Access All Areas?
The Impact of Fees and Background on Student Demand for Postgraduate Higher Education in the UK

Philip Wales (SERC)

February 2013

Access All Areas?
The Impact of Fees and Background
on Student Demand for Postgraduate
Higher Education in the UK

Philip Wales*

February 2013

* SERC

Abstract

This paper analyses participation in postgraduate higher education in the UK at the micro-level makes several contributions to the literature. Firstly, it describes trends in postgraduate participation in the UK. Secondly, it introduces a hitherto unavailable dataset of postgraduate tuition fees by institution and subject: the first of its kind. Thirdly, it attempts to control for several potential forms of endogeneity to assess the extent to which tuition fees affect demand. It adopts an instrumental variables approach to partially control for the potential endogeneity of tuition fees and includes a broad array of fixed effects to mitigate the impact of sorting into universities and endogenous residential selection. The results suggest that (1) there is substantial variation in tuition fees across and within institutions and that (2) tuition fees reduce demand for postgraduate places. In our preferred specification a 10% increase in tuition fees reduces the probability of progression by 1.7%.

Postgraduate education is a large and growing part of the higher education system in the UK. In 2000/01 there were 168,235 full-time postgraduates at universities in Great Britain. By 2010/11 the number of full-time students had grown to 304,320, taking the total number of postgraduates in higher education to more than 575,000 (HESA 2010). Around 10% of graduating first-degree students progressed directly into study for a higher qualification between 2004/05 and 2008/09.[1]

Recent reforms have focussed academic and policy-maker attention on first-degree students (Johnstone 2004, Chowdry *et al.* 2010, Barr 2010a, 2010b, Dearden *et al*. 2011). Despite the large size of the postgraduate sector and the relevance of issues such as access and the impact of tuition fees, few papers have engaged with these questions beyond undergraduate level, with notable exceptions (Machin and Murphy 2010). Highlighting this research deficit, the Browne review of higher education funding concludes that trends in postgraduate study should 'be monitored carefully, including after the introduction of changes to funding and student finance' (Browne 2010, pp.55). Although the primary focus of the Review was the financing of undergraduate teaching, Browne (2010) also considered the funding arrangements for taught postgraduate courses, concluding: 'we have seen no evidence that the absence of student support in the taught postgraduate market has had a detrimental impact on access to postgraduate higher education' (Browne 2010, pp.55). In an earlier review of postgraduate training in the UK, Department for Business, Innovation and Skills (BIS) (2010) calls for research to examine whether finance presents a barrier for potential postgraduate students, arguing that at present 'there is little in the way of robust

---

[1] Based on Destinations of Leavers from Higher Education survey from the Higher Education Statistics Agency and author's own calculations. See Section 3.5.

evidence on whether the cost of postgraduate study and the lack of student support prevent those who would otherwise have pursued postgraduate education from doing so' (BIS 2010, pp.48).

This paper seeks to address this research deficit through an examination of participation in postgraduate higher education. Using a large micro-level dataset it explores why some undergraduates choose to remain in higher education after completing their first degree and why others do not, and makes several contributions to the literature. Firstly, this paper provides a summary of previously neglected trends in postgraduate participation in the UK. Secondly, it introduces and utilises a substantial and hitherto unavailable dataset of postgraduate tuition fees by institution and subject, generated through a large number of requests made under the Freedom of Information Act. Thirdly, it uses a micro-level model and seeks to control for several potential forms of endogeneity to assess the extent to which tuition fees affect the demand for postgraduate education in the UK.

The paper makes a number of findings. Firstly, postgraduate fees increased faster than inflation between 2003/04 and 2008/09. Secondly, there are significant differences in tuition fees within and between institutions. Thirdly, the results suggest that higher fees reduce student demand for postgraduate places. In my preferred specification, a 10% increase in tuition fees is associated with a reduction in the probability of progressing to a postgraduate degree of between 1.7% and 4.5%. Finally, the results also suggest that there are significant differences in progression probabilities between students from different socio-economic groups, even after controlling for observable differences in academic attainment. The results raise questions about the relative lack of public funding to support research students above undergraduate level.

The remainder of this paper is structured as follows. Section 1 provides a brief examination of higher education funding in the UK. Section 2 surveys existing academic

work. Section 3 examines trends in postgraduate participation, while Section 4 introduces the empirical model. Section 5 summarises the data, Section 6 documents the results and Section 7 describes my robustness checks. Section 8 offers some discussion, conclusions and areas for future research.

1. Higher education funding policy

The funding of teaching in UK higher education has been the subject of repeated policy revisions in recent years (Chowdry *et al.* 2010, Crawford and Dearden 2010, Dearden *et al.* 2011, Barr 2009, 2010a, 2010b, Adnett and Tlupova 2007). Starting in 1998/99, a series of reforms have aimed to (1) shift a greater proportion of the cost of undergraduate teaching from tax-payers to graduates, (2) to increase competitive pressure in the higher education sector to raise standards and efficiency, and (3) to ensure that the system remains accessible to all qualified students regardless of ability to pay.[2]

To these ends, institutions derive income for teaching from both the publicly-funded Higher Education Funding Councils (HEFCs) and tuition fees paid by graduates. The balance between these two sources of income varies between subjects and across different qualifications (Table 1). At undergraduate level, students pay a common, centrally set tuition fee regardless of the subject they study or the institution they attend.[3] The larger proportion of teaching funding comes through formula-based grants

---

[2] These reforms broadly parallel international changes to higher education finance (Marcucci and Johnstone 2007, Johnstone 2004, Chapman 1997).

[3] The Higher Education Act 2004 introduced a number of changes which are detailed in elsewhere (Barr 2010a). Undergraduate institutions have had the ability to vary fees by subject up to a centrally set cap since 2006/07. In practice the majority of institutions priced their courses at this maximum fee. The only institution not to do so was Leeds Metropolitan University, which offered courses at a discounted rate between 2006/07 and 2008/09 (Times Higher Education 2011).

Table 1: Public & private per-student funding (£) for undergraduate & postgraduate study in the UK: 2010-11[1]

	Undergraduate				Postgraduate			
Subject Group[2]:	D	C	B	A	D	C	B	A
(A) Standard Resource	3,951	5,136	6,717	15,804	3,951	5,136	6,717	15,804
(B) Expected Fee Income[3]	1,310 (33.2%)	1,310 (22.5%)	1,310 (19.5%)	1,310 (8.3%)	3,951 (100%)	3,951 (76.9%)	3,951 (58.8%)	3,951 (25.0%)
(C) HEFCE grant	2,641 (66.8%)	3,826 (74.5%)	5,407 (80.5%)	14,494 (91.7%)	0 (0%)	1,185 (23.1%)	2,766 (41.2%)	11,853 (75.0%)

Note(s): (1) Based on HEFCE (2010). (2) Subject groups are defined by HEFCE. Group A includes clinical stages of medicine and dentistry courses and veterinary science. Group B includes laboratory based subjects, including pre-clinical stages of medicine & dentistry, engineering and technology. Group C includes subjects with a studio, laboratory or fieldwork element. Group D includes all other subjects. (3) Expected Fee Income reflects HEFCE assumptions, set by statutory instrument. These have continued to reflect tuition fees in the pre-Higher Education Act 2004 era as a result of a consultation carried out by HEFCE in 2005. See HEFCE (2006) for more details.

from the HEFCs. These aim to equalise the amount of funding per equivalent full-time student within each subject area (HEFCE 2010). As shown in Table 1, the HEFCs make up the difference between the estimated costs of teaching (A) and the expected average contribution of the student (B), given in row (C). Confronted with different costs of educating students in different subjects and a single-rate tuition fee, the HEFCs offer a smaller public subsidy for students of 'cheaper' degrees (such as Arts and Humanities) than to students of more expensive degrees (such as Clinical Medicine and Dentistry degrees). As the 'standard resource' of even the cheaper degrees exceeds the expected fee income from each student, every undergraduate receives a subsidy.

At the postgraduate level, public funding is more limited and the balance between HEFC funding and tuition fees is shifted towards the student. Once again, the HEFCs aim to equalise teaching funds on a per equivalent full-time student basis, and make up the difference between the cost of teaching and the expected student contribution. As can be seen in Table 1, the public subsidy for postgraduate students is substantial – particularly for students in the more expensive, band A subjects – but it is smaller than the undergraduate

subsidy across the range of subjects and zero for the 'base' subjects. Based on Table 1, postgraduate students in all but the most expensive subject areas bear the greater share of their costs of teaching.

The second difference between undergraduate and postgraduate funding concerns how fees are set. While undergraduate fees have effectively been centrally set, taught postgraduate fees are largely unregulated, may vary across subjects and are set independently by the institutions themselves. As a consequence there is greater intra- and inter-institution variation in fee levels which is not captured by the HEFCs workings as set out in Table 1. Rather than basing 'expected' postgraduate fee income on survey data, the HEFCs set the student contribution equal to the standard resource for type 'D' degrees. Section 6 sets out my findings with regard to tuition fees, but it is clear that postgraduate fees differ from the type 'D' standard resource in the majority of cases.

A further difference between undergraduate and postgraduate financing in the UK is the extent of public funding to help students pay tuition fees. While undergraduate students may use state-financed income-contingent loans to pay their fees, the range of funding sources available to postgraduates is more limited. The primary providers of financial support for postgraduate study are the publicly funded Research Councils. These specialise along academic lines and offer a limited number of scholarships for postgraduate study, allowing students domiciled in the UK who intend to study for a Masters and continue to a PhD, to compete for public support to cover both living and tuition costs. Professional and Career Development Loans (PCDLs) are also available to cover postgraduate study, but the number of students taking these up is very small.[4] Some institutions also offer financial assistance or early payment discounts, while others offer their Bachelors students preferential rates if they progress to postgraduate study at their undergraduate institution. BIS (2010) suggests that

---

[4] BIS (2010) presents data suggesting that just 1,750 individuals, or 0.5% of the UK-domiciled postgraduate population, used PCDLs to fund their postgraduate study in 2008/09.

around 30% of postgraduate researchers and around 60% of taught postgraduate students receive no funding from either public or private providers.

2 Literature review

A rigorous analysis of the determinants of participation must confront a series of empirical challenges. Selection into universities and courses based on unobservable characteristics (Black and Smith 2004, Ehrenberg 2004, Hoxby 1997, Arcidiacono 2004, Chevalier and Conlon 2003, Long 2004) and a shortage of suitable instruments make dependable analytical work difficult. This section surveys a number of papers which offer insightful descriptive work or analysis of participation at undergraduate level to inform my approach.

2.1 Undergraduate participation

Several recent papers examine post-secondary progression rates in the context of family income and socio-economic group. Galindo-Rueda, Marcenaro-Gutierrez and Vignoles (2004) use data from the Youth Cohort Survey (YCS), the Higher Education Statistics Agency (HESA) and the CACI Paycheck dataset to examine how individuals from households with different levels of income have varied in their participation likelihood over time. Using individual- and postcode-level analyses, their results suggest that wealthier postcodes experienced a more rapid increase in the number of students choosing to participate in higher education at age 18 between 1996 and 2000. The authors highlight the difficulty of separating the effects of economic background and educational performance before university, as students from disadvantaged backgrounds have lower average school-level attainment than wealthier students. They conclude that in 1996 (before the introduction

of undergraduate tuition fees) there was a significant class divide in participation which largely reflected pre-existing patterns of educational attainment and economic background. By 2000 however, they find that economic class has a direct impact on participation probabilities, even after controlling for prior academic achievement.

Chowdry *et al.* (2010) use a student-level dataset to explore patterns of participation among people from different socio-economic backgrounds in the UK. They use a micro-level linear probability model with school fixed effects to try to control for selection and to explore patterns of participation in higher education. Introducing the variables in groups, their initial estimates suggest that male (female) students from the poorest socio-economic quintile are 40.7% (44.6%) less likely to participate in higher education than students from the top quintile. Introducing student and school characteristics alongside academic attainment at 11, 14, 16 and then 18, they find that this gap falls to 4.1% for males and 5.3% for females. Chowdry *et al.* (2010) conclude that poorer students are less likely to attend university, but that the majority of this gap is attributable to well-documented differences in educational attainment earlier in life, rather than specific access constraints at entry to higher education.

The results of these papers confirm the findings of several others. Gayle, Berridge and Davies (2002) also use YCS data, and conclude that parental education, socio-economic class and State-school attendance all affect participation probabilities. Blanden and Machin (2004) use data from three panel surveys and similarly conclude that the recent expansion of higher education in the UK has disproportionately benefited students from wealthier backgrounds. Their detailed results suggest that after controlling for individual characteristics and prior academic achievement, family income increased in importance as a determinant of participation between 1981 and 1993.

However, while the finding of substantial inequality in undergraduate education is common, several papers challenge the notion that social class and family income are of

increasing importance. Using data from the Scottish Higher Education Funding Council, Paterson (1997) concludes that while participation rates are highest among those from the top social class, differences between socio-economic groups fell between the early 1980s and the mid-1990s. Gallacher (2006) also finds that students from the wealthiest groups are most likely to continue to higher education, but that students from the most deprived families increased their participation slightly at all types of institution in Scotland between 2001 and 2003. O'Connell, McCoy and Clancy (2006) use data from the Irish Republic and find that while patterns of social inequality in undergraduate education remain in Ireland, there has also been a gradual reduction in the extent of this gap.

2.2 Tuition fees

The introduction of undergraduate tuition fees in the UK created the potential for new papers examining student responses. Crawford and Dearden (2010) use data on four cohorts of British students to examine whether the introduction of 'top-up fees' in 2006/07 had a significant impact on participation in undergraduate higher education. Their formal analysis used a difference-in-difference approach based on limited geographical variation in the introduction of top-up fees. Their results suggest that the reforms had a small, negative but insignificant impact on participation. However, they caution that because of underlying differences in the control and treatment groups their results may not be reliable. Soo and Elliot (2010) examine UK data from the University and College Admission Service (UCAS) for evidence that higher tuition fees have discouraged international undergraduate applicants to a selection of British universities. They find that demand for places is largely driven by university quality and environmental factors: tuition fees are of second order importance.

Dearden *et al.* (2011) use data on potential university entrants from the Labour Force Survey to examine the impact of reforms to tuition fees, grants and loans between 1992 and 2007. They attempt to control for differences in unobservable characteristics by dividing their data into cells of individuals who are observably similar and estimating for each cell separately. Their results suggest that a £1,000 increase in undergraduate fees is associated with a 3.9% reduction in demand for undergraduate places, while a £1,000 increase in maintenance grants is associated with a 2.6% increase in demand. Dolton and Lin (2011) use a large time-series dataset to look for structural breaks in participation rates in the UK and similarly conclude that student's participation behaviour does respond to financial incentives.

International evidence on the impact of fees on demand for higher education is more plentiful. Flannery and O'Donoghue (2009) focus primarily on the impact of expected earnings on the probability of attending university in Ireland, but also include average tuition fees in their analysis. They find no evidence that tuition fees either reduce demand for undergraduate places or impede access to higher education for particular groups. Chapman and Ryan (2005) examine the impact of the Australian Higher Education Contribution Scheme on access, while Christofides, Hoy and Yang (2010) examine higher education participation in Canada. Chapman and Ryan (2005) find no impact of tuition fees on student demand and argue that there is no evidence to suggest that fees have deterred individuals from poor backgrounds from attending university in Australia. Christofides, Hoy and Yang (2010) find that tuition fees do have a small, negative impact on student demand and that they affect females slightly more than males.

In contrast to these results, a large literature in the United States has reported strong evidence that students respond to price signals from higher education institutions, both in terms of the level of tuition fees and the amount of financial assistance available (Leslie and Brinkman 1987, Heller 1997). Carneiro and Heckman (2002) offer evidence on the nature

and extent of credit constraints affecting higher education participation in the United States. They argue that two forms of credit constraint are relevant: (1) the short-term credit constraint which prevents some students meeting the financial cost of university, and (2) the long-term credit constraint which prevents students from buying greater ability through higher family income. They estimate that the second of these constraints is far more important in the US case, mirroring findings in the UK (Crawford and Dearden 2010).

Recent work has also sought to exploit quasi-experimental methods around policy shifts to identify the impact of tuition fees and financial aid on university enrolment. Dynarski (2003, 2005) and Kane (2003, 2004) offer four such analyses. Dynarksi (2003) conducts a difference-in-difference analysis around the withdrawal of a source of financial aid for university study in 1981. After controlling for individual, parental and family characteristics as well as prior academic attainment, she finds a significant reduction in participation probabilities among eligible students following the withdrawal of the benefit scheme. Dynarksi (2005) similarly concludes that the introduction of financial aid schemes in Arkansas and Georgia in 1991 and 1993 had an impact on participation, increasing university enrolment rates by around 3%.

Kane (2003) uses a similar, quasi-experimental approach to estimate the impact of the introduction of the Cal Grant program in California. Using data on 150,000 applicants to the scheme between 1998/99 and 1999/2000, he identifies the impact of eligibility for the scheme using variation in the income and Grade Point Average (GPA) scores required each year. His results suggest that eligibility for the Cal Grant scheme raised the probability of participation by between 3% and 4%. Kane (2004) exploits the introduction of a new financial aid package designed to improve the mobility of students from Washington D.C. to examine how individuals respond to price changes. He finds that students from the District of Colombia

were more likely to attend university, and more likely to go out of state for their higher education, after the introduction of the programme.

In the UK, the literature on the impact of financial aid is more limited. Adnett (2006) summarises concerns about the decentralised nature of financial support in the UK, but Callender (2010) provides the first evidence on the nature of the bursary system established in response to recent reforms. Although it remains too early to assess their effectiveness, the data suggest that around 60% of established bursaries were designed to improve access for individuals from poor backgrounds. A further 25% were merit based and targeted individuals who achieved particular grades at school level, or excellence in a particular subject. Callender (2010) presents evidence that many of these schemes were designed to alter the composition of student bodies, to attract 'star' students and to raise a university's academic standing. Callender (2010) also raises questions about the equity of the decentralised financial aid system. In particular, she demonstrates that some poorer students at the best universities receive as much as three times as much aid as equivalent students in other institutions.

2.3 Postgraduate participation

The small size of the literature on postgraduate participation represents a significant research deficit. The author is aware of only one paper which examines trends in progression to further study in the UK.

