

University Dropouts: An Evaluation of the Effects of a Tuition Fee Reform in the UK*

Steve Bradley[†]
Giuseppe Migali[‡]

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Abstract

This paper attempts to demonstrate that the 2006 UK HE reform which has increased student debt, by raising fees and introducing income contingent tuition fee loans, has also generated higher ‘reluctance to borrow’ leading to higher rates of university dropout. We estimate the causal effect of the reform on drop out using multiple cohorts of administrative data for students who enrolled in the period 2003-2009. Our treatment group are English, Welsh and Northern Irish students and our comparison group, who were unaffected by the reform, are international students. We estimate difference-in-differences models with propensity score covariate adjustment. Our findings suggest that the policy reform raised the probability of dropping out by around 1 percentage point, an effect which varies by gender, year of study and type of university attended. We also show that the effect of the reform was not just a one off but persisted for up to 2 years. Finally, we demonstrate a continuum of student responses to the reform - students who switch their degree scheme and particularly those who pause their studies are much more likely to drop out following the reform. Our evidence raises some important issues regarding the 2011 tuition fee reforms.

JEL Classification: I20, I22, I28

Keywords: Tuition fee reform, Student loans, Dropout, Stopout, Difference-in-Differences.

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[†]s.bradley@lancaster.ac.uk, Department of Economics, Lancaster University Management School, Lancaster University.

[‡]corresponding author: g.migali@lancaster.ac.uk, Department of Economics, Lancaster University Management School, Bailrigg Lancaster LA1 4YX, UK. Dipartimento S.G.S.E.S., Universita’ Magna Graecia, Catanzaro, Italy.

1 Introduction

Dropping out of education can be costly for individuals, especially if there is an increased risk of unemployment and associated lower lifetime earnings (Arulampalam et al., 2005), for universities insofar as income is reduced, and for society as a whole, especially when the state subsidy to education is high. Furthermore, countries like the US and the UK have witnessed substantial increases in participation rates in higher education, and dropout rates have remained high as more marginal (in terms of ability) students have enrolled on university courses. With the increase in participation rates, and associated increased taxation to finance this expansion, it is no surprise that governments should look for alternative funding mechanisms. In recent years, successive UK governments have sought to reduce the subsidy to higher education and have sought to push more of these costs onto the beneficiaries of their education - the students.

A tuition fee was first introduced for students enrolling at universities in the UK in 1998/99 when they were required to pay approximately £1,000 per annum. The Higher Education Reform Act, approved in 2004, which was effective from the academic year 2006/07, raised the cap on fees to £3,000 per annum. From 2006 students could defer the payment of fees by taking a Tuition Fee Income Contingent Loan (TICL) up to the maximum amount of fees being charged. Repayments of the loan was linked to income obtained after graduation, at a 9 per cent fixed rate for everything earned above £15,000 and at a zero real interest rate. Hence, graduate students only repaid when they could afford it.¹ A further fee increase was introduced in 2012/13, which raised the fees to £6,000-£9,000.²

Students did receive support through both loans and grants. From 1999 support for living costs was entirely through Income Contingent Maintenance Loans (MICL), a quarter of which was means tested. Students did also receive tuition fee grants, which were available on a means tested basis. In 2004/05, to help cover the cost of participating in higher education, the government introduced the Higher Education grant, and this was fully means tested and non-repayable. However, this grant was replaced from 2006/07 by the maintenance grant, which was also an income-assessed support.

Table A.1 shows the evolution of fees and student support from 2003 to 2009. We note that the introduction of the tuition fee loans in 2006 drastically decreased the number of tuition fee grants.³ In general, after 2006 although students could choose to pay fees upfront, the majority took out a tuition fee ICL and the total amount of debt (MICL + TICL) has therefore been increasing.

In this paper we argue that a larger student debt has generated higher “reluctance to borrow” and this may have led to higher dropout rates. Students may be more reluctant to borrow because they fear potential credit constraints after graduation or they are ‘debt

¹Before 1998/99 loans were repaid on mortgage style basis. Furthermore, from 2012/13 the government has added a tapered rate of interest which would rise to 3% depending on earnings, and the earnings threshold at which the loans start to be repaid has been increased from £15,000 to £21,000. The debt, however, will be written off after 30 years.

²It was hoped that the increase in 2012 would lead to a range of fees charged by universities, however, almost all universities chose to charge the highest fee.

³Tuition fee ICL were also available to pre-2006/07 entrants if they make a full or partial contribution to their fixed fees, but we observe in Table A.1 that the number of these loans are now negligible.

averse'. Furthermore, the recent literature has shown that student debt and reluctance to borrow have effects on both academic and career decisions (Stinebrickner and Stinebrickner, 2008; Field, 2009; Rothstein and Rouse, 2011; Johnson, 2013).

The UK reform has potentially increased debt aversion amongst students and the income contingent structure of the loans has amplified the uncertainty over the costs and repayment period. The costs of dropping out have therefore shifted at least partly from the State to the individual student. It is therefore of policy interest to explore how these reforms have affected the dropout behaviour amongst undergraduates. We focus on the impact of the 2006 fee increase and the introduction of the tuition fee ICL scheme. Our data do not enable us to disentangle these two parts of the reform.

As suggested above, the 2006 reform represented a three-fold increase in tuition fees and was targeted at students whose nationality was English, Welsh or Northern Irish. Fees at Scottish universities were unchanged, however, English, Welsh and Northern Irish students studying in Scotland were liable for the fee increase. Similarly Scottish students choosing to study in English universities, for instance, were subjected to the fee increase as were students from the European Union (EU). Throughout the time period Non-EU, 'international', students paid fees that were market determined and higher in level. Nevertheless, fee increase for international students over this period did not exhibit any major hikes and tended to reflect the effect of inflation (see Figure 1). These differences in the impact of the 2006 reform are important when we try to find a suitable control group.

Moreover, although our primary focus is on trying to identify the causal effect of the tuition fee increase in 2006 on the risk of dropping out of university, there are two other groups that are important both of whom have been largely ignored by the existing literature. These two groups have been referred to as 'switchers' and 'stop outs'. Stopouts are those students who interrupt their study usually for 1 academic year, for a variety of reasons, including debt, but whom subsequently re-engage with their original degree programme, or change to another programme at a different institution, to some of whom then drop out before graduating. From a policy perspective it is important to assess whether the 2006 reform increased the risk of drop out following a period of interrupted study. The switchers are students who change their degree programme, perhaps because of revised expectations of success on an initial programme of study or because of changes in career aspirations. Some of this group graduate whereas others drop out. The question is, did the 2006 reform increase the risk of drop out following a switch to a different programme? To address these issues we use administrative data for the period 2003-2010 obtained from the UK's Higher Education Statistics Agency (HESA). Ours is the first paper that we are aware of to assess the causal effect of the 2006 tuition fee increase.

Our analysis suggests that the tuition fee reform did increase the risk of dropping out of a university degree course by about 1-1.5 percentage points, depending on the definition of dropouts. We argue that this is a causal effect. The impact of the policy was quite long lasting and was not a one-off effect for the 2006 student cohort. It is also the case that much of the effect is observed in the 1st year of study, and, interestingly, we show that the risk of dropping out of a degree as a result of the policy reform is higher for students from teaching intensive universities. A second finding of our analysis is that Asian and Afro-Caribbean students have a similar risk of drop out when compared to the 'average' student. Our third major finding is that we identify a continuum of effects of the tuition fee policy reform

such that students who pause their studies ('stopouts') are far more likely to drop out than those students who do not do so; switchers fall in between. This finding suggests that simply focusing on drop out behaviour ignores important differences between sub-groups of students with respect to their attitude to debt.

In the next section of this paper we outline a theoretical framework for interpreting our results, which draws on existing work, and we describe the evidence on dropout behaviour from the existing literature. This is followed by a detailed discussion of our data and in the proceeding section we outline our econometric modelling strategy. The results of our analysis follow and we end with our conclusions and policy implications.

