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Student loans and participation in postgraduate education: the case of English master's loans

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Higher education researchers have paid little attention to postgraduate participation. This issue has become more prominent in England following the introduction of high undergraduate fees. Many predicted that master's participation would decline consequently, strengthening known inequalities in access by socio-economic background at master's level. The introduction of master's loans in 2016/17 intended to help those without access to independent resources afford master's study. We investigate whether this intention was realised by analysing an exceptionally detailed dataset containing information on the destinations of all UK first-degree graduates between 2012/13 and 2016/17 (N = 1,360,965). In doing so we test two hypotheses: master's loans will increase overall enrolment; and latent demand for master's among underrepresented groups will mean rates of master's participation will increase more rapidly for those groups when loans are available. Our results confirm the hypotheses: 1) after the introduction of master's loans in England, overall enrolment rates increased from 8.9% in 2015/16 to 12.5% the year loans were introduced; and 2) the probability of progressing to a taught master's across socioeconomic groups changed substantially, with students from hitherto underrepresented groups reaching similar rates than their more advantaged counterparts after 2016/17.

Keywords: student loans, postgraduate education, master's degree, social inequalities, higher education, university funding

Word count: 7,999

Introduction

In this article, we investigate the role of student loans in both increasing and widening participation in taught master's programmes. We do so examining the introduction of new

master's loan schemes in England since 2016/17. With the new policy as a form of natural experiment, we are able to compare in detail the impact of the loans on graduates' progression to master's-level study overall and differential impacts for previously underrepresented groups. We are thus able to evaluate both the success of the policy and the utility of different predictions about the impact of financial factors on educational participation.

Fundamental changes to higher education student finance in England since 1998 have seen the introduction of increasingly large tuition fees, and the phased replacement of direct state funding with income-contingent loans. The scale and novelty of these changes compared to international student funding norms make them particularly interesting for researchers and policymakers. Their effects on disadvantaged groups' participation rates have been followed carefully. The situation is complex, but at the aggregate level evidence suggests that both overall participation and rates for the socio-economically disadvantaged have not suffered (Murphy *et al.*, 2019). While the architects of the most recent loan policy contend that it is progressive (Willetts, 2017), others argue that the longer-term consequences of substantial student debts are regressive and a brake on social mobility (Dorling, 2018). In this sense, Dorling (2018) argues that the current student loans system in England produces an unequal distribution of debt, in which students from the best-off backgrounds avoid accumulating debt and interest by paying for the cost of their higher education up front. As their families tend to fund them, they 'go to university at no potential cost to themselves' while for most young adults, 'student loans are now a major part of growing burden of debt' (Dorling 2018, p. 257).

Postgraduate education has historically gone unnoticed in major debates on the structure, finance and fairness of higher education. Surprisingly, this persists despite significant growth in taught postgraduate students over the last two decades. In the UK, in

1995/96, there were around 160,400 full-time equivalent postgraduate taught students. By 2016/17, these numbers had grown by 70%, to 272,000 (HESA, 2018). Of the latter numbers in 2016/17, 150,900 were UK-domiciled students, growing from 125,500 in 1995/96.

We now have clear and consistent evidence that master's degree graduates typically obtain better outcomes than those holding first degrees alone. In every country for which the OECD produces statistics, holding an ISCED2011 level 7 qualification is associated with higher median earnings than at level 6 (OECD 2019). In England, various studies using different data sources all point to an earnings premium (DfE, 2018; Lindley & Machin, 2013; Wakeling & Laurison, 2017; Walker & Zhu, 2013). Recent research by the UK Office for National Statistics (2019) shows that individuals with a master's or a PhD earn, on average over their lifetime, £65,000 more than those with an undergraduate degree, a 10% premium. However, only in recent years have debates about widening participation considered master's degrees (Wakeling & Laurison, 2017). Questions of funding and finance have been at the forefront of the limited international debate. A recent comparative review of postgraduate education in eight countries noted that they all

> appear to have a commitment to ensure access to postgraduate higher education to those with the ability, qualities and suitable qualifications to succeed. This raises the question of how to remove barriers, in particular, financial constraints, and in all countries progress here has been slow (Clarke & Lunt, 2014, p.3)

In the UK, mainly prompted by the anticipated deterrent effects of higher undergraduate debts, the government, third sector and academia began to scrutinise postgraduate study's role in social mobility (cf. d'Aguiar & Harrison, 2016; Lindley & Machin, 2013; Wakeling, 2005). In addition to concerns about the deterrent effects of debt, a further issue around equity of access and outcomes in education at the master's level is the lack of funding available to students who do not have independent financial means (Higher Education

Commission, 2012; Universities UK, 2014; Wakeling, Hampden-Thompson & Hancock, 2017).

Our study takes forward knowledge and understanding by evaluating the impact of the loan scheme in question on the rate of different kinds of graduates progressing into master's study. Using a sophisticated and rigorous analysis, we will review the conclusions of two recent evaluations by the Office for Students (2018) and the Department for Education — conducted by IFF Research (Adams *et al.*, 2019). More broadly, we will appraise the utility of different predictions of the impact of loan finance on participation using this new, postgraduate test case. We will finally consider the implications of our findings for the future of this specific policy and for its application elsewhere. In doing so, we will highlight the potential for the gains we identify from our evaluation to be rapidly eroded by both fee and credential inflationary pressures.

Master's loans: a succint history of a recent policy

Master's funding context in England

For the past half century, state contributions to the cost of master's degrees have decreased at the expense of student contributions. In 1973, and for the whole of the UK, full-time postgraduate students paid £90 per year – the equivalent to £1,069 at 2018 prices (Bank of England, 2018) - representing 6% of the actual cost of provision (HMSO, 1973). Master's tuition in England is currently fully deregulated: institutions can charge what they think the market will bear. Full-time equivalent prices for UK students are thought to range from about £4,900 a year to over £30,000, with prices averaging around £11,000 (UCAS, 2018).

It is therefore easy to see why students with limited resources may be unable to afford master's courses when support is scant. In 2012/13, prior to the introduction of state-sponsored master's loans, 72% of full-time UK-domiciled master's students were self-funded

(UUK 2014). Other sources of funding have been rather heterogeneous. Although students could – and still can – access public resources for a handful of specialist areas such as teacher training, social work, or in limited numbers as preparation for a research-council–funded doctorate, there has been no comprehensive system of state-backed support for master's students. Numerous commentators have pointed out the challenge posed to social mobility when, despite the requisite academic ability, the inability to pay creates a barrier to further study (Milburn, 2012; Willetts 2017).

Policy drivers for master's loans

Policy motivations informing the introduction of master's loans are manifold. We lack space to be definitive, but we can identify three principal drivers. We focus on the third.

