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Dan Anderberg
Arnaud Chevalier
Lena Hassani-Nezhad
Melanie Lührmann
Ronni Pavan

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Dan Anderberg
Royal Holloway, University of London and IFS

Arnaud Chevalier
Royal Holloway, University of London and IZA

Lena Hassani-Nezhad
Royal Holloway, University of London and IZA

Melanie Lührmann
Royal Holloway, University of London and IFS

Ronni Pavan
University of Rochester

ABSTRACT

Higher Education Financing and the Educational Aspirations of Teenagers and their Parents*

We study the impact of higher education financing on the academic aspirations of teenagers and of their parents. We exploit a reform which introduced a large increase in the maximum university tuition fees and a more redistributive student loan system, both of which varied across the UK's constituent countries. Using rare survey data on postcompulsory secondary and university education aspirations, we find that teenagers' aspirations are not responsive to large changes in higher education financing. In contrast, the socio-economic gap in parental aspirations for their childrens' education is reduced through the reform, in accordance with the redistributive financing policies set by policy-makers.

Corresponding author:
Lena Hassani-Nezhad
Department of Economics
Royal Holloway, University of London
Egham Hill
TW20 0EX Egham
United Kingdom
E-mail: lena.hassaninezhad@rhul.ac.uk

1 Introduction

In most developed countries, governments are grasping with the conflicting objectives of expanding higher education, especially among poorer students, while maintaining educational quality standards and financial sustainability. For example, since the Fifties, participation rates in higher education have increased from below 10% to about 50% in both the US and the UK (Rizzica, 2020; Department for Education, 2019a). To address financial sustainability and maintain educational quality standards, several countries rely on financial autonomy of and increasing competition between universities. As a result, the private costs of education have risen dramatically in the recent years. In the US, tuition fees more than doubled in real terms between 1985 and 2016 (National Centre for Education Statistics, 2019); England moved within two decades from zero fees to some of the highest tuition fees in the world (Murphy et al., 2019). What remains unknown is how the financing of higher education affects the educational aspirations of younger pupils and of their parents.

One such large shock to the financing of Higher Education was the 2010 UK Higher Education Act, which dramatically affected university costs. It led to almost a tripling of tuition fees in England from £3,375 to £9,000 per year. At the same time, university financing via loans changed towards a more redistributive scheme, and minor changes were made to means-tested grants to make them more generous towards the poorest students. In the UK, student loans to pay for tuition fees are available to all, implicitly making university free at the point of entry. Loan repayment occurs after the completion of studies and is contingent on graduate incomes exceeding a threshold. Loan repayments are also extinguished after a period of time. The 2010 reform raised this threshold for loan repayments, reducing the effective costs of higher education for graduates with low subsequent earnings. These mechanisms act as insurance against adverse labour market outcomes and could reduce the participation gap if it stems from differences in debt aversion (Callender and Jackson, 2008). Overall Chowdry et al. (2012) estimate that the 2010 UK Higher Education Act will make the average graduate £8,850 worse off over their life time due to the rise in the costs of attending higher education but that the reform is progressive with the bottom 29% of graduates becoming better off under the new system. Moreover, for the poorest students means-tested grants and support loans

were expended by about 10%, reducing the (expected) costs of attending higher education for the poorest students. In spite of the large cost increase, participation in Higher Education only dropped by 10% (Sá, 2019), implying a price elasticity of -0.05 (Azmat and Simion, 2018), and suggesting that financial barriers play a limited role in hampering access to university. Moreover, Azmat and Simion (2018) and Murphy et al. (2019) find a small reduction in the participation gap, driven by a greater reduction in participation from children originating from higher income families, reflecting the greater support provided to students from lower socio-economic backgrounds and the insurance against bad labour market outcomes provided by the reform.

To some extent, the small contemporaneous effect of a large tuition fee hike on participation might reflect that decisions regarding participation were made in advance; for example, at age 16 when pupils decide which educational track to follow. Hence, we examine whether this large increase in university costs and their financing may have unintended effects on the educational choices made by younger cohorts that are not immediately affected by the policy. In particular, we focus on the impacts of a change in the financing of higher education on the aspirations to attend the most academic secondary education track and university. Lower educational aspirations might in turn lead to sub-optimal secondary school attainment and postsecondary education investment choices which are hard to reverse. These potential and unintended consequences of higher education financing reforms on future cohorts have been mostly ignored in the literature, which mainly focuses on contemporaneous reform effects.

The large public debate on tuition fees and extensive street demonstrations that surrounded the reform insure that information regarding the future costs of higher education was widely available, making the reform an ideal experiment on how it affected the educational aspirations of pupils aged 10 to 15 and of their parents. Our identification relies on differences-in differences estimates based on variation in the implementation of the reform between the constituent countries of Great Britain.[1]. Scottish students were unaffected by Higher Education Act. Welsh students were isolated

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[1]Higher education legislation is devolved to regional parliaments (not for England) which can directly legislate (Scotland) or alter the national policies (Northern Ireland, Wales). Additionally, students from Northern Ireland do not pay tuition fees when studying in the Republic of Ireland. This cost free options was available to them through out the period, making it ambiguous how thy were impacted by the reform. We exclude Northern Ireland residents from this analysis.

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from the tuition fee increase by the ramping up of tuition grants, and only affected by the change to the loan system. In consequence, only students in England faced the full reform of increased tuition fees and altered student loan and support.

We use rarely available information on the aspirations of teenagers and of their parents, contained in six waves of Understanding Society, a large representative UK Household Longitudinal Study, during the 2009 to 2015 period.[2] We focus on teenagers aged 10 to 15 who complete a self-completion questionnaire pertaining to their aspirations towards education, and on their parents who were separately asked about their aspirations for the education of their children. We distinguish aspirations in two domains directly related to higher education investment: i) obtaining a higher secondary qualification that allows for the pursuit of higher education (i.e. A-levels), and ii) intentions to go to university. Importantly, Understanding Society elicits aspirations from both children and their parents.