2 Theory and Literature

2.1 A simple theoretical framework

Models of the decision to attend university or start working and the subsequent decision to drop out of education are based on the solution to a series of optimization problems that are well known in the literature (Ben-Porath (1970); Heckman (1976) and recently Oreopoulos (2007)). Individuals maximise their expected lifetime utility by choosing their level of education, conditional on the present value of the expected lifetime wealth. Lifetime utility is regarded as a function of consumption which is affected by the individual's rate of time preference⁴, risk aversion⁵, the inter-temporal elasticity of substitution and the non-pecuniary benefits of education. Uncertainty is another important factor that may have an effect on schooling decisions. Individuals may be uncertain about their ability, the distribution of earnings in graduate and non-graduate jobs, as well as the possibility of short-term credit constraint during university attendance. Another school of thought suggests that psychological factors can also influence the participation and drop out decisions (Field, 2009), over and above the effect of rational economic decision making.

We adopt the rational economic approach and use this as a framework for thinking about the effect of the policy reform in 2006 on drop out decisions from HE in the UK. We are unable with our data to evaluate the effect of the reform on the participation decision which, as suggested above, has been the subject of earlier work (Dearden et al., 2013).

Thus, a student decides to either stay at university if her expected lifetime utility, EU_g , is higher than the expected lifetime utility of entering the labor market, EU_{ng} . Following Stinebrickner and Stinebrickner (2008) we assume that partial completion does not affect earnings and that learning after university entrance may modify only EU_g . If there is no uncertainty at the time of entry to university then a student that learns that his or her ability is lower than expected would have an EU_g which is lower by φ than was initially anticipated. Thus he or she decides to drop out of university. The presence of uncertainty at the point of entry to university may further reduce the expected lifetime utility of an enrolled student. He or she may realise that EU_g is smaller by ν (which is independent of student's ability) than was expected when he or she enrolled and thus decides to drop-out. In summary, we

⁴A higher rate implies more consideration to immediate utility than future utility.

⁵Risk averse individuals may be more concerned with the variance of their expected earnings than the expected returns to education.

can identify two scenarios, as follows:

1. No uncertainty: if $EU_g^i - \varphi_i < EU_{ng}^i$ i drops out
2. Uncertainty: if $EU_g^i - \varphi_i - \nu_i < EU_{ng}^i$ i drops out.

We know that the policy reform under investigation increased the fees and introduced tuition fee income contingent loans. A direct consequence, as described above (see Table A.1), has been a higher student debt and we think it has intensified the “reluctance to borrow”. We model this effect as an increase in the the constraint ν_i , such that ν_i^a after the reform is higher than ν_i^b before the reform. Thus if

$$EU_g^i - \varphi_i - \nu_i^a < EU_g^i - \varphi_i - \nu_i^b < EU_{ng}^i$$

the drop-out rate after the reform would increase.⁶

This implies that life-cycle model with perfect capital markets is poorly characterising the consumer behaviour. According to the standard theory, individuals smooth their consumption over the entire lifetime and students debt should produce only an income effect and no effect on academic decision during college neither on early career consumption or on employment decision. However, there is a recent literature which shows that student debt and reluctance to borrow affect both academic and job market decisions. The reluctance to borrow can be related to potential credit constraints after graduation and possible inability to borrow against future earnings. Another reason for reluctance to borrow could be ‘debt aversion’, that is a distaste to hold debt independent of other factors that can affect consumption.

Rothstein and Rouse (2011) show how students debt can affect graduates employment decisions. They evaluate, in a very selective US college, the effects of the replacement of students loans with a grant aid to students in financial need. They find that student debt reduces the probability to accept low-paying jobs (e.g. in education, government, nonprofit) and accept instead high starting salary jobs.

Field (2009) offers a clear example of how psycho-social costs of debt can affect career decisions, by looking at the effects of an experiment run at the NYU school of law. Students were randomly selected in a lottery, where winners obtained income-contingent tuition waivers to be repaid only if after graduation they decided to get high-paying (private) jobs. Losers obtained tuition loans which were repaid by NYU if after graduation they decided to work in low-paying (public) jobs. Thus the two packages of financial aid were equivalent in terms of net present value, and according to the standard economic theory students should have been indifferent to the lottery outcomes. However, Field finds that graduates that received the tuition waver were more willing to work in low-paying jobs. This can only be attributed to the different perception, and the associated psychological costs, of the debt horizon between the two financial packages.

Johnson (2013) extending the structural model of Keane and Wolpin (2001) finds that changes in the size of government loans, which relax students’ borrowing constraints, do

⁶It may be that are likely to be many other factors due to uncertainty that can affect EU_g , but we assume that they remain constant before and after the reform and we set, for simplicity, their level equal to zero.

not have important effects on degree completion rates. Johnson interprets these results as a consequence of the reluctance to borrow. The individuals, preoccupied by future labor market shocks, prefer in fact precautionary savings (Carroll, 1997).

The paper of Stinebrickner and Stinebrickner (2008) is the closest in spirit to our analysis. They study the causal effect of credit constraints on drop out decisions, exploiting an experiment where students of Berea college are questioned whether they would like to take up a loan to finance their consumption during school. They find that borrowing constraints are not the main reason of college attrition. Indeed, the majority of students are reluctant to borrow and most of those that drop out are students which admit to have financial problems.

In the context of the UK HE system the reluctance to borrow can be also generated by the uncertain repayment period of the student debt, due to the income contingent structure of the loan. The repayment period is uncertain because students are, in turn, uncertain about future labor market outcomes, for example, with respect to spells of unemployment and negative wage shocks. Therefore, the way the loan is repaid produces different individual utilities because of the randomness of the earnings (Migali, 2012). The UK reform by increasing the size of the student debt, which directly affects the repayment period, may exacerbate the reluctance to borrow leading to an increase of the drop-out rate.

The causal effect of the reform is given by the difference between the dropout rate of students constrained by the reform minus the dropout rate of the same individuals in the counterfactual situation of no constraint. However, we can only observe the first type of student and we therefore need a good proxy for the counterfactual group, who are unconstrained by the policy reform - we discuss the choice of control group below. Note, however, that the causal effect of the policy reform may suffer downward bias because we rely on non-experimental data in our analysis (Stinebrickner and Stinebrickner, 2008) .

2.2 A review of the literature on drop out behaviour

There are very few studies of the decision to drop out of higher education and almost none that investigate stop outs and switchers. Many of the studies that do exist for the UK are largely descriptive and do not assess the impact of policy reforms on drop out behaviour. Smith and Naylor (2001) use data for a single cohort of HE students in the UK who enrolled in 1989-90 and find strong effects of prior attainment and local labour market conditions on the risk of dropping out. In addition, family background, personal characteristics and the subject studied at university also had an effect on drop out behaviour. A further study by Johnes and McNabb (2004) focused on drop outs from UK HE institutions in 1993 and investigate the role of student-course matches, similar to our switchers, and the effect of the students peers. Although it is difficult with this data to mitigate the reflection problem (Manski, 1993) they do provide some descriptive evidence that males with low ability peers are more likely to drop out. Students in higher quality institutions are less likely to drop out. In a more sophisticated study (Arulampalam et al., 2005) analyse the effect of prior qualifications (A-levels), following eight cohorts of university entrants over the period 1984-1992. Perhaps unsurprisingly, weaker students are more likely to drop out, whereas females are less likely to drop out. They confirm the negative effect of university quality on drop out behaviour.

Vignoles and Powdthavee (2009) assess the effect of socio-economic background using administrative data for 1st year students who enrolled in a university in 2004-05. Students from families of higher socio-economic status are less likely to drop out; interestingly, students from an ethnic minority background are less likely to drop out. Although of less relevance to our paper there are many more studies of drop out behaviour at the secondary school level students. Lofstrom (2007), for instance, suggests that economic disadvantage, or family background, accounts for nearly 50% of the hispanics-whites gap in dropout rates. Studies that use more sophisticated econometric techniques, such as Ermish and Francesconi (2001) and Bratti (2007) find a limited effect of family income on dropout behaviour.

There are however a number of studies that investigate the effect of policy reforms both for the UK and the US which are of indirect relevance to this paper. In particular, Dearden et al. (2013) evaluate the re-introduction of grants in the UK universities in 2004/05. Using a difference-in-differences approach they find that the increase in grants raised first-year degree participation, in 2005/06, of around 4 percentage points.

