ORIGINAL ARTICLE

Access and returns to unpaid graduate work experience

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Abstract

We use longitudinal data on graduates from UK universities to evaluate whether unpaid work experience is a stepping stone into paid or stable employment. We document the characteristics and occupations of recent graduates taking unpaid work experience and then use propensity score matching to estimate the treatment effect of unpaid work experience on outcomes 3.5 years after graduation. We find negative treatment effects compared with initially being in paid work, on annual salary (£2900), job security and attainment of a professional occupation (both 9% pts). We find no evidence of a benefit to salary or job attributes compared with initially being out of the labour force.

KEYWORDS
higher education, human capital, job satisfaction, Unpaid work

JEL CLASSIFICATION
J24; J28; J31; K31

1 | INTRODUCTION

Is unpaid work experience a stepping stone into a good job? It has been shown that the wages of workers initially employed on atypical contracts (including temporary, agency and flexible workers, and interns) do catch up with peers initially employed under standard contracts (Bertrand-Cloodt et al., 2012; Booth et al., 2002; Cerulli-Harms, 2017; Cockx and Picchio, 2012; Ichino et al., 2008). But there has hitherto been no evidence on whether those taking unpaid work also catch up with their peers in paid work. In this paper, we test whether unpaid work experience is a dead end, with

comparable prospects to those out of the labour force, or a stepping stone to more favourable labour market outcomes.

Unpaid work experience is rare, even among recent graduates. In our data, only 1% were taking unpaid work experience 6 months after graduation. Despite this, the returns to unpaid work experience deserve attention for two reasons.

First, given the financial and opportunity costs of taking unpaid work experience, it is important that graduates are well informed about the likely returns. The existing literature on atypical contracts suggests that unemployed workers or those entering the labour market for the first time should accept temporary, fixed-term or flexible positions as doing so will leave a smaller and shorter-lived scar than remaining out of work. In this paper, we evaluate whether graduates taking unpaid work also suffer a smaller penalty, relative to entering paid work, than those remaining out of work.

Second, many existing unpaid work positions are illegal, and lawmakers in the UK are currently considering a Bill to further restrict the practice. If employers are to be criminalized for providing unpaid work experience, and adults denied the opportunity to take it, it is important that the motivation behind the law is founded in evidence.

Current UK law states that 'workers', those working set hours, doing set tasks and contributing value to the organization, are entitled to the minimum wage.[1] However, the government provides extensive guidance for employers and prospective staff on permissible arrangements for unpaid work experience (Department for Business, Energy and Industrial Strategy, 2013). The 'Unpaid Work Experience (Prohibition) (No. 2) Bill (2019–21)' being considered by the UK Parliament would, if enacted, outlaw any unpaid work experience lasting longer than four weeks (UK Parliament, 2020). Following the recommendations of a weight of policy-orientated studies from government, think-tanks and pressure groups (Sutton Trust, 2014; Montacute, 2018; Panel on Access to the Professions, 2009; Roberts, 2017; Social Mobility Commission, 2007) the proposed law is founded on the assumption that the institution of unpaid work experience widens socio-economic inequalities in access to professional occupations. There is no evidence that this is the case. This paper fills that gap.

In this paper, we first describe the characteristics and outcomes of recent graduates in the UK who took unpaid work experience, initially went into paid work, or were out of the labour force. We then use propensity score matching to evaluate the return to unpaid work experience compared with counterfactuals of entering paid work, or being out of the labour force. We also evaluate the robustness of our results to selection on unobservables. We use data from the Destination of Leavers from Higher Education (DLHE) survey, sent to the population of graduates from UK universities on a snapshot day 6 months after leaving university, and to a sample of these for a follow-up survey 3.5 years after graduation.

In line with the policy literature, we confirm that unpaid work experience is most prevalent in competitive and influential occupations in law, creative industries, media and publishing, and research. We also confirm that those taking unpaid work experience are more likely to come from privileged backgrounds. However, we find that a graduate taking unpaid work 6 months after graduation can expect significantly worse labour market outcomes 3.5 years after graduation than one initially taking paid work. This holds with respect to salary (£ 2,900 per year), job security (9.4 percentage points less likely to be employed on a permanent contract) and occupational attainment (8.5 percentage points less likely to be in a professional or managerial occupation). This shows that contrary to the motivation for current moves to restrict unpaid work experience, it does not improve graduates' occupational attainment. Indeed, we show that the labour market outcomes of such graduates are very similar to those who were initially out of the labour force. Unpaid work does not pay off, even 3 years after it is taken.

The rest of this paper is structured as follows: In Section 2, we describe our dataset, define our explanatory and outcome variables and present descriptive statistics. In Section 3, we describe our method to identify the causal effect of unpaid work experience and to evaluate robustness to selection on unobservables. In Section 4, we present our results, and in Section 5, we conclude.

2 | DATA

2.1 | Dataset and sample selection

We use data from the Higher Education Statistics Agency's (HESA) Destination of Leavers from Higher Education (DLHE) surveys for 2005–2011 graduates. We restrict our analysis to English and Welsh domiciled, young (21 or under when they started their course) students graduating from a full-time 3-year first degree (without a year abroad or in industry) from an English or Welsh institution. We do this to minimize differences in work experience accumulated before, during or as part of university courses.

The sample frame for the First Destinations survey was the population of university leavers. They were contacted in January, 6 months after graduation, to provide information about their activities on a snapshot day. This we refer to as the '6-month survey'. The Destination of Leavers Longitudinal survey was sent to a sample selected from respondents to the 2005, 2007 and 2009 graduates' 6-month surveys, a further 3 years later. This we refer to as the '42-month survey'. This survey deliberately oversampled graduates from minority groups, with the aim of ensuring sufficient respondents from each group for statistically robust sub-group analysis (see HESA introductions to the data; HESA, 2007, 2009, 2011; and technical report by IFF Research for HESA, 2011, for more details on sample selection for the 42-month survey).

The 6-month and 42-month surveys achieved 95% and 13% coverage of our eligible population. Table 1 shows the characteristics of the population and responding samples. To account for unequal selection and response probabilities, we link the sample frame with our achieved responses and construct combined sampling and non-response weights. These are equal to the inverse of the predicted probability of participation based on observed characteristics. In all further descriptive statistics and regression models, we weight observations to the profile of the population of graduates for the corresponding year.

2.2 | Definition of unpaid work experience

We derive our indicator for taking unpaid work experience from three questions in the 6-month survey. First, respondents' 'main activity' is 'Employed either full-time or part-time (including self-employed, freelance, voluntary work, or other unpaid work)'. (The other options were 'Unemployed and looking for work', 'Engaged in study or training' or 'Doing something else (e.g. retired, travelling, maternity leave)'.)

Second, the basis of their employment, from the question 'Which of the following best describes this employment?' is 'Voluntary work/other unpaid work'. (The other options were 'Employed full-time', 'Employed part-time', or 'Self-employed or freelance'.)

Third, respondents were asked 'Please fill in your job title and briefly describe your duties'. HESA used this to derive occupations using the Standard Occupational Classification. We restrict our definition of unpaid workers to those in major groups 2 ('Professional occupations'), 3 ('Associated professional and technical occupations') and 4 ('Administrative and secretarial occupations'). We exclude

TABLE 1 Characteristics of population, 6-month respondents and 42-month respondents (per cent, unweighted)

Per cent:	(1) Population	(2) 6-month survey	(3) 42-month survey
High parental SES	37.3	37.2	39.8
SES not classified	15.5	15.3	13.6
Low HE participation neighbourhood	8.5	8.5	7.9
Private School	11.7	11.7	11.4
Oxbridge	2.9	3.0	3.6
Golden Triangle	3.0	3.0	4.1
Russell Group	21.0	21.3	23.9
1994 Group	12.0	12.2	14.2
Male	44.3	44.3	42.7
Black	2.2	2.1	3.6
South Asian	8.0	8.0	8.4
Other Asian	1.9	1.8	2.1
Other Non-white	4.6	4.5	7.9
Non A-level	8.7	8.4	6.7
First / 2:1 class degree	64.7	65.0	68.7
Disability	8.6	8.6	9.6
Unemployment rate	2.7	2.7	2.4
N	1,370,090	1,292,283	63,095

Notes: Population: English and Welsh domiciled, young graduates from 3-year bachelor's degrees at English and Welsh Higher Education Institutions, academic years 2005–2011. Forty-two-month sample drawn from 2005, 2007 and 2009 cohorts only. All control variables are as measured at time university application, in university student records, except degree class (determined at time of graduation) and the domicile unemployment rate (travel-to-work-area of domicile, measured at 6 months after graduation for population and 6-month survey, 42 months after graduation for 42-month sample). High parental SES is classes 1 and 2 (higher and lower managerial or professional occupations). Low HE (higher education) participation neighbourhood is an indicator for domicile in a Census Area Statistics ward in the bottom quintile of rates of HE participation.

those in group 1 ('Managers, directors and senior officials'). We assume these to be self-employed or directing a start-up project. We manually exclude further roles in teaching and medical professions which we expect to represent training placements. The resulting list of occupations is shown in Table 4.

Our mutually exclusive counterfactual activities are (i) paid work, which includes part-time; and (ii) out of the labour force, which includes unpaid workers or volunteers not meeting the above criteria, and those unemployed, waiting to start work or travelling. We exclude those in further study from both groups and from our main analysis.

2.3 | Characteristics of recent graduates taking unpaid work experience

Table 2 plots the proportion of recent graduates undertaking each activity 6 months after graduation, by year of graduation. Only 0.95% of recent graduates are observed taking unpaid work, but this disguises a tripling from 0.5% to 1.5% between 2007 and 2011 graduates.

