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Money for nothing: estimating the impact of student aid on participation in Higher Education

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Abstract

Understanding how finance policy can affect higher education is important for understanding how governments can promote human capital accumulation. Yet there is a severe lack of evidence on the effectiveness of student aid on HE participation outside of the US, and none at all for the UK. This paper exploits a reform that took place in the UK in 2004, when maintenance grants were re-introduced for students from low income families, having been abolished since 1999. This reform occurred in isolation of any other policy changes, and did not affect students from relatively better off families, making them a potential control group. We use a difference in difference framework to estimate its effects on degree participation. We find a positive impact of maintenance grants on degree participation, with a £1,000 increase in grants leading to a 3.95ppt increase in participation. This finding is in line with US studies.

JEL classification: I21, I22, I28

Keywords: higher education participation, higher education funding policies, maintenance grants, difference in differences

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1. Introduction

Student aid is widely used as a tool to promote higher education participation among individuals from disadvantaged groups. Empirical evidence suggests such policies can be effective, with studies from the US (McPherson and Shapiro, 1991; Dynarski, 2000; 2003) finding increases in participation in Higher Education (HE) of 3-5 percentage points per $1,000 spending on student grant aid.[4] However, there is a severe lack of evidence on the effectiveness of student aid outside of the US, and none at all for the UK. This is largely due to the challenging nature of such empirical work. Two particular challenges are present. First, student aid is generally awarded to those from low-income backgrounds, rendering aid eligibility correlated with many other observable and unobservable factors that also affect an individuals' HE participation. Second, it is often the case that policy reforms affecting Higher Education finance are implemented in packages, affecting the three main elements of HE finance (grants, fees and loans) simultaneously. This is particularly true in the UK context where the major reforms to date have included a complex mixture of changes to HE finance and makes it very difficult to isolate the effects of grants on HE participation.

We overcome these challenges in this paper by exploiting a policy reform from the UK which affected students undertaking undergraduate degrees in higher education institutions[5]. Though the reform affected various elements of the HE finance package, it did so in a gradual manner over time. In particular, it introduced policy changes relating to grants two years in advance of any other changes (which related to student fees and loans). This reform to grants affected students from relatively poor families only.

[4] Throughout we use the terms aid and grants interchangeably

[5] Throughout we use the term 'degree' to specifically mean undergraduate degree

This reform to maintenance grants was one of the least publicised components of the 2004 UK Higher Education Act, which is mainly associated with the sweeping changes it introduced as and from 2006/07 - in particular, the introduction of tuition fees of up to £3,000 per year for all students, regardless of background, deferrable until after graduation using government-subsidised loans – quite a change from the previous up-front fees, means-tested at a maximum of £1,200 per year. However, the Act also included the reintroduction of means-tested maintenance grants – which had been abolished in 1999 – to be phased in from the 2004/05 academic year. The level was set at a maximum of £1,050 per student for those with joint parental incomes of £22,500 or below[6], before being further increased substantially from 2006/07 to a maximum of £2,700 per year.

We thus use this policy change to estimate the impact of student aid on degree participation within a difference-in-differences framework. Since relatively better off students were not affected by the re-introduction of grants, they are a valid control group, subject to caveats discussed later on. Moreover we provide evidence on the plausibility of the key common trends assumption across both groups in the years preceding the policy shift. Our paper thus presents rare evidence on the effectiveness of student aid in a European setting.

Using data from the UK Labour Force Survey (LFS) on the first-year degree participation decisions of young people from England, Wales and Northern Ireland[7], our differences-in-difference estimates of the impact of the 2004 increase in maintenance grants show that grants have a positive and significant impact on first-year degree participation. In particular, we find robust

[6] Students are assessed on joint parental income. If a student's parents are divorced or separated then they are assessed on the income of the parent they live with most of the time.

[7] We exclude Scotland from our analysis. Scotland experienced a significant departure from UK HE policy in 2000 and, made a number of significant changes including abolishing tuition fees, lowering student loans and introducing an endowment of around £2,200 per student, to be paid upon graduation. This renders the Scottish system very different from the system that covers the rest of the UK.

evidence that degree participation in 2005/06[8], the year after the re-introduction of grants, increased by 3.8 percentage points as a result of the increase in maintenance grants. These findings, which survive a battery of robustness checks, are in line with results estimated in a number of similar studies from the US and Europe (Dynarksi, 2003; Hemelt and Marcotte (2008), Neilsen et al (2010)). We also find similar results from an alternative estimation strategy using instrumental variables.

The paper proceeds as follows. Section 2 provides some background on student aid and the relevant literature. Section 3 provides more detail on HE finance reforms in the UK[9] over the past two decades. In Section 4 we describe the data used in the paper. In Section 5 we outline our methodology. In Section 6 we present the results of the analysis of the effects of the 2004 increase in maintenance grants, using difference-in-differences. In Section 7 we present robustness tests, including an instrumental variables estimation. Section 8 concludes.

2. Student Aid: Background and Literature Review

Understanding the impact of student aid on HE participation is important from an economic and political perspective. Student aid is widely used as a tool to encourage students from the least represented groups to enrol in HE for many reasons. Young people from poor backgrounds are more likely to be credit constrained than their better-off counterparts and this could lead to an inefficient number or mix of participation in higher education (Carneiro & Heckman, 2002). There may also be cause to subsidise poorer students for equity reasons. For example, if young people from poor backgrounds are more likely to experience capital market failings or lack of information,

[8] We use this notation throughout to denote the academic year commencing in September 2005 (for instance).

[9] As discussed, we exclude Scotland from our analysis. Hence references to the UK in this paper refer to England, Wales and Northern Ireland – or the UK *excluding* Scotland.

then subsidies could be justified on these grounds. Similarly, those from poorer backgrounds could be more likely to suffer from debt-aversion, again justifying intervention in the form of non-repayable subsidies (Goodman and Kaplan, 2003).

Indeed, the UK government is committed to spending on student aid. Despite the increasing share of the financial burden borne by students in the form of tuition fees and loans, UK government spending on student aid continues to grow – in 2009/10, government spend on maintenance grants was £1,050m on maintenance grants – versus the £722m spend on student fee loans and £610m on maintenance loans[10] – and reached 'unsustainable' levels.[11] Spending on student aid is high across Europe, as well as the UK. But little European evidence exists as to whether and to what extent this aid has an impact on HE participation.

Separating out the effect of maintenance grants on HE participation is also important from a political perspective. Since September 2012, UK Higher Education Institutions (HEIs) have been able to charge tuition fees of up to £9,000 per year for undergraduate degree courses. The announcement was met with a great deal of controversy, with students taking to the streets in their millions to protest the reforms, and widespread concern that the increase in fees would severely lower participation, particularly among young people from poor backgrounds (see assorted press coverage[12]). However, while tuition fees are now some of the highest in the world, the UK government argues that the upfront support package – comprising maintenance grants and loans – is

[10] All in 2009 prices. Sources: Student grant figures – Student Loans Company, Statistical First Release, 06/2009, table 3. Maintenance loan and fee loan figures – DIUS Annual Report 2009, annex 1, table 11. (This does not represent the amount of money lent to students, but the future cost of subsidising and writing off student loans issued in that year as well as management of the student loans stock.)

