


ARTICLE

# Horses for Courses: Subject Differences in the Chances of Securing Different Types of Graduate Jobs in the UK

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## Abstract

Analysis of the 2010/11 Longitudinal Destinations of Leavers from Higher Education survey shows that overly-simplistic conceptions of graduate success underestimate the value of obtaining a degree in some subjects. Using a skills-based classification of graduate jobs the research finds that maths and vocationally-oriented subjects associated with higher earnings returns (Belfield et al., 2018a, 2018b) – engineering, architecture, computer science and nursing – increase the chances of having an ‘Expert’ job compared to the average for all graduates. However, more generalist subjects that have been linked with lower earnings such as creative arts, languages and mass communication and documentation are better for accessing graduate jobs where creativity and ability to communicate is key. The research demonstrates the value of using a more nuanced conception of graduate jobs and shows that debate about the value of higher education needs to move away from a narrow focus on earnings.

**Keywords:** graduate jobs; returns to a degree; higher education

## Introduction

In the United Kingdom (UK), the introduction of, and subsequent increases to, student contributions to tuition fees has shifted the view of higher education (HE) from that of a public good (an educated and highly skilled population) to that of a private good (an individual investment in human capital). At the same time, an increasingly congested graduate labour market (Tholen and Brown, 2018), combined with concerns about fee loan repayments (Department for Education [DfE], 2018) and low earnings returns for graduates of some subjects (Belfield et al., 2018b) has intensified debate about funding policy and the value of HE. Concerns about the individual costs and returns of HE are not confined to the UK, but are of increasing interest in many countries where students bear much

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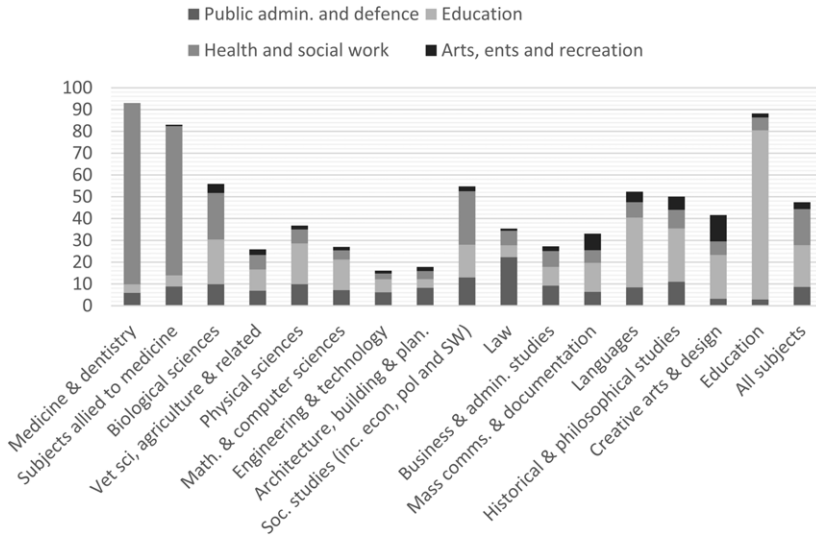
of the costs themselves, including the United States (US), Australia, Singapore and India (Cappelli, 2020).

In UK policy, as in the US and elsewhere, education is seen as a potential way to tackle intergenerational inequality (Blanden and MacMillan, 2016; Social Mobility Commission, 2022) and even degree courses associated with lower financial returns may help increase social mobility (Britton et al., 2021). While there is some recognition of the wider value of HE for society and individuals in the UK (Hunt and Atfield, 2019), a narrow focus on subject differences in earnings has informed government policy to reduce funding for arts subjects and redistribute it to science, technology, engineering and mathematics (STEM) (Weale, 2021). The Augar Review of post-18 education in the UK exemplifies this. While the review notes the wider individual, social and economic benefits of HE, the justifications for policy recommendations focus on subject differences in earnings returns, costs of provision and fee loan write-offs (Augar, 2019). Such debates are only likely to intensify in a post-Covid labour market, as students graduate into difficult labour market conditions.

While concerns about the repayment of student loans and graduate incomes are important considerations in policy debates, an overly narrow focus on earnings limits a full understanding of the value of HE. A wider conception of graduate success is particularly warranted given that (1) graduates of some subjects are motivated less by financial reward and more by creativity, interest and doing something worthwhile (UCAS, 2021; Ball et al., 2010) and (2) many graduates end up securing rewarding and/or socially useful work while not necessarily earning a high wage. Data from the Annual Population Survey show that, of those in work, one third of language graduates and a quarter of historical and philosophical studies graduates work in education and around half of language and social studies graduates work in the public sector (Figure 1), despite earnings returns for these subjects being lower than the average for all subjects (Belfield et al., 2018a).

This article contributes to debates about the value of a university education by showing that an overfocus on earnings underestimates the value of HE in some subjects. While subjects associated with lower earnings (relative to other subjects) – creative arts, mass communications, languages (Belfield et al., 2018a) – may be less likely to lead to ‘Expert’ graduate jobs that involve daily use of specialist knowledge developed at university, they increase the chances of securing graduate jobs where interpersonal, creative and high-level technical skills are key. The reverse is true for some higher earnings returns subjects, such as maths, law, architecture and nursing. These findings question the logic of defunding subjects such as art that provide workers in valuable industries and occupations – even if not so well remunerated – and show that a wider conception of graduate success is much needed.

The article progresses as follows. First, the article critiques the overly-narrow focus on the financial returns to HE in the UK before discussing alternative measures of labour-market returns and introducing a detailed measure of graduate jobs based on the types of skills used (Elias and Purcell, 2013) and a separate measure of creative jobs (Ball et al., 2010). The article then presents a multivariate analysis investigating subject differences in the chances of having different types of graduate job 3.5 years after graduation. The implications of the findings for debates on the value of HE are then discussed.