3 Data

We use administrative data which covers the population of students who first enrolled at an institution of Higher Education in the UK between 2003-2010. The data were obtained from the Higher Education Statistics Agency (HESA) who had, in turn obtained the data from each university and institute of higher education in the UK. There are several important features of these data. First, they record a students nationality and country of domicile as well as the actual university at which they studied. Second, students fee status can be derived from the country of origin and domicile data. Third, since the data refer to the population of students there are no problems of attrition which is common in survey data, such as the British Household Panel Survey or the National Child Development Study, both of which have often been used in studies of student behaviour. Finally, we are able to make use of repeated cohort data for students who enrolled in HE prior to the reform (2003-2005) and post-reform (2006-2010).

The data refer to over 1.8 million students. However, there are various restrictions that we impose on the data. Students who enrol at a university in 2010 are excluded since we were unable to observe their completion of study, which is normally 3 years after enrolment. Only full time students are considered since the dropout behaviour of part time students is likely to be very different. Students who have been registered for 6 years or more are excluded and so too are those registered for a postgraduate qualification - they are ineligible for income contingent loans. We also exclude students who register for an undergraduate course but who have a prior postgraduate qualification. These could have been data errors and where they are not, then they are likely to be ineligible for student loans. Lastly, students aged 36 years or more are excluded from the analysis. The objective with all of these restrictions is to ensure that we are able to generate the correct treatment group and a good comparison, or control, group.

Our data allow us to distinguish several categories of students: enrolled, graduated, dropout, transferred to another HEI, stopout (i.e. those that started a degree, stop for 1 or more years and then re-enrol), switchers (i.e. those that change their subject of study). These

categories are also overlapping, thus it is important a clear definition of the outcomes in order to identify a ‘pure’ causal effect. First, we define a broad category of graduated/enrolled versus dropout students, which includes also stopouts, switchers and transfers. Second, we select graduated/enrolled versus dropouts excluding any possible overlap with the other types of students. We then consider students that are only switchers and that may or may not drop out. Finally, we consider stopouts that may or may not drop out, we exclude transferred students, but due to the small sample size we have to include stop out students that are also switchers.

Table 1 reports the average dropout rate by year of entrance, within the academic years 2003-2010 (for example, students enrolled in 2003 can drop anytime between 2003 and 2010). We consider students that are exclusively in the dropout category.

Table 1, Panel A, shows the dropout rate by year (cohort) where it is clear that on average this has remained fairly constant at around 6 per cent of the student population, albeit with a slight drop for the 2008 and 2009 cohorts. Consequently, there is very little difference between the raw dropout rate before and after the policy reform.

Table 1, Panel B disaggregates the dropout rate by the socio-economic background of the students parents, where their occupation is collapsed into one of three groups - high, middle and low socio-economic groups.⁷ These groups roughly correspond to high, middle and low income groups. What is clear from Panel B is that whilst the temporal trend in the dropout rate is constant for each group, there is a clear ranking of dropout rates by group for each year. The dropout rate for the low income group is roughly 3 percentage points higher than that for the high income groups throughout the time period.

In Table 1, Panel C the dropout rate is calculated for students by their year of study - students are likely to learn quickly about their ability to study at degree level and hence one would expect the dropout rate to fall as the duration of study increases. What is perhaps surprising, however, is the magnitude of the dropout rate for 1st year students especially when compared to 3rd year students. Note, however, that the dropout rate for 2nd year students is high but roughly two thirds that for 1st year students. Furthermore, there is some slight evidence that the dropout rate before the reform was lower by around 1.5pp than after the reform for 1st year students whereas for 2nd year students is the same.

It is worth noting that UK HE is highly stratified and several ‘mission’ groups have emerged. The Russell Group of universities are research intensive, are generally large in terms of student numbers and typically have a strong science base. Examples include Oxford, Cambridge, Imperial and UCL. The 1994 Group focus on teaching and research and include universities such as, Lancaster and Sussex. Post-1992 universities which converted from polytechnic or college of higher education status are essentially teaching focused. Not surprisingly, the type of students who attend universities in each of the mission groups vary in terms of prior educational attainment (A level scores) and socio-economic background with the greatest overlap occurring between Russell and 1994 Group Universities. It is therefore important to allow for university type when trying to estimate the causal effect of the 2006 policy reform on dropout behaviour. In Table 1, Panel D we report the dropout rate by the

⁷The high income group includes students whose parents have managerial and professional occupations. The middle income group includes students with parents in intermediate and technical occupations, small employers and self-employed. The low income groups includes student with parents in routine occupations and unemployed.

type of university attended. We notice a constant trend in each type of university, however it is clear that the dropout rate in the Russel Group is around 40% lower than universities in 1994 Group, and it is around a third of the dropout rate in the other universities.

To identify whether there was a causal effect of the policy reform on the risk of drop out it is necessary to find a suitable control group for whom the policy had no effect. This is not a trivial issue. One obvious possibility is to choose students whose nationality is Scottish and who studied at a Scottish university. As suggested in the Introduction, the reform did not change the fee charged to these students. The problem is that this group are likely to have been affected by the reform insofar as Scottish students who would otherwise have enrolled at universities south of the border are deterred from doing so. This undermines the use of this group as a control group.

An alternative control group are students whose nationality and country of domicile was outside of the EU before the reform but who joined the EU after 2006. This happened for students from Bulgaria and Romania. Prior to joining the EU students from these countries will have been treated as ‘international’ students and paid a fee substantially greater than ‘Home’ and EU students; following their countries entry to the EU the fee they would have been charged was equal to that of the Home/EU level. Unfortunately, this is not a good control group because of the confounding effect of EU entry on fee levels and subsequent dropout behaviour. There are also too few observations to permit a meaningful analysis.

A third, and our preferred control group, are international (non-EU) students. They were unaffected by the policy reform since their fees were already at a substantially higher level than those of Home/EU students. Furthermore, fee increases for this group of students were not subjected to a major hike over the period of the reform, as was the case for UK (excluding Scottish) and EU students, but rather increased in line with inflation. Figure 1 shows that the real value of international student fees is virtually flat for the period 2003 - 2010. Thus, although the level of the fee was higher for international students, the change in the level of their fees was lower. Also, whereas Home students had access to the ICL, international students either funded their study via government scholarships, bank loans or family budgets, which meant that they had greater certainty regarding the costs of study and if, and when, they had to repay those loans. Thus the argument of the increased student debt and the subsequent ‘reluctance to borrow’ clearly does not apply to this type of students.

International students are by definition a very heterogeneous group. We therefore construct two broad ethnic groups, driven largely by data availability, which are Asian students and Afro-Caribbean students.⁸ These are then compared to a subset of the treated group, notably Asian and Afro-Caribbean students from England, Wales and Northern Ireland. Since these sub-groups are likely to be more similar in terms of cultural background and attitudes to education, for instance, we hope to construct more meaningful comparison groups with which to evaluate the tuition fee reform. Panel A of Table 2 reports the dropout rates for our treatment and control groups for the period 2003-2009 and shows the ‘raw’ drop outs before and after the reform in 2006. We observe that the dropout rate was lower in the post reform period, especially for the control group. Clearly, this implies that the reform

⁸The Asian students come from: China, India, Pakistan, Malaysia, Bangladesh, Hong Kong. The Afro-Caribbean students come from: Angola, Burundi, Congo, Rep Ivory Coast, Cameroon, Eritrea, Ethiopia, Ghana, Kenya, Mauritius, Nigeria, Rwanda, Sierra Leone, Somalia, Uganda, South Africa, Zambia, Zimbabwe, Jamaica.

may have lowered dropout rates, rather than increased, and that any difference between the treatment and control groups could be driven by the control group behaviour. Whether this is the case once we control for observables and unobservables effects remains to be seen in the following analysis. In Panel B of Table 2 we also show the change in the dropout rate for ‘switchers’ and ‘stop outs’ and it is clear that dropout rates are much higher for both sub-groups.

Table A.2 reports some summary statistics for the covariates used in our analysis below, distinguishing between treatment and control group. Table A.3 shows the covariates’ descriptive statistics for each ethnic group and for switchers and stopouts.

4 Econometric Methodology

Our purpose is to identify the causal effect of the policy reform, which has increased the tuition fees and introduced tuition fee ICL, on the probability of dropping out of HE in the UK. The identification and the measurement of this effect, Δ_i , requires that we observe the same student i being affected by the reform and also being unaffected.

$$\Delta_i = Y_i^a - Y_i^u$$

where a = affected, u = unaffected

Y_i^u outcome if student i is affected by the reform

Y_i^a outcome if student i is unaffected by the reform.