Machin and Murphy (2010) use individual level data from HESA on students in full-time undergraduate and postgraduate study in 2004/05, 2006/07 and 2008/09 to examine trends in participation in the UK. They find that the social composition of the population of postgraduates in the UK broadly reflects the social composition of the undergraduate population – suggesting that the jump from undergraduate to postgraduate study presents few

additional barriers to students from poorer backgrounds. Machin and Murphy (2010) estimate that achieving a 'good' degree increases the probability of progression to a postgraduate course by 12%, while attending an Independent school raises the probability of progression by a further 1.2%.[5]

Machin and Murphy (2010) also highlight the increasingly 'gateway' nature of postgraduate qualifications for careers in Law, Journalism and Economics. However, they lack data on postgraduate fees and therefore cannot provide an assessment of how these have shaped student demand in recent years. The extent to which they have controlled for selection based on unobservable characteristics is also unclear, but the paper provides a useful yardstick against which to judge the results of my analysis.

3 Trends in postgraduate participation

A range of different measures have been used to estimate participation in post-compulsory education. As students may take breaks from their studies before returning to pursue higher qualifications, aggregate birth-cohort measures of participation derived from longitudinal data or multiple cross-section surveys have advantages (Card and Lemeiux 2000), but the definition used in this paper is dictated by the dataset. Participation is here defined as the proportion of students domiciled in the UK who are enrolled in a full-time course of higher education six- to nine-months after graduating with a first undergraduate degree. My results consequently capture 'direct entry' graduates and cannot take into account students who choose to pause between their undergraduate and postgraduate degrees. This is
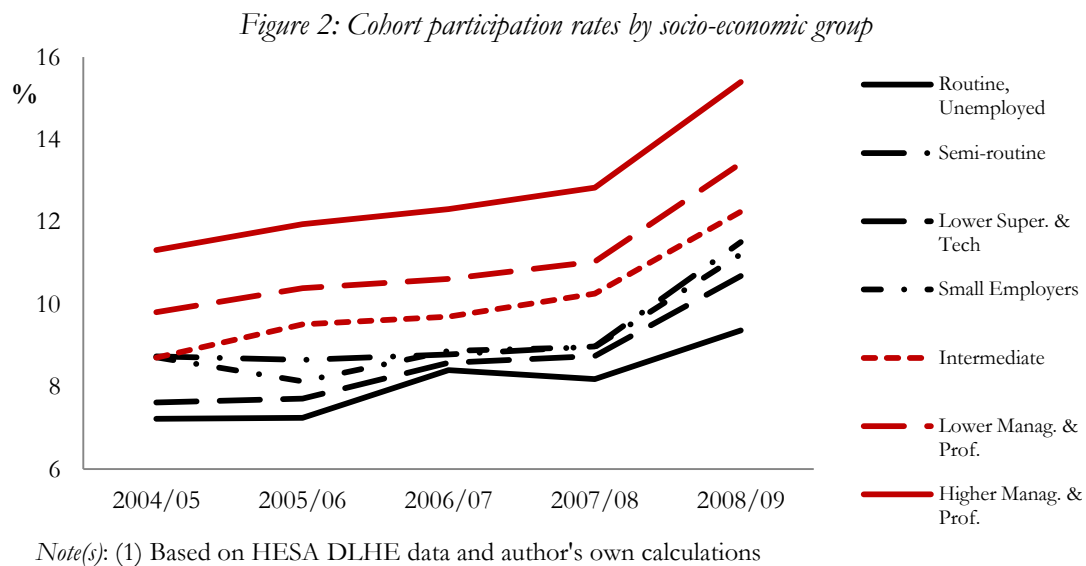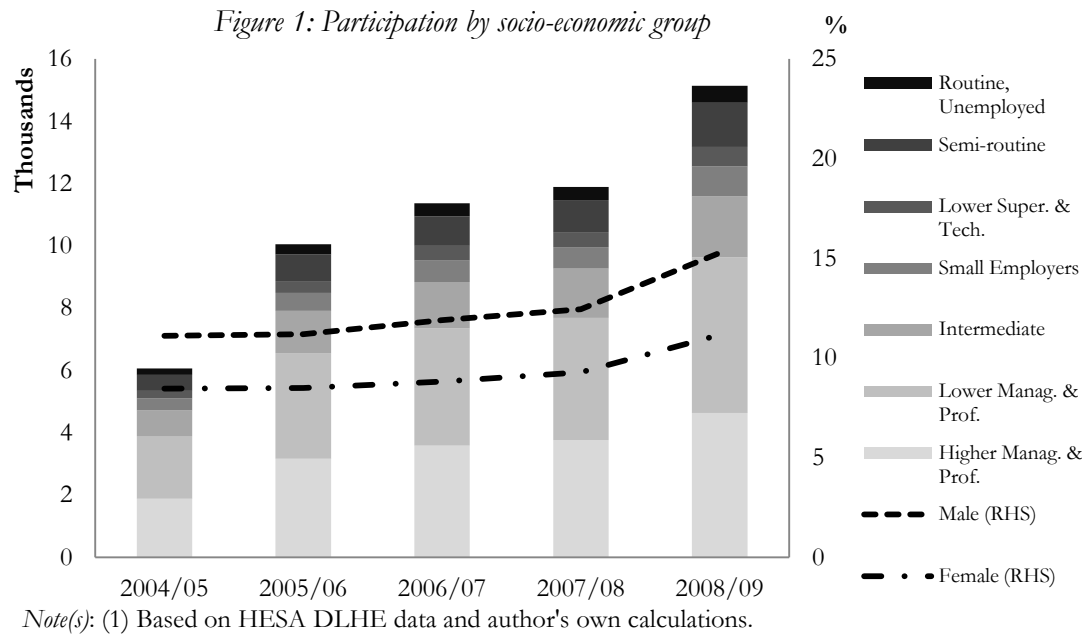
---

[5] Machin and Murphy (2010) define a 'good degree' as either First or Upper Second class honours.

discussed further in Section 8 and is a potential limitation of this paper, but is similar to other work in the field (Kane 2004).

Figures 1 to 3 show descriptive statistics for my measure of participation based on the Destination of Leavers from Higher Education survey (see Section 5). Figure 1 shows the proportion of surveyed students who progress to a postgraduate degree. Average participation rates grew slowly until the final year of data, rising from 9.6% in 2004/05 to 12.8% in 2008/09. The male enrolment rate exceeded the female enrolment rate in every year, although participation rates for both genders increased sharply in 2008/09. Figure 1 also demonstrates that the surveyed student population progressing to postgraduate study is heavily weighted in favour of students from higher occupational groups. Students from Managerial and Professional backgrounds account for 60% or more of those continuing each year between 2004/05 and 2008/09. The two lowest socio-economic groups– Routine occupations and Never Worked and Long-term Unemployed – need to be aggregated to form a group large enough for reliable inference, and account for no more than 4% of progressing students during this period. Figure 2 suggests that there are unconditional differences in enrolment rates across socio-economic groups. Students from amongst the wealthiest families enjoy a 4-6% probability premium in their likelihood of remaining in higher education after graduating relative to students from the poorest backgrounds. However, these differences cannot account for the large inequalities demonstrated in Figure 1, which implies that barriers to progression for poorer students earlier in education must play an important role (Galindo-Rueda, Marcenaro-Gutierrez and Vignoles, 2004). If postgraduate participation rates for the lowest socio-economic groups were equal to that of the highest, the number of students from the poorest backgrounds would still be less than one-fifth of the number of progressing students from wealthy families.

Figure 1: Participation by socio-economic group

Note(s): (1) Based on HESA DLHE data and author's own calculations.

Figure 2: Cohort participation rates by socio-economic group

Note(s): (1) Based on HESA DLHE data and author's own calculations

Academic criteria appear to be more important. Figure 3 shows progression rates among all undergraduates by the class of their degree between 2004/05 and 2008/09. Around one-in-five First-class degree students choose to continue to a postgraduate degree, and 10-13% of Upper-Second class degree holders continue, compared to just 3-4% of Third-class students.

Figure 3: Participation by undergraduate degree class
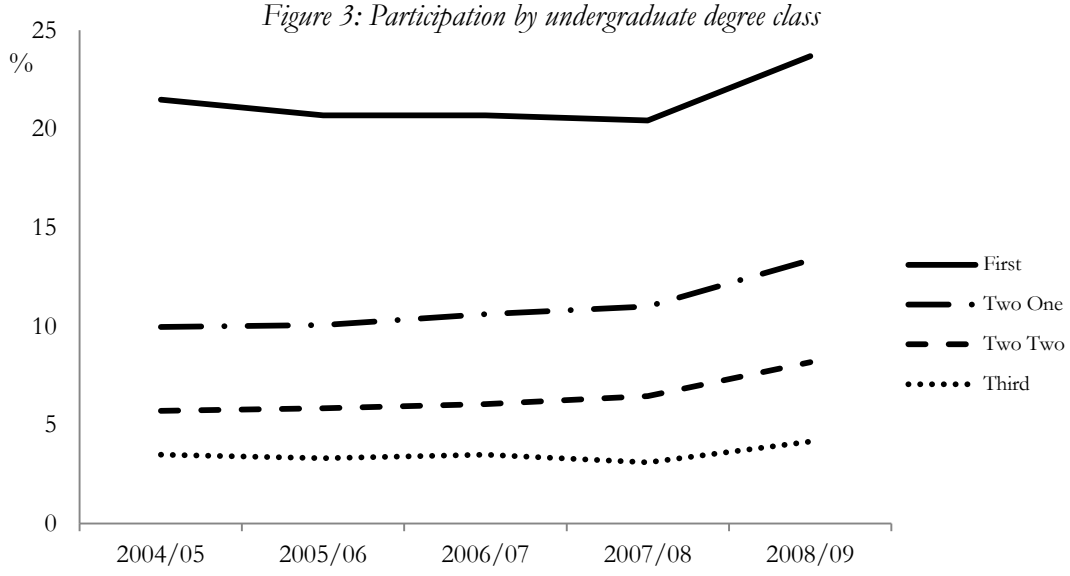
Note(s): (1) Based on HESA DLHE data and author's own calculations

4 Empirical model

The empirical model is built around the reduced form human capital investment model set out in Rice (1999) and developed in Card and Lemieux (2000). The demand of an individual (n) for a postgraduate place to read a particular subject (s) at a particular institution (i), in year t, is given by:

$$x^*_{n,s,i,t} = A_0 + A_1 D_n + A_2 B_{s,i,t} + A_3 C_{s,i,t} \qquad (1)$$

Where D_n are characteristics of individual n, $B_{s,i,t}$ is the present discounted value of the expected benefits of a further course of study and $C_{s,i,t}$ captures the present value of the expected costs of a course of further study including tuition fees. As $x^*_{n,s,i,t}$ is unobserved, a variable, x, is defined which takes a value one where the student chooses to participate (and

16

therefore the net present value of a further qualification is assumed to be positive) and zero otherwise.

$$\Pr\left(x_i = 1\right) = \begin{cases} 0 & \text{iff } x^*_{n,s,i,t} \leq 0 \\ 1 & \text{iff } x^*_{n,s,i,t} > 0 \end{cases} \tag{2}$$

This specification presents several empirical challenges. Firstly, measures of the discounted future benefits and costs of a higher degree are likely to be (a) measured with significant error and (b) subject to uncertainty, both from the perspective of the researcher and the potential student. Secondly, unobserved characteristics are likely to influence students' choices about whether to pursue a particular postgraduate degree. Individual level characteristics, such as a taste for research, or institution level characteristics, such as the extent of research training during their undergraduate degree, are both unobserved and may play significant roles.

Finally, the postgraduate fees component of $C_{s,i,t}$ poses two problems. Firstly, the choice to progress is usually binary: students either select into further study or opt out – which prevents analysis of how marginal changes in price bring about marginal changes in quantity. The binary nature of the decision is complicated because information about prices is incomplete. Postgraduate fees are only paid by graduates who choose to progress. For these students, it is possible to estimate how much they are likely to have paid for their course. However, no information is available about what fee non-progressing students considered paying (and then rejected). As a result, undergraduates divide into two groups: those who progressed (and paid postgraduate fees) and those who did not (for whom no price information is available).

A further problem arises for those who do progress as the fee levels themselves are likely to be endogenous in the level of demand. Prestigious research institutions will have

higher applicant to place ratios, giving them a degree of market power which allows them to charge a higher price for their courses. Failing to account for the simultaneity of prices and quantity would attribute selection into universities based on unobserved characteristics to higher fee levels and suggest a spurious, positive relationship between fees and student demand.

To help to mitigate these problems, the basic specification in (1) and (2) is modified and developed. An instrumental variables approach is implemented. My main equation is a linear probability model of the form:

$$Pr\big(x_{n,si,g,t} = 1\big) = \alpha_0 + \alpha_1 D_n + \alpha_2 O_{si,g,t} + \alpha_3 \bar{P}_{si,t} + f_{si} + f_t + f_g \tag{3}$$

On the left-hand-side is the probability that a student enrolled in an undergraduate program defined by a particular subject-institution combination,[6] si, domiciled in a labour market area, g, at time t, chooses to progress to a higher degree. On the right-hand-side are the student's characteristics, D_n, and opportunity cost of a further course of study, excluding the costs of tuition fees, $O_{si,g,t}$. Tuition costs are included in $\bar{P}_{si,t}$, alongside fixed effects for each undergraduate subject-institution combination, f_{si}, each graduating cohort, f_t, and each labour market area of pre-university domicile, f_g.

Incorporating the arrays of fixed effects in (3) has several important consequences. Firstly, the fixed effects for each subject-institution combination control for the common, time invariant unobserved characteristics of both undergraduate students and the department at which they are studying. This helps to reduce the impact of confounding effects in the analysis which follows, but requires two additional assumptions: (a) that students reveal information about their unobserved characteristics, including their preference for research

---

[6] See Appendix 3A for a detailed breakdown of the subject classification used in this paper.

and innate ability, when they select into their undergraduate courses, and (b) that the unobserved characteristics of the courses and the students on them are time-invariant. Secondly, as set out in the previous paper, the arrays of fixed effects for domicile and cohort help to control for selection into areas of residence and cohort specific effects.

4.1 Predicting fees for participating and non-participating students

To avoid the problems associated with imperfect price information detailed above, the tuition fee variable, $\bar{P}_{si,t}$, is designed to capture the price that each student might reasonably expect to pay for a course of higher study. This approach allows me to assign an 'expected fee' to each student regardless of whether they choose to progress to postgraduate study and is consistent with an intention to treat approach. The assumed underlying process is one in which a student's progression behaviour is conditioned by the perceived costs and benefits of a course of further study. A negative, significant coefficient on $\bar{P}_{si,t}$ is therefore interpreted as evidence that higher expected tuition fees discourage students from remaining in higher education. Conversely, a positive, significant coefficient on $\bar{P}_{si,t}$ is interpreted as evidence that higher tuition fees encourage students to progress to further study.

A wide range of plausible mechanisms may be used to estimate student's expectations about the costs of a higher degree. Details of the micro-level data are provided in the following section, but Table 2 analyses the destinations of the subset of students for whom information is available on both their undergraduate and postgraduate universities. Columns (1)-(4) demonstrate that a majority of male (57.3%) and a large minority of female students (46.8%) choose to stay at their undergraduate institution for postgraduate study.

To examine student destinations in more detail, I calculated the share of undergraduates from each university, i, progressing to each other university, j, for

	Male – (%)		Female – (%)		% Institutions retaining largest share of their undergraduates[3]
	Stay	Move	Stay	Move	
2004/05	55.8	44.2	45.0	55.0	84.9
2005/06	56.4	43.6	45.9	54.1	89.3
2006/07	58.2	41.8	47.3	52.7	90.7
2007/08	57.3	42.7	47.4	52.6	91.8
2008/09	58.4	41.6	48.1	51.9	92.4
Total	57.3	42.7	46.8	53.2	89.8

Note(s): (1) Based on Destination of Leavers from Higher Education (DLHE) survey provided by HESA. See Section 5 for details. (2) Total sample size: 93,025. (3) Proportion of undergraduate institutions in which the largest fraction of undergraduates remain at the institution for postgraduate study.

postgraduate study. The final column of Table 2 suggests that the undergraduate institution, i, retains the largest fraction of progressing students in the vast majority of cases. As a result I expect the cost of postgraduate courses at the student's undergraduate institution to play an important role in determining fee expectations.

Unfortunately the micro-level data does not contain information about the subject the student chooses to study at postgraduate level, which prevents me from assigning fees with precision. This is a limitation of the paper which is returned to in Section 8. With this information, there are several possible methods of calculating expected postgraduate fees:

DEFINITION [1]: Use the average cost of a postgraduate degree in the student's undergraduate subject at their undergraduate institution. Adopting the subscripts s, i and t to denote subjects, institutions and time, and specifying P as the price of a higher degree course: Def. 1:

$$E\left(P_{s,i,t}\right) = \bar{P}_{s,i,t}$$

DEFINITION [2]: Use the average cost of a postgraduate degree at the student's undergraduate institution. This approach allows students to switch subjects between Bachelors and Masters levels. Def. 2: $E\left(P_{s,i,t}\right) = \bar{P}_{i,t}$

DEFINITION [3]: Students may change institutions between undergraduate and postgraduate levels (Table 2). To allow for this, I assign to each progressing student the cost of a higher degree in their undergraduate subject at their observed postgraduate institution, j. I analyse this fee as a function of the student's individual characteristics and the cost of a course in their undergraduate subject at their undergraduate institution: $P_{s,j,t} = f(D_n, \bar{P}_{s,i,t})$. Using the coefficients from this regression, I predict the price each undergraduate (both those students who continue and those who do not) would need to pay for a postgraduate degree in their undergraduate subject. This approach allows students to change institutions.

DEFINITION [4]: The final possible definition allows students to change subjects and institutions between undergraduate and postgraduate levels. I begin by assigning to each progressing student the average cost of a higher degree at their observed postgraduate institution, j. This fee is then analysed as a function of the student's characteristics and the average cost of a postgraduate course at their undergraduate institution: $P_{j,t} = f(D_n, \bar{P}_{i,t})$. Using the coefficients from this regression I predict the price each undergraduate (both those students who continue and those who do not) would need to pay for a postgraduate degree.