**Figure 1.** Industry sector of main job: public sector industries as a proportion of all graduates in work by subject (%).

Source: Annual Population Survey three year dataset (January 2017 - December 2019)

Base: working age (16-64) graduates in work (employees and self-employed)

## The value of higher education

In 1998, the UK Labour government of Tony Blair introduced student contributions to tuition fees for first degrees, invoking the higher earnings of graduates relative to non-graduates as a justification. Prior to this, student fees had been wholly funded by the state, with earlier expansion justified as a public good, providing a highly skilled and productive workforce (Ross, 2003). Under the ‘cost sharing’ model, beliefs about the role of HE in society, who benefits and who should ultimately pay shifted towards the individual (Callender and Wilkinson, 2013). The fact that students now effectively paid towards their education increased interest in the financial returns they might expect to receive from their investment. Econometric studies subsequently attempted to estimate these returns (e.g. O’Leary and Sloane, 2005; Walker and Zhu, 2013), which in turn have been used to justify increases to course fees to £9,250 a year in 2021.

Despite an increased focus on employability and skills from universities, prompted by the marketization of HE (Durazzi, 2021), some graduates fail to achieve the anticipated earnings returns. Analysis of graduate earnings using Longitudinal Education Outcomes (LEO) data shows wide disparities in earnings between graduates of different subjects and from different universities (Belfield et al., 2018a), suggesting that male art graduates may end up earning less than if they had not studied for a degree (Belfield et al., 2018b). And as many as 45% of graduates may never repay their student loans (DfE, 2018). Such findings inform policy that reduces funding for some subjects. However, the methodological limitations of these studies are often overlooked. Choice of subject is endogenous.

Individuals who are more motivated by earnings are more likely to choose certain subjects than others (UCAS, 2021) and these motivations influence occupational choices and financial rewards in the graduate labour market (Shury et al., 2017). Thus, choice factors determine both subject choice and labour-market choices and earnings. Consequently, simply controlling for GCSE performance and A-Level subject choices does not fully account for these motivational factors and to interpret the findings as showing a causal link between subject of study and earnings, as policy appears to, is misguided. A second limitation of LEO data relates to the outcome measure used. Only annual earnings, and not hourly wages, from employment are available in the LEO, downwardly biasing returns to subjects such as arts where there are disproportionately more graduates who work part time, work multiple jobs or are self-employed (Ball et al., 2010).

Yet a more fundamental weakness in such analyses, acknowledged by the authors, is that they cannot account for the wider value of HE to individuals and society, such as greater tolerance and wellbeing, economic growth and a productive and highly skilled workforce (Hunt and Atfield, 2019). Focusing only on the financial returns to HE also fails to capture individual benefits to HE beyond earnings, such as the chances of securing meaningful and worthwhile jobs, suitable for those with higher-level skills.

### Graduate jobs as a measure of labour market success

One wider measure of labour market success is the type of jobs graduates go on to secure. Examination of such a measure is particularly warranted because not all valuable and meaningful jobs are well remunerated, yet many still require a high level of education.

#### *Measuring graduate jobs*

While there is no agreed upon definition of what sort of jobs are suitable for those with a degree (Green and Henseke, 2016), a number of attempts have been made to define graduate jobs dating back to at least the late 1990s when student contributions to fees were introduced in the UK. These attempts to define graduate jobs can be seen as falling into four broad categories:

- (1) Definitions based on pre-existing groupings in the Standard Occupational Classification (SOC) or the National Statistics Socio-economic Classification (NS-SEC) systems;
- (2) Definitions that take into account the proportion of workers within occupational groups that hold certain levels of qualification, typically using SOC at a more detailed level;
- (3) Definitions based on the skills used in different occupations;
- (4) Definitions based on earnings.

Studies in the latter category have attempted to define jobs as suitable for graduates by either assigning a value based on the proportion of workers within a given occupational group that earn more than a given hourly rate ('occupational

earnings' – Roksa and Levey, 2010), or simply estimating the effect of subject studied on the chances of being in the top 5% of earners (Sullivan et al., 2018). Such approaches are subject to the same limitations levelled at studies looking at the financial returns to a degree. Skills levels are not the only factor that determine wages and many valuable and highly-skilled jobs are not highly paid.

In the first approach listed above, occupations are assigned as graduate or non-graduate if they are in the top (MacMillan et al., 2015) or top two broad categories in the highest level of classification (analytic class or major group) in the NS-SEC (Bukodi and Goldthorpe, 2011; De Vries, 2014)<sup>1</sup> or SOC classification systems (Centre for Higher Education Research and Information [CHERI], 2002; Okay-Somerville and Scholarios, 2013). In some cases, specific occupations at a lower level of classification are included or excluded (e.g. Glover et al., 1996), or the definition is broadened out to include SOC major group 3 'Associate professional and technical' occupations (Shury et al., 2017).<sup>2</sup> These definitions have some appeal as they are easy to code and make use of the hierarchical structure of the SOC and NS-SEC classifications. However, they have been criticised as imprecise and somewhat arbitrary, particularly where the inclusion or exclusion of occupations do not reflect the proportion of incumbents that hold a degree (Alpin et al., 1998).

Another problem with the above approach is that it fails to take into account a changing labour market and the growing professionalisation and 'graduatisation' of some occupations (Okay-Somerville and Scholarios, 2013). Attempts have been made to address this by defining graduate jobs by looking at the qualification levels of workers in different occupations, including by:

- defining occupations as graduate if the modal level of qualification of incumbents is degree-level or higher (Alpin et al., 1998);
- scoring occupations according to the mean level of education (McKnight, 1999);
- classifying occupations as graduate jobs if the proportion of incumbents with a degree meets a given threshold (Elias and Purcell, 2004);
- assigning a value based on the proportion of workers in that occupational unit who have at least some HE (Roksa and Levey, 2010).