TABLE 2   Activity 6 months after graduation, by year of graduation: Per cent

	2005	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**
Unpaid work exp'	0.5	0.5	0.5	0.8	1.3	1.2	1.5
Paid work	70.0	69.7	70.1	66.6	63.6	66.7	66.8
Further study	15.1	15.2	15.2	15.3	16.7	14.7	14.2
Out of labour force	13.9	13.9	13.5	16.4	17.2	16.1	16.1
N	116,155	119,680	126,850	138,105	139,390	145,855	153,280

Note: Estimated population proportions from respondents to 6-month DLHE survey, weighted to profile of graduating population (see Table 1)

Table 3 shows the estimated population characteristics by labour market activity 6 months after graduation. This shows that relative to graduates in paid work, the following are overrepresented among those taking unpaid work experience: graduates of high socio-economic status (high SES, those with a parent in professional or managerial occupation), from areas with higher university participation rates, who attended private schools prior to university, who attended elite or research-intensive universities (Oxbridge, Golden Triangle, Russell Group or 1994 Group), or who attained a first or upper second ('2:1') class degree. All these indicate positive selection into unpaid work by aspects of prior advantage or educational performance. On the other hand, graduates from all four non-White ethnic groups, those with a disability and from areas facing a higher unemployment rate are also overrepresented. This suggests some selection associated with labour market disadvantage. These comparisons also hold when comparing those in unpaid work with those out of the labour force.

The demographic profile of those in unpaid work is more similar to those in further study. These groups have in common that they are incurring an opportunity cost by foregoing earnings early after graduation and potentially a significant financial cost too. It is estimated that the cost of taking a six-month programme of unpaid work experience in London and living independently rose from £ 5,500 in 2014 to £ 6,114 in 2018 (Sutton Montacute, 2018; Trust, 2014). This is less than the average cost of pursuing a taught master's degree in the UK, though greater uncertainty about the returns mean there are not well-developed credit markets for prospective unpaid workers (Carneiro and Heckman, 2002).

2.4 | Prevalence of unpaid work experience by occupation

Although a small proportion of all graduates, those taking unpaid work experience comprise a large proportion of the recent graduate intake in several occupations. Table 4 documents the share of all working (paid and unpaid) recent graduates in each occupation (column 1); the share of all unpaid recent graduates in each occupation (column 2); and the share of working recent graduates in each occupation who are unpaid (column 3). We show these figures for the pooled sample of 2005–2010 cohorts, assigned occupations under the 2000 Standard Occupational Classification.

These occupations in Table 4 are sorted in order of their overall number of unpaid working graduates. Two occupations stand out both for this overall number and the within-occupation share of unpaid workers: 'Media associate professionals' and 'Research professionals' are first and third by total number of unpaid workers (17.7% and 12.2% of the total, respectively) and third and second in terms of within-occupation share (7.2% and 8.2%). The group 'Administrative occupations: General' employs 14% of all unpaid recent graduates in our data, but as this occupation employers many more workers in total, the within-occupation share who are unpaid is only 2.3%. In contrast, only 1.6% of

TABLE 3 Graduate characteristics by activity 6 months after graduation

	Unpaid work experience	Paid work	Further study	Out of labour force
% of group who are				
High parental SES	51.2	43.6***	50.0*	42.9***
Low HE participation neighbourhood	5.3	8.8***	8.5***	8.3***
Private school	17.0	10.5***	16.6	12.0***
Oxbridge	6.4	2.0***	6.5***	2.7***
Golden Triangle	4.3	2.7***	4.6	2.5***
Russell Group	21.6	19.8***	28.8***	19.2***
1994 Group	14.6	11.2***	16.7***	11.1***
Male	39.5	43.0***	44.1	51.3***
Black	4.3	2.1***	1.9***	2.9***
South Asian	10.4	7.5***	9.0***	10.4
Other Asian	2.5	1.6***	2.4	2.5
Other Non-white	6.5	4.2***	5.2***	5.6***
Non A-level (vocational)	8.7	7.8**	4.8***	8.9
First/2:1 class degree	74.2	62.5***	77.6***	59.3***
Disability	12.3	8.4***	8.9***	10.4***
Mean of				
domicile unemployment rate, %	3.08	2.93***	2.93***	3.01***
N	8,660	634,065	143,015	128,525

Notes: Estimated population proportions or means from respondents to 6-month DLHE survey, weighted to profile of graduating population (see Table 1). All control variables are as measured at time university application, in university student records, except degree class (determined at time of graduation) and the domicile unemployment rate (travel-to-work-area of domicile, measured at 6 months after graduation). High parental SES is classes 1 and 2 (higher and lower managerial or professional occupations). Low HE (higher education) participation neighbourhood is an indicator for domicile in a Census Area Statistics ward in the bottom quintile of rates of HE participation. Significant differences from those initially in unpaid work indicated by: *** for $p<0.001$; ** for $p<0.01$; * for $p<0.05$, tests of differences in means (unemployment rate) and proportions (all other variables).

unpaid recent graduates are 'Librarians and related professionals' (a category that includes museum archivists and curators) but this occupation has the highest within-occupation share of unpaid workers at 9.5%.[2]

We analysed the wage structures of these occupations in the Annual Population Survey, to test whether occupations with many unpaid workers are characterized by a tournament wage structure. This would entail a low median wage and high variance. We might expect this if graduates are prepared to take unpaid work experience when the opportunity cost is low but potential returns are high. We find no support for this, but some evidence from reported motivations that unpaid work experience is taken with a view to future progression. (We show full results on motivations and the tournament structure in Annex A1.)

TABLE 4 Occupations employing recent graduates as unpaid workers

| 3-digit code | Minor group name | 2000 Standard Occupational Classification (2003–2010 graduates) | | |
		(1) Share of working graduates (per cent)	(2) Share of unpaid working graduates (per cent)	(3) Share of graduates in this occupation who are unpaid (per cent)
343	Media associate professionals	2.3	17.7	7.2
415	Administrative occupations: General	5.5	14.0	2.3
232	Research professionals	1.3	12.2	8.2
342	Design associate professionals	2.5	10.0	4.0
411	Admin' occ's: Gov't and related organizations	1.7	9.1	4.9
354	Sales and related associate professionals	4.9	8.7	1.8
341	Artistic and literary occupations	1.6	6.4	3.8
353	Business and finance associate professionals	4.0	5.5	1.4
421	Secretarial and related occupations	2.1	2.3	0.9
244	Public service professionals	0.7	2.0	2.3
245	Librarians and related professionals	0.2	1.6	9.5
241	Legal professionals	0.2	1.5	5.9
213	ICT professionals	2.7	1.4	0.5
352	Legal associate professionals	0.5	1.4	2.5
413	Administrative occupations: Records	3.4	1.3	0.4
412	Administrative occupations: Finance	3.2	1.2	0.4
312	Draughtspersons and building inspectors	0.7	0.9	1.4
313	IT service delivery occupations	1.2	0.9	0.7
311	Science and engineering technicians	1.2	0.9	0.8
242	Business and statistical professionals	3.0	0.8	0.3

TABLE 4 (Continued)

3-digit code	Minor group name	2000 Standard Occupational Classification (2003–2010 graduates)		
		(1)	(2)	(3)
		Share of working graduates (per cent)	Share of unpaid working graduates (per cent)	Share of graduates in this occupation who are unpaid (per cent)
356	Public service and other associate professionals	2.7	0.3	0.1
N		531,675	6410	538,085

Notes: Estimated population proportions, from respondents to 6-month DLHE survey, weighted to profile of graduating population (see Table 1). Occupations are sorted by share of unpaid working graduates from the 2000 Standard Occupational Classification. Complete list of occupations: **343 Media associate professionals:** 3431 journalists, newspaper & periodical editors, 3432 broadcasting associate professionals, 3433 public relations officers, 3434 photographers audio-visual equipment operators. **415 Administrative occupations—General:** 4150 general office assistants/clerks. **232 Research professionals:** 2321 scientific researchers, 2322 social science researchers, 2329 researchers n.e.c. **342 Design associate professionals:** 3421 graphic designers, 3422 product, clothing & related designers. **411 Admin' occ's—Gov't and related organisations:** 4111 civil service executive officers, 4112 civil service administrative officers & assistants, 4113 local government clerical officers & assistants, 4114 officers of non-governmental organisations. **354 Sales and related associate professionals:** 3541 buyers & purchasing officers, 3542 sales representatives, 3543 marketing associate professionals, 3544 estate agents, auctioneers. **341 Artistic and literary occupations:** 3411 artists, 3412 authors, writers, 3413 actors, entertainers, 3414 dancers choreographers, 3415 musicians, 3416 arts officers, producers & directors. **353 Business and finance associate professionals:** 3531 estimators, valuers & assessors, 3532 brokers, 3533 insurance underwriters, 3534 finance investment analysts/advisers, 3535 taxation experts, 3536 importers, exporters, 3537 financial accounting technicians, 3539 business-related associate professionals n.e.c. **421 Secretarial and related occupations:** 4211 medical secretaries, 4212 legal secretaries, 4213 school secretaries, 4214 company secretaries, 4215 personal assistants & other secretaries, 4216 receptionists, 4217 typists. **244 Public service professionals:** 2441 public service administrative professionals, 2442 social workers, 2443 probation officers, 2444 clergy. **245 Librarians and related professionals:** 2451 librarians, 2452 archivists & curators. **241 Legal professionals:** 2411 solicitors & lawyers, judges coroners, 2419 legal professionals n.e.c. **213 ICT professionals:** 2131 IT strategy & planning professionals, 2132 software professionals. **352 Legal associate professionals:** 3520 legal associate professionals. **413 Administrative occupations—Records:** 4131 filing & other records assistants/clerks, 4132 pensions & insurance clerks, 4133 stock control clerks, 4134 transport & distribution clerks, 4135 library assistants/clerks, 4136 database assistants/clerks, 4137 market research interviewers. **412 Administrative occupations—Finance:** 4121 credit controllers, 4122 accounts & wages clerks, book-keepers, other financial clerks, 4123 counter clerks. **312 Draughtspersons and building inspectors:** 3121 architectural technologists town planning technicians, 3122 draughtspersons, 3123 building inspectors. **313 IT service delivery occupations:** 3131 IT operations technicians, 3132 IT user support technicians. **311 Science and engineering technicians:** 3111 laboratory technicians, 3112 electrical/electronics technicians, 3113 engineering technicians, 3114 building & civil engineering technicians, 3115 quality assurance technicians, 3119 science & engineering technicians n.e.c. **242 Business and statistical professionals:** 2421 chartered & certified accountants, 2422 management accountants, 2423 management consultants, actuaries, economists & statisticians. **356 Public service and other associate professionals:** 3561 public service associate professionals, 3562 personnel & industrial relations officers, 3563 vocational & industrial trainers instructors, 3564 careers advisers & vocational guidance specialists, 3565 inspectors of factories, utilities trading standards, 3566 statutory examiners, 3567 occupational hygienists & safety officers (health safety), 3568 environmental health officers.

