- (6) **Prestige/reputation of university:** average, high.
- (7) **Starting salary:** 25% below average, 10% below average, average for this position, 10% above average for this position, 25% above average for this position.

The number of attributes on the profiles is seven, which is well below the limit of 10 attributes advised in the literature in order to limit the information processing burden on respondents (DeShazo & Fermo, 2002). The degree levels used are the typical levels differentiated in higher education. National equivalents of these levels were used in the various translations of the master questionnaire. The three levels referring to the match between the field of study and the job tasks-attribute resemble those commonly used in graduate surveys, indicating that the match is complete,

incomplete or non-existent.<sup>4</sup> We deliberately limited the number of years of work experience to 2 years, reflecting our intention to measure employers' preferences for *recent* graduates. Study experience abroad was taken up as this attribute is increasingly common in the European context. Grade point average was included in four levels, whereas we included the upper 10% level to explore whether there is a return to belonging to the top 10% of the reference group beyond that of having above average grades. The prestige or reputation of the university was taken up as a two level attribute to see whether enrolling into a university with high prestige or reputation, rather than an average university, has an impact on graduates' chances to get invited to a job interview.<sup>5</sup> Starting salary was taken up as an attribute to have a measure of labour costs in the model which may be used to calculate employers' willingness to pay for CV attributes and their levels.

In the second stage of the survey, we use a discrete choice experiment to elicit employers' preferences for particular skills in the actual hiring decision. We here include six types of skills and the starting salary. Respondents were told that in the first step they had selected and invited a pool of candidates who all seem equally suitable to do the job the respondent was recruiting for, indicating that in this experiment, candidates only differ with regard to the skills included in the profiles. Respondents were instructed that all candidates had been sent to an assessment centre which had thoroughly tested their skills. The information provided on the profile presented the results from this assessment centre, containing the graduates' skill level in the following six domains<sup>6</sup>:

<sup>4</sup> The general formulation of this aspect makes it easier to compare choices across the different occupational fields and countries.

<sup>5</sup> Unlike the degree level, we deliberately refrained from using country-specific equivalents here (like the 'Grande Ecoles' in France or Russel Group universities in the UK) as this would not be comparable across all the countries.

<sup>6</sup> The selection of these six types of skills is based on a review of the literature on the skills demanded of higher education graduates in today's workplaces performed by Humburg and van der Velden (2013).

- (1) **Professional expertise:** content-specific knowledge and skills needed to solve occupation-specific problems
- (2) **General academic skills:** skills which one typically associates with higher education yet which are not occupation-specific, such as analytical thinking and reflectiveness.
- (3) **Innovative/creative skills:** the ability to come up with new ideas and to approach problems from a different angle
- (4) **Strategic/organizational skills:** the capacity to think strategically and act in the interest of their organization.
- (5) **Interpersonal skills:** ability to work in a team and to communicate and cooperate effectively with diverse colleagues and clients.
- (6) **Commercial/entrepreneurial skills:** ability to identify commercial risks and opportunities and being cost-aware.

The skill levels presented on the profiles were whether graduates belonged (1) to the top 25%, (2) to the average, or (3) to the bottom 25% of their reference group. For the purpose of readability and comprehensibility we will refer to these levels as high, average and low skill levels.

Respondents were provided with the definitions of the six types of skills before running the choice experiment. In addition, by scrolling over the skill type, they were able to recall the definition of all types of skills at any time during the experiment. The meaningfulness and appropriateness of these types of skills in the context of the recruitment process had been tested with a small sample of human resources personnel before the study started, and was confirmed in in-depth interviews which were conducted later with a selection of the survey respondents. No indication was found that a relevant skill domain was missing.

A shortcut randomized design was used to automatically generate the hypothetical graduate profiles (Chrzan & Orme, 2000) during the survey. With this type of design, profiles are constructed using the least often previously used attribute levels for a particular respondent. As a result, the occurrence of attribute levels is balanced.

In each of the two experiments simulating the two recruitment stages, respondents were presented with 10 different choice sets. Consequently, each of the 903 respondents evaluated 30 graduate profiles per recruitment stage, so that 9030 choices per stage were observed.

A total of 130 in-depth interviews (10 interviews in each of the nine European countries of the online survey plus Estonia, Greece and Hungary, as well as 10 large multinational corporations) were conducted to learn more about employers' rationale behind the choices observed in the experiments. Each interview lasted about one hour and included a short version of the experiment to learn about the motivation behind employers' choices. In the nine countries where the online experiment was conducted, interviewees were recruited from among participants of the online study who had signalled their availability for such an interview. In the other three countries and with respect to the 10 large multinational corporations databases of the market

research organization were used to recruit interviewees. Recruitment was done according to a scheme which ensured that all occupational fields were equally represented. Within occupational fields, interviewees were chosen randomly except where travel costs and expenditure of time would have been unreasonably high. The interviews took place at the national premises of the market research organization except for the interviews with the representatives of the large multinational organizations, eight of whom we visited at their headquarters and two of whom we interviewed by telephone. A 2 months period in-between the online study and the interviews was deliberately chosen in order to allow the results from the preliminary data analysis to be addressed in the interviews. We developed interview guidelines containing interviewer instruction, example graduate profiles from the choice experiments and the most important questions to be asked and issues to be addressed in the interviews. We also supplied national interviewers with a template for reporting the results, which were filled in in English and analyzed qualitatively.

#### 4. Limitations

Although studies have shown that stated preferences predict real market behaviour quite well (Louviere et al., 2000), hypothetical bias – the divergence of stated and revealed preferences – cannot be entirely excluded. Because respondents do not have to substantiate their choices with real commitments in stated choice experiments, estimates of respondents' willingness to pay for certain attributes or outcomes derived from stated choice experiments may be larger than valid measures of actual willingness to pay. However, we believe that hypothetical bias is minimal in our study. Firstly, in a meta-analysis of 28 studies and 83 observations, Murphy, Allen, Stevens, and Weatherhead (2005) find a median ratio of hypothetical to actual willingness to pay of only 1.35. Secondly, several features of our study have been reported to reduce hypothetical bias (Hensher, 2010; Ladenburg, Olsen, & Nielsen, 2007; Murphy et al., 2005): the use of a choice-based design (as opposed to direct pricing), the existence of a no-choice option (to accommodate ambivalence, indifference or uncertainty), the private nature of the good being studied (as opposed to public), and the use of experienced respondents (as opposed to students in a lab). Moreover, in contrast to studies investigating labour market discrimination of particular groups of individuals, the CV attributes and types of skills included in our experiments are not prone to social desirability bias.

An aspect of study which may potentially limit the generalizability of our results is our operationalization of the hiring stage. In our setting, employers are assumed to get reliable information on graduates' level of skills relative to others, which may not apply to all employers' actual recruitment practice. From our results, we can therefore infer the relative importance of types of skills if employers have this information. Employers who do not assess job applicants in this manner and who therefore do not have accurate information on graduates' levels of different types of skills may in reality base their hiring decision on signals or proxies for these skills. Nevertheless, the interviewees indicated that they perceived the experimental setting as realistic even if

they did not use assessment centres themselves, thus confirming the validity of our results even for employers who use different methods to assess skills.

**5. Econometric model**

We use the mixed logit model to estimate employers' preference for our selection of CV attributes and types of skills. In our discrete choice experiments, the probability of an alternative (a hypothetical graduate) being chosen depends on its characteristics displayed on the profiles shown to respondents, and the difference between its utility and the utilities of the other three alternatives, including the "none of these" option. A conditional logit framework as developed by [McFadden \(1974\)](#) is appropriate for estimating the relative importance of graduate characteristics in these kinds of choice settings. The mixed logit model we use in this study is an advanced version of the original conditional logit model, allowing the coefficients to vary by individual. While the mean coefficients estimated by both types of models do not differ qualitatively (not shown here) the mixed logit model estimates the standard deviation of the mean coefficients, thereby providing information on the extent to which employers' preferences for particular characteristics differ.

Like any discrete choice model consistent with random utility theory, the mixed logit model assumes that an individual faces a choice amongst  $J$  alternatives in each of  $T$  choice situations. The model is well explained in [Hensher and Greene \(2003\)](#) and [Train \(2009\)](#), on which the following description is strongly based. In our specification, coefficients that enter utility are treated as varying over individuals but being constant over choice situations for each individual. The utility that individual  $n$  obtains from alternative  $j$  in choice situation  $t$  can be written as  $U_{njt} = \beta_n x_{njt} + \varepsilon_{njt}$ , where  $x_{njt}$  is the vector of observed variables (in our case attribute levels), coefficient vector  $\beta_n$  is unobserved for each  $n$  and varies in the population with density  $f(\beta_n|\theta^*)$  where  $\theta^*$  are the true parameters of this distribution, and  $\varepsilon_{njt}$  is an unobserved random term that is distributed iid extreme value over choice situations, individuals, and alternatives. Conditional on  $\beta_n$ , the probability that individual  $n$  chooses alternative  $i$  in choice situation  $t$  is assumed to be logit:

$$L_{nit}(\beta_n) = \frac{e^{\beta_n' x_{nit}}}{\sum_j e^{\beta_n' x_{njt}}} \tag{1}$$

The unconditional probability is the integral of the conditional probability over all possible values of  $\beta_n$ , which depends on the parameters of the distribution of  $\beta_n$ . We specify the density of  $\beta_n$  to be normal with mean  $b$  and covariance  $W$  [ $\phi(\beta_n|b,W)$ ]. This allows the coefficients to have positive or negative signs for different decision makers. The choice probability under this density becomes:

$$Q_{nit}(b, W) = \int \frac{e^{\beta_n' x_{nit}}}{\sum_j e^{\beta_n' x_{njt}}} \phi(\beta_n|b, W) d\beta_n \tag{2}$$

where  $b$  and  $W$  are the parameters of interest to be estimated.