As well as altering the financing of higher education, a second aim of the reform was to reduce the social gap in participation, by increasing the financial support available to the poorest students and by reducing the risk associated with bad labour market oucomes. We thus investigate whether the 2010 Higher Education Act had heterogeneous impacts on the aspirations of teenagers and their parents by social background. Lower educational aspirations may be one mechanism which discourages students from less advantaged socio-economic backgrounds from attending university, and thus contribute to the socio-economic participation and attainment gaps observed in higher education (Manski, 1993; Lergetporer et al., 2018).

We find that the aspirations of teenagers regarding investing in post-compulsory education, and going to university are insensitive to changes in the costs of higher education. Despite significant aspirations differences by gender and family background at baseline and differential financial incentives set by the reform through changes in the loan financing system, the 2010 Higher Education Act had homogeneous impacts between groups. Welsh pupils reacted similarly to English ones despite not facing increased costs to participate in higher education. Hence, despite the prominent media coverage of the tuition fee increase in the media, we find no evidence that a large increase in

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[2]Belfield et al. (2020) rely on a purpose build questionnaire of 900 pupils in the UK

the cost of higher education discouraged teenagers' aspirations towards advanced qualifications or higher education. Yet, we do find that their parents reacted to the reform. Richer parents adjusted their aspirations downwards in reaction to the substantial increase in the cost of higher education, while poorer parents' aspirations increased in line with the expansion of financial support available to their children and the greater insurance against the risk of higher education via the increased repayment threshold. In consequence, the social gap in parental aspirations is reduced. These results suggest that such institutional reforms may have long-run effects on education decisions via their impact on the aspirations of parents towards the education of their children.

Our findings contribute to the discussion about the origins of the socio-economic gap in participation in higher education. Despite targeted policies to widen participation, inequality in higher education participation in the UK and the US has remained at around 30 percentage points in the last 20 years (see Galindo-Rueda and Vignoles (2005) and Murphy et al. (2019) for the UK, Bailey and Dynarski (2011) and Belley and Lochner (2007) for the US). The resulting large educational attainment gaps have been shown to contribute to persistent intergenerational inequality and to limit social mobility (Corak, 2013; Black and Devereux, 2011).

If the participation gap was mostly driven by financial barriers to university education, financial support may help reduce it. Yet, the elasticity of participation with respect to financial support is low. In the UK, using previous reforms, Dearden et al. (2014) estimate that a grant increase of £1,000 raises higher education participation by 4 percentage points. Similarly Azmat and Simion (2018) estimate a price elasticity of -0.5 for the 2010 Higher Education Act. The limited effectiveness of policies aiming at reducing financial constraints in access to higher education is not specific to the UK. Similar estimates have been produced for the US (Dynarski, 2003) or France (Fack and Grenet, 2015). Indeed financial constraints appear to have a limited effect on higher education participation (Cameron and Heckman, 1998; Keane and Wolpin, 2001; Cameron and Taber, 2004).

This price insensitivity might be due to a lack of information on the actual costs and benefits of higher education Yet, experiments providing information on costs and benefits of education have had limited effect in affecting higher education participation (Bergman et al., 2019; Busso et al., 2017; Hastings et al., 2015; Kerr et al., 2020; McGuigan et al., 2016a; Oreopoulos and Dunn, 2013;

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Peter and Zambre, 2017) or may even increase participation gap (Dinkelman and Martínez A, 2014). This could be because by the time information is provided, students academic credentials largely determine their higher education decision. For example, Chowdry et al. (2013) emphasises that the participation gap in HE in the UK is driven to a larger extent by "poor achievement in secondary schools among pupils from low socio-economic backgrounds than [by] barriers arising at the point of entry to HE". In spite of this, interventions aimed at increasing university participation among lower socio-economic groups often focus on the transition period between secondary and tertiary education. Emmerson (2006) and Rizzica (2020) demonstrate that outreach policies successfully increased aspirations to attend higher education among school pupils from deprived neighbourhoods in the UK, and subsequently participation in post-compulsory education, but ultimately did not increase HE participation. Goux et al. (2017) show that an intervention improving the match between expectations and ability reduced drop-out in secondary education in France, but again did not succeed in raising university participation. Those interventions might have already come too late to alter the dynamic of investment decisions.

Indeed Belfield et al. (2020) using a survey of secondary school children in the UK highlight the importance of dynamic choices but importantly report that aspirations to attend university as largely shaped by the consumption values that teenagers attached to it, rather than financial considerations. There is also a noticeable socio-economic gap in educational aspirations. Children from low-income families have lower aspirations than those from high-income families (Chowdry et al., 2011; Baker et al., 2014), as they underestimate the returns to higher education and over-estimate its costs (Boneva and Rauh, 2019). A similar gap emerges in the aspirations of parents regarding their children's educational choices (Lergetporer et al., 2018). These aspirations are shaped by economic factors and the observed experiences in the social group (Ray, 2006), and by institutional features of the education system (La Ferrara, 2019). This raises the question whether education policies shape aspirations of adolescents and parents of less advantaged socio-economic backgrounds during during secondary school or earlier. Dalton et al. (2016) argues that aspirations are important drivers of early schooling investments, costly to revise, and might trap individuals out of higher education. Similarly, Polidano and Buddelmeyer (2013) estimate that the most important

factors explaining the gap in school completion rate are parental aspirations and test scores. Ler-getporer et al. (2018) provide experimental evidence on the responsiveness of parental aspirations to information on the costs and benefits of a university degree. They find that although parents without university education underestimate returns and overestimate costs of university education more, experimental information provision raises aspirations more strongly among parents with a university degree. In consequence, they conclude that such interventions will not result in narrower socio-economic aspiration gaps.