2.5 | Definitions of outcome variables

Table 5 summarizes our outcome variables in the 42-month survey, by activity 6 months after graduation.

Annual gross salary was missing for 10% of respondents in paid work. To increase the sample size, we impute these missing salaries. We use the predicted mean salary for workers in the same

TABLE 5 Mean labour market outcomes 42 months after graduation by activity 6 months after graduation

	Activity 6 months after graduation			
	Unpaid work experience	Paid work	Further study	Out of labour force
Salary (£) (no imputation)	22,703	26,384	25,692	23,968
	(325)	(29,110)	(6230)	(4915)
Salary (£)(incl. imputed)	21,493	24,835***	24,280***	21,605
	(380)	(32,590)	(6925)	(5520)
In work	0.822	0.890***	0.726***	0.804
	(480)	(37,700)	(10,080)	(7125)
Permanent contract | In work	0.668	0.788***	0.703	0.749**
	(375)	(31,860)	(6755)	(5940)
Professional occupation | In work	0.325	0.487***	0.648***	0.383**
	(375)	(31,860)	(6755)	(5940)
Very satisfied with career (All)	0.262	0.349***	0.408***	0.242
	(480)	(37,700)	(10,080)	(7125)
Very satisfied with career | In work	0.271	0.370***	0.436***	0.274
	(375)	(31,860)	(6755)	(5940)
Same occupation as at 6 months In work	0.149	0.317***	NA	NA
	(375)	(31,860)		

Notes: Estimated population proportions or means from respondents to 42-month DLHE survey by activity 42 months after graduation, weighted to profile of graduating population (see Table 1). Figure in parentheses is sample size from which statistic is calculated. Significant differences from those initially in unpaid work indicated by: *** for $p<0.001$; ** for $p<0.01$; * for $p<0.05$, from tobit regression (imputed salary) and tests of differences in means (no-imputation salary) and proportions (all other outcome variables). Imputed values of salary, share of unpaid workers in 3-digit occupation and mean salary in 3-digit occupation all calculated from the pooled sample of workers in the same occupation in the Annual Population Survey.

government office region, industry sector, 3-digit occupation, full-time status, contract type (permanent or temporary) and employer size (four groups), in the Annual Population Survey for the corresponding financial year (Office for National Statistics and Social Survey Division, 2019). We use a tobit regression model for these predictions, because salaries in the Annual Population Survey are top-coded at £ 40,000.[3]

The outcome 'In work' is equal to one if the respondent is in paid employment. Conditioning on being in work, the outcome 'Professional occupation' is equal to one for those in the managerial and professional major groups of the Standard Occupational Classification, and 'Permanent contract' is equal to one for those on a permanent or open-ended contract, rather than temporary, fixed-term or other contract types. The outcome 'Very satisfied with career' is equal to one for those answering the question 'Given what you have told us so far, how satisfied are you with your career to date?' with the highest category 'Very satisfied' and zero otherwise ('Not applicable' or not at all, not very or fairly satisfied).

Table 5 shows that by most measures those initially taking unpaid work subsequently experience inferior labour market outcomes to those both in paid work and in further study, and comparable outcomes to those initially out of the labour force. For example, using our preferred salary measure (including imputations), the annual deficit between initially unpaid and paid workers is £3,342, between unpaid and further study is £4,041, but between unpaid and those out of the labour force just £112.

This pattern of relative outcomes is largely replicated for career satisfaction. Those taking unpaid work are less likely to be in paid work after 3.5 years than those initially in paid work, but more likely than those in further study, reflecting the latter group's delay in attempting to enter the labour market. Those initially in unpaid work are also less likely to have attained a permanent contract or professional occupation than all comparators, even those initially out of the labour force.

These raw differences in outcomes may not represent causal effects of unpaid work experience for two reasons. First, as shown in Table 3, there is differential selection into unpaid work experience by observable characteristics that we would expect also to affect labour market outcomes, both positively (e.g. high SES, private schooling, degree class) and negatively (e.g. non-White, vocational schooling, disability). Second, there may be selection on unobservable characteristics that would also affect labour market outcomes, such as occupation-specific career aspirations, skills valued by employers or the (in)ability to signal these skills. In the next section, we describe our methods to account for these issues.

3 | METHODS

3.1 | Identification strategy

In an ideal setting, we would identify the effect of taking unpaid work by exploiting random or quasi-random variation in the propensity to take such positions. Unfortunately, there have been no changes to regulations on unpaid work experience in any region of the UK during our period of observation that could facilitate a difference-in-difference approach. There are also no variables in our data correlated with opportunities or compulsion to take unpaid work experience that we would not also expect directly to affect later labour market outcomes. This prevents us from adopting an instrumental variables strategy.

To overcome these obstacles, we adopt a matching approach. This yields unbiased estimates if selection into unpaid work experience is on observable characteristics only. With the rich set of individual characteristics in our data we have some confidence in applying this method, but take additional steps to evaluate robustness to selection on unobservables. This method is in line with work evaluating Active Labour Market Programmes, where there is similarly no available natural experiment (Aakvik, 2001; Lechner, 2002).

3.2 | Estimation

We seek to identify the treatment effect β_u of taking an unpaid position U, on the subsequent labour market outcome Y:

$$\beta_u = E[Y_{1i}] - E[Y_{0i}] \tag{1}$$

Here, Y_{1i} and Y_{0i} are the outcomes measured 3.5 years after graduation, for individual i in the case of unpaid work participation 6 months after graduation (Y_{1i}) and no unpaid work participation 6 months after graduation (Y_{0i}). The treatment effect β_u cannot directly be observed because we only ever observe one of these outcomes for each individual i.

For our propensity score matching estimates, we match individuals to their nearest neighbour according to their conditional probability of participating in unpaid work experience given their

pre-treatment characteristics. Formally, we assume that within cells defined by our pre-treatment characteristics ($\mathbf{X}_i$), opportunities arrive such that the assignment to the unpaid work experience treatment (U) is random. In this case, Rosenbaum and Rubin (1983) show that treatment is also random within cells defined by the one-dimensional propensity score ($p(X_i) \equiv Pr(U = 1 | \mathbf{X})$). The Average Treatment Effect on the Treated (ATT) can therefore be evaluated as the expectation of the difference between the outcomes of pairs of individuals with the same propensity score, one of whom takes unpaid work experience ($U_i = 1$) whereas the other does not ($U_i = 0$):

$$
\begin{aligned}
ATT &\equiv E(Y_{1i} - Y_{0i} | U_{i=1}) \\
&= E(EY_{1i} - Y_{0i} | U_{i=1}, p(\mathbf{X}_i)) \\
&= E(E(Y_{1i} | U_i = 1, p(\mathbf{X}_i)) - E(Y_{0i} | U_i = 0, p(\mathbf{X}_i)) | U_i = 1)
\end{aligned}
\tag{2}
$$

Matching should only be conducted on variables that are predetermined with respect to the treatment. This means that we cannot match on occupation or accumulated experience. In Annex A4, we present tobit and probit regression estimates of the corresponding treatment effects after controlling for occupation and experience in a Mincer-type specification. The conclusions of this paper are robust to using these alternative estimators.
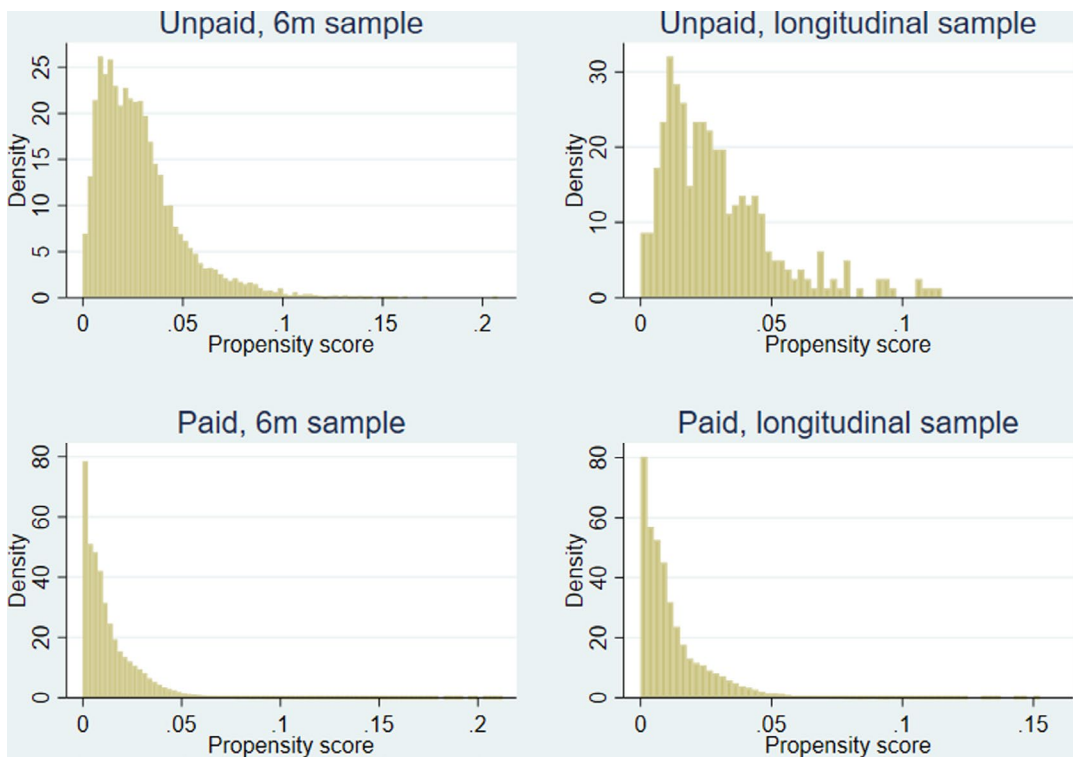
3.2.1 | Propensity scores and common support

We estimate propensity scores for selection into unpaid work experience using a probit regression on the sample of respondents to the 6-month survey, weighted to the population profile of all graduates in the relevant years. (The underlying regressions are presented in Annex A2.) To estimate treatment effects on our outcome variables, we implement nearest neighbour matching on respondents to the 42-month longitudinal survey. Figures 1 and 2 summarize the effects of sample attrition, by plotting the density of estimated propensity scores in the 6-month survey (left panels) and those observed in the 42-month survey with a valid (reported or imputed) salary (right panel). The upper panels show those initially in unpaid work and the lower panels their comparison group. We show sample sizes and the region of common support in the longitudinal sample in the notes to each figure.