While all of these measures have value, in that they reflect an evolving labour market and capture the graduatisation of occupations, they are somewhat tautological (Green and Henseke, 2016). If graduate jobs are defined as the jobs that graduates do, this risks conflating professionalisation of some occupations with growing underemployment in others.

The third type of classification listed above attempts to address this issue by classifying occupations based on the skills needed to perform different jobs. Using data from the British Skills and Employment Survey, Green and Henseke (2016) classified occupations as graduate or non-graduate by estimating the chances of incumbents in a given occupation reporting that (a) a degree (or higher) was 'required' to get the job and (b) the qualification was considered 'essential' or 'fairly necessary' to do the work competently. While the method used in this classification is transparent and replicable, meaning it can be reclassified as occupations and the labour market change, there are two main limitations. First, self-reports of current incumbents

may overestimate the extent to which a degree is necessary to get the job and do the work (i.e. confirmation bias), and second, it is susceptible to grade inflation if a degree is increasingly perceived to be the norm due to an oversupply of graduates.

Using a slightly different approach, Elias and Purcell (2013) (SOC(HE)2010\_EP) scored all 369 occupations (4-digit) in the 2010 SOC on the use of three types of higher-level skill: specialist, orchestration or communication. The resulting classification distinguishes three types of graduate occupations:

- (1) *Experts* – knowledge-intensive occupations that use specialist HE knowledge on a daily basis;
- (2) *Orchestrators* – jobs that require individuals to draw on and orchestrate their own and others' knowledge to evaluate information, assess options, plan, make decisions and co-ordinate the contributions of others to achieve objectives;
- (3) *Communicators* – jobs requiring skills based on interpersonal skills, creative skills or high-level technological knowledge, and capacity to access, manipulate and communicate information effectively.
- (4) All other occupations are classified as '*Non-graduate*'.

While the process used in this approach is time-consuming to replicate (Green and Henseke, 2016) it not only avoids the tautological reasoning identified above but also has the advantage of enabling analysis of the relationship between degrees of different subjects – that provide different skills and knowledge – and the jobs that can potentially make use of these different skillsets.

It should be noted, however, that none of the above measures have been fully accepted in all quarters, particularly in the creative sector in HE. A definition of creative jobs was developed by researchers drawing on contributions from industry and policy stakeholders and a consortium of 26 higher education institutions (HEIs) with significant provision in creative arts and design (Ball et al., 2010). This definition includes some occupations considered as non-graduate in previous definitions of graduate jobs (e.g. jewellery, glass, ceramics and textiles makers and technicians) along with many that would be considered graduate jobs (e.g. graphic designers, journalists, marketing professionals and senior managers of arts organisations), and so accounts for the diverse career aims of creative graduates.

### **Subject comparisons in graduate outcomes**

Studies that have looked at subject differences in accessing graduate jobs (Table 1) tend to indicate that graduates of STEM and/or highly vocational subjects, such as medicine, engineering or law, tend to fare well in the graduate labour market, whereas those who studied art, humanities or social sciences tend to fare less well. Notable exceptions to this rule are biological and physical sciences whose graduates tend to fare less well than other sciences such as medicine, engineering and computer science (e.g. CHERI, 2002; Purcell et al., 2012). Data from Futuretrack show considerable variation not only in the propensity but also the type of graduate jobs that graduates had 1-2 years after graduation (Purcell et al., 2012), although this analysis did not control for personal characteristics and other factors.

**Table 1.** Summary of subject findings from studies using different measures of graduate jobs

Study	Type of measure	Subjects faring well*	Subjects faring less well*
Alpin et al. (1998)	SOC-based measure of overeducation	biological sciences, maths/physics, engineering/technology, information sciences, education	architecture, social sciences, business
	Modal measure of overeducation	maths/physics, social sciences, languages and literature, education	business, information sciences
CHERI (2002)	SOC-based 'Managerial/professional' and Proportion-based 'Graduate/Graduate track'	computer science, medicine, law and subjects allied to medicine	art, languages/humanities, social sciences, biological sciences and psychology
Roksa and Levey (2010)	Earnings-based 'Occupational earnings' Qualifications-based 'Occupational Education'	education, medicine, business, engineering/architecture, computer science, social work	humanities, biological sciences, maths/physical sciences, social sciences, communications, Other
De Vries (2014)	NSSEC-based measure 'Managerial/professional'	medicine and related, STEM, vocational subjects or economics	hospitality and leisure, humanities/social sciences
Purcell et al. (2012)	Skills-based SOC(HE) 2010_EP	medicine/dentistry, subjects allied to medicine, education, engineering and technology	arts, humanities, languages, social sciences, biological sciences, physical sciences
Sullivan et al. (2018)	Earnings-based	STEM (science, technology, engineering and mathematics), LEM (law, economics and management)	OSSAH (other social sciences, arts, languages and humanities)

Note: \*in terms of securing graduate jobs.

These studies show that the selection of a suitable outcome measure is not neutral but has an important influence on the findings. Whatever measure is used, comparison creates winners and losers. Equally, focussing solely on the pecuniary gains of individuals will, by definition, tend to favour certain subjects more closely aligned with higher-paying occupations and industries while penalising subjects whose graduates may be willing to forego higher wages in order to do something worthwhile or creative (UCAS, 2021; Ball et al., 2010). As current research and policy discourse seems preoccupied with earnings, it can appear that only subjects aligned with high-wage occupations and industries are of any value. A more nuanced understanding of the wider labour market value of HE in different subjects is therefore warranted.

