EMPLOYABILITY SKILLS AND JOBS FOR GRADUATES
Learning from job advertisements

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Abstract   We use 2812 online job advertisements from 21 European countries to identify attributes demanded by employers and explore economic and labour market characteristics associated with the set of required skills. Whereas some employers clearly target ready-to-work candidates for high skilled occupations, others do not even specify skill requirements. The latter are from countries that are moderate or modest innovators with varying levels of high-tech employment activities, a high level of youth unemployment and a low job vacancy rate. The findings suggest employers have raised hiring criteria and have therefore contributed to credential inflation.

Keywords: employability skills, graduates, job advertisements, European Union, fuzzy clustering.

Competências requeridas e empregos para graduados: lições a partir dos anúncios

Resumo   Esta pesquisa explora 2812 anúncios de emprego publicados no sítio da internet de 21 países europeus para identificar as exigências de emprego e analisar as características económicas e do mercado de trabalho associadas a esse conjunto de competências procuradas. Enquanto alguns empregadores preferem claramente candidatos prontos a trabalhar para profissões altamente qualificadas, outros não especificam as competências requeridas. Estes últimos são de países com um nível de inovação moderado ou modesto, têm um baixo nível de emprego em atividades intensivas em tecnologia e conhecimento, com um elevado nível de desemprego jovem e uma baixa taxa de ofertas de emprego. Os resultados empíricos sugerem que os empregadores aumentaram os critérios de contratação e, por conseguinte, contribuíram para a inflação dos diplomas.

Palavras-chave: competências requeridas, graduados, anúncios de emprego, União Europeia, conjuntos difusos.

Compétences d'employabilité et emplois pour les diplômés: tirer des enseignements des offres d'emploi

Résumé Cette recherche explore 2812 offres d'emploi publiées sur le site web provenant de 21 pays européens pour identifier les attributs exigés par les employeurs et explorer les caractéristiques de l'économie et du marché du travail associées à l'ensemble des compétences requises. Alors que certains employeurs ciblent clairement des candidats prêts à l'emploi pour des professions hautement qualifiées, d'autres ne précisent même pas les compétences requises. Ces derniers proviennent de pays qui sont des innovateurs modérés ou modestes avec des niveaux variables d'activités d'emploi de haute technologie, un niveau élevé de chômage des jeunes et un faible taux de vacance d'emploi. Les résultats suggèrent que les employeurs ont relevé les critères d'embauche et ont donc contribué à l'inflation des diplômes.

Mots-clés: compétences d'employabilité, diplômés, offres d'emploi, Union européenne, *fuzzy clustering.*

Competencias de empleabilidad y empleo para titulados: aprender de las ofertas de empleo

Resumen   Utilizamos 2812 anuncios de empleo en línea de 21 países europeos para identificar los atributos exigidos por los empleadores y explorar las características económicas y del mercado laboral asociadas al

conjunto de cualificaciones requeridas. Mientras que algunos empleadores se dirigen claramente a candidatos listos para trabajar en ocupaciones de alta cualificación, otros ni siquiera especifican los requisitos de cualificación. Estos últimos proceden de países que son innovadores moderados o modestos, con niveles variables de actividades de empleo de alta tecnología, un alto nivel de desempleo juvenil y una baja tasa de vacantes. Las conclusiones sugieren que los empleadores han elevado los criterios de contratación y, por tanto, han contribuido a la inflación de credenciales.

Palabras-clave: competencias de empleabilidad, titulados, ofertas de empleo, Unión Europea, *fuzzy clustering*.

Introduction

Although higher education (HE) reform recognises the primary role of employability in the mission of universities and other institutions, the concept of employability has been the subject of deep debate. The term employability combines the words employment and the ability to become employed (Vanhercke et al., 2014); it is at the core of the debate on the relationship between HE and the world of work (see Teichler, 2007, for a survey of main issues) and consequently on graduates' transition into the labour market (Alves, Alves and Chaves, 2012; Chaves and Morais, 2016). However, it is up to the individual to become employable; this not only involves acquiring the necessary skills, but also being able to stand out in the labour market (Torres, 2019).

Employability is a complex concept that encompasses multiple perspectives related to the supply of and demand for skills, and yet research usually focuses on the possessive approach, namely the skills and other attributes that make it easier to find a job (Holmes, 2013). As this approach is influenced by the human capital argument, attention is placed largely on job requirements other than qualifications or professional experience (Andrews and Higson, 2008; Branine, 2008). However, the lack of a clear definition of employability skills means that HE institutions inevitably find it difficult to provide their students with these skills.

Job advertisements are an important source of information and have been widely used to identify the employability skills graduates are expected to have (Bennett, 2002; Ahmed, 2005; Choi and Rasmussen, 2009; McArthur et al., 2017), namely skills for low and medium level occupations (Mýtna Kureková et al., 2016), and those for all levels of occupation (Brown and Souto-Otero, 2020). While comparative studies remain scarce, some authors have compared different countries (Mýtna Kureková et al., 2016; Kennan et al., 2006). Comparative research can enhance our understanding of the dynamics of the labour market where the job vacancies are posted. The information provided by job ads goes beyond the skills and attributes required by employers; they not only shed light on countries' specificities but also on the employers' attitudes towards the qualifications and abilities, aspects that need to be brought to the debate.

Our research uses jobs ads to compare the skill sets in various European countries and to explore the link between the requirements and labour market

characteristics in each geography. For example, what are employers looking for when they hire graduates? Why do they inform (or not) job requirements? How do economic and labour market characteristics interact with job offers? Available literature has focused almost entirely on the skill set required in the labour market but has failed to examine this link even though it could provide HE and employment policy makers with useful information. We assume that job ads do more than simply publicise job vacancies. In fact, they reveal hidden information on the graduate labour market.

In an attempt to answer the above questions, we explore 2,812 online job advertisements targeting graduates (bachelor) and post-graduates (master), collected from European Union websites in 2019 and early 2020. More specifically, we aim to compare the job offers in Europe in terms of countries (n = 21), occupations and a set of country characteristics. We apply a fuzzy cluster analysis to identify types of skills and explore the association with types of occupation, as used in Cedefop (2011). Subsequently, variables such as field of education, industry, and country help provide a better characterisation of each skill cluster.