We estimate treatment effects using the sample of matched pairs within the range of common support only. This means we drop observations in the right-tail of the propensity score distribution, rather than match them with nearest neighbours who are very different to them. Our estimates for salary are based on 325 unpaid workers, each matched to a paid worker or a graduate who is out of the labour force. Final sample sizes are slightly larger for other outcome variables that do not condition on being in paid work 3.5 years after graduation.

3.2.2 | Bound test statistics: Robustness to unobserved factors

To evaluate the robustness of our results to selection on unobservables, we compute Mantel–Haenszel and Rosenbaum Bound Test Statistics (Mantel and Haenzel, 1959, with respect to binary outcome variables; Rosenbaum and Rubin, 1983, with respect to salaries). These statistics indicate the extent to which an additional unobserved factor must increase the odds of selection into unpaid work for a significant estimate to become statistically insignificant. We calculate these using the mhbounds (Becker and Caliendo, 2007) and rbounds (diPrete and Gangl, 2004) procedures in Stata.

FIGURE 1 Propensity scores for unpaid workers and paid workers. Note: Sample sizes: unpaid, 6 months: 8660; paid, 6 months: 632,165; unpaid, longitudinal: 325; paid, longitudinal: 27,305. Region of common support in final (longitudinal) matched sample is 0.0015 to 0.1126

4 | RESULTS

We present our estimation results in Table 6. In the upper panel (A), we compare those initially taking unpaid work experience with those in paid work and in the lower panel (B) with those initially out of the labour force.

Column (1) of Panel A shows a negative treatment effect of unpaid work versus paid work on annual salary 42 months after graduation of £2872. Following Aakvik (2001), we consider to be robust only those treatment effects with statistical significance that survives unobservable factors increasing the odds of selection by a factor of 1.25 or above. This threshold is met for this outcome and comparison group: the Rosenbaum test statistic shows that an unobserved factor negatively correlated with salaries would need to increase the odds of selection into unpaid work experience, conditional on the propensity score, by a factor of at least 1.41 for us to fail to reject the null hypothesis of zero treatment effect.

Column (1) of Panel B shows that those taking unpaid work experience at 6 months have neither higher nor lower salaries after 3.5 years, than those initially out of the labour force. Hence, over this horizon, unpaid workers neither catch up with paid workers, nor gain ground ahead of those out of the labour force.[4]

Column (2) shows those initially taking unpaid work experience are 4.0 percentage points less likely to be in employment after 3.5 years than those initially in paid work, but 4.7 percentage points more likely than those out of the labour force. These results are only marginally or not significant at
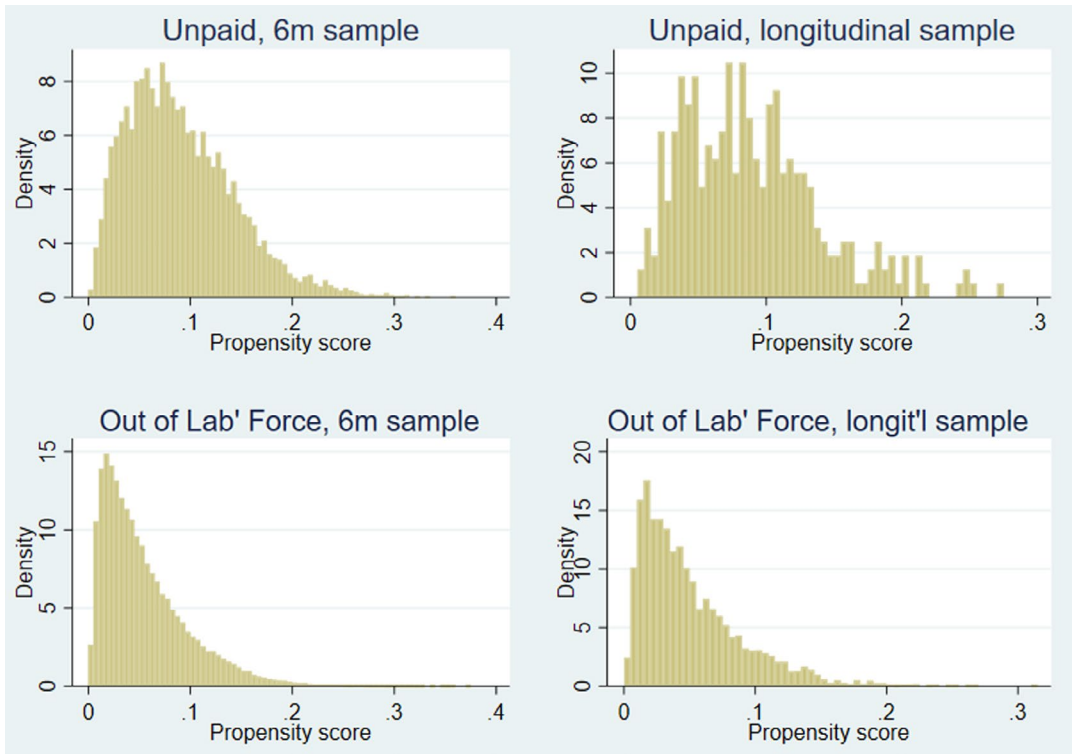
FIGURE 2 Propensity scores for unpaid workers and out of the labour force. Note: Sample sizes: unpaid, 6 months: 8660; out of labour force, 6 months: 144,030; unpaid, longitudinal: 325; out of labour force, longitudinal: 4634. Region of common support in final (longitudinal) matched sample is 0.0064 to 0.2729

the 5% level and are not robust to selection on unobservables (permitted influence of an unobserved factor on odds of selection is a maximum of 1.09, even for 90% rather than 95% confidence).

Columns (3) and (4) show that, conditional on being in paid work after 3.5 years, those initially taking unpaid work experience are 9.4 percentage points less likely to have a permanent contract and are 8.5 percentage points less likely to be in a professional occupation than those initially in paid work. Both are statistically significant but do not meet our threshold for robustness to selection on unobservables. There is no support for a significant treatment effect compared with those out of the labour force, though point estimates are negative.

Column (5) shows that those initially taking unpaid work experience are 6 percentage points less likely to be very satisfied with their career than those in paid work. This is statistically significant but not robust to selection on unobservables. Compared with those initially out of the labour force, unpaid workers are 2 percentage points more likely to be very satisfied with their career, but this result is not significant at any conventional level. Yet again, we find no evidence that unpaid work experience provides a stepping stone to a more desirable labour market outcome.

We show checks for robustness to restricting estimation to those initially taking paid or unpaid work in occupations with many unpaid workers, and to controlling for observed characteristics in tobit or probit regressions, in Annex A3. These additional specifications confirm the clear finding of our main results: that unpaid work experience does not pay off, even three years after it is taken.

TABLE 6 Propensity score matching estimates of the effect of unpaid graduate work experience on subsequent outcomes

	(1) Salary	(2) In work	(3) Permanent contract	(4) Professional occupation	(5) Very satisfied with career
Panel A: Unpaid work experience versus paid work					
Average Treatment Effect on the Treated (standard error)	−2872.21	−0.040	−0.094	−0.085	−0.058
	(680.65)	(0.025)	(0.036)	(0.039)	(0.032)
t-stat	−4.22	−1.61	−2.65	−2.17	−1.84
Rosenbaum or Mantel–Haenszel Bounds					
Retain sig' at 5%	1.41	1.02	1.13	1.09	1.04
Retain sig' at 10%	1.47	1.09	1.21	1.17	1.09
N matched pairs	325	445	330	330	445
Panel B: Unpaid work experience versus being out of the labour force					
Average Treatment Effect on the Treated (standard error)	867.37	0.047	−0.030	−0.035	0.020
	(711.40)	(0.028)	(0.036)	(0.037)	(0.031)
t-stat	1.22	1.67	−0.84	−0.95	0.65
Rosenbaum or Mantel–Haenszel Bounds					
Retain sig' at 5%	NA	NA	NA	NA	NA
Retain sig' at 10%	NA	1.04	NA	NA	NA
N matched pairs	325	445	370	370	445

Notes: Samples comprise respondents to DLHE 42-month surveys on 2005, 2007 and 2009 graduating cohorts, who were in unpaid work 6 months after graduation, plus either those in paid work or out of the labour force 6 months after graduation. Matching variables: SES (2 dummies); privately schooled; male; ethnicity (4 dummies); non-A-level track; first-class or upper second-class degree; disability; unemployment rate in travel-to-work-area of domicile, plus missing dummy; year of graduation (2 dummies); university mission group (4 dummies); subject of study (18 dummies). Rosenbaum bounds are for salary; Mantel–Haenszel bounds are for all other (binary) outcomes.

5 | CONCLUSIONS

In this paper, we have shown that taking unpaid work experience provides comparable prospects to foregoing early post-graduation work experience altogether. Unpaid work experience is a stepping stone to paid employment, but not to any other measure of favourable labour market outcomes, including earnings, job security, attainment of a professional occupation or career satisfaction. Meanwhile, compared with their peers who went into paid work 6 months after graduation, we find a significant penalty along most of these dimensions.

It is important to highlight that our conclusions are based on a snapshot 3.5 years after graduation. The full benefits of unpaid work experience may not yet have materialized. Bertrand-Cloodt et al. (2012), Booth et al. (2002) and Cerulli-Harms (2017) find that a 5- to 10-year period is required for the wage scar from temporary work or internship experience to be eliminated. However, our results indicate a significant deficit in lifetime earnings to that date. The welfare cost of such a wage penalty will be important for young graduates, who have been shown to be both credit-constrained and averse to debt (Field, 2009; Minicozzi, 2005; Rothstein and Rouse, 2011).

There are three implications of the findings of this paper. First, it is important that recent graduates have accurate information about the prospects of those taking unpaid work experience. University

careers services should impress upon their soon-to-be-graduates the expectation that a period of unpaid graduate work experience is not an investment that will 'pay off' on average with respect to future earnings, job attributes or satisfaction. We find no evidence that such experiences act as a 'foot in the door' to professional occupations.