This is logically impossible since each student we can only be observed in one state. Thus the statistical solution to this problem is to adopt a method to compute the average causal effect in comparison to a control group which we have discussed in the previous section.

Our data allow us to track a student from first enrolment at a UK higher education institution up to the point in time that they graduate or drop out. This means that we can observe students that complete their degree, dropout, transfer to another institution and/or switch their degree programme, as well as those students who stop and then restart their studies. Each of these categories are analysed to evaluate the effect of the reform.

Knowing that the reform started in the academic year 2006-07, we define the binary variable

$$R_t = 0 \quad \text{if a student is observed in } t < 2006-07$$

$$R_t = 1 \quad \text{if a student is observed in } t \geq 2006-07.$$

Students first enrolled before the reform continued to pay lower fees for the rest of their academic career, therefore we will never observe the same student subject to two different fee regimes. Consequently, the panel element of our data cannot be exploited to identify the causal effect of the reform. We use instead multiple cohorts of students which are first year entrant from the academic year 2003/04 up to 2009/10.

However, a simple *before and after* reform estimator (see Table 2) might pick up the effects of other factors that changed during the post-treatment period. It is a biased estimator. Therefore, we use a control group (students never affected by the reform) to “difference out” these confounding factors and isolate the treatment effect.

Our identification is based on the fact that some students, due to their nationality and domicile, are not affected by the reform.

Given this, we define our treatment variable or group indicator as

$$\begin{aligned} T_i &= 1 && \text{if } i \text{ is student affected by the reform} \\ T_i &= 0 && \text{if } i \text{ is unaffected by the reform} \end{aligned}$$

We have four categories: 1) UK-EU students first enrolled before the reform, 2) non-EU students first enrolled before the reform, 3) UK-EU students first enrolled after the reform, 4) non-EU students first enrolled after the reform. Since we are using repeated cross-sections data, the students in categories 1) and 3) and categories 2) and 4) are not the same observed before and after the reform.

Considering as dependent variable a dummy

$$\begin{aligned} Y^s &= 1 && \text{if a student drops out HE} \\ Y^s &= 0 && \text{otherwise} \end{aligned}$$

where $s = a, u$.

the population difference-in-differences

$$\begin{aligned} &(E[Y^a|R = 1, T = 1] - E[Y^u|R = 1, T = 0]) \\ &- (E[Y^u|R = 0, T = 1] - E[Y^u|R = 0, T = 0]) = \rho. \end{aligned} \tag{1}$$

is the causal effect of interest. This is easily estimated using the sample analogue of the population means. The identifying hypothesis is that the average change in the dropout rate from pre- and post-reform is equal for untreated in the factual and the counterfactual situation.

$$\begin{aligned} &E[Y^u|R = 1, T = 0] - E[Y^u|R = 0, T = 0] = \\ &E[Y^a|R = 1, T = 0] - E[Y^a|R = 0, T = 0]. \end{aligned}$$

The same result of Equation 1 can be obtained in a regression framework, where the treatment effect on the treated at the time of treatment, ($R = 1, T = 1$), is identified by an interaction effect in a linear probability model :

$$E[Y|R, T, X] = \gamma + \alpha R + \beta T + \rho RT + \theta \mathbf{X}. \tag{2}$$

The DiD estimator is indeed the LPM estimate of ρ .

The regression based estimator is more flexible, allows us to add controls, (i.e. vector \mathbf{X}), and includes institution fixed effects and time dummies. In general, the validity of the DiD estimator relies on the assumptions that the underlying ‘trends’ in the outcome variable (i.e. time effects α in equation 2 are common across treated and untreated students and that the group difference β is constant across time.

Since this is a strong assumption, and it is important to have treatment and comparison groups as homogenous as possible, hence we re-estimate Equation 2 using a covariate adjustment approach using the propensity score.

$$E[Y|R, T, X] = \gamma + \alpha R + \beta T + \rho RT + \delta \widehat{p}(X) + \delta_1 T(\widehat{p}(X) - \mu_p) + \theta \mathbf{X} \tag{3}$$

where $\mu_p = E[p(X)]$ and $\hat{p}(X)$ is the estimated propensity score, $p(X) = P(T = 1|X)$, which plays the role of control function for possible self-selection bias. The coefficient ρ in equation 3 consistently estimates the ATT (see Rosenbaum and Rubin (1983)).

This approach, as noted by Rubin (2001), may be sensitive to whether the propensity score model has been adequately estimated. To obtain an accurate specification, we follow an iterative procedure. We first check the initial balance of all covariates included in the model, looking at the standardized difference of the means in the treated and untreated groups. Then, we re-estimate the model by combining each variable with the variable with greatest imbalance, until all variables are balanced to an acceptable level. Thus, the estimated propensity score included in equation 3 is obtained from the estimation of the most balanced specification.

5 Results

5.1 The Effect of the Tuition Fee Reform on the Risk of Dropping Out

Table 3 reports the findings of our analysis for the comparison of the treatment group with all international students, for our broad definition of dropouts (i.e. including transfers, stopouts and switchers). Tables 4 and 5 focus on the analysis for the narrow definition of dropouts, which excludes transfers, stopouts and switchers.

Panels A of Tables 3 and 4 report the unadjusted estimates (column 1) and the adjusted estimates (column 2) obtained by estimating Equations 2 and 3, respectively. The important covariate to focus on is ‘treated*reform’ which captures the effect of the reform on the treated compared to the control group. It is clear from this evidence that the policy reform had the effect of increasing the dropout rate of students from HE by 2 percentage points in the case of the unadjusted regression and is reduced to 1.5 percentage points in the case of the adjusted regression (broad definition). If we focus on the narrow definition of dropouts the effect is smaller, that is, 1 percentage point in the case of the unadjusted regression and a bit less in the case of the adjusted regression. Since the latter is a more ‘homogenous’ comparison group we focus on the estimates from these regressions from here on. We also investigate whether the effect of the policy reform varies with gender (columns 3 and 4). We show that there is very little difference between males and females, although the former have a slightly higher risk of drop out which is consistent with the existing literature.

We then disaggregate the analysis to investigate some of the possible variations in risk of dropping out as a results of the higher fees and tuition fee ICL, focusing only on the narrow definition of dropouts. In Panel B, Table 4, we observe how the risk of drop out varies with university quality, broadly defined here by mission group membership. The results show that the policy did not increase the risk of drop for the research-intensive Russell Group of universities whereas for the ‘Other’ category, including post 1992 universities, the effect of the reform is to increase the risk of drop out by 1.9 percentage points. The 1994 Group of universities lies in between those two extreme cases. Note, however, that these broad groups of universities recruit students from different parts of the ability distribution, as reflected by A-Level scores, and so this finding may also reflect the impact of the policy on different

ability groups.

Panel A, Table 5, shows how the effect of the reform varies with the year of study of the student - it is clear that the policy has the greatest effect on the risk of drop out in the first year of study, increasing this by 4pp. The effect of the reform is drastically lower in the second year of study and close to zero in the subsequent years. This may reflect the fact that students learn quickly about their ability, or their tastes for education change, which leads for some to a reformulation of expected costs and benefits of staying versus dropping out. What would be of interest is exactly when students drop out in their 1st year since this may be influenced by the liability to repay loans after a certain length of time at a university.

Panel B, Table 5, examines heterogeneity in the policy impact by looking at its effect in the second and third years after the reforms were implemented in 2006. Our estimates show that the reform has an increasing effect some time after its implementation, which suggests that the policy effect was not a ‘one-off’ effect.

There are potential problems with the preceding analysis insofar as we are not able to ‘balance’ the treatment and control groups on all covariates, hence implying some bias. This is because of the large number of observations in the treatment and control groups. The following analysis seeks to mitigate this problem. By comparing more similar sub-groups of students we are indeed able to strongly reduce the standardised bias in the difference between covariates in the treated and control group. This is evident looking at Table A.4.

5.2 The effect of the policy reform for ethnic sub-groups

Tables 6-9 reports the estimated effects of the policy for two broad sub-groups of students - Asians and Afro-Caribbeans. Because the sample sizes are reduced substantially we are able to balance the treatment and control groups, however, we cannot claim that these results can be generalised to the wider population. With respect to the Asian group, Panel A of Table 6 shows that the policy effect increased the risk of drop out for Asians of English, Welsh and Northern Irish nationality by about 1.4 percentage points when compared to their ethnic counterparts from overseas. Panel A, of Table 8 shows that reform has a slightly higher effect (2pp) effect on the risk of drop out of Afro-Caribbeans students.