If, as normally the case in stated choice experiments, a sampled individual faces a sequence of choice situations, it

is the probability of the sequence of observed choices which matters for maximum likelihood estimation. Let  $i(n,t)$  denote the alternative that individual  $n$  chose in choice situation  $t$ . Conditional on  $\beta_n$ , the probability that individual  $n$  made this sequence of choices is the product of logit formulas:

$$S_n(\beta_n) = \prod_{t=1}^T \left[ \frac{e^{\beta_n' x_{ni(n,t)t}}}{\sum_j e^{\beta_n' x_{njt}}} \right] \tag{3}$$

The unconditional probability for the observed sequence of choices is (see [Train, 2009](#)):

$$P_n(b, W) = \int \prod_{t=1}^T \left[ \frac{e^{\beta_n' x_{ni(n,t)t}}}{\sum_j e^{\beta_n' x_{njt}}} \right] \phi(\beta_n|b, W) d\beta_n \tag{4}$$

One of the reasons why mixed logit models have only become a promising tool in data analysis recently is that the integral in (4) necessary for exact maximum likelihood estimation cannot be calculated analytically as it does not have a closed form in general. The integral is approximated through simulation and the simulated log-likelihood function is maximized. For a given value of the parameters  $b$  and  $W$  (mean and covariance of normally distributed  $\beta_n$ ) a value of  $\beta_n$  is drawn from its distribution. Using this draw  $S_n(\beta_n)$  (Eq. (3)) is calculated. This process is repeated for many draws, and the mean of the resulting  $S_n(\beta_n)$ s is taken as the approximate choice probability:

$$SP_n(b, W) = \frac{1}{R} \sum_{r=1}^R S_n(\beta_n^{r|b,W}) \tag{5}$$

where  $R$  is the number of draws of  $\beta_n$ ,  $\beta_n^{r|b,W}$  is the  $r$ th draw from  $\phi(\beta_n|b,W)$ , and  $SP_n(b,W)$  is the simulated probability of individual  $n$ 's sequence of observed choices. The simulated log-likelihood function is constructed as:

$$SLL(b, W) = \sum_{n=1}^N \ln(SP_n(b, W)) \tag{6}$$

and the estimated parameters are those who maximize  $SLL$ . As noted in [Revelt and Train \(1998\)](#), the log of the simulated probability with a fixed number of draws is not an unbiased estimate of the log of the true probability. However, the bias in  $SLL$  decreases as the number of draws increases, and 500 draws commonly generate adequate results. We use 1000 draws in our estimation.

**6. The right CV for getting invited to the job interview**

[Table 2](#) presents the results of the mixed logit model for graduates' probability of getting invited to a job interview. With the exception of the coefficients for attribute levels "master's degree" and "study abroad entirely", all coefficients are statistically significant. The insignificance of the coefficients for "master's degree" and "study abroad entirely" is a remarkable finding. We will show below that this mean result masks the opposing views of employers from different countries.

The match between the field of study and the job tasks is one of the most important CV attributes with the mean coefficient of a complete match being 1.137 and that of the field of study and the job tasks being related being 0.709.

**Table 2**  
Mixed logit model of selecting graduates for a job interview.

Attributes with normally distributed coefficients		
<i>Degree</i>		
Bachelor's	Ref.	
Master's		
Mean coefficient	0.045	(0.05)
SD of coefficient	0	(0.07)
Doctorate		
Mean coefficient	−0.357***	(0.06)
SD of coefficient	1.195***	(0.08)
<i>Match of field of study and job tasks</i>		
Unrelated	Ref.	
Incomplete		
Mean coefficient	0.709***	(0.06)
SD of coefficient	0.762***	(0.10)
Complete		
Mean coefficient	1.137***	(0.07)
SD of coefficient	1.228***	(0.07)
<i>Relevant work experience</i>		
No	Ref.	
1 year		
Mean coefficient	0.556***	(0.05)
SD of coefficient	0.775***	(0.07)
2 years		
Mean coefficient	0.711***	(0.06)
SD of coefficient	1.179***	(0.08)
<i>Study experience abroad</i>		
No	Ref.	
Partly		
Mean coefficient	0.123**	(0.04)
SD of coefficient	0.542***	(0.10)
Entirely		
Mean coefficient	−0.004	(0.05)
SD of coefficient	0.795***	(0.07)
<i>Grades</i>		
Below average	Ref.	
Average		
Mean coefficient	0.355***	(0.05)
SD of coefficient	0.575***	(0.07)
Above average		
Mean coefficient	0.549***	(0.06)
SD of coefficient	0.784***	(0.08)
Top 10%		
Mean coefficient	0.579***	(0.06)
SD of coefficient	0.790***	(0.08)
<i>Prestige/reputation of university</i>		
Average	Ref.	
High		
Mean of coefficient	0.130***	(0.04)
SD of coefficient	0.457***	(0.07)
<i>Fixed coefficient attributes</i>		
<i>Salary</i>		
25% below average	0.935***	(0.08)
10% below average	0.980***	(0.07)
Average	1.044***	(0.07)
10% above average	0.600***	(0.06)
25% above average	Ref.	
None	0.083	(0.16)

Standard errors adjusted for 903 clusters (individuals) in parentheses. \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$ . Estimation based on 1000 random draws per iteration. Log likelihood −9627.26,  $N = 36120$ . The Wald-test of the joint significance of the attributes with 17 degrees of freedom is 1071.73 and has a  $p$ -value  $> 0.000$ . The model has no alternative-specific constants, as is common practice with data from so-called unlabelled discrete choice experiments, where randomly generated alternatives (graduates) have no utility beyond the characteristics attributed to them in the experiment. The use of unlabelled discrete choice experiments also implies that no meaningful marginal effects can be calculated. In order to illustrate the effect of changes in the attribute levels on graduates' chances to get invited to a job interview, we compare the predicted probabilities to be chosen of two graduates who only differ with regard to one attribute level in [Table A3](#).

Having a degree in a field of study which matches the job tasks of the vacancy well gives graduates a decisive advantage over competing applicants who do not have this match. Considering the size of the mean coefficients of the levels of the other attributes, a disadvantage with respect to the match between the field of study and the job tasks will be difficult to compensate for with an advantage with respect to another attribute. Results from the interviews suggest that the importance of the match between the field of study and the job tasks in the recruitment process stems from employers' expectation that graduates with a complete match have higher levels of occupation-specific human capital and will therefore require a shorter adjustment period and less firm-provided training.<sup>7</sup>

A second attribute which can be understood as a measure of graduates' stock of occupation-specific human capital and low training costs is relevant work experience. Relevant work experience has a substantial impact on graduates' probability to get invited to a job interview for a junior position. The mean coefficient of 2 years of work experience, as opposed to none, is similar to that of having a field of study which is related, as opposed to unrelated, to the job on offer (0.711 vs. 0.709). This implies that relevant work experience can to some extent compensate for a lacking match between the field of study and the job tasks; a graduate with 2 years of relevant work experience and a field of study unrelated to the job tasks has a similar probability of being invited to a job interview as a graduate with an incomplete match between the field of study and the job tasks and no relevant work experience, all other attributes being equal. Likewise, a graduate with an incomplete match between the field of study and the job tasks and 1 year of relevant work experience has a similar probability of being invited to a job interview as a graduate with a complete match and no relevant work experience.

There are obvious decreasing marginal returns to relevant work experience, and the first year increases graduates' chances to get invited to a job interview most. The mean coefficient of the second year of relevant work experience is slightly larger and statistically significantly different from the first. The in-depth interviews indicate that an important difference between the match of field of study and job tasks and relevant work experience is that relevant work experience is not only a signal of graduates' stock of occupation-specific knowledge and skills, but also one of general productive factors such as punctuality, attitudes towards hierarchical settings, and familiarity with work-life in general.<sup>8</sup>

Remarkably, the standard deviation of 0.775 implies that 23.7% of employers have a negative coefficient for the 1 year of relevant work experience dummy [ $\phi(-0.556/0.775)$ ]. The in-depth interviews suggest that this is not merely

<sup>7</sup> "The discipline is really a main indicator for how quickly someone is broken in. The question always at the very fore is how long it will take before the applicant pays off." (Respondent 5, Policy and Organization, Management consultancy, Germany). Quotes always indicate the respondent number as well as the interviewee's occupational field, industry and country.