Second, we have shown that recent graduates taking unpaid work experience are positively selected on SES, neighbourhood university participation and private schooling and that a sizeable proportion of recent graduates in high profile media and legal professions, or administrative positions in government, are working unpaid. However, our results show negative returns to unpaid work experience on occupational attainment. This indicates that access to unpaid work experience is not a contributing factor to unequal access to professional occupations by SES. Restricting opportunities for unpaid work experience in law will not, therefore, reduce this inequality.

Third, the possibility of unpaid work experience positions being exploitative is a major concern among lawmakers legislating on this issue. This has been countered with arguments that unpaid work experience is valuable for the participant. (See, for example parliamentary debates on the 'Unpaid Work Experience (Prohibition)' Bills in the UK Parliament, Hansard, 2017, 2020.) The scar we find compared with paid workers, and lack of evidence for any benefit compared with those out of the labour force, is not necessarily evidence that exploitation is occurring. However, our results show the counteracting welfare argument in favour of unpaid work experience is very weak.

ENDNOTES

[1] These rules are similar in the United States, with the key requirements for an unpaid worker's position to be legal being that he/she "does not displace regular employees" (United States Department of Labor, 2010).

[2] 2011 graduates' occupations are allocated under the 2010 Standard Occupational Classification. Inspecting these reveals some sharp upward shifts in the share of unpaid recent graduates in the Media, Research and Librarian occupations to 13.4%, 15.0% and 15.2%, also joined by a large increased in the proportion of recent graduates in 'Administrative occupations [in] government and related occupations' from under 5% to 14%. No 2011 graduates feature in our 42-month survey data.

[3] Among those who *do* report a salary, the predictive power of this imputation method is similar for our treatment and comparison groups, with a correlation of 0.61 for initially unpaid workers, 0.57 for initially paid workers and 0.65 for those initially out of the labour force.

[4] Excluding imputed salaries reduces our estimation sample to 270 matched pairs. This reduces statistical precision but does not qualitatively affect the point estimates or statements of statistical significance.

REFERENCES

Aakvik, A. (2001) Building a matching estimator: the case of a Norwegian training program. *Oxford Bulletin of Economics and Statistics*, 63(1), 115–143.

Becker, S. & Caliendo, M. (2007) Sensitivity analysis for average treatment effects. *Stata Journal*, 7(1), 71–83.

Bertrand-Cloodt, D., Cörvers, F., Krichel, B. & van Thor, J. (2012) Why do recent graduates enter into flexible jobs? *De Economist*, 160, 157–175.

Booth, A., Francesconi, M. & Frank, J. (2002) Temporary jobs: Stepping stones or dead ends. *The Economic Journal*, 112(480), F189–F213.

Carneiro, P. & Heckman, J. (2002) The evidence on credit constraints in postsecondary schooling. *Economic Journal*, 112, 705–734.

Cerulli-Harms, A. (2017) *Generation internship: The impact of internships on early job market performance*. IZA Discussion Papers 11163.

Cockx, B. & Picchio, M. (2012) Are short-lived jobs stepping stones to long-lasting jobs? *Oxford Bulletin of Economics and Statistics*, 74(5), 646–675.

Department for Business, Energy and Industrial Strategy (2013) *National minimum wage: work experience and internships*. https://www.gov.uk/national-minimum-wage-work-experience-and-internships, published 15th May 2013, [Accessed 1 May 2015].

DiPrete, T. & Gangl, M. (2004) Assessing bias in the estimation of causal effects: Rosenbaum bounds on matching estimators and instrumental variables estimates with imperfect instruments. *Sociological Methodology*, 34, 271–310.

Field, E. (2009) Educational debt burden and career choice: Evidence from a financial aid experiment at NYU Law school. *American Economic Journal: Applied Economics*, 1, 1–21.

Hansard. (2017) *Unpaid Work Experience (Prohibition) Bill [HL], Second Reading Debates*. 27th October 2017, Available at https://hansard.parliament.uk/lords/2017-10-27/debates/1CC18AF0-4140-46EC-A435-2C1EB ED9E707/Debate

Hansard. (2020) *Unpaid Work Experience (Prohibition) (No. 2) Bill, Second Reading Debates*. 11th September 2020, Available at https://hansard.parliament.uk/commons/2020-09-11/debates/FACC2196-DB36-4F94-A085-F34C9 9E8A84D/UnpaidWorkExperience(Prohibition)(No2)Bill.

HESA (Higher Education Statistics Agency). (2007) *Destinations of Leavers from Higher Education Longitudinal 2002/03*. https://www.hesa.ac.uk/data-and-analysis/publications/long-destinations-2002-03.

HESA (Higher Education Statistics Agency). (2009) *Destinations of Leavers from Higher Education Longitudinal 2004/05*. https://www.hesa.ac.uk/data-and-analysis/publications/long-destinations-2004-05.

HESA (Higher Education Statistics Agency). (2011) *Introduction - Destinations of Leavers Longitudinal survey 2006/07*. https://www.hesa.ac.uk/data-and-analysis/publications/long-destinations-2006-07/introduction.

Ichino, A., Mealli, F. & Nannicini, T. (2008) From temporary help jobs to permanent employment: what can we learn from matching estimators and their sensitivity. *Journal of Applied Econometrics*, 23, 305–327.

IFF Research for HESA: Higher Education Statistics Agency. (2011) *DLHE Longitudinal Survey 2006/07 - Technical Report*.

Lechner, M. (2002) Program heterogeneity and propensity score matching: An application to the evaluation of active labor market policies. *Review of Economics and Statistics*, 82(2), 205–220.

Mantel, N. & Haenzel, W. (1959) Statistical analysis of data from retrospective studies. *Journal of the National Cancer Institute*, 22, 718–748.

Minicozzi, A. (2005) The short term effect of education debt on job decisions. *Economics of education Review*, 31, 871–889.

Montacute, R. (2018) *Internships: Unpaid, unadvertised, unfair*. Sutton Trust Research Brief No. 20.

Office for National Statistics, Social Survey Division (2019). *GN 33357: Annual Population Survey 2004-*. Series link: beta.ukdataservice.ac.uk/datacatalogue/series/series?id=200002.

Panel on Fair Access to the Professions. (2009) *Unleashing aspiration: The final report of the Panel on Fair Access to the Professions*.

Roberts, C. (2017) *The inbetweeners: The new role of internships in the graduate labour market*. Institute for Public Policy Research, Available at https://www.ippr.org/research/publications/the-inbetweeners.

Rosenbaum, P. & Rubin, D. (1983) The central role of the propensity score in observational studies for causal effects. *Biometrika*, 70(1), 41–55.

Rothstein, J. & Rouse, C. (2011) Constrained after college: Student loans and early career occupational choices. *Journal of Public Economics*, 9, 149–163.

Social Mobility Commission (2007) *Unpaid internships are damaging to social mobility*. Available at https://www.gov.uk/government/news/unpaid-internshipsare-damaging-to-social-mobility.

Sutton Trust. (2014) *Internship or indenture?* Sutton Trust Research Brief No. 2.

UK Parliament. (2020) *Unpaid Work Experience (Prohibition) (No. 2) Bill (2019-21)*. Available at https://services.parliament.uk/bills/2019-21/unpaidworkexperienceprohibitionno2.html.

United States Department of Labor (2010) *Wage and hour division fact sheet 71: Internships under the fair labor standards act*. Available at https://www.dol.gov/whd/regs/compliance/whdfs71.htm, published April 2010, [Accessed 23 September 2016].

ANNEX A

A1 | TOURNAMENT HYPOTHESIS: MOTIVATIONS AND WAGE STRUCTURES IN OCCUPATIONS WITH MANY UNPAID WORKERS

In this section, we investigate the hypothesis that graduates are prepared to take unpaid work experience if the opportunity cost is low but potential returns are high.

As graduates may not have full information about occupational wage structures, we first evaluate whether graduates' reported motivations for taking their 6-month position are consistent with this hypothesis. We focus on those occupations with at least 5% of all the unpaid graduates in our data, and/or those in which at least 5% of recent graduate employees are unpaid. These are labelled in subsequent tables and specifications as 'occupations with many unpaid workers'.

In Table A1, we list the proportion of paid and unpaid recent graduates in these ten occupations, who select each of the following (in a 'tick all that apply' structure) as a motivation for taking their current position: Fitted exactly: 'It fitted into my career plan/it was exactly the type of work I wanted'; Best or only offer: 'It was the best job offer I received/only job offer I received'; To gain experience: 'To gain and broaden experience in order to get the kind of job I really want'.

These variables provide some indication that unpaid work experience is taken with a view to future progression. Unpaid workers are less likely than paid workers to select the 'Fitted exactly' motivation, apart from the two administrative occupations (minor groups 415 and 411), which may represent an entry into a desired industry rather than final preferred occupation. Unpaid workers are less likely to select 'Best or only offer' in every listed occupation. The survey instrument is ambiguous about the interpretation of 'best' versus 'only'. However, whether we read this as 'It was not the best offer, but they still took it', or 'It was not the only offer, but they still took it', this does suggest unpaid work is more likely to be a strategic than constrained choice. Finally, unpaid workers are more likely to have selected 'To gain experience' for all these occupations.

We next consider whether the wage structure of these occupations supports taking unpaid work experience as a (risky) investment for future labour market outcomes. In Table A2, we describe the population wage structure of these ten occupations, and other occupations collectively, as recorded in the Annual Population Survey. Because wages are top-coded in the Annual Population Survey, at £40,000 per year, the mean and standard deviation are estimated using a tobit model with no additional covariates.

