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Phillip Brown, Manuel Souto-Otero

Institutions: Zhengzhou University, Cardiff University

Published on: 01 Jan 2020 - Journal of Education Policy (Taylor & Francis (Routledge))

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Citation for final published version:

Brown, Phillip and Souto-Otero, Manuel 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. 10.1080/02680939.2018.1549752 file

Publishers page: <https://doi.org/10.1080/02680939.2018.1549752>
<<https://doi.org/10.1080/02680939.2018.1549752>>

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The end of the credential society? An analysis of the relationship between education and the labour market using big data.

Published in the Journal of Education Policy,
<https://doi.org/10.1080/02680939.2018.1549752>

Phillip Brown and Manuel Souto-Otero
School of Social Sciences
Cardiff University

Contact: BrownP1@cardiff.ac.uk and souto-oterom@cardiff.ac.uk

Abstract: A major focus of sociological research is on the role of the credential as a currency of opportunity, mediating the relationship between education and occupational destinations. However, the labour market has largely remained a black box in sociological and education policy studies. This article draws on big data from over 21,000,000 job adverts to explore how employers in the UK describe job requirements, with particular reference to the role of credentials. It challenges existing theories premised upon the notion that higher levels of formal education determine individual (dis)advantage in the competition for jobs. Although they have different views of the relationship between credentials, opportunity and efficiency, these theories assume that credentials largely determine occupational hiring. Our analysis suggests that formal academic credentials play a relatively minor differentiating role in the UK labour market, as the majority of employers place greater emphasis on 'job readiness'. This raises a number of issues for sociological and policy analysis, including the future role of credentials in the (re)production of educational and labour market inequalities. Methodologically, the article highlights how the use of big data can contribute to the analysis of education, skills and the labour market.

1. Introduction

The main focus of this article is on the role of the credential, or academic qualifications, as a 'currency of opportunity' mediating the relationship between education and occupational destinations. In the academic literature, three theories have dominated the debate in this area: 'liberal' or technical-function theories, queue theory and social closure theory. A key conceptual distinction in these theories refers to the role of formal education credentials in 'certifying' and 'signalling'. In the case of certification, 'an educational qualification may serve to certify that an individual has acquired certain specific forms of knowledge, expertise or skill' (Jackson, Goldthorpe, and Mills 2005, 11). In some occupations, such as general practitioners in the National Health Service, formal certification has the status of a legal requirement, and in other occupations certification through educational qualifications is an essential requirement. In relation to signalling, credentials are seen to signal the possession of certain attributes that are difficult to observe at the time of recruitment but are viewed as relevant for an individual's productive capacity. Technical-function theories emphasise the 'certifying' role of credentials, whereas queue theory and social closure emphasise their 'signalling' role, although in relation to different 'referents', as explained below. The three theories exhibit fundamental differences with regards to their assessment of the fairness and efficiency derived from the use of credentials in recruitment, a point that we develop below, but they agree on the centrality of the role of credentials in the allocation of people to jobs.

Recent sociological research has underlined the importance of looking at the ways in which employers make their hiring decisions in order to better understand how and why societies allocate occupational positions (Protsch and Solga 2015; Di Stasio 2014; Brown, Lauder and Ashton 2011; Jackson 2007). While much research on the relation between education and work has focussed on the analysis of supply (Di Stasio 2014), as Jackson, Goldthorpe, and Mills (2005) underline, it is not teachers and university lectures, but employers who define job requirements and make hiring decisions. We contribute to the debate by providing an analysis of employers' descriptions of job requirements as expressed in over 21 million job adverts in the UK. In so doing, we challenge the overwhelming focus of the literature on entry-level positions, which present a particular view of the labour market because credentials are likely to be of greater importance at that level. This is the first attempt, from a sociological perspective, to use big data to examine the role of credentials as part of an analysis of the attributes specified by employers during recruitment processes. This offers a new way to explore theories on the relationship between credentials and the labour market. The analysis gives little support to technical-function theories and also challenges the foundations of the labour queue approach, based on the role of credentials as a proxy for individual 'trainability'. But the analysis also underlines that credentials are not simply a tool for exclusion. Instead, we find that employers consider a wide range of factors in the recruitment process, with credentials having lost part of their screening function in the UK context. Credentials can still have an important role in recruitment, but as the returns to education and over-qualification

literatures suggest, they seem to have become a 'defensive tool' in the labour market – a *conditio sine qua non* – rather than be a differentiating factor for the majority of jobs, in a context of educational expansion. Instead of conceiving 'merit' in terms of educational credentials as presented in technical-function theory, the data presented in this article suggest that employers view their selection decisions as being 'merited' by virtue of a candidate being perceived to be 'job ready'. Institutional characteristics such as loose connections between education and careers, weak vocational training system or little involvement of employer representatives in curriculum design in the UK context may help to explain these findings.

2. The relationship between credentials and jobs

Technical-function accounts associated with the 'liberal' theory of social mobility (Erikson and Goldthorpe 1992) predict an increasingly 'meritocratic' society that affords a central role for credentials, as schools, colleges and universities, become the arbiter of class stratification (Bell 1973; Kerr et al. 1973). Under these accounts, employers are expected to make recruitment decisions, increasingly, based on credential performance in formal education which is believed to reflect individual differences in innate ability and hard work (Young 1958).

As societies become more technologically advanced, the demand for technical and professional workers increases and these workers are expected to have high levels of achievement in formal education, which certify their knowledge, skills and competences. The strengthening of the relationship between credentials and occupational destinations is thus central to the idea of increasing 'merit selection' (Jackson 2007). Other traits not associated with merit-based achievements, such as social confidence or family connections, are assumed to become less important over time. On the whole, this amounts to a view of recruitment as 'academic merit-selection' (AMS).

Growing evidence of credential inflation (Van de Werforst and Andersen 2005) and over-qualification (Dolton and Vignoles 2000; McGuinness 2006; Sichertman 1991), suggests that employers may include additional qualification requirements when they perceive an increasing supply of qualified candidates. This, per se, does not undermine the academic merit-selection view if it can be shown that employers are rising entry requirements to get access to more productive workers, even if they are not able to use their knowledge and skills on entering the firm. However, a well-established body of sociological research has challenged various aspects of the academic merit selection hypothesis, especially the claim that societies become more meritocratic and socially mobile over time (Souto-Otero 2010; Breen and Goldthorpe 2001; Lipset and Bendix 1991; Goldthorpe 1980; Collins 1979).

Evidence showing that the relationship between academic attainment and occupational destinations did not increase substantially in the second half of the twentieth century (Breen 2004; Breen and Luijkx 2004), also challenges the theoretical foundations of technical-function theory. Social class destinations are becoming less closely linked to individuals' educational attainment. Goldthorpe

(2014) refers to increasing availability of credentials, and other characteristics of applicants, such as their social backgrounds and familiarity with certain lifestyles, activities and networks to explain this disjunction. By contrast to our work, he offers little reference to the way employers may be (re)defining their job requirements in specific ways that require candidates to be job ready.