<sup>8</sup> "Work experience does not only represent professional skills, but the ability to wake up every day, go to work, where you [...] must do what your boss asks you to do." (Respondent 8, Finance, Bank, Hungary).

an artefact of the assumption of a normally distributed coefficient but that this represents real employer preferences. Whereas most employers prefer graduates who have demonstrated their functioning in work-life and have gathered experience which enables them to “hit the ground running”, as one employer expressed it, there are also those employers who prefer “fresh” graduates. These employers argue that individuals who just graduated from university could be integrated into the firm’s culture more easily.<sup>9</sup>

Employers’ indifference between graduates with a bachelor’s and a master’s degree in the pooled sample masks opposing views on the value of these two degrees in different countries. A separate analysis presented in [Table A4](#) reveals that in the UK, graduates with a bachelor’s degree are actually preferred over graduates with a master’s degree, whereas in the Czech Republic, France, Germany and Poland employers tend to prefer graduates with master’s degrees over graduates with bachelor’s degrees when it comes to filling vacancies for junior positions. In Italy and Spain, employers’ average preference for master’s degrees does not significantly differ from that of employers in the UK, and in the Netherlands and Sweden, employers on average seem to be indifferent about the two degrees.

The negative mean coefficient of the doctorate attribute level indicates that the average employer in our sample values a doctorate less than a master’s or a bachelor’s degree, all other things being equal. This result may be driven by the specific context of our experiment where employers were asked to recruit a graduate for a typical junior position in their organization. The in-depth interviews brought forth several arguments why some employers are hesitant to hire a doctorate for a junior position, ranging from doctorates being too ambitious to doctorates being too theoretical in their approach for the average junior position. As recruitment is costly, employers try to avoid hiring graduates who will leave the organization as soon as a better opportunity opens up. Moreover, for some of the interviewed employers the doctorate sends a mixed signal: while employers tend to take for granted that doctorates who apply for junior positions have an elevated level of knowledge, they expect them to have a lower level of other productive factors – such as motivation or self-confidence – than their counterparts who apply for positions which better match their qualification level. While our estimates suggest that the average employer is hesitant to consider doctorates for his or her junior position the significant standard deviation of the mean coefficient for the doctorate attribute level implies that 38.3% of employers prefer doctorates over graduates with bachelor’s degrees (the coefficient of the dummy indicating a doctorate level is positive for 38.3% of employers,  $[1 - \phi(0.357/1.195)]$ ,

and that there is a relevant labour market segment for doctorates.

Having above average as opposed to below average grades matters similarly for graduates’ chances of getting invited to a job interview as does having 1 year of relevant work experience. Graduates can compensate for their low grades with relevant work experience, yet graduates with high grades have a higher chance of getting a job.

Marginal returns to grades are decreasing. Employers seem to put the most value on avoiding below average performers. On average, belonging to the upper 10% of the grades distribution has no additional effect on graduates’ probability to be invited to a job interview over and above the effect of having above average grades.<sup>10</sup> However, this is not the case for some junior positions with high skill requirements and possibly better career prospects: some employers interviewed in-depth indicated that they exclusively recruit graduates who are among the best 5% with regard to grades.<sup>11</sup>

Graduates who have spent some time abroad during their studies are, on average, preferred by employers over graduates who did not gather any study experience abroad. Besides being an indicator of foreign language skills, the in-depth interviews strongly suggest that this attribute level is often used by employers as a signal of graduates’ independence and resourcefulness. However, in line with the relatively small coefficient of the “study experience abroad: partly” attribute from the quantitative analysis, the in-depth interviews suggest that rather than being decisive for employers’ final decision to invite a graduate to a job interview or not, having some study experience abroad is seen as a nice extra and may tip the balance in the improbable case that two graduates are otherwise identical.<sup>12</sup>

Judging from the pooled sample of employers, having studied entirely abroad does not improve graduates’ chances of getting invited to a job interview when compared to graduates who studied exclusively in the home country. However, as shown in [Table A5](#) there is substantial variation across employers from different countries. Employers from the UK on average prefer graduates who studied exclusively at home over graduates who followed entire programmes abroad. The average employer in the Czech Republic, France, Germany, the Netherlands, Spain and Sweden seems to be indifferent between graduates who did not go abroad during their studies and graduates who earned a degree abroad, all else being equal. The signalling value of having studied entirely abroad, without specification where precisely the degree was obtained, is only positive in Italy and Poland. When running a separate conditional logistic regression with the “studied abroad: entirely” attribute interacted with a country’s annual expenditure on higher education excluding R&D activities per student (in purchasing power parity US

<sup>9</sup> “If you need to train someone in quality control, for example, each company has its own way of working. We prefer to take a young, inexperienced candidate, especially so we can integrate him into a team. It is easier than with a person who has experience.” (Respondent 7, R&D, Pharmaceutical Industry, France). “The odds are in favour of persons with more experience. On the other hand since this is a junior position we approach it in a way that sometimes it is better to take a person with no experience, to teach him everything, than to accept a person with manners that do not fully correspond to our organization.” (Respondent 3, Finance, Bank, Poland).

<sup>10</sup> The difference between the mean coefficients of both attribute levels is not statistically significant.

<sup>11</sup> “We, just as our competitors in the market, are basically trying to attract the top 3–5% of graduates in terms of grades as well as the intensity and quality of education.” (Respondent 1, Legal, Multinational law firm, Germany).

<sup>12</sup> “Studies abroad? Not that important for this position, but not a downside either.” (Respondent 4, Policy and Organization, Public administration, Sweden).

Dollars)<sup>13</sup> as a proxy for how respondents perceive the quality of their national higher education system, we find the interaction term to be negative and statistically significant.<sup>14</sup> This indicates that employers' preference for graduates with a foreign degree may have a systematic negative relationship with the good reputation of national universities.

While relevant, the importance of the university's prestige<sup>15</sup> in the recruitment process is much smaller than that of the match between the field of study and the job tasks or that of relevant work experience. Its impact is, however, comparable to having partly studied abroad or to having above average grades. The in-depth interviews suggest that the prestige of the university is a signal for both the positive self-selection (and thus higher than average ability) of graduates as well as the quality and rigour of education. Many employers interviewed in-depth therefore indicated that they use the prestige of the university to validate grades.<sup>16</sup>

The hypothetical candidate profiles also included the starting salary the graduate would have to be paid when hired. Fig. 3 illustrates employers' preference for starting salary. While higher than average starting salaries (almost) linearly decrease employers' preference for candidates, lower than average salaries do not affect employers' selection decision in favour of applicants. One possible explanation is that employers' preferences reflect institutional arrangements. In the in-depth interviews, many employers stated that graduate salaries were usually fixed and advertised with the job specification. If negotiation takes place then it seems to be with respect to getting a higher than average salary if justified by a higher level of qualification or work experience. In-depth interviews from all participating countries suggest that many European employers experience the below average starting salary attribute levels as meaningless as it seems neither intended nor feasible to pay an employee less than the institutionalized or market salary.<sup>17</sup>

<sup>13</sup> Source: Education at a Glance 2014 with 2011 figures. The Czech Republic (6.320), Italy (6.482) and Poland (7.916) are the three countries with the lowest annual expenditure per student in PPP USD. The Netherlands (10.665), the UK (10.570) and France (10.470) are the countries with the highest annual expenditure per student in PPP USD. In the regression, expenditure is entered as a multiple of 1000 USD.

<sup>14</sup> The logit coefficient of the main effect of "study abroad: entirely" is 0.697\*\*\* (s.e. = 0.17) and the coefficient of the interaction term  $-0.074^{***}$  (s.e. = 0.018).

<sup>15</sup> It is important to note that the translation to the languages of the nine countries in which the study was carried out was based on keeping the meaning comparable across countries but adjusting the concept to the national context where necessary. For example, in the UK where university rankings are widely known, used and available, high prestige was translated to high ranking. Referring to ranking would, however, not make much sense in countries like the Netherlands or Germany. In these countries, the concept of reputation was used. This was done as the concept we had in mind for prestige was rather broad, pertaining to the subjective evaluation of a university, not necessarily an objective one. This, however, has to be taken into account when interpreting the results.

<sup>16</sup> "There are universities that are extremely easy, and if on top of that the person does not have good marks, then this means it is not a very bright person." (Respondent 6, Legal, Electric Utility Company, Spain).