TABLE A1 Motivations for taking positions in occupations employing many recent graduates as unpaid workers

| 3-digit code | Minor group name | Percentage selecting motivation: | | | | | | N Respondents | |
| | | Fitted exactly | | Best or only offer | | To gain experience | | | |
		Unpaid	Paid	Unpaid	Paid	Unpaid	Paid	Unpaid	Paid
343	Media associate professionals	43.7	58.4	15.4	22.7	69.1	42.7	565	6575
415	Administrative occupations: General	28.6	15.8	15.7	34.4	67.1	43.4	425	14,875
232	Research professionals	44.5	58.3	15.0	28.4	75.6	49.0	475	4735
342	Design associate professionals	41.4	61.8	17.2	28.0	60.0	40.7	280	8310
411	Admin' occ's: Gov't and related organizations	32.6	23.2	9.1	30.9	64.2	51.0	310	4656
354	Sales and related associate professionals	42.4	45.2	18.8	35.0	74.9	40.2	415	23,345
341	Artistic and literary occupations	45.6	66.2	15.5	23.6	64.3	38.9	220	7465
353	Business and finance associate professionals	38.9	48.5	14.6	39.1	71.2	38.3	275	18,240
241	Legal professionals	49.7	62.1	11.2	24.2	72.1	32.6	35	765

Sample is recent graduates in occupations employing at least 5% of all unpaid recent graduates, and/or for which at least 5% of its recent graduate employees are unpaid. Weighted to profile of university graduates, but Ns are unweighted cell counts. Fitted exactly: 'It fitted into my career plan/it was exactly the type of work I wanted'. Best or only offer: 'it was the best job offer I received/only job offer I received'. To gain experience: 'To gain and broaden experience in order to get the kind of job I really want'.

**TABLE A2** Population wage distributions in occupations employing many recent graduates as unpaid workers

3-digit code	Minor group name	Median	Mean	>£40,000 (%)	Std. Dev	N (in APS)
343	Media associate professionals	24,042	25,245	17.1	21,475	26,345
415	Administrative occupations: General	13,418	13,960	2.6	9886	37,060
232	Research professionals	25,012	25,455	10.4	13,217	2505
342	Design associate professionals	21,917	22,748	8.1	16,491	6905
411	Admin' occ's: Gov't and related organizations	16,151	17,265	3.1	9410	29,975
354	Sales and related associate professionals	25,227	26,810	19.0	16,555	29,775
341	Artistic and literary occupations	22,856	23,046	16.1	34,156	12,000
353	Business and finance associate professionals	27,180	29,166	23.7	17,658	26,345
245	Librarians and related professionals	19,979	20,475	5.3	11,933	2230
241	Legal professionals	37774	37907	43.7	29,442	8390
All of the above, weighted by number of unpaid grads'		22187	23323	14.1	16,950	177,530
Other occs' in DLHE with unpaid graduates		23952	24757	15.6	14,196	262,240
Occs' in DLHE with no unpaid graduates		20646	21548	14.0	14,784	1,184,035

Sample is recent graduates in occupations employing at least 5% of all unpaid recent graduates, and/or for which at least 5% of its recent graduate employees are unpaid. Sample sizes are pooled numbers in each occupation in the Annual Population Survey from 2004/05 to 2013/14, comprising workers in the specified minor group of the 2000 (for 2004/05-2009/10) and 2010 (for 2010/11-2013/14) versions of the Standard Occupational Classification.

A tournament structure would be characterized by a low median wage and high variance. We find limited support for such a structure being associated with a high prevalence of unpaid work. Overall, these ten occupations do have a higher estimated standard deviation of wages—at £ 16,950 versus £ 14,784—than occupations with no unpaid graduates, but the proportion of top-coded salaries is the same (14.1% and 14.0%) and the median is also higher (at £ 22,187 versus £ 20,646).

Looking at occupations separately, the low median and standard deviation seen for both administrative occupations (415 and 411) mean there is indeed a low opportunity cost, but entry to these positions through unpaid work experience only makes sense as an investment if seen as a stepping stone to higher occupations in the same industry. The high median and standard deviation for legal, media associate, and artistic and literary professionals suggest a potentially high return. in these cases, significant occupation-specific preferences are necessary to overcome the high opportunity cost of taking unpaid work.

These associations are summarized graphically in Figures A1-A3. In Figures A1 and A2, we plot the share of graduates in each occupation after 6 months against first the median then standard deviation of wages in that occupation, as estimated from the Annual Population Survey. Markers are sized in proportion to the share of all graduates in paid or unpaid work who are present in that occupation.
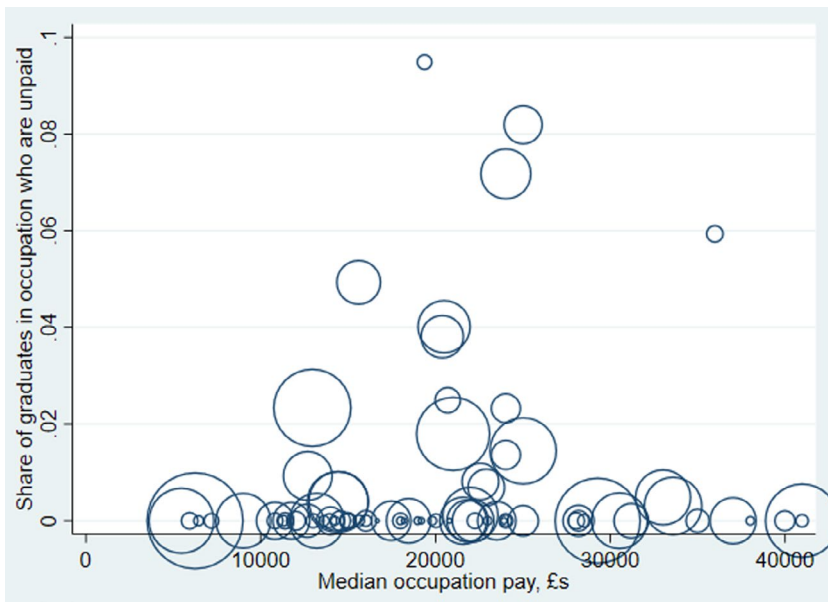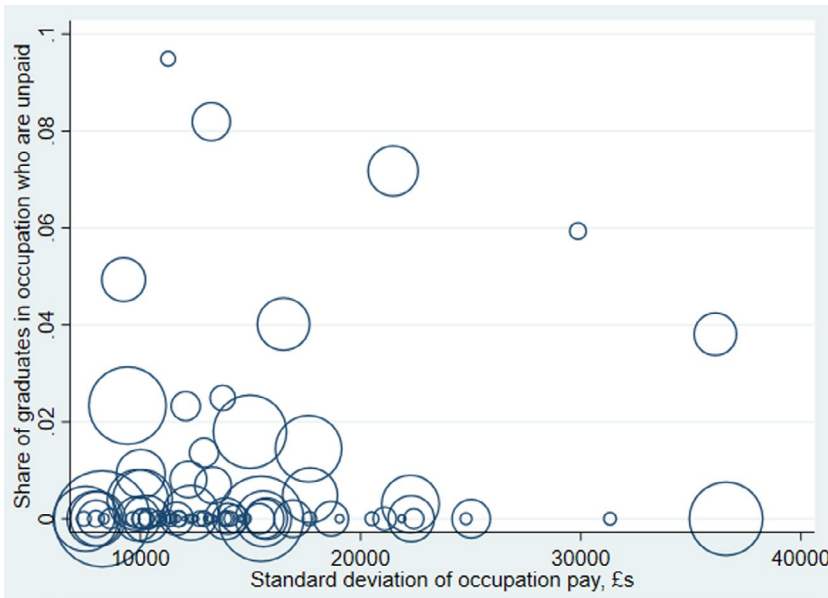
FIGURE A1 Proportion of graduates in unpaid work by median earnings of 3-digit occupation. (Markers proportional to share of graduates in occupation). Note: Each marker represents an occupation minor group (3-digit SOC code.) Horizontal axis shows median pay (gross annual earnings) in pooled Annual Population Survey, April 2005–March 2011. Vertical axis shows the share of recent graduates working in the occupation who are unpaid, estimated from the DLHE 6-month survey. Markers are proportional in size to the share of recent graduates working in each occupation

If the tournament hypothesis holds, occupations with unpaid recent graduates should be clustered in the top-left and top-right quadrants of these Figures, respectively, but this pattern is not in evidence.

For an alternative perspective, in Figure A3, we plot the estimated standard deviation of wages against the median occupation wage, with markers sized in proportion to the share of recent graduates in that occupation who are unpaid. (We represent those occupations with no unpaid graduates by a nominally small dot.) If the tournament hypothesis holds, the larger markers should be in the top-left quadrant, with a low opportunity cost of working unpaid but a high potential return. Again, this pattern is not in evidence.

A2 | PROBIT REGRESSION UNDERLYING PROPENSITY SCORES

Table A3 presents average marginal effects on selected explanatory variables, from the probit model used to estimate the propensity scores used to match unpaid workers with paid workers or those out of the labour force. In each case, the dependent variable is being in unpaid work. Column (1) is based on the sample of all graduates observed in paid work or unpaid work experience 6 months after graduation. Column (2) is based on the sample of all graduates observed in paid work or unpaid work in one of the occupations with many unpaid workers (listed in Table A1 and A2). Column (3) is based on the sample of all graduates in unpaid work or out of the labour force. Note that this means that all the individual recent graduates in unpaid work after 6 months appear in multiple samples and those paid workers in occupations with many unpaid workers appear in both columns (1) and (2).

FIGURE A2 Proportion of graduates in unpaid work by standard deviation of earnings of 3-digit occupation. (Markers proportional to share of graduates in occupation.) Note: Each marker represents an occupation minor group (3-digit SOC code). Horizontal axis shows the standard deviation of pay (gross annual earnings) estimated from the pooled Annual Population Survey, April 2005–March 2011. Vertical axis shows the share of recent graduates working in the occupation who are unpaid, estimated from the DLHE 6-month survey. Markers are proportional in size to the share of recent graduates working in each occupation

In all three columns, the direction of selection on observables revealed by these marginal effects is in line with the unconditional descriptive statistics shown in Table 3.

A3 | ROBUSTNESS: RESTRICTING TO OCCUPATIONS WITH MANY UNPAID WORKERS

Figure A4 plots propensity scores and Table A4 shows matching results, when the sample is restricted to those initially working in occupations with many unpaid workers, listed in Table A2. The penalty is similar or slightly larger with respect to all outcome variables. The result for salaries is to be expected: occupations with many unpaid workers have higher mean and median gross annual earnings than the population at large (see Table A2). Those taking unpaid work experience are also shown to be 12 percentage points less likely to remain in the same occupation. This robustness check strengthens the main result of this paper that unpaid work experience does not pay off along any dimension, even over a horizon of three years.