The analysis is repeated by stratifying the data by gender, university type, year of study and year of the reform. There are almost no gender differences for Asian students in response to the reform. In contrast, Afro-Caribbean females are more likely to drop out than males as a result of the policy reform - a differential of 0.6pp.

The effect of the reform follows a similar pattern, albeit with slightly different orders of magnitude, with regard to the Russell Group of universities (where there is no effect for both ethnic sub-groups) and Others universities (around 2pp in both cases). However, the effect of the reform for the 1994 Group is significant (1.5pp) only for Asian students.

The risk of drop out for 1st year Asian students is around 1 percentage point higher than for the ‘average’ student and it is almost the same for 2nd year students (compare Tables 5 and 7). First year Afro-Caribbeans students have the same probability of dropping out as the ‘average’ student, whereas for those in their 2nd year the probability is 4 percentage points higher (compare Tables 5 and 9).

It is also worth noting that when compared to all students, the effect of the policy reform also persists beyond the year of implementation for Asians and Afro-Caribbeans (see Panel

B of Tables 7 and 9) and these effects are around a 1 percentage point higher than for the whole population of students.

In sum, there is evidence that the two ethnic groups were affected more by the fee increase and introduction of the tuition fee ICL and that these effects lasted for some time. This could be because ethnic groups in Britain continue to face discrimination in the labour market which, in turn, generates greater uncertainty about future returns to HE, or it could be that these groups of students are more debt averse or learn more quickly about their ability.

5.3 The effect of the reform on stopouts and switchers

In this final section we investigate the impact of the tuition fee reform on students who initially ‘stop out’ of HE by pausing their studies and on those who switch their course of study from one degree programme to another. Due to the smaller sample size we are not able to stratify the analysis by university type and year of study. We provide therefore only the estimates for the overall effect and by year of reform.

Table 10 shows the estimates for those students who stop out. Panel A reports the overall effect of the tuition fee reform and our evidence suggests that those students who pause their studies are much more likely to subsequently drop out of HE once they eventually re-start their programme of study. In fact, the effect is more than 4 times the magnitude of the effect for all students - a 4.3pp increase in the risk of dropping out compared to 0.7pp for all students (see Table 4). Female stop outs are, however, much more likely to subsequently drop out than males, and the risk is increased by 6.6pp (columns 3 and 4). This is a substantial impact of the policy. Our evidence implies that students who have a ‘bad’ start to their undergraduate studies, perhaps because of relatively poor academic performance, quickly re-evaluate their prospects. In the post reform period they are much more likely to drop out possibly to avoid further accumulation of debt.

There is also evidence from Table 10, Panel B that the impact of the reform was quite long lasting insofar as we observe a positive and statistically significant effect on the risk of dropping out two years after the tuition fee reform was introduced.

Table 11 repeats the analysis for students who switch from one degree programme to another, at the same university (i.e. we exclude students who transfer). Panel A reports the aggregate effect for all switchers and shows that switchers are subsequently 1.7pp more likely to subsequently drop out after the reform. Furthermore, this increased risk lies around midway between all dropouts (0.07pp, narrow definition) and the stopout group (4.3pp), which implies a continuum of responses to the tuition fee reform. Male switchers are also more likely to drop out following the reform than females (columns 3 and 4). Like the stopout group, we also show in Table 11 Panel B that there is strong persistence in the effect of the policy reform.

6 Conclusion

In this paper we have investigated the impact of the 2006 tuition fee reform which simultaneously substantially increased the fee paid to English, Welsh and Northern Irish students

and introduced tuition fee ICL. Theory suggests that this can lead to a variety of effects, such as increased uncertainty about net lifetime utility, or increased debt aversion, and may also lead students who have embarked on a university degree to re-evaluate their ability and hence expectations of success. Recent literature has also shown that student debt and reluctance to borrow may also affect academic and early career decision.

Consequently, we argue that the increase in student debt in the UK HE system has also intensified the students' reluctance to borrow leading to higher dropout rates. This has been demonstrated by the fact that students may be more likely to drop out of HE following the tuition fee reform compared to their counterparts who embarked on a university prior to the reform, and in comparison to international students who were unaffected by the policy reform. To investigate the impact of the 2006 reform we use HESA data for the period 2003-2009 and use difference-in-differences techniques in combination with a propensity score adjusted regression methodology, which allows us to construct better comparison groups, to identify the causal impact of the reform.

Our results suggest that the tuition fee reform did increase the risk of dropping out of a university degree course by about 1 percentage point. We argue that this is a causal effect. Moreover, we show that the impact of the policy was quite long lasting and was not a one-off effect for the 2006 student cohort. It is also the case that much of the effect is observed in the 1st year of study, following a period in which students re-evaluate their ability, and decide to drop out before too much debt is accumulated. Interestingly, although this could be due to the sorting of students by ability between universities of different types, we show that the risk of dropping out of a degree as a result of the policy reform is higher for students from teaching intensive universities.

A second major finding of our analysis is that Asian and Afro-Caribbean students have a higher risk of drop out than the average students following the tuition fee reform. This could be because they are more reluctant to borrow, because they are more uncertain about the future returns to continuing their studies due to the presence of discrimination in the labour market.

Our third major finding is that we identify a continuum of effects of the tuition fee policy reform such that students who pause their studies ('stopouts') are far more likely to drop out than those students who do not do so; switchers fall in between. This finding suggests that simply focusing on drop out behaviour ignores important differences between sub-groups of students with respect to their attitude to debt, for instance.

The evidence presented in this paper also has implications for policy and practice. From a policy perspective it is clear that the 2006 reform has had a causal effect on drop out behaviour, and hence it is likely that the 2011 reform, which increased fees further (to £6,000-£9,000) may have had a further effect. Whether this effect is of a similar, or greater magnitude, than the 2006 reform is a question that can only be addressed by further research. We speculate that the 2011 reform is likely to have had a larger effect insofar as debt aversion and uncertainty are increased further. Our evidence also suggests that the 2011 reform is likely to have unequal effects on students of different backgrounds. From a practice perspective, our evidence implies that universities need to counsel students contemplating interruptions to their studies, or switching to alternative degree programmes, because this may increase their risk of non-completion.

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Figure 1: Real change in international student fees

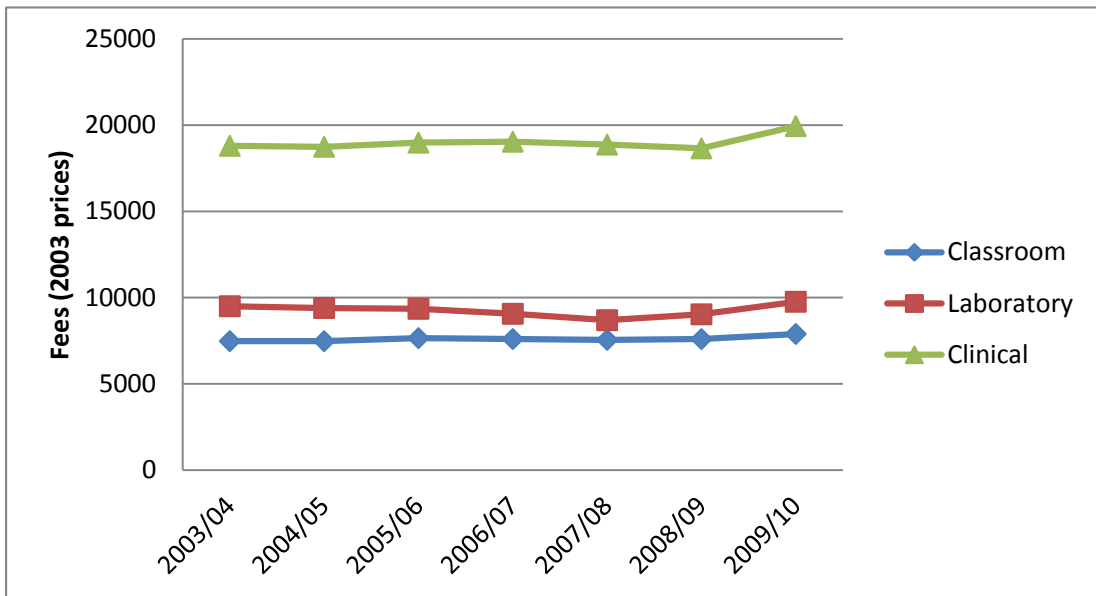


Table 1: Changes in Drop out rates by year of enrolment, pre- and post-policy reform