A different understanding of the role of the credential is offered by signalling theory (Arrow 1973; Spence 1973) and the related idea of a 'labour queue' (Thurow 1975). Rather than viewing education as directly contributing to the productivity of job applicants on entry to the labour market – certified through academic qualifications – signalling theorists view credentials as signals for future productivity and learning potential. Employers recruit in a context of uncertainty about applicants' characteristics and productivity. A higher education qualification provides employers with information about the likely value of candidates as it signals an individual's potential to enter professional or managerial occupations, and occupy a privileged position in the 'labour queue' in the competition for jobs and income on the labour market (Thurow, 1975).

'Queue theory', or labour queue theory, as we use these two denominations interchangeably, argues that candidates rate fields of work and jobs within those (job queues) and employers rank candidates (labour queue) hierarchically, based on their desirability. The interaction between both queues determines recruitment: 'As a result, the best jobs go to the most preferred workers, and less attractive jobs go to workers lower in the job queue; bottom ranked workers may go jobless, and the worst jobs may be left unfilled' (Thurow 1972, 73).

In its original conception, queue theory does not, per se, imply that formal education alone is the fundamental aspect when constructing a labour queue. However, education is seen as a crucial background characteristic: 'since this is one of the few types of background characteristics that is controlled by the individual' (Thurow 1975, 183). In explaining the labour queue Thurow rejects the idea that individuals acquire relevant skills before they enter the labour market as these are only acquired from employment through on-the-job training: 'Thus, the labor market is not primarily a bidding market for selling existing skills but a training market where training slots must be allocated to different workers' (Thurow 1975, 76; Goldthorpe 2014). Therefore, the labour queue is shaped by relative differences in background characteristics of which education is key because employers prefer to hire the most trainable candidates. Given this: 'as the supply of more highly educated labor increases, individuals find that they must improve their own educational qualifications simply to defend their current income position. If they do not go to college, others will, and they will not find their current job open to them' (Thurow 1975, 96; Brown 2013).

Recently, a range of works have drawn on queue theory making explicit reference to the use that employers make of credentials as a basis in their hiring decisions in various national contexts (see for example Breen, Hannan, and O'Leary 1995; Di Stasio 2014). Recent work examining 'queue theory' has focused heavily on achievement in formal education: in other words, it has focused on what we will call

‘academic queue theory’ (AQT). Under this interpretation of queue theory ‘people with high educational levels are always preferred to persons with lower levels, even if the job does not require that particular level of schooling’ (Van de Werfhorst 2011, 532). In AQT, credentials are seen to play a central role in applicants’ ranking. ‘Since educational attainment can be regarded as reflecting both trainability and discipline, it will tend to be the indicator that is given most weight for most types of jobs’ even though other characteristics, such as age, sex and lifestyle ‘may all play a part’ (Goldthorpe 2014, 276).

AQT acknowledges the importance of the level and vocational specificity of credentials in the recruitment process. However, its main argument revolves around the importance of trainability as signalled by the level of educational achievement, creating a hierarchy of academic worth (Di Stasio 2014, 796). Queuing theory ‘predicts that hiring decisions are a function of expected training costs: observable characteristics (such as education) signal learning potential and willingness to acquire new skills, and are used by employers as filters to identify easy-to-train applicants’ (Di Stasio 2014, 798). People can therefore improve their positions in the queue through educational investments (Gross, Meyer, and Hadjar 2016), as individuals are distributed across job opportunities based on their relative position in the queue (Brauns et al. 1999, 4).

As such, the hypotheses analysed in AQT studies tend to focus on whether the ‘level of general education reached and vocational specificity of the degree earned make a difference for one’s chances of being offered a job’ (Ibid.). This is often examined without much reference to other skills-related aspects. Brauns et al. (1999, 6) find support (although to somewhat different degrees) for the academic ‘queue’ hypothesis in Germany, Britain and France. In a vignette study of 59 employers in the ICT sector in Italy, Di Stasio also found that employers attach importance to fine-grained indicators of school performance, such as grades and study duration, but attach little value to internship experience within their own company when assessing a candidates’ trainability (Di Stasio 2014, 796; Breen, Hannan, and O’Leary 1995). Di Stasio notes (2014, 796) that this conforms to a ‘queuing’ theory of the labour market, where labour market outcomes are merited on a hierarchy of academic worth.

A similar vignette study of 34 employers in the ICT sector in England by Di Stasio and van de Werfhorst concluded that queue theory also applies to the English case: ‘English employers primarily sort applicants based on relative signals of merit such as grades, in line with queuing theory’ (Di Stasio and van de Werfhorst 2016, 77). According to this study English employers avoid indicators of occupation-specific knowledge such as fields of study and regard education as a signal of willingness to learn. It has also been suggested that employers will take account of an individual’s academic performance even where credentials are not required to perform the job to an adequate standard, as employers may think that they are getting ‘something for nothing’, or in order to recruit overqualified employees with the potential to progress within the company (Keep and Mayhew 2004).

Given this focus on educational attainment the importance of on-the-job and

informal learning presented in the original version of queue theory, often disappears from the analysis. In this new context it remains unclear why employers, in calculating potential training costs, prioritise indicators of trainability over indicators of performance, or the actual possession of skills. It should be underlined that AQT does not argue that the academic queue is formed through an open and fair competition. There is recognition that the screening of candidates is not meritocratic because of inequalities in educational opportunities and the preferences of employers, and several studies have made use of this theory to explore discrimination, for example looking at how gender or race influence the construction of labour queues (Reskin and Roos 1990; Kaufman 2002) or discrimination operates in the 'credential society' (Gaddis 2014). Thus, in technical-function accounts performance in education is seen to reflect merit (translated into labour market advantage), whereas academic 'queue' theory permits a view of educational performance and recruitment as being non-meritocratic or 'unfair' as they are shaped by class, gender and race, amongst other factors. However, AQT, like technical-function accounts, sees credentials as playing a key role in the job market because of their relation to productivity – not because credentials can be directly associated with skills that result in higher productivity, but through an indirect relationship, mediated by trainability.

Social closure theories, grounded on Weber's insights (Weber 1978), emphasise the role of credentials not as direct or indirect enhancers of productivity, but as signals of the achievement of particular 'status cultures' (Collins 1971) and means for inclusion and exclusion into specific occupations. The teaching of those cultures is seen as the primary activity of the education system: 'educational requirements for employment can serve both to select new members for elite positions who share the elite culture and, at a lower level of education, to hire lower and middle employees who have acquired a general respect for these elite values and styles' (Collins 1971, 1011). Berg, in his classic study of education and jobs, described the growing use of credentials in 1960's America as the 'great training robbery'. He was interested in whether academic qualifications were important for doing 'the job' or just for 'getting the job'. He argued that 'Educational credentials have become the new property in America. Our nation, which has attempted to make the transmission of real and personal property difficult, has contrived to replace it with an inheritable set of values concerning degrees and diplomas which will most certainly reinforce the formidable class barriers that remain, even without the right within families to pass benefices from parents to their children.' (Berg 1970, 185). This view was elaborated in the work of Bourdieu who describes credentials as the embodiment of cultural capital (Bourdieu and Passeron 1977).