<sup>17</sup> "Starting salary is not a choice criterion for us [...] those graduates' salary wishes are very realistic and it's our policy that we don't want to pay them less than the market average." (Respondent 5, ICT, IT, Estonia). "You will likely have a hard time retaining graduates long-term that you have pressed too hard on their salary requirements." (Respondent 2, Financial Services, Engineering, Germany). "Everybody enters at the same level with the

**Table 3**  
Employers' willingness to pay for CV attribute levels.

	Mean WTP	SD
<i>Degree</i>		
Bachelor's	Ref.	
Master's	1.0%	22.0%
Doctorate	-8.0%	26.9%
<i>Match of field of study and job tasks</i>		
Unrelated	Ref.	
Incomplete	16.0%	17.2%
Complete	25.6%	27.6%
<i>Relevant work experience</i>		
No	Ref.	
1 year	12.5%	17.5%
2 years	16.0%	26.6%
<i>Study experience abroad</i>		
No	Ref.	
Partly	2.8%	12.2%
Entirely	-0.1%	17.9%
<i>Grades</i>		
Below average	Ref.	
Average	8.0%	12.9%
Above average	12.4%	17.7%
Top 10%	13.0%	17.8%
<i>Prestige/reputation of university</i>		
Average	Ref.	
High	2.9%	10.3%

Willingness to pay is assumed to be distributed normally in the population with mean MeanWTP and standard deviation SD. For calculation, the difference between the average salary level coefficient and the 10% above average salary level coefficient ( $1.044 - 0.600 = 0.444$ ) presents a measure of 10% of the average wage. Using the rule of three, the mean willingness to pay for a particular attribute level – in percent of the average salary compared to the reference attribute level – can be calculated by multiplying its coefficient estimate by 10 and then dividing it by 0.444. The standard deviations of the willingness to pay are calculated using the same rule but replacing the mean coefficients with the coefficients of the standard deviations.

If we accept that the parameter estimates for above average salary levels are a good representation of employers' average preferences for labour costs, we can use these estimates to calculate employers' willingness to pay (WTP) for CV attribute levels (Revelt & Train, 1998). The difference between the average salary level coefficient and the 10% above average salary level coefficient ( $1.044 - 0.600 = 0.444$ ) presents a measure of 10% of the average wage. Using the rule of three, the monetary value of a particular attribute level – in percent of the average wage compared to the reference attribute level – can be calculated by multiplying its coefficient estimate by 10 and then dividing it by 0.444. The standard deviations of the willingness to pay are calculated using the same rule but replacing the mean coefficients with the coefficients of the standard deviation. Employers' willingness to pay and its standard deviation for particular CV attribute levels is presented in Table 3.<sup>18</sup>

same salary decided by the National Contract. Then it is a matter of length of service to decide the increase" (Respondent 2, Media, IT, Italy).

<sup>18</sup> Because the decrease in the preference of above average salaries is almost linear, using the 25% above average salary level coefficient instead of the 10% above average salary level coefficient only slightly changes willingness to pay estimates. For example, the willingness to pay for a field of study which matches the job tasks incompletely would rise from 16 to 17%.

Table 3 shows that on average employers are willing to pay a 12.5% higher wage for the first year of work experience. The standard deviation of 17.5% implies that the variation in this willingness to pay is quite substantial. The return to a second year of relevant work experience, over and above that of the first year, is 3.5% on average. This is very much in line with estimated Mincerian returns to experience of around 4% for European countries (Bils & Klenow, 2000). Even after accounting for a steep learning curve in the first year of work, employers' very high willingness to pay for the first year of relevant work experience strongly suggests that work experience is a very important signal of general work readiness and that employers are willing to pay a premium for reducing their risk of hiring someone who is not ready for work-life yet.

In conclusion, CV attributes indicating occupation-specific human capital, a shorter adjustment period in the job and a lower need for less firm-provided training have the highest impact on graduates' probability of getting invited to a job interview. In addition, graduates' general ability and capacity to learn as indicated by above average grades – signalling low training costs – have a substantial impact on employers' choices. These results support the view that general human capital can to some extent compensate for specific human capital but not entirely. Other CV attributes, such as study experience abroad or the reputation of the university, are much fuzzier signals of graduates' human capital than the match between the field of study and the job tasks, relevant work experience and grades. They also determine employers' choices but to a much lesser degree.

Interestingly, employers' preferences do not cluster along the lines of categories often used to describe them. In an extended analysis not shown here, we tested whether employers' preferences for CV attributes differed by firm size, occupational field, nationality and the degree to which the firm is operating on the local, regional, national or international market.<sup>19</sup> With the exception of graduates' degree and study experience abroad, which were briefly discussed above, no systematic differences were found. This suggests that employers' needs are too diverse to be captured by these variables.

The statistically insignificant coefficient of the none-option dummy implies that employers are indifferent between inviting no one or a graduate with a relatively weak CV to the job interview. This may be an indication of the relatively low risk involved in inviting the wrong graduate to a job interview.<sup>20</sup>

<sup>19</sup> We focus here on employer categories most referred to in the literature. Other background variables we collected, such as industry, the respondent's kind of involvement in the recruiting process, the role of the respondent in the firm, the number of graduate recruitments the respondent was involved in in the past 5 years, or the proportion of graduates in the firm do also not explain the heterogeneity of preferences.

<sup>20</sup> The none-option dummy was included in the model assuming a fixed rather than a randomly varying parameter. The coefficient expresses whether employers' utility is higher when not inviting anybody compared to inviting the reference graduate. In our case, this is the graduate with a field of study unrelated to the job task, no work experience, below average grades, a bachelor's degree from a university of average prestige or reputation, no study abroad, and with a starting salary of 25% above average.

## 7. Which skills are getting graduates the job?

Table 4 presents the results of the second stated choice experiment of the survey in which we asked respondents to select the graduates they would hire. As shown in Fig. 2, graduates now differed with regard to their mastery of different types of skills and could be considered equally suited in all other respects. Therefore, in contrast to the first stage of the experiment, the estimated parameters represent employers' preferences for actual skills, not for some other dimension of human capital.

As expected, employers always prefer higher skill levels over lower skill levels, no matter what skill type they are considering. There is, however, an obvious asymmetry between the penalty for low<sup>21</sup> skill levels and the reward for high skill levels: the positive coefficients of the dummies indicating that graduates have a high skill level are always less than half the size, in absolute terms, of the negative coefficients of the dummies indicating that graduates have a low skill level.

With respect to the probability of being hired, the reward for having a high skill level as opposed to an average one is largest for professional expertise and smallest for commercial/entrepreneurial skills. The reward for having a high skill level is second-largest for interpersonal skills, followed by innovative/creative skills and strategic/organizational skills. The reward for a high level of general academic skills lies somewhere in between that of strategic-organizational skills and commercial/entrepreneurial skills. These differences are, however, not always statistically significant.<sup>22</sup>

The penalty<sup>23</sup> for having low skill levels as opposed to average skill levels is larger than the premium for having high skill levels. Two findings stand out. First, the negative coefficient of the dummy indicating that graduates have a low level of interpersonal skills is largest. While not statistically significantly different from that of professional skills, this result highlights the importance of interpersonal skills in today's workplaces. The in-depth interviews indicate that employers attach a high value to having at least an average level of interpersonal skills, as one team member with a low level of

<sup>21</sup> Note that in accordance with the attribute levels used in the choice experiment, a graduate has a low skill level if he or she belongs to the bottom 25% of his or her reference group, and a high level of skill if he or she belongs to the top 25% of his or her reference group.

<sup>22</sup> The coefficient of the dummy indicating a high level of professional expertise is not statistically significantly different from that of interpersonal skills, yet is statistically significantly different from the other coefficients (at the 10% level for innovative/creative skills). The coefficient of a high level of interpersonal skills is statistically significantly different from that of general academic skills and commercial/entrepreneurial skills (10% level and 5% level, respectively) and the reward to a high level of innovative/creative skills as well as strategic/organizational skills is statistically significantly different from that of commercial/entrepreneurial skills (10% level).

<sup>23</sup> We deliberately ran the model with average skills as the reference category to emphasize that there is a penalty for having low skill levels, rather than a reward for having average skill levels. The vast majority of employers interviewed in-depth state that they consider an average skill level as the minimum skill level necessary to come into consideration for the job (note that in our definition, the average level contains 50% of individuals around the mean). This implies that graduates with skill deficiencies are seriously disrupting the production process, incurring costs to the organization.

Of these 3 candidates, which one would you hire? Remember this is a junior position for a recent higher education graduate			
<b>Starting Salary:</b> 10% below average for this position <b>Professional expertise:</b> Bottom 25% <b>General academic skills:</b> Top 25% <b>Innovative/creative skills:</b> Top 25% <b>Strategic/organizational skills:</b> Average <b>Interpersonal skills:</b> Bottom 25% <b>Commercial/entrepreneurial skills:</b> Average	<b>Starting Salary:</b> Average for this position <b>Professional expertise:</b> Average <b>General academic skills:</b> Average <b>Innovative/creative skills:</b> Bottom 25% <b>Strategic/organizational skills:</b> Bottom 25% <b>Interpersonal skills:</b> Top 25% <b>Commercial/entrepreneurial skills:</b> Bottom 25%	<b>Starting Salary:</b> 10% above average for this position <b>Professional expertise:</b> Top 25% <b>General academic skills:</b> Bottom 25% <b>Innovative/creative skills:</b> Average <b>Strategic/organizational skills:</b> Top 25% <b>Interpersonal skills:</b> Average <b>Commercial/entrepreneurial skills:</b> Top 25%	None of these

Fig. 2. Choice set example skills.