From the aforementioned definitions of graduate jobs, two in particular have appeal for providing a wider contribution to debates about the value of degrees in different subjects. The Elias and Purcell (2013) definition enables investigation of the extent to which graduates from different subjects secure jobs appropriate

for their skills. Similarly, Ball et al.'s (2010) definition of creative occupations provides a useful measure of whether graduates secure creative work. This is important, not only to those who opt for creative subjects (Ball et al., 2010) but also because of the strategic importance of the creative industries in UK policy (Department for Business Energy and Industrial Strategy [BEIS], 2018; HM Treasury, 2021).

Using these two wider measures of labour market outcomes provides the much-needed nuance currently lacking in debates about the value of HE.

### Data and methodology

This research uses data from the Destinations of Leavers from Higher Education Longitudinal survey (LDLHE), covering the 2010/11 cohort of UK graduates. The survey was conducted in Winter 2014/15 on behalf of the Higher Education Statistics Authority (HESA), surveying graduates from UK HEIs 3.5 years after graduation. The survey was conducted by telephone and online and collected data on current employment, skills and knowledge use in their current main job, and the experience and qualifications required to get the job.

In 2018 the DLHE and LDLHE – measuring graduate destinations at 6 months and 3.5 years respectively – were replaced by the Graduate Outcomes survey, which measures outcomes just once at 15 months after graduation. The LDLHE for 2010/11 graduates, therefore, provides a snapshot that allows graduates more time to begin to establish a career than the Graduate Outcomes survey affords, and allows us to examine outcomes for a cohort who graduated in a difficult labour market: the immediate aftermath of the great recession. This enables a timely comparison, given that recent cohorts of graduates have graduated into a difficult labour market due to Covid-19.

The analysis focuses on working age<sup>3</sup> UK domiciled first degree graduates from all UK HEIs covered by the LDLHE. It excludes graduates who went on to complete subsequent HE qualifications, and so reflects the 'marginal' labour market return to HE, not taking into account the cumulative effects of further qualifications.

### Classifications of graduate jobs

The analysis uses two measures of labour market outcomes that enable us to explore the relative labour market experiences of graduates from different subjects: graduate jobs and creative jobs.

The measure of graduate jobs used in this analysis is the SOC(HE)2010\_EP classification (Elias and Purcell, 2013):

- *Expert;*
- *Orchestrator;*
- *Communicator;* and
- *Non-graduate.*

The analysis uses this definition, first, in a binary manner (*Graduate* vs *Non-graduate*) and, second, in a more detailed way in order to provide a more nuanced understanding of the association between different subjects and different kinds of jobs.



**Table 2.** Common occupations in graduate and creative job groupings

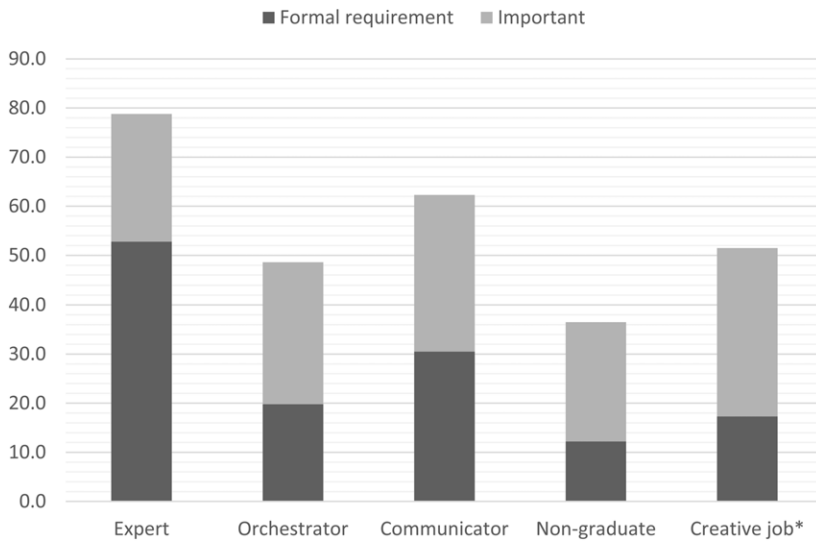
	Outcome category	Common occupations found in the sample
SOC(HE)_EP classification	Expert	Nurses
		Medical practitioners
		Programmers and software development professionals
		Human resources and industrial relations officers
	Orchestrator	Management consultants and business analysts
		Managers and directors in retail and wholesale
		Business and financial management professionals
		National government administrative occupations
	Communicator	Sales accounts and business development managers
		Primary and nursery teaching professionals
		Marketing associate professionals
		Business sales executives
	Non-graduate	Other administrative occupations n.e.c
Sales and retail assistants		
Teaching assistants		
Managers and proprietors in other services n.e.c		
Creative jobs	Creative*	Marketing associate professionals
		Programmers and software development professionals
		Arts officers, producers and directors
		Graphic designers

Note: \*The creative jobs measure is a separate categorisation from the SOC(HE)\_EP definition, so some creative occupations are also found in other graduate and non-graduate job categories.

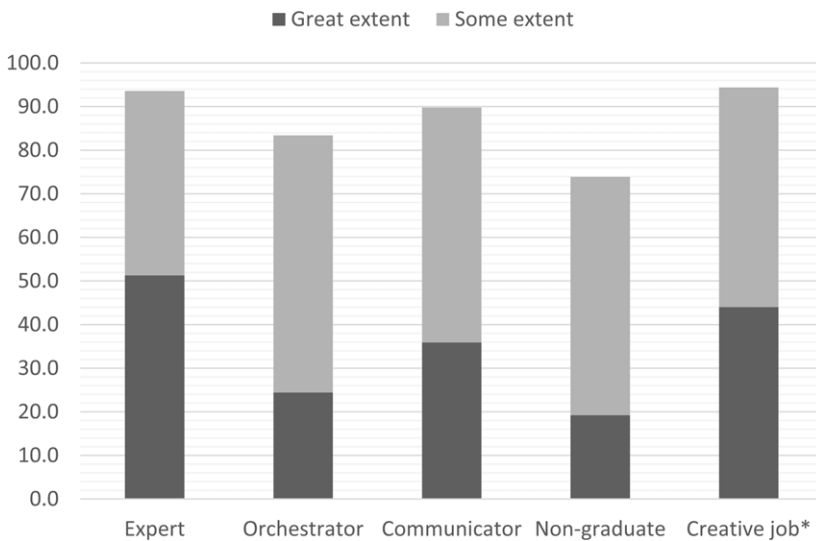
The analysis also uses Ball et al.'s (2010) measure of *creative jobs*, in order to explore the association between different subjects and access to occupations in the creative sector.