Bourdieu's theory of cultural reproduction describes a process of intensification in the use of the education system as a tool to perpetuate the economic privilege of the upper classes in modern times. Increases in importance of formal criteria (formal qualifications) in recruitment into business management positions ensured and legitimised class reproduction following a transformation of the structure of the economic field, from small family firms to bureaucratic enterprises, as the preeminent sites for the appropriation of profit. Such qualifications signalled technical competence and intellectual dispositions as well as social competences to

run businesses. As a result: ‘the growing weight of academic qualifications in the recruitment criteria for managers tends to make them the principal mediators between the social classes and economic institutions’ (Bourdieu and Boltanski 1978, 202). This process is seen as both unfair, as social background rather than competence determines progress in education and employment, and inefficient, as what is valued from education, beyond a certain knowledge, are dispositions that are ‘not directly the object of instruction’, rather than productive capacities. Top credentials from reputable higher education institutions are an ‘index’ of characteristics required of directors of large firms, ‘in order to occupy positions of power in the structure of business as did the possession of title deeds in earlier phases of the system’ (Bourdieu and Boltanski 1978, 200).

How the relationship between credentials and labour market outcomes is theorised in these different accounts is summarised in Table 1. For technical-function accounts, the results of the recruitment process are fair, because they are ‘merited’: the hierarchy of academic worth certifies differences in skills. Decisions based on credential performance are, thus, efficient in an economic sense because they place the most productive individuals at the top of the hierarchy of jobs.

Table 1: Fairness and efficiency in the relationship between credentials and employment

	Fairness	Efficiency
Technical-functional account	Yes	Yes
Signalling and queue theory	No	Yes
Social Closure	No	No

AQT does not view the competition for credentials as based on a fair and open contest but presupposes an increasing role for education in recruitment and that the results of educational competition create a labour queue which is ‘merited’ by differential ‘trainability’, with the more qualified candidates being likely to become productive more quickly. Social closure theory questions the use of academic credentials for recruitment, in terms of its fairness, and efficiency. In spite of these differences, all three theories assume that credentials play an important role in the recruitment process, although the credential may be viewed to signal different things, such as productive skills, trainability, or cultural capital.

3. Real-time labour market analytics: the strengths and limitations of ‘big data’

Previous studies on the role of credentials in the recruitment process have been hampered by methodological constraints due to a lack of quantitative data on employer recruitment practices. While there is an established tradition of employer surveys that explore perceptions of changing occupational demands for broad

categories of workers (Nickson et al. 2012; Wilson 2010), and such surveys serve as a useful source of labour market data, they inevitably represent an employer 'wish list' at an aggregate level, with reference to generic notions of company 'needs' rather than actual job opportunities. Other studies tend to focus exclusively on qualification requirements (Dörfler and Van de Werfhorst 2009; Sacchi, Salvisberg, and Buchmann 2005) and lack information on the skills that companies demand in relation to actual vacancies. A number of qualitative studies are highly suggestive but not designed to draw general conclusions. Recently, experimental (Protsch and Solga 2015) and vignette studies (Di Stasio 2014; Di Stasio and van de Werfhorst 2016) have also been used with relatively small samples of employers.¹

While these represent significant advances, our study is the first sociological analysis to draw on real-time labour analytics – 'big data' gathered on the Internet and classified within days from being posted- and responds to calls for innovation in the methods that sociologists use (Burrows and Savage 2014). We explore the UK context by making use of data from over 21 million job adverts from Burning Glass, Labour Insight (LI).² While the use of big data available from the Internet is not without its pitfalls (Giardullo 2016; Tinati et al. 2014), including loss of control in data collection by the researcher compared to current mainstream methodologies and in the replicability of results as a consequence of the continuing evolution and modification of the rules and algorithms used to classify big data (Souto-Otero and Beneito-Montagut 2016), this large sample allows us to conduct a granular analysis of a much higher number of job adverts and job requirements than previous research.

The UK is a perfect candidate for strong signalling value of education along the lines of queue theory, given its institutional characteristics (Van de Werfhorst 2011). Employer requirements, as expressed in job postings, are a source of information about how employers 'construct' descriptions of the 'ideal' candidate given the make-up of the labour markets within which they operate, rather than simply a source of information on the actual jobs being advertised. We also note that adverts are used to brand organisations as 'employer of choice', and this may be reflected in their content. While employer requirements in job adverts are not gender or race neutral, we leave an analysis focussing on these dimensions as a matter for further research for reasons of space.

We are interested in what the job descriptions of UK employers reveal about the relationship between education, credentials and the labour market. The expectation from AMS, AQT and social closure theories is that credentials are a key differentiating factor in hiring decisions, albeit for different reasons, and that qualification requirements increase as one moves up the occupational structure. An alternative expectation, derived from studies of graduate employability is that employers make extensive use of social qualifications, specific skills, and personal characteristics as they reflect job readiness. Given the complexities of the labour market, these expectations may be more or less applicable depending on the nature of the specific job that is analysed. Our analysis is mainly restricted to the level of major occupational groups, but is not limited to what are often defined as 'graduate jobs' or entry-level jobs, which have tended to dominate the literature. The analysis

is based on job adverts posted online, and does not include other common stages in the recruitment process, such as CV examination or interviewing, and the factors considered important at these different stages of the recruitment process may vary. However, job adverts are key in that they provide the first filter in the allocation of people to jobs. Through this filter, the number of candidates is narrowed down more drastically than in any subsequent phase: from the pool of job-seekers available to a much smaller pool of applicants which will respond positively to the way potential employers frame job requirements and target potential hires.

This study of online job postings draws on Burning Glass's 'Labour Insight' (LI) for the UK, which web crawl approximately 10,000 employer sites per day, including job boards, staffing agencies and online media. LI uses a web crawling technique that employs computer programmes to browse websites and text parsing each job advert into pre-coded data families. All the free text in the online advert is machine read. The information about each job advert analysed is included in the LI database within a few days from the posting appearing. Labour Insight builds on Statistical Natural Language Processing (a field of computational linguistics and artificial intelligence that uses statistical methods to enable computers to derive meaning from human language (Hristea 2011)), to mine the text of each job posting and collects more than 70 data fields (including level of qualification required, location, industry, level of experience, skills required). In the construction of the different categories employed in the analysis -see Annex- we relied on the sub-fields defined in the Labour Insights database and previous literature (Jackson 2007; Gutman and Schoon 2013). While more comprehensive than job adverts datasets used previously in the literature, the dataset did not contain information on all possible personal characteristics that may be required in job adverts. As such, some attributes which can be present in some adverts, such as politeness, empathy or ethical values are not included in the analysis.