[11] According to an independent review of higher education finance in the UK, known as the Browne Review, (2010, p.56)

also one of the most generous in the world.[13] Indeed, maintenance grants were significantly increased for students from low income backgrounds alongside the fee 2012 increase.

Understanding the impact of maintenance grants is also important for policy going forward. Historically, policymakers in the UK have introduced packages of reforms affecting all three major elements of HE finance – maintenance grants, maintenance loans and tuition fees. However, if policymakers in the future favour adjusting one element of HE finance more than others, evidence on how this may affect HE participation – which is what we provide in this paper – is of key importance.

There is a sizeable body of US literature estimating the causal effects of maintenance grants on HE participation. Dynarski (2000) finds that Georgia's HOPE Scholarship, a merit-aid programme, had a positive impact on students: a $1,000 increase in aid resulted in a 4 percentage point increase in HE participation. A later paper (Dynarski, 2003) exploits a one-off policy change whereby financial aid was withdrawn from children with a deceased, disabled or retired father, finding that the reform reduces HE participation by 3.6 percentage points. Kane (1995) also looks at the impact of the Pell Grant aid system, finding no impact on participation, while Seftor and Turner (2002) find a small impact of Pell Grant eligibility of 0.7 percentage points per $1,000 of aid (although of a restricted sample of mature students). More recently, Nielsen et al (2010), exploit a change in aid in the Danish HE system which particularly benefitted higher income students, and find that a $1,000 increase in grants results in a 1.35 percentage point increase in HE participation.

These results suggest an important role for maintenance grants in HE participation decisions. However, with the exception of Neilsen et al (2010) for Denmark, they all relate to the US context, which is a unique setting in terms of having de-centralised, high-level tuition fees; indeed, it is hard to think that they can be informative a priori about different, non-US, settings. To

our knowledge, our paper is the first to examine the role of upfront support in a different setting, the UK.

3. Institutional Setting and Policy Changes

As is relatively common in Europe, but in contrast to the US, the UK system is firmly rooted in the public sector, as is evidenced by the fact that just one private degree awarding institution in operation during our period of interest.[14] Thus, tuition fee and aid levels were set centrally by the government throughout the period we consider; Higher Education Institutions (HEIs) had no control over these levels.[15] Up until 1998, UK students benefitted from free tuition, deferred maintenance loans (which were introduced in 1990) and maintenance grants. HE participation was around 40% of 18-30 year olds in 1998 (Public Accounts Committee, 2009) and 30% of 17-20 year-olds (HEPI, 2009).

Despite this, however, there was concern that the gap in HE participation between rich and poor was very wide in comparison with other developed countries (Barr and Crawford, 1998), with concerns that it was growing even wider (Blanden, Gregg and Machin, 2005).

The first major reform to the UK HE finance system occurred in 1998, when significant changes to all three elements (loans, grants and fees) of the system were implemented. In particular, the 1998 reforms saw the introduction, for the first time ever, of up-front means-tested tuition fees of £1,200, affecting all just over half of the undergraduate degree student population at the time.

[14] This is the University of Buckingham. Two further private institutions (BPP and the New College of Humanities) have since begun awarding degrees in the UK.

[15] From 2006, universities notionally gained control over fee setting although these were capped at £3,000 per annum which was binding for practically all. The fee cap was lifted to £9,000 per year in 2012 introducing more control over fee setting for universities. This initially resulted in little variation (average fees were around £8,600), though variation has increased as a result of additional incentives for universities to cut fees.

Such a fee level was modest in comparison to the US, but relatively low in comparison to public universities in other countries in Western Europe such as France and Germany.[16] More relevant for this paper, the reforms also resulted in the abolition of means-tested maintenance grants from 1999 onwards (preceded by their halving in 1998), affecting just over half of all undergraduate degree students – those from poorer backgrounds.

No further HE finance policy changes were put in place until the 2004 Higher Education Act. This Act again principally affected undergraduate degree students, and the reforms included sweeping changes to fees – the introduction of tuition fees deferrable until after graduation through the provision of government loans - and large increases in maintenance grants of up to £2,700 for the poorest students. Crucially, some of the increase in grants was to come into effect two years before any of the other changes, from 2004/05 as opposed to 2006/07.[17] This provides exogenous variation in student aid only and thus, we will argue, a credible source of identification for analysing the effects of aid on degree participation. In particular, we exploit the fact that there were no policy changes between 1999 and 2003, followed by a window of two years that saw the introduction of maintenance grants for relatively poor students only and no other policy changes. We estimate the impact of the increase in maintenance grants on those affected by the reform, using those unaffected as a suitable control group, under the assumption of common trends, which we will discuss in detail later on.

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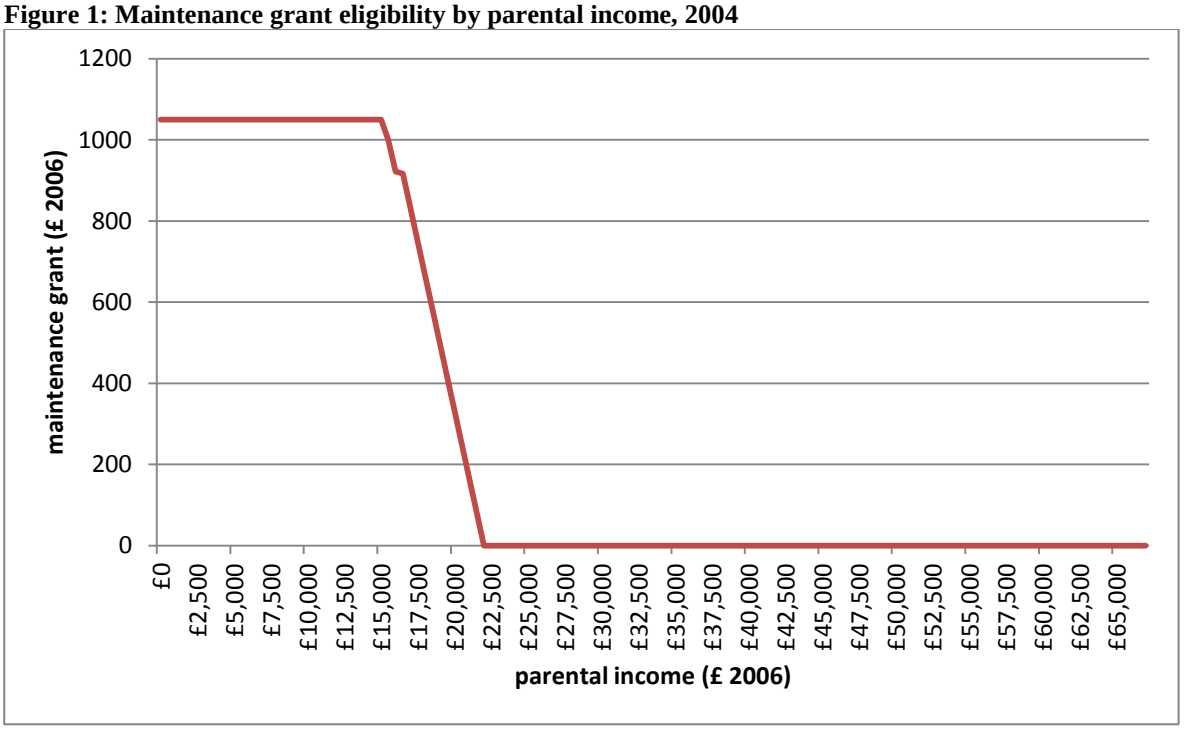
[16] Public universities in France and Germany charge low or no fees, though private universities can charge significantly more (see the International Comparative Higher Education Finance Project, available at http://gse.buffalo.edu/org/inthigheredfinance/project_profiles.html)

[17] Fee loans were available at a zero real interest rate, repayable according to income (at 9% above a threshold of £15,000). Unlike its predecessor, the fee, which could be up to £3,000 per year, was not means-tested. Maintenance loans remained pretty much unchanged, though they were reduced slightly for students who saw a grant increase in 2006/07. Dearden et al (2004) and Dearden et al. (2008) contain more details.