To ensure the robustness of my results, I adopt all four definitions.

4.2 Instrumenting for expected postgraduate fees

Having established an 'expected fee' for each student, regardless of whether they progress or not, I instrument for the expected fee in a first stage. To help to mitigate the likely endogeneity of fee levels, a strategy is designed to capture variation in fees which is not attributable to changes in home student demand. To this end (4) is estimated in addition to (3):

$$\bar{P}_{si,t} = \beta_0 + \beta_1 D_n + \beta_2 O_{si,g,t} + \beta_3\left(FX_t * OV_{si,t=0}\right)$$
$$+\beta_4\left(t_{si,t} * S_{si,t=0}\right) + f_{si} + f_t + f_g \tag{4}$$

Equation (4) models expected postgraduate tuition fees as a function of the other explanatory variables in (3) and two instrumental variables. First, following a shift-share approach (see Bartik 1991), the proportion of students on each subject-institution combination who are from overseas in the two years preceding my analysis ($OV_{si,t=0}$) is interacted with the trade-weighted movement in the Sterling exchange rate (FX_t). Higher purchasing power for Sterling raises the cost of migrating to the UK for study and reduces the demand for places from overseas. This in turn reduces pressure on the number of places available for students from the UK, reducing home fee levels. Consequently I expect β_3 to be negative.

The second instrument is the level of the total HEFC teaching grant received by each institution divided by the number of full-time academic staff, $t_{si,t}$. This variable is used in log form, and is interacted in a shift-share manner with the proportion of all academic staff in each department in the two years prior to my regression analysis ($S_{si,t=0}$). This generates a proxy variable for the level of academic salaries in each subject area at each university. All else equal, departments with growing staff costs will need to charge higher fee levels to break even. As a result I expect the estimate of β_4 to be positive. For the system of equations to be identified, I need β_3 and β_4 to be both individually and jointly significant at conventional levels.

5 Data

The student level data used in this paper are drawn from the Destination of Leavers from Higher Education (DLHE) dataset provided by HESA which has been analysed extensively elsewhere (Faggian and McCann 2006, 2009, Faggian, McCann and Sheppard, 2006, 2007a,

2007b, Naylor and Smith 2004, Smith and Naylor 2005, Wales 2010). The DLHE is a large survey of graduates from universities in the UK six to nine months after they complete their degrees. It includes a wealth of information about what qualification the student studied for and their degree classification, as well as a range of individual characteristics and the student's pre-university postcode district of domicile. The DLHE also provides the variable of interest, as it records what the student is doing at the time of survey. Participation is defined as those who report that they are in 'full-time study' for a 'higher degree', six to nine months after completing their first undergraduate degree.

Starting with all full-time, undergraduate students taking subjects other than Medicine & Dentistry, domiciled in Great Britain who take between three and five years to complete their degree, graduating between 2004/05 and 2008/09, who respond to the DLHE yields a sample of 786,750 students. After eliminating non-typical students who commenced their degree aged 22 or above and all those for whom there is no information about school level performance, the remaining sample size is 563,740. Some further attrition occurs as the data on fees, university staff records and HEFC funding is incomplete, leaving a sample of students which slightly over-represents younger students from well-off backgrounds, although these differences are relatively slight.[7] Summary statistics on included students are shown in Table 3.

5.1 Fees data

The tuition fee dataset used in this paper represents a significant contribution to the literature. Unlike undergraduate tuition fees which have effectively been centrally set and regulated,

---

[7] The non-response rate to the DLHE survey varies between 23.8% and 27.4% in the period under consideration. These fluctuations are assumed to be random as they do not appear to differ systematically across sub-populations.

postgraduate fees are largely unregulated and are set by individual institutions. Few attempts have been made to monitor how tuition costs at the postgraduate level have changed over time. One notable exception, the 'Public Goods' website (Reddin, 2004, 2005, 2006, 2007, 2008, 2009), contains data on 'standard' Masters course fees by institution, but contains no systematic information about different fees for different subjects at the same university.

To develop a dataset of postgraduate fees by subject and university, I contacted 159 of the 173 postgraduate degree-granting institutions in the UK and requested information about the level of postgraduate fees for each Masters course, both taught and research, offered between 2003/04 and 2009/10. Using the surveyed Masters students in the DLHE, I first constructed a matrix detailing all of the Masters courses taken at the two-digit Joint Academic Classification of Subjects (JACS) level (Appendix 3A). This yielded a set of 7,917 courses, distinguished by the type of qualification (taught or research), the institution attended and the subject(s) studied. The detail of the JACS classification allows distinctions to be drawn between courses composed of different elements and different quantities of the 165 academic fields included in the taxonomy.

Using this matrix as the starting point, I manually linked each course included in the DLHE to the tuition fee information provided by institutions and specifically to the home/EU full-time price.[8] In the majority of cases a single definitive fee could be identified. In cases of small ambiguity an average of the possible courses was taken. In the minority where there was no identifiable fee, none was recorded. As not all institutions were able to provide a full time series for their courses, the final dataset includes price information for 47,380 course-institution-year combinations, of a total of 55,419, or 85.5%. Among the missing data are a small number of institutions who were excluded as their postgraduate degrees took a modular form for which it was impossible to establish a 'standard' subject fee. A small number of

---

[8] For clarity of exposition, I shall refer to 'Home/EU full-time tuition fees' simply as 'tuition fees' from this point forward.

	Males		Females	
	Frequency	*%*	*Frequency*	*%*
Total	289,800	*44.0*	368,830	*56.0*
Ethnicity				
White	242,920	*83.8*	311,850	*84.6*
Black	5,470	*1.9*	9,450	*2.6*
Asian	27,870	*9.6*	31,900	*8.6*
Other	7,790	*2.7*	10,300	*2.8*
Unknown	5,750	*2.0*	5,330	*1.4*
Year				
2004/05	55,260	*19.1*	69,670	*18.9*
2005/06	56,200	*19.4*	71,460	*19.4*
2006/07	57,250	*19.8*	72,930	*19.8*
2007/08	58,880	*20.3*	75,920	*20.6*
2008/09	62,210	*21.5*	78,840	*21.4*
School				
State	218,920	*75.5*	289,800	*78.6*
Private	40390	*13.9*	40300	*10.9*
Unknown	30490	*10.5*	38730	*10.5*
Undergraduate degree class				
First	41,550	*14.3*	46,150	*12.5*
Upper Second	139,250	*48.0*	206,020	*55.9*
Lower Second	86,140	*29.7*	97,030	*26.3*
Third	16,120	*5.6*	11,380	*3.1*
Unclassified	6,750	*2.3*	8,240	*2.2*
Progression Rates				
Further Study	36,070	*12.4*	34,230	*9.3*
Other	253,730	*87.6*	334,600	*90.7*
Socio-economic group				
Higher Manag. & Prof.	59,680	*20.6*	71,830	*19.5*
Lower Manag. & Prof.	69,620	*24.0*	91,850	*24.9*
Intermediate	30,260	*10.4*	40,140	*10.9*
Small Employers	14,880	*5.1*	20,720	*5.6*
Lower Super. & Tech.	10,500	*3.6*	14,410	*3.9*
Semi-routine	20,930	*7.2*	29,480	*8.0*
Routine, Unemployed	9,440	*3.3*	13,530	*3.7*
Unknown	74,490	*25.7*	86,870	*23.6*

Note(s): (1) Figures are for all academic years combined, percentages based on proportion of gender group. (2) Figures may not sum to totals due to rounding. (3) Progression rates based on direct entry graduates, see Sections 5 and 8.

institutions also excluded themselves on the grounds of lost records or on the basis of the cost of gathering information.[9] Finally, to reduce the potential for bias introduced through human error, the dataset was aggregated to the JACS 1 level of detail (See Appendix 3A for details of the subject breakdown).

The result of this data gathering process is the first dataset of postgraduate tuition fees by subject and institution in the UK. Average tuition fees at current prices (Table 4) increased 31.8% between 2003/04 and 2009/10, from £3,232 to just over £4,261. This rate of increase is significantly higher than the general price level, which was just 18.4% higher in 2010 than in 2003 (ONS 2012).[10] However, this average masks significant differences in across subjects. Business Studies courses (comprising Business Studies, Management, Marketing, Finance, Accounting and Human Resource Management) were the most

Table 4: UK tuition fees 2003/04-2009/10

	£, current			£, current by institutional group			
	UG[1]	Public Goods[2]	FOI Dataset[3]	Russell Group[5]	1994 Group[6]	Million+[7]	University Alliance[8]
2003/04	1125	3048	3232	3339	3200	3079	3151
2004/05	1150	3031	3439	3684	3326	3233	3320
2005/06	1175	3441	3620	3919	3566	3397	3471
2006/07	3000[4]	3730	3801	4104	3666	3595	3666
2007/08	3070	3970	3970	4266	3772	3819	3833
2008/09	3145	3989	4121	4487	3909	3882	3948
2009/10	3225	4191	4261	4595	4107	4145	4095

Note(s): (1) Regulated undergraduate annual fee levels for students starting in that academic year. (2) 'Standard' postgraduate fee as reported by Reddin (2004-2009). (3) Average postgraduate fee based on freedom of information requests carried out for this paper. (4) Undergraduate fees increased due to a policy shift between 2005/06 and 2006/07. (5) Russell Group of research institutions is a group twenty research institutions in the United Kingdom. (6) 1994 Group is a group of nineteen 'smaller research-intensive' institutions. (7) Million+ is a group of 27 universities including many former polytechnics. (8) University Alliance is a group of 23 universities which focus on business courses.

---

[9] These were Aston University, Thames Valley University, UHI Millennium Institute, St Mary's University College, Twickenham.
[10] This figure is based on the Consumer Prices Index provided by the Office for National Statistics and the author's own calculations.

expensive over the period, ranging from £4,920 in 2003/04 to a little over £6,810 in 2009/10. Least expensive were Education courses, which varied from an average of £2,780 in 2003/04 to £3,720 in 2009/10. Among the fastest climbing courses (Figure 4) were Law degrees (rising 42% during the period) and Business Studies (38%), while the lowest relative increases came in European Languages (24%) and Engineering (26%). The Russell Group of research institutions has charged the highest average fees throughout the period, rising from £3,339 in 2003/04 to £4,595 by 2009/10.

The extent of variation in tuition fees has also risen significantly in recent years. Although universities have had the capability to vary fees by subject for several years, there has only been a gradual move away from charging the 'standard HEFC' assumed fee (Tables 1 and 5). In 2003/04, 74.3% of the courses for which data was gathered charged the HEFC fee, a proportion which falls gradually to 31.1% in 2009/10. The deregulated nature of postgraduate tuition fees allows me to side-step the empirical difficulties that a single,

Figure 4: Postgraduate tuition fees by academic field
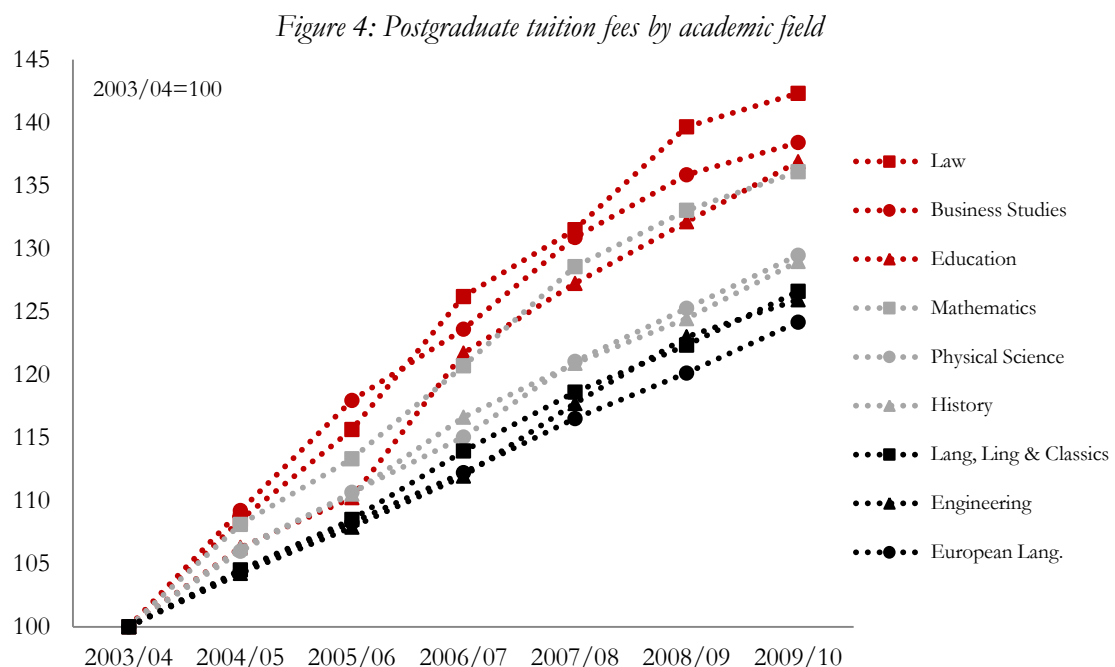
Note(s): Based on FOI data requested for this paper and author's own calculations

Table 5: Variation in postgraduate tuition fees: 2003/04-2008/09

	% Courses within +/- £10 of HEFC Fee	Standard Deviation	Observations
2003/04	74.3	1608	6265
2004/05	63.9	1833	6376
2005/06	55.2	1972	6503
2006/07	48.6	2051	6699
2007/08	44.0	2172	6756
2008/09	33.5	2266	7225
2009/10	31.1	2303	7556

Note(s): Based on data gathered by FOI requests and author's own calculations. Each observation is an observed course of study.

universal policy shift presents for estimating changes in student demand (Crawford and Dearden, 2010).

Finally, to estimate expected fees using definitions [3] and [4] above, two preliminary regressions were run as detailed in Section 4. Definition [3] involves regressing the average cost of a higher degree in the student's undergraduate subject at their observed postgraduate institution, against individual characteristics and the average cost of a course in their undergraduate subject at their undergraduate institution. Definition [4] involves a similar regression of the average cost of a higher degree at the student's observed postgraduate institution, against individual characteristics and the average cost of a higher degree at their undergraduate institution. Both regressions include only those students who are observed progressing to postgraduate education and who report both their undergraduate and postgraduate institutions.

The results of these analyses are shown in Table 6. In both regressions, the student's undergraduate institution fees have a large, positive and significant impact on expected postgraduate fees. Higher than average fees are recorded for students with stronger academic results, students who attended private secondary schools and students who are from higher socio-economic groups. Undergraduates from ethnic minorities also appear to pay more on

average than white students. These coefficients are used to predict expected postgraduate fees for all students, regardless of whether they choose to progress or not. Controls for all student and local economic characteristics included in Table 6 are also included in the subsequent participation regressions.

5.2 Local economic data

The empirical specification set out in (3) also demands measures of the opportunity cost of a higher degree relative to an undergraduate degree. Following other work in the field (Rice 1999, 2000) measures of unemployment and hourly wages are included in my regressions to capture (1) the likelihood of a student finding of employment if they choose not to progress and, (2) forgone earnings during further study. These data are drawn from the quarterly Labour Force Survey (LFS) records held by the Office for National Statistics (ONS). Using the micro-level record, measures of unemployment and average hourly earnings were calculated for each of the 297 travel-to-work areas in the UK based on the 1998 definitions.[11] These definitions (see Panel A of Figure A1 in Appendix 3A) were aggregated to 219 entities to avoid non-disclosive sample sizes (see Panel B). Local unemployment is broadly defined as the proportion of the population aged 16 to retirement who are not working or in full-time training/study. Local wages are defined as the natural logarithm of average reported gross hourly earnings in each geographical area.

---

[11] The boundaries of the 1998 travel to work areas were based on an analysis of commuting flows from the 1991 census and are deemed to more closely represent 'local economies' than administrative geographies such as local authorities or counties. See Appendix 3A.

Table 6: Estimated postgraduate tuition fees: Fees definitions [3] and [4][1, 3]

		Definition [3]		Definition [4]	
		β	s.e	β	s.e
Av. PG Fee in UG Subj. at PG Inst.[2]		**0.593*****	(0.022)		
Av. PG Fee at PG Inst.[2]				**0.572*****	(0.004)
Female		**-0.004****	(0.002)	**-0.005*****	(0.002)
Ethnicity	Black	**0.021*****	(0.007)	**0.014****	(0.006)
	Asian	**0.034*****	(0.004)	**0.031*****	(0.004)
	Other	**0.014*****	(0.005)	**0.014*****	(0.005)
	Unknown	0.004	(0.007)	-0.002	(0.007)
School Type	Private	**0.019*****	(0.003)	**0.031*****	(0.003)
	Unknown	0.002	(0.004)	0.004	(0.003)
UG Degree Class	1	**0.036*****	(0.003)	**0.042*****	(0.003)
	2-1	**0.021*****	(0.003)	**0.019*****	(0.002)
	Third	-0.017*	(0.009)	-0.006	(0.006)
	Unknown	0.003	(0.009)	0.004	(0.01)
Socio-economic group	Lower Manag. & Prof.	-0.004*	(0.002)	-0.003	(0.002)
	Intermediate	**-0.009*****	(0.002)	**-0.009*****	(0.002)
	Small Employers	-0.006*	(0.003)	-0.007*	(0.003)
	Lower Super. & Tech.	-0.004	(0.004)	-0.003	(0.004)
	Semi-routine	**-0.011*****	(0.003)	**-0.006****	(0.003)
	Routine, Unemployed	**-0.013*****	(0.004)	**-0.012*****	(0.004)
	Unknown	-0.003	(0.003)	-0.002	(0.003)
School Results	2nd Quartile	-0.004	(0.003)	-0.002	(0.002)
	3rd Quartile	-0.001	(0.003)	0.002	(0.003)
	4th Quartile	0.002	(0.004)	0.003	(0.003)
UG Degree Duration		0.001	(0.003)	0.003	(0.002)
Dom. Econ.	Unemployment[2]	-0.021	(0.039)	-0.004	(0.036)
	Hourly Earnings[2]	-0.002	(0.012)	-0.014	(0.011)
	Year 2005	**-0.012*****	(0.003)	**-0.014*****	(0.003)
	Year 2007	**0.019*****	(0.003)	**0.022*****	(0.003)
	Year 2008	**0.037*****	(0.003)	**0.043*****	(0.003)
	Year 2009	**0.049*****	(0.004)	**0.056*****	(0.004)
Controls	Age	YES		YES	
	Domicile TTWA FE	YES		YES	
	Subject*Institution FE	YES		YES	
Observations		51,270		52,440	
F-stat		**34.61*****		**51.70*****	

Note(s): (1) Dep. Var. is the average cost of a postgraduate course in the student's undergraduate subject at their observed postgraduate institution (Definition Three) and the average cost of a postgraduate course at the student's observed postgraduate institution (Definition Four). Std. Errors Clustered at the subject-institution level. (2) These variables are continuous. (3) *, ** and ** reflect significance at the 10%, 5% and 1% levels respectively.