Education for a highly skilled society. One objective for the introduction of postgraduate loans was 'to support the highest levels of skills to support the UK economy, and increase participation at postgraduate taught level, by enabling those who cannot afford or delay study at this level to take up places' (Department for Business Innovation & Skills, 2015, p. 16).

Supply-side pressures on sustainable provision. From a supply-side perspective, universities warned in 2014 that postgraduate taught student numbers were declining and suggested that the heterogeneous nature of funding sources for postgraduate study was a likely cause. This situation had also been highlighted in a HEFCE report of 2013 concerning postgraduates in England and Northern Ireland (HEFCE, 2013). Universities proposed that publicly-backed loans, together with other funding mechanisms, could hold the key to increasing demand for master's taught courses (UUK, 2014).

Mitigating an anticipated debt deterrent. Finally, the introduction of £9,000+ variable tuition fees – and the concomitant student loan regime – in 2012 revitalised the debate around

both the private and public benefits of increased participation in higher education, heightening the scrutiny placed on university finances. These brought about 'widespread concern about debt-aversion on the part of UK graduates [,who] may feel less able to progress to postgraduate study and face further debt and upfront costs' (NUS, 2012, p. 4).

Master's loans in England

State-backed master's loans were first introduced in England in 2016. The policy was the culmination of a process beginning in 2014/15 with two pilot Postgraduate Support Schemes. The second such scheme in 2015/16, involved resources allocated formulaically, taking into account 'the size of each institution's UK-domiciled taught postgraduate population and the past success of the institution in recruiting students from selected disadvantaged groups' (Wakeling, Hancock, & Ewart, 2017, p. 7). It was intended to bridge the gap before any new master's loans scheme, and consisted of 10,000 awards of £10,000 each co-funded by state and institutional contributions. Around 7,300 students took up these awards (ibid.).

Since 2016/17, English and EU-domiciled students have been able to access a non-means-tested loan for master's study. Initially, the total amount available per student was £10,000, increasing annually every year with inflation (HM Government, 2019). This is intended as a contribution towards tuition fees and maintenance for a first postgraduate master's degree, tenable at UK institutions (English institutions only in the case of EU students).

In the following years, devolved governments in the other three UK nations followed suit and introduced postgraduate loans with varying amounts and conditions. Table 1 summarises the amounts available by year and country.

[Table 1 here, available at the end of the document]

The effect of master's loans on participation: expectations

We derive two predictions about the likely effect of the new master's loan provision on graduates' behaviour from theory and from the findings of previous studies. The predictions we set out below cover the overall rate of transition from first degree to postgraduate master's. They also address the question of which types of students make the transition.

Rational economic calculation

Evidence from the UK (and beyond) shows clear pecuniary advantages for postgraduate qualification holders compared to first-degree graduates. For instance, Lindley and Machin (2013) found a postgraduate premium of £5,500 a year, which did not diminish in parallel with increases in postgraduate enrolment. Data from the Longitudinal Educational Outcomes initiative, which connects student data with UK tax records to identify graduates' earnings, also shows that, in 2015/16, graduates with a master's qualification had substantially higher earnings than first-degree graduates (DfE, 2018). While there is clear variation in the size of this gap across subject areas and genders, experimental statistics suggest that the median earnings of UK domiciled-students graduating from a taught master's degree in an English institution in 2013/14 were around £29,000 (ibid.), £10,000 more than their first-degree counterparts (DfE, 2018).

Wakeling & Laurison (2017) find that postgraduate degree holders typically attain higher-status occupational positions than those with first degrees alone, with this relationship again consistent over a long period. Similar patterns are evident across OECD countries. On average, residents in OECD countries with a master's or a PhD earn 91% more than those with upper secondary education (OECD, 2019).

A new graduate faces a cost-benefit calculation in considering whether to pursue a master's, to enter the labour market, or do something else. The master's loan considerably

alters that calculation. Making a detailed explicit calculation of the costs and benefits of participation is difficult. Mellors-Bourne, Hooley, & Marriott (2014) found that UK graduates' decision-making in this respect is based on impressionistic calculations. The direct costs of participation – tuition fees – vary considerably from institution to institution and course to course. There is no central source of information about these fees. Nevertheless, the form of the master's loan, with income contingent repayments and write-off of debt after 30 years, is likely to be attractive to borrowers..

Hypothesis 1: the overall rate of transition from a first-degree to a master's degree will increase substantially following the introduction of the master's loan among eligible students

Latent demand

Evidence suggests that master's participation rates have been increasing over time (Morgan 2014; Lindley & Machin 2013). The overall increase hides inequalities across different groups, including by socio-economic class (Wakeling & Hampden-Thompson, 2013). A plausible explanation for this difference is access to resources. As described above, little support has hitherto been available to intending master's students. Some predict that debt aversion among graduates from less financially-advantaged backgrounds, especially with the introduction of higher undergraduate tuition fees, will lead to lower take-up by disadvantaged groups. For instance Pyne & Grodsky (2019) speculate that the high debt levels they find among US graduate students will deter and exclude the disadvantaged. However other research suggests that lack of access to credit, rather than debt aversion, may be key (Wakeling et al., 2017). While a small but representative sample of UK undergraduates showed lower expectation of postgraduate enrolment among first-generation students, partly on the basis of lower anticipated returns, but partly on lower levels of anticipated support from parents (Boneva et al., 2019), a much larger survey of new first-degree graduates found

those from lower socio-economic classes were more likely to aspire to postgraduate study, but less likely to actually enrol than their more advantaged peers (HEFCE, 2013). On balance then, it seems reasonable to predict that the master's loan policy will have a greater impact on those groups who are less likely to have access to other financial means, satisfying an apparent latent demand.

Hypothesis 2: following introduction of master's loans, the overall rate of transition to a master's degree will increase at a greater rate for graduates from lower socio-economic class backgrounds than those from higher socio-economic backgrounds

Previous studies

There is a well-established link between various academic and background characteristics and progression to postgraduate study. Students from lower socio-economic backgrounds, women, those from particular minority ethnic groups, graduates of lower-status universities, those graduating with a lower grade and in particular subjects are all less likely to progress to a master's degree than their opposites (Wakeling & Hampden-Thompson, 2013).

In relation to master's loans, there is prima facie evidence that they had a positive effect on overall participation rates. The 'Postgraduate Initial Participation Rate' for England showed a jump in the rate from 8.9% in the year before master's loans, to 10.8% and 11.0% respectively in the two following years[1]. However, to our knowledge, only two previous studies have investigated the impact of master's loans on participation across different socio-economic groups. The Office for Students (OfS) (2018) reviewed changes in immediate transition rates across a number of measures following the first year of the loans. This showed a substantial increase in transitions to loan-eligible courses, against a slight decline in non-eligible equivalents. Increases were especially marked for younger graduates and those

identifying as Black. Strikingly, graduates from the lower participation neighbourhoods (POLAR quintile 1) were more likely than those from the highest participation neighbourhoods (quintile 5) to progress to a master's degree following the introduction of loans. This is a sociologically unusual finding and may support Wakeling and colleague's (2017) thesis that access to resources, even in the form of loans, are critical to meet the aspirations of graduates from lower socio-economic backgrounds. However, OfS's study relies exclusively on bivariate analysis, an issue that we address by controlling for a set of socio-economic and educational variables.