While the coverage of LI is not universal for UK vacancies, the article makes use of a vast amount of data. We use data for 21,226,995 job adverts posted online between January 2012 and December 2014. We are unable to analyse changes over time given a lack of time-series in the data accessed. Carnevale, Jayasundera, and Repnikov (2014) estimate, making use of USA data, that around 60–70 per cent of the total number of job vacancies are captured in online job postings – higher for vacancies requiring a Bachelor Degree or above, and lower for vacancies with lower education requirements. Burning Glass report that their coverage of USA online adverts is in the region of 90 per cent (Burning Glass 2015). An analysis conducted at Harvard University to compare the LI USA database and the Bureau of Labor Statistics' Job Openings and Labor Turnover Survey (JOLTS), suggests that approximately two-thirds of jobs identified through the BLS survey can be matched to LI records (Burning Glass 2015). The protocols used by Burning Glass are broadly similar in the USA and the UK.

Our analysis shows that LI data on job vacancies are generally comparable to the UK labour market structure (around 26 million employees) during the period analysed (the Pearson correlation coefficient between both is close to 0.89), although there is an over-representation of professional and associate professional occupations, and

under-representation of those occupations at the lower end of the occupational structure (see [Table 2](#)). A greater number of ‘higher value’ jobs are advertised online, and lower skilled jobs are proportionally more likely to be advertised ‘by word of mouth’, as online advertising is not worth the cost for small companies such as restaurants and retail businesses, given the low wages and high turnover of staff (Rothwell 2013). It is also to be expected that job vacancies and labour demand will not correspond perfectly, as some occupational groups may have higher turnover or growth rates than others. LI contains data on the full range of occupations with less than 0.5% of adverts missing SOC code data.

In the USA, LI data is estimated to have an 86 per cent rate of accuracy in the coding of adverts for all fields studied (Burning Glass 2015). While, again, no similar studies are available for the UK, on the whole our inspection of the LI coding of job adverts across a sample of occupations suggested a satisfactory coding of the data for the purposes of our analysis. Inevitably with automated real-time labour market data, we encountered a small number of inaccuracies in coding during our use and testing of the data relating to educational levels and job codes, but the nature of these did not suggest strong shortcomings in the data. Nevertheless, LI includes millions of rules, and the existence of systematic errors in some categorisations cannot be ruled out, so the results should be treated with some caution.

Table 2: UK labour force and Labour Insight (LI) vacancies data, percentage by SOC code (Jan.2012-Dec.2014)

SOC (2010)	ONS(1)	LI	Difference
Managers, directors and senior officials	9.15	10.12	+0.97
Professional occupations	20.21	31.66	+11.45
Associate professional & technical	13.79	22.09	+8.3
Administrative & secretarial	12.12	9.57	-2.55
Skilled trades	8.01	6.60	-1.41
Caring, leisure & other services	9.63	4.38	-5.25
Sales & customer services	9.00	6.67	-2.33
Process, plant & machine operatives	6.11	4.25	-1.86
Elementary occupations	11.78	4.65	-7.13

Figures are obtained adding up the twelve 3-month averages for each SOC code and all employees provided by ONS for the 36 months period covered. The figures remain virtually unchanged when using averages for individual periods of 3 months, provided by ONS. Data are not seasonally adjusted. Source: ONS Labour Market Statistics

4. Findings

This section examines technical-function, academic queue and social closure theories' expectations that (A) academic credentials are a crucial factor in hiring decisions because they certify skills, signal trainability or signal specifically valued dispositions, and that (B) minimum qualification requirements increase as one moves up the occupational structure. Our findings show that academic credentials are not the key factor that employers highlight in the advertisement phase of the recruitment process and that social skills, specific skills and personal characteristics – rather than academic qualifications – are more central in this process. We conjecture that this is the case because these aspects signal job readiness to employers.

4.1 (A) merit selection and trainability: the importance of credentials in UK job postings

We begin by analysing the use of academic credentials in job adverts, looking at the proportion of adverts that stipulate a minimum qualification requirement. The results are surprising as only 18 per cent of jobs specify a qualification requirement (see [Figure 1](#)).⁴ This is in stark contrast to Dörfler and van de Werfhorst's (2009) Austrian sample that found 66 per cent of adverts requiring some form of educational qualification, and is also 8 percentage points (or around 30%) lower than the 26 per cent reported by Jackson (2007).⁵ It could be argued that the difference with 'Germanic' systems could be expected, given their emphasis on specific skills and qualifications (Brockmann, Clarke, and Winch 2011). It may also signal that when there is a relatively small proportion of an age cohort entering the labour market with graduate credentials, such credentials offer employers a useful signalling device in recruiting to middle and upper echelons of corporate bureaucracies, yet as numbers in HE expand, formal qualifications lose part of their informational value to employers and play a less prominent role in shaping the outcome of the recruitment process (Jackson, Goldthorpe, and Mills 2005; Brown and Hesketh 2004), notwithstanding evidence to suggest that qualifications awarded by elite institutions may continue to offer a positional advantage for some posts (Brown, Lauder, and Ashton 2011).

These findings should be interpreted with caution.⁶ Specific qualification requirements may be used as an initial filter in the selection/elimination process, even if not listed in advertised job requirements. In some professions certification requirements may be well known and thus assumed rather than made explicit. There may also be greater use of academic qualifications in entry-level jobs as other jobs may focus more on relevant experience. Notwithstanding these caveats, the above

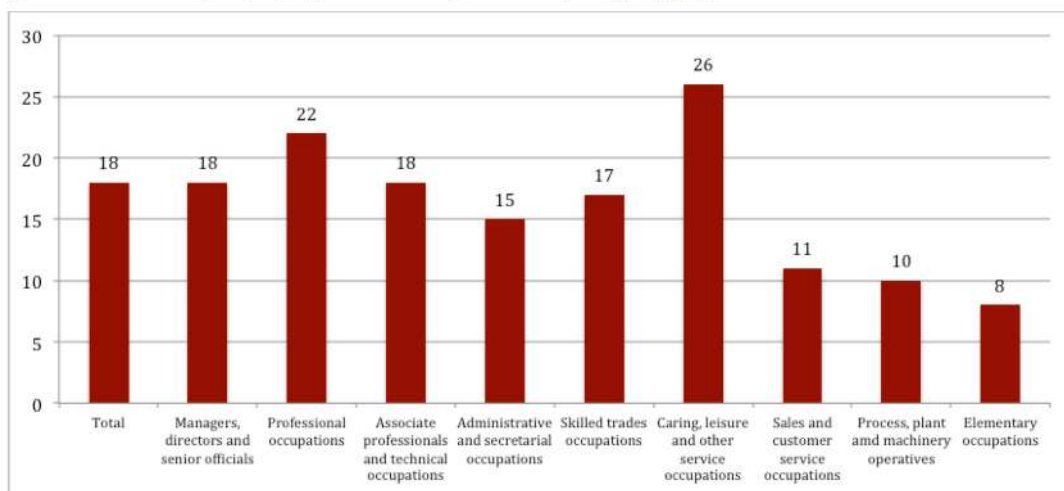
¹ The best represented job openings in our sample were business, administration and management (10% of records), followed by electrical and electronic engineering technologists/ technicians (9%).

figures offer little support to technical-function, academic queue or social closure theories' claims that employer value qualifications as certifying skills or signal 'trainability' and dispositions. If credentials are an indicator of these aspects within a context of labour market competition, they currently appear to have little differentiating value for employers, who put greater emphasis on other characteristics.