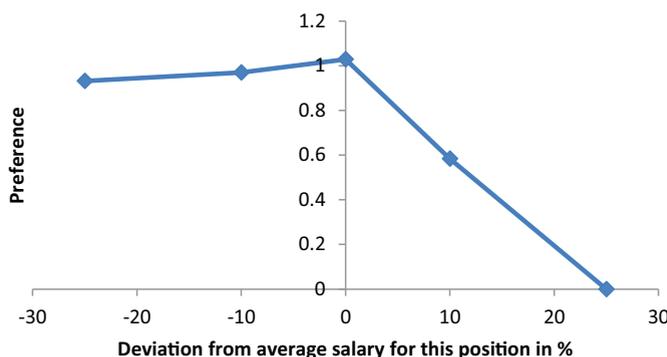


Fig. 3. Graphical illustration of salary attribute coefficients displayed in Table 2.

interpersonal skills can endanger the functioning – and thus productivity – of an entire team.<sup>24</sup>

Second, while the reward for a high level of commercial/entrepreneurial skills is relatively small, the penalty for a low level is relatively large, comparable to that of having a low level of professional expertise. In line with the findings of Mason (1998, 1990) employers avoid employees with no commercial intuition or sense of entrepreneurship.

The reward for having a high skill level is similar for innovative/creative and strategic/organizational skills. However, the penalty for having a low skill level is higher for innovative/creative skills. The penalty for having a low level, as opposed to an average one, is similar for strategic/organizational and general academic skills.

Employers attach the highest overall importance to professional expertise and interpersonal skills (the difference between the coefficients of the high and the low skill lev-

els). The in-depth interviews suggest that employers expect graduates with high levels of professional expertise to already have been exposed to the occupational challenges occurring most often and to be able to perform the new job tasks quickly. Given the smaller coefficients for general academic skills, the average employer does not seem to perceive professional expertise and general academic skills as perfect substitutes, possibly because the latter implies higher costs for training and a longer adjustment period.

In some instances the influence of innovative/creative skills, strategic/organizational skills and commercial/entrepreneurial skills in the hiring decision is not statistically separable from that of interpersonal skills and professional expertise.<sup>25</sup> The findings from the in-depth interviews indicate that they nevertheless tend to form a group of relatively less important skills for labour market entry. In the in-depth interviews, employers acknowledge these three skills as being important, but for further career development rather than for immediate employability. Some interviewees argued that these types of skills determine

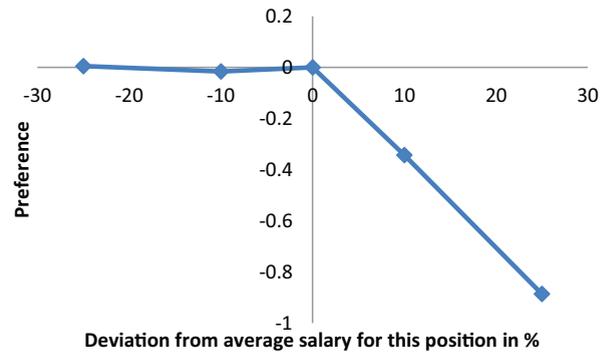
<sup>24</sup> “Somebody who cannot give a good presentation or who is not well trained in presenting him or herself... we would take this into account but we would not put too much weight on it. We know that we offer intensive training in this area. What matters more to us is that a plurality of our employees in the area for which we are recruiting is positive about being able to work with this person. This is really important to us as one spends quite some time here and it really should fit together well.” (Respondent 1, Legal, Multinational law firm, Germany).

<sup>25</sup> The difference of the coefficients of the dummies indicating a high level of interpersonal skills, innovative/creative skills and strategic/organizational skills is not statistically significant at the 10% level. The difference of the coefficients of the dummies indicating a low level of professional expertise and commercial/entrepreneurial skills is not statistically significant.

**Table 4**  
Mixed logit model of selecting graduates for hiring.

Attributes with normally distributed coefficients			
<i>Professional expertise</i>			
High			
Mean coefficient	0.507***		(0.08)
SD of coefficient	0.969***		(0.12)
Average	Ref.		
Low			
Mean coefficient	-1.219***		(0.09)
SD of coefficient	1.300***		(0.12)
<i>General academic skills</i>			
High			
Mean coefficient	0.305***		(0.05)
SD of coefficient	0.657***		(0.07)
Average	Ref.		
Low			
Mean coefficient	-0.900***		(0.08)
SD of coefficient	1.140***		(0.10)
<i>Innovative/creative skills</i>			
High			
Mean coefficient	0.392***		(0.05)
SD of coefficient	0.660***		(0.10)
Average	Ref.		
Low			
Mean coefficient	-1.045***		(0.07)
SD of coefficient	1.176***		(0.21)
<i>Strategic/organizational skills</i>			
High			
Mean coefficient	0.376***		(0.06)
SD of coefficient	0.693***		(0.11)
Average	Ref.		
Low			
Mean coefficient	-0.878***		(0.07)
SD of coefficient	0.859***		(0.08)
<i>Interpersonal skills</i>			
High			
Mean coefficient	0.422***		(0.06)
SD of coefficient	0.844***		(0.08)
Average	Ref.		
Low			
Mean coefficient	-1.329***		(0.09)
SD of coefficient	1.350***		(0.10)
<i>Commercial/entrepreneurial skills</i>			
High			
Mean coefficient	0.248***		(0.06)
SD of coefficient	1.136***		(0.13)
Average	Ref.		
Low			
Mean coefficient	-1.114***		(0.07)
SD of coefficient	1.105***		(0.09)
Fixed coefficient attributes			
<i>Salary</i>			
25% below average	0.014		(0.07)
10% below average	-0.019		(0.06)
Average	Ref.		
10% above average	-0.340***		(0.07)
25% above average	-0.874***		(0.1)
None	-2.515***		(0.12)

Standard errors adjusted for 903 clusters (individuals) in parentheses. \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$ . Estimation based on 1000 random draws per iteration. Log likelihood -8674.02,  $N = 36120$ . The Wald-test of the joint significance of the attributes with 17 degrees of freedom is 1252.29 and has a  $p$ -value  $> 0.000$ . The model has no alternative-specific constants, as is common practice with data from so-called unlabelled choice experiments, where randomly generated alternatives (graduates) have no utility beyond the characteristics attributed to them in the experiment. The use of unlabelled discrete choice experiments also implies that no meaningful marginal effects can be calculated. In order to illustrate the effect of changes in the attribute levels on graduates' chances to get hired, we compare the predicted probabilities to be chosen of two graduates who only differ with regard to one attribute level in Table A6.



**Fig. 4.** Graphical illustration of salary attribute coefficients displayed in Table 4.

employees' selection for promotion and the ease and speed with which they leave the junior position.<sup>26</sup>

Finally, in additional analyses not shown here<sup>27</sup> we find no systematic differences in the relative importance of types of skills between employers of different countries, occupational fields, firm size and international market exposure.

The coefficient of the none-option dummy is negative and highly significant, indicating that employers are on average better off hiring a graduate with average levels of all skills and earning the average salary than hiring no one. However, when running a model with the bottom skill level and a starting salary of 25% above average as the reference category (not shown here), the none-option dummy is positive and significant, suggesting that it is better to hire no one rather than taking the risk of hiring a graduate without the necessary skills.

Employers' preference for starting salary in the hiring stage is similar to that of the interview stage. Lower than average starting salaries are not associated with a higher probability of being hired. As suggested in the previous section, a possible explanation for this result is that paying graduates less than the average is, for the average employer, either not possible (because of institutional agreements) or not desirable (because of disruption in the group), or both. In contrast, employers' preference for graduates decreases linearly for above average salaries, as shown in Fig. 4.

Table 5<sup>28</sup> indicates that employers are willing to pay on average a 14.9% higher salary for a graduate with a high level

<sup>26</sup> "We do not ask for this [commercial/entrepreneurial] skill because it does not need to be considered for junior positions. However, if one were in the top 25% for this skill, it could be useful in the future in some client account position." (Respondent 2, ICT, ICT, Czech Republic).

<sup>27</sup> Available from the authors upon request.