6 Results

To examine the impact of expected postgraduate tuition fees on student demand, two analyses were carried out. The first set of results is derived from a series of ordinary least squares regressions (OLS) of the likelihood of progression, conditional on a range of student

characteristics and expected tuition fees. The second set of results includes the same variables, but instruments for expected postgraduate fees using changes in the trade-weighted exchange rate of Sterling and the level of HEFC funding per full-time academic employee. The main results are summarized in Tables 7, 8 and 9. The full results using fee definition [1]-[4] are available in Appendices [B]-[E].

6.1 Expected tuition fees

Table 7 summarises the findings with respect to expected postgraduate tuition fees. The dependent variable is a binary variable which takes a value one if the student is in full-time study for a higher degree, six to nine months after graduating with their first undergraduate degree, and zero otherwise. Explanatory variables were introduced gradually to allow comparison of the estimated coefficients in both the OLS (Specifications 1-6) and IV (7-12) estimations. Each specification is run for each definition of expected postgraduate fees. The coefficients reported in Table 7 therefore reflect the results of 48 separate regressions.

Details of how expected postgraduate tuition fees are calculated are included in Section 4. The first definition assigns each student the cost of taking a higher degree in the student's undergraduate subject at their undergraduate institution. The second assigns the average cost of taking a postgraduate degree at their undergraduate institution (allowing students to switch subjects). The third and fourth definitions estimate expected fees using the results of supplementary analysis. This work, reported in Section 5, analyses the price paid by continuing students on each undergraduate course as a function of their individual and academic characteristics as well as the average cost of courses at their undergraduate institution.

Across the range of specifications, the coefficients estimated by OLS tend to be smaller than those produced by the IV procedure. Using simple averaging, Fee Definitions [1] and [2] produce a small, negative but insignificant coefficients on expected fees. Using the results of the preliminary regressions in Fee Definitions [3] and [4] yields more interesting results. These measures initially suggest that students who expect to pay higher tuition costs are more likely to progress to further study. In specification (1), a 1% point increase in expectations of postgraduate tuition fees raises the likelihood of progressing to higher study by between 0.30% (Definition [3]) and 0.51% (Definition [4]). This counter-intuitive finding is reversed once controls for academic performance and parental background are introduced in specifications (3), (4) and (5). In these regressions, expected postgraduate fees have a small, negative but statistically significant impact on participation probabilities.

Specifications (7-12) instrument for postgraduate tuition fees to partially account for their endogeneity and suggest a larger and more important role for expected tuition costs. After controlling for year effects (four effects) and institution-by-subject fixed effects (1,381) in specification (7), the results suggest that a 1% increase in expected tuition fees is associated with a reduction of between 0.14% and 0.48% in the probability of participation. Fee Definitions [1]-[3] are significant at the 1% level and are only marginally affected by the introduction of individual level characteristics in (8), while Fee Definition [4] is significant at the 5% level.

Specification (9) incorporates controls for the student's socio-economic group and academic characteristics, including their secondary school type, exam performance aged 18 and their undergraduate degree class. These variables serve to increase the magnitude and standard error of the coefficients on expected tuition fees. Incorporating unemployment rates

Table 7: Expected postgraduate tuition fees & participation probabilities[1,8]

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
ln(Exp. Fees Def. One)[2]	-0.007 (0.007)	-0.006 (0.007)	-0.005 (0.007)	-0.006 (0.007)	-0.007 (0.008)	-0.006 (0.008)	-0.140*** (0.034)	-0.130*** (0.034)	-0.167** (0.070)	-0.172** (0.072)	-0.167** (0.071)	-0.171** (0.073)
ln(Exp. Fees Def. Two)[2]	-0.009 (0.010)	-0.008 (0.010)	-0.006 (0.012)	-0.007 (0.011)	-0.008 (0.012)	-0.007 (0.012)	-0.271*** (0.083)	-0.251*** (0.076)	-0.280** (0.112)	-0.287** (0.114)	-0.283** (0.113)	-0.288** (0.115)
ln(Exp. Fees Def. Three)[2]	0.304*** (0.042)	0.265*** (0.039)	-0.038*** (0.012)	-0.020 (0.012)	-0.020 (0.012)	-0.008 (0.014)	-0.273*** (0.104)	-0.268** (0.113)	-0.257** (0.106)	-0.255** (0.105)	-0.250** (0.106)	-0.258** (0.110)
ln(Exp. Fees Def. Four)[2]	0.506*** (0.042)	0.460*** (0.041)	-0.095*** (0.019)	-0.054*** (0.019)	-0.055*** (0.019)	-0.016 (0.023)	-0.480** (0.201)	-0.466** (0.189)	-0.439** (0.179)	-0.435** (0.177)	-0.433** (0.177)	-0.447** (0.182)
Controls												
Subject*Inst., Year FE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Personal Characteristics[3]		Y	Y	Y	Y	Y		Y	Y	Y	Y	Y
Sch. Type & Performance[4]			Y	Y	Y	Y			Y	Y	Y	Y
Socio-economic group			Y	Y	Y	Y			Y	Y	Y	Y
UG Degree Class			Y	Y	Y	Y			Y	Y	Y	UG
Labour Market Effects[5]				Y	Y	Y				Y	Y	Y
Domicile TTWA FE[6]						Y						Y
Sample[7]	ALL	ALL	ALL	ALL	Selection	Selection	ALL	ALL	ALL	ALL	Selection	Selection
Estimation Method	OLS	OLS	OLS	OLS	OLS	OLS	IV	IV	IV	IV	IV	IV
Multivariate F-test:												
Def. One:							54.95***	54.96***	29.09***	28.83***	28.71***	28.74***
Def. Two:							65.70***	65.80***	79.74***	81.18***	83.69***	83.27***
Def. Three:							32.26***	34.05***	34.43***	34.88***	34.47***	34.75***
Def. Four:							73.54***	78.99***	83.24***	85.24***	77.93***	83.03***

Note(s): (1) Dep. Var. is a binary indicator of whether the student progressed to postgraduate higher education. Estimated coefficients are shown with standard errors in brackets. Standard errors are clustered at the Institution-by-subject level. (2) ln(Expected Fees) is defined in four different ways. Each specification is estimated separately for each expected fees definition, see Section 4. (3) Personal characteristics include dummy variables for age, gender, ethnicity and disability status. (4) School type is defined as State, Private or Unknown. School Performance includes dummies for the quartile position of students in the A-level point score distribution in their year of undergraduate commencement. (5) Labour market effects consist of average hourly earnings and the rate of unemployment in the student's domicile travel-to-work-area. (6) 219 domicile travel to work areas are included, see Section 4. (7) Specifications (5)-(6) and (11)-(12) include only students obtaining Lower Second Class UG degrees or above. (8) *, ** and ** reflect significance at the 10%, 5% and 1% levels respectively.

and average earnings in the student's domicile travel-to-work-area in (10) suggests that a 1% increase in expected tuition costs reduces the probability of participation by between 0.17% and 0.44%.

To more accurately focus on the effective demand for postgraduate places, specifications (5), (6), (11) and (12) limit their sample to students who obtain at least Lower Second Class honours in their undergraduate degree studies. (12) also attempts to mitigate against endogenous patterns of residential selection through an array of domicile travel-to-work-area fixed effects (219 effects). Neither (11) nor (12) significantly alters the results of (10). (12), which reflects the preferred specification, suggests that a 1% increase in expected tuition costs is associated with a reduction in the probability of progression by between 0.17% and 0.45%.

The disparity between the OLS and IV results is significant and suggests that the IV results partially resolve several empirical problems likely to hamper the least squares procedure. Firstly, the OLS results are likely to be attenuated by measurement error, both in the recording of fee levels and in the assignment of expected fees to students who change subjects or universities. My broader measures of expected fees which make use of limited information about undergraduate destinations are superior in this respect and offer the most intuitive results. Secondly, the smaller OLS results are consistent with a mechanism for setting fees which is sensitive to patterns of demand. Stronger demand for a particular institution-subject combination will lead to higher fee levels. Conversely, weaker demand for a postgraduate course will lead to lower fee levels (or lower rates of increase). Failing to control for this endogeneity in the OLS regressions therefore understates the impact of expected tuition fees on students, as it spuriously assigns higher (lower) participation probabilities to higher (lower) fees, which in turn were caused by higher (lower) demand. Failing to control for this endogeneity is a serious problem in the OLS regressions.

The IV estimates are dependent upon several identifying assumptions. These are that (a) a stronger Sterling Exchange rate deters foreign students from coming to the UK for postgraduate study, reducing pressure on the supply of places for home students, and (b) that changes to academic salaries raise university costs but leave student demand for places unchanged. The results of the first stage regressions are shown in full in the Appendix and summarised in Tables 7 and 8. In Table 7, the results of multivariate F-tests for the exclusion restrictions are shown (Angrist and Pischke 2009, Stock, Wright and Yogo 2002), while Table 8 reports the estimated coefficients on the instruments from the most detailed specifications.

These results bear out expectations. The teaching salary instrument is positively and significantly correlated with postgraduate tuition fees in each specification and for each Fees Definition, which is consistent with higher input costs pushing up the price of the final good. The trade weighted Sterling index, by contrast, is negatively and significantly correlated with postgraduate tuition fees, suggesting that a stronger Pound reduces the attractiveness of the UK as a destination for higher education migration, reducing pressure on postgraduate places for home students. Both variables are individually significant at conventional levels, and are jointly significant with an F-stat comfortably above the Stock, Wright and Yogo (2002) recommended level of 10.

Table 8: First stage IV results for expected postgraduate fees[1,6]

Fees Definition:	[1]	[2]	[3]	[4]
Instruments				
Teaching grant per academic staff FPE, subject weighted[2]	**0.040*****	**0.039*****	**0.024*****	**0.023*****
	(0.009)	(0.003)	(0.005)	(0.002)
Overseas share * Trade weighted Sterling[3]	**-0.033****	**-0.018****	**-0.021****	**-0.012****
	(0.015)	(0.008)	(0.009)	(0.005)
Controls (see Table 7)[4]	Y	Y	Y	Y
Specification	(12)	(12)	(12)	(12)
Sample[5]	Selection	Selection	Selection	Selection
Diagnostics				
Observations	463,197	463,197	430,091	432,003
F-stat	**16.60*****	**28.86*****	**1786.27*****	**5074.29*****
Multivariate F-test of Excl. Res.	**28.74*****	**83.27*****	**34.75*****	**83.03*****

Note(s): (1) Dependent variable is the natural logarithm of the average cost of a course of higher study by subject and institution, see Section 4. Estimated coefficients are shown with standard errors in brackets. Standard errors are clustered at the Institution-by-subject level. (2) The HEFC teaching grant awarded to each institution divided by the number of full-time equivalent academic staff, which is logged and interacted with the proportion of academic staff in each subject in 2003/04. (3) The share of overseas students taking each subject at each institution in 2002/03 and 2003/04 is interacted with the trade weighted Sterling exchange rate. (4) Controls included are shown in Table 7. (5) Specification shown (12) includes only students obtaining Lower Second Class UG degree classification or above. (6) *, ** and ** reflect significance at the 10%, 5% and 1% levels respectively.

6.2 Socio-economic group

Table 9 summarises the findings with respect to socio-economic group,[12] reporting the estimated coefficients on group dummies from specification (12) across each definition of expected fees. In each case the base category are students from Higher Managerial & Professional occupations and the estimated coefficients reflect the change in participation probabilities associated with a student coming from a different socio-economic group.

---

[12] Socio-economic group is here defined as the 2001-National Statistics Socio-Economic Classification (NS-SEC) which is based on the Standard Occupational Classification 2000. See Table 9 for categories.

Table 9: Socio-economic group and participation probabilities[1,4]

Fees Definition:	*[1]*	*[2]*	*[3]*	*[4]*
Socio-economic group				
Lower managerial & Professional occupations	-0.005***	-0.005***	-0.006***	-0.007***
	(0.001)	(0.001)	(0.002)	(0.002)
Intermediate occupations	-0.012***	-0.012***	-0.015***	-0.017***
	(0.002)	(0.002)	(0.002)	(0.002)
Small employers & own account workers	-0.016***	-0.016***	-0.018***	-0.020***
	(0.002)	(0.002)	(0.002)	(0.002)
Lower supervisory & technical occupations	-0.015***	-0.015***	-0.017***	-0.017***
	(0.002)	(0.002)	(0.002)	(0.002)
Semi-routine occupations	-0.013***	-0.013***	-0.017***	-0.017***
	(0.002)	(0.002)	(0.002)	(0.002)
Routine occupations & Never worked and long-term unemployed	-0.018***	-0.018***	-0.022***	-0.024***
	(0.002)	(0.002)	(0.003)	(0.003)
Not classified	-0.001	0.000	-0.002	-0.001
	(0.002)	(0.002)	(0.002)	(0.002)
Controls (see Table 7)[2]	Y	Y	Y	Y
Specification	(12)	(12)	(12)	(12)
Sample[3]	Selection	Selection	Selection	Selection
Estimation Method	IV	IV	IV	IV

Note(s): (1) Dep. Var. is a binary indicator of whether the student progressed to postgraduate higher education. Estimated coefficients are shown with standard errors in brackets. Standard errors are clustered at the Institution-by-subject level. Excluded category is Higher managerial and Professional occupations. (2) Controls included are shown in Table 7. (3) Results shown are drawn from regressions using specification (12) which includes only students obtaining Lower Second Class UG degree classification or above. (4) *, ** and ** reflect significance at the 10%, 5% and 1% levels respectively.

In contrast to the results on expected tuition fees, these coefficients are relatively stable across specifications.

Compared to students from Higher Managerial & Professional occupations, students from lower socio-economic groups appear less likely to progress to postgraduate study. The magnitude of this effect varies, from between -0.5% and -0.7% for students from Lower Managerial & Professional occupations, to between -1.8% and -2.4% for students from the poorest socio-economic groups, Routine occupations and Never worked & long term unemployed. Students from Lower supervisory & technical occupations and Small employers & own account worker backgrounds are between 1.5% and 2.0% less likely to progress to

postgraduate study. As can be seen in full in the Appendices, these results are consistent across specifications and estimation methods.

6.3 Other results

In addition to the core results with respect to fees and socio-economic background, the findings of this paper shed light on a range of other factors which affect the probability of progressing to postgraduate study. As is shown in the Appendix, the results suggest that women are between 3.1% and 3.4% less likely to progress to postgraduate study than men, while students from non-white backgrounds are significantly more likely to remain in higher education. After controlling for common, time-invariant unobservable characteristics, Specification (12) suggests that Black and Asian students are 5.8-6.6% and 5.2-6.8% more likely respectively to progress to a further degree than equivalent white students. Students who report having a disability are also significantly more likely to remain in higher education.

The effect of academic performance on the probability of a student progressing to a higher degree is broadly as expected. Students who obtained First Class or Upper Second Class undergraduate degrees are 13.4-16.0% and 4.1-5.3% more likely to remain in higher education than students who obtained Lower Second Class degrees. School level results also appear to have a residual significant effect, with better performing students more likely to remain in higher education. Attendance at a Private school prior to university significantly increases the likelihood of progression by between 0.9% and 2.4%, confirming the findings of Machin and Murphy (2010).

Finally, the effect of local economic conditions on student's decisions varies across specifications. In specifications (5) and (11), before the introduction of fixed effects to

control for endogenous residential selection, earnings around the student's domicile are found to have a significant if relatively small impact on progression probabilities. In specification (11), a 10% increase in the level of hourly earnings is associated with a reduction of between 0.2% and 0.3% in the probability of remaining in higher education. A similar increase in youth unemployment is associated with an increase in progression probabilities of between 0.2% and 0.5%.

Including an array of fixed effects for domicile travel to work area in specifications (6) and (12) has the effect of shifting the identification strategy onto changes in unemployment and earnings over time. These results vary across Fee Definitions. Using definitions [1] and [2], earnings growth has no statistically significant impact on progression rates, while growing rates of youth unemployment reduce the probability of participation. Using definitions [3] and [4], youth unemployment continues to exert downwards pressure on participation probabilities, but growing earnings also reduces the likelihood of progression. Both effects are relatively slight. Taken together, these coefficients suggest that students from relatively wealthy areas are marginally more likely to remain in higher education after completing their undergraduate degrees, but that a poorer economic outlook encourages students to look for employment rather than pursue further study.

7 Heterogeneity and robustness of the effects

To check that these results are not the product of my assumptions, a number of robustness checks were carried out. Firstly, as reported in Section 4, a number of different methods were used to calculate the expected postgraduate tuition fee for each student. Adopting different assumptions allowed me to control for students who change subject, institution or both between undergraduate and Masters levels. The consistency of the findings across expected

fee definitions provides strong evidence that expected postgraduate fees do influence student behaviour.

Secondly, to examine the robustness of my results to changes in the instrumental variables, IV regressions were performed for each fee definition using one instrument at a time. Using just the teaching cost instrument, the magnitude and significance of the coefficient on expected fees remained similar to that produced using both instruments. In each case teaching costs are positively and significantly correlated with expected postgraduate fees and in each case the variable produces an F-stat greater than ten. Using only the trade-weighted Sterling index in the first stage produced coefficients on fees of a similar magnitude, but a slightly lower level of significance. In each case, trade-weighted movements in Sterling are significantly and negatively associated with expected postgraduate fees and in two of the four definitions, the coefficient on expected fees is significant at the 10% level. However, on its own the exchange rate instrument is not sufficiently powerful to pass the first-stage multivariate F-test (Stock, Wright and Yogo 2002).