A separate evaluation study (Adams et al., 2019) procured by the Department for Education reported a substantial increase in master's numbers following the introduction of master's loans. In contrast to the OfS study, this evaluation claimed there was no positive impact of the loans for widening participation, on the basis that the proportion of master's students who did not have graduate parents had not shifted substantially. This conflicting evidence found in both reports can be attributed to different data used to understand the relationship between socioeconomic characteristics and progression to postgraduate study. In the OfS study, they used a similar dataset to the one analysed in this article, linking the data of first degree qualifiers to those entering postgraduate study the following year and using the participation rates in higher education of the local areas of graduates as an indicator of disadvantage. In Adams et al. (2019) report, they compare the findings of two online surveys conducted in 2013/14 and 2016/17 and use parental education as a proxy for disadvantage.

Our research offers three marked improvements on these prior studies. First, it investigates two, rather than only one cohort of graduates eligible for the loans. Second, unlike the bivariate comparisons included in the other studies, we conduct multivariate statistical analysis which adjusts for the possibility of confounding variables and underlying

trends. Third, we utilise additional, more sociologically sophisticated measures of background, such as socio-economic class (Rose, Pevalin, & O'Reilly, 2005).

Data and variables

Our data comprises the records of all English-domiciled first-degree graduates who successfully completed their studies at a UK institution between 2012/13 and 2016/17 (N = 1,360,965). This is effectively a census of the population of interest and covers three years prior to and two years following the introduction of the master's loan policy in England. It is compiled from institutional student records, which are returned to the Higher Education Statistics Agency (HESA) in a prescribed format, and subject to a range of data validation and quality checks.

Graduate records are linked to responses to the Destination of Leavers from Higher Education survey (DLHE). This survey requests, for each of the graduates in our population, details of their activity (employment, further study and so on) approximately six months after graduation. In our dataset, the response rate to the survey ranged from 77% to 79%. While this is a very high survey response rate, we have nevertheless weighted the data to account for nonresponse to the survey by applying poststratification inverse probability weights. This technique uses the full information available about graduates in the HESA Student Record to predict nonresponse to DLHE. The weights are generated from a logistic regression model, the outcome variable of which is response to the survey (Gelman & Carlin, 2002). The model includes a full range of predictor variables: since we have population data, there is no requirement for parsimony. Applying the weights ensures that statistics generated with the data give a very close approximation to population values. Our approach assumes that survey nonresponses are missing at random. There is a risk that the probability of nonresponse is

associated with the value of the outcome variable (unobserved in the case of nonrespondents). However, the size of the response rate mitigates this risk.

Data were supplied to us as counts of unique values across the variables, weighted to give 'Full Person Equivalents' (FPEs). The FPE measure represents the proportion of time a student/graduate engages in an activity. It is used in this instance to accurately represent the allocation of students/graduates across fields of study. When reporting field of study in this article, graduates of programmes in more than one field of study (as measured in the categories in our data) are split accordingly; in analyses which do not include field of study, this split is not needed.

A limitation of our dataset is that we can only observe the impact of the new master's loans on the behaviour of graduates who are progressing immediately to a master's degree (or not). In this sense, master's loans were issued to 59,400 English domiciled students in 2016/17 and to 75,900 in 2017/18[2]. In our data, 31,720 and 35,620 graduates respectively progressed from a first-degree to a taught higher degree in those years. HESA data about all postgraduate students indicates that there were 92,030 and 92,715 first-year English-domiciled first-year taught higher degree students respectively[ibid]. Thus while those progressing immediately from a first-degree to a taught higher degree represent a substantial share of new taught higher degree students (34% and 38% respectively), there is a large portion of students who have done other things before returning to study. We can therefore only make firm claims about the impact of the loans policy on immediate progression to postgraduate study, although it is likely to give useful pointers to a broader evaluation of the policy.

Taken together, the linked Student Record and DLHE datasets provide an extensive array of variables about each graduate's first-degree study, their background characteristics, and graduate destination. Furthermore, we have excluded from our dataset those students that

undertook an integrated master's degree, a programme that integrates a first degree and a master's course that is commonly found in STEM subjects. We can expect that the master's take-up of these subset of students is low. Table 2 sets out the variables used.

[Table 2 here, available at the end of the document]

Results

In this section, we address our hypotheses covering the relationship between loan availability, the conditions of these loans, and access and demand for master's-level education among English graduates. We first examine overall trends of progression to taught higher degrees in England, comparing them to those found in the other three UK home nations. The devolved nature of higher education policy in the UK (the master's loan policy was first introduced in England in 2016/17, with the other three nations following suit a year later) allows us to compare changes in progression rates across home nations, reducing the risk of misidentifying the cause of these changes. This allows us to address Hypothesis 1. Second, we look at these changes in progression rates in more detail, exploring which groups of students show greater changes in their progression rates by socio-economic class, ethnicity, attainment, institution type and subject of study.

Overall trends: evidence from the home nations

Hypothesis 1 suggests that transition rates to a master's degree will increase following the introduction of postgraduate loans. This may be due to loan conditions being potentially attractive to borrowers. It could also be that these loans plug a resourcing gap. Regardless of the loan conditions, students now have access to credit, thus tapping latent demand.

Figure 1 shows the numbers of new graduates progressing immediately to taught higher degrees in the years 2013/14 to 2017/18 by their home nation of domicile. The vertical

dashed lines indicate the year when the master's loans policy was introduced in each home nation.

[Figure 1 here, available at the end of the document]

Figure 1 shows a clear unstable – tending to flat – trend in the years immediately before the introduction of the master's loans policy, which appears to apply across all nations but to differing degrees. Interestingly, Scotland shows an upward trend the academic year before student loans were introduced. Northern Ireland saw the smallest overall increase in master's entrants, growing from 835 to 1,125 first-degree leavers progressing to higher taught degrees between 2016/17 and 2017/18. However, those two academic years witnessed the reversal of a negative trend. Wales also shows phenomenal growth. Between 2016/17 and 2017/18, the number of first-degree leavers progressing to higher taught degrees rose from 1,250 to 2,165.

As Figure 1 gives absolute numbers of progression, it is possible that the overall trend is affected by the size of the cohort. To investigate this, Figure 2 shows progression rates to postgraduate taught study of first-degree graduates, again by home nation of domicile.