In contrast, we focus on the role of a large and well advertised change in the actual future cost of university, along with a redistributive financing scheme, on the aspirations of children and of their parents. While children's aspirations were unaffected, we find that parental aspirations are responsive to the rise in the cost of university and the accompanying changes in the financing scheme. In line with the financial incentives, richer parents adjusted their aspirations downwards while poorer parents' aspirations increased. This suggests that higher education policies have unintended consequences on future cohorts and that parents adjust their aspirations to education policies in a forward-looking manner. In consequence, we observe a small reduction in the social gap in parental aspirations.

2   Institutional Setting

In this section, we briefly define the main school leaving qualifications attainable in Great Britain and set out the specifics of the 2010 Higher Education Act and the pre-reform financing environment in the constituent countries of Great Britain.

2.1   Secondary school qualifications in GB

Education in England and Wales comprises of 7 years of primary education and 5 years of secondary education. Schools follow a National Curriculum. At the end of lower secondary school, typically at age 16, all pupils take a series of exams called the General Certificates of Secondary Education. These usually consists of examinations in about 10 subjects chosen by pupils. Following these exams, pupils enter a higher secondary education academic track, vocational training, apprenticeship

programs or, until 2013, leave education. In 2013, the Education Leaving Age in England was raised to the year in which those born on or after 1 September 1997 turn 17, thereafter in 2015 the compulsory year of education was raised to 18.[3] Pupils on the academic track choose three subjects to study for another two years towards Advanced level certificates, so called A-levels.

Education is fully devolved to the Scottish government, and we highlight here some of the key differences with the English system. Education is compulsory up to the age of 16 only. The Scottish education system also comprises of 7 years of primary school but only 4 years of lower secondary education, in which students prepare for National 4/5 qualifications provided by the Scottish Qualifications Authority. Thereafter, they can study for a further two years of post-compulsory education to prepare for the Scottish Advanced Highers qualifications. A-levels and Scottish Advanced Highers are the prime, but not unique qualifications for applying to Higher Education (we will refer to both of them as A-levels for the rest of the paper). Pupils expecting to go to university must thus around the age of 15/16 decide to study towards upper secondary education.

2.2 University fees across the UK before the 2012-13 reform

In 1998, universal university tuition fees were first introduced across the UK in the form of an upfront fee of £1,000 per year. From the academic year 2006-07, fees were increased to a cap of £ 3,000 per year, which raised with inflation to £3,375 by 2011-12 (see Table 1 below). Tuition fees could be financed through income-contingent loans, so that higher education was free at the point of entry for all students. The interest rate on student loans was fixed at exactly the inflation rate; i.e. 0% real interest rate. Repayment of the loans was conditional on graduate annual earnings being above £15,000 and the amount reimbursed was set at 9% of the income above this threshold. After 25 years, any unpaid sums were extinguished. The loan offered strong insurance against low post-graduation wages. Additionally, low income students were also eligible for a non-repayable grant and additional maintenance loans.

Welsh students were subject to the same regime from the academic year 2007/08. Additionally,

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[3]As this reform may also affect attitudes towards education, we provide sensitivity analysis in appendix 2.2.

those studying at Welsh institutions were eligible for a subsidy limiting tuition fees to their previous level of £ 1,175. Those studying in England had to pay the regular tuition fees of £ 3,000. This reduced tuition fee policy at Welsh institutions was dismissed in 2010, and Welsh residents paid tuition fees of £ 3,000 wherever they studied in the UK.

In 1999, the Scottish assembly attained legislative powers over tuition fees and abolished tuition fees in Scotland. In its place an endowment scheme was implemented, whereby graduates had to make a one-off payment of £2,000 after graduation, subject to an earnings threshold of more than £10,000. This payment was often added to their student loan. In 2007, the endowment scheme was abolished making university in Scotland free for Scottish students. Students from other parts of the UK were subject to fees of up to £1,820.

2.3 The 2012-13 reform in university fees in England

In November 2009, the labour government launched a review of higher education funding and student finance (Browne review), whose findings were published in October 2010. It recommended a lifting of the tuition fee cap and an increase of the income threshold at which tuition loans needed to be repaid. Almost immediately, students organised large scale demonstrations which took place in central London on a weekly basis. In the 3rd week of protests, the Welsh assembly announced that it would not increase tuition fees for Welsh students. On 14th December 2010, Westminster parliament adopted most of the recommendations from the Browne review which were implemented for the cohort entering higher education in the academic year 2012/13.

The reform almost tripled the tuition fee cap English universities could charge, to £9,000 per year. Although universities were given discretion over the exact tuition, a third charged the maximum amount, and no institution charged less than £6,000 (HEFCE, 2016). Average fees amounted to £8,040 in 2012/13, and rose to £8,507 in 2013/14.

In parallel, student financing was altered. The repayment threshold on tuition loan was raised to £21,000, albeit at a higher real interest rate of 3%, and any unpaid amount was to be written off after 30 instead of 25 years. Student loan forecasts suggest that due to means-tested repayment and the time limit of 30 years to repay a student loan, up to 70% of loans will not be fully reimbursed

and that 45% of the value of student loans will not be repaid Department for Education (2019b). However, student surveys suggest that many students, especially those from lower socio-economic backgrounds, may not be fully aware of this design feature, and hence may not take the insurance component of student loans into account when making their education choices. For example, students from lower socio-economic groups are more likely than those from higher groups to be concerned about being able to repay their student debt when they start working (48% in social groups D and E (i.e. those of working class or with non-working parents) compared with 42% in groups C1 and C2 (skilled working and lower middle class) and 36% in groups A and B (middle and upper middle class) (Unite Students, 2016).

The reform also expended financial help for the poorest students; grants for students from family earning less than £25,000 increased by 9% to £3,250 per year but disappeared for those with a family income between £42,600 and £50,695 and a National Scholarship Program was set-up to provide fee waivers to the poorest students (see Chowdry et al. (2012) for a full description of the reform).