4.2 (B) qualification requirements and the occupational structure

On the issue of qualifications and job complexity there is no direct relationship between the status of occupations and the requirement of an academic qualification (Figure 1). Again, the proportion of job opening specifying formal qualification requirements for professional and managerial occupations are lower than reported by Jackson (2007). She found approximately 70 per cent of job adverts associated with higher managerial and professional, and 40 per cent for lower managerial and professional, specified a qualification requirement, albeit based on a small sample of job adverts.⁷ Figure 1 shows that in our data 18 per cent of job adverts associated with managers, directors and senior officials, 22 per cent of those associated with professional occupations, and 18 per cent of the adverts related to associate professionals, specify a qualification requirement, dramatically lower than Jackson's findings. This may be related partly to Jackson's inclusion of what she calls 'other qualifications' such as 'strong medical background', 'good academic record' or professional qualifications, whereas we focus more strongly on specific formal academic qualifications, the main focus of the theories considered here. This finding adds to evidence that in Anglophone countries there is a loose link between qualifications and the occupations linked with those qualifications, both in the case of higher education and vocational training (Wheelahan and Moodie 2017).

Figure 1: Job adverts specifying a qualification requirement by SOC group (%)



Source: Burning Glass Labour Insights. N= 3,799,959. (18% of the records).

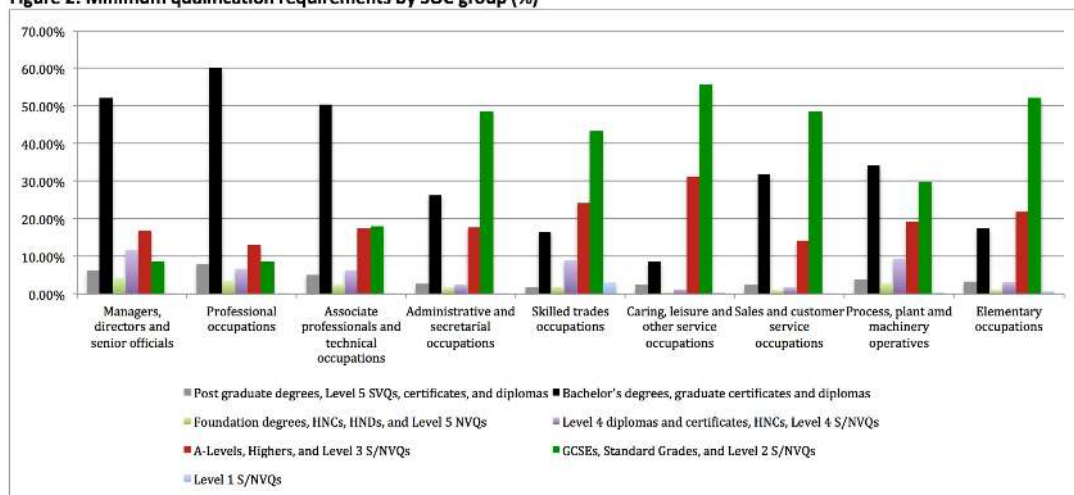
Figure 2 shows the level of qualification requirements by occupational group. It presents further evidence of the equivocal role of qualifications in occupational selection. It suggests that many employers do not present credentials as a differentiating factor in the competition for occupational roles. Where qualification

requirements are specified, higher status jobs are more likely to require a degree than other occupations. But Figure 2 also reveals exceptions to that pattern, such as professional occupations requiring higher qualifications than managerial occupations – which are closer to the requirements of associate professionals. The hierarchy of levels of qualifications required does not correspond to occupational hierarchies. Foundation degrees are required less often than level 4 diplomas and those less than often than A-levels across occupations, including those at the top of the hierarchy.

For less knowledge-based occupations there is also great variation of academic requirements, including significant demand for graduates in sales and customer services and operative occupations, but not in skilled trades and caring and leisure/service occupations. Diversity therefore exists between occupations at different levels in the occupational hierarchy, but also between occupations at similar levels in this hierarchy. The resulting picture is much more diverse than advanced by AMS and AQT. The figure could look more in line with social closure theories, in the sense that top occupations require higher education qualifications much more often than others, but this is only based on a reduced number of job adverts which specify qualification requirements, while the vast majority do not.

It should be noted, for clarification purposes, that those job openings asking for graduate level qualifications in lower occupational groups represent a relatively low share of the overall adverts in this category. In elementary occupations, for example, 92 per cent of the records are excluded because they do not ask for any kind of qualification. So the requirement for a degree or above in 17.5 per cent of the adverts for which a qualification requirement is stated is equivalent to less than 2 per cent of the total postings for that group.

Figure 2: Minimum qualification requirements by SOC group (%)

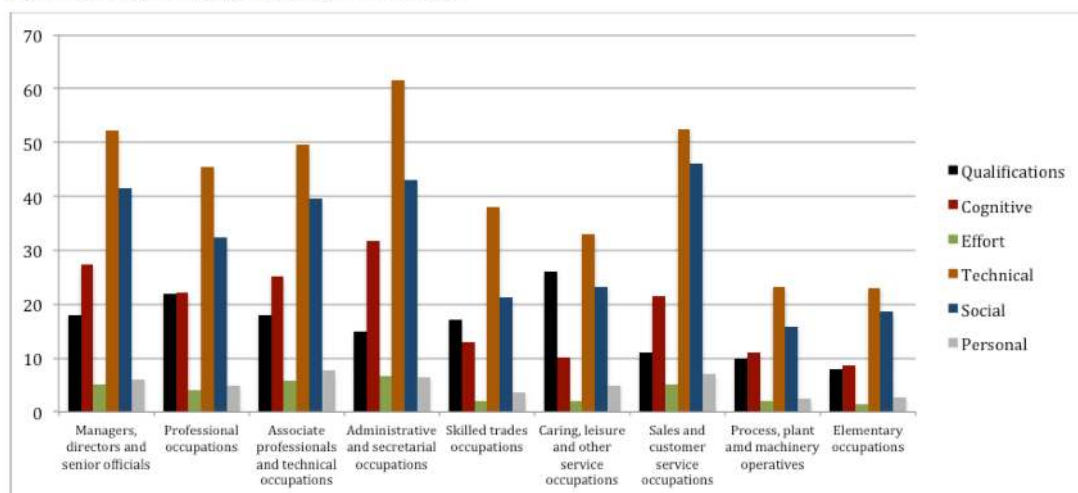


Source: Burning Glass Labour Insight. N= 3,799,959.