To examine whether students from different backgrounds differ in their responses to expected postgraduate tuition fees a further set of IV regressions were run using interaction terms between expected tuition fees and (1) gender, (2) socio-economic background and (3) ethnic group. In the first case, the two fees terms (expected postgraduate fee and expected postgraduate fees interacted with the Female dummy variable) were instrumented for using the interacted teaching costs and exchange rate variables (teaching costs and exchange rate movements, and these terms interacted with the Female dummy variable). The results of this process suggest that men and women respond to expected postgraduate fees in broadly the same way, as none of the interacted fees terms were significant.

In the second case, a similar identification strategy was adopted, interacting both the fees variable and the instruments. As before, none of the expected fee interaction terms were

significant, suggesting that fees have a similar impact across students from different socio-economic groups. The ethnic group interactions suggest that Asian students are significantly more affected by expected postgraduate fees than white students, although the magnitude and significance of this effect varies. The coefficient on expected postgraduate fees interacted with the Asian dummy variable is negative and significant at the 5% level using three of the four fees definitions, while the fourth is significant at the 10% level. The magnitude of the coefficient on the interacted variable ranges between -0.09 and -0.14, although as with the other robustness regressions, the interacted instruments perform relatively poorly in the first stage, placing the reliability of this result in question.

Finally, a set of IV regressions were estimated including more detailed variables examining the return to specific types and levels of qualification. In a preliminary stage (unreported), micro-level Labour Force Survey data was used to model (a) undergraduate earnings, (b) postgraduate earnings and (c) unemployment risk for those aged 18-24 as a function of individual, academic and geographical characteristics. The coefficients from these regressions were used to impute forgone earnings (if the student chose not to progress), likely earnings (if the student chose to take a higher degree) and the risk of unemployment (if the student chose not to progress), and capture variation in the labour market returns of different qualifications over time. By their construction, these variables go some way towards addressing the risk that the unobserved returns to particular courses vary significantly over time. In practice, these measures had little impact on the significance of the estimated fees coefficient, but did marginally attenuate the size of the effect. Using these more detailed measures of the return to different levels of qualification produced coefficients of between -0.146 and -0.375 depending on the definition of expected fees adopted. In each case the estimated coefficient is statistically significant at conventional levels.

8 Discussion and conclusions

This paper examines the impact of tuition fees on student demand for postgraduate higher education in the UK and explores patterns of participation among students from different economic backgrounds. Using a large, micro-level dataset of students in higher education between 2004/05 and 2008/09, it makes several contributions to the literature. Firstly, it provides a summary of previously neglected trends in participation above undergraduate level. Secondly, it uses a large and hitherto unavailable dataset of postgraduate tuition fees by institution and subject. Thirdly, it uses a micro-level, two-stage model to reduce the impact of multiple forms of endogeneity bias to assess the extent to which postgraduate tuition fees impact on the demand for postgraduate higher education in the UK.

The results suggest that students do respond to price signals in higher education and that the marginal impact of postgraduate fees may be quite large. The preferred specification, which partially controls for unobserved individual and departmental characteristics and which attempts to deal with the endogeneity of postgraduate fees, suggests that a 10% increase in expected postgraduate tuition fees is associated with a reduction in the probability of progressing to postgraduate study of between 1.7% and 4.5% depending on the approach adopted. The results also suggest that there are significant differences in the progression rates of students from different economic backgrounds. Students from the poorest families are between 1.8% and 2.4% less likely to progress to a postgraduate degree than students from the wealthiest backgrounds, even after controlling for their individual characteristics and prior academic attainment.

Two areas present scope for future work. Firstly, the definition of participation used here only captures 'direct entry' postgraduate students. As a consequence, those who study for a higher degree after a spell of other activity are outside the scope of this paper.

Longitudinal datasets offer scope to improve the robustness of these analyses. Further investigation to examine which sub-groups of students choose to defer further study may also shed light on access concerns. Secondly, this paper can say nothing about the impact of changes to undergraduate tuition fees on access to postgraduate higher education, as all the students included in the dataset took their undergraduate degrees under the same tuition fee regime. Given the price sensitivity these results suggest, further research is urgently needed to examine the effect of student debt on willingness to pursue higher degrees in the UK.

Two implications of these results for policy are especially clear. Firstly, a systematic effort is needed to monitor all postgraduate tuition fees in the UK. The absence of a database of fees by subject, institution and qualification level has presented a significant barrier for research and is an essential pre-requisite for efforts to effectively monitor access above undergraduate level, as demanded by the Browne Review (Browne 2010). Recent policy reforms to encourage institutions to charge different rates for undergraduate courses must also be accompanied with effective monitoring.

Secondly, there is a need to re-examine how public support for postgraduate study is allocated. The 'assumed fee' used by the Higher Education Funding Councils understates the true student contribution in many cases and therefore fails to equalise per equivalent student funding. My results suggest that students from poorer backgrounds (1) are under-represented in postgraduate study and (2) that the jump from undergraduate to postgraduate study presents an additional barrier, through both level effects and the deterrent effect of tuition fees. Policy makers should reconsider the funding arrangements for postgraduate study and in particular the extent of public support for students from low income backgrounds who aspire to study beyond undergraduate level.

Appendix A

Table A.1: Joint Academic Classification of Subjects[1]

JACS2 Subject	JACS3 Codes
Degrees related to Medicine	B0-B9
Biological Science	C0-C9
Veterinary Science	D0-D9
Physical Science	F0-F9
Mathematics	G0-G92
Engineering	H0-H9
Mineral Technology	J1-J9
Architecture	K0-K9
Social Sciences	L0-L9
Law	M0-M9
Business Studies	N0-N9
Communications	P0-P9
Lang, Ling and Classics	Q0-Q9
European Languages	R1-R9
Other Languages	T1-T9
History	V0-V9
Art and Music	W0-W9
Education	X0-X9
Combined degrees	Y0

Note(s): (1) Listings available at www.hesa.ac.uk.

Figure A.1: 1998 Travel to work areas: Original
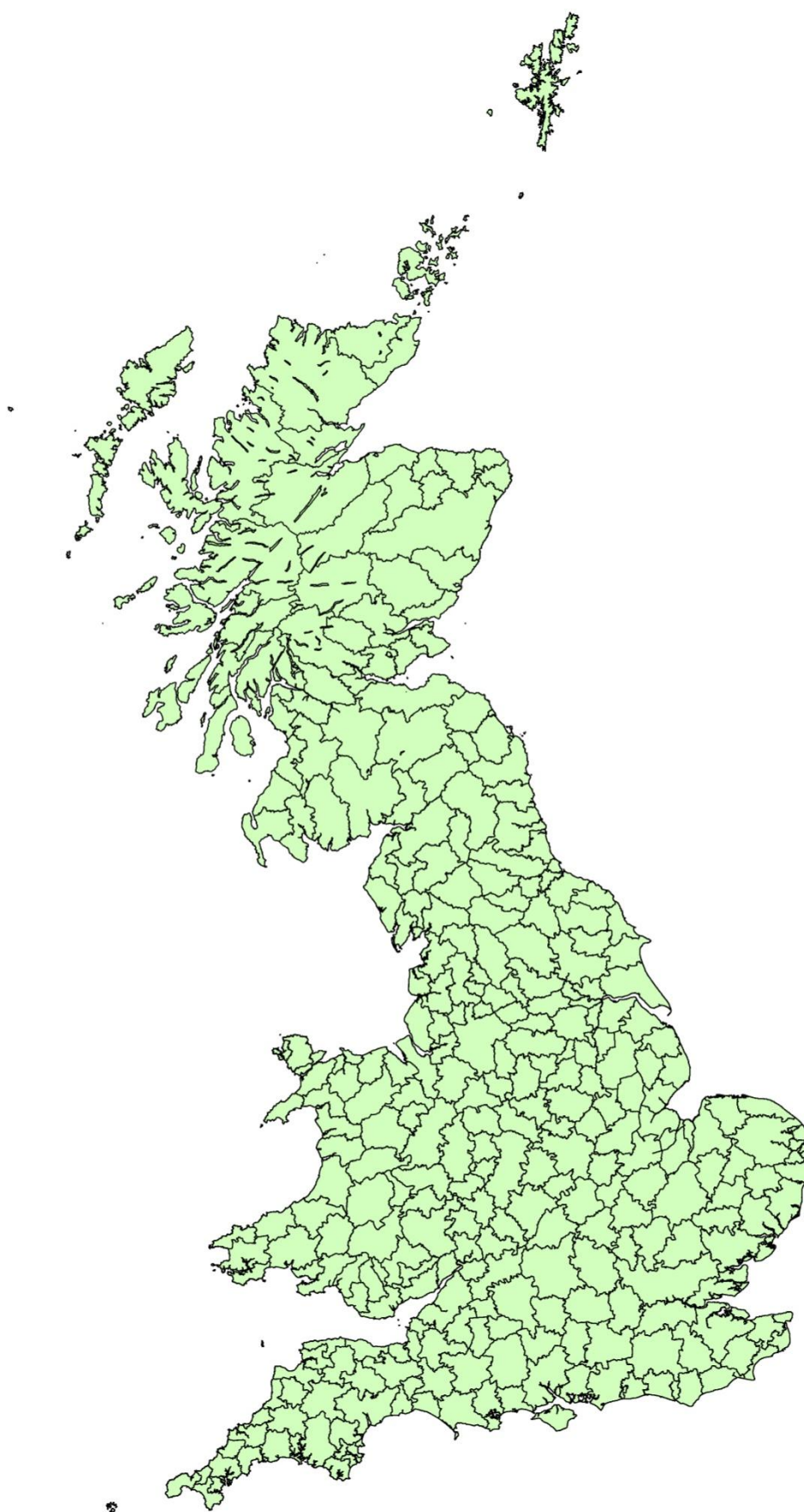
Figure A.1: 1998 Travel to work areas: Modified

Note(s): Combined TTWAs are shown in blue. Maintained, original TTWA shown in green.

Appendix B: Table B.1: Fees Definition [1]: Main Equation[1,4,5]

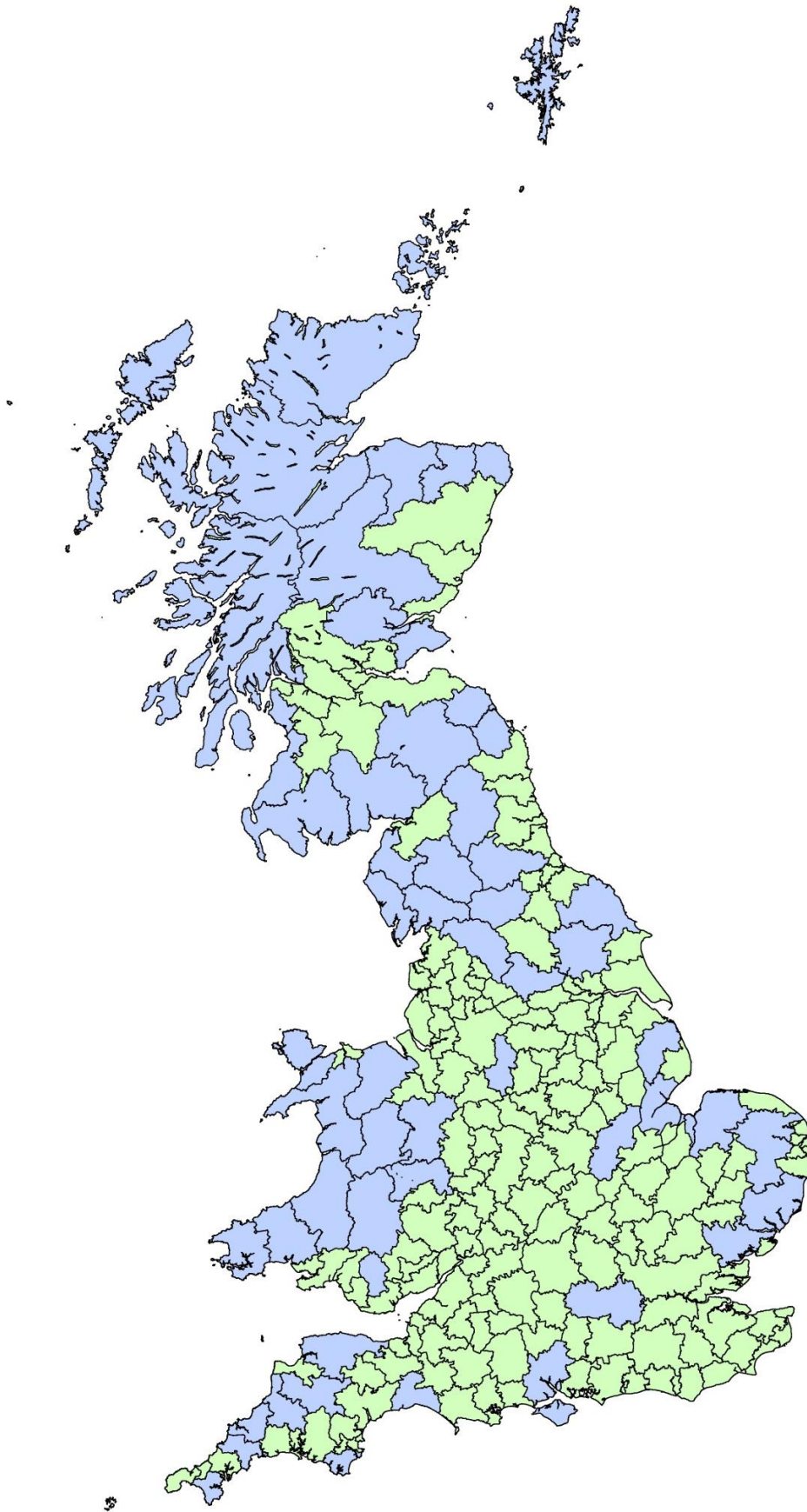|		(1)		(2)		(3)		(4)		(5)		(6)	
		β	s.e	β	s.e	β	s.e	β	s.e	β	s.e	β	s.e
ln(Fee)[2,3]		-0.007	0.007	-0.006	0.007	-0.005	0.007	-0.006	0.007	-0.007	0.008	-0.006	0.008
Female				-0.022***	0.001	-0.029***	0.001	-0.029***	0.001	-0.031***	0.001	-0.031***	0.001
Disability				0.024***	0.002	0.030***	0.002	0.030***	0.002	0.031***	0.002	0.031***	0.002
Ethnicity	Black			0.038***	0.004	0.054***	0.004	0.057***	0.004	0.056***	0.004	0.058***	0.004
	Asian			0.033***	0.002	0.050***	0.003	0.051***	0.003	0.052***	0.003	0.052***	0.003
	Other			0.033***	0.003	0.035***	0.003	0.037***	0.003	0.037***	0.003	0.037***	0.003
	Unknown			0.021***	0.004	0.027***	0.005	0.027***	0.005	0.028***	0.005	0.027***	0.005
School Type	Private					0.008***	0.002	0.009***	0.002	0.009***	0.002	0.010***	0.002
	Unknown					0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002
Parental Occ.	Lower Manag., Prof.					-0.004***	0.001	-0.005***	0.001	-0.005***	0.001	-0.005***	0.001
	Intermediate					-0.012***	0.002	-0.012***	0.002	-0.012***	0.002	-0.012***	0.002
	Small Employers					-0.015***	0.002	-0.015***	0.002	-0.016***	0.002	-0.015***	0.002
	Super., & Tech.					-0.014***	0.002	-0.015***	0.002	-0.014***	0.002	-0.015***	0.002
	Semi-routine					-0.011***	0.002	-0.012***	0.002	-0.012***	0.002	-0.012***	0.002
	Routine, Unemp.					-0.017***	0.002	-0.018***	0.002	-0.018***	0.002	-0.018***	0.002
	Unknown					-0.001	0.002	-0.001	0.002	-0.001	0.002	-0.001	0.002
UG Class	First					0.177***	0.006	0.177***	0.006	0.134***	0.004	0.134***	0.004
	Upper Second					0.084***	0.003	0.084***	0.003	0.041***	0.002	0.041***	0.002
	Lower Second					0.043***	0.002	0.043***	0.002				
	Unknown					0.008	0.007	0.008	0.007				
Sch. Results	2nd Quartile					-0.009***	0.001	-0.009***	0.001	-0.009***	0.001	-0.009***	0.001
	3rd Quartile					-0.013***	0.002	-0.013***	0.002	-0.013***	0.002	-0.013***	0.002
	4th Quartile					0.000	0.002	-0.001	0.002	-0.002	0.002	-0.002	0.002
Dom. Econ.	Unemployment[3]							0.015	0.013	0.018	0.013	-0.050**	0.024
	Hourly Earnings[3]							-0.028***	0.003	-0.030***	0.004	-0.011	0.008
Controls		Cohorts, Age		Cohorts, Age		Cohorts, Age		Cohorts, Age		Cohorts, Age		Cohorts, Age, Dom. TTWA	
Observations		658,618		658,618		528,430		524,941		495,996		495,996	
F-stat		126.52***		73.33***		72.51***		68.64***		69.88***		14.16***	

Note(s): (1) Dep. Var. is a binary indicator of whether the student progressed to postgraduate higher education. Std err. clustered at the Institution-by-subject level. All specifications include Institution-by-subject fixed effects. (2) Expected Fees are defined as the average postgraduate fee in the student's undergraduate subject at their undergraduate institution. See Section 4. (3) These variables are continuous. (4) Specifications (5), (6), (11) and (12) include only students achieving at least a Lower Second Class UG degree. Specifications (1)-(6) are estimated by OLS. Specifications (7)-(12) are estimated by IV. (5) *, ** and ** reflect significance at the 10%, 5% and 1% levels respectively.