[Insert Figure 2 here, available at the end of the document]

There is a clear upward trend in the proportions of first-degree graduates progressing to a taught master's course in all four home nations after the introduction of master's loans. When master's loans were introduced in England for those students starting a taught higher degree in 2016/17, the rate of first-degree graduates progressing to a master's course grew by 3.6 percentage points from 8.9% to 12.5%, an increase which was sustained into 2017/18 (13.5%). Welsh-domiciled students saw the largest overall growth in their progression rate to master's courses, from 8.8% in 2016/17 to 14.3% in 2017/18, the year master's loans were introduced in Wales. As shown in Figure 1, the introduction of master's loans in Northern Ireland seems to have reversed a trend of decline in their master's progression rates. This is

despite the maximum loan available to Northern Irish students being significantly lower than their English, Scottish and Welsh counterparts.

While the rate of progression to a taught higher degree varied little between the four UK nations before the introduction of master's loans, it has clearly diverged since. All four countries have seen an increase in the rate of progression, but the size of the increase varies. The English and Welsh rates grew most, potentially because the English and Welsh loan schemes are more generous than Northern Ireland's. In Scotland, many first degrees are four years in length and carry the title of master's; this, together perhaps with less familiarity with loans among Scottish graduates (there being no liability for undergraduate tuition fees for Scottish students in Scotland) may account for the differences.

Satisfying latent demand?

As stated in Hypothesis 2, we expect master's loans to have a greater impact on groups least likely to have independent access to financial resources. Although we cannot know students' access to such resources, we do have the socio-economic classification of the reference occupation for their household, measured using the Erikson-Goldthorpe-Portacero model (Rose et al., 2005). This classification, known as the National Statistics Socio-Economic Classification (NS-SEC), classifies occupations in seven classes, which we have grouped into three categories for simplicity. These are NS-SEC 1-2 (managerial and professional), NS-SEC 3-4 (intermediate occupations) and NS-SEC 5-7 (routine and semi-routine occupations).

Figure 3 shows the evolution of numbers of English-domicile first-degree graduates progressing to a taught higher degree by their NS-SEC classification between 2013/14 and 2017/18. We focus hereafter on England because we have two years' of post-loan-scheme data. Figure 4 displays progression rates. As shown in Figure 3, in absolute terms, students from NS-SEC 1-2 backgrounds form the majority of first-degree graduates progressing to

taught higher degrees, a situation that continues after the introduction of student loans. However, as shown in Figure 4, the gap between NS-SEC 1-2, and NS-SEC 3-4 and 5-7 shrinks substantially after the introduction of master's loans in 2016/17. Furthermore, first-degree graduates from NS-SEC 5-7 backgrounds show steep growth in all years, with a hike the year master's loans were introduced. This is likely to be due to the Postgraduate Support Schemes (PSS) mentioned in previous sections.

[Figures 3 and 4 here, available at the end of the document]

In the case of minority ethnic students, the picture looks quite different (Table 3). First, while White students dominate the numbers of first-degree leavers progressing to taught higher degrees, Whites do not have the highest progression rates, either before or after the loans were introduced. Progression rates increased the most after the introduction of master's loans in England among Black African, Other, Mixed and Black Caribbean groups, growing from 12.6% to 17.8%, 13.9% to 18.3%, 10.2% to 14.3% and 7.2% to 11.1% respectively. In the case of White students, these grew from 8.2% to 11.8%. Finally, the group with the least growth was Asian Indian, from 10.0% to 11.7% respectively. Notable too is that students from ethnic minority backgrounds appear to have benefited particularly from PSS, at least more than their White counterparts. For instance, the progression rates of Other Black, Black Caribbean and Asian Pakistani students grew, between 2014/15 and 2015/16, from 8.0% to 13.2%, 5.7% to 7.2% and 8.6% to 11.0% respectively.

[Table 3 here, available at the end of the document]

Multivariate models

Finally, we go beyond bivariate associations to assess whether these associations remain when considered alongside other salient factors such as attainment, type of higher education institution attended, gender, mode of study and subject area. To do so, we have fitted two

logistic regression models: one for those graduates that finished their first degree before master's loans were introduced; and another for those who could have accessed loans. The results of these models are displayed in Table 4. By doing so, we compare the predictive power of these factors in explaining individuals' probability to progress to a taught higher degree before and after loans were implemented. We adopted this strategy rather than, say, longitudinal techniques that take into account yearly changes because this research is not concerned with the evolution over time of the numbers of students progressing to taught postgraduate courses. Instead, we are interested in understanding what explains progression before and after a *disruption* in the system, as shown in Figures 1 to 4. In this section, our explanatory variables include measurements of graduates' characteristics and education histories during their first degrees, which are described in Table 2.

[Table 4 here, available at the end of the document]

Our first model, which predicts progression to taught higher degrees before the introduction of master's loans, produces findings consistent with our bivariate analysis, although with some interesting qualifications. First, we observe substantial differences in the probability of progression between graduates' subject of first-degree study when controlling for other explanatory variables. In particular, we observe that graduates from highly vocational subjects are less likely to progress to a master's course compared to those finishing an academically focused degree, which is unsurprising. For instance, as shown in the third column of the first model, which displays average marginal effects, Education, and Medicine & Dentistry first degree leavers' probability to progress to a taught higher degree was 10.2% and 9.4% lower respectively than the reference category (Biological Sciences). Again, this is unsurprising due to the nature of Biological Sciences as a subject. The latter showed one of the highest progression rates to postgraduate study, which is likely to be due to the fact that Biological Sciences are one of the few science subjects that does not offer

integrated master's and where graduates may enrol in a master's degree in preparation for doctoral study.

Regarding graduates' socioeconomic characteristics, we observe that the difference in the probability of progressing across NS-SEC is, though significant, relatively modest, with the probability of progression of students from intermediate and routine and manual backgrounds being 0.9% and 1.1% lower than their higher professional counterparts. Interestingly, all Black, Asian and Minority Ethnic graduates show higher probabilities of progression to taught postgraduate courses when controlling for other explanatory variables than White graduates. In this sense, before master's loans were introduced, Black African students and Chinese students' probability to progress was 7.7% and 9.2% higher than their White counterparts. Moreover, female graduates' probability of progression is 1.8% smaller than their male counterparts.

Finally, both academic performance and type of institution attended have substantial effects on the probability of progression. Unsurprisingly, students who achieved third-class honours had a probability of progression 9.9% lower than those with a first-class degree. Moreover, students from all institutional types had probabilities that were almost 3% higher than those graduating from a post-1992 institution.

The second model confirms our predictions. First, as we see in the constant (0.342, $p<0.01$), students who belonged to all the reference categories for all variables had a higher probability to progress to a taught higher degree after the loans were introduced, compared to Model 1 (0.225, $p<0.001$). Regarding subjects of study, we see an increase of the differences in probabilities of progression between subject areas and the reference category, suggesting that graduates in the Biological Sciences benefitted particularly from the master's loans scheme.