<sup>28</sup> Willingness to pay in this recruitment stage is calculated similarly to willingness to pay in the first recruitment stage. The difference between the average salary level coefficient (reference category) and the 10% above average salary level coefficient ( $0 - (-0.340) = 0.340$ ) presents a measure of 10% of the average wage. Using the rule of three, the mean willingness to pay for a particular attribute level – in percent of the average salary compared to the reference attribute level – can be calculated by multiplying its coefficient estimate by 10 and then dividing it by 0.340. The standard deviations of the willingness to pay are calculated using the same rule but replacing the mean coefficients with the coefficients of the standard deviations. Using the coefficient of the 25% above average salary level instead of the 10% above average salary level results in almost identical estimates.

**Table 5**  
Employers' willingness to pay for skills.

	MeanWTP	SD
<i>Professional expertise</i>		
High	14.9%	28.5%
Average	Ref.	
Low	−35.9%	38.2%
<i>General academic skills</i>		
High	9.0%	19.3%
Average	Ref.	
Low	−26.5%	33.5%
<i>Innovative/creative skills</i>		
High	11.5%	19.4%
Average	Ref.	
Low	−30.7%	34.6%
<i>Strategic/organizational skills</i>		
High	11.1%	20.4%
Average	Ref.	
Low	−25.8%	25.3%
<i>Interpersonal skills</i>		
High	12.4%	24.8%
Average	Ref.	
Low	−39.1%	39.7%
<i>Commercial/entrepreneurial skills</i>		
High	7.3%	33.4%
Average	Ref.	
Low	−32.8%	32.5%

Willingness to pay is assumed to be distributed normally in the population with mean MeanWTP and standard deviation SD. For calculation, the difference between the average salary level coefficient (reference category) and the 10% above average salary level coefficient ( $0 - (-0.340) = 0.340$ ) presents a measure of 10% of the average wage. Using the rule of three, the mean willingness to pay for a particular attribute level – in percent of the average salary compared to the reference attribute level – can be calculated by multiplying its coefficient estimate by 10 and then dividing it by 0.340. The standard deviations of the willingness to pay are calculated using the same rule but replacing the mean coefficients with the coefficients of the standard deviations.

of professional expertise, compared to a graduate with average professional expertise. The standard deviation of 28.5% indicates that this willingness to pay varies substantially. For a junior position with an average salary of 30,000 Euro per year the estimates in Table 5 imply an average premium of around 4500 Euro per year for a graduate belonging to the top 25% as opposed to the average group with regard to professional expertise.

Employers' willingness to pay for a graduate with low professional expertise is negative, indicating that employers would require compensation for hiring such a graduate. This compensation amounts to about a third of the average salary of a junior position. Taking the example of a junior position with an average salary of 30,000 Euro per year again, the average employer would require compensation of 10,770 Euro per year for hiring a graduate with a low level of professional expertise. This amount can be understood in terms of productivity loss or training costs which have to be spent in order to improve the graduate's skills to average level.

## 8. Conclusions

In this study we elicit employers' preferences for a variety of CV attributes and types of skills when recruit-

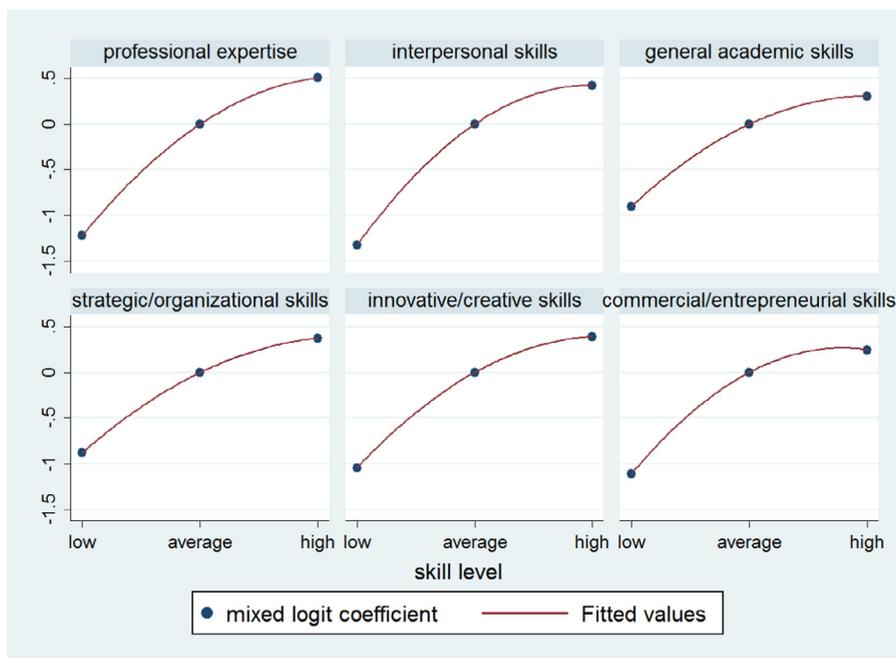
ing recent university graduates. Using two discrete choice experiments, we are able to show that employers' selection of candidates for job interviews is most strongly influenced by CV attributes which signal a high stock of occupation-specific human capital indicating short adjustment periods in the job and low training costs. Accordingly, professional expertise is a type of skill strongly influencing the hiring decision, supporting the findings of previous studies which point to the importance of occupation-specific skills (Elish et al., 2010; Heijke et al., 2003; Mason, 1998, 1999). However, we also find that having good interpersonal skills is as important for graduates' employability as having professional expertise. The large impact we find of interpersonal skills on graduates' chances to get hired is in line with earlier studies emphasizing the increasing importance of communication in today's work-life in general, and especially for team productivity (Autor et al., 2003; Biesma et al., 2007; Felstead et al., 2007; Kiong-Hock 1986).

Other types of skills and attributes also play a role in the recruitment process but are less important and can therefore not easily compensate for a lack of more specific human capital and interpersonal skills.

Our findings can also be interpreted as evidence for a concave relationship between skills and productivity.<sup>29</sup> The productivity loss associated with hiring a graduate with low skills is much larger than the benefits of recruiting a high skilled graduate instead of one with average skills. This suggests that having low skilled workers in the workplace cannot be compensated for by team members with high skills. What is more, our findings suggest that the costs associated with below average performance are so substantial that salary is not an adequate adjustment mechanism. Employers are in general willing to pay average salary for average performance but are unwilling to hire underperforming graduates just because they are cheaper.

The large standard deviations of the estimated mean coefficients imply that there is not one graduate profile which all employers prefer. Rather, employers' demand for skills varies substantially. Some employers may not want to recruit the graduates with the highest skill levels because the job does not require them and they fear that graduates will get bored too quickly. Other employers, and the in-depth interviews confirm this, may not have a strong preference for graduates with high professional expertise because they have the internal training facilities to teach them the occupation-specific knowledge they need. The same employers may therefore put more emphasis on other, more transversal types of skills such as general academic skills because they are an important ingredient for further professional growth. Remarkably, background variables, such as employers' country, occupational field, firm size or international market exposure, explain little of the variance in preferences: the relative importance employers attach to CV attributes and types of skills does not cluster according to characteristics often used to describe and categorize them – the country differences of preferences for master's degrees and study experience abroad being exceptions. More detailed

<sup>29</sup> For scatter plots indicating a concave relationship between productivity (the mixed logit coefficients) and skill levels see Fig. A1 in Appendix A.



**Fig. A1.** Concave relationship between productivity and skill levels. Figure contains scatter plots indicating the concave relationship between productivity (the mixed logit coefficients) and skill levels by type of skill. The fitted values are based on the prediction for the mixed logit coefficient from a regression of the mixed logit coefficient on skill level and skill level squared.

information on the particular junior positions employers had in mind when doing the experiments would be necessary to further explain the differences in employers' preferences. This has important implications for individuals intending to maximize their employability. When envisaging employment with a particular employer, graduates need more detailed information on this employer's preferences when making decisions regarding their skill profile. Merely depending on characteristics such as firm size or the sector is insufficient for making optimal choices. In contrast, individuals who aim to maximize their average chances on the labour market without having a particular employer in mind do best by investing in their professional expertise and interpersonal skills.

The implications of our results for higher education institutions are similar. Aggregate skill supply should match aggregate skill demand reasonably well, and some graduate skill profiles need to be developed in higher quantity than others. Our findings show that some types of skills are more important for labour market entry while others are more important for individuals' future careers. From the employer's perspective, types of skills such as commercial/entrepreneurial skills, innovative/creative skills and strategic/organizational skills are more important and better developed after having acquired a few years of work experience. This suggests that initial higher education should focus on the transmission of occupation-specific knowledge, problem-solving skills, general academic skills and interpersonal skills. Unless it is a central characteristic of a study programme aligned to the needs of particular employers, providing individuals with high levels of com-

mercial/entrepreneurial skills, innovative/creative skills and strategic/organizational skills may not be optimal for graduates' employability.

### Acknowledgements

The data on which this article is based was collected for the study "What makes the difference: A qualitative appraisal of higher education graduate employability in Europe: the employers' perspective" (Humburg, van der Velden, & Verhagen, 2013) commissioned and financed by the European Commission.