In terms of the level of grants from 2004/05 (which, as already discussed, had been scrapped in 1999/00), the new grants were means-tested to a maximum of £1,050 for students from parental income backgrounds <£15,000 and tapered to zero for students with parental income exceeding £22,500. This was the level of aid that stayed in place in both 2004/05 and 2005/06 – and is illustrated in Figure 1 below for 2004 (2005 thresholds are very similar and not shown). As Figure 1 shows, during the treatment years, according to the means-testing rules, youths with parental income up to and including £15,000 per year received the full £1,050 grant, while those from parental income backgrounds between £15,000 and £22,500 received a partial grant. It is notable, however, that the vast majority of our treatment group come from parental income backgrounds below £15,000 meaning that the average 7maintenance grant in our treatment sample is £963. Nevertheless, we will also experiment with different control groups in our robustness checks.[18]

Figure 1: Maintenance grant eligibility by parental income, 2004



[18] We also show robustness of findings later on to including just the "fully eligibles" in the treatment group.

In 2006/07, the HE landscape changed considerably for all students. We thus focus on the period 1999/00 through 2005/06 to identify the effect of maintenance support on degree participation. The variation just described is shown graphically in Figures 2-3 and summarised in Table 1, which set out the values of grants, fees and loans respectively, for students with parental backgrounds below £22,500 (the 'treatment group') and with parental income backgrounds at or above £22,500 (the 'control group'). Shaded areas show the period used in the estimation, 1999-2005. Figure 2 shows that, for poorer students, the only element changing during this (shaded) period is grants (note also that the treatment group were not affected by the introduction of tuition fees in 1998 since only those from richer backgrounds were eligible for the fees). Figure 3 shows that there were no policy changes implemented during this period for relatively better off students.

Figure 2: Fee liability and grant and loan eligibility: parental income < £22,500

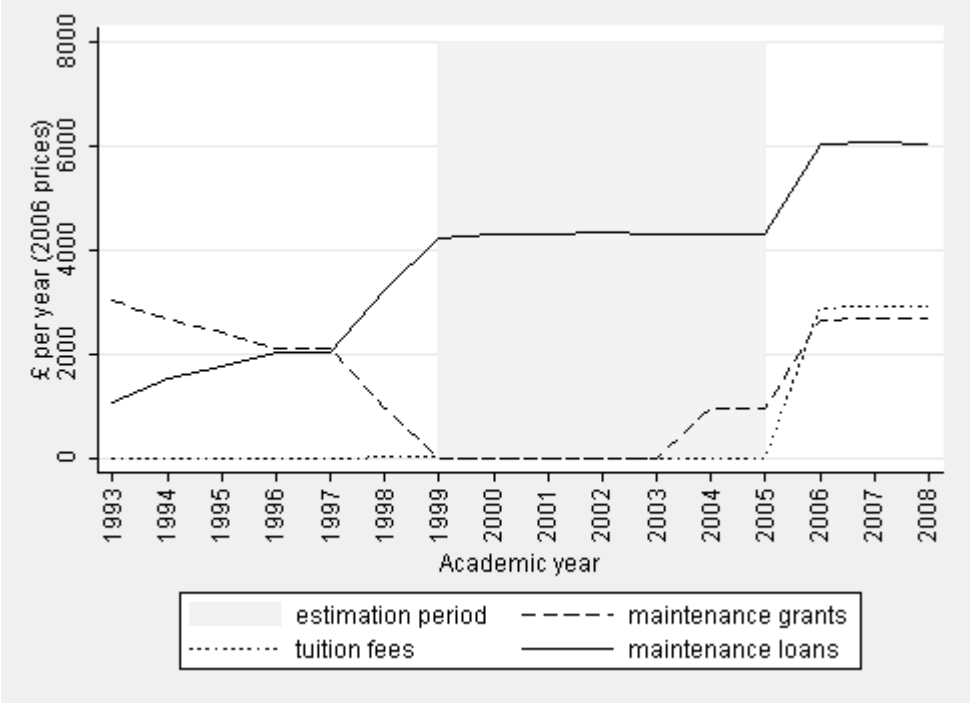


Figure 3: Fee liability and grant and loan eligibility: parental income >= £22,500

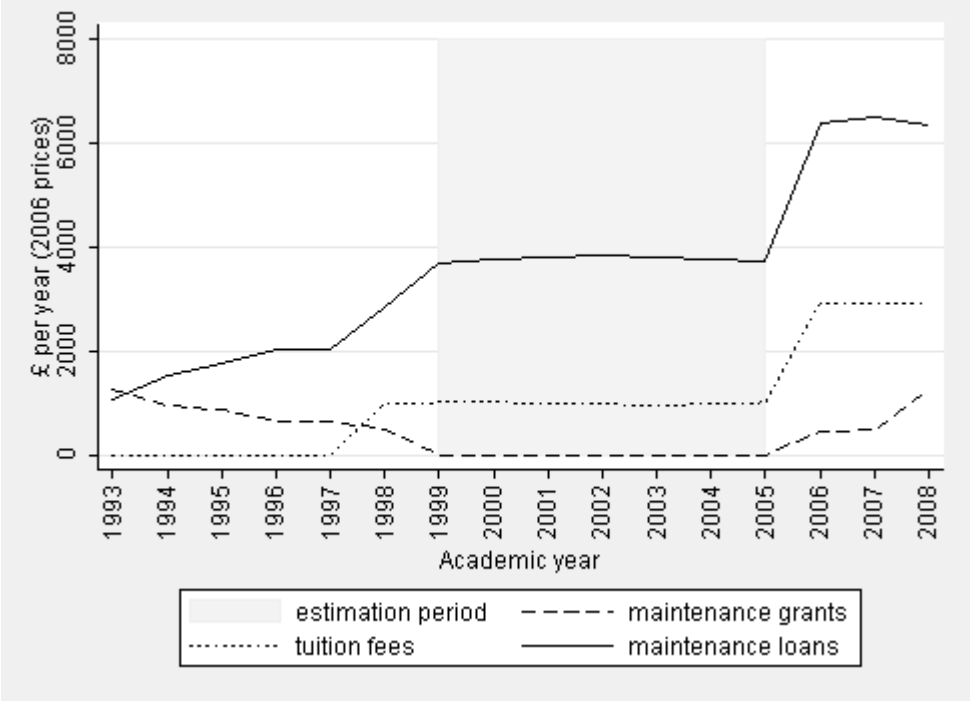


Table 1: tuition fees and support for undergraduate degree students (£)

Academic	Parental income <£22,500 'treatment group'			Parental income >=£22,500 ' control group'		
Year	loan[a]	grant	fee	loan[a]	grant	fee
1993	1072	3018	0	1072	1252	0
1994	1518	2682	0	1518	966	0
1995	1773	2402	0	1773	854	0
1996	2040	2109	0	2040	659	0
1997	2022	2094	0	2022	636	0
1998	3227	956	0	2838	493	982
1999	4217	0	0	3670	0	1010
2000	4284	0	0	3766	0	1019
2001	4311	0	0	3812	0	969
2002	4335	0	0	3829	0	977
2003	4320	0	0	3814	0	947
2004	4300	963	0	3757	0	985
2005	4321	958	0	3738	0	1010
2006	6019	2661	2889	6394	442	2904
2007	6056	2670	2908	6488	481	2933
2008	6033	2693	2897	6359	1245	2910

Notes

[a] Includes £3,000 fee loan (introduced in 2006/07). Maintenance loan amounts depend on whether the student is attending a London or non-London higher education institution, and whether (s)he is living at home or away from home; the figures in this table refer to non-home, outside London.