In the case of socioeconomic characteristics, we clearly observe that the relatively modest effect NS-SEC had before the loans were introduced, disappears almost completely after the introduction of the loans. Moreover, the differences in probabilities of progression between Black, Asian and Minority Ethnic students, and White students persists after the introduction of the loans, with White students remaining less likely to progress when controlling for other explanatory variables. We also observe that female students are still less likely to progress than their male counterparts.

Finally, regarding measures of attainment and institutional type, we observe a noteworthy reduction in the difference of the probability to progress to a taught higher degree between students with different attainment levels, with the exception of those with a third-class honours degree. In the latter case, this subset of students were 12.1% less likely to progress than graduates with a first-class degree, 2.2 percentage points lower than in Model 1. As for graduates' type of institution, the introduction of master's loans is associated with an important reduction in the differences in probabilities of progression. Whereas before the introduction of loans graduating from a Golden Triangle university most strongly predicted progression to a taught higher degree than from other institution types, under the loan policy this changed substantially, such that Golden Triangle graduates were 0.8% less likely to make that transition than those graduating from the notionally least prestigious post-1992 institutions. Closer investigation of the dataset shows that the majority of the post-loan increase in participation occurred among graduates from post-1992 institutions. These institutions graduate a far greater proportion of students from lower socio-economic and minority ethnic backgrounds than the Russell Group universities.

Discussion and conclusion

Using our comprehensive dataset, we show conclusively that the transition of UK-domiciled

first-degree graduates to taught higher degrees increased markedly after the introduction of master's loans schemes in the four UK nations. Furthermore, for England we show that under the loan system, gaps in participation between graduates from different socio-economic classes narrowed considerably. Indeed taking into account a range of other pertinent factors (subject and institution of first degree, prior attainment etc.), these differences disappeared almost entirely. Our results suggest that the lack of credit, rather than debt aversion, may explain lower progression rates among graduates from lower socio-economic backgrounds in cohorts that did not have access to master's (Wakeling et al., 2017).

Ostensibly, this indicates the loan policy is a marked success, since expanding and widening participation were amongst the declared intentions. In the social scientific study of education policy, it is unusual to find such clear evidence of narrowing inequalities following a policy intervention. Additionally, in the two years under the master's loans scheme, there has been a further increase in transition to taught higher degrees by students from minority ethnic backgrounds (who were already more likely to make this transition than the White British group). Typically, interventions and system designs have negligible effects on inequality, often because 'advantage finds its way' (Triventi et al., 2019). While we believe there are a number of reasons to be cautious, it is important to acknowledge the evidence that many graduates who would previously have been denied access to a master's degree have been enabled to enrol as a result of the loans policy. We would expect similar outcomes for the loan schemes in Scotland, Wales and Northern Ireland.

There are some notes of caution to sound, however, and some questions requiring further research. The loans policy has not shifted gender differences in transition to taught higher degrees among UK-domiciled students. Women remain disadvantaged here, contrary to observed trends at earlier levels, including undergraduate participation. While there may be improved transition rates for those from disadvantaged socio-economic backgrounds and

ethnic minority students, the reasons for and consequences of these changes is not clear. As Pyne & Grodsky (2019, p. 1) note, in the US case 'the burden of educational debt among graduate borrowers appears to have fallen on students from lower socioeconomic backgrounds and historically underserved students of color' making the cost of entry (literally) to certain careers greater for those already in the most disadvantaged position. Moreover, as suggested by Lessard-Phillips and colleagues (2018, p. 507), ethnic minority graduates 'are disproportionately likely to adopt a strategy of further, compensatory education investment in order to offset the immediate impact of unrealised aspirations'.

The loans scheme has the potential to be a victim of its own success due to twin inflationary pressures. Firstly, fee inflation is likely – and anecdotally already occurring – as institutions react to increased demand and the availability of loan funding by increasing their tuition fees for UK students. Second, credential inflation is likely as an increase master's graduates risks eroding the value of a bachelor's degree, making a master's degree necessary for entry to certain careers. There are other possible drawbacks. Extra 'deadweight' is one: looked at in absolute rather than relative terms, more students from advantaged backgrounds have benefitted from loans, as Figure 3 makes clear.

Finally, and crucially, there is no guarantee that acquiring a master's degree will secure desired employment or further study outcomes for those students unlikely to have participated prior to the loans policy. Future research could usefully explore whether there is indeed a change in outcomes for those students from disadvantaged backgrounds who take out a master's loan, rather than simply greater debt and no further extrinsic benefit.

Notes

1. Source: DfE Tables: participation rates in higher education 2006 to 2018, Table D. Downloaded from https://www.gov.uk/government/statistics/participation-rates-in-higher-education-2006-to-2018 (accessed 25 October 2019).

2. Sources: HESA Heidi database; Student Loans Company (2018) Student Support for Higher Education in England 2018: 2017/18 Payments, 2018/19 Awards. Table 2. Downloaded from: https://www.slc.co.uk/media/10179/slcsp052018.xlsx (accessed 29 April 2019)

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Table 1. Master's loan amount available to UK students by domicile and academic year

	Student domicile			
Year	England	Scotland	Wales	Northern Ireland
2016/17	£10,000	£0	£0	£0
2017/18	£10,280	£10,000	£10,280	£0
2018/19	£10,609	£10,000	£13,000	£5,500

Table 2. Variables included in analytic dataset.

Variable	Description
PGT	Whether a student progressed to a taught higher degree (i.e. master's).
Academic year	Year of first degree completion
Institution attended	Higher education institution attended for first degree.
Type of institution attended	Classifies first degree institutions into four categories, capturing the stratified nature of UK higher education using a combination of institutions' age and global outreach: 1) 'Golden Triangle' universities (Oxford, Cambridge, University College London, Imperial College, London School of Economics, King's College London); 2) Other Russell Group universities (see https://russellgroup.ac.uk/about/our-universities/); 3) Non-Russell Group pre-1992 universities, and 4) Post-1992 institutions.
First-degree subject	Field of first-degree study, classified using HESA's Joint Academic Classification System (JACS)
Mode of study	Full-time or part-time
Level of study	Whether or not first degree was integrated master's degree (e.g. MEng, MPhys etc). We have excluded those students undertaking an integrated master's course (N=75,875, 4.7% of the target population).
Gender	Male, Female, Other
Occupational social class	Occupational social class of the household referent, categorised using the National Statistics Socio-Economic Classification (NS-SEC) (Rose et al., 2005). For graduates

Variable	Description
	classified as ‘dependent’, this is their parent/guardian household; for independent students, it is their own.
Degree classification	Grade of first degree (first class honours, upper second class honours, etc.).
Ethnicity	Graduates’ ethnicity measured using 11 distinct categories.