Literature review

Employability skills: an overview

The link between education and the world of work has been at the centre of the research on young people's transition into the labour market since the early 1980s (Rose, 1984) and it gained renewed interest following the worldwide massification of higher education (HE). The concept of employability has become crucial in this debate as it captures both the job itself and the ability to become employed (Vanhercke et al., 2014), namely mechanisms that guarantee a smooth transition from HE to the labour market, or, in other words, the employability skills that HE should endow graduates with.

The debate on the role of education in the provision of productive skills that employers are willing to reward emerged as a result of human capital theory (Becker, 1964), which provided grounds for the skills-based definition of employability. Holmes (2013) labels it as a possessive approach, which means graduates should be endowed with skills and abilities that increase their probability of accessing a job. Graduates may therefore pursue HE studies to acquire employability skills and to facilitate the transition into the labour market (Alves, Alves and Chaves, 2012). The individual is thus responsible for being employable and for acquiring distinctive skills (Torres, 2019).[1]

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1   Literature has provided much discussion around the different drivers of employability and has introduced a distinction between absolute and relative employability. The former is related to the skills that foster employability, while the latter regards external factors that affect the probability of accessing a job, notably economic conditions, and segmentation of HE institutions (see Suleman, 2021, for a survey of different dimensions of employability).

From the employers' perspective, the information about job candidates in the recruitment process is known to be both complex and uncertain due to its asymmetry (Arrow, 1973). Job advertisements are an important source of information on employability skills and have been used in studies worldwide to explore job requirements since the early 2000s (Bennett, 2002); online job offers have also gained relevance since digitalisation. Beblavý et al. (2017) underline that job advertisements are a valuable source to examine both the labour market and the skill needs for occupations. However, employers disseminate job offers in advertisements for various reasons, notably to obtain a larger pool of candidates with a view to selecting the best candidate (Feldman, Bearden and Hardesty, 2006); to inform prospective employees about the required or preferred knowledge, skills, and abilities (Kennan et al., 2009); to publicise hard-to-fill vacancies, and to fill jobs that require a complex skill set (Cedefop, 2018).

Even though there is a lack of agreement on employability skills in part due to the methods used to identify them (Suleman, 2018), some skills and abilities prevail in much of the literature. For example, Branine (2008) claims that most employers are looking for attitude, personality, and transferable skills, i.e., person-oriented rather than job-oriented skills. Brown and Souto-Otero (2020) states that employers' expectations of job readiness are reflected in the set of social and specific skills as well as personal characteristics, such as communication, IT, interpersonal abilities, and team working, specified in job ads. These attributes are therefore more relevant than formal qualifications. García-Aracil and van der Velden (2008) found six types of skill, namely organisational (ability to work under pressure, autonomy, and attention to detail); specialisation (performance of activities and tasks in own field of work); methodological (dealing with problems and solving them); generic (critical thinking and oral and written communication); participative (planning, decision-making, responsibility); and socio-emotional (interpersonal, team-working). Some argue that employers are ultimately looking for attributes that reduce monitoring (Bowles and Gintis, 2000) and training costs (Thurow, 1976).

Despite being valuable when studying employability skills, using job ads is not without its problems. Kennan et al. (2006) note that employers often fail to specify the skills and other attributes they require from candidates. In contrast, Napierala and Kvetan (2023) suggest that employers mention only few skills to conceal the expected requirements. Others argue employers use HE credentials to signal productive skills and tangible resources that can add value to their business (Tomlinson and Anderson, 2021), rendering a description of other required attributes unnecessary. Arrow (1973) argues that HE is useful to screen candidates and plays an informative role but that it does not produce useful skills, as advocated by human capital theory. Others believe employers continue to consider formal credentials an inadequate way of ascertaining a job applicant's skills because they expect ready-to-work and trainable candidates (Brown and Souto-Otero, 2020). In sum, the discussion on the content of job ads sheds light on employers' ability (or option) to design job offers and to specify the required attributes.

Beyond the skill requirements in job ads

Job requirements must also be situated in the economic context. This section provides an overview of some of the literature on the underlying information contained in job ads to identify the skill set employers require. This can further the understanding of the impact of HE expansion, a subject that divides researchers between those who believe HE returns have declined (Mok, Wen and Dale, 2016) and those who criticise the catastrophist theses (Chaves, Morais and Nunes, 2009).

Some studies have addressed the types of occupation assigned to graduates. Trow (1973) was the first to warn of the lack of skilled jobs, arguing that the probability of graduates working in traditionally non-graduate sectors increases with the growing supply. This has led some social scientists to examine the association between skill requirements and occupational structure (Brown and Souto-Otero, 2020), while others have provided taxonomies of graduate occupations (*e.g.* Elias and Purcell 2004). The latter authors have discriminated four types of graduate job based on a comparison between two cohorts of graduates: traditional, modern, new, niche; they also identified non-graduate jobs. Figueiredo et al. (2017) used Elias and Purcell's proposal to identify three types of job: traditional, new, and latent. The traditional jobs have a very high percentage of graduates in both cohorts; the new are similar to modern jobs and are made up of jobs where most of the younger workers have a higher education diploma. Finally, the latent jobs correspond to non-graduate jobs. An additional taxonomy used in the Cedefop (2011) study on job polarisation classifies the occupations in four categories, namely high-skilled, skilled non-manual, skilled manual, and elementary.