		(7)		(8)		(9)		(10)		(11)		(12)	
		β	s.e	β	s.e	β	s.e	β	s.e	β	s.e	β	s.e
ln(Fee)[2,3]		-0.140***	0.034	-0.130***	0.034	-0.167**	0.070	-0.172**	0.072	-0.167**	0.071	-0.171**	0.073
Female				-0.022***	0.001	-0.029***	0.001	-0.029***	0.001	-0.031***	0.001	-0.031***	0.001
Disability				0.024***	0.002	0.031***	0.002	0.030***	0.002	0.032***	0.002	0.032***	0.002
Ethnicity	Black			0.038***	0.004	0.055***	0.004	0.058***	0.004	0.057***	0.004	0.058***	0.004
	Asian			0.033***	0.002	0.050***	0.003	0.051***	0.003	0.052***	0.003	0.052***	0.003
	Other			0.034***	0.003	0.036***	0.003	0.038***	0.003	0.038***	0.003	0.038***	0.003
	Unknown			0.022***	0.004	0.028***	0.005	0.028***	0.005	0.029***	0.005	0.029***	0.005
School Type	Private					0.008***	0.002	0.009***	0.002	0.009***	0.002	0.009***	0.002
	Unknown					0.003	0.002	0.002	0.002	0.003	0.002	0.002	0.002
Parental Occ.	Lower Manag., Prof.					-0.005***	0.001	-0.005***	0.001	-0.005***	0.001	-0.005***	0.001
	Intermediate					-0.012***	0.002	-0.012***	0.002	-0.012***	0.002	-0.012***	0.002
	Small Employers					-0.015***	0.002	-0.016***	0.002	-0.016***	0.002	-0.016***	0.002
	Super., & Tech.					-0.014***	0.002	-0.015***	0.002	-0.015***	0.002	-0.015***	0.002
	Semi-routine					-0.012***	0.002	-0.013***	0.002	-0.013***	0.002	-0.013***	0.002
	Routine, Unemp.					-0.017***	0.002	-0.018***	0.002	-0.018***	0.002	-0.018***	0.002
	Unknown					-0.001	0.002	-0.002	0.002	-0.001	0.002	-0.001	0.002
UG Class	First					0.177***	0.008	0.177***	0.008	0.134***	0.005	0.134***	0.005
	Upper Second					0.084***	0.007	0.084***	0.007	0.041***	0.002	0.041***	0.002
	Lower Second					0.043***	0.007	0.043***	0.007				
	Unknown					0.008	0.007	0.008	0.007				
Sch. Results	2nd Quartile					-0.010***	0.001	-0.010***	0.001	-0.010***	0.002	-0.010***	0.002
	3rd Quartile					-0.013***	0.002	-0.013***	0.002	-0.014***	0.002	-0.013***	0.002
	4th Quartile					-0.001	0.003	-0.002	0.003	-0.002	0.003	-0.002	0.003
Dom. Econ.	Unemployment[3]							0.020	0.013	0.023*	0.013	-0.053**	0.025
	Hourly Earnings[3]							-0.028***	0.004	-0.030***	0.004	-0.012	0.008
Controls		Cohorts, Age		Cohorts, Age		Cohorts, Age		Cohorts, Age		Cohorts, Age		Cohorts, Age, Dom. TTWA	
Observations		612,531		612,531		493,664		490,358		463,197		463,197	
F-stat		103.19***		70.58***		68.53***		64.75***		66.09***		13.96***	

Note(s): (1) Dep. Var. is a binary indicator of whether the student progressed to postgraduate higher education. Std err. clustered at the Institution-by-subject level. All specifications include Institution-by-subject fixed effects. (2) Expected Fees are defined as the average postgraduate fee in the student's undergraduate subject at their undergraduate institution. See Section 4. (3) These variables are continuous. (4) Specifications (5), (6), (11) and (12) include only students achieving at least a Lower Second Class UG degree. Specifications (1)-(6) are estimated by OLS. Specifications (7)-(12) are estimated by IV. (5) *, ** and ** reflect significance at the 10%, 5% and 1% levels respectively.

Appendix B: Table B.2: Fees Definition [1]: First Stage Equation[1,3]

		(7) β	s.e	(8) β	s.e	(9) β	s.e	(10) β	s.e	(11) β	s.e	(12) β	s.e
Teaching Cost[2]		0.049***	0.012	0.049***	0.012	0.040***	0.01	0.040***	0.009	0.040***	0.009	0.040***	0.009
Trade Weighted GBP[2]		-0.042**	0.017	-0.042**	0.017	-0.033**	0.015	-0.033**	0.015	-0.033**	0.015	-0.033**	0.015
Female				0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Disability				-0.001	0.001	-0.001	0.001	-0.001	0.001	-0.001	0.001	-0.001	0.001
Ethnicity	Black			0.000	0.001	-0.001	0.001	-0.001	0.001	-0.001	0.001	-0.001	0.001
	Asian			0.001	0.001	0.001	0.001	0.001	0.001	0.000	0.001	0.000	0.001
	Other			0.000	0.000	0.000	0.001	0.000	0.001	0.000	0.001	0.000	0.001
	Unknown			-0.001	0.002	-0.002	0.003	-0.002	0.003	-0.002	0.003	-0.002	0.003
School Type	Private					-0.001	0.000	-0.001	0.000	0.000	0.000	-0.001	0.000
	Unknown					0.000	0.002	0.000	0.002	-0.001	0.002	-0.001	0.002
Parental Occ.	Lower Manag., Prof.					0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	Intermediate					0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	Small Employers					0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	Super., & Tech.					0.000	0.001	0.000	0.001	0.000	0.001	0.000	0.001
	Semi-routine					0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	Routine, Unemp.					0.000	0.001	0.000	0.001	0.000	0.001	0.000	0.001
	Unknown					-0.001	0.002	-0.001	0.002	-0.002	0.002	-0.002	0.002
UG Class	First					0.004	0.004	0.003	0.004	0.000	0.001	0.000	0.001
	Upper Second					0.003	0.004	0.003	0.003	0.000	0.000	0.000	0.000
	Lower Second					0.003	0.004	0.003	0.003				
	Unknown					0.003	0.004	0.003	0.004				
Sch. Results	2nd Quartile					0.001	0.001	0.001	0.001	0.001*	0.001	0.001	0.001
	3rd Quartile					0.000	0.001	0.000	0.001	0.000	0.001	0.000	0.001
	4th Quartile					0.000	0.001	0.000	0.001	0.001	0.001	0.001	0.001
Dom. Econ.	Unemployment[2]							0.005	0.004	0.004	0.004	0.002	0.013
	Hourly Earnings[2]							-0.001	0.001	-0.001	0.001	-0.006**	0.003
Controls		Cohorts, Age		Cohorts, Age		Cohorts, Age		Cohorts, Age		Cohorts, Age		Cohorts, Age, Dom. TTWA	
Observations		612,531		612,531		493,664		490,358		463,197		463,197	
F-stat		162.39**		66.33**		43.67**		40.96**		40.98**		16.60**	

Note(s): (1) Dep. Var. is natural logarithm of the average cost of a course of higher study by subject and institution, see Section 4. Std. err clustered at the Institution-by-subject level. All specifications include Institution-by-subject fixed effects. (2) These variables are continuous. (3) *, ** and ** reflect significance at the 10%, 5% and 1% levels respectively.

		(1)		(2)		(3)		(4)		(5)		(6)	
		β	s.e	β	s.e	β	s.e	β	s.e	β	s.e	β	s.e
ln(Fee)[2, 3]		-0.009	0.010	-0.008	0.010	-0.006	0.012	-0.007	0.011	-0.008	0.012	-0.007	0.012
Female				-0.022***	0.001	-0.029***	0.001	-0.029***	0.001	-0.031***	0.001	-0.031***	0.001
Disability				0.024***	0.002	0.030***	0.002	0.030***	0.002	0.031***	0.002	0.031***	0.002
Ethnicity	Black			0.038***	0.004	0.054***	0.004	0.057***	0.004	0.056***	0.004	0.058***	0.004
	Asian			0.033***	0.002	0.050***	0.003	0.051***	0.003	0.052***	0.003	0.052***	0.003
	Other			0.033***	0.003	0.035***	0.003	0.037***	0.003	0.037***	0.003	0.037***	0.003
	Unknown			0.021***	0.004	0.027***	0.005	0.027***	0.005	0.028***	0.005	0.027***	0.005
School Type	Private					0.008***	0.002	0.009***	0.002	0.009***	0.002	0.010***	0.002
	Unknown					0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002
Parental Occ.	Lower Manag., Prof.					-0.004***	0.001	-0.005***	0.001	-0.005***	0.001	-0.005***	0.001
	Intermediate					-0.012***	0.002	-0.012***	0.002	-0.012***	0.002	-0.012***	0.002
	Small Employers					-0.015***	0.002	-0.015***	0.002	-0.016***	0.002	-0.015***	0.002
	Super., & Tech.					-0.014***	0.002	-0.015***	0.002	-0.014***	0.002	-0.015***	0.002
	Semi-routine					-0.011***	0.002	-0.012***	0.002	-0.012***	0.002	-0.012***	0.002
	Routine, Unemp.					-0.017***	0.002	-0.018***	0.002	-0.018***	0.002	-0.018***	0.002
	Unknown					-0.001	0.002	-0.001	0.002	-0.001	0.002	-0.001	0.002
UG Class	First					0.169***	0.008	0.169***	0.008	0.134***	0.004	0.134***	0.004
	Upper Second					0.076***	0.007	0.076***	0.007	0.041***	0.002	0.041***	0.002
	Lower Second					0.035***	0.007	0.035***	0.007				
	Unknown					-0.008	0.007	-0.008	0.007				
Sch. Results	2nd Quartile					-0.009***	0.001	-0.009***	0.001	-0.009***	0.001	-0.009***	0.001
	3rd Quartile					-0.013***	0.002	-0.013***	0.002	-0.013***	0.002	-0.013***	0.002
	4th Quartile					0.000	0.002	-0.001	0.002	-0.002	0.002	-0.002	0.002
Dom. Econ.	Unemployment[3]							0.015	0.013	0.018	0.013	-0.050**	0.024
	Hourly Earnings[3]							-0.028***	0.003	-0.030***	0.004	-0.011	0.008
Controls		Cohorts, Age		Cohorts, Age		Cohorts, Age		Cohorts, Age		Cohorts, Age		Cohorts, Age, Dom. TTWA	
Observations		658,618		658,618		528,430		524,941		495,996		495,996	
F-stat		128.61***		73.18***		72.42***		68.53***		69.84***		14.13***	

Note(s): (1) Dep. Var. is a binary indicator of whether the student progressed to postgraduate higher education. Std err. clustered at the Institution-by-subject level. All specifications include Institution-by-subject fixed effects. (2) Expected Fees are defined as the average postgraduate fee at the student's undergraduate institution. See Section 4. (3) These variables are continuous. (4) Specifications (5), (6), (11) and (12) include only students achieving at least a Lower Second Class UG degree. Specifications (1)-(6) are estimated by OLS. Specifications (7)-(12) are estimated by IV. (5) *, ** and ** reflect significance at the 10%, 5% and 1% levels respectively.

		(7)		(8)		(9)		(10)		(11)		(12)	
		β	s.e	β	s.e	β	s.e	β	s.e	β	s.e	β	s.e
ln(Fee)[2,3]		-0.271***	0.083	-0.251***	0.076	-0.280**	0.112	-0.287**	0.114	-0.283**	0.113	-0.288**	0.115
Female				-0.022***	0.001	-0.029***	0.001	-0.029***	0.001	-0.031***	0.001	-0.031***	0.001
Disability				0.024***	0.002	0.031***	0.002	0.030***	0.002	0.032***	0.002	0.032***	0.002
Ethnicity	Black			0.038***	0.004	0.055***	0.004	0.057***	0.004	0.057***	0.004	0.058***	0.004
	Asian			0.033***	0.002	0.050***	0.003	0.051***	0.003	0.052***	0.003	0.052***	0.003
	Other			0.034***	0.003	0.036***	0.003	0.038***	0.003	0.038***	0.003	0.038***	0.003
	Unknown			0.023***	0.004	0.028***	0.005	0.028***	0.005	0.029***	0.005	0.029***	0.005
School Type	Private					0.008***	0.002	0.009***	0.002	0.009***	0.002	0.009***	0.002
	Unknown					0.003	0.002	0.003	0.002	0.003	0.002	0.003	0.002
Parental Occ.	Lower Manag., Prof.					-0.005***	0.001	-0.005***	0.001	-0.005***	0.001	-0.005***	0.001
	Intermediate					-0.012***	0.002	-0.012***	0.002	-0.012***	0.002	-0.012***	0.002
	Small Employers					-0.015***	0.002	-0.016***	0.002	-0.016***	0.002	-0.016***	0.002
	Super., & Tech.					-0.014***	0.002	-0.015***	0.002	-0.014***	0.002	-0.015***	0.002
	Semi-routine					-0.012***	0.002	-0.013***	0.002	-0.013***	0.002	-0.013***	0.002
	Routine, Unemp.					-0.017***	0.002	-0.018***	0.002	-0.018***	0.002	-0.018***	0.002
	Unknown					0.000	0.002	-0.001	0.002	0.000	0.002	0.000	0.002
UG Class	First					0.168***	0.008	0.168***	0.008	0.134***	0.005	0.134***	0.005
	Upper Second					0.075***	0.007	0.075***	0.007	0.041***	0.002	0.041***	0.002
	Lower Second					0.034***	0.007	0.034***	0.007				
	Unknown					-0.009	0.007	-0.009	0.007				
Sch. Results	2nd Quartile					-0.010***	0.001	-0.010***	0.001	-0.010***	0.002	-0.010***	0.002
	3rd Quartile					-0.013***	0.002	-0.013***	0.002	-0.013***	0.002	-0.013***	0.002
	4th Quartile					-0.001	0.003	-0.001	0.003	-0.002	0.003	-0.002	0.003
Dom. Econ.	Unemployment[3]							0.020	0.013	0.023*	0.013	-0.050**	0.025
	Hourly Earnings[3]							-0.028***	0.004	-0.029***	0.004	-0.012	0.008
Controls		Cohorts, Age		Cohorts, Age		Cohorts, Age		Cohorts, Age		Cohorts, Age		Cohorts, Age, Dom. TTWA	
Observations		612,531		612,531		493,664		490,358		463,197		463,197	
F-stat		94.52***		67.49***		67.92***		64.15***		65.59***		13.67***	

Note(s): (1) Dep. Var. is a binary indicator of whether the student progressed to postgraduate higher education. Std err. clustered at the Institution-by-subject level. All specifications include Institution-by-subject fixed effects. (2) Expected Fees are defined as the average postgraduate fee at the student's undergraduate institution. See Section 4. (3) These variables are continuous. (4) Specifications (5), (6), (11) and (12) include only students achieving at least a Lower Second Class UG degree. Specifications (1)-(6) are estimated by OLS. Specifications (7)-(12) are estimated by IV. (5) *, ** and ** reflect significance at the 10%, 5% and 1% levels respectively.

Appendix C: Table C.2: Fees Definition [2]: First Stage Equation[1, 3]

		(7) β	(7) s.e	(8) β	(8) s.e	(9) β	(9) s.e	(10) β	(10) s.e	(11) β	(11) s.e	(12) β	(12) s.e
Teaching Cost[2]		**0.044***	0.006	**0.044***	0.006	**0.040***	0.003	**0.040***	0.003	**0.039***	0.003	**0.039***	0.003
Trade Weighted GBP[2]		**-0.019***	0.007	**-0.019***	0.007	**-0.018**	0.008	**-0.018**	0.008	**-0.018**	0.008	**-0.018**	0.008
Female				0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Disability				-0.001*	0.000	-0.001	0.000	-0.001*	0.000	-0.001*	0.000	-0.001*	0.000
Ethnicity	Black			-0.001	0.001	**-0.002**	0.001	**-0.002**	0.001	**-0.002**	0.001	**-0.002**	0.001
	Asian			0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	Other			0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	Unknown			0.001	0.002	0.000	0.002	0.000	0.002	0.000	0.002	0.000	0.002
School Type	Private					0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	Unknown					0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Parental Occ.	Lower Manag., Prof.					0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	Intermediate					0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	Small Employers					0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	Super., & Tech.					0.001*	0.000	0.001*	0.000	0.001	0.000	0.001*	0.000
	Semi-routine					0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	Routine, Unemp.					0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	Unknown					**0.002**	0.001	**0.002**	0.001	**0.001**	0.001	**0.001**	0.001
UG Class	First					-0.002	0.002	-0.002	0.002	0.000	0.000	0.000	0.000
	Upper Second					-0.002	0.002	-0.002	0.002	0.000	0.000	0.000	0.000
	Lower Second					-0.002	0.002	-0.002	0.002				
	Unknown					-0.002	0.002	-0.002	0.002				
Sch. Results	2nd Quartile					0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
	3rd Quartile					0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
	4th Quartile					0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Dom. Econ.	Unemployment[2]							0.003	0.003	0.002	0.003	0.013	0.011
	Hourly Earnings[2]							0.000	0.001	0.000	0.001	-0.004	0.003
Controls		Cohorts, Age		Cohorts, Age		Cohorts, Age		Cohorts, Age		Cohorts, Age		Cohorts, Age, Dom. TTWA	
Observations		612,531		612,531		493,664		490,358		463,197		463,197	
F-stat		**415.66***		**175.33***		**113.87***		**108.67***		**115.07***		**28.86***	

Note(s): (1) Dep. Var. is natural logarithm of the average cost of a course of higher study by institution, see Section 4. Std. err clustered at the Institution-by-subject level. All specifications include Institution-by-subject fixed effects. (2) These variables are continuous. (3) *, ** and ** reflect significance at the 10%, 5% and 1% levels respectively.