### Appendix A

#### Tables A1–A6

**Table A1**

Comparison of the proportion of graduates working in a particular occupational field and respondents in our sample.

Occupational field	Sample (%)	REFLEX/HEGESCO (%)
Electro-technology	6.72	7.64
Engineering	18.66	33.65
Financial Services	17.16	20.83
ICT	19.90	16.21
Legal professionals	15.05	8.07

(continued on next page)

**Table A1** (continued)

Occupational field	Sample (%)	REFLEX/HEGESCO (%)
Media and Communication	13.56	4.56
Policy and Organization	8.96	9.03

*Note:* This table compares the proportion of graduates who have been found to be working in a particular occupational field in the REFLEX and HEGESCO graduate surveys with the proportion of respondents representing this occupational field in our sample. The comparison has been done for all countries covered in the present study except Sweden, which is not represented in the REFLEX and HEGESCO data. As occupations were coded according to ISCO88 in the REFLEX and HEGESCO surveys, exact matching of graduates from these surveys to the occupational fields used in our survey – which are broadly based on ISCO08, is not possible. Some of the differences in descriptive statistics between the present study and REFLEX/HEGESCO may therefore be due to correspondence problems between ISCO88 and the occupational fields we defined. We code electrical and electronics and telecommunications engineers (ISCO88 2143 and 2144) to Electro-technology. The remaining occupations in the architects, engineers and related professionals category (ISCO88 214) are considered to belong to the Engineering occupational field. We code accountants and business professionals to the Financial Services category (ISCO88 214, except for personnel and career professionals, ISCO88 2412, who are coded to Policy and Organization), and computing professionals (ISCO88 213) to ICT. Writers and creative or performing artists are included in Media and Communication. This is likely to underestimate the number of media and communications professionals as public relations jobs, which can be distinguished in ISCO08 but not ISCO88, cannot be included. Legal professionals are easily identified from ISCO88 262. The Policy and Organization category contains personnel and career professionals (ISCO88 2412) as well as economists, sociologists and political scientists (ISCO88 2441, 2442, 2443). These categories represent 72.79% of graduates working in graduates jobs (ISCO88 2) outside health and education professions. While the proportion of graduates working in a particular field and respondents in our sample match reasonably well for Electro-technology, Financial Services, ICT and Policy and Organization, respondents representing the Engineering occupational field seem to be under represented, and those of Legal Services and Media and Communication over represented.

**Table A2**

Comparison of firm size by occupational field in REFLEX/HEGESCO and our sample.

Firm size by occupational field	Sample (%)	REFLEX/HEGESCO (%)
<i>Electro-technology</i>		
<50	37.21	43.09
50–99	27.91	12.15
100–249	18.60	17.13
>249	16.28	27.62
<i>Engineering</i>		
<50	49.33	45.73
50–99	12.00	14.46
100–249	14.00	13.64
>249	24.67	26.17
<i>Financial Services</i>		
<50	44.72	43.24
50–99	17.07	14.29
100–249	14.63	17.76
>249	23.58	24.71

(continued)

**Table A2** (continued)

Firm size by occupational field	Sample (%)	REFLEX/HEGESCO (%)
<i>ICT</i>		
<50	37.88	39.05
50–99	17.42	16.19
100–249	20.45	16.90
>249	24.24	27.86
<i>Legal professionals</i>		
<50	36.61	67.20
50–99	13.39	10.58
100–249	15.18	10.05
>249	34.82	12.17
<i>Media and Communication</i>		
<50	50.59	67.01
50–99	9.41	6.19
100–249	21.18	12.37
>249	18.82	14.43
<i>Policy and Organization</i>		
<50	23.44	44.27
50–99	15.63	13.54
100–249	18.75	14.58
>249	42.19	27.60

*Note:* firm size measures in REFLEX/HEGESCO are not strictly comparable to those in our study. While we asked for the number of persons employed in the firm in the particular country in the employer survey, the measure available in REFLEX/HEGESCO is the number of employees at the location. The comparison of firm size characteristics suggests that respondents working in small firms are underrepresented (and respondents working in large firms overrepresented) in the occupational fields Legal Services and Policy and Organization. For Media and Communication, respondents working in small firms also seem to be underrepresented, while those working in firms with between 100 and 249 employees seem to be overrepresented in our sample.

**Table A3**

Changes in choice probabilities associated with changes in CV attribute levels.

	Change in choice probability	
	Attribute level down	Attribute level up
	Baseline choice probability: 46.00%	
Degree	Master's to bachelor's –1.3%	Master's to doctorate –8.2%
Match of field of study and job tasks	Incomplete to unrelated –15.9%	Incomplete to complete 9.9%
Work experience	1 year to none –12.8%	1 year to 2 years 3.9%
Study experience abroad	Partly to entirely	Partly to none
Grades	–3.0%	–3.4%
	Average to below average –8.8%	Average to above average 4.9%
Prestige of university		Average to high 3.5%

(continued on next page)

**Table A3** (continued)

	Change in choice probability	
	Attribute level down	Attribute level up
Salary	Average to 10% below average –1.6%	Average to 10% above average –10.5%

Note: Choice probabilities calculated on the basis of the individual-level coefficients from the mixed logit model presented in Table 2. In the scenario on which this calculation is based, employers have the choice between two graduates and the no-choice option. In the baseline model, both graduates have a master's degree, a field of study which matches the job tasks only incompletely, 1 year of work experience, partly studied abroad, average grades, attended a university with average prestige, and would receive the average salary. Presenting employers with this choice, both graduates would have a probability of 46% of being invited to the job interview. Eight percent of respondents would choose neither of them because for them, no graduate's utility surpasses that of choosing no candidate. The utilities of graduate 1 and 2 and the none-of-these-option are calculated by inserting the coefficients presented in Table 2 into the logit formula (e.g.  $P_1 = \exp(x_1b)/\exp(x_1b)+\exp(x_2b)+\exp(b_n)$ , where  $P_1$  is the choice probability of graduate 1,  $x_1b$  is the vector of characteristics of graduate 1 multiplied with the coefficient vector  $b$ ,  $x_2b$  is the vector of characteristics of graduate 2 multiplied with the coefficient vector  $b$ , and  $b_n$  is the coefficient of the none-option dummy). In each choice situation (two for each row in the table), attributes of the first graduate remain unchanged, while one attribute level of the second graduate is changed up or down. Therefore, graduates always only differ with regard to the one attribute displayed in the table row.

**Table A4**

Employers' preference for master's degrees across countries.

Variables	Coefficient
Master's degree	–0.151* (0.081)
Master's degree × Czech Republic	0.297* (0.153)
Master's degree × France	0.242* (0.124)
Master's degree × Germany	0.392*** (0.124)
Master's degree × Italy	0.011 (0.120)
Master's degree × Netherlands	0.165 (0.108)
Master's degree × Poland	0.437*** (0.131)
Master's degree × Spain	0.067 (0.119)
Master's degree × Sweden	0.182 (0.117)
N	36210
Pseudo R <sup>2</sup>	0.159

Logit coefficients from a conditional logit model containing all attributes and their levels. The interaction of master's degree and the UK is omitted. The main effect of master's degree therefore represents the effect in the UK. Standard errors adjusted for 903 clusters (individuals) in parentheses. \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ . Log pseudo likelihood = –10527.666.

**Table A5**

Employers' preference for study experience abroad: entirely across countries.

Variables	Coefficient
Study abroad: entirely	–0.337*** (0.089)
Study abroad: entirely × Czech Republic	0.392*** (0.128)

(continued)

**Table A5** (continued)

Variables	Coefficient
Study abroad: entirely × France	0.377*** (0.126)
Study abroad: entirely × Germany	0.357*** (0.122)
Study abroad: entirely × Italy	0.583*** (0.125)
Study abroad: entirely × Netherlands	0.246** (0.111)
Study abroad: entirely × Poland	0.543*** (0.121)
Study abroad: entirely × Spain	0.478*** (0.122)
Study abroad: entirely × Sweden	0.199 (0.125)
N	36210
Pseudo R <sup>2</sup>	0.160

Logit coefficients from a conditional logit model containing all attributes and their levels. The interaction of study abroad: entirely and the UK is omitted. The main effect of study abroad entirely therefore represents the effect in the UK. Standard errors adjusted for 903 clusters (individuals) in parentheses. \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ . Log pseudo likelihood = –10521.229.

**Table A6**

Changes in choice probabilities associated with changes in skill levels.