Table 3. Evolution of numbers and progression rates to taught higher degrees by ethnicity. Numbers are shown both as absolute numbers (N) and progression rates (PR).

Ethnicity		2013/14	2014/15	2015/16	2016/17	2017/18
Asian or Asian British - Bangladeshi	N	140	185	255	395	485
	PR	5.1%	6.4%	8.4%	11.9%	12.9%
Asian or Asian British - Indian	N	805	975	995	1,155	1,320
	PR	7.6%	9.1%	10.0%	11.7%	13.4%
Asian or Asian British - Pakistani	N	525	640	830	1,120	1,330
	PR	7.7%	8.6%	11.0%	14.0%	15.6%
Black or Black British - African	N	1,100	1,185	1,640	2,430	2,570
	PR	9.8%	9.8%	12.6%	17.8%	17.7%
Black or Black British - Caribbean	N	190	250	300	470	555
	PR	4.6%	5.7%	7.2%	11.1%	13.0%
Chinese	N	330	405	330	360	460
	PR	14.2%	16.0%	14.7%	17.3%	19.5%
Mixed	N	795	870	950	1,405	1,550
	PR	8.8%	8.7%	10.2%	14.3%	14.5%
Other	N	325	355	430	625	680
	PR	11.6%	12.2%	13.9%	18.3%	18.6%
Other Asian background	N	480	535	580	705	830
	PR	11.3%	11.3%	12.7%	14.9%	15.6%
Other Black background	N	65	65	100	130	155
	PR	8.5%	8.0%	13.2%	14.9%	15.5%
White	N	14,480	15675	15,495	22,410	25,070
	PR	7.1%	7.4%	8.2%	11.8%	12.8%

Table 4. Logistic regression models predicting progression to taught higher degree. Odd ratios (OR) and Average Marginal Effects (AME).

	Model 1 (Pre-loans)				Model 2 (Post-loans)			
Independent variable	**OR**	**SE**	**AME**	**SE**	**OR**	**SE**	**AME**	**SE**
NS-SEC 3 (ref: Higher managerial)								
Intermediate	0.878***	0.011	-0.009***	0.001	0.978	0.013	-0.002	0.001
Routine and manual	0.854***	0.011	-0.011***	0.001	1.011	0.012	0.001	0.001
Never worked	1.137	0.096	0.010	0.007	1.400***	0.091	0.040***	0.008
Not classified	1.029*	0.012	0.002*	0.001	1.138***	0.014	0.014***	0.001
Unknown	0.965	0.025	-0.003	0.002	0.944*	0.026	-0.006*	0.003
Ethnicity (ref; White)								
Black Caribbean	1.151***	0.045	0.010**	0.003	1.222***	0.042	0.022***	0.004
Black African	2.372***	0.045	0.077***	0.002	2.071***	0.037	0.093***	0.003
Other Black	2.172***	0.156	0.067***	0.008	1.748***	0.117	0.068***	0.009
Indian	1.492***	0.032	0.030***	0.002	1.149***	0.026	0.015***	0.003
Pakistani	1.652***	0.041	0.039***	0.002	1.399***	0.033	0.038***	0.003
Bangladeshi	1.171***	0.052	0.011**	0.003	1.095*	0.041	0.009*	0.004
Chinese	2.67***	0.094	0.092***	0.004	1.838***	0.075	0.075***	0.006
Other Asian	2.32***	0.066	0.075***	0.003	1.582***	0.047	0.054***	0.004
Other	2.31***	0.078	0.074***	0.004	1.804***	0.058	0.072***	0.005
Mixed	1.306***	0.028	0.019***	0.002	1.212***	0.026	0.021***	0.002
Unknown	1.462***	0.059	0.028***	0.003	1.346***	0.060	0.033***	0.005
Sex (ref: Male)								

	Model 1 (Pre-loans)				Model 2 (Post-loans)			
Independent variable	**OR**	**SE**	**AME**	**SE**	**OR**	**SE**	**AME**	**SE**
Female	0.781***	0.007	-0.018***	0.001	0.845***	0.008	-0.018***	0.001
Other	3.186***	0.939	0.135**	0.046	2.555***	0.543	0.141***	0.039
Mode of study (ref: full-time)								
Part-time	0.619***	0.016	-0.029***	0.001	0.535***	0.014	-0.056***	0.002
Class of first degree (ref: first class honours)								
2:1	0.647***	0.007	-0.038***	0.001	0.79***	0.008	-0.028***	0.001
2:2	0.402***	0.006	-0.068***	0.001	0.583***	0.008	-0.059***	0.001
3rd	0.162***	0.006	-0.099***	0.001	0.217***	0.008	-0.121***	0.002
Unclassified	0.099***	0.008	-0.108***	0.002	0.105***	0.012	-0.142***	0.003
Type of HEI (ref: Post-1992)								
Golden Triangle	1.506***	0.031	0.029***	0.002	0.926**	0.022	-0.008**	0.002
Other Russell Group (RG)	1.497***	0.018	0.029***	0.001	1.070***	0.013	0.007***	0.001
Non-RG pre-1992	1.490***	0.017	0.028***	0.001	1.191***	0.014	0.019***	0.001
JACS subject area (ref: Biological sciences)								
Medicine & dentistry	0.245***	0.022	-0.094***	0.003	0.210***	0.026	-0.154***	0.006
Subjects allied to medicine	0.305***	0.006	-0.085***	0.001	0.193***	0.004	-0.158***	0.002
Agriculture & related subjects	0.487***	0.027	-0.061***	0.004	0.426***	0.024	-0.105***	0.005
Veterinary science	0.322***	0.079	-0.083***	0.011	0.125***	0.052	-0.175***	0.013
Physical sciences	1.021	0.021	0.002	0.002	1.018	0.021	0.003	0.003

	Model 1 (Pre-loans)				Model 2 (Post-loans)			
Independent variable	**OR**	**SE**	**AME**	**SE**	**OR**	**SE**	**AME**	**SE**
Mathematical sciences	0.552***	0.016	-0.053***	0.002	0.55***	0.017	-0.080***	0.004
Engineering & technology	0.658***	0.015	-0.039***	0.002	0.711***	0.016	-0.049***	0.003
Computer science	0.289***	0.009	-0.087***	0.002	0.353***	0.010	-0.121***	0.003
Architecture, building & planning	0.403***	0.015	-0.072***	0.002	0.272***	0.012	-0.139***	0.003
Social studies	0.671***	0.010	-0.038***	0.001	0.695***	0.011	-0.052***	0.002
Law	0.757***	0.016	-0.028***	0.002	1.006	0.020	0.001	0.003
Business & administrative studies	0.318***	0.006	-0.083***	0.001	0.360***	0.006	-0.119***	0.002
Mass communications & documentation	0.314***	0.010	-0.084***	0.002	0.415***	0.012	-0.107***	0.003
Languages	0.770***	0.013	-0.026***	0.002	0.776***	0.014	-0.038***	0.003
Historical & philosophical studies	1.011	0.018	0.001	0.002	0.988	0.018	-0.002	0.003
Creative arts & design	0.394***	0.007	-0.073***	0.001	0.372***	0.007	-0.117***	0.002
Education	0.19***	0.007	-0.102***	0.001	0.262***	0.007	-0.141***	0.002
Combined	0.633***	0.031	-0.042***	0.004	0.666***	0.037	-0.058***	0.007
Constant	0.225***	0.003			0.342***	0.005		
Pseudo r-squared	0.077				0.068			
Chi-squared	33,655.62***				26,795.18***			