[b] Shaded areas refer to estimation period

4. Data

The objective of the paper is to estimate the effect of maintenance grants on the individual decision to enrol in an undergraduate degree programme at a higher education institution. In the UK, grants (like other means-tested elements of HE finance) are solely determined by parental income and the year of entry to HE.

Our sample of interest comprises individuals who are *eligible for the first year* of HE regardless of prior educational attainment, or in other words, individuals who are of the appropriate 'academic age' (used hereon) for the first year of HE. This is determined in the UK by date of birth.[19]

[19] English schooling laws are such that youths become eligible for HE if they are aged 18 before August 31st of that academic year. This means that young people can be aged either 18 or 19 when they first become eligible for HE.

Choosing the sample in this way allows us to observe the exact HE finance policy they are eligible for, which is the one corresponding to the year that they turn academic age 18 - policy changes occurring during the duration of their course do not affect them. This advances on studies such as Blanden and Machin (2004) where individuals are selected on the basis of age (e.g. 19 year olds) rather than precise date of birth, thus precluding accurate knowledge of the specific HE policies they are subject to. Our paper is the first empirical study to focus on the effect of HE finance policies on entry to higher education rather than on the decision of students to continue at HE in any particular year.[20]

We use data from the UK Labour Force Survey (LFS) over the period 1993 through 2006. This follows approximately 60,000 households every quarter, with households interviewed for five consecutive quarters (i.e. waves 1–5, so wave 1 and wave 5 are one year apart) and then removed from the panel and replaced with a new household. This design means that it contains information on individuals living at home in the year before they are eligible for higher education, as well as their higher education enrolment decision a year later. Moreover, it records individuals' date of birth and parental income, and has adequate sample sizes to allow for robust estimation. This is the only UK data source to combine all of these pieces of information, which are necessary for this analysis.[21]

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[20] This is because we are unable to ascertain which HE policy individuals who have *already* left school are subject to: for those in university, we do not observe the year in which they began studying and hence the relevant HE finance policy in place at that time; for those not in education, it is more difficult to observe parental income, as they are less likely to be living at home in the previous period and thus we are less likely to observe their parents.

[21] Neither the British Household Panel Survey (BHPS) nor the Family Resources Survey (FRS) fulfil these criteria. The BHPS has inadequate sample sizes, while the FRS does not collect information on those attending university but living outside the home (except for those in halls of residence).

For every individual, we can then use date of birth to match on the HE finance policy they are subject to. To calculate exact eligibility for grants and fees, we combine information on their parental income with the HE policies in place in that particular year of eligibility, as described next. We use the level of parental income in the year before the individual is eligible to attend a higher education institution, to calculate an individual's fee liability and grant and loan eligibility, using the relevant means-testing formulae, which, as described, are based purely on parental income and the HE policy in place at that time.[22] The fact that we observe households exactly one year apart (waves 1 and 5) in the LFS, means that for individuals of academic age in wave 5 (whether studying, working or other), we should - in principle - observe parental income a year before in wave 1. This is the case for 8,024 individuals in our sample. However, for a substantial proportion of the sample of those of academic age in wave 5 (whether studying, working or other), wave 1 parental income is not reported[23]. We use instead current (wave 5) parental income, adjusted for inflation.[24] This comprises 15,403 individuals, resulting in a final sample of 23,427 individuals.[25]

[22] We observe parental earnings, as opposed to parental income, in the LFS. We therefore use earnings as a proxy for income.

[23] For years up to 1996, the Labour Force Survey only asked individuals to report their earnings in wave 5. After 1996 individuals were asked in both waves 1 and 5.

[24] We test the robustness of this approach by imputing lagged income in this way, for those whose income we observe in both waves, and measuring the correlation between the imputed and real measures. We find the imputed and real incomes for wave 1 to be highly correlated, at around 0.72, which is reassuring.

[25] There is also a group of individuals who either live away from home and therefore whose parental income is unobservable (4,296), or who live at home but for whom current (wave 5) parental income is missing (3,936 individuals). Since we are unable to estimate parental income and maintenance grant, fee or loan eligibility for this group, we drop them.

Table 2 shows summary statistics and sample means for all of the variables used in the analysis. The main outcome variable is 'attending first year of HE, undergraduate degrees only'. The average participation rate across the sample is 17.6% of individuals of academic age, though this varies considerably by parental income, and therefore for our treatment and control groups, as we will see. Other variables of interest in the Table include gender, ethnicity (a binary variable taking the value 1 if the individual is white and 0 otherwise), a dummy variable for youth's age when they first became eligible for higher education (taking the value 1 if the youth became eligible for higher education within six months of turning 18 ('younger'), and 0 if they became eligible for higher education when older than this[26]), prior educational attainment (measured as having 5 or more good GCSEs, less than 5 GCSEs), education level of each parent (measured in four categories of attainment using the National Qualification Framework of both educational and vocational qualifications) and main UK region. Note that region represents the region of home domicile of the individual.[27]

[26] As described in footnote 2, youths become eligible for school if they are aged 18 before August 31st of that academic year. This means those born in summer months enter school, and therefore university, at a younger age than those born from September 1st onwards. This variable can be calculated where we have information on the date of birth of the student (only available in our sample between 1993-2005).

[27] So students and non-students living in a region away from home have their home domicile as their region, rather than the region of the institution they are attending / place they are working. Note, in this respect, that HE finance is dependent on country of *domicile* rather than on country of institution.

Table 2: Summary Statistics (Labour Force Survey 1993 – 2008)[a]

	mean (sd)
HE degree participant	0.18 (0.38)
parental income:	
< £22,500 'treatment group'	0.61 (0.49)
>= £22,500 'control group'	0.39 (0.49)
gender	
male	0.54 (0.50)
female	0.46 (0.50)
ethnicity:	
white	0.85 (0.36)
nonwhite	0.08 (0.28)
missing	0.06 (0.23)
age first eligible for HE:	
younger	0.41 (0.49)
older	0.38 (0.49)
missing	0.21 (0.40)
prior attainment:	
less than 5 GCSEs	0.18 (0.38)
more than 5 GCSEs[b]	0.56 (0.50)
missing	0.26 (0.44)
parental education:	
father: has no qualifications	0.13 (0.33)
NVQ level 4 or above	0.19 (0.39)
NVQ level 3	0.10 (0.30)
NVQ level 2	0.20 (0.40)
NVQ level 1	0.14 (0.34)
missing	0.25 (0.43)
mother: has no qualifications	0.23 (0.42)
NVQ level 4 or above	0.20 (0.40)
NVQ level 3	0.08 (0.27)
NVQ level 2	0.21 (0.41)
NVQ level 1	0.22 (0.41)
missing	0.06 (0.23)
UK region:	
England	0.89 (0.32)
Northern Ireland	0.06 (0.23)
Wales	0.06 (0.23)
N	23,427

Notes:

[a] Sample shown is all those eligible for first year of higher education.