Alongside the discussion on graduate and non-graduate occupations, some research attempts to explain how these jobs are assigned. Green and Henseke (2017) refer to relative demand to highlight the gap between the availability of graduate jobs and the supply of graduates. They show that underemployment has registered an upward trend across Europe despite variations between countries. It is higher in Greece, Italy, and Ireland because of the disparities between the supply of graduates and graduate jobs, while Sweden has the highest proportion of graduates working in non-graduate jobs in Nordic countries. Other researchers provide evidence on the allocation of graduates to managerial, white collar and scientific and technical jobs in Portugal that require a degree and show there is a mismatch in only a small proportion of non-graduate jobs (Chaves, Morais and Nunes, 2009). Other research on the Portuguese case indicates the mismatch is predominately in new and latent graduate jobs, and that fewer graduates have been employed in traditional jobs since HE expansion (Figueiredo et al., 2017).

The literature also discusses overeducation (McGuinness, 2006), credentials inflation (Collins 1979; Tomlinson and Watermeyer, 2022), and crowding out (Klein, 2015) to illustrate the impact of the oversupply of graduates in the labour market. The term credentials inflation refers to the increase in educational requirements for jobs as a result of the growing number of advanced education degrees conferred (Collins, 1979). Tomlinson and Watermeyer (2022) admit that these

credentials become a positional good, but the benefits of education will be restricted to some graduates. In such circumstances, some graduates tend to accept any available job, i.e., the lack of skilled jobs in some labour markets means graduates are assigned to non-graduate jobs (Teichler, 2000). It seems that the overeducation / underemployment following the massification of HE is largely explained by a mismatch between the pace at which the supply of graduate increases and the availability of graduate jobs.

Marques, Suleman and Costa (2022) bring new insights to this discussion, showing that overqualification is common in countries with low weight high-tech manufacturing and services sectors, as in the case of Southern European countries and Austria. This is because the high level of HE expansion occurred within a production regime that continued to be based on low technologies and domestic demand rather than on high-tech sectors (Hall, 2018). The European Innovation Scorecard (Hollanders, Es-Sadki and Merkelbach, 2019) classifies the European countries in four clusters based on the performance of the innovation system: the *innovation leaders* (Denmark, Finland, the Netherlands, Sweden, and Switzerland); *strong innovators* (Austria, Belgium, Estonia, France, Germany, Ireland, Luxembourg, Norway, and the United Kingdom); *moderate innovators* (Croatia, Cyprus, Czechia, Greece, Hungary, Italy, Latvia, Lithuania, Malta, Poland, Portugal, Slovakia, Slovenia, and Spain); and *modest innovators* (Bulgaria and Romania).

Based on the reported literature, we submit the following hypotheses to empirical testing:

> H1: Employers demand a broad set of attributes that include not only soft and hard skills but also personal traits that might influence job performance because this is what makes ready-to-work employees.
> H2: The massification of HE and the increasing supply of graduates contributed to changes in hiring criteria.
> H3: Countries vary in terms of their sectoral specialisation, and this leads to different concentrations of industries and services with a high (low) level of skills. We expect job ads to vary according to country specific features.

Data and methodology

The data: job advertisements

This study uses data on job ads targeting HE graduates (holders of bachelor's and master's degrees) collected from 24 European countries in 2019 and 2020 from the following sources: the European Union website EURES and the private website Monster.com. These two websites differ in that employers' access when posting job offer is different: whereas employers write the job descriptions directly in Monster.com (Backhaus, 2004), they must contact national public employment services or EURES personnel to post vacancies on EURES (Mýtna Kurekova et al., 2016). As

Monster.com is a private webpage, employers must pay a fee for postings, which may discourage them from using the site.

To avoid bias due to over or underrepresentation of data from any country, we limited the number of job advertisements per country to the 40-150 range. Countries with fewer than 40 ads, i.e. Denmark, Norway, and Poland were therefore excluded from the analysis. The final country-based sub-samples were obtained randomly whenever their original size was higher than 150. Using this criterion, the initial sample of 4830 observations was reduced to N = 2812 cases.

The raw data contained 230 skills and other attributes that were unmanageable due to tautology or lack of clarity. The first step of our data analysis involved a content analysis of advertisements to categorise terms based on frequency, literature review, and self-knowledge. Around 40 different foreign languages appeared in the job advertisements, which we placed into a single "other foreign language(s)" category. Some skills are similar but differ only in wording, *e.g.*, orientation towards outcomes, goals, business, and solutions: these were categorised as "orientation towards results". The cluster of "work attitudes" includes initiative, commitment, proactivity, motivation, positive attitude, persistence, loyalty, and caring. The category "personal qualities" encompasses open mind, dynamism, ambition, confidence, and persistence. Some skills remained unchanged, i.e., were used as they appeared in ads. To examine the skills by occupation, we used ISCO and converted each occupation in job advertisements into a one-digit occupation, and finally classified each of them as high-skilled, skilled non-manual, skilled manual or elementary in line with the Cedefop study (2011).

The 19 skill variables are all dichotomous, i.e. yes/no type, as follows: 1: specific skills; 2: IT skills; 3: English; 4: other foreign language(s); 5: interpersonal relationship; 6: autonomy; 7: problem solving; 8: quality; 9: communication; 10: planning and organisation; 11: stress; 12: innovation; 13: responsibility; 14: personal qualities; 15: leadership; 16: work attitude; 17: orientation towards results; 18: analytical skills; and 19: flexibility and adaptability.

The job ad dataset includes information on occupations, contractual arrangements, working time, and industry affiliation. This information is varied, details skills and other attributes differently, and frequently lacks key data, notably regarding the field of education, contracts, wages, and other conditions offered. Additionally, we searched for information on economic and labour market characteristics from the European data website (Eurostat). The data include labour market outcomes such as youth unemployment and the job vacancy index; and productive system features, particularly the proportion of employment in 2018 [2] in high-tech manufacturing sectors (pharmaceutical; computer, electronic, optical; radio and television; air and spacecraft and related machinery) and high-tech knowledge-intensive service sectors (post and telecommunications; computer and related activities; research and development).[3]

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2   https://ec.europa.eu/eurostat/statistics-explained/index.php?title=File:Employment_in_high-tech_sectors,_EU-28_and_selected_countries,_2018.png
3   https://ec.europa.eu/eurostat/cache/metadata/Annexes/htec_esms_an_2.pdf

Data decomposition

Due to the heterogeneity of the population under study, i.e., job ads, we decided to perform a fuzzy cluster analysis of the dataset, with a view to identifying its structure but also understanding the position of each advertisement in that structure. This explorative approach assumes that the data are organised in K > 1 fuzzy clusters, and every ad is characterised by a set of K parameters that account for its grade of membership (GoM) in each cluster. Unlike traditional cluster analysis, here a partial membership is allowed, thus making it possible to share characteristics of every cluster in different degrees. This allows a fuzzy analysis to express the heterogeneity of the underlying population.