Overall, the average student debt at graduation was predicted to increase from £24,754 to £44,035 (at 2014 prices) (Crawford and Jin, 2014). The average life-time repayment was predicted to increase from 1.1% to 2.1% of life-time earnings. However, due to the increase of the repayment threshold, the bottom 3rd of graduates would be better off under the new system (Chowdry et al., 2012). The reform is thus redistributive.

Wales implicitly caped tuition fees to £3,465 (Equal to £3,000 tuition at 2007 value) by introducing a universal grant for all Welsh students to make up the short-fall up to the £9,000 charged by most universities. This deviation from the English system neutralises the hike in tuition fees for Welsh students, wherever they study and leaves them only affected by the changes in the loan system.[4]

The reform did not affect Scottish students studying at a Scottish HE institution. They remained eligible for a tuition fee waiver from SAAS (Student Awards Agency for Scotland). The small minority of Scottish students wishing to study in England, Northern Ireland or Wales could

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[4]Wales adopted the English system for the 2018-19 academic year. The fee grant was abolished, and replaced by a fee loan.

Table 1: Finaning of Higher Education in 2011 and in 2012 by country of Domicile

	Pre-reform (2011-12)	Post-reform (2012-13)
	Tuition fees	
England	£3,375 (£1,820 at Scottish HEI)	Up to £9,000
Wales	£3,375** (£1,820 at Scottish HEI)	Up to £9,000 (Tuition Fee Grant up to £5,535)
Scotland	£3,375 (£0 at Scottish HEI*)	Up to £9,000 (£0 at Scottish HEI*)
	Tuition loan	
England	Interest: RPI Income threshold: £15,795 Period: 25 years	Interest up to RPI + 3% Income threshold: £21,000 Period: 30 years
Wales	Interest: RPI Income threshold: £15,795 Period: 25 years	Interest up to RPI + 3% Income threshold: £21,000 Period: 30 years
Scotland	Interest: Min of RPI or base rate +1% Income threshold: £15,000 Period: 35 years	Interest: Min of RPI or base rate +1% Income threshold: £15,795 Period: 35 years

* From 2001 to 2007, graduates had to make a one-off payment (endowment) of £2,000 after study completion
** Between 2006/07 and 2009/10 Students domiciled in Wales and studying in Wales were entitled to a tuition fee grant for tuition fees above £1,380.

be charged up to £9,000 but could apply to SAAS for a loan to cover the additional cost.[5] Table 1 summarises the changes in tuition costs and funding available to students by country of residence. To summarise, the Higher education Act 2010 notably increased tuition fees in England but had no effect on tuition fees for Scottish and Welsh resident. Moreover, in England and Wales, the student loans becomes less generous but somehow more redistributive over the life time, as the threshold of reimbursement is increased. Grants were also made marginally more generous for the poorest students. The student support system is not changed in Scotland. The reform clearly defines two treatment groups: England, fees and financing changed, and Wales, financing changed, and one control group: Scotland.

Information about the reform permeated largely in the population. For nearly two months, between the release of the Browne review of Higher Education on the 12th October 2010 recommending the reform and the passing of the Higher Education Act on the 14th of December 2010,

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[5]Note that non-Scottish students studying in Scotland were subject to the £9,000 tuition fee.

large students demonstrations took place throughtout the country. These demonstrations, especially resulted in extensive and sustained media coverage of the new HE financing rules (see also McGuigan et al. (2016b) for a time line of media coverage on tuition fees over the period). Figure 1 reports the number of Google search hits for "tuition fees" per week, standardised to 100 at its peak. It shows that the day the legislation was voted coincides with the peak general interest in tuition fees in the three countries, which we use to define our pre- and post reform period. Moreover, Figure 1 also shows that there is no further discontinuity in tuition information in the years following the announcement. In particular, there is no spike in internet search intensity around the actual implementation dates: December 2011 when most students apply for a place or in September 2012, when the first students to be charged under the new regime started university.

Figure 1: Interest in Tuition Fees in the UK Over Time
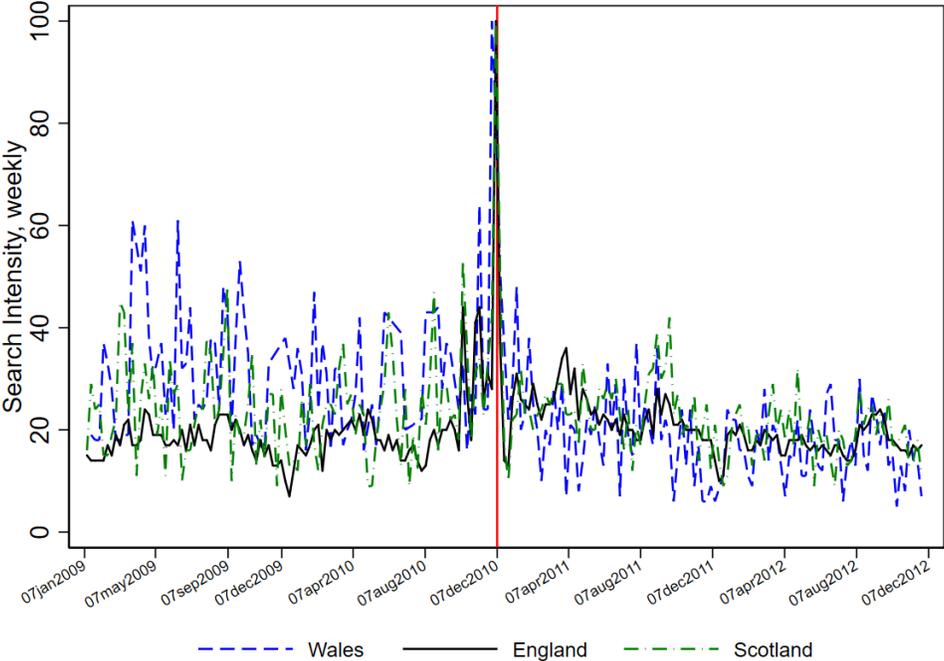
Data source: Google Trends (www.google.com/trends). The figure shows the search for terms "Tuition" + "Tuitions" + "Tuition Fees" + "Tuition Fee" + "University Fees" in England, Scotland, and Wales. Numbers represent search interest relative to the highest point on the chart for the given region and time. A value of 100 is the peak popularity for the term. A value of 50 means that the term is half as popular. Likewise a score of 0 means the term was less than 1% as popular as the peak.