[b] This is the expected level of attainment by the end of compulsory education in the UK.

5. Methodology

As discussed in section 3, the policy variation exploited to estimate the effect of maintenance grants on degree participation is the phasing in of maintenance grants from 2004/05. Crucially, for a period before (1999-2003) and after (2004-2005) their re-introduction, no other changes to HE finance were made: students eligible for upfront tuition fees (medium and high income backgrounds) remained so, and these fees were unchanged over 1999-2005 (see Figures 2-3); furthermore all students remained eligible for maintenance loans, which stayed stable. The grants were set at a maximum of £1,050 for students with joint parental income ≤ £15,000 and tapered to zero for students whose parental income was ≥ £22,500. This maintenance grant stayed in place in both 2004/05 and 2005/06, after which time it increased substantially, alongside other significant changes in HE finance, most notably fee increases.

To estimate the effect of grants on degree participation, we use a difference-in-difference framework, comparing changes over time in degree participation amongst those affected by the above policy change with changes over time in participation of those unaffected by it. The treatment group is thus individuals of academic age whose parents earn less than £22,500 per annum and the control group is those whose parents earn more than £22,500 per annum. Later on we provide evidence of common trends in degree participation across the two groups; we also provide robustness exercises in a later section.

An important aspect of the grant phase-in concerns the timing of the policy announcement, which was in early 2004[28], just 7 days before the deadline for HE applications for the 2004/05 academic year.[29] With such short period of time between the announcement and the application deadline, individuals applying for 2004/05 would in all likelihood not have had time to react to the

[28] To be precise, the announcement was made on January 8th 2004 in the first reading of the Higher Education Bill

[29] See http://www.ucas.com/students/importantdates - the deadline for the majority of applications is January 15th

announcement of the forthcoming grant increase. However, those of academic age for the 2005/06 academic year would have been aware of the policy change for a year, making it more likely to see the grant increase affecting this group. For this reason, in our empirical work we separate out the effects in both years.

We also note that 2005 is the year before the major 2006 reforms were enacted, and thus a concern over anticipation effects may arise. We come back to this issue in Section 5.2 where we provide several pieces of evidence suggesting that this is unlikely to be the case.

5.1 Common trends

The first issue we address concerns the appropriateness of our control group. As is well-known, the key assumption for identification using difference-in-differences is that trends in degree participation over time are similar for treatment and control groups in the period preceding the reforms (pre-2004). Whilst this assumption cannot be tested, it is useful to compare trends in degree participation between treatment and control groups pre-2004. Whilst Figure 4 shows that the trends do indeed look similar, we assess the validity of the "common trends" assumption by testing whether the trend in the treatment group is statistically different from the trend in the control group. We estimate the yearly difference between the treatment and control groups for each year leading up to the policy change in 2004 – as shown in Table 3. We also include a treatment dummy (to pick up the average difference between treatment and control groups) and year dummies (2003 omitted), as well as a full set of control variables (as described in Section 4). None of the treatment effect-by year dummies are statistically significant (or jointly significant), suggesting the treatment and control groups exhibit common trends in the years leading up to the policy change and giving us no reason to believe that they would not have been the same post-2004 in the absence of the reform to grants.

Figure 4: Degree participation pre-treatment period

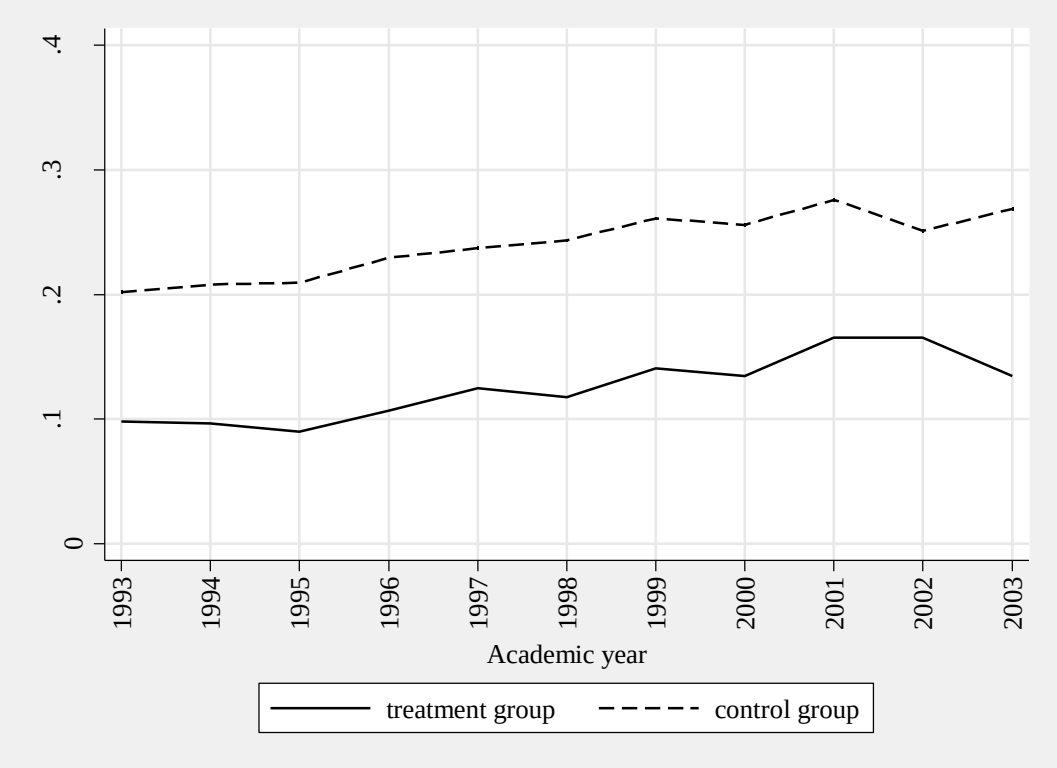


Table 3: Probability of first-year degree participation at age 18–19

VARIABLES	(1)
Treatment	-0.03
	(0.02)
Year=1999	0.00
	(0.02)
Year=2000	-0.01
	(0.02)
Year=2001	0.01
	(0.02)
Year=2002	-0.01
	(0.02)
Treatment x 1999	-0.01
	(0.03)
Treatment x 2000	0.01
	(0.03)
Treatment x 2001	0.01
	(0.02)
Treatment x 2002	0.03
	(0.02)
Constant	-0.03
	(0.02)
Observations	7,888
R-squared	0.02
Controls	Y

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

5.2 Anticipation effects and Deferral Rules

In using post-policy data from a year preceding another set of policy reforms, the concern arises regarding anticipation effects of the new reforms. The particular concern is that students who were eligible for higher education in 2005/06 and who would - in the absence of any reforms - have taken a gap year and postponed entering their degree programme to 2006/07 (or later) may have chosen to enrol in their degree programme in 2005/06 in order to avoid the fee. If such students are disproportionately found in the treatment group, our estimate may be biased upwards.