The data analysis was carried out using the GoM model devised by Woodbury and Clive (1974) and further developed by Manton et al. (1994). The model comprises two sets of parameters: one set accounts for the importance of variables in fuzzy clusters and the other addresses the individual position of each ad in the structure set out by those clusters; in other words, the grades of membership. Using two different analytical tools to measure the goodness-of-fit of the different models that were attempted, we realised that the one comprising K = 5 fuzzy clusters best fit the data.

Empirical evidence

Skill sets and other attributes

Table 1 gives a qualitative overview of the skill set categories we can expect to find in each of the five fuzzy clusters. One is a null cluster, i.e., no specific skill is required, which we labelled as *undifferentiated*. We found two clusters of foreign languages, one specifying *English and other languages*, and the other comprising different languages; we grouped the latter into *other foreign languages*. Finally, the other two clusters detail a considerable number of skills. According to the weight of each skill, we labelled one as *soft skills* (cluster II), and the other *specific skills* (cluster III). It is clear from the clusters that a knowledge of languages does not appear as relevant. Most probably, employers consider it to be a key prerequisite for skilled jobs.

Soft skills comprise requirements such as interpersonal skills, quality awareness, communication, planning and organisation, ability to work under stress, innovation, responsibility, personal qualities, attitudes towards work, orientation towards goals, analytical abilities, and flexibility and adaptability. Here, employers are searching for candidates with a broad skill set for both highly skilled and elementary occupations; they are offering a permanent and full-time job and expect candidates to be available to travel for work. This skill set prevails in financial, public administration and construction sectors.

The *specific skills* cluster comprises technical skills, IT, interpersonal skills, problem solving, communication, orientation towards goals, and analytical abilities. Additionally, employers require a master's degree and professional experience (4-10 years) to work in highly skilled occupations in ICT and financial sectors.

Table 1   Skills and abilities demanded by employers

| Skills and other attributes	Language: others	Soft skills	Specific skills	Language: English	Undifferentiated
Specific skills			****		
IT		***	****		
English				****	
Other foreign languages	****				
Interpersonal		****	****		
Autonomy		****			
Problem solving			****		
Quality awareness		**			
Communication		****	****		
Planning and organisation		****			
Dealing with stress		**			
Innovation		**			
Responsibility		***			
Personal qualities		****			
Leadership				***	
Work attitudes		****			
Goal orientation		****	***		
Analytical thinking		**	****		
Flexibility and adaptability		****			

However, the most striking finding is in the *undifferentiated* cluster. No skill prevails in this cluster, and it can therefore be referred to as a null cluster. Employers are looking for graduates for skilled non-manual and skilled manual occupations, offering them temporary and part-time jobs in public administration, the education system and construction. No experience is required, but ethics-related attributes are relevant.

The skill set varies according to the type of occupation. For high-skilled occupations, employers tend to specify both soft and specific skills. The lack of information on required skills is most frequently found for skilled non-manual occupations, which clusters clerical jobs, personal services, and sales workers. Next, we examine how countries' specificities impact the way employers express (or not) the required skills.

Country specificities and skill sets

The weights of countries in each fuzzy cluster prompt questions about employability skills and the extent to which ads are merely a vehicle for disseminating job offers (figure 1). It seems clear that labour markets in each country demand a different set of skills. For example, whereas job ads in Romania only refer to requiring a foreign language, English is generally specified in Malta. Figure 1 shows that the *undifferentiated* cluster prevails in a set of countries, namely Spain, Croatia, Greece, Ireland, Portugal, Slovakia, and Sweden. These findings raise questions about the country specificities, i.e., context-related factors, that might affect job offers.

As we are unable to access employers' motivations, or the reasons behind the job offers and required skills, we chose to look at some country characteristics that shed light on what drives the demand for skills. Bearing in mind the supply and
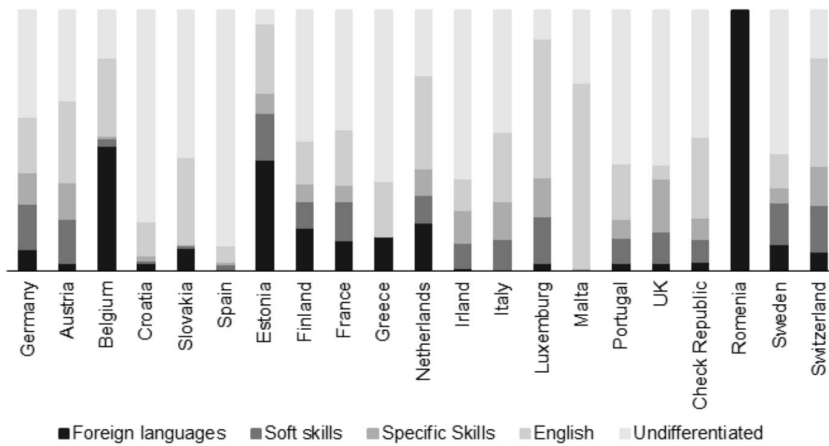
Figure 1   Weights of clusters in each country

demand arguments reported in the literature, we include a set of economic and labour market characteristics that help circumvent the lack of information contained in job ads in each country. The Eurostat provides data on youth unemployment, level of job vacancies and the proportion of employment in high-intensive technology manufacturing (HITM) and high-tech knowledge intensive services (HTKIS). The goal here is to examine the probable association between these variables and the weight of the *undifferentiated* cluster in each country.