A4 | ROBUSTNESS: TOBIT OR PROBIT ESTIMATION

Unpaid work experience is concentrated in certain occupations and there are large between-occupation wage differences. This means our results could be driven by occupational preferences. As matching should only be conducted on variables that are predetermined with respect to the treatment, it is important to test whether results are sensitive to residualizing by either the initial or destination occupation. We therefore present a complementary set of regression-based estimates that include an
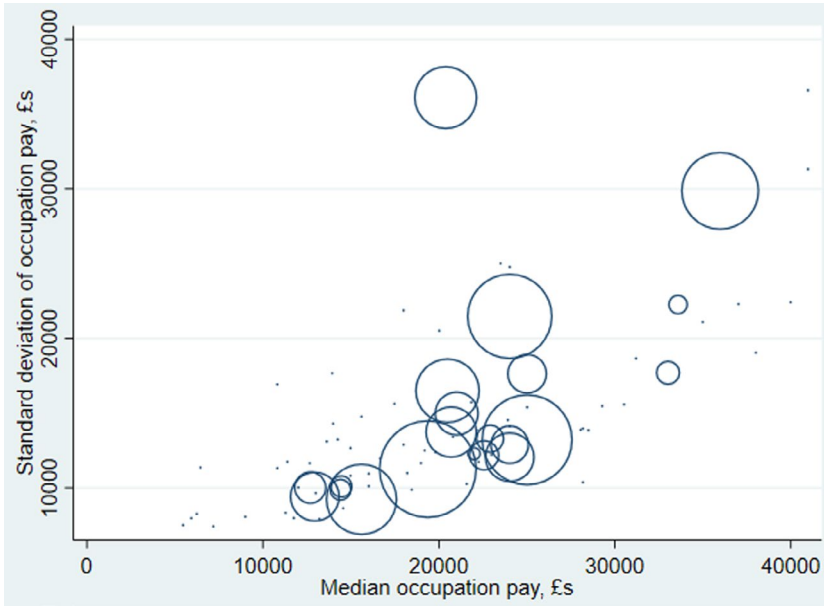
FIGURE A3 Standard deviation by median of earnings of 3-digit occupation (markers proportional to number of graduates in unpaid work in occupation.) Note: Each marker represents an occupation minor group (3-digit SOC code.) Horizontal axis shows the median pay (gross annual earnings) and vertical axis the standard deviation of pay estimated from the pooled Annual Population Survey, April 2005–March 2011. Markers are proportional in size to the share of all recent graduates who are working in the occupation *and* are unpaid, estimated from the DLHE 6-month survey

exhaustive set of occupation dummy variables. These are shown in Table A5 (salary), Table A7 (employment probability), Table A8 (permanency, retention, and professional occupation) and Table A9 (career satisfaction). This approach also enables us to control for accumulated work experience up to the 42-month survey (Table A6).

A4.1 | Estimated specifications

For our continuous outcome variable, salary, our preferred sample includes values of salary imputed using estimated cell mean salaries in the Annual Population Survey. As salaries in the Annual Population Survey are top-coded at £40,000, we estimate a tobit regression using this figure as the upper limit. This step also guards against very large reported salaries potentially introducing major measurement error issues into our estimates. This means that in the underlying model for true salary Y_i, our treatment effect is the coefficient β_u on unpaid work experience at 6 months (U_i) in the following equation, where $\mathbf{X}_i$ is a vector of pre-treatment characteristics, and $\mathbf{R}_i$ is a vector of occupation dummy variables and/or terms for accumulated experience:

$$Y_i = \beta_u U_i + \gamma \mathbf{X}_i + \delta \mathbf{R}_i + \varepsilon_i$$
$$\varepsilon_i: \mathcal{N}(0, \sigma) \tag{A1}$$

However, in practice, we estimate a tobit model on the observed outcome Y_i^*:

$$Y_i^* = Y_i \ \text{if} \ Y_i \leq 40,000$$
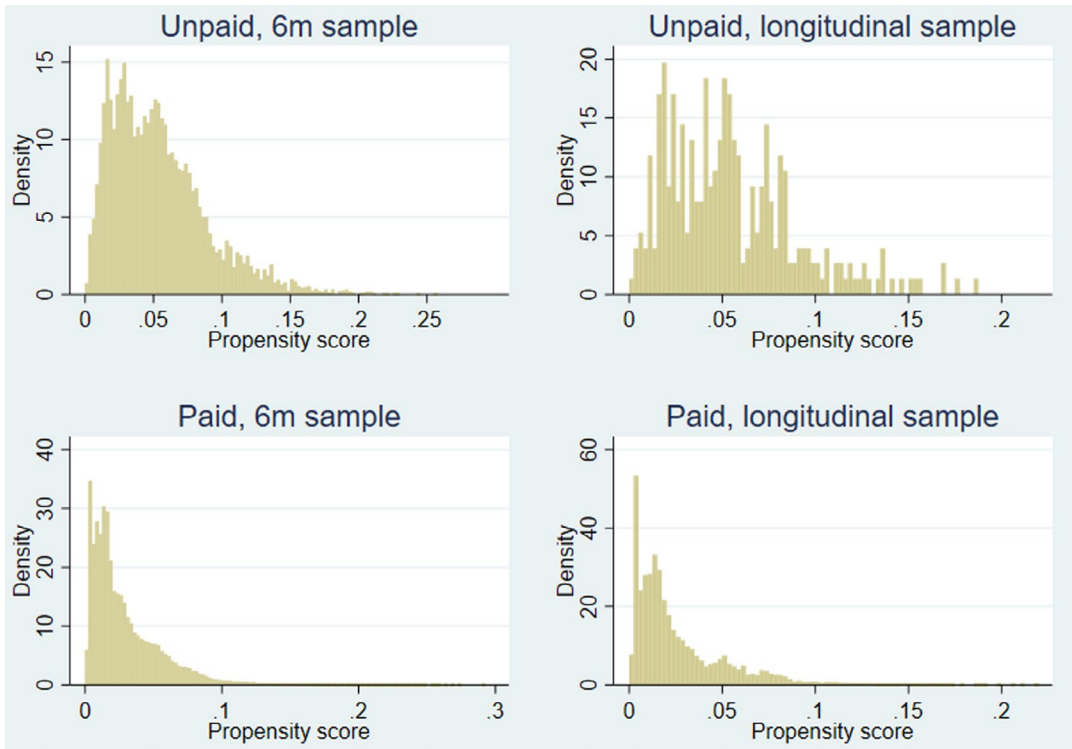$$Y_i^* = 40,000 \ \text{if} \ Y_i > 40,000 \tag{A2}$$

Figure A4 Propensity scores for unpaid workers and paid workers in occupations with many unpaid workers. Note: Sample sizes: unpaid, 6 months: 7705; paid, 6 months: 270,715; unpaid, longitudinal: 305; paid, longitudinal: 12,142. Region of common support in final (longitudinal) matched sample is 0.0020 to 0.1857

For our binary outcome variables (being in paid work, a professional occupation, permanent contract, same occupation as at 6 months, very satisfied with career), we estimate probit regressions of the form in equation A4, but rather than the coefficient β_u, our estimated treatment effect is the average marginal effect of a discrete change in U_i from zero to one, on the probability that the labour market outcome is realized.

$$Y_i^* = \beta_u U_i + \gamma \mathbf{X}_i + \delta \mathbf{R}_i + \varepsilon_i \tag{A3}$$

$$Y_i = 1 \ if \ Y_i^* \geq 0$$

$$Y_i = 0 \ if \ Y_i^* < 0$$

$$\varepsilon_i : \mathcal{N}(0, \sigma)$$

Results

For all the labour market outcomes evaluated in Table 6, in samples of unpaid versus paid workers, the estimated treatment effect from the regression approach is less negative than with matching. This suggests that the observable characteristics associated with greater probability of unpaid work experience are associated with greater labour market disadvantage outside the range of common support

TABLE A3 Probit average marginal effects for selection into unpaid work experience (estimation of propensity scores)

Sample	(1) v. Paid work (All)	(2) v. Paid work (occupations with many unpaid workers)	(3) v Out of labour force (All)
High SES	0.003***	0.004***	0.010***
	(0.000)	(0.001)	(0.001)
SES not classified	0.001	0.002	−0.001
	(0.000)	(0.001)	(0.002)
Private School	0.004***	0.006***	0.008***
	(0.000)	(0.001)	(0.002)
Oxbridge	0.017***	0.025***	0.052***
	(0.001)	(0.002)	(0.003)
Golden Triangle	0.012***	0.016***	0.040***
	(0.001)	(0.002)	(0.003)
Russell Group	0.006***	0.009***	0.019***
	(0.000)	(0.001)	(0.002)
1994 Group	0.006***	0.010***	0.024***
	(0.000)	(0.001)	(0.002)
Male	−0.001***	−0.002***	−0.018***
	(0.000)	(0.001)	(0.001)
Black	0.013***	0.027***	0.034***
	(0.001)	(0.002)	(0.003)
South Asian	0.013***	0.027***	0.026***
	(0.001)	(0.001)	(0.002)
Other Asian	0.012***	0.020***	0.016***
	(0.001)	(0.002)	(0.004)
Other Non-white	0.005***	0.010***	0.005**
	(0.001)	(0.001)	(0.002)
Non A-level	0.002***	0.004***	0.004*
	(0.001)	(0.001)	(0.002)
First / 2:1 class degree	0.003***	0.002**	0.023***
	(0.000)	(0.001)	(0.001)
Disability	0.005***	0.011***	0.008***
	(0.000)	(0.001)	(0.002)
Unemployment rate	−0.001***	−0.001*	−0.004***
	(0.000)	(0.000)	(0.001)
N	640,830	258,420	152,695

All control variables are as measured at time university application, in university student records, except degree class (determined at time of graduation) and the domicile unemployment rate (travel-to-work-area of domicile, measured 6 months after graduation). High parental SES is classes 1 and 2 (higher and lower managerial or professional occupations). Additional covariates: Dummy for missing unemployment rate; 18 subjects of study dummies; 9 (6-month) or 3 (42-month) year of graduation dummies.

*$p<0.1$, ** $p<0.05$, *** $p<0.01$.