<i>Panel A: Full sample</i>									
	<i>2003</i>	<i>2004</i>	<i>2005</i>	<i>2006</i>	<i>2007</i>	<i>2008</i>	<i>2009</i>	<i>before</i>	<i>after</i>
all	0.070	0.066	0.065	0.064	0.062	0.062	0.064	0.067	0.063
N	274128	252950	262980	257938	284462	305513	336686	790898	1183759

<i>Panel B: Drop out rates by socio-economic background</i>									
	<i>2003</i>	<i>2004</i>	<i>2005</i>	<i>2006</i>	<i>2007</i>	<i>2008</i>	<i>2009</i>	<i>before</i>	<i>after</i>
high income	0.049	0.047	0.048	0.048	0.045	0.046	0.051	0.048	0.048
N	110045	100877	96483	90437	101449	103417	119158	307432	414434
middle income	0.066	0.061	0.059	0.058	0.060	0.059	0.065	0.062	0.061
N	52110	47133	47039	44644	49497	53250	59324	146308	206689
low income	0.082	0.075	0.076	0.073	0.077	0.076	0.081	0.078	0.077
N	31825	28581	31264	30834	35322	43424	42262	91691	151821

<i>Panel C: Drop out rates by year of study</i>									
	<i>2003</i>	<i>2004</i>	<i>2005</i>	<i>2006</i>	<i>2007</i>	<i>2008</i>	<i>2009</i>	<i>before</i>	<i>after</i>
1st year	0.203	0.277	0.269	0.263	0.269	0.249	0.245	0.241	0.255
N	59609	36429	37854	37711	40486	45039	62778	134732	185174
2nd year	0.166	0.173	0.153	0.193	0.172	0.142	.	0.164	0.164
N	23111	21445	24983	19622	21050	35665	.	69539	76337
3 or more years	0.017	0.015	0.015	0.014	0.014	.	.	0.016	0.014
N	191408	195076	200143	200605	222926	.	.	586627	423531

<i>Panel D: Drop out rates by type of university</i>									
	<i>2003</i>	<i>2004</i>	<i>2005</i>	<i>2006</i>	<i>2007</i>	<i>2008</i>	<i>2009</i>	<i>before</i>	<i>after</i>
Russell group	0.031	0.028	0.025	0.024	0.022	0.023	0.023	0.028	0.023
N	56968	57843	57868	55803	61171	63244	68233	172704	248426
1994 group	0.050	0.046	0.046	0.050	0.042	0.040	0.044	0.047	0.044
N	31228	28897	29931	30154	34660	36583	38957	90058	140352
Others	0.088	0.085	0.082	0.080	0.080	0.079	0.081	0.085	0.080
N3	176622	160008	169470	166388	182539	199459	222936	506907	770515

The academic years considered are from 2003/04 to 2010/11.

Table 2: Drop out rates by comparison groups and year of enrolment

Panel A

<i>All</i>									
	<i>2003</i>	<i>2004</i>	<i>2005</i>	<i>2006</i>	<i>2007</i>	<i>2008</i>	<i>2009</i>	<i>before</i>	<i>after</i>
T	0.070	0.064	0.063	0.063	0.062	0.062	0.067	0.066	0.064
C	0.069	0.068	0.065	0.063	0.054	0.055	0.049	0.067	0.054
diff	0.001	-0.004	-0.002	0.000	0.008	0.007	0.018	-0.002	0.009
N_T	188714	177111	188267	180582	199878	212176	229752	554413	822067
N_C	17875	18005	17369	17888	19696	22487	26274	53496	86098

<i>Asian</i>									
	<i>2003</i>	<i>2004</i>	<i>2005</i>	<i>2006</i>	<i>2007</i>	<i>2008</i>	<i>2009</i>	<i>before</i>	<i>after</i>
T	0.062	0.054	0.058	0.051	0.051	0.055	0.059	0.058	0.054
C	0.069	0.069	0.067	0.069	0.056	0.054	0.044	0.069	0.054
diff	-0.007	-0.015	-0.009	-0.018	-0.005	0.001	0.015	-0.010	0.000
N_T	20340	18804	19269	18772	19727	21300	22471	58480	82203
N_C	10693	10548	9647	9637	10972	12766	15149	31018	48394

<i>Afro-Caribbean</i>									
	<i>2003</i>	<i>2004</i>	<i>2005</i>	<i>2006</i>	<i>2007</i>	<i>2008</i>	<i>2009</i>	<i>before</i>	<i>after</i>
T	0.089	0.100	0.080	0.082	0.084	0.088	0.093	0.090	0.087
C	0.082	0.080	0.069	0.058	0.049	0.054	0.059	0.077	0.055
diff	0.007	0.020	0.011	0.023	0.036	0.035	0.033	0.013	0.032
N_T	5558	5483	6129	6465	7576	8915	10218	17209	33135
N_C	1711	1939	1879	1864	1921	2146	2306	5550	8216

Panel B

<i>Stopout</i>									
	<i>2003</i>	<i>2004</i>	<i>2005</i>	<i>2006</i>	<i>2007</i>	<i>2008</i>	<i>2009</i>	<i>before</i>	<i>after</i>
T	.	0.207	0.214	0.180	0.186	0.248	0.554	0.207	0.283
C	.	0.227	0.258	0.231	0.225	0.210	0.428	0.242	0.259
diff	.	-0.020	-0.045	-0.051	-0.039	0.038	0.126	-0.035	0.024
N_T	.	2743	3418	4054	4796	5059	3925	6291	17825
N_C	.	238	240	342	364	309	229	488	1242

<i>Switchers</i>									
	<i>2003</i>	<i>2004</i>	<i>2005</i>	<i>2006</i>	<i>2007</i>	<i>2008</i>	<i>2009</i>	<i>before</i>	<i>after</i>
T	0.053	0.054	0.041	0.049	0.066	0.066	0.058	0.048	0.058
C	0.077	0.072	0.041	0.056	0.054	0.044	0.040	0.062	0.050
diff	-0.025	-0.018	-0.000	-0.007	0.012	0.022	0.018	-0.014	0.008
N_T	15241	13412	19695	17655	10668	10494	7142	48348	45959
N_C	775	704	858	824	591	501	445	2337	2361

The academic years considered are from 2003/04 to 2010/11.

Table 3: Estimates of the Effect of the Policy Reform on Drop out Behaviour, 2003-2010 (Broad Definition of Dropouts)*

<i>Panel A: Overall effects</i>				
	Unadjusted	PS Adjusted	Females	Males
treated	0.034*** (0.001)	0.009*** (0.001)	0.009*** (0.002)	0.006*** (0.002)
reform	0.022*** (0.002)	0.028*** (0.002)	0.035*** (0.002)	0.022*** (0.003)
treated*reform	0.021*** (0.002)	0.015*** (0.001)	0.014*** (0.002)	0.016*** (0.002)
N	1649231	1649231	869919	734892
F	2602.613	2942.495	1488.363	1391.323

*This includes stopout, transfers, special students and switchers.

Treated: UK nationality students domiciled in England, Wales or Northern Ireland.

Control: Non-EU nationality students domiciled in non-EU countries.

All attend university in England, Wales or Northern Ireland.

Each specification, except the first, is propensity score adjusted and all include cohort effects, subjects, length of degree, mature students, and institutions fixed effects.

Standard errors in parenthesis.