However, it is important to stress that at that time individuals could enrol in a degree programme in the year before the fee increase (2005/06), and then defer for at least a year *whilst retaining the fees applicable on enrolment*. As outlined in Clark (2010), the ability to defer entry and at the same time avoid a tuition fee increase has since been abolished, but was in place in 2005 "The plan [for the 2012/13 academic year] contrasts with the arrangements made the last time fees increased significantly – in 2006 – when they rose from £1,200-a-year to £3,000-a-year. Then, students applying in 2005 for deferred entry in 2006 were allowed to pay at the lower rate amid fears of a mass scramble for places".

Therefore any student who intended to take a gap year could still do so and avoid the higher fee, meaning there should be no financial gain to be had from going into HE in 2005/06 compared to 2006/07. In fact, 7.5% of accepted applicants chose to defer entry in 2004 – and there was no discernible break in trend of deferral rates in the years around our estimation period – suggesting students did not behave differently because of the forthcoming fee.[30] However, it is important to test for the presence of anticipation effect, to allow for the possibility that students were not aware of such deferral rules. This seems unlikely, as we next discuss.

[30] See http://www.ucas.com/about_us/stat_services/stats_online/data_tables/deferring

We use the previous large change to HE policy (in 1998) to assess whether there is evidence of an anticipation effect amongst those eligible for the policy. In particular, we compare trends in first-year degree participation in the years leading up to that policy announcement, where tuition fees were introduced for students with parental incomes greater than £17,000 per year (a significant proportion of our treatment group) alongside a large decrease in grants. We might expect to see an anticipation effect in 1997 if students from poorer backgrounds were unaware of deferral rules. Reassuringly on this, Figure 4 provided little evidence of an anticipation effect amongst this group in 1997. However we test this more formally in Table 4. We estimate a regression of degree participation on interactions of the treatment and control groups with time trends, and interactions of the treatment and control groups with year=1997, a dummy which captures whether there was a particular increase in degree participation in 1997 for either the treatment and control groups relative to the underlying trend (we also control for the difference in levels between the treatment and control groups, and we also include a full set of control variables). We do not find either of the interactions between the treatment/control groups and the 1997 dummy to be significantly different from zero, suggesting that in that in advance of the 1998 reform, there was no anticipation effect for either treatment or control groups.

Table 4: Effect of maintenance grants on probability of degree participation, testing for an anticipation effect in 1997

VARIABLES	(1)
treatment	-0.040***
	(0.011)
time*treatment	0.005***
	(0.001)
time*control	0.002**
	(0.001)
year1997*treatment	0.017
	(0.011)
year1997*control	-0.001
	(0.015)
Constant	0.081***
	(0.015)
Observations	23,427
R-squared	0.17
Controls	Y

Notes:
'time' is a simple time trend or binary variable which equals 1 when academic year is 1993, 2 when academic year is 1994 and so on.
Standard errors in parenthesis
*** p<0.01, ** p<0.05, * p<0.1

6. Results

In this section we present our estimates of the effect of student aid on degree participation. Figure 5 illustrates HE participation over time, separately for the treatment and control groups, over the entire time period for which we have data – 1993 – 2008. As it happens, the treatment (control) group broadly corresponds to those with parental income backgrounds below (above) UK median income[31], it, making our analysis all the more informative from a policy perspective. As Figure 5 shows, degree participation is strongly positively correlated with parental income, which

[31] Estimates for weekly median income in 2010/11 are approximately £419 per week, which equates to around £20,000 per year in 2006 prices (IFS, 2012) .

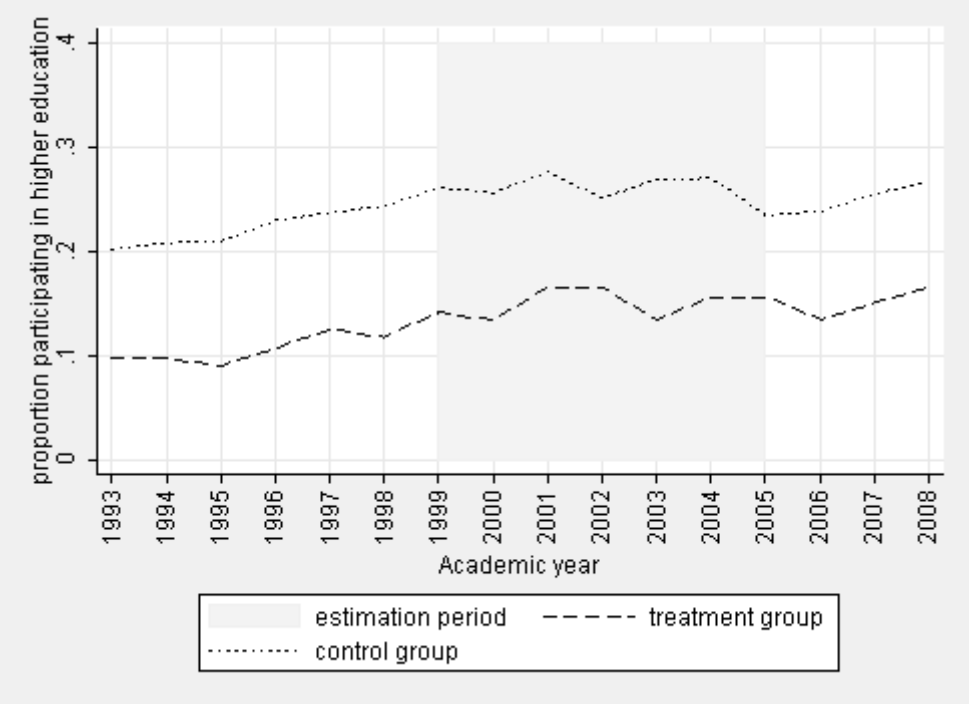
exclusively determines whether an individual is treatment or control. On average over the entire period of 1993-2008[32], inequality was high - 13.5% of individuals from the treatment group participated in HE, compared with 24.8% of individuals from the control group, and it is also clear that the gap in HE participation between groups has remained wide throughout this period.

Despite the inequality in HE participation, however, the trends in participation over time appear, at least visually, similar for the two groups. This is crucially important for our identification strategy. Indeed, degree participation has followed a fairly smooth upward trajectory over the entire period despite the many reforms that have taken place over this time. Between the period 1993-1997, while there were no tuition fees in place, and grants were being run down and replaced with maintenance loans (primarily affecting poorer students in our treatment group), degree participation increased steadily for both groups of students.[33] During the period 1999-2003, where tuition fees were introduced (affecting students in the control group) and grants were abolished (affecting students in the treatment group), degree participation was rather more static for both groups, perhaps suggesting the increase in costs through the loss of grants and increase in fees was damaging to participation growth. In the period between 2004-2005, the gap in degree participation between the treatment and control groups decreased. Interestingly, after the switch to deferred fees in 2006, degree participation among both groups increases.

[32] We choose this period since this is the entire sample of LFS data available at the time of analysis. While we do not go beyond 1995-2005 in our estimation, we use the entire sample for various robustness checks including analysis of pre-trends, and to put the estimation period into context.

[33] It should be noted that the increase in maintenance loans compensated for the reduction in grants during this period.