3 Data

In our analysis, we use panel data from Understanding Society (USoc) covering the period between 2009 and 2015. Usoc is a representative sample of over 40,000 UK households which are followed up over time. The study collects data on a wide range of socio-economic characteristics from all adult household members (aged 16 or older) each year. We make use of a unique feature of the survey: it also collects data on education aspirations from teenagers and their parents.

Teenagers' educational aspirations

Teenagers' educational aspirations are elicited through a self-completion youth questionnaire, administered in participating households to teenagers aged 10 to 15. The sample consists of 10,704 teenagers. Our main variables of interest are teenagers' educational aspirations which we capture along two important dimensions, i) obtaining qualifications that allow for the pursuit of Higher Education (i.e. A-levels), and ii) intentions to go to university. Since university admissions are largely based on A-level results, attitudes towards obtaining A-levels can affect the probability of applying to -and being admitted to- university.

Teenagers' aspirations are elicited in USoc via two survey questions, listed in panel A of Table 2.[6] We construct binary indicators of high and low aspirations for each dimension. Teenagers have high advanced educational aspirations if they report to plan to continue school beyond age 16 and wish to take A-level exams.[7] We define university aspirations as high if students express an intention to pursue a Higher Education degree.[8] We link the aspirations data from the youth surveys with information on the household and their parents. This allows us to obtain data on mother's and father's education[9], as well as a wide set of household characteristics such as monthly household net income, race, and the constituent country and region they live in.

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[6]We use data on aspiration from Understanding Society. The British Household Panel Survey (BHPS) goes further back in time and also includes questions on education aspirations. However, the answers to aspirations questions in BHPS are different from those of USoc. We therefore only use data from USoc.

[7]Due to changes in the answer categories of the A-level question between the first two and subsequent waves, we categorise teenagers as intending to take A-levels if they plan to continue studying beyond age 16 (either full-time or in conjecture with a job)

[8]Individuals who plan to get a full-time job at age 16 are not asked about their HE aspirations. We classify those with intentions to start work immediately as having low aspirations towards university. We code "Don't know" answers as missing.

[9]Mother's (father's) education is an indicator variable equal to 1 if she (he) has an A-level degree or higher.

Table 2: Definition of key outcome variables

Domain	Survey instrument	Variable definition
A Teenagers' aspirations towards own education		
Advanced qualifications (A-levels)	"What would you like to do at age 16?" - get a full-time job - stay at school or college to do A levels/Highers - get an apprenticeship - do some other form of training - do something else - don't know	high: "stay at school/college to do A levels/Highers"
Study at university	"Would you like to go to University?" - yes - no - don't know	high: "yes"
B Parental aspirations towards teenagers' education		
Advanced qualifications (A-levels)	"How important do you think it is for your child/children to complete [A level] - very important - important - not very important - not at all important - don't know	high: "very important"
Study at university	"Would you personally like to see NAME go on to university or college when they finish their schooling?" - yes - no - don't know	high: "yes"

Adolescents' educational aspirations are high. Prior to the reform, 82% of teenagers state an intention to pursue A-levels, and 85% of teenagers wish to attend university (see first column of Table 3)[10]. This is overly optimistic compared to the Higher Education Initial Participation Rate for 17 to 20 year olds which ranges between 37% and 41% for the period of study (Department for Education, 2017). Additionally, we report a large gender gap in educational aspirations along both dimensions, with substantially lower aspirations among males: 76% of boys intend to obtain A-level qualifications relative to 87% for girls (p-value<0.0001). There is an even larger gender gap in aspirations to go to university: 90% of girls want to pursue Higher Education, about 10 percentage points more than boys (p-value≤ 0.0001). This is larger than the actual participation gap which amounted to 7 percentage points during the study period (Department for Education, 2017). This finding is consistent with several studies conducted in the UK that show that girls have

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[10]Note that these answers are not recorded on the same scale. For details, see Table 2.

Table 3: Teenagers' educational aspirations prior to the tuition reform, UK

A. All Teenager's Aspiration	Mean	Std.	No. of obs					
A-levels	0.8163	(0.3872)	6033					
University	0.8450	(0.3619)	5589					

B. By Gender	Females		Males				No. of obs	
	Mean	Std.	Mean	Std.	Mean diff	P-value	Females	Males
A-levels	0.8720	(0.3342)	0.7620	(0.4260)	0.1099	(0.0000)	2983	3050
University	0.8984	(0.3021)	0.7901	(0.4073)	0.1082	(0.0000)	2835	2754

C. By Maternal Education	A-levels and above		Below A-levels				No. of obs	
	Mean	Std.	Mean	Std.	Mean diff	P-value	A-levels and above	Below A-levels
A-levels	0.8588	(0.3483)	0.7621	(0.4259)	0.0967	(0.0000)	3385	2648
University	0.8798	(0.3252)	0.7994	(0.4005)	0.0804	(0.0000)	3171	2418

D. By HH Net Income	Median and Above		Below Median				No. of obs	
	Mean	Std.	Mean	Std.	Mean diff	P-value	Median and above	Below Median
A-levels	0.8668	(0.3398)	0.7796	(0.4146)	0.0873	(0.0000)	2546	3484
University	0.8932	(0.3089)	0.8098	(0.3925)	0.0835	(0.0000)	2370	3217

Note: All aspiration variables are based on binary definitions of high and low aspirations where high (low) aspirations are reported as 1 (0). Source: Understanding Society (waves 1-3, 2009-2011).

higher educational aspirations (Rampino and Taylor, 2013; Berrington et al., 2016; Hartas, 2016).