We started by standardising all variables to obtain a single metric to compare countries. Figure 2 displays the countries with the combination of variables referring to the particularities of the employment characteristics. A set of countries shows a higher proportion of *undifferentiated* job ads (≥ 0.50) and a low level of employment in HITM and HTKIS. This is particularly the case of Southern European countries (Spain, Greece, Portugal, and Italy). At the other extreme, we found Austria, Malta, Netherlands, Switzerland, Belgium, Luxemburg, and Estonia [4] with a low proportion of *undifferentiated* job ads and a high level of jobs in HTKIS and HITM. The outcome for liberal economies (Ireland and UK) is puzzling as employers are less likely to specify skill requirements even though a significant share of jobs is in qualified sectors. We also see this in Sweden and Finland for HTKIS.

Another economic characteristic that deserves scrutiny is the innovation path. While most of these countries are moderate innovators, others are modest (Romania) or strong innovators (Ireland and UK). We therefore explore the link

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4   Romania has a lower level of undifferentiated job ads, but also a lower level of employment in
     HITM and the lowest level in qualified services.
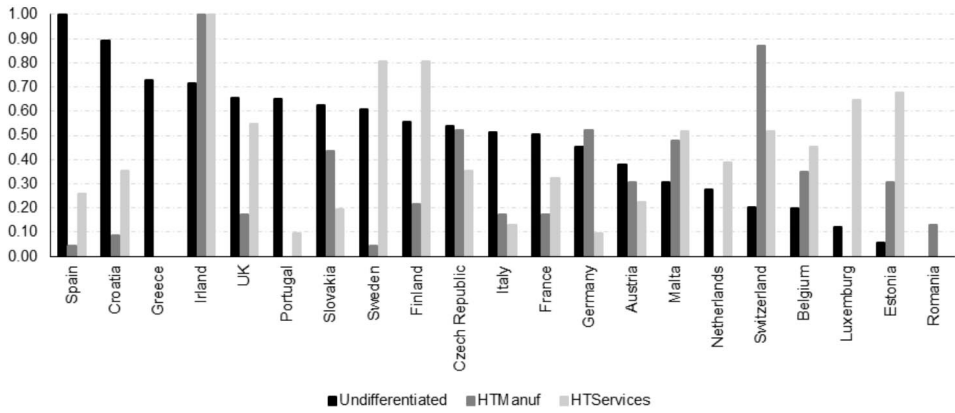
Figure 2   The employment in high-tech manufacturing and services and undifferentiated cluster
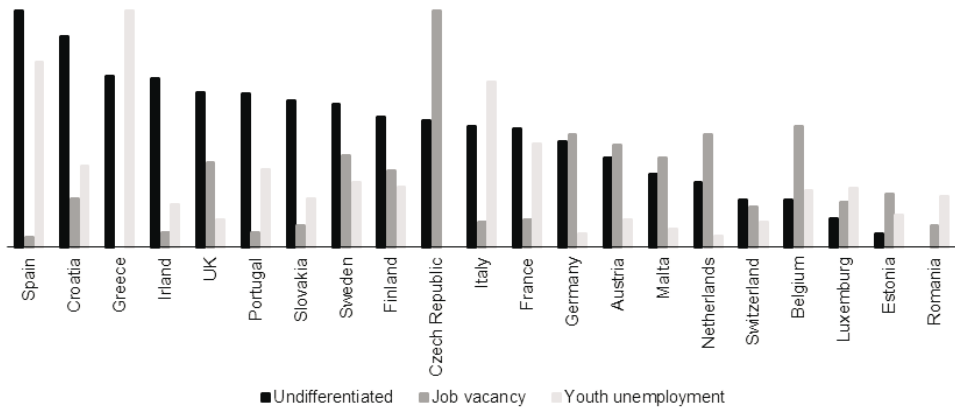
Figure 3   The labour market characteristics of countries and undifferentiated job ads

between the innovation pattern and the lack of information in the job ads. The leader and strong innovation countries are more likely to specify skill requirements than the moderate innovation countries when hiring graduates.

Next, we analyse the labour market outcomes which make employers express skill requirements more (less). They include the job vacancy index and youth unemployment, which we associate with *undifferentiated* skill clusters.

We see that SE countries tend to form a cluster, with a high proportion of *undifferentiated* ads, a low level of job offers and a high level of youth unemployment. Ireland also falls into this cluster. As noted earlier for HITM and HTKIS, the cluster with Austria, Malta, Netherlands, Switzerland, Belgium, Luxemburg, Estonia, and Romania remains consistent.

Post-hoc analysis

The final step of our empirical analysis consisted of exploring the relationship between clusters of skills and the labour market and economic characteristics of each country. We created a variable that acknowledges membership of any cluster with limited or null specification (*languages* and *undifferentiated*) or clusters that specify soft and hard skills. This is obtained by summing the degree of membership of the advertisements in clusters *language: others*, *language: English*, and *undifferentiated* on one hand and the degree of membership in *soft skills* and *specific skill*s on the other. Technically, this corresponds to a union of fuzzy sets, and ends up with two broad groups of clusters. Since the underlying quantities are nonnegative and have unit sum, a higher value of the variable means proximity to one group, whereas lower values indicate proximity to the second group. Therefore, we call the variable *pos*, which stands for the position of each advertisement "between" two major groups.

We used *pos* to assess how other characteristics such as type of occupation, level of education, job vacancy, youth unemployment, employment in technological intensive manufacturing and services, and cluster of innovation level, can interact with the nature of a job ad. Since this variable has a limited range, here between 0 and 1, we opted for a Tobit regression model to account for the factors that might be influencing the design of a job ad. Table 2 displays the estimates of the coefficients of explanatory variables and associated statistics.

The findings displayed in table 2 are in line with the previous analysis of the link between countries' economic and labour market characteristics. More specifically, countries with high levels of employment in HITM tend to have fewer undifferentiated ads, while those with a high level of employment in HTKIS are more likely to have job offers without detailing requirements. The same holds for the innovation index which shows that countries that are leaders and strong innovators tend to specify their skills requirements. The data on labour market dynamics indicate a negative association between a low level of job vacancies and less detailed job ads. Finally, employers that are looking for graduates to do so-called non-graduate jobs do not provide information on skill requirements.