Detailed descriptions of the occupations covered by each category can be found in Elias and Purcell (2013) and Ball et al. (2010).<sup>4</sup> Examples of the most common occupations in each of the above categories found among graduates in our sample can be seen in Table 2.

Descriptive analysis of other variables in the LDLHE shows that all four graduate outcome measures have internal validity. Graduates in all three graduate job categories in the SOC(HE)2010\_EP classification were more likely than those in non-graduate roles to report that their qualification was needed to get the job and that they used the skills or knowledge developed during their degree (Figures 2 and 3).



**Figure 2.** Extent to which a degree was needed to secure graduates' current main job (%). Base: Working age graduates in employment (\*creative arts subjects only)



**Figure 3.** Extent to which employers enable graduates to use skills gained during their degree studies (%). Base: Working age graduates in employment (\*creative arts subjects only)

Likewise, graduates from creative subjects working in creative jobs 3.5 years after graduation were more likely than those working in non-creative occupations to indicate that their qualification was needed and that they used their skills/knowledge in their job.

It may also be worth noting at this stage that the above categorisation may reveal something about access to different types of power resources. While the Orchestrator category might be seen as aligning with Weberian notions of social class related to the economic order, the expert, communicator and creative categories are made up of occupations that hold relatively high status (Chan and Goldthorpe, 2004) despite some occupations in the latter two commanding lower wages on average. While these questions are not the focus of this article, this may be an avenue of future enquiry.

### Approach to analysis

Multivariate analysis was used to examine subject differences in the propensity to have a graduate or creative job as a main job 3.5 years after graduation, while controlling for a range of factors that have been shown to be associated with labour market outcomes from previous research (De Vries, 2014; Sullivan et al., 2018).

The analysis first uses logistic regression (LR) to estimate propensity to have a graduate job (*Outcome\_dummy<sub>i</sub>* = 1) compared to having a non-graduate job and then propensity to have a creative job compared to a non-creative job, as given by:

$$\begin{aligned} E(\text{Outcome\_dummy}_i) &= \text{Prob}(\text{Outcome\_dummy}_i = 1) \\ &= F(\text{Char}_i, \text{Subject}_i, \text{Error}_i) \end{aligned}$$

Multinomial logistic regression (MLR) was then used to estimate propensity to have an Expert, Orchestrator or Communicator job (*c*) compared to having a non-graduate job.

$$E(\text{SocHE}_i) = \text{Prob}(\text{SocHE}_i = c) = F(\text{Char}_i, \text{Subject}_i, \text{Error}_i)$$

Where  $c \in \{1,2,3\}$

The controls (*Char<sub>i</sub>*) used in all analyses were: gender, age at graduation, ethnicity, socio-economic background (NS-SEC), region of domicile, schooling (state Vs privately funded), prior attainment (UCAS tariff points), classification of degree and university mission group<sup>5</sup> of HEI attended. Descriptive statistics and multicollinearity test information is presented in the Appendix (Supplementary Materials, Table A.1).

While the analysis does not allow us to demonstrate causality between subject of study and increase/decrease in the chances of securing a graduate job, due to endogeneity and selection effects into HEI and subjects (Belfield et al., 2018a), it does allow us to explore associations between subject of study and the relative chances of being in different types of graduate jobs 3.5 years after graduation.

A second limitation of our analysis relates to potential clustering effects. Such effects need to be accounted for when cases are sampled by cluster or where treatments were applied to clusters. While neither condition applies in our case, it is possible that within cluster correlation at the university level could bias standard errors in the model, affecting significance levels of coefficients. While it is possible that university level effects could mean that the error terms for individuals from the same university are correlated in some way there are no strong reasons to assume that such effects would be large. First, our sample is random and the regressor of interest (subject) is not fixed at the university level (Angrist and Pischke, 2009).

**Table 3.** Propensity to have a graduate/creative job (binary logistic regression) and different types of graduate job (multinomial logistic regression)

	Odds ratios [95% confidence interval]				
	(a) Graduate job	(b)			(c) Creative
		Expert	Orchestrator	Communicator	
<b>Controls</b>	✓	✓	✓	✓	✓
<b>Subject area (JACS 2.0)</b>					
Social sciences (Ref.)	1.0	1.0	1.0	1.0	1.0
Subjects allied to med.	5.458*** [4.415, 6.749]	9.21*** [7.339, 11.557]	0.916 [0.584, 1.437]	0.847 [0.579, 1.239]	0.297*** [0.194, 0.455]
Biological sciences	0.823* [0.695, 0.973]	0.948 [0.782, 1.151]	0.609** [0.45, 0.826]	0.742* [0.583, 0.945]	0.751† [0.559, 1.009]
Agriculture & related	0.725 [0.464, 1.134]	0.843 [0.502, 1.414]	0.759 [0.337, 1.71]	0.516† [0.244, 1.095]	2.263** [1.226, 4.176]
Physical sciences	0.983 [0.792, 1.221]	1.277* [1.004, 1.624]	0.71† [0.486, 1.037]	0.618** [0.441, 0.865]	1.009 [0.712, 1.429]
Mathematical sciences	1.284† [0.992, 1.662]	1.88*** [1.426, 2.479]	0.813 [0.526, 1.259]	0.419*** [0.261, 0.673]	1.152 [0.793, 1.673]
Computer science	2.153*** [1.69, 2.743]	2.677*** [2.056, 3.488]	1.039 [0.675, 1.6]	1.79** [1.28, 2.504]	8.802*** [6.633, 11.681]
Engineering & technology	2.149*** [1.667, 2.772]	2.979*** [2.267, 3.914]	1.003 [0.642, 1.568]	1.227 [0.842, 1.786]	3.162*** [2.331, 4.289]
Architecture, build & plan.	1.659** [1.176, 2.34]	2.349*** [1.628, 3.389]	1.101 [0.608, 1.992]	0.598 [0.311, 1.148]	2.047** [1.292, 3.244]