Figure 5: Degree participation over time , treatment and control groups



Notes
[a] Shaded areas refer to estimation period

Difference-in-difference analysis

Table 5 focuses on our period of interest, illustrating HE participation by treatment and control groups before and after the 2004 grant increase. Note that, since we are concerned that students may not have had sufficient opportunity to respond to the early increase in grants in the academic year 2004/05, we show results for 2004/05 and 2005/06 separately.

As Table 5 shows, during the four year period between 1999 and 2003 - during which there were no maintenance grants - the gap in HE participation between the treatment and control groups was fairly wide at 11.4 percentage points (column (1)).

Table 5: Degree participation (probability at age 18/19)

proportion participating in HE

	1999-2003	2004	2005	change (2004)[a]	change (2005)
<£22.5k (treatment)	0.149	0.155	0.156	0.007 (0.013)	0.007 (0.012)
>=£22.5k (control)	0.263	0.270	0.235	0.007 (0.018)	-0.028 (0.018)
(treatment-control)	-0.114	-0.115	-0.079		
	(0.008)***	(0.02)***	(0.019)***		
difference-in-difference (2004)				-0.001 (0.022)	
difference-in-difference (2005)					0.036 (0.021)*

Notes

[a] grants introduced near HE application deadline in 2004

[b] figures in brackets represent standard errors

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Looking at 2004, the first year of the maintenance grant introduction, we see no difference in HE participation amongst individuals in the treatment group compared to those in the control group (column (2)). However, it must be remembered that the increase in grants was announced just before the HE application deadline corresponding to 2004/05 (see Section 5.2), meaning that HE applicants had very little time to react to it in their decision-making (or indeed they may not have been aware of it). In 2005, however, we find that individuals in the treatment group are 3.6 percentage points more likely to be participating in HE compared to individuals in the control group. As the only change to HE finance during this period relates to the increase in grants, which affected the treatment but not the control group, we attribute this differential to the increase in grants; though we will probe this finding further in the analysis that follows.

Whilst Table 5 shows the 'raw' difference-in-difference estimates, we next estimate it in the following regression framework:

$$y_i = \alpha + \beta(treat * 2004_i) + \gamma(treat * 2005_i) + \delta treat_i + \theta 2004_i + \mu 2005_i + \mathrm{X}_i + \upsilon_i \quad (1)$$

where the dependent variable y_i is a binary variable which takes the value of 1 if the youth is enrolled in the first year of a HE degree and 0 otherwise. 2004_i is a variable equal to 1 if the youth first becomes eligible for HE for 2004/05 academic year and 2005_i is equal to 1 if the youth is first

eligible for HE for the 2005/06 academic year. $Treat_i$ is a variable set to 1 if the youth's parental income is less than £22,500 per year, and 0 if the youths' parental income is equal to or above £22,500 per year. We also control for the set of characteristics described in Table 2, as represented by X_i. We estimate equation (1) over the period 1999-2005. Note that since we do not observe take-up of maintenance grants among the treatment group, but just a proxy for eligibility, the parameters we estimate are 'intention to treat' ones. The effect of maintenance grants on first year HE participation is given by the coefficients β and γ which capture the impacts separately in 2004/05 and 2005/06 respectively (due to the fact that we expect the policy to have had more bite in the latter period, due to the late timing of its announcement relative to the 2004/05 application deadline).

Estimates where we do not control for any background characteristics are given in column 1 of Table 6, and are equivalent to Table 5, where we find no significant impact of the introduction of grants on HE participation in the 2004/05 academic year, and an effect of 3.6 percentage points in 2005/06, statistically significant at the 10% level. In column 2 we add our full set of control variables, to help increase precision. The point estimate for 2005 remains very similar, increasing slightly to 3.8 percentage points, though more precisely estimated and now statistically significant at the 5 % level.

Table 6: Effect of maintenance grants on degree participation at age 18/19

INDEPENDENT VARIABLES	(1)	(2)
Treatment x 2004	-0.001	-0.011
	(0.022)	(0.020)
Treatment x 2005	0.036*	0.038**
	(0.021)	(0.019)
Year = 2004	0.007	0.006
	(0.017)	(0.015)
Year = 2005	-0.028*	-0.025
	(0.016)	(0.016)
Treatment	-0.114***	-0.018**
	(0.009)	(0.009)
male		-0.034***
		(0.011)
white		-0.105***
		(0.007)
younger		-0.031***
		(0.018)
has >= 5 GCSEs		0.251***
		(0.017)
father education: NVQ L4[a]		0.133***
		(0.014)
father education: NVQ L3		0.045***
		(0.015)
father education: NVQ L2		0.014
		(0.013)
father education: NVQ L1		0.008
		(0.012)
mother education: NVQ L4[a]		0.109***
		(0.012)
mother education: NVQ L3		0.070***
		(0.015)
mother education: NVQ L2		0.028**
		(0.011)
mother education: NVQ L1		0.015
		(0.017)
Northern Ireland[b]		0.032**
		(0.016)
Wales		0.016
		(0.015)
Constant	0.263***	0.111***
Observations	11,286	11,286
R-squared		

Notes:
a Omitted category is mother/father has no educational qualifications
b Omitted region is England.
Sample includes individuals eligible for first year of higher education for all of UK except Scotland
Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

As the average increase in grants over the period was approximately £960 in real terms, this means that a £1,000 increase in grants equates to a 3.95 percentage point increase in HE participation. This estimate is in line with findings from other studies, bearing in mind exchange rates – Dynarski (2000, 2003) finds that a $1,000 increase in aid results in a 3.6-4 percentage point increase in participation for students in the US, and Nielsen et al (2010) find that a $1,000 increase in grants results in a 1.35 percentage point increase in HE participation for students in Denmark.[34]

7. Robustness

The results so far show that the group of students who were eligible for a new maintenance grant in 2004/05 increased their HE participation after the reform at a faster rate than those ineligible for the reform, against a background of pre-reform trends amongst the two groups being very similar. In this section we probe this finding further in four different robustness tests. The first concerns our choice of control group; the second concerns the definition of our treatment group; the third carries out a placebo test; and the fourth implements an instrumental variables estimation strategy.

Although we mitigated concerns around our choice of control group by showing they exhibit similar pre-reform trends to the treatment group, in Table 7 we explore the impact of the maintenance grant using an alternative control group, which is closer in terms of parental income to the treatment group: those with parental incomes between £22,500 and £50,000.[35] We find that the narrower control group yields very similar estimates to our main specification, and yields a treatment effect of 4 percentage points, which is very close to our original estimate and is significant at the 10% level.

[34] At the time of writing, $1,000 was roughly £630.

[35] The proportion of our sample over the estimation period 1999-2005 with parental incomes falling beyond £50,000 per year is 12%. Thus the majority of our sample has incomes below £50,000 per year.

Table 7: Effect of maintenance grants on degree participation, narrower control group

INDEPENDENT VARIABLES	(1)	(2)
Treatment x 2004	-0.000	-0.009
	(0.023)	(0.021)
Treatment x 2005	0.041*	0.040*
	(0.023)	(0.021)
Year = 2004	0.007	0.004
	(0.019)	(0.017)
Year = 2005	-0.034*	-0.031*
	(0.018)	(0.018)
Treatment	-0.071***	-0.008
	(0.009)	(0.009)
Constant	0.220***	0.109***
	(0.008)	(0.019)
Observations	10,082	10,082
R-squared	0.007	0.163
Controls[a]	N	Y

Notes
a: specification includes set of controls comprising gender, ethnicity, mothers' education, fathers' education, prior GCSE attainment, age eligible for higher education, UK region
Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

Second, we vary slightly the treatment group, by including in it just those eligible for the full grant of £1,050 per year, and thus excluding individuals eligible for a partial grant (between £50-£1,049). As the latter represent just about 10% of those eligible for a grant, the results are not impacted substantially, as shown in Table 8.