Table 4: Estimates of the Effect of the Policy Reform on Drop out Behaviour, 2003-2010 (Narrow Definition of Dropouts)*

<i>Panel A: Overall effects</i>				
	Unadjusted	PS Adjusted	Females	Males
treated	0.025*** (0.001)	0.005*** (0.001)	0.005*** (0.002)	0.001 (0.002)
reform	0.032*** (0.002)	0.036*** (0.002)	0.043*** (0.003)	0.029*** (0.003)
treated*reform	0.011*** (0.002)	0.007*** (0.002)	0.006*** (0.002)	0.009*** (0.002)
N	1484338	1484338	781987	662286
F	2202.038	2507.416	1282.422	1171.272

<i>Panel B: effects by university groups</i>			
	Russell group	1994 group	others
treated	0.009*** (0.002)	0.000 (0.003)	0.008*** (0.002)
reform	0.031*** (0.003)	0.036*** (0.005)	0.028*** (0.003)
treated*reform	-0.005** (0.002)	0.009** (0.004)	0.019*** (0.002)
N	317344	198836	928093
F	221.546	255.354	2034.259

*This excludes stopout, transfers, special students and switchers.

Treated: UK nationality students domiciled in England, Wales or Northern Ireland.

Control: Non-EU nationality students domiciled in non-EU countries.

All attend university in England, Wales or Northern Ireland.

Each specification, except the first, is propensity score adjusted and all include cohort effects, subjects,

length of degree, mature students, and institutions fixed effects.

Standard errors in parenthesis.

Table 5: Effects by year of study and years of reform on drop out (narrow definition)*

<i>Panel A: effects by year of study</i>			
	1st year	2nd year	3rd year
treated	0.069*** (0.006)	0.038*** (0.006)	-0.000 (0.001)
reform	0.103*** (0.014)	0.082*** (0.008)	-0.020*** (0.002)
treated*reform	0.040*** (0.005)	0.013** (0.005)	0.003** (0.001)
N	195388	100971	771872
F	324.223	115.044	55.579

<i>Panel B: effects by year of reform</i>		
	Year 2nd	Year 3rd
treated	0.003** (0.001)	0.002 (0.001)
reform	0.045*** (0.002)	0.025*** (0.003)
treated*reform1y	0.011*** (0.002)	
treated*reform2y		0.014*** (0.002)
N	1289958	1074848
F	2161.412	1803.906

*This excludes stopout, transfers, special students and switchers.

Treated: UK nationality students domiciled in England, Wales or Northern Ireland.

Control: Non-EU nationality students domiciled in non-EU countries.

All attend university in England, Wales or Northern Ireland.

Each specification is propensity score adjusted and includes cohort effects, subjects, length of degree, mature students, and institutions fixed effects.

Standard errors in parenthesis.

Table 6: Effect of the Policy Reform on Drop out Behaviour, 2003-2010 - Asian ethnic group (narrow definition)*

<i>Panel A: overall effects</i>				
	Unadjusted	PS Adjusted	Females	Males
treated	0.012*** (0.002)	0.004 (0.002)	0.000 (0.003)	0.002 (0.003)
reform	0.009*** (0.003)	0.013*** (0.003)	0.016*** (0.004)	0.010** (0.005)
treated*reform	0.018*** (0.002)	0.014*** (0.002)	0.015*** (0.003)	0.014*** (0.004)
N	211306	211306	101206	103126
F	192.796	215.155	72.212	130.896

<i>Panel B: effects by university groups</i>			
	Russell group	1994 group	others
treated	-0.005 (0.003)	-0.001 (0.006)	0.003 (0.004)
reform	0.006 (0.005)	0.041*** (0.011)	0.006 (0.004)
treated*reform	0.005 (0.003)	0.015** (0.006)	0.022*** (0.003)
N	43560	26921	133851
F	21.823	30.085	165.109

*Stopout, transfers, special students and switchers are excluded.

Treated: Asian ethnic group, UK nationality students domiciled in England, Wales or Northern Ireland.

Control: Asian nationality students domiciled in non-EU countries.

All attend university in England, Wales or Northern Ireland.

Each specification, except the first, is propensity score adjusted and all include cohort effects, subjects,

length of degree, mature students, and institutions fixed effects.

Standard errors in parenthesis.

Table 7: Effects by year of study and years of reform on drop out - Asian ethnic group (narrow definition)*

<i>Panel A: effects by year of study</i>			
	1st year	2nd year	3rd year
	b/se	b/se	b/se
treated	0.007 (0.009)	0.014 (0.010)	-0.001 (0.002)
reform	-0.026 (0.042)	0.071*** (0.014)	-0.021*** (0.003)
treated*reform	0.049*** (0.008)	0.016* (0.009)	0.005** (0.002)
N	38781	21127	96679
F	28.12	12.628	10.789

<i>Panel B: effects by year of reform</i>		
	Year 2nd	Year 3rd
treated	0.004 (0.002)	0.005** (0.002)
reform	0.010** (0.004)	-0.002 (0.005)
treated*reform1y	0.018*** (0.002)	
treated*reform2y		0.019*** (0.003)
N	184130	154666
F	186.368	159.771

*Stopout, transfers, special students and switchers are excluded.

Treated: Asian ethnic group, UK nationality students domiciled in England, Wales or Northern Ireland.

Control: Asian nationality students domiciled in non-EU countries.

All attend university in England, Wales or Northern Ireland.

Each specification is propensity score adjusted and includes cohort effects, subjects, length of degree, mature students, and institutions fixed effects.

Standard errors in parenthesis.

Table 8: Effect of the Policy Reform on Drop out Behaviour, 2003-2010 - Afro-Caribbean ethnic group (narrow definition)*

<i>Panel A: overall effects</i>				
	Unadjusted	PS Adjusted	Females	Males
treated	0.033*** (0.005)	0.027*** (0.005)	0.009 (0.006)	0.042*** (0.008)
reform	0.008 (0.007)	0.007 (0.007)	0.006 (0.009)	0.010 (0.010)
treated*reform	0.019*** (0.005)	0.020*** (0.005)	0.022*** (0.007)	0.016** (0.008)
N	61732	61732	33554	27089
F	83.698	93.460	41.250	48.907

<i>Panel B: effects by university groups</i>			
	Russell group	1994 group	others
treated	0.017** (0.008)	0.028** (0.013)	0.029*** (0.006)
reform	0.029** (0.014)	0.059** (0.023)	-0.004 (0.008)
treated*reform	-0.001 (0.009)	0.006 (0.015)	0.027*** (0.007)
N	5777	5984	48882
F	3.723	8.510	84.637

*Stopout, transfers, special students and switchers are excluded.

Treated: Afro-Caribbean ethnic group, UK nationality students domiciled in England, Wales or Northern Ireland.

Control: Afro-Caribbean nationality students domiciled in non-EU countries.

All attend university in England, Wales or Northern Ireland.

Each specification, except the first, is propensity score adjusted and all include cohort effects, subjects, length of degree, mature students, and institutions fixed effects.

Standard errors in parenthesis.

Table 9: Effects by year of study and years of reform on drop out - Afro-Caribbean ethnic group (narrow definition)*

<i>Panel A: effects by year of study</i>			
	1st year	2nd year	3rd year
treated	0.061*** (0.019)	0.038** (0.018)	0.010*** (0.004)
reform	0.085 (0.057)	-0.052* (0.031)	-0.029*** (0.007)
treated*reform	0.052*** (0.018)	0.055*** (0.020)	0.003 (0.005)
N	11593	5960	27336
F	10.025	4.148	4.777

<i>Panel B: effects by year of reform</i>		
	Year 2nd	Year 3rd
treated	0.025*** (0.005)	0.026*** (0.005)
reform	0.006 (0.009)	-0.007 (0.012)
treated*reform1y	0.021*** (0.006)	
treated*reform2y		0.021*** (0.006)
N	53654	44549
F	80.745	69.365

*Stopout, transfers, special students and switchers are excluded.

Treated: Afro-Caribbean ethnic group, UK nationality students domiciled in England, Wales or Northern Ireland.

Control: Afro-Caribbean nationality students domiciled in non-EU countries.

All attend university in England, Wales or Northern Ireland.

Each specification is propensity score adjusted and includes cohort effects, subjects, length of degree, mature students and institutions fixed effects.

Standard errors in parenthesis.