(Continued)

**Table 3.** (Continued)

	Odds ratios [95% confidence interval]				
	(a)	(b)			(c)
	Graduate job	Expert	Orchestrator	Communicator	Creative
Law	0.86 [0.659, 1.123]	0.831 [0.605, 1.141]	1.142 [0.748, 1.744]	0.713 [0.471, 1.079]	0.785 [0.47, 1.312]
Business & admin. studies	1.489*** [1.249, 1.776]	0.943 [0.762, 1.167]	1.3† [0.972, 1.74]	2.683*** [2.134, 3.374]	1.809*** [1.387, 2.358]
Mass comms. & doc.	1.705*** [1.333, 2.18]	0.574** [0.401, 0.823]	0.928 [0.577, 1.493]	4.261*** [3.193, 5.688]	9.211*** [6.874, 12.341]
Languages	0.96 [0.793, 1.163]	0.491*** [0.382, 0.631]	0.69* [0.492, 0.967]	1.93*** [1.52, 2.45]	2.567*** [1.972, 3.341]
Historical & phil. studies	0.774* [0.623, 0.961]	0.567*** [0.433, 0.743]	0.617* [0.421, 0.902]	1.231 [0.935, 1.622]	2.016*** [1.496, 2.718]
Creative arts & design	1.188† [0.987, 1.43]	0.973 [0.78, 1.214]	0.523** [0.358, 0.762]	1.982*** [1.558, 2.522]	8.85*** [6.876, 11.39]
Education	3.823*** [2.988, 4.89]	1.591** [1.166, 2.171]	0.18** [0.061, 0.536]	10.36*** [7.769, 13.816]	0.142*** [0.062, 0.325]
<b>Goodness of fit:</b>					
-2LL =	13,273		24,180		8,447
Δ-2LL	$\chi^2=1,182$ , df = 44, p<.0005		$\chi^2=3,448$ , df = 132, p<.0005		$\chi^2=1,719$ , df = 44, p<.0005
Pseudo R <sup>2</sup> (C&S, Nag)	.101, .139,		.267, .290		.143, .239

Controls: Prior attainment, HEI mission group, classification of degree, schooling, socio-economic group, age, ethnicity, gender, region of domicile  
 Base: Working age first degree graduates in employment (no further study or qualifications) for whom UCAS tariff points are available (excludes medicine and dentistry, and veterinary science)  
 (n = 12,759)

Notes: Significance level P < †.10, \*.05, \*\*.01, \*\*\*.001

Second, individuals on the same course may take different options and have different teachers, thus no reason to assume teacher effects. And, third, the outcome of interest (occupation 3.5 years after graduation) is one step removed from any potential teacher effect (e.g. on test scores). However, while it was not possible to test for potential clustering effects at the university level, because a variable for institution attended was not available from HESA, a robustness check using bootstrapped standard errors was carried out (see Appendix, Supplementary Materials, Table A.3). The effect of bootstrapping on the standard errors was almost negligible lending credibility to our findings. Following Angrist and Pischke (2009) we report the analysis with the highest standard errors here, which are the results without bootstrapping.

## Results

Of the sample used in the analysis, 36% of first degree graduates in employment were working in a non-graduate job as their main job 3.5 years after graduation and 64% were working in a graduate job: 35% Expert, 22% Communicator and 7% Orchestrator. When looking at creative jobs, 17% were in a creative job and 83% were in a non-creative job, although creative jobs were much more common among graduates of creative arts and design (43%), mass communications and documentation (45%) and computer science (45%).

Table 3 displays the results of: (a) a binary logistic regression of the propensity to be in any kind of graduate job; (b) a multinomial logistic regression of the propensity to be in each of the three types of graduate job, and (c) a binary logistic regression of the propensity to have a creative job. For each, the odds ratios displayed indicate the corresponding change in the odds of having each type of job compared to having a non-graduate (or non-creative) job relative to the reference group, while holding the control variables constant. A table containing results for all controls can be seen in the Appendix (Supplementary Materials, Table A.2).

### Personal and study characteristics

Results show that mission group of HEI attended, classification of degree, socioeconomic background, age, ethnicity and region of domicile were all found to have a statistically significant effect on the odds of having a graduate job in one form or another. The general pattern can be summarised as follows (*ceteris paribus*):

- An increase in UCAS tariff points is associated with an increase in the odds of having all types of graduate or creative job;
- Having studied at a Russell Group university increases the odds of having a graduate job relative to the reference group (University Alliance);
- Obtaining a first or upper second class degree increases the odds of having a graduate job relative to obtaining a 2:2 or below;
- Relative to having attended a state school, having studied at an independent school is associated with an increase in the chances of having all types of graduate job but not the chances of having a creative job;

- Being from a household where the primary earner was in a Managerial/professional occupation (or Intermediate in some cases) increases the odds of having a graduate job relative to being from a Routine/manual background;
- Being male is associated with an increase in the odds of having a graduate job relative to being female;
- Being Black or Asian was associated with a decrease in the odds of having a Communicator job relative to being White;
- Being from Scotland, London or the East or South East of England was associated with increased odds of having certain types of graduate or creative jobs, relative to the reference group (North East England).