	Change in choice probability	
	Average to low	Average to high
	Baseline choice probability: 48.05%	
Professional skills	–22.8%	11.7%
General academic skills	–18.0%	7.4%
Innovative/creative skills	–20.6%	9.5%
Strategic/organizational skills	18.6%	9.0%
Interpersonal skills	–24.3%	9.8%
Commercial/entrepreneurial skills	–22.4%	5.6%
Salary	Average to 10% below average –0.5%	Average to 10% above average –8.4%

Note: Choice probabilities calculated on the basis of the individual-level coefficients from the mixed logit model presented in Table 2. In the scenario on which this calculation is based, employers have the choice between two graduates and the no-choice option. In the baseline model, both graduates belong to the average group with regard to all types of skills, and would receive the average salary. Presenting employers with this choice, both graduates would have a probability of 48.05% of getting the job. 3.9% of respondents would choose neither of the two graduates because for them, no graduate's utility surpasses that of choosing no candidate. The utilities of graduate 1 and 2 and the none-of-these-option are calculated by inserting the coefficients presented in Table 4 into the logit formula (e.g.  $P_1 = \exp(x_1b)/\exp(x_1b) + \exp(x_2b) + \exp(b_n)$ , where  $P_1$  is the choice probability of graduate 1,  $x_1b$  is the vector of characteristics of graduate 1 multiplied with the coefficient vector  $b$ ,  $x_2b$  is the vector of characteristics of graduate 2 multiplied with the coefficient vector  $b$ , and  $b_n$  is the coefficient of the none-option dummy). In each choice situation (two for each row in the table), skill levels of the first graduate remain unchanged, while the level of one skill type of the second graduate is changed up or down. Therefore, graduates always only differ with regard to the one type of skill displayed in the table row.

## References

- Aigner, D. J., & Cain, G. G. (1977). Statistical theories of discrimination in labor markets. *Industrial and Labor Relations Review*, 30(1), 175–187.
- Allen, J., & van der Velden, R. (2001). Educational mismatches versus skill mismatches: Effects on wages, job satisfaction, and on-the-job search. *Oxford Economic Papers*, 53(3), 434–452.
- Allen, J., & van der Velden, R. (2011). The Flexible professional in the knowledge society: Required competences and the role of higher education. In J. Allen, & R. van der Velden (Eds.), *The flexible professional in the knowledge society: New challenges for higher education: vol. 35* (pp. 15–53). Dordrecht, Heidelberg, London, New York: Springer Higher Education Dynamics.
- Altonji, J. G., & Pierret, C. R. (2001). Employer learning and statistical discrimination. *Quarterly Journal of Economics*, 116(1), 313–350.
- Arrow, K. J. (1998). What has economics to say about racial discrimination? *Journal of Economic Perspectives*, 12(2), 91–100.
- Autor, D. H., Levy, F., & Murnane, R. (2003). The skill content of recent technological change. An empirical exploration. *The Quarterly Journal of Economics*, 118(4), 1279–1333.
- Becker, G. S. (1962). Investment in human capital: A theoretical analysis. *Journal of Political Economy*, 70, 9–49.
- van Beek, K. W. H., Koopmans, C. C., & van Praag, B. M. S. (1997). Shopping at the labour market: A real tale of fiction. *European Economic Review*, 41(2), 295–317.
- Bertrand, M., & Mullainathan, S. (2004). Are Emily and Greg more employable than Lakisha and Jamal? A field experiment on labor market discrimination. *American Economic Review*, 94(4), 991–1013.
- Biesma, R. G., Pavlova, M., van Merode, G. G., & Groot, W. (2007). Using conjoint analysis to estimate employers' preferences for key competencies of master level Dutch graduates entering the public health field. *Economics of Education Review*, 26(3), 375–386.
- Bils, M., & Klenow, P. (2000). Does schooling cause growth? *American Economic Review*, 90(5), 1160–1183.
- Borghans, L., & de Grip, A. (2000). The overeducated worker? *The economics of skill utilization* Cheltenham: Edward Elgar.
- Borghans, L., Romans, M., & Sauermann, J. (2010). What makes a good conference? Analysing the preferences of labour economists. *Labour Economics*, 17(5), 868–874.
- Carroll, J. D., & Green, P. E. (1995). Psychometric methods in marketing research: Part I, conjoint analysis. *Journal of Marketing Research*, 32, 385–391.
- Cattin, P., & Wittink, D. R. (1982). Commercial use of conjoint analysis: A survey. *Journal of Marketing*, 46, 44–53.
- Chrzan, K., & Orme, B. (2000). An overview and comparison of design strategies for choice-based conjoint analysis. *Research paper series*. Sawtooth Software.
- DeShazo, J., & Fermo, G. (2002). Designing choice sets for stated preference methods: The effects of complexity on choice consistency. *Journal of Environmental Economics and Management*, 44, 123–143.
- Elish, K., O'Connell, P. J., & Smyth, E. (2010). The economic returns to field of study and competencies among higher education graduates in Ireland. *Economics of Education Review*, 29(4), 650–657.
- Eriksson, S., Johansson, P., & Langenskiöld, S. (2012). What is the right profile for getting a job? A stated choice experiment of the recruitment process. *IZA Discussion Papers* 6691. Institute for the Study of Labor (IZA).
- Felstead, A., Gallie, D., Green, F. & Zhou, Y. (2007). *Skills at work, 1986 to 2006*. Universities of Oxford and Cardiff, ESRC Centre on Skills, Knowledge and Organisational Performance.
- Hartog, J. (1992). *Capabilities, allocation and earnings*. Dordrecht: Kluwer Academic.
- Heckman, J. J., Stixrud, J., & Urzua, S. (2006). The effects of cognitive and noncognitive abilities on labor market outcomes and social behavior. *Journal of Labor Economics*, 24(3), 411–482.
- Heijke, H., Meng, C., & Ris, C. (2003). Fitting to the job: The role of generic and vocational competencies in adjustment and performance. *Labour Economics*, 10, 215–229.
- Hensher, D. (2010). Hypothetical bias, choice experiments and willingness to pay. *Transportation Research Part B: Methodological*, 44(6), 735–752.
- Hensher, D., & Greene, W. (2003). The mixed logit model: The state of practice. *Transportation*, 30(2), 133–176.
- Humburg, M., & van der Velden, R. (2015). What is expected of higher education graduates in the 21st century? Research memorandum 2013/13, Research Centre for Education and the Labour Market (ROA). In J. Buchanan, D. Finegold, K. Mayhew, & C. Warhurst (Eds.), *Oxford handbook of skills and training*. Oxford: Oxford University Press, in press.
- Humburg, M., van der Velden, R., & Verhagen, A. (2013). *The employability of higher education graduates: The employer's perspective*. European Commission.
- Kiong-Hock, L. (1986). Affective, cognitive and vocational skills: The employers' perspective. *Economics of Education Review*, 5(4), 395–401.
- Knight, J. B. (1979). Job competition, occupational production functions, and filtering. *Oxford Economic Papers*, 31(2), 187–204.
- Ladenburg, J., Olsen, S., & Nielsen, R. (2007). Reducing hypothetical bias in choice experiments, powerpoint presentation. Institute of Food and Resource Economics, University of Copenhagen, Denmark, reported in Hensher (2010).
- Louvière, J. J., Hensher, D. A., & Swait, J. D. (2000). *Stated choice methods: Analysis and applications*. New York: Cambridge University Press.
- Mason, G. (1998). *Diversity and change: The challenges facing chemistry higher education*. London: Royal Society of Chemistry/Council for Industry and Higher Education.
- Mason, G. (1999). *The labour market for engineering, science and IT graduates: Are there mismatches between supply and demand*. London: Department for Education and Employment Research Report No. 112.
- Mason, G., Williams, G., & Cranmer, S. (2009). Employability skills initiatives in higher education: What effect do they have on graduate labour market outcomes? *Education Economics*, 17(1), 1–30.
- McFadden, D. (1974). Conditional logit analysis of qualitative choice behavior. In P. Zarembka (Ed.), *Frontiers in economics* (pp. 105–142). New York: Academic Press.
- Murphy, J. J., Allen, P. G., Stevens, T. H., & Weatherhead, D. (2005). A meta-analysis of hypothetical bias in stated preference valuation. *Environmental and Resource Economics*, 30(3), 313–325.
- Phelps, E. S. (1972). The statistical theory of racism and sexism. *American Economic Review*, 62, 659–661.
- Pouliakas, K., & Theodossiou, I. (2010). Measuring the utility cost of temporary employment contracts before adaptation: A conjoint analysis approach. *Economica*, 77(308), 688–709.
- Revelt, D., & Train, K. (1998). Mixed logit with repeated choices: Households' choices of appliance efficiency level. *The Review of Economics and Statistics*, 80(4), 647–657.
- Ryan, M. (2004). Discrete choice experiments in health care. *British Medical Journal*, 328, 360–361.
- Sattinger, M. (1993). Assignment models of the distribution of earnings. *Journal of Economic Literature*, 31, 831–880.
- Spence, M. (1973). Job market signaling. *Quarterly Journal of Economics*, 87(3), 355–374.
- Teijeiro, M., Rungo, P., & Freire, J. (2013). Graduate Competencies and employability: The impact of matching firms' needs and personal attainments. *Economics of Education Review*, 34, 286–295.
- Train, K. (2009). *Discrete choice models with simulation*. Cambridge: Cambridge University Press Cambridge books.