Table 10: Effect of the Policy Reform on Drop out Behaviour of Students who are Stopout*, 2003-2010

Panel A: Overall effects

	Unadjusted	PS Adjusted	Females	Males
treated	-0.013 (0.013)	0.014 (0.016)	0.015 (0.024)	0.023 (0.024)
reform	-0.114*** (0.017)	-0.110*** (0.017)	-0.145*** (0.025)	-0.075*** (0.024)
treated*reform	0.049*** (0.016)	0.043*** (0.016)	0.066*** (0.025)	0.022 (0.023)
N	66032	66032	34880	29471
F	709.860	726.699	358.277	406.327

Panel B: effects by year of reform

	Year 2nd	Year 3rd
treated	0.024 (0.017)	0.024 (0.019)
reform	-0.147*** (0.020)	-0.193*** (0.026)
treated*reform1y	0.059*** (0.018)	
treated*reform2y		0.090*** (0.021)
N	54966	41923
F	636.708	518.176

Broad category which may include switchers and transfers who stop out.

Treated: UK nationality students domiciled in England, Wales or Northern Ireland.

Control: Non-EU nationality students domiciled in non-EU countries.

All attend university in England, Wales or Northern Ireland.

Each specification, except the first, is propensity score adjusted and all include cohort effects, subjects, length of degree, mature students and institutions fixed effects.

Standard errors in parenthesis.

Table 11: Effect of the Policy Reform on Drop out Behaviour of Students who are switchers*, 2003-2010

<i>Panel A: Overall effects</i>				
	Unadjusted	PS Adjusted	Females	Males
treated	0.012** (0.006)	-0.001 (0.006)	0.010 (0.007)	-0.016 (0.011)
reform	0.028*** (0.008)	0.029*** (0.008)	0.038*** (0.010)	0.017 (0.012)
treated*reform	0.018** (0.007)	0.017** (0.007)	0.010 (0.009)	0.024** (0.011)
N	97992	97992	52560	42809
F	71.046	77.715	33.664	42.075

<i>Panel B: effects by year of reform</i>		
	Year 2nd	Year 3rd
treated	-0.001 (0.006)	-0.003 (0.007)
reform	0.061*** (0.010)	0.043*** (0.012)
treated*reform1y	0.026*** (0.008)	
treated*reform2y		0.031*** (0.009)
N	79674	68564
F	63.797	52.535

*Stopout, transfers and special students are excluded.

Treated: UK nationality students domiciled in England, Wales or Northern Ireland.

Control: Non-EU nationality students domiciled in non-EU countries.

All attend university in England, Wales or Northern Ireland.

Each specification, except the first, is propensity score adjusted and all include cohort effects, subjects, length of degree, mature students and institutions fixed effects.

Standard errors in parenthesis.

A Appendix

Table A.1: The evolution of students financial support in the UK

	<i>2003</i>	<i>2004</i>	<i>2005</i>	<i>2006</i>	<i>2007</i>	<i>2008</i>	<i>2009</i>
tuition fees	1125	1150	1175	3000	3070	3145	3225
<i>Loans</i>							
tuition fee loan							
		<i>students entering prior 2006/07</i>					
number loans	na	na	na	158	99	32	5.6
		<i>students entering from 2006/07</i>					
number loans	na	na	na	234	455	666	780
maintenance loan							
number eligible	840	874	897	905	928	963	1004
number loans	682	693	719	728	746	772	820
<i>Grants</i>							
tuition fee grant							
number full grants	321	327	315	190	102	32	6.5
number partial grants	109	100	92	59	31	9	1.3
maintenance grant							
full	na	na	na	98	180	155	99
partial	na	na	na	68	122	98	54
HE grants							
full	na	83	160	127	77	24	5.2
partial	na	19	36	28	17	5	1

Source: Student Loans Company. Tuition fees are in GBP, other figures are in thousands.

na= not applicable.

Table A.2: Control Variables

	<i>Treated</i>		<i>Control</i>	
	mean	s.d.	mean	s.d.
<i>Gender</i>				
male	0.448	0.497	0.526	0.499
<i>Prior attainment</i>				
Qual Lev 3	0.884	0.32	0.321	0.467
Qual Lev 2 and below	0.044	0.204	0.347	0.476
Qual Lev 4	0.073	0.26	0.332	0.471
<i>School type</i>				
State-funded school or college	0.792	0.406	0.154	0.361
Privately funded school	0.099	0.299	0.081	0.273
Unknown school type	0.108	0.311	0.765	0.424
<i>Family background</i>				
Higher manag & profes	0.180	0.384	0.038	0.192
Lower manag & profes	0.238	0.426	0.076	0.264
Intermed & Lower supervis	0.151	0.358	0.02	0.141
Small employers & own	0.057	0.231	0.005	0.073
Semi-routine & routine	0.140	0.347	0.012	0.109
Never work & long-term unempl	0.001	0.036	0.002	0.047
Not classified	0.233	0.423	0.846	0.361
N	1,438,333		140,051	

Treated: UK nationality students domiciled in England, Wales or Northern Ireland.

Control: Non-EU nationality students domiciled in non-EU countries.

All attend university in England, Wales or Northern Ireland.

We consider all the cohorts of entrants between 2003/04 and 2009/10.

Table A.3: Control Variables by comparison groups

	<i>Asian</i>		<i>Afro-Caribbean</i>		<i>Switchers</i>		<i>Stopout</i>	
	mean	s.d.	mean	s.d.	mean	s.d.	mean	s.d.
<i>Gender</i>								
male	0.509	0.5	0.447	0.497	0.45	0.497	0.455	0.498
<i>Prior attainment</i>								
Qual Lev 3	0.689	0.463	0.704	0.456	0.886	0.318	0.865	0.342
Qual Lev 2 and below	0.145	0.352	0.123	0.328	0.059	0.236	0.076	0.265
Qual Lev 4	0.166	0.372	0.173	0.378	0.055	0.228	0.059	0.236
<i>School type</i>								
State-funded school or college	0.576	0.494	0.64	0.48	0.75	0.433	0.748	0.434
Privately funded school	0.095	0.293	0.041	0.199	0.113	0.317	0.098	0.297
Unknown school type	0.329	0.474	0.319	0.466	0.136	0.343	0.154	0.361
<i>Family background</i>								
Higher manag & profes	0.084	0.277	0.075	0.264	0.176	0.381	0.158	0.365
Lower manag & profes	0.122	0.328	0.173	0.378	0.235	0.424	0.229	0.42
Intermed & Lower supervis	0.079	0.27	0.107	0.309	0.144	0.351	0.135	0.342
Small employers & own	0.063	0.242	0.02	0.141	0.055	0.227	0.054	0.225
Semi-routine & routine	0.139	0.346	0.133	0.34	0.137	0.343	0.139	0.346
Never work & long-term unempl	0.003	0.051	0.003	0.059	0.001	0.035	0.001	0.031
Not classified	0.511	0.5	0.488	0.5	0.252	0.434	0.284	0.451
N	253,674		77,394		104,581		92,835	

Asian, Afro-Caribbean, Switchers and Stopout are a subset of both treated and control groups. We consider all the cohorts of entrants between 2003/04 and 2009/10.

Table A.4: Std. Bias Reductions after Balancing

	<i>Asian</i>		<i>Afro-Caribbean</i>		<i>Switchers</i>		<i>Stopout</i>	
	Initial	Final	Initial	Final	Initial	Final	Initial	Final
<i>Gender</i>								
male	-0.094	-0.019	-0.255	-0.009	-0.122	0.092	-0.155	-0.076
<i>Prior attainment</i>								
Qual Lev 3	1.470	0.017	0.813	0.018	1.286	-0.001	1.165	-0.012
Qual Lev 2 and below	-0.873	0.022	-0.530	-0.017	-0.796	0.001	-0.692	0.003
Qual Lev 4	-0.685	-0.043	-0.424	-0.006	-0.649	0.001	-0.540	-0.012
<i>School type</i>								
State-funded school or college	1.704	0.038	1.604	0.024	1.403	-0.002	0.931	-0.029
Privately funded school	0.055	-0.060	-0.189	-0.001	-0.046	0.001	0.111	0.072
Unknown school type	-1.797	-0.004	-1.426	-0.024	-1.400	0.001	-0.987	-0.005
<i>Family background</i>								
Manag & profes	0.391	-0.050	0.385	0.075	0.613	0.003	0.571	-0.040
Intermed & Small empl	0.611	0.028	0.387	0.017	0.565	-0.004	0.488	-0.032
Routine & unempl	0.666	0.034	0.484	0.007	0.489	-0.002	0.484	0.069
Not classified	-1.285	-0.001	-0.903	-0.080	-1.393	0.002	-1.145	0.014