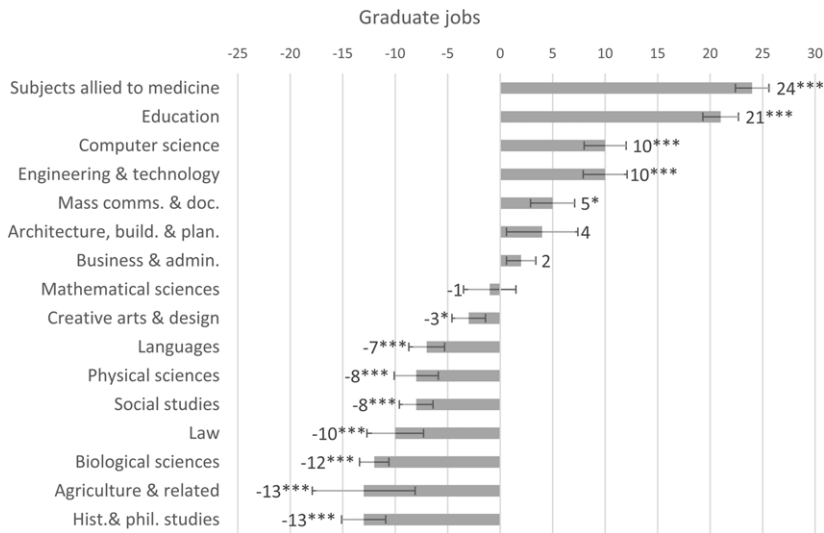
Analysis was carried out to test for potential interactions between subject of study and other factors in the model: social class, HEI mission group and region. However, in order to do this it was necessary to drop some subjects from the analysis and group up some controls due to low sample size. Even then, it was not possible to run the analysis using the detailed SOC(HE)2010\_EP measure due to complete separation in the data. The addition of interaction terms for subject by region (London/South East vs other) and subject and social class did not improve the model (Appendix, Supplementary Materials, Table A.4). However, a significant interaction was found for subject by mission group (Russell Group vs other). While these results are not reported here, because the restricted sample and low cell sizes raise questions about reliability, the effect of controlling for this interaction was to amplify the average subject effects (Appendix, Supplementary Materials, Table A.5).

### **Subject differences in chances of having any kind of graduate job**

In order to aid interpretation of subject differences in the chances of having a graduate job, the marginal effects of studying each subject relative to the average across all subjects were estimated (Figure 4). The marginal effects can be interpreted as the proportional increase on the probability of having the outcome relative to the average while holding the controls at their mean value; they are also less affected by issues of unobserved heterogeneity than odds ratios when comparing across groups and samples (Kuha and Mills, 2018).

When considering the marginal effects of subject of study on the probability of having any kind of graduate job, the following can be seen:

- Having studied subjects allied to medicine, education, computer science, engineering and technology, mass communications and documentation, were associated with a statistically significant increase in the probability of having a graduate job relative to the average across all subjects;
- All other subjects, except mathematics, business studies and architecture, building and planning, were associated with a statistically significant decrease in the probability of having a graduate job, ranging from 5% for creative arts to 13% for historical and philosophical studies, compared to the average (*ceteris paribus*).



**Figure 4.** Marginal effect of subject on the probability of having a graduate job (%).  
 Base: Working age first degree graduates (with no further qualifications) in employment  
 Notes: Marginal effect is different from 0 at  $\alpha = \dagger.10, *.05, **.01, ***.001$

As can be seen, the subjects most strongly associated with an increase in the odds of having a graduate job tend to be more vocational subjects aligned with particular professions or occupations. The negative finding for law is perhaps surprising but likely reflects that the analysis excludes graduates who have gone on to complete further qualifications and qualify as lawyers.

Overall, while the findings for subject differences in the propensity to have any kind of graduate job is informative, painting a picture of winning and losing subjects in the race for graduate jobs, they belie a certain level of nuance in the data.

**Subject differences in chances of having different types of graduate job**

When looking at the marginal effects for the different types of graduate jobs (Figure 5) the results show a more nuanced picture, with some subjects helping to get some types of graduate jobs and not others. For example, relative to the average across all subjects (*ceteris paribus*):

- Studying subjects allied to medicine is associated with a 37% increase in the probability of having an expert job (mostly nursing) compared to the average across all subjects, but a 10-11% decrease in the probability of having a communicator or creative job;
- Mathematics, architecture, building and planning and engineering are also strongly associated with expert jobs, but not other types of graduate jobs;
- Having studied creative arts or mass communication was associated with a decrease in the probability of having an expert job (8% and 19% respectively)



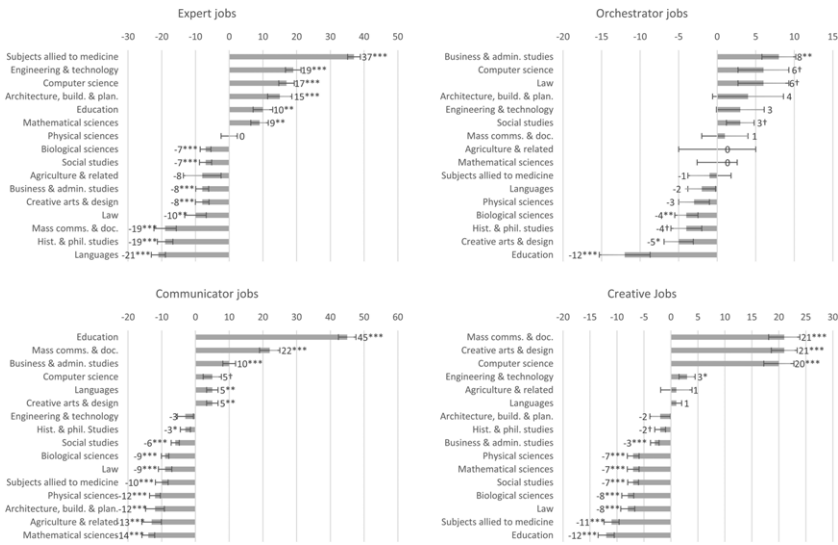


Figure 5. Marginal effect of subject on the probability of having different types of graduate or creative job (%).