4.3 Beyond formal academic credentials: the nature and specificity of employer requirements

The above analysis raises fundamental questions regarding academic attainment and its role in labour market outcomes. When education and the labour market are recognised as distinct fields the conceptualisation of credentials as a proxy for merit selection is shown to be misleading. When we look beyond formal academic credentials, we find that employers look for a wider range of technical and social skills in defining job profiles, with an emphasis on performance within short time horizons, rather than assume that qualifications already equal the skills they need or focus on notions of ‘trainability’. Figure 3 shows the requirements expressed in job postings by SOC code, looking at qualifications, cognitive skills, effort, technical, social and personal skills. For most occupational groups, cognitive, social and above all technical skills, are indeed more frequently demanded than qualifications. The emphasis on these skills is important as it points to the detailed specification of technical requirements, for instance in terms of the ability to use certain software programmes, not captured by formal qualifications. Personal characteristics – being articulate, energetic, a quick learner, a self-starter or having certain physical abilities – play a limited role across occupations. These findings also suggest greater importance of cognitive skills and much less importance attached to ‘effort’ in the labour market than found in a previous study of job adverts in the UK by Jackson (2007).

Figure 3: Job advert requirements by SOC code (%).

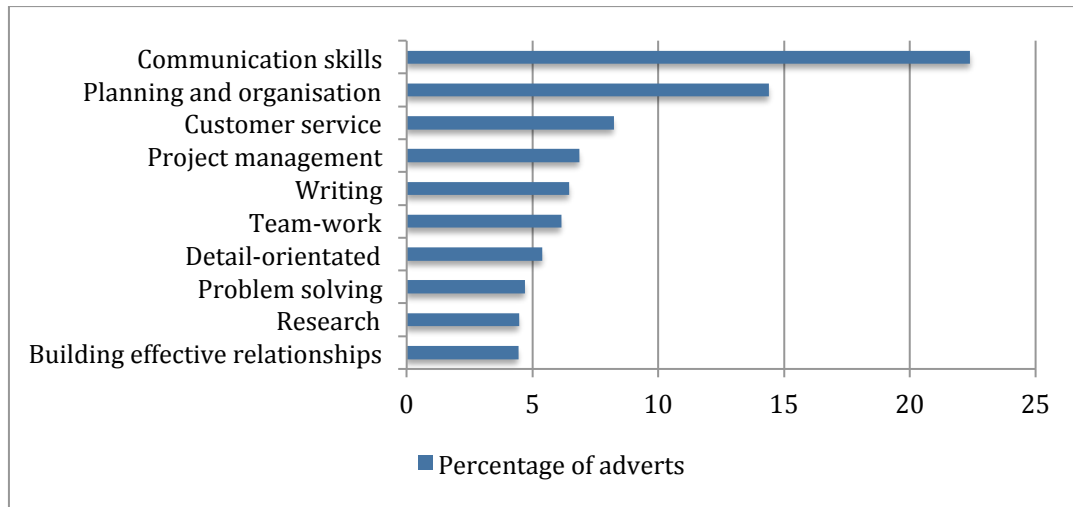


Source: Burning Glass Labour Insight. N= 21,185,278.

To develop our understanding of employer demands we analysed data from 18,967,237 adverts that contained information about skills requirements. A large proportion of the adverts in the LI database ask for generic skills, alongside technical requirements. Figure 4 shows that only two generic – or transversal – skills are mentioned in over 10 per cent of adverts. Skills such as ‘problem-solving’ and ‘being a self-starter’ are mentioned in less than 1 in 20 adverts. In total 14,621 types of skills and competences in specific domains, tasks and sometimes specific software or modes of working are identified in the 2012 LI database. This granular analysis

further emphasises the extremely complex spectrum of skills employers ask for, which helps to explain why credentials are not viewed as an accurate single proxy of future occupational performance.

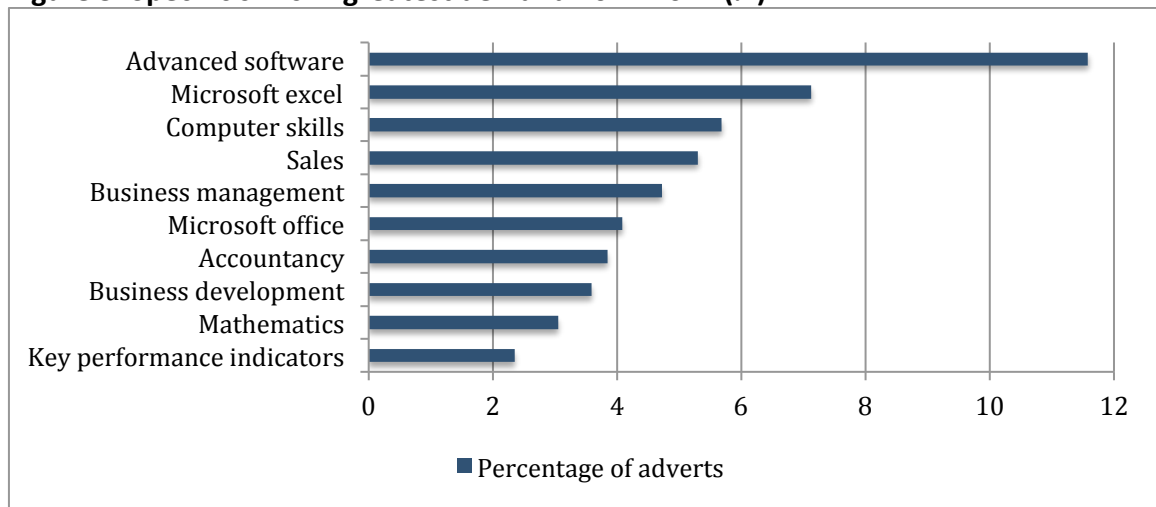
Figure 4: Generic skills in greatest demand 2012-2014 (%).



Source: Burning Glass Labour Insight. N= 18,967,237.

The AMS and AQT models assume a career trajectory where merit is revealed over time, initially through the education system and then within employment. But the high level of specification in job advertisements can be read as an attempt to attract and identify candidates who can hit the ground running, rather than signalling generic potential for productive contributions that need to be nurtured through extended training. Figure 5 shows that, among specific skills, only computer-related skills and sales skills were found in more than 5 per cent of job adverts.

Figure 5: Specific skills in greatest demand 2012-2014 (%)



Source: Burning Glass Labour Insights. N= 18,967,237

Digital skills were found to be required across a wide range of occupations, well beyond those typically designated as STEM. This points to a ‘hybridisation’ in skill requirements with typical STEM occupations asking for social skills and non-STEM

occupations asking for computer-related digital skills, for example in terms of generic (Word, Excel) or more specific software packages (Sage, SAP, etc.). Amongst the occupations requiring, for instance, Excel skills are a wide range of sales professionals, customer service occupations and personal assistants. Therefore, job readiness applies to social skills but also to detailed technical requirements, including for non-STEM occupations. This points to 'merit' by virtue of being job-ready rather than being trainable.