In the remaining panels of Table 3, we split the sample by mother's education and household income respectively. Teenagers whose mothers have lower educational attainment exhibit lower educational aspirations regarding upper secondary qualifications and attending university (Panel C) . Among teenagers coming from families with lower educated mothers 76% want to obtain A-levels which is about 10 percentage points lower than teenagers coming from families with more educated mothers. This aspiration gap of about 9 percentage points also exists for aspirations towards obtaining a university degree (p-value≤ 0.0001). We also see similar differences in teenagers' aspirations by household net income (Panel D). Among teenagers from below median income families 78% and 81% aspire to obtain A-levels and a university degree, respectively. Aspirations of teenagers from higher income households are however about 8 percentage points higher along both aspiration dimensions (p-value≤ 0.0001). As previously established, we confirm in this dataset that

in the UK there is a substantial socio-economic gap in teenagers' educational aspirations.

Parental aspirations for their children's education

Similarly, USoc captures parental aspirations regarding the educational choices of their adolescent children, in particular the importance of completing A-levels and whether parents would like to see their children attend university.[11] We construct binary indicators of high and low aspirations (See panel B in Table 2). We define parental aspirations towards their childrens' advanced qualifications as high if they state obtaining A-levels of their children is very important. Their aspirations towards university education of their children is classified as high if they express that they want their child to attend university.

Table 4 shows pre-reform aspirations of mothers and fathers towards the education of their teenagers. Similar to their children's, parental aspirations are high, regardless of which parent is asked. Three-quarters of parents think that it is very important that their children complete A-levels, and around 95% of parents would like to see their children attend university (See column 1 in Table 4). We find no evidence that fathers' and mother' aspirations for their children are different (p-value=0.4127), and obtain qualitatively similar results if we compare (highly) educated fathers' and mothers' aspirations (see last row in Table 4).

Higher educated parents have higher aspirations towards their childrens' education (See columns 4 and 6 in Table 4). Maternal aspiration gaps towards A-levels and university are about 6 and 2 percentage points, respectively. The corresponding paternal gap for a-levels and university are smaller at 1 and 3 percentage points. While highly educated parents have higher aspirations, the parental aspirations gap by educational background is considerably weaker when compared with aspirations gap observed in their children. In Appendix 1, we show that there is a weak positive correlation between both A-levels and university aspirations of parents and their children. These correlations are statistically significant but small in magnitude.

The descriptive statistics discussed above indicate that prior to the announcement of the 2012-13 reform in tuition fees, there was a socio-economic gap in teenagers' aspirations towards obtaining Higher Education qualifications. Similarly, we find a socio-economic gap in parental aspirations

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[11]These aspirations are elicited every two years in the main-stage questionnaire- in waves one, three and five.

Table 4: Parental aspirations regarding their children's education by parental educational attainment prior to the tuition reform, UK

Parental aspiration	All		A-levels and above		Below A-levels		p-value	Obs.
	mean	std.	mean	std.	mean	std	(mean-dif)	
A-levels aspirations								
Mothers	0.7349	(0.4414)	0.7691	(0.4215)	0.6982	(0.5591)	0.000	3,968
Fathers	0.7499	(0.4332)	0.7634	(0.4251)	0.7308	(0.4438)	0.091	2,067
$H_0 : asp_f = asp_m$ (p-value)	0.2074		0.0809		0.7277			
$H_0 : asp_f - asp_m = 0$ (p-value)	0.000							
University aspirations								
Mothers	0.9551	(0.2070)	0.963	(0.1888)	0.9467	(0.2247)	0.013	3,967
Fathers	0.9506	(0.2166)	0.9520	(0.2138)	0.9487	(0.2207)	0.732	2,067
$H_0 : asp_f = asp_m$ (p-value)	0.4127		0.8267		0.1301			
$H_0 : asp_f - asp_m = 0$ (p-value)	0.000							

Note: All aspiration variables are based on binary definitions of high and low aspirations where high (low) aspirations are reported as 1 (0). Source: Understanding Society (waves 1-3, 2009-2011).

towards education of their children. In what follows we study whether the reform has changed the existing aspiration gaps of teenagers and their mothers. We refrain from analysing fathers' aspirations because absent fathers would reduce our sample size and create selection bias.

4   Econometric Model

In this section we lay out the formal econometric framework we utilize to evaluate the extent to which this large change in tuition fees has affected teenagers' and their parents' aspirations regarding A-levels and University education. The tripling of tuition fees, accompanied by an increase in financial support to needy families and by the expansion of the HE borrowing system, may have affected not only the demand for future higher education, but also the demand for those qualifications that are more relevant for continuing education, such as A-levels.[12] Our outcomes of

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[12]The reform could also affect the expected return to Higher Education through general equilibrium effects. These could either arise from changes in the relative supply of graduates, caused by a decline in Higher Education enrolment or through fee-related changes in degree quality. Such general equilibrium effects would likely increase the expected return to a university degree and thus bias our estimates towards zero. Yet, the increase in fees was accompanied by a reduction in government grants to universities of similar size, so any quality adjustments would only arise from increased competition of universities for students. We assume that teenagers form their education attitudes focusing ceteris paribus on the much publicised increase in the net cost of attending Higher Education, and do not consider

interest are the educational aspirations of teenagers in secondary school and those of their mothers. Parental beliefs about the importance of the education of their children are likely important factors for the educational choices of teenagers and their aspirations are therefore also relevant for this analysis.