Notes: ***<0.001, **<0.01, *<0.05

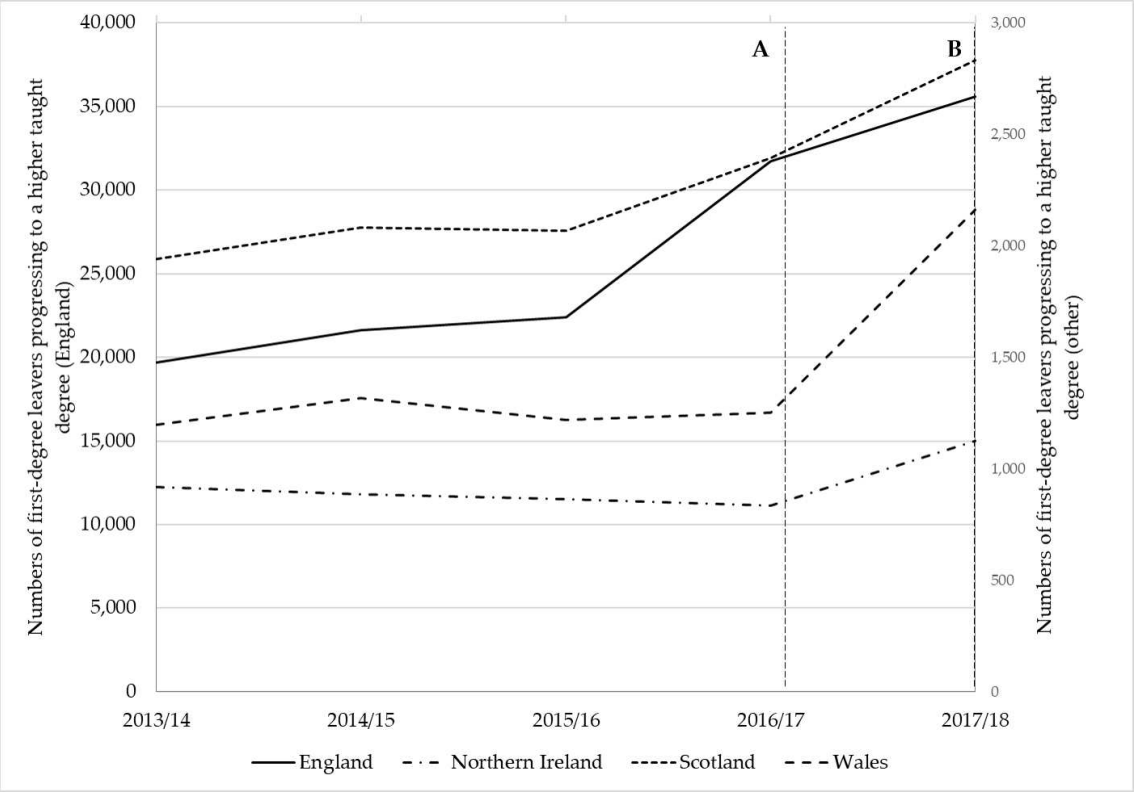

Figure 1. Numbers of first-degree graduates progressing immediately to a taught higher degree by home nation of domicile. A – Introduction of the master's loan policy in England; B – Introduction of the master's loan policy in Scotland, Wales and Norther Ireland. Due to the large differences in numbers between England and the other three home nations, the former's numbers are displayed in the left axis and the latter's in the right axis.

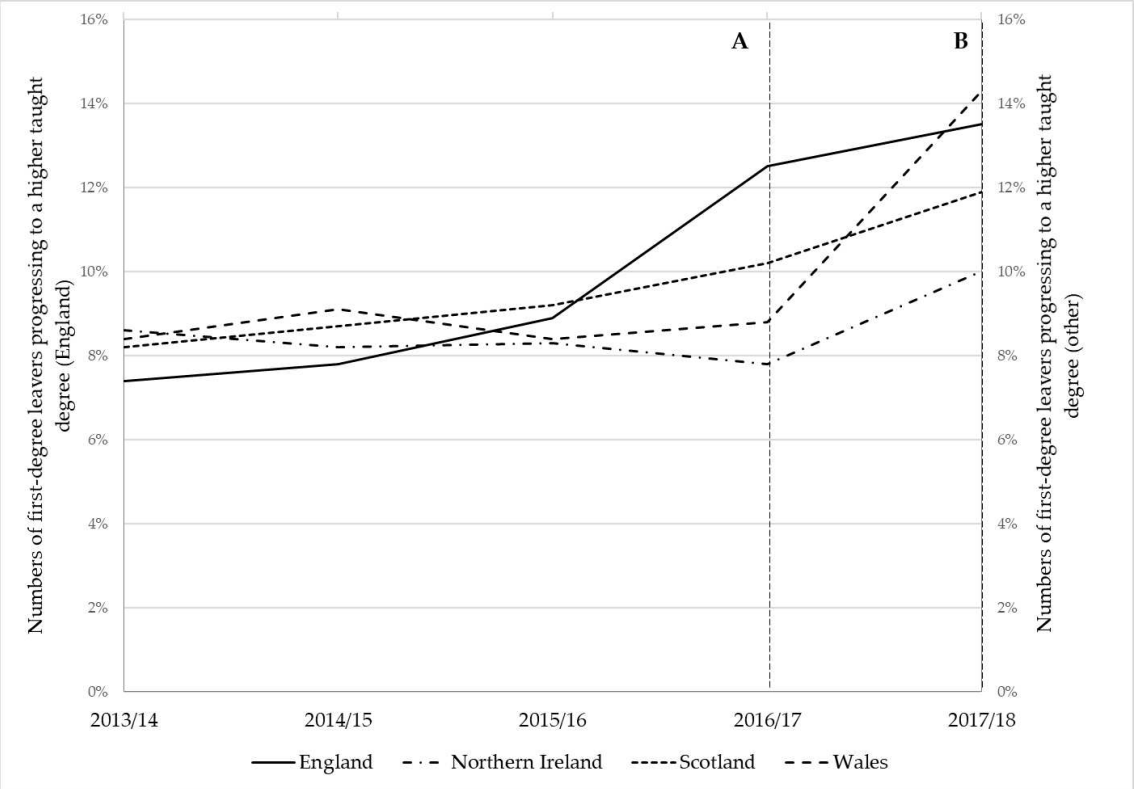

Figure 2. Percentage of first-degree graduates progressing to a higher degree, taught course by home nation of domicile. A – Introduction of the master's loan policy in England; B – Introduction of the master's loan policy in Scotland, Wales and Northern Ireland.