Table 2 Estimates from Tobit regression: undifferentiated cluster and country characteristics

Model	Estimates	SE	t
Job vacancy	-0.126***	0.037	-3.40
Youth unemployment	-0.010	0.043	-0.24
HITM	-0.104***	0.030	-3.44
HITS	0.072*	0.037	
Innovation level of country			
Leaders	-0.310***	0.025	-12.35
Strong	-0.267***	0.020	-13.02
Moderate/modest (reference)			
Occupations			
High-skilled	0.031	0.031	1.00
Skilled non-manual	0.218***	0.037	5.91
Skilled manual	0.125*	0.068	1.84
Elementary (reference)			
Education level			
Bachelor	-0.008	0.018	-0.47
Master (reference)			
Constant	1.109***	0.045	24.56
/Sigma	0.300	0.006	
N	2506		
LR chi2 (10)	545.43		
Prob > chi2	0.000		
Pseudo R2	0.208		
Log likelihood	-1039.196		

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

Discussion

Job advertisements are used in the literature to learn about employability skills (Beblavý et al., 2017). Access to these data has been eased through their availability in websites, which has led to much research on skill requirements that informs HE policy makers and institutions. However, our findings raise an important question: should jobs ads be seen merely as a means of publicising job offers? We believe that data on the countries where these offers are publicised can further our knowledge of the graduate labour market. Moreover, our research focuses on the ads that lack detailed information on skills and tries to identify potential explanations.

The literature underlines the lack of clarity (Kennan et al., 2006) in the terms used to describe the skills and other attributes in job ads, as well as the enormous number of abilities (230); for simplification, we aggregated some of these into broad categories. The data contained in the job ads provided a picture of the attributes graduates must have in the sampled countries; we found employers demand a broad set of attributes that include soft and hard skills, and personal traits (hypothesis 1). The two clusters that specified these attributes showed that employers prefer "ready-to-work" candidates (Brown and Souto-Otero, 2020). The cluster labelled *soft skills* includes interpersonal and communication abilities, in addition to aptitude to work autonomously, to plan and organise own work, to deal with stress, positive work attitudes and goal orientation, which symbolise work readiness attributes. All these

behavioural traits help reduce monitoring costs, which means employees voluntarily comply with their employment contracts that are generally incomplete (Bowles and Gintis, 2000). Employability skills therefore comprise abilities that reduce employers' monitoring and training costs and influence employees' commitment to high job performance.

The same rationale is found in the cluster designated *specific skills*. Employers demand job-oriented skills together with cognitive abilities (analytical thinking) and soft skills (interpersonal and communication). There is also an underlying preference for person-oriented abilities, such as personal qualities and positive work attitudes (Branine, 2008). In sum, employers target job applicants with a broad set of skills (hypothesis 1), but some do not specify the skills and abilities in their job ads (Feldman, Bearden and Hardesty, 2006).

Our empirical analysis pointed to one cluster with no significant skill (*undifferentiated*) and two with only foreign language. Arguments presented in the literature help explain this outcome. For example, employers are probably trying to create a pool of graduate candidates and fail to understand that credentials are poor proxies for occupational performance (Brown and Souto-Otero, 2020). However, they may also continue to believe that HE credentials signal productive and valuable skills for their business (Tomlinson and Anderson, 2021) and therefore a sufficient reason to hire. On the other hand, they may be unable to describe the specific attributes (Kennan et al., 2006) or prefer not to specify them to keep their competitors in the dark (Napierala and Kvetan, 2023).

Our findings illustrate that some particularities of labour markets and productive regimes are associated with *undifferentiated* job ads. The data showed that both Southern European (SE) countries and liberal markets have a combination of high youth unemployment, a low level of job vacancies and the highest levels of *undifferentiated* job ads (figure 3; table 2). In addition to these labour market conditions, low employment in innovative activities seems to drive the assignment of graduates to non-graduate jobs. In fact, the estimates from Tobit regression point to the allocation of graduates in skilled non-manual occupations without any specific requirement, and even to elementary jobs. Employers in these labour markets, where job offers are scarce and youth unemployment is high, have probably raised hiring criteria due to the increase in the supply of graduates (Thurow, 1976; Green and Henseke, 2017), creating credential inflation (Collins, 1979) (hypothesis 2).

Though less evident and puzzling, the link between *undifferentiated* job ads and employment in HITM and HITS provides further insights. Employers provide detailed information on skill requirements when qualified employment in manufacturing is high, but not for high-tech jobs in the service sector. Could this be because it is difficult to specify the kind of tasks required in service-related activities? This is more visible in the UK, Sweden, and Finland, where there is a high proportion of HTKIS jobs. However, Ireland also has a large share of employment in HITM, casting doubts on this thesis. It should be noted that underemployment grew most in Ireland (Anglo) and Sweden (Nordic) as well as in SE countries (Green and Henseke, 2017) (hypothesis 3).

Growing underemployment is likely to intensify because on one hand young people strive to acquire credentials to be well positioned in the labour queue (Thurow, 1976; Tomlinson and Watermeyer, 2022) and, on the other, the skilled jobs generated by economies do not grow at the same pace as the supply of graduates. As a result, there is a greater risk of wasting skilled and scarce resources (Marques, Suleman and Costa, 2022) that could be used by countries to become more competitive and ensure well-being. This also raises doubts about HE's responsibility for the employability of graduates.

The HE reform is based on the belief that the supply of graduates is the solution to skill problems and provides unprivileged social groups with the opportunity to access HE. European countries' HE target and associated benchmarking fail to take into account demand and the varying skills required in the labour market. Our study suggests that the economic system has been unable to generate enough jobs to guarantee that available skills are used and ultimately that individuals get a fair return on investments in HE. The job ads revealed that the growing supply of graduates in some countries may simply be affecting the hiring criteria for HE graduates since no explicit skill is required. Therefore, young people invest in HE to obtain credentials as a response to these increasing requirements. In addition, our study shows that there is a mismatch between the supply of graduates and the pace of innovation in the productive system. While some graduates access better jobs in qualified sectors, others must accept whatever offer is available even if it is a non-graduate job. This mismatch fosters segmentation and perpetuates social inequalities among holders of HE diplomas, notably between women and men (Alves and Morais, 2021).