Base: Working age first degree graduates (with no further qualifications) in employment

Notes: Marginal effect is different from 0 at  $\alpha = \uparrow .10, *.05, **.01, ***.001$

- compared to the average but an increase of having a communicator (5% and 22% respectively) or creative job (both 21%);
- Business studies and law are associated with a 6-8% increase in the probability of having an orchestrator job but a 3-10% decrease in the probability of having an expert or creative job;
  - Education is strongly associated with the probability of having a communicator (45%) or expert (10%) job but negatively associated with having a creative job (-12%);<sup>6</sup>
  - Computer science is positively associated with all outcome measures (5-20%).

These findings show that at a fairly early stage in graduate careers, binary measures of graduate success underplay the complexity of the situation. Certainly, some subjects may be less likely to lead to graduate jobs overall, but the same subjects may still increase the chances of accessing certain types of graduate jobs.

### Discussion and conclusion

The introduction of and subsequent rises to student contributions to fees, combined with concerns about fee loan repayments and subject differences in earnings has prompted policy-makers to withdraw funding and limit university places for some subjects. This policy, and wider academic debate, is based on an overly-simplistic notion of the value of a degree, based overwhelmingly on earnings as a measure of labour market success.

The analysis presented in this article shows that the choice of outcome measure is not neutral. For every measure there will be winners and losers. Our analysis shows that while some subjects associated with higher earnings returns (e.g. engineering, business studies, maths, architecture and nursing) might increase the chances of having certain types of graduate job where specialist or orchestration skills are important, they are negatively associated with other types of graduate job (e.g. communicator or creative). Moreover, some subjects associated with lower wages (e.g. creative arts and languages) are positively associated with an increase in the chances of securing jobs where creative, technical and communication skills are key. These findings show that studying such subjects has benefits that are not reflected in earnings, benefits that are likely to be of great value to those who choose their subject for reasons other than financial reward. Studying art, for example, may not always lead to high wages but may well improve one's chances of securing creative work relative to other subjects.

The findings also show that STEM subjects, which policy in the UK is keen to expand, do not always perform so well on the measures used in this analysis. Maths and engineering and technology are strongly associated with expert jobs, but biological and physical sciences only perform around average on this measure and below average in terms of the chances of having a graduate job overall.

These findings question the logic of promoting some subjects at the cost of others. Not all STEM subjects are strongly associated with positive labour market outcomes. And some arts and humanities subjects where funding is being curtailed are strongly associated with creative and communicator jobs. Particularly as the creative sector is a high value and strategically important sector in UK policy (BEIS, 2018; HM Treasury, 2021) and creativity and communication skills are thought to be less susceptible to automation by artificial intelligence (Deloitte, 2014).

The concentration of certain types of graduate jobs among some groups of graduates is also somewhat revealing. The fact that language and arts graduates and graduates from London and the southeast of England are relatively more likely to go into communicator and creative jobs perhaps says something about access to status resources and the location of power elites. Such jobs may have relatively high status, in the Weberian sense, and may wield a certain amount of cultural and political power (Chan and Goldthorpe, 2004).

While these findings expose some inconsistencies in UK industrial and HE policy, it is important to recognise the limitations in the analysis presented in this paper. First, we cannot claim causality from the analysis presented here. As with other analyses of graduate outcomes, our analysis cannot account for motivational factors that may be related to both subject choice and labour market outcomes. Our analysis also cannot account for earlier qualification choices that limit HE options or potential clustering effects related to university level factors. Instead, our analysis indicates the associations between subject studied and the chances of having different types of jobs at a given point in time, which may have some parallels for the current crop of graduates. Second, while our analysis contributes to debates on the value of HE by providing a wider measure of labour-market success for individuals, it does not say anything about the wider individual, societal and economic value of HE. Future research using such measures would broaden the debate about

the value of HE further and might find a quite different set of winners and losers. Such a contribution is much needed.

That said, the research makes three important contributions. First, the research indicates that some subjects associated with lower earnings may still help students get certain types of creative or graduate jobs. Second, in doing so the research reveals the value of using a more nuanced measure of graduate jobs. Finally, the findings underline the importance of looking at wider measures of success than just focusing on earnings. Policy debates would do well to move beyond overly simplistic conceptions of the value of HE.

**Supplementary material.** To view supplementary material for this article, please visit <https://doi.org/10.1017/S0047279423000041>

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## Notes

- 1 This measure has also been used to examine occupational outcomes of private schooling (Green et al., 2020).
- 2 This latter definition is widely used in annual reporting of graduate outcomes and is included in official Key Information Sets (KIS) used to compare courses in the UK.
- 3 From 18 to the legal retirement age (65 for men and 62 for women at the time of the survey).
- 4 For *creative jobs*, equivalent SOC codes were used where occupation codes had changed from SOC 2000 to 2010. In addition, the occupations ‘3542 - Business sales executives’, ‘4151 - Sales administrators’ and ‘6211 - Sports and leisure assistants’ were excluded from our definition of creative occupations because they were likely to include many non-creative jobs.
- 5 A proxy for university prestige. The Russell Group and 1994 Group represent prestigious, research-led universities with high entry requirements.
- 6 Primary school teacher is a communicator job while secondary school teacher is an expert job.

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