Appendix D: Table D.1: Fees Definition [3]: Main Equation[1, 4, 5]

		(1)		(2)		(3)		(4)		(5)		(6)	
		β	s.e	β	s.e	β	s.e	β	s.e	β	s.e	β	s.e
$ln(Fee)$[2, 3]		**0.304*****	0.042	**0.265*****	0.039	**-0.038*****	0.012	-0.020	0.012	-0.020	0.012	-0.008	0.014
Female				**-0.025*****	0.001	**-0.031*****	0.001	**-0.031*****	0.001	**-0.032*****	0.001	**-0.032*****	0.001
Disability				**0.029*****	0.002	**0.032*****	0.002	**0.032*****	0.002	**0.034*****	0.003	**0.034*****	0.003
Ethnicity	Black			**0.033*****	0.004	**0.058*****	0.004	**0.060*****	0.004	**0.059*****	0.004	**0.061*****	0.004
	Asian			**0.029*****	0.003	**0.053*****	0.003	**0.054*****	0.003	**0.055*****	0.003	**0.055*****	0.003
	Other			**0.026*****	0.003	**0.037*****	0.003	**0.038*****	0.003	**0.038*****	0.003	**0.038*****	0.003
	Unknown			**0.024*****	0.005	**0.028*****	0.005	**0.028*****	0.005	**0.029*****	0.005	**0.029*****	0.005
School Type	Private					**0.009*****	0.002	**0.010*****	0.002	**0.010*****	0.002	**0.010*****	0.002
	Unknown					0.004	0.002	0.004	0.002	0.004	0.002	0.003	0.002
Parental Occ.	Lower Manag., Prof.					**-0.005*****	0.001	**-0.005*****	0.001	**-0.005*****	0.001	**-0.005*****	0.001
	Intermediate					**-0.013*****	0.002	**-0.012*****	0.002	**-0.012*****	0.002	**-0.012*****	0.002
	Small Employers					**-0.015*****	0.002	**-0.016*****	0.002	**-0.017*****	0.002	**-0.016*****	0.002
	Super., & Tech.					**-0.014*****	0.002	**-0.015*****	0.002	**-0.015*****	0.002	**-0.015*****	0.002
	Semi-routine					**-0.013*****	0.002	**-0.013*****	0.002	**-0.013*****	0.002	**-0.013*****	0.002
	Routine, Unemp.					**-0.017*****	0.002	**-0.018*****	0.002	**-0.019*****	0.003	**-0.018*****	0.002
	Unknown					-0.001	0.002	-0.001	0.002	-0.001	0.002	0.000	0.002
UG Class	First					**0.142*****	0.005	**0.142*****	0.005	**0.142*****	0.005	**0.142*****	0.005
	Upper Second					**0.045*****	0.002	**0.044*****	0.002	**0.045*****	0.002	**0.045*****	0.002
	Lower Second					**-0.047*****	0.003	**-0.046*****	0.003				
	Unknown					**-0.041*****	0.007	**-0.041*****	0.007				
Sch. Results	2nd Quartile					**-0.010*****	0.002	**-0.010*****	0.002	**-0.010*****	0.002	**-0.010*****	0.002
	3rd Quartile					**-0.013*****	0.002	**-0.013*****	0.002	**-0.014*****	0.002	**-0.014*****	0.002
	4th Quartile					-0.001	0.003	-0.002	0.003	-0.002	0.003	-0.002	0.003
Dom. Econ.	Unemployment[3]							0.015	0.013	0.018	0.014	**-0.051****	0.026
	Hourly Earnings[3]							**-0.029*****	0.004	**-0.031*****	0.004	-0.013	0.008
Controls		Cohorts, Age		Cohorts, Age		Cohorts, Age		Cohorts, Age		Cohorts, Age		Cohorts, Age, Dom. TTWA	
Observations		487,519		487,519		487,519		487,519		461,927		461,927	
F-stat		**86.82*****		**62.64*****		**74.47*****		**70.68*****		**71.40*****		**14.90*****	

Note(s): (1) Dep. Var. is a binary indicator of whether the student progressed to postgraduate higher education. Std err. clustered at the Institution-by-subject level. All specifications include Institution-by-subject fixed effects. (2) Expected Fees are estimated using the average postgraduate fee paid by students on the same undergraduate course (assuming they continue with their undergraduate subject). See Section 4. (3) These variables are continuous. (4) Specifications (5), (6), (11) and (12) include only students achieving at least a Lower Second Class UG degree. Specifications (1)-(6) are estimated by OLS. Specifications (7)-(12) are estimated by IV. (5) *, ** and ** reflect significance at the 10%, 5% and 1% levels respectively.

Appendix D: Table D.1 (Cont): Fees Definition [3]: Main Equation[1,4,5]

		(7) β	(7) s.e	(8) β	(8) s.e	(9) β	(9) s.e	(10) β	(10) s.e	(11) β	(11) s.e	(12) β	(12) s.e
ln(Fee)[2,3]		-0.273***	0.104	-0.268**	0.113	-0.257**	0.106	-0.255**	0.105	-0.250**	0.106	-0.258**	0.110
Female				-0.026***	0.001	-0.031***	0.001	-0.031***	0.001	-0.033***	0.001	-0.033***	0.001
Disability				0.030***	0.003	0.033***	0.003	0.033***	0.003	0.034***	0.003	0.035***	0.003
Ethnicity	Black			0.046***	0.005	0.065***	0.005	0.067***	0.005	0.065***	0.005	0.066***	0.005
	Asian			0.045***	0.005	0.061***	0.005	0.062***	0.005	0.062***	0.005	0.063***	0.005
	Other			0.037***	0.004	0.042***	0.004	0.043***	0.003	0.043***	0.004	0.043***	0.003
	Unknown			0.027***	0.005	0.030***	0.005	0.030***	0.005	0.031***	0.006	0.031***	0.006
School Type	Private					0.014***	0.003	0.015***	0.003	0.014***	0.003	0.015***	0.003
	Unknown					0.005*	0.002	0.004*	0.002	0.005*	0.003	0.004*	0.003
Parental Occ.	Lower Manag., Prof.					-0.006***	0.002	-0.006***	0.002	-0.006***	0.002	-0.006***	0.002
	Intermediate					-0.015***	0.002	-0.015***	0.002	-0.015***	0.002	-0.015***	0.002
	Small Employers					-0.018***	0.002	-0.018***	0.002	-0.018***	0.002	-0.018***	0.002
	Super., & Tech.					-0.016***	0.002	-0.016***	0.002	-0.016***	0.002	-0.017***	0.002
	Semi-routine					-0.016***	0.002	-0.016***	0.002	-0.016***	0.002	-0.017***	0.002
	Routine, Unemp.					-0.021***	0.003	-0.022***	0.003	-0.022***	0.003	-0.022***	0.003
	Unknown					-0.002	0.002	-0.002	0.002	-0.002	0.002	-0.002	0.002
UG Class	First					0.150***	0.006	0.151***	0.006	0.150***	0.006	0.151***	0.006
	Upper Second					0.049***	0.003	0.049***	0.003	0.049***	0.003	0.050***	0.003
	Lower Second					-0.050***	0.003	-0.050***	0.003				
	Unknown					-0.040***	0.007	-0.040***	0.007				
Sch. Results	2nd Quartile					-0.012***	0.002	-0.012***	0.002	-0.012***	0.002	-0.012***	0.002
	3rd Quartile					-0.014***	0.002	-0.014***	0.002	-0.015***	0.002	-0.014***	0.002
	4th Quartile					-0.002	0.003	-0.002	0.003	-0.003	0.003	-0.002	0.003
Dom. Econ.	Unemployment[3]							0.021	0.013	0.024*	0.014	-0.061**	0.027
	Hourly Earnings[3]							-0.017***	0.006	-0.019***	0.006	-0.014*	0.008
Controls		Cohorts, Age		Cohorts, Age		Cohorts, Age		Cohorts, Age		Cohorts, Age		Cohorts, Age, Dom. TTWA	
Observations		454,853		454,853		454,853		454,853		430,091		430,091	
F-stat		79.71***		63.71***		70.35***		66.59		67.41***		14.85***	

Note(s): (1) Dep. Var. is a binary indicator of whether the student progressed to postgraduate higher education. Std err. clustered at the Institution-by-subject level. All specifications include Institution-by-subject fixed effects. (2) Expected Fees are estimated using the average postgraduate fee paid by students on the same undergraduate course (assuming they continue with their undergraduate subject). See Section 4. (3) These variables are continuous. (4) Specifications (5), (6), (11) and (12) include only students achieving at least a Lower Second Class UG degree. Specifications (1)-(6) are estimated by OLS. Specifications (7)-(12) are estimated by IV. (5) *, ** and ** reflect significance at the 10%, 5% and 1% levels respectively.

Appendix D: Table D.2: Fees Definition [3]: First Stage Equation[1, 3]

		(7) β	(7) s.e	(8) β	(8) s.e	(9) β	(9) s.e	(10) β	(10) s.e	(11) β	(11) s.e	(12) β	(12) s.e
Teaching Cost²		0.023***	(0.005)	0.024***	(0.004)	0.024***	(0.004)	0.024***	(0.004)	0.024***	(0.004)	0.024***	(0.005)
Trade Weighted GBP²		-0.022**	(0.009)	-0.022**	(0.009)	-0.021**	(0.009)	-0.021**	(0.009)	-0.021**	(0.009)	-0.021**	(0.009)
Female				-0.003***	(0.000)	-0.004***	(0.000)	-0.004***	(0.000)	-0.004***	(0.000)	-0.004***	(0.000)
Disability				0.000	(0.000)	0.000	(0.000)	0.000	(0.000)	0.000	(0.000)	0.000	(0.000)
Ethnicity	Black			0.023***	(0.001)	0.030***	(0.001)	0.024***	(0.001)	0.024***	(0.001)	0.020***	(0.001)
	Asian			0.031***	(0.001)	0.037***	(0.000)	0.034***	(0.000)	0.034***	(0.000)	0.034***	(0.000)
	Other			0.017***	(0.000)	0.019***	(0.000)	0.016***	(0.000)	0.015***	(0.000)	0.014***	(0.000)
	Unknown			0.002	(0.002)	0.003*	(0.002)	0.003	(0.002)	0.003	(0.002)	0.002	(0.002)
School Type	Private					0.021***	(0.000)	0.020***	(0.000)	0.020***	(0.000)	0.019***	(0.000)
	Unknown					0.001	(0.001)	0.002	(0.001)	0.001	(0.001)	0.002	(0.001)
Parental Occ.	Lower Manag., Prof.					-0.004***	(0.000)	-0.004***	(0.000)	-0.004***	(0.000)	-0.004***	(0.000)
	Intermediate					-0.009***	(0.000)	-0.009***	(0.000)	-0.009***	(0.000)	-0.009***	(0.000)
	Small Employers					-0.006***	(0.000)	-0.005***	(0.000)	-0.005***	(0.000)	-0.006***	(0.000)
	Super., & Tech.					-0.005***	(0.000)	-0.004***	(0.000)	-0.004***	(0.000)	-0.004***	(0.000)
	Semi-routine					-0.013***	(0.000)	-0.011***	(0.000)	-0.011***	(0.000)	-0.011***	(0.000)
	Routine, Unemp.					-0.015***	(0.000)	-0.013***	(0.000)	-0.013***	(0.000)	-0.013***	(0.000)
	Unknown					-0.005***	(0.001)	-0.004***	(0.001)	-0.005***	(0.001)	-0.004***	(0.001)
UG Class	First					0.037***	(0.000)	0.037***	(0.000)	0.037***	(0.000)	0.036***	(0.000)
	Upper Second					0.022***	(0.000)	0.021***	(0.000)	0.021***	(0.000)	0.021***	(0.000)
	Lower Second					-0.017***	(0.000)	-0.017***	(0.000)				
	Unknown					0.002	(0.002)	0.002	(0.002)				
Sch. Results	2nd Quartile					-0.004***	(0.000)	-0.004***	(0.000)	-0.004***	(0.000)	-0.004***	(0.000)
	3rd Quartile					-0.002***	(0.000)	-0.002***	(0.000)	-0.002***	(0.000)	-0.001*	(0.000)
	4th Quartile					-0.002***	(0.001)	-0.001	(0.001)	-0.001	(0.001)	0.002***	(0.001)
Dom. Econ.	Unemployment²							0.006*	(0.003)	0.006*	(0.003)	-0.022***	(0.007)
	Hourly Earnings²							0.048***	(0.001)	0.048***	(0.001)	-0.004**	(0.002)
Controls		Cohorts, Age		Cohorts, Age		Cohorts, Age		Cohorts, Age		Cohorts, Age		Cohorts, Age, Dom. TTWA	
Observations		454,853		454,853		484,853		454,853		430,091		430,091	
F-stat		343.62***		571.40***		1634.59***		1917.53***		1899.86***		1786.27***	

Note(s): (1) Dep. Var. is natural logarithm of the average price for a postgraduate course paid by students on a given undergraduate course (assuming they continue with their undergraduate subject), estimated as a function of their academic and individual characteristics. See Section 4. Std. err clustered at the Institution-by-subject level. All specifications include Institution-by-subject fixed effects. (2) These variables are continuous. (3) *, ** and ** reflect significance at the 10%, 5% and 1% levels respectively.

Appendix E: Table E.1: Fees Definition [4]: Main Equation[1, 4, 5]

		(1)		(2)		(3)		(4)		(5)		(6)	
		β	s.e	β	s.e	β	s.e	β	s.e	β	s.e	β	s.e
ln(Fee)[2, 3]		**0.506***	0.042	**0.460***	0.041	**-0.095***	0.019	**-0.054***	0.019	**-0.055***	0.019	-0.016	0.023
Female				**-0.024***	0.001	**-0.031***	0.001	**-0.031***	0.001	**-0.032***	0.001	**-0.032***	0.001
Disability				**0.029***	0.002	**0.032***	0.002	**0.032***	0.002	**0.034***	0.003	**0.034***	0.003
Ethnicity	Black			**0.029***	0.004	**0.059***	0.004	**0.060***	0.004	**0.059***	0.004	**0.060***	0.004
	Asian			**0.023***	0.003	**0.055***	0.003	**0.055***	0.003	**0.056***	0.003	**0.055***	0.003
	Other			**0.022***	0.003	**0.038***	0.003	**0.039***	0.003	**0.038***	0.003	**0.038***	0.003
	Unknown			**0.025***	0.005	**0.028***	0.005	**0.028***	0.005	**0.029***	0.005	**0.029***	0.005
School Type	Private					**0.012***	0.002	**0.011***	0.002	**0.011***	0.002	**0.011***	0.003
	Unknown					0.004*	0.002	0.004	0.002	0.004*	0.002	0.004	0.002
Parental Occ.	Lower Manag., Prof.					**-0.005***	0.001	**-0.005***	0.001	**-0.005***	0.001	**-0.005***	0.001
	Intermediate					**-0.013***	0.002	**-0.013***	0.002	**-0.013***	0.002	**-0.012***	0.002
	Small Employers					**-0.016***	0.002	**-0.016***	0.002	**-0.017***	0.002	**-0.016***	0.002
	Super., & Tech.					**-0.015***	0.002	**-0.015***	0.002	**-0.015***	0.002	**-0.015***	0.002
	Semi-routine					**-0.013***	0.002	**-0.013***	0.002	**-0.013***	0.002	**-0.013***	0.002
	Routine, Unemp.					**-0.019***	0.002	**-0.019***	0.002	**-0.019***	0.003	**-0.019***	0.002
	Unknown					-0.001	0.002	-0.001	0.002	-0.001	0.002	-0.001	0.002
UG Class	First					**0.145***	0.005	**0.143***	0.005	**0.143***	0.005	**0.142***	0.005
	Upper Second					**0.046***	0.002	**0.045***	0.002	**0.045***	0.002	**0.045***	0.002
	Lower Second					**-0.046***	0.003	**-0.046***	0.003				
	Unknown					**-0.040***	0.007	**-0.040***	0.007				
Sch. Results	2nd Quartile					**-0.010***	0.002	**-0.010***	0.002	**-0.010***	0.002	**-0.010***	0.002
	3rd Quartile					**-0.013***	0.002	**-0.013***	0.002	**-0.014***	0.002	**-0.014***	0.002
	4th Quartile					-0.001	0.003	-0.002	0.003	-0.002	0.003	-0.002	0.003
Dom. Econ.	Unemployment[3]							0.019	0.013	0.021	0.014	-0.049*	0.026
	Hourly Earnings[3]							**-0.026***	0.004	**-0.028***	0.004	-0.013	0.008
Controls		Cohorts, Age		Cohorts, Age		Cohorts, Age		Cohorts, Age		Cohorts, Age		Cohorts, Age, Dom. TTWA	
Observations		488,863		488,863		488,863		488,863		463,146		463,146	
F-stat		**116.33***		**69.08***		**74.44***		**70.66***		**71.47***		**14.83***	

Note(s): (1) Dep. Var. is a binary indicator of whether the student progressed to postgraduate higher education. Std err. clustered at the Institution-by-subject level. All specifications include Institution-by-subject fixed effects. (2) Expected Fees are estimated using the average postgraduate fee paid by students on the same undergraduate course. See Section 4. (3) These variables are continuous. (4) Specifications (5), (6), (11) and (12) include only students achieving at least a Lower Second Class UG degree. Specifications (1)-(6) are estimated by OLS. Specifications (7)-(12) are estimated by IV. (5) *, ** and ** reflect significance at the 10%, 5% and 1% levels respectively.