5. What is 'merited' in the relationship between education and employment?

Michael Young originally defined meritocracy as: IQ + effort determine educational and this labour market success. This raises the question of IQ and effort in relation to what? Gardner (2008) proposes the existence of multiple intelligences, some of which are more closely related to academic achievement than others. Effort can be displayed on a range of aspects, even within an educational context: core content and broader learning, tests and marks or extra-curricular activities, to name a few. Academic queue and social closure theories, in particular, argue that the IQ and Effort that count in the labour market are those that relate to the achievement of formal educational qualifications because these characteristics are considered to signal trainability, as in AQT, or certain dispositions, as in social closure theory.

Such accounts are suspect in ignoring new pressures for short-term and continuing results in neo-liberal capitalist markets, such as that of the UK, as well as changes in production processes and labour relations that erode long-term employee-employer ties (Friedman 2014). Employers' expectations have changed since the 1970s when Thurow, Bourdieu and others, were analysing the labour market: few people had then graduate qualifications and occupational careers were more stable and long-term (Cappelli 2012).

An alternative conceptualisation of the role of credentials in today's labour market is related to the notion of merit as 'market performance'. This is an important change in emphasis resulting in a different basis for recruitment. It underlines that employers will often prioritise candidates who are perceived to offer a satisfactory level of performance and fit in the short-term over trainable candidates who can offer potentially high performance over the long-term. This is largely overlooked by technical-function accounts' emphasis on academic knowledge and skills, by AQT's emphasis on trainability (and training slots), and by social closure's strong emphasis on cultural dispositions.

The focus on job-readiness reflects a shift in training costs from employers to candidates prior to entry in the company, given the short-term horizons in the production of value for the company ('plug and play'). While all employees will require some training investment to perform satisfactorily in a new job, the volume of that investment matters to employers. In this context, candidates are expected to 'hit the ground running' with minimal cost to the employer, and the credential loses much of its signalling value because 'job readiness' extends far beyond the

examination hall, requiring job seekers to demonstrate both specific and generic, hard and soft skills. This is consistent with reported substantial cuts to investment in the training of workers in Britain since the 1990s, and a striking reduction in the volume of training per worker: “it is fair to state that the volume of training per worker has been approximately halved since 1997” (Green et al. 2013:27). Candidates are expected to present a ‘narrative of employability’ (Brown and Hesketh 2004; Souto-Otero 2016), which capitalises on cultural background, extra-curricular activities, social networks, and other life experiences that demonstrates a good ‘fit’ with colleagues and the organizations’ ethos.

While all three theories acknowledge that the competition for jobs is positional, the shifting focus on job readiness in the notion of merit as market performance points to the ‘contingent’ realities of individual employability in today’s labour market. The position of the same individual in a ‘queue’ is likely to change depending on a) the character of the supply, as employers adapt to labour market conditions and modify job requirements based on the characteristics of available labour (Thurow 1975; Modestino, Shoag, and Ballance 2015) and b) changes in the occupational structure or changes in job definition as companies introduce new technologies or firms update their competition strategies (Sung and Ashton 2015; Grugulis 2007).

In a context of mass higher education the appropriate certified knowledge is often taken as a necessary but insufficient condition in an assessment of job readiness. This has become more important because of the issue of how companies recruit within a context of social congestion: the problem of having to select from a number of candidates who could all do the job (Brown 2013; Bills 2016). Faced with this situation, employers may adjust entry hurdles depending on how they view labour market conditions. When there is an over-riding focus on differences in the level or prestige of educational credentials evident in the theories discussed above, today’s ‘contingent employability’ is largely ignored.

6. Conclusion: merit and credentials in today’s labour market

This article explores the role of credentials in shaping social stratification through their role in recruitment processes. There has been a tendency in the literature to treat the labour market as a ‘black box’. Through the use of ‘big data’, based on a unique dataset of over 21 million job adverts in the UK, we have given the labour market a central role in our analysis. This highlights how ‘big data’ can contribute to the production of new insights based on a richer and more granular understanding of employer job descriptions than previous research.

Our findings challenge dominant theories of the relationship between education and the labour market, for failing to account for changes in the background character of labour supply and changes in what employers demand from those they hire. The three theories analysed place considerable emphasis on the importance of the credential as a differentiating factor in the recruitment process. However, our analysis suggests that the majority of employers place greater emphasis on ‘job readiness’. Less than one in five job postings in our sample specified a minimum educational requirement. Formal education credentials are an imperfect proxy for

relevant work skills such as trainability and dispositions, at least in the UK context. Employers can use a range of other signifiers (such as work experience, job histories, behavioural competences, etc.) to inform and legitimate their hiring decisions. This is largely overlooked by technical- function theories given their emphasis on academic knowledge and skills; by AQT's emphasis on trainability (and training slots), involving substantial investment in training funded by employers; and by social closure's strong emphasis on cultural dispositions.

While job readiness underlines the importance of reduction of training costs, it also points towards the increasing impatience of employers in the UK since the time AQT was developed, which affects the importance of trainability in many jobs and the logic of recruitment processes: being the most trainable applicant is different to being the most job ready applicant. The emphasis on job readiness is on the reduction of the 'residual' training to be undertaken before the job can be done ('last mile training'), rather than on the capacity of the individual to be trained quickly and successfully. An aspect for future research is how the importance of the credential and of particular types of skills as differentiating factors may vary according to specific occupations (e.g. more or less regulated, higher or lower in the occupational hierarchy). Closure theory, for example, suggests that some occupations are better able to close off entry opportunities through education than others.

If credentials are not the crucial differentiating criterion on which candidates are judged in the UK labour market, this questions the future role of credentials in the labour market and wider society in the UK. This is not because credentials are no longer important, but because they cannot determine how recruitment operates: they can no longer be seen as the differentiating factor in employer hiring decisions, in the way the theories analysed imply. Our analysis reaffirms that it is a mistake to place such a single-sided focus on formal academic credentials to understand how the labour market operates: when it comes to the examination of the role of education in occupational achievement there has been too much emphasis on credentials, and too little on the 'other stuff'.

However, even when credentials are not required in job specifications they may still be 'essential' to enter the competition as employer's screen for qualifications as a way of eliminating applicants when they confront large numbers of applications. This underlines Thurow's argument that as access to education expands, education may become a 'necessity' to stay ahead of the competition if others acquire an education and s/he does not (1975, 97; Hirsch, 1977). Qualifications may be used as part of a screening process, but our analysis points to a high level of specificity in the way job requirements are described and screening is conducted. This, of course, does not mean that we should ignore the study of the relative value of qualifications. But it does change our understanding of the 'credential society', as mass certification not only results in credential inflation, but calls for a fundamental re-evaluation of the role of the credential in the labour market.