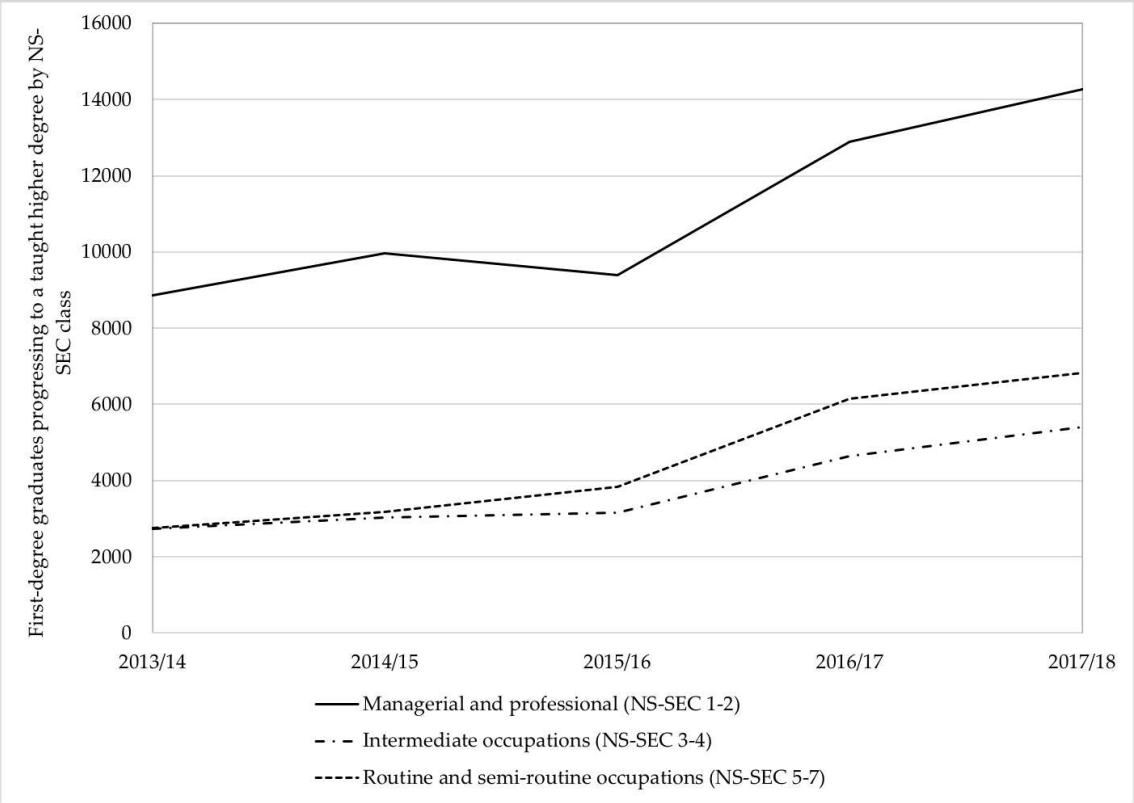

Figure 3. Evolution of numbers of English first-degree leavers progressing to taught higher degrees by NS-SEC class from 2013/14 to 2017/18.

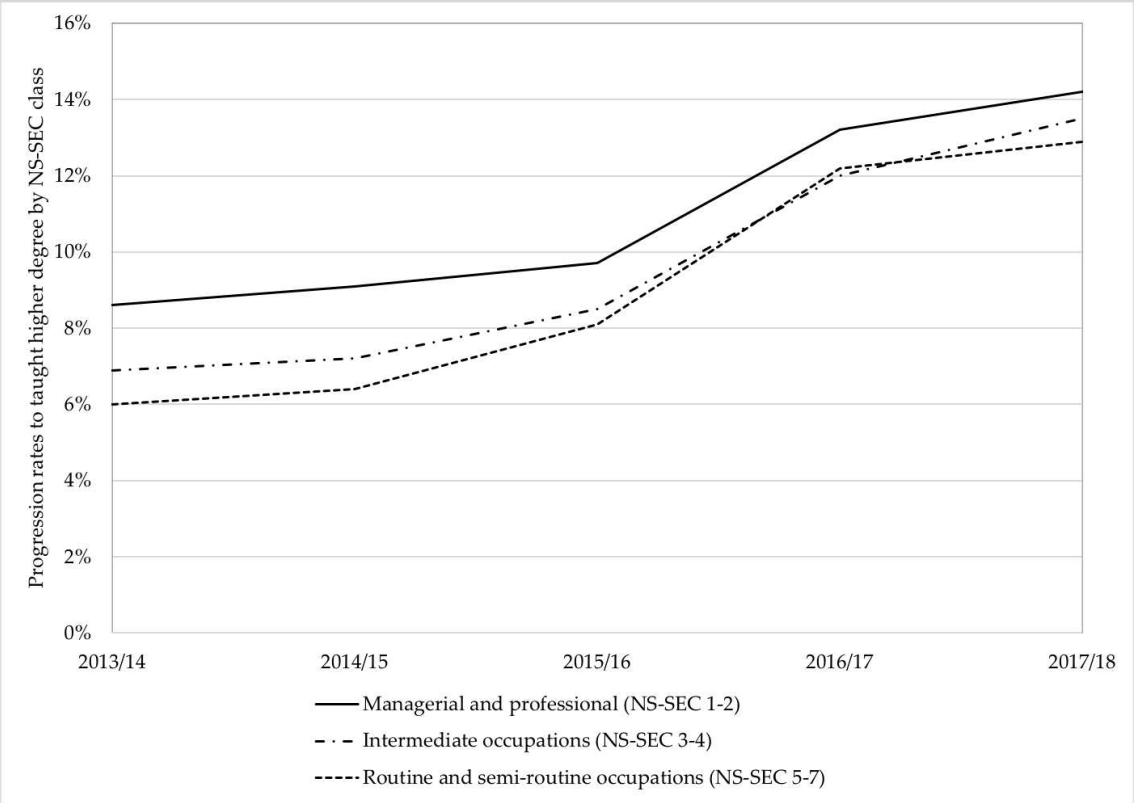

Figure 4. Evolution of progression rates of English first-degree leavers to taught higher degrees by NS-SEC class from 2013/14 to 2017/18.