Concluding remarks

Our study sought to go beyond the simple identification of graduates' attributes described in job ads. The findings revealed that we can glean a better understanding of job ads if we consider certain factors such as the employers' ability and/or willingness to specify skill requirements; the productive regime, which influences the level of employment in high-tech activities; a country's level of innovation; and the type of occupations assigned to graduates. Other drivers that deserve scrutiny include the influence of economic conditions on the hiring criteria and search for skills. Future research should include longitudinal data on job offers to explore whether recession and expansion stages affect employers' hiring criteria and consequently graduates' employability.

We showed that it is necessary to delve into the demand side when discussing employability. Our aim was to demonstrate that unless the productive system is transformed, skills are wasted and the potential benefits of HE reduced. Policy makers should thus encourage employers to upskill jobs and not limit themselves simply to raising the skill requirements, which leads to credential inflation. In this situation, young people just participate in HE to obtain the credentials they need to get to the front of the labour queue.

However, this picture is incomplete if we overlook the social inequalities in the access to HE and acquisition of skills, as well as in benefiting from these attributes. The fate of young people before and after graduation is influenced by social class, family background, race, gender, and cultural matching, as well as by the type of HE institution that confers their degree.

On the other hand, although HE intends to provide a solution to skill problems, its benefits depend on how organisations take advantage of the supply of skills. In some cases, these investments can be counterproductive: graduates crowd out non-graduates from less demanding jobs and, consequently, expose non-graduates to unemployment or professional exclusion. Only a combination of education, economic, labour market and social policies can produce a win-win solution.

The data from job ads and country specific features allowed us to unveil outcomes that are usually less explored in the literature. However, our sample is relatively small. Further research should explore the potential of artificial intelligence to collect and classify ads and resubmit these research hypotheses to empirical tests with big data on both European and non-European countries.

References

Ahmed, Shamima (2005), "Desired competencies and job duties of non-profit CEOs in relation to the current challenges: through the lens of CEOs' job advertisements", *Journal of Management Development*, 24 (10), pp. 913-928.

Alves, Mariana Gaio, Natália Alves, and Miguel Chaves (2012), "Inserção profissional e razões de ingresso e reingresso no ensino superior: um ponto de partida para uma temática em aberto", *Sociologia, Problemas e Práticas*, 69, pp. 99-118.

Alves, Mariana Gaio, and César Morais (2021), "A inserção profissional de licenciados e mestres: efeitos paradoxais da feminização do ensino superior em tempos de incerteza", *Sociologia, Problemas e Práticas*, 95, pp. 103-126.

Andrews, Jane, and Helen Higson (2008), "Graduate employability, 'soft skills' versus 'hard' business knowledge: a European study", *Higher Education in Europe*, 33 (4), pp. 411-422.

Arrow, Kenneth Joseph (1973), "Higher education as a filter", *Journal of Public Economics*, 2, pp. 193-216.

Backhaus, Kristin B. (2004), "An exploration of corporate recruitment descriptions on Monster.com", *The Journal of Business Communication*, 41 (2), pp. 115-136.

Beblavý, Miroslav, Mehtap Akgüç, Brian Fabo, Karolien Lenaerts, and Félix Paquier (2017), "A methodological inquiry into the data generating process concerning new jobs and skills: taxonomy", *working paper, Leuven, FP7 InGRID project,* M21.6c.

Becker, Gary (1964), *Human Capital,* Chicago and London, The University of Chicago Press.

Bennett, Roger (2002), "Employers' demands for personal transferable skills in graduates: a content analysis of 1000 job advertisements and an associated empirical study", *Journal of Vocational Education and training*, 54 (4), pp. 457-476.

Bowles, Samuel, and Herbert Gintis (2000), "Does schooling raise earnings by making people smater?", in Kenneth Arrow, Samuel Bowles and Steven Durlauf (Eds.) *Meritocracy and Economic Inequality,* New Jersey, Princeton University Press, pp. 118–136.

Branine, Mahomed (2008), "Graduate recruitment and selection in the UK: a study of the recent changes in methods and expectations", *Career Development International*, 13 (6), pp. 497-513.

Brown, Phillip, and Manuel Souto-Otero (2020), "The end of the credential society? An analysis of the relationship between education and the labour market using big data", *Journal of Education Policy*, 35 (1), pp. 95-118.

Cedefop (2011), *Labour-Market Polarisation and Elementary Occupations in Europe. Blip or Long-Term Trend?*, Research Paper No. 9, Luxembourg, Publications Office of the European Union.

Cedefop (2018), *Mapping the Landscape of Online Job Vacancies. Background Country Report*, Czech Republic, available at: http://www.cedefop.europa.eu/en/events-and-projects/projects/big-data-analysison line-vacancies/publications (last acess in May 2024).

Chaves, Miguel, César Morais, and João Sedas Nunes (2009), "Os diplomados do ensino superior perante o mercado de trabalho: velhas teses catastrofistas, aquisições recentes", *Forum Sociológico*, série II, 19, pp. 83-98.

Chaves, Miguel, and César Morais (2016), "Quanto tempo para aceder ao mercado de trabalho? A inserção profissional dos diplomados do ensino superior no dealbar da recessão", *Configurações, Revista Ciências Sociais*, 17, pp. 231-251.

Choi, Youngok, and Edie Rasmussen (2009), "What qualifications and skills are important for digital librarian positions in academic libraries? A job advertisement analysis", *The Journal of Academic Librarianship*, 35 (5), pp. 457-467.

Collins, Randall (1979), *The Credential Society*, New York, Academic Press.