		(7)		(8)		(9)		(10)		(11)		(12)	
		β	s.e	β	s.e	β	s.e	β	s.e	β	s.e	β	s.e
ln(Fee)[2,3]		-0.480**	0.201	-0.466**	0.189	-0.439**	0.179	-0.435**	0.177	-0.433**	0.177	-0.447**	0.182
Female				-0.028***	0.002	-0.033***	0.002	-0.033***	0.002	-0.034***	0.002	-0.034***	0.002
Disability				0.031***	0.003	0.033***	0.002	0.033***	0.002	0.034***	0.003	0.035***	0.003
Ethnicity	Black			0.049***	0.006	0.069***	0.006	0.068***	0.005	0.067***	0.005	0.066***	0.005
	Asian			0.051***	0.006	0.067***	0.007	0.067***	0.006	0.067***	0.006	0.068***	0.006
	Other			0.041***	0.005	0.046***	0.005	0.046***	0.004	0.045***	0.004	0.045***	0.004
	Unknown			0.026***	0.005	0.029***	0.005	0.029***	0.005	0.030***	0.006	0.029***	0.006
School Type	Private					0.023***	0.007	0.023***	0.006	0.023***	0.006	0.024***	0.007
	Unknown					0.005**	0.002	0.006**	0.002	0.006**	0.003	0.005**	0.003
Parental Occ.	Lower Manag., Prof.					-0.007***	0.002	-0.007***	0.002	-0.007***	0.002	-0.007***	0.002
	Intermediate					-0.017***	0.002	-0.017***	0.002	-0.017***	0.002	-0.017***	0.002
	Small Employers					-0.019***	0.002	-0.019***	0.002	-0.020***	0.002	-0.020***	0.002
	Super., & Tech.					-0.016***	0.002	-0.016***	0.002	-0.016***	0.002	-0.017***	0.002
	Semi-routine					-0.016***	0.002	-0.016***	0.002	-0.016***	0.002	-0.017***	0.002
	Routine, Unemp.					-0.024***	0.004	-0.024***	0.003	-0.024***	0.003	-0.024***	0.003
	Unknown					-0.001	0.002	-0.001	0.002	-0.001	0.002	-0.001	0.002
UG Class	First					0.160***	0.009	0.160***	0.009	0.160***	0.009	0.160***	0.009
	Upper Second					0.052***	0.004	0.052***	0.004	0.052***	0.004	0.053***	0.004
	Lower Second					-0.048***	0.003	-0.048***	0.003				
	Unknown					-0.038***	0.007	-0.037***	0.007				
Sch. Results	2nd Quartile					-0.012***	0.002	-0.012***	0.002	-0.012***	0.002	-0.011***	0.002
	3rd Quartile					-0.013***	0.002	-0.013***	0.002	-0.014***	0.002	-0.013***	0.002
	4th Quartile					-0.002	0.003	-0.002	0.003	-0.002	0.003	-0.001	0.003
Dom. Econ.	Unemployment[3]							0.044***	0.016	0.047***	0.017	-0.051*	0.027
	Hourly Earnings[3]							-0.001	0.012	-0.003	0.012	-0.020**	0.009
Controls		Cohorts, Age		Cohorts, Age		Cohorts, Age		Cohorts, Age		Cohorts, Age		Cohorts, Age, Dom. TTWA	
Observations		456,071		456,071		456,071		456,071		432,003		432,003	
F-stat		75.26***		61.08***		70.07***		66.49***		67.48***		14.60***	

Note(s): (1) Dep. Var. is a binary indicator of whether the student progressed to postgraduate higher education. Std err. clustered at the Institution-by-subject level. All specifications include Institution-by-subject fixed effects. (2) Expected Fees are estimated using the average postgraduate fee paid by students on the same undergraduate course. See Section 4. (3) These variables are continuous. (4) Specifications (5), (6), (11) and (12) include only students achieving at least a Lower Second Class UG degree. Specifications (1)-(6) are estimated by OLS. Specifications (7)-(12) are estimated by IV. (5) *, ** and ** reflect significance at the 10%, 5% and 1% levels respectively.

		(7) β	(7) s.e	(8) β	(8) s.e	(9) β	(9) s.e	(10) β	(10) s.e	(11) β	(11) s.e	(12) β	(12) s.e
Teaching Cost[2]		0.021***	(0.002)	0.022***	(0.002)	0.023***	(0.002)	0.023***	(0.002)	0.023***	(0.002)	0.023***	(0.002)
Trade Weighted GBP[2]		-0.012***	(0.005)	-0.012**	(0.005)	-0.012**	(0.005)	-0.012**	(0.005)	-0.012**	(0.005)	-0.012**	(0.005)
Female				-0.005***	(0.000)	-0.006***	(0.000)	-0.005***	(0.000)	-0.005***	(0.000)	-0.005***	(0.000)
Disability				0.001***	(0.000)	0.000	(0.000)	0.000	(0.000)	0.000	(0.000)	0.000	(0.000)
Ethnicity	Black			0.020***	(0.001)	0.027***	(0.001)	0.018***	(0.001)	0.018***	(0.001)	0.013***	(0.000)
	Asian			0.030***	(0.000)	0.035***	(0.000)	0.031***	(0.000)	0.031***	(0.000)	0.031***	(0.000)
	Other			0.019***	(0.000)	0.020***	(0.000)	0.016***	(0.000)	0.016***	(0.000)	0.014***	(0.000)
	Unknown			-0.001	(0.001)	0.000	(0.001)	-0.002	(0.001)	-0.002	(0.001)	-0.002	(0.001)
School Type	Private					0.033***	(0.000)	0.031***	(0.000)	0.031***	(0.000)	0.031***	(0.000)
	Unknown					0.003***	(0.000)	0.004***	(0.000)	0.003***	(0.000)	0.004***	(0.000)
Parental Occ.	Lower Manag., Prof.					-0.004***	(0.000)	-0.003***	(0.000)	-0.003***	(0.000)	-0.003***	(0.000)
	Intermediate					-0.009***	(0.000)	-0.009***	(0.000)	-0.009***	(0.000)	-0.009***	(0.000)
	Small Employers					-0.007***	(0.000)	-0.006***	(0.000)	-0.006***	(0.000)	-0.006***	(0.000)
	Super., & Tech.					-0.004***	(0.000)	-0.003***	(0.000)	-0.003***	(0.000)	-0.003***	(0.000)
	Semi-routine					-0.008***	(0.000)	-0.007***	(0.000)	-0.007***	(0.000)	-0.006***	(0.000)
	Routine, Unemp.					-0.015***	(0.000)	-0.012***	(0.000)	-0.012***	(0.000)	-0.012***	(0.000)
	Unknown					-0.002***	(0.000)	-0.001**	(0.000)	-0.001**	(0.000)	-0.001**	(0.000)
UG Class	First					0.044***	(0.000)	0.044***	(0.000)	0.044***	(0.000)	0.043***	(0.000)
	Upper Second					0.020***	(0.000)	0.019***	(0.000)	0.019***	(0.000)	0.019***	(0.000)
	Lower Second					-0.006***	(0.000)	-0.006***	(0.000)				
	Unknown					0.005***	(0.001)	0.005***	(0.001)				
Sch. Results	2nd Quartile					-0.002***	(0.000)	-0.002***	(0.000)	-0.001***	(0.001)	-0.001**	(0.001)
	3rd Quartile					0.000	(0.001)	0.001*	(0.001)	0.001*	(0.001)	0.002***	(0.001)
	4th Quartile					-0.001*	(0.001)	0.001	(0.001)	0.001	(0.001)	0.004***	(0.001)
Dom. Econ.	Unemployment[2]							0.055***	(0.003)	0.055***	(0.003)	0.003	(0.006)
	Hourly Earnings[2]							0.066***	(0.001)	0.066***	(0.001)	-0.016***	(0.002)
Controls		Cohorts, Age		Cohorts, Age		Cohorts, Age		Cohorts, Age		Cohorts, Age		Cohorts, Age, Dom. TTWA	
Observations		456,071		456,071		456,071		456,071		432,003		432,003	
F-stat		1470.91***		1259.70***		3769.27***		5185.19***		5063.77***		5074.29***	

Note(s): (1) Dep. Var. is natural logarithm of the average price for a postgraduate course paid by students on a given undergraduate course, estimated as a function of their academic and individual characteristics. See Section 4. Std. err clustered at the Institution-by-subject level. All specifications include Institution-by-subject fixed effects. (2) These variables are continuous. (3) *, ** and ** reflect significance at the 10%, 5% and 1% levels respectively.

9 References

Adnett, N. (2006) 'Student Finance and Widening Participation in the British Isles: Common Problems, Different Solutions', *Higher Education Quarterly*, vol. 60(4), pp. 296-311.

Adnett, N. and D. Tlupova (2007) '"Informed Choice? The New English Student Funding System and Widening Participation', *London Review of Education*, vol. 6(3), 243-254.

Angrist, J. D. and J. S. Pischke (2009) *Mostly Harmless Econometrics*, New Jersey: Princeton University Press.

Arcidiacono, P. (2004) 'Ability sorting and the returns to college major', *Journal of Econometrics*, vol. 121(1-2), pp. 343-375.

Barr, N. (2009) 'Financing Higher Education: Lessons from Economic Theory and Reform in England', *Higher Education in Europe*, vol. 34(2), pp. 201-209.

Barr, N. (2010a) 'Paying for higher education: What policies, in what order?', available at: http://econ.lse.ac.uk/staff/nb/index_own.html (last accessed: 1 November 2011).

Barr, N. (2010b) 'Comment on the Browne Review', available at: http://econ.lse.ac.uk/staff/nb/index_own.html (last accessed: 1 November 2011).

Bartik, T. J. (1991) 'The Effects of Metropolitan Job Growth on the Size Distribution of Family Income', Upjohn Institute, Working Paper No. 91-06.

BIS (2010) 'One Step Beyond: Making the most of postgraduate education', available at: http://www.bis.gov.uk/assets/BISCore/corporate/docs/P/10-704-one-step-beyond-postgraduate-education.pdf (last accessed: 9 April 2012).

Black, D. A. and J. A. Smith (2004) 'How robust is the evidence on the effects of college quality? Evidence from matching', *Journal of Econometrics*, vol. 121(1-2), pp. 99-124.

Blanden, J. and S. Machin (2004) 'Educational Inequality and the Expansion of UK Higher Education', *Scottish Journal of Political Economy*, vol. 51(2), pp. 230-249.

Browne, J. (2010) 'Securing a sustainable future for higher education: An independent review of higher education funding and student finance', available at: http://www.independent.gov.uk/browne-report (last accessed: 1st November 2011).

Callender, C. (2010) 'Bursaries and Institutional aid in Higher Education in England: do they safeguard and promote fair access?', *Oxford Review of Education*, vol. 36(1), pp. 45-62.

Card, D. and T. Lemieux (2000) 'Dropout and enrollment trends in the post-war period: What went wrong in the 1970s?', National Bureau of Economic Research, Working Paper 7658.

Carneiro, P. and J. J. Heckman (2002) 'The evidence on credit constraints in post-secondary schooling', *The Economic Journal*, vol. 112 (October), pp. 705-734.

Chapman, B. (1997) 'Conceptual Issues and the Australian Experience with Income Contingent Charges for Higher Education', *The Economic Journal*, vol. 107 (May), pp. 735-751.

Chapman, B. and C. Ryan (2005) 'The access implications of income-contingent charges for higher education: lessons from Australia', *Economics of Education Review*, vol. 24: 491-512.

Chevalier, A. and G. Conlon (2003) 'Does It Pay to Attend a Prestigious University?', Centre for the Economics of Education, Discussion Paper 33.

Chowdry, H., C. Crawford, L. Dearden, A. Goodman and A. Vignoles (2010), 'Widening Participation in Higher Education: Analysis Using Linked Administrative Data', Institute for the Study of Labor, Discussion Paper 4991.

Christofides, L. N., M. Hoy and L. Yang (2010) 'Participation in Canadian Universities: The gender imbalance (1977-2005)', *Economics of Education Review*, vol. 29(3), pp. 400-410.

Crawford, C. and L. Dearden (2010) 'The Impact of the 2006-07 Higher Education Finance Reforms on Higher Education Participation', available at: http://www.bis.gov.uk/assets/biscore/corporate/docs/i/10-1189-impact-2006-07-he-finance-reforms-on-participation (last accessed: 1 November 2011).

Dearden, L., E. Fitzsimons and G. Wyness (2011) 'The Impact of Tuition Fees and Support on University Participation in the UK', Centre for the Economics of Education, Discussion Paper 126.

Dolton, P. J. and L. Lin (2011) 'From Grants to Loans and Fees: The Demand for Post-Compulsory Education in England and Wales from 1955 to 2008', Centre for the Economics of Education, Discussion Paper 127.

Dynarski, S. M. (2003) 'Does Aid Matter? Measuring the Effect of Student Aid on College Attendance and Completion', *American Economic Review*, vol. 93(1), pp. 279-288.

Dynarski, S. M. (2005) 'Building the stock of college-educated labor', National Bureau of Economic Research, Working Paper 11604.

Ehrenberg, R. G. (2004) 'Econometric studies of higher education', *Journal of Econometrics*, vol. 121(1-2), pp. 19-37.

Faggian, A. and P. McCann (2006) 'Human capital flows and regional knowledge assets: A simultaneous equation approach', *Oxford Economic Papers*, vol. 58(3), pp. 475-500.

Faggian, A. and P. McCann (2009) 'Human capital, graduate migration and innovation in British regions', *Cambridge Journal of Economics*, vol. 33(2), pp. 317-333.

Faggian, A., P. McCann and S. Sheppard (2006) 'An analysis of ethnic differences in UK graduate migration patterns', *Annuals of Regional Science*, vol. 40(2), pp. 461-471.

Faggian, A., P. McCann and S. Sheppard (2007a) 'Human Capital, Higher Education and Graduate Migration: An Analysis of Scottish and Welsh Students', *Urban Studies*, vol. 44(13), pp. 2511-2528.

Faggian, A., P. McCann and S. Sheppard (2007b) 'Some Evidence that Women are More Mobile than Men: Gender Differences in UK Graduate Migration Behaviour', *Journal of Regional Science*, vol. 47(3), **pp.** 517-539.

Flannery, D. and C. O'Donoghue (2009) 'The Determinants of Higher Education Participation in Ireland: A Micro Analysis', *The Economic and Social Review*, vol. 40(1), pp. 73-107.

Galindo-Rueda, F., O. Marcenaro-Gutierrez and A. Vignoles (2004) 'The Widening Socio-economic gap in UK Higher Eudcation', Centre for the Economics of Education, Working Paper 44.

Gallacher, J. (2006) 'Widening Access or Differentiation and Stratification in Higher Education in Scotland', *Higher Education Quarterly*, vol. 60(4), pp. 349-369.

Gayle, V., D. Berridge and R. Davies (2002) 'Young People's Entry into Higher Education: quantifying influential factors', *Oxford Review of Education*, vol. 28(1), pp. 5-20.

HEFCE (2006) 'Review of the teaching funding method: Outcomes of first cycle of consultation', available at: http://www.hefce.ac.uk/pubs/hefce/2006/06_12/06_12.pdf (last accessed: 1 November 2011).

HEFCE (2010) 'Guide to funding: How HEFCE allocates its funds', available at: http://www.hefce.ac.uk/pubs/hefce/2010/10_24 (last accessed: 1 November 2011).

Heller, D. E. (1997) 'Student Price Response in Higher Education: An Update to Leslie and Brinkman', *The Journal of Higher Education*, vol. 68(6), pp. 624-659.

HESA (2010) 'Student and Qualifiers Data Tables', available at: http://www.hesa.ac.uk (last accessed: 1 November 2011).

Hoxby, C. M. (1997) 'How the changing market structure of U.S. higher education explains college tuition', National Bureau of Economic Research, Working Paper 6323.

Johnstone, D. B. (2004) 'The economics and politics of cost sharing in higher education: A comparative perspective', *Economics of Education Review*, vol. 23(4), pp. 403-410.

Kane, T. J. (2003) 'A quasi-experimental estimate of the impact of financial aid on college-going', National Bureau of Economic Research, Working Paper 9703.

Kane, T. J. (2004) 'Evaluating the impact of the D.C. tuition assistance grant programme', National Bureau of Economic Research, Working Paper 10658.

Leslie, L. L. and P. T. Brinkman (1987) 'Student Price Response in Higher Education: The Student Demand Studies', *Journal of Higher Education*, vol. 58(2), pp. 181-204.

Long, M. C. (2008) 'College quality and early adult outcomes', *Economics of Education Review*, vol. 27(5), pp. 588-602.

Machin, S. and R. J. Murphy (2010) 'The social composition and future earnings of postgraduates: Interim results from the Centre for Economic Performance', available at: http://www.suttontrust.com/public/documents/1Sutton_Trust_Postgraduate_report_01032010 .pdf (last accessed: 1 November 2011).

Marcucci, P. N., and D. B. Johnstone (2007) 'Tuition fee policies in a comparative perspective: Theoretical and Political Rationales', *Journal of Higher Education Policy and Management*, vol. 29(1), pp. 25-40.

Naylor, R. and J. Smith (2004) 'Degree Performance of Economics Students in UK Universities: Absolute and Relative Performance in Prior Qualifications', *Scottish Journal of Political Economy*, vol. 51(2), pp. 250-265.

O'Connell, P. J., S. McCoy and D. Clancy (2006) 'Who Went to College? Socio-Economic Inequality in Entry to Higher Education in the Republic of Ireland in 2004', *Higher Education Quarterly*, vol. 60(4), pp. 312-332.

ONS (2012) 'Consumer Price Indices, March 2012', available at: http://www.ons.gov.uk/ons/rel/cpi/consumer-price-indices/march-2012/index.html (last accessed: 18 April 2012).

Paterson, L. (1997) 'Trends in Higher Education Participation in Scotland', *Higher Education Quarterly*, vol. 51(1), pp. 29-48.

Reddin, M. (2004), Surveys of UK University and HE College Fees 2004, available at: http://www.publicgoods.co.uk/ (last accessed: 1 November 2011).

Reddin, M. (2005), Surveys of UK University and HE College Fees 2005, available at: http://www.publicgoods.co.uk/ (last accessed: 1 November 2011).

Reddin, M. (2006), Surveys of UK University and HE College Fees 2006, available at: http://www.publicgoods.co.uk/ (last accessed: 1 November 2011).

Reddin, M. (2007), Surveys of UK University and HE College Fees 2007, available at: http://www.publicgoods.co.uk/ (last accessed: 1 November 2011).

Reddin, M. (2008), Surveys of UK University and HE College Fees 2008, available at: http://www.publicgoods.co.uk/ (last accessed: 1 November 2011).

Reddin, M. (2009), Surveys of UK University and HE College Fees 2009, available at: http://www.publicgoods.co.uk/ (last accessed: 1 November 2011).

Rice, P. (1999) 'The impact of local labour markets on investment in further education: Evidence from the England and Wales youth cohort studies', *Journal of Population Economics*, vol. 12(2), pp. 287-312.

Smith, J. and R. Naylor (2005) 'Schooling effects on subsequent university performance: evidence for the UK university population', *Economic of Education Review*, vol. 24(5), pp. 549-562.

Soo, K. T. and C. Elliott (2010) 'Does Price Matter? Overseas students in UK Higher Education', *Economics of Education Review*, vol. 29(4), pp. 553-565.

Stock, J. H., J. H. Wright, M. Yogo (2002) 'A Survey of Weak Instruments and Weak Identification in Generalized Method of Moments', *Journal of Business & Economic Statistics*, vol. 20, pp. 518-529.

Times Higher Education (2011) 'Leeds Met to charge near-maximum fees', available at: http://www.timeshighereducation.co.uk/story.asp?storycode=415624 (last accessed: 9 April 2012).

Wales, P. D. (2010) 'Geography or Economics? A micro-level analysis of degree choice in the context of regional economic disparities in the UK', Spatial Economics Research Centre, Discussion Paper 56.