From the employer's perspective the focus on job readiness rather than 'trainability' points to a less patient capitalism, looking for further ways to reduce training costs

(see also Green et al. 2013) and to shorten the time it takes for new hires to make a productive contribution. This shift is reflected in education policy, as the education system is increasingly responsible for developing marketable skills of immediate value to employers. It also helps to explain the increasing popularity and importance of access to internships in the UK, to gain the experience required to convince an employer of one's job-readiness rather than simply trainability.

A strengthening or weakening relationship between education and occupational outcomes does not immediately tell us whether the job allocation process is more or less 'merited', fair or unequal, because this depends on the social structure of competition shaping the distribution of life-chances. But it does raise the thorny question of whether it is more 'merited' to base occupational selection on credentials, rather than on a broader range of indicators related to perceived job readiness. At the same time, there is little to suggest that a greater focus on job readiness will lead to a reduction in class-based inequalities in the competition for jobs. It is likely that those candidates with the financial, cultural and social resources will maintain a major positional advantage when the 'economy of experience' and the specific skills and personal traits that are not a central part of formal education are a more important part of what it means to be 'job ready' (Milburn 2014). Similarly, while a focus on job readiness may result in increased efficiency for employers in the very short term, it does not necessarily guarantee increased efficiency in the longer term. The analysis, thus, emphasises the importance of time horizons in the assessment of efficiency. For individuals a requirement of job readiness is likely to reduce efficiency, as it requires additional inputs (increasing time and effort) on their behalf to achieve the objective of job attainment.

Our findings therefore call for a fresh discussion on the meaning of 'merit' and 'fairness' in the relationship between education and labour market, especially at a time when government reforms in the UK are premised on the assumption that increasing intergenerational social mobility can be achieved by widening access to higher education (Brown 2013). If the exchange value of credentials in the labour market is more limited than assumed, the idea of a level playing field will need to be cast far beyond the school gates or university lecture theatre. The failure to consider the importance of other skills, competences and experiences beyond formal qualifications in recruitment processes is destined to disappoint in efforts to reduce educational, labour market and wage inequalities.

This study also highlights the need for comparative studies to complement the findings reported, exploring how institutional differences may influence the value of credentials in various national and sectoral contexts – for example, public versus financial services. Given the low vocational specificity of the education system in the UK and the weak coordination of educational certification and standardization of qualifications, these do not signal occupationally-relevant skills to employers (see also Di Stasio and van de Werfhorst 2016). This could be seen as a justification for employers to look for candidates that already possess those technical skills learned elsewhere, for example in previous jobs, but this may play out differently depending on the institutional context and (more or less regulated) occupation (see Wheelahan and Moodie 2017).

Finally, this article has used an innovative dataset and methods to explore these issues, making use of big data on job postings. Much recent work on the role of employers' preferences in social stratification has suffered from the use of strikingly small samples of employers, often in a single sector, to extract conclusions for entire national labour markets. The use of labour market analytics offers important insights that enable the documentation and analysis of employer practices, in the early stages of recruitment, on a much broader basis. Further improvements in the quality and availability of data will enable the analysis to be refined in the future. Advances in labour market analytics offer new tools for studying the key role of the labour market in shaping individual life- chances. While recognising important limitations discussed in this article, we believe that big data is a powerful tool for sociological and policy research, in particular when it is combined with other methods of data collection, such as biographical data from job applicants and qualitative studies on the various stages of the recruitment process. Such research will further contribute to our understanding of the opportunities and limitations of credentials in relation to the reduction of social inequality, as new questions emerge with regards to the mechanisms for social reproduction and change.

Notes

1. Protsch and Solga (2015) sent 322 applications for apprenticeship positions in Germany, and analysed data from 70 employers in the first wave of their study and 87 in the second wave. Di Stasio (2013) gathered data on around 2,400 'hiring propensities' from 131 employers in 3 countries (see also DiStasio 2014). Jackson (2007), Dörfler and Van de Werfhorst (2009) along with Bennett (2002), have attempted to cast a light into the black box of the labour market by interrogating between 1,000 and 5,000 job openings Jackson studied local/ national British newspaper adverts; Dörfler and van de Werfhorst studied Austrian newspaper adverts, Bennett studied six UK graduate recruitment online databases plus in-house hard copy publications.
2. See <http://burning-glass.com/>.
3. The best represented job openings in our sample were business, administration and management (10% of records), followed by electrical and electronic engineering technologists/ technicians (9%).
4. This figure is fairly constant throughout the 3-year period (16% in 2012; 18% in 2013 and 19% in 2014).
5. They also reported an increasing use of qualifications in Austrian job advertisements (from 61% in 1985 to 73% in 2005). However, at the same time they also report the increasing importance of social and cognitive skills that they see as not necessarily obtained through schooling.
6. The relatively higher requirements for 'caring, leisure and other service occupations' category may be related to the National Health Service qualification requirements/license to practice in social care, childcare and other related professions.
7. Jackson's used the Socio-economic classification (SEC) whereas our analysis uses the Standard Occupational Classification 2010.
8. We have reported results for all vacancies.

Acknowledgment

We would like to thank Gareth Rees, Heike Solga and Bledi Taska for comments and suggestions on an earlier version of this paper. Any remaining errors are the authors.

ORCID

Manuel Souto-Otero  <http://orcid.org/0000-0002-7608-5421>

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Annex. List of Categories

Qualifications

Post graduate degrees, level 5 SVQs, certificates and diplomas
Bachelor's degrees, graduate certificates and diplomas
Foundation degrees, HNCs, HNDs and level 5 NVQs Level 4 diplomas and certificates, HNCs,
Level 4 S/NVQs
A-levels, Highers and level 3 S/NVQs
GCSEs, Standard grades, and level S/NVQs
Level 1 S/NVQs
Unknown

Cognitive abilities

Organisational skills
Time management
Planning
Multi-tasking
Prioritising tasks
Project planning
Detail-oriented and detail orientated
Analytical skills
Quick learner
Problem-solving
German
French
Spanish
Change management

Effort

Energetic
Meeting deadlines
Self-motivation
Self-starter
Initiative

Technical skills

Computer skills
Microsoft windows; Microsoft office; Microsoft excel;
Microsoft project;
Microsoft word
Typing
Secretarial skills
Budgeting

There are thousands of specific skills are recorded in the database. 60 specific skills can be derived from the top 10 specific skills from each SOC code 2 digits

Social skills

Team-work
Leadership
Supervisory skills

Team management
Team building
Building effective relationships;
Building effective relationships with customers-coworkers
Customer service
People skills
Communication skills
Writing skills
English
Presentation skills
Articulate
Listening
Negotiation skills
Conflict management

Personal characteristics

Energetic
Physical abilities
Telephone skills
Creativity
Creative problem-solving
Positive disposition