Decision System, Inc. (1999), *User Documentation for DSIGoM*, version 1.0.

Elias, Peter, and Kate Purcell (2004), "SOC (HE): a classification of occupations for studying the graduate labour market", *ESRU*, research paper, 6.

Feldman, Daniel C., William O. Bearden, and David M. Hardesty (2006), "Varying the content of job advertisements: the effects of message specificity", *Journal of Advertising*, 35 (1), pp. 123-141.

Figueiredo, Hugo, Ricardo Biscaia, Vera Rocha, and Pedro Teixeira (2017), "Should we start worrying? Mass higher education, skill demand and the increasingly complex landscape of young graduates' employment", *Studies in Higher Education*, 42 (8), pp. 1401-1420.

García-Aracil, Adela, and Rolf van der Velden (2008), "Competencies for young European higher education graduates: labor market mismatches and their payoffs", *Higher Education*, 55 (2), pp. 219-239.

Green, Francis, and Golo Henseke (2017), *Graduates and 'Graduate Jobs' in Europe. A Picture of Growth and Diversification*, Centre for Global Higher Education, Working Paper nº 25.

Hall, Peter A. (2018, "Varieties of capitalism in light of the euro crisis", *Journal of European Public Policy,* 25 (1), pp. 7-30.

Hollanders, Hugo, Nordine Es-Sadki, and Iris Merkelbach (2019), *European Innovation Scoreboard 2019*, Luxembourg, Publications Office of the European Union.

Holmes, Leonard (2013), "Competing perspectives on graduate employability: possession, position or process?", *Studies in Higher Education*, 38 (4), pp. 538-554.

Kennan, Mary Anne, Fletcher Cole, Patricia Willard, Concepción S. Wilson, and Linda Marion (2006), "Changing workplace demands: what job ads tell us", in *Aslib Proceedings*, Emerald Group Publishing Limited.

Kennan, Mary Anne, Patricia Willard, Dubravka Cecez-Kecmanovic, and Concepción S. Wilson, (2009), "Is knowledge and skills sought by employers: a content analysis of Australian IS early career online job advertisements", *Australasian Journal of Information Systems*, 15 (2), pp. 169-190.

Klein, Markus (2015), "The increasing unemployment gap between the low and high educated in West Germany: structural or cyclical crowding-out?", *Social Science Research*, 50, pp. 110-125.

Marques, Paulo, Fátima Suleman, and João M. Costa (2022), "Moving beyond supply-side arguments to explain over-qualification: the ability to absorb graduates in different models of capitalism", *European Journal of Education*, 57 (2), pp. 342-360.

McArthur, Ellen, Krzysztof Kubacki, Bo Pang, and Celeste Alcaraz (2017), "The employers' view of 'work-ready' graduates: a study of advertisements for marketing jobs in Australia", *Journal of Marketing Education,* 39 (2), pp. 82-93.

McGuinness, Seamus (2006). "Overeducation in the labour market", *Journal of Economic Surveys*, 20 (3), pp. 387-418.

Mok, Ka Ho, Zhuoyi Wen, and Roger Dale (2016), "Employability and mobility in the valorisation of higher education qualifications: the experiences and reflections of Chinese students and graduates", *Journal of Higher Education Policy and Management*, 38, pp. 264-281.

Mýtna Kureková, Lucia, Miroslav Beblavý, Corina Haita, and Anna-Elisabeth Thum (2016), "Employers' skill preferences across Europe: between cognitive and non-cognitive skills", *Journal of Education and Work*, 29 (6), pp. 662-687.

Napierala, Joanna, and Vladimir Kvetan (2023), "Changing job skills in a changing world", in Eleonora Bertoni, Matteo Fontana, Lorenzo Gabrielli, Serena Signorelli, and Michele Vespe (Eds.), *Handbook of Computational Social Science for Policy*, Cham, Springer International Publishing, pp. 243-259.

Rose, Jose (1984), *Enquête d'Emploi. Formation, Chômage, Emploi*, Paris, Economica.

Suleman, Fátima (2018), "The employability skills of higher education graduates: insights into conceptual frameworks and methodological options", *Higher Education*, 76 (2), pp. 263-278.

Suleman, Fátima (2021), "Revisiting the concept of employability through economic theories: contributions, limitations and policy implications", *Higher Education Quarterly*, 75 (4), pp. 548-561.

Teichler, Ulrich (2000), "Graduate employment and work in selected European countries", *European Journal of Education*, 35 (2), pp. 141-156.

Teichler, Ulrich (Ed.) (2007), *Careers of University Graduates. Views and Experiences in Comparative Perspectives*, vol. 17, New York, Springer Science & Business Media.

Thurow, Lester C. (1976), *Generating Inequality*, London, The MacMillan Press.

Tomlinson, Michael, and Valerie Anderson (2021), "Employers and graduates: the mediating role of signals and capitals", *Journal of Higher Education Policy and Management*, 43 (4), pp. 384-399.

Tomlinson, Michael, and Richard Watermeyer (2022), "When masses meet markets: credentialism and commodification in twenty-first century higher education", *Discourse: Studies in the Cultural Politics of Education*, 43 (2), pp. 173-187.

Torres, Leonor Lima (2019), "A excelência na escola e no mundo do trabalho: ideários e dinâmicas em colisão?", in Leoplodo Cabrera (coord.) *Sociología de la Educación. Desigualdad Social, Política Educativa, Experiencias Escolares y Trayectorias Juveniles de Vida, Monografies & Aproximacions*, nº 14, pp. 42-52.

Trow, Martin (1973), *Problems in the Transition from Elite to Mass Higher Education*, Berkeley, CA, Carnegie Commission on Higher Education.

Vanhercke, Dorien, Nele De Cuyper, Ellen Peeters, and Hans De Witte (2014), "Defining perceived employability: a psychological approach", *Personnel Review*, 43 (4), pp. 592-605.

Woodbury, Max A., and Jonathan Clive (1974), "Clinical pure types as a fuzzy partition", *Journal of Cybernetics,* 4 (3), pp. 111-121.

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