TABLE A4 The effect of unpaid graduate work experience on subsequent outcomes, restricting to occupations with many unpaid workers

Unpaid work experience versus paid work	(1) Salary	(2) Salary residualized by initial occ'	(3) Employment probability	(4) Permanent contract	(5) Professional occupation	(6) Very satisfied with career	(7) Same occupation as at 6 months
Average Treatment Effect on the Treated (standard error)	−3703.42 (713.54)	−3390.19 (767.72)	−0.045 (0.026)	−0.094 (0.036)	−0.085 (0.039)	−0.076 (0.033)	−0.116 (0.031)
t-stat	−5.19	−4.42	−1.73	−2.65	−2.17	−2.30	−3.70
Rosenbaum or Mantel–Haenszel Bounds:							
Retain sig' at 5%	1.64	1.43	NA	1.16	1.10	1.04	1.57
Retain sig' at 10%	1.72	1.72	1.09	1.24	1.17	1.09	1.69
N matched pairs	305	305	420	330	330	420	330

Samples comprise respondents to DLHE 42-month surveys on 2005, 2007 and 2009 graduating cohorts, who were in unpaid work 6 months after graduation, plus either those in paid work 6 months after graduation. Matching variables: SES (2 dummies); male; ethnicity (4 dummies); non-A-level track; first-class or upper second-class degree; disability; unemployment rate in travel-to-work-area of domicile, plus missing dummy (tobit regressions use rate on date of 42-month interview, matching uses rate on date of 6-month interview); year of graduation (2 dummies); university mission group (4 dummies); subject of study (18 dummies). Rosenbaum bounds are for salary; Mantel–Haenszel bounds are for all other (binary) outcomes

TABLE A5 Tobit regression coefficients: The effect of unpaid graduate work experience on salaries

	(1)	(2)	(3)	(4)	(5)	(6)
Sample:	Pooled	v. Paid work (All)	v. Paid work in occupations with many unpaid workers		v. Out of labour force (All)	
Control for occupation:	Destination	Destination	Destination	Origin	None	Destination
Activity 6 months after graduation (Base =Paid work)						
Unpaid work	−1910.609***	−1938.675***	−2528.399***	−2761.341***	−266.103	−651.108
	(448.774)	(451.920)	(478.269)	(531.593)	(521.488)	(467.638)
Further study	−1035.810***					
	(116.458)					
Out of labour force	−1763.187***					
	(115.991)					
N	38,550	27,695	12,450	12,450	4960	4960

Samples comprise respondents to DLHE 42-month surveys on 2005, 2007 and 2009 graduating cohorts, who were in unpaid work 6 months after graduation, plus either those in paid work or out of the labour force 6 months after graduation, and have a reported or imputed value for salary 42 months after graduation. Column (1) pooled sample also includes those in further study 6 months after graduation. Additional restriction in columns (3) and (4) to those in one of the occupations specified in Table A2, 6 months after graduation. Standard errors in parentheses. * $p<0.1$, ** $p<0.05$, *** $p<0.01$. Additional covariates: SES (2 dummies); privately schooled; male; ethnicity (4 dummies); non-A-level track; first-class or upper second-class degree; disability; unemployment rate in travel-to-work-area of domicile, plus missing dummy (tobit regressions use rate on date of 42-month interview, matching uses rate on date of 6-month interview); year of graduation (2 dummies); university mission group (4 dummies); subject of study (18 dummies). Tobit regressions in columns (1), (2) and (6) control for destination (42-month) occupation with 100 dummy variables; and Column (4) controls for initial (6-month) occupation with 19 dummy variables; both for 3-digit code of the Standard Occupational Classification.

TABLE A6 Robustness of effects of unpaid work experience on salaries, to a Mincer-type residualization by experience

	(1)	(2)	(3)	(4)	(5)	(6)
Tobit regression coefficients:						
Sample:	Pooled	v. Paid work (All)	v. Paid work in occupations with many unpaid workers		v. Out of labour force (All)	
Control for occupation:	Destination	Destination	Destination	Origin	None	Destination
Activity 6 months after graduation (Base = Paid work)						
Unpaid work	−1777.844***	−1713.065***	−2261.850***	−2693.326***	−635.957	−839.235*
	(447.130)	(471.560)	(500.505)	(551.412)	(540.252)	(498.890)
Further study	221.080					
	(142.485)					
Out of labour force	−1293.937***					
	(132.206)					
Years of experience	−526.091	−2034.134***	−1313.663	−1514.102	1426.198	1065.146
	(351.374)	(545.865)	(1035.834)	(1178.959)	(1098.438)	(883.837)
Years of experience squared	438.195***	668.108***	555.558***	622.045***	251.700	201.141
	(69.084)	(102.020)	(189.082)	(211.104)	(219.775)	(178.621)
N	31,975	20,885	9155	9155	3970	3970

Samples comprise respondents to DLHE 42-month surveys on 2007 and 2009 graduating cohorts, who were in unpaid work 6 months after graduation, plus either those in paid work or out of the labour force 6 months after graduation, and have a reported or imputed value for salary 42 months after graduation. Column (1) pooled sample also includes those in further study 6 months after graduation. Additional restriction in columns (3) and (4) to those in one of the occupations specified in Table A2 6 months after graduation. Standard errors in parentheses. $* \ p < 0.1$, $** \ p < 0.05$, $*** \ p < 0.01$. Additional covariates: SES (2 dummies); privately schooled; male; ethnicity (4 dummies); non-A-level track; first-class or upper second-class degree; disability; unemployment rate in travel-to-work-area of domicile, plus missing dummy (tobit regressions use rate on date of 42-month interview); year of graduation (2 dummies); university mission group (4 dummies); subject of study (18 dummies). Tobit regressions in columns (1), (2), and (6) control for destination (42-month) occupation with 100 dummy variables; and column (4) controls for initial (6-month) occupation with 19 dummy variables; both for 3-digit code of the Standard Occupational Classification.

TABLE A7 Probit average marginal effects: The effect of unpaid graduate work experience on employment probability

Sample	(1) v. Paid work (All)	(2) v. Paid work in occupations with many unpaid workers	(3) v. Out of labour force (All)
Control for occupation	*Origin*	*Origin*	*None*
Unpaid work	−0.033**	−0.033**	0.038*
	(0.014)	(0.014)	(0.020)
N	35,670	16,070	7175

TABLE A8 Probit average marginal effects: The effect of unpaid work experience on job permanency, occupational retention and advancement to professional occupations

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Outcome at 42 months:	Permanent position			Same occupation as at 6 months	Professional occupation		
Sample	v. Paid work (All)	v. Paid work in occupations with many unpaid workers	v. Something else (All)	v. Paid work in occupations with many unpaid workers	v. Paid work (All)	v. Paid work in occupations with many unpaid workers	v. Something else (All)
Control for occupation	*Origin*	*Origin*	*None*	*Origin*	*Origin*	*Origin*	*None*
Unpaid work	−0.054***	−0.053***	−0.062**	−0.112***	−0.042	−0.041	−0.028
	(0.021)	(0.020)	(0.025)	(0.030)	(0.026)	(0.029)	(0.027)
N	30,170	13,565	5620	13,565	30,185	13,565	5620

Samples comprise respondents to DLHE 42-month surveys on 2005, 2007 and 2009 graduating cohorts, who were in unpaid work 6 months after graduation, plus either those in paid work or out of the labour force 6 months after graduation, and are in paid work with valid contract type and occupation fields 42 months after graduation. Additional restriction in columns (1), (3) and (4) to those in one of the occupations specified in Table A2, 6 months after graduation. Standard errors in parentheses. * $p < 0.1$, ** $p<0.05$, *** $p<0.01$. Additional covariates: SES (2 dummies); privately schooled; male; ethnicity (4 dummies); non-A-level track; first-class or upper second-class degree; disability; unemployment rate in travel-to-work-area of domicile, plus missing dummy (tobit regressions use rate on date of 42-month interview, matching uses rate on date of 6-month interview); year of graduation (2 dummies); university mission group (4 dummies); subject of study (18 dummies).

TABLE A9 Probit average marginal effects: the effect of unpaid graduate work experience on career satisfaction

	(1)	(2)
Sample	**v. Paid work (All)**	**v. Out of labour force**
Control for occupation:	*Origin*	*None*
Unpaid work	−0.057**	0.028
	(0.025)	(0.022)
N	35,685	7175

Samples comprise respondents to DLHE 42-month surveys on 2005, 2007 and 2009 graduating cohorts, who were in unpaid work 6 months after graduation, plus either those in paid work or out of the labour force (not in employment or further study) 6 months after graduation. Column (1) includes only those in an occupation with many unpaid workers (see Table A2) 6 months after graduation. Standard errors in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Additional covariates: SES (2 dummies); privately schooled; male; ethnicity (4 dummies); non-A-level track; first-class or upper second-class degree; disability; unemployment rate in travel-to-work-area of domicile, plus missing dummy (using rate on date of 42-month interview); year of graduation (2 dummies); university mission group (4 dummies); subject of study (18 dummies). Tobit regressions in columns (1) and (2) control for initial (6-month) occupation with 75 and 19 dummy variables; both for 3-digit code of the Standard Occupational Classification.

than within it. The tobit and probit marginal effects, calculated with linear parametric assumptions influenced by data well outside that range of common support, reflect this. However, inference about the direction of the effect is always the same.

Samples comprise respondents to DLHE 42-month surveys on 2005, 2007 and 2009 graduating cohorts, who were in unpaid work 6 months after graduation, plus either those in paid work or out of the labour force 6 months after graduation. Additional restriction in column (2) to those in one of the occupations specified in Table A2, 6 months after graduation. Standard errors in parentheses. * $p<0.1$, ** $p<0.05$, *** $p<0.01$. Additional covariates: SES (2 dummies); privately schooled; male; ethnicity (4 dummies); non-A-level track; first-class or upper second-class degree; disability; unemployment rate in travel-to-work-area of domicile, plus missing dummy (tobit regressions use rate on date of 42-month interview, matching uses rate on date of 6-month interview); year of graduation (2 dummies); university mission group (4 dummies); subject of study (18 dummies). Columns (1) and (2) control for initial (6-month) occupation with 75 and 19 dummy variables; both for 3-digit code of the Standard Occupational Classification.