Table 8: Effect of maintenance grants on degree participation, different control group

INDEPENDENT VARIABLES	(1)
Treatment x 2004	-0.023
	(0.021)
Treatment x 2005	0.036*
	(0.020)
Year = 2004	0.006
	(0.015)
Year = 2005	-0.025
	(0.016)
Treatment	-0.020**
	(0.009)
Constant	0.115***
	(0.019)
Observations	10,973
R-squared	0.175
Controls[a]	Y

Notes
a: specification includes set of controls comprising gender, ethnicity, mothers' education, fathers' education, prior GCSE attainment, age eligible for higher education, UK region
Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

Next, we carry out a placebo test whereby we create a placebo treatment, in this case taking the effect over 2002-2003 (with the pre-treatment years specified as 1999-2001), with the treatment and control groups as originally specified in equation (1) (and the regression estimated over the years 1999-2003). We find no significant effect of this placebo reform (either with or without covariates), which is reassuring (see Table 9) and indeed expected given the evidence we showed regarding common trends.

Table 9: Effect of maintenance grants on degree participation, placebo test

INDEPENDENT VARIABLES	(1)	(2)
Treatment x year=2002 or 2003	0.008	0.01
	(0.018)	(0.02)
Year = 2002 or 2003	-0.005	-0.01
	(0.014)	(0.01)
Treatment	-0.118***	-0.02**
	(0.012)	(0.01)
Constant	0.265***	0.14***
	(0.009)	(0.02)
Observations	7,888	7,888
R-squared	0.020	0.18
Controls[a]	N	Y

Notes
a: specification includes set of controls comprising gender, ethnicity, mothers' education, fathers' education, prior GCSE attainment, age eligible for higher education, UK region
Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

Finally, we assess robustness of findings to an alternative estimation strategy, instrumental variables. Given endogeneity concerns with the level of the grant an individual is entitled to - as it is a non-linear function of parental income - we use instrumental variables to estimate its causal effect, thus providing additional validation. A further rationale for using IV is that this estimation strategy does not suffer from issues around anticipation effects (though as discussed in section 5 these are unlikely to be an issue).

We use as an instrument the average level of the grant by government office region (16 in total) and parental education level (4 categories) in 1999, chosen as our base year.[36] More specifically, we construct the instrument as follows:

1. Create average levels of income for every region/parental education level combination, as of 1999.

[36] Where parents have different education levels, we take the higher of the two.

2. Assign all individuals in that region/parental education grouping, regardless of year, the 1999 value of parental income, inflated to the appropriate year (so for instance, for 2004, the 1999 income value is inflated to 2004).
3. Construct the instrument - individuals' grant entitlement - based on that value of income and on the HE policies in place in each specific year.

Note our reason for choosing a base year, rather than taking year-specific averages, is that year-specific averages may capture underlying trends in degree participation over time, and would thus not satisfy the exclusion restriction.

The first stage estimates in Table 10 show that the instrument has strong predictive power and is highly correlated with the actual grant an individual is entitled to. Table 11 shows the estimates from the second stage specification. The IV estimate suggests that a £1,000 increase in grants results in a 3.9 percentage point increase in degree participation. This point estimate is highly similar to the estimate obtained from the difference-in-difference model, though it is not statistically significant at conventional levels and is less precisely estimated – though the similarity to the earlier finding using difference-in-differences is highly encouraging.

Table 10: first stage regression, dependent variable maintenance grant eligibility

INDEPENDENT VARIABLES	(1)
average grant[a]	0.442***
	(0.025)
male	-0.006
	(0.004)
non-white	-0.011
	(0.009)
younger	-0.008*
	(0.004)
has >= 5 GCSEs	0.009
	(0.007)
father education: NVQ L4[b]	0.052***
	(0.012)
father education: NVQ L3	0.016
	(0.014)
father education: NVQ L2	0.003
	(0.011)
father education: NVQ L1	-0.000
	(0.010)
mother education: NVQ L4[b]	0.055***
	(0.011)
mother education: NVQ L3	0.050***
	(0.016)
mother education: NVQ L2	0.023**
	(0.010)
mother education: NVQ L1	0.029***
	(0.011)
log parental income $_t$	-0.111***
	(0.011)
Constant	2.337***
	(0.125)
Observations	10,804
R-sq	0.591
F-stat	76.79
Regional dummies	Y

Notes:
a mean value by parental ed*region, based on parental income in year 1999
b Omitted category is mother/father has no educational qualifications
c Standard errors clustered at group level
d 1 group contained no information so was dropped (region NI, parental education level missing, parental income level missing in 1999)
Sample includes individuals eligible for first year of higher education for all of UK except Scotland
Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Table 11: Effect of maintenance grants on degree participation

INDEPENDENT VARIABLES	(1)
grant-eligible[a]	0.039
	(0.027)
male	-0.034***
	(0.007)
non-white	-0.101***
	(0.014)
younger	-0.030***
	(0.008)
has >= 5 GCSEs	0.250***
	(0.007)
father education: NVQ L4[b]	0.128***
	(0.015)
father education: NVQ L3	0.042***
	(0.013)
father education: NVQ L2	0.011
	(0.011)
father education: NVQ L1	0.005
	(0.011)
mother education: NVQ L4[b]	0.105***
	(0.013)
mother education: NVQ L3	0.069***
	(0.015)
mother education: NVQ L2	0.027***
	(0.010)
mother education: NVQ L1	0.014
	(0.009)
log parental income $_t$	0.023***
	(0.006)
Constant	-0.290**
	(0.131)
Observations	10,804
R-squared	0.176
Regional dummies	Y

Notes:
a mean value by parental ed*region, based on parental income in year 1999
b Omitted category is mother/father has no educational qualifications
c Standard errors clustered at group level
d 1 group contained no information so was dropped (region NI, parental education level missing, parental income level missing in 1999)
Sample includes individuals eligible for first year of higher education for all of UK except Scotland
Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

8. Conclusion

Understanding how policy can affect higher education participation is important for understanding how governments can promote human capital accumulation. This paper exploits one element of the 2006 reforms to HE finance, in which maintenance grants for poorer students were phased in two years ahead of any other changes, in 2004, to estimate the effect of student aid on degree participation.

The policy change occurred in isolation of any others and did not affect relatively better off students, who we use as a control group to identify the effects within a difference-in-difference framework. We find evidence that maintenance grants positively affect degree participation, with a £1,000 increase per year resulting in an increase in participation of around 3.95 percentage points. These estimates are in line with those in the US in a number of studies, such as Dynarski (2003), Hemelt and Marcotte (2008), and Neilsen et al (2010) for Denmark.

Whilst much of the media attention relating to higher education finance is concentrated on increases in tuition fees, our results underlie the importance of the holistic package of higher education finance and in particular the importance of government commitment to non-repayable forms of upfront support such as maintenance grants for undergraduate degree participation.

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