All aspiration measures are dummy variables that take a value of 1 when the individual reports high aspiration, and zero otherwise. We estimate linear probability models utilizing a difference in difference approach, exploiting the timing of the reform and the differential impact that this reform has had on the different countries of Great Britain. The first specification takes the following form:

$$Aspiration_{ict} = \alpha + \beta_0 E_{ic} \times T_t + \beta_1 W_{ic} \times T_t + \beta_2 E_{ic} + \beta_3 W_{ic} + \beta_2 T_t$$
$$+ \gamma_1 X_{ict} + \theta_1 t + \theta_2 t^2 + \theta_3 t \times T_t + \theta_4 t^2 \times T_t + \epsilon_{ict}$$

$$(1)$$

where $Aspiration_{ict}$ denotes the aspiration of individual i living in country c, in year t. E_{ic} and W_{ic} are binary variables to indicate individuals living in England and Wales, respectively. T_t is equal to one after the Higher Education Act was voted (i.e. December 2010), and zero otherwise. The vector of controls X_{ict} is composed of four groups. It includes time-variant individual characteristics such as urban residency and a flexible control for the teenagers' age; time-invariant individual characteristics such as ethnicity, gender or race; time-varying region specific characteristics such as unemployment rate and yearly log median annual pay; and time-invariant region characteristics such as education deprivation in 2012, measured by the proportion of adults who have no education or have left full-time education at the age of 16 or below. The inclusion of the controls not only can reduce the standard error of our estimates but, in the case of the time-variant variables, can also control for certain changes in the populations that would make the common trend assumption less likely to hold.[13] Since interviews were conducted over an extended period of time around the reform, we control for specific quadratic time trend (by quarter) on each side of the treatment

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its potential general equilibrium effects on returns to a degree. We abstract here from these likely small general equilibrium considerations and consider any change in aspiration as due to the changes in costs.

[13]We also estimate event study versions of these equations and we find parallel pre-reform trends in aspirations, see Appendix 2.4.

variable T_t.[14] The error term ϵ_{ict} is assumed to be orthogonal to all the right hand side variables. The parameters of interest are β_0 and β_1 which describe how the aspirations of English and Welsh individuals evolve differently from those of Scottish individuals after the introduction of the reform.

We estimate separate treatment impacts for teenagers living in England and Wales, since as previously explained, policies enacted by the Welsh parliament effectively cancelled the fee increase for Welsh resident and only left them experiencing the change in the financing of higher education, while English pupils are exposed to both reform components. Indeed while for the average English student the reform increased the costs of participating in Higher Education, Welsh students might have benefited from a reduction in the overall costs and in the risk associated with a bad labour market outcomes, potentially making them more likely to aspire to attend higher education.

In a second step, we investigate whether the policy has had differential effects across families with different socio-economic backgrounds. While the policy has dramatically increased the cost of higher education on average, previous simulation have demonstrated a large amount of heterogeneity in the life-time costs, with poorer graduates becoming better off due to the insurance effect of the loan restructuring (Chowdry et al. (2012)). We therefore expand our model to include interactions of the treatment with indicator of lower socio-economic characteristics of the parents:

$$
\begin{aligned}
Aspiration_{ict} = {} & \alpha + \beta_0 E_{ic} \times T_t \times Low_i + \beta_1 W_{ic} \times T_t \times Low_i + \beta_2 E_{ic} \times T_t + \beta_3 W_{ic} \times T_t \\
& + \beta_4 T_t \times Low_i + \beta_5 E_{ic} \times Low_i + \beta_6 W_{ic} \times Low_i + \beta_7 Low_i + \beta_8 E_{ic} + \beta_9 W_{ic} \quad (2) \\
& + \beta_{10} T_t + \gamma_1 X_{ict} + \theta_1 t + \theta_2 t^2 + \theta_3 t \times T_t + \theta_4 t^2 \times T_t + \epsilon_{ick}
\end{aligned}
$$

where Low_i is a binary variable equal to 1 if teenager i is from a lower socio-economic background. We analyse two possible measures for socio-economic background: maternal education and household income. We define lower educated mothers as those who have qualifications below A-levels. We classify households with an income below the median in England, Scotland, and Wales as lower income households. Our parameters of interest are β_0 to β_3. For example, β_0 describes how the aspirations of English teenagers from lower background evolve differently from their peers after the introduction of the reform, while β_2 describe the change for the English teenagers coming from a

[14]In Appendix 2.3 we compare the estimates of this specification with one including only year fixed effects.

higher socio-economic background compared to their Scottish peers. The parameters β_1 and β_3 have similar interpretations but relate to Welsh teenagers.[15]

5 Results

In this section, we present the main results. If students' educational aspirations depend on the perceived costs and benefits of different education pathways, the increase in the life-time costs of higher education for the average graduate should have decreased English teenagers' aspirations to pursue higher education and thus A-levels. In Wales, the fees remained at a lower level but the risks associated with bad labour market outcomes following graduations have been considerably reduced which should lead to an increase in university aspiration

In terms of the distributional impacts of the reform, the overall effects depends on the relative effects of the tuition fee increase and change in the financing for students from different backgrounds. Teenagers from lower socio-economic backgrounds are more likely to be financially constrained, and hence more likely to be discouraged by the increase in tuition fees and less generous terms on student loans, but other aspects of the reform might narrow the aspiration gap.

5.1 Teenagers' educational aspirations

Table 5 is split in two different panels, the left one reporting A-levels expectations and the right one University Expectations. Within each panel we report in Columns (1) and (6) the key parameters of interest, β_0 and β_1, from Model 1, for specific sub-populations. When considering all pupils, we estimate effects of the reform close to zero for English and Welsh teenagers (relative to their Scottish counterfactual) for both the expectations to study for A-levels and for attending university. The estimates are not statistically significant. Assuming a power of 80%, we can exclude effects larger than a reduction in expectation by 6 and 5 percentage points for A-level and university participation respectively for English teenagers. The minimum detectable effects are larger for the Welsh sub-sample, up to 9 percentage points reduction, due to the smaller sample size and

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[15]We also estimate equations 1 and 2 controlling for individual fixed effects and find that our results are robust to inclusion of individual fixed effects.

reduced precision. Note that these effects are smaller than the effects of the reform on applications (-19%) and enrolment (-11%) (Sá, 2019). Overall, we estimate that the reform had no effect on the expectations of teenagers in England and Wales and can exclude effects larger than half of the impact that the reform had on applications. Given the significant gender gap in aspirations found in Table 3, we also report gender-specific estimates. For both A-levels and university, girls' expectations are more sensitive to the reforms than boys but none of the parameters are statistically significant different from zero and the minimum detectable effects are of a similar order of magnitude as the one reported for the full population.

Since we cannot directly test the individual pupils' knowledge about the reform, as a proxy, we split the sample by age to test whether older teenagers, aged 13 to 15, react differently to the reform than younger teenagers. They are closer to making A-levels and university participation choices, and may be better informed about the policy change. Indeed, for English teenagers, we find that the older age group revise their educational aspiration downwards more than the younger teenagers, but even for this group, the estimates remain statistically insignificant.

Overall, we do not find that overall or any specific sub-population significantly reacted to the Higher Education Act. Estimates are larger among females, older teenagers and English residents. Surprisingly, despite the reform having substantial differences on the costs of higher education in England and Wales, we do not find that Welsh teenagers reacted differently than their English peers.

We now expand the analysis to account for possible heterogeneity by socio-economic status in the effect of the reform. As detailed in Chowdry et al. (2012) poorer students and graduates experiencing worse labour market outcomes are better off financially under the new system, we thus present estimates of Equation 2 to account for this heterogeneity. In Table 5, we report the estimates of β_0 and β_2 (respectively β_1 and β_3 for Welsh teenagers) from 2 for A-level aspirations and university aspirations. We do this separately for maternal education (Columns 2 and 3 for A-levels and Columns 7 and 8 for University aspirations) and household income (Columns 4 and 5 for A-levels and Columns 9 and 10 for University aspirations).

In Table 3 we previously confirmed there was an aspiration gap by socio-economic background.

However, we find no evidence of a statistically significant effect of the reform on aspirations to obtain A-levels or attend university in either socio-economic group and the point estimates on the specific effect for children with less educated mothers are actually negative. Similarly, we find no evidence that either English students from families with higher net income who are exposed to a strong increase in tuition fees *and* higher interest rates on student loans, nor students from poorer families change their aspirations following the policy change.

As previously, we replicate the analysis for different sub-groups. The estimates of the reforms on A-level aspirations for English pupils from lower socio-economic background are in general negative, even when split by gender or age, and are never statistically significant. Similarly, aspirations to attend university drop post reform, but never significantly so. For Welsh children, there is a wider range of results, mostly insignificant effects, apart from younger pupils with less educated mothers, whose aspirations to study for A-level is marginally significant. However, due to the large number of tests conducted, we would expect one to be significant by chance and we conclude that by and large the 2010 Higher Education Act had no effect on the aspirations of Welsh teenagers.

Altogether despite the large redistributive effect of the reform, especially in Wales, we find no heterogeneous impact either by maternal education or household income, and thus no closing of the aspiration gap. This may be due to lack of knowledge among lower income students about the redistributive nature of student loans, since this information is more difficult to grasp than the increase in the tuition fees or to the inelastic nature of their aspirations. Indeed, Belfield et al. (2020) report that beliefs about monetary benefits and costs play little role in shaping the educational aspirations of teenagers. These results are thus consistent with the small price elasticity often reported for the demand for higher education (Dearden et al., 2014; Azmat and Simion, 2018).

Table 5: Estimates of heterogeneous reform impacts on English and Welsh teenagers' educational aspirations by socio-economic status

	A-Levels Aspirations					University Aspirations				
		Maternal Education		*Household Income*			*Maternal Education*		*Household Income*	
	Overall (1)	Low (2)	High (3)	Low (4)	High (5)	Overall (6)	Low (7)	High (8)	Low (9)	High (10)
Panel A: All pupils										
English	-0.0110	-0.0292	0.0049	-0.0116	-0.0099	-0.0019	-0.0119	-0.0013	-0.0156	-0.0035
	(0.0223)	(0.0520)	(0.0239)	(0.0449)	(0.0264)	(0.0194)	(0.0489)	(0.0200)	(0.0396)	(0.0224)
Welsh	0.0157	0.0411	0.0035	0.0110	0.0113	-0.0051	-0.0667	0.0232	0.0305	-0.0315
	(0.0329)	(0.0713)	(0.0395)	(0.0673)	(0.0473)	(0.0292)	(0.0658)	(0.0355)	(0.0593)	(0.0406)
Panel B: Female pupils										
English	-0.0311	-0.0499	-0.0103	-0.0399	-0.0157	-0.0159	0.0440	-0.0323	-0.0418	-0.0040
	(0.0274)	(0.0644)	(0.0298)	(0.0562)	(0.0305)	(0.0222)	(0.0540)	(0.0240)	(0.0457)	(0.0234)
Welsh	-0.0226	0.0152	-0.0277	-0.0793	0.0210	-0.0221	-0.0408	0.0032	0.0404	-0.0638
	(0.0395)	(0.0861)	(0.0497)	(0.0826)	(0.0570)	(0.0325)	(0.0716)	(0.0426)	(0.0613)	(0.0340)
Panel C: Male pupils										
English	0.0118	-0.0035	0.0216	0.0240	-0.0057	0.0171	-0.0732	0.0349	0.0194	-0.0026
	(0.0343)	(0.0778)	(0.0369)	(0.0684)	(0.0424)	(0.0316)	(0.0790)	(0.0318)	(0.0642)	(0.0379)
Welsh	0.0434	0.0563	0.0290	0.0985	-0.0063	-0.0038	-0.1106	0.0328	0.0236	-0.0170
	(0.0510)	(0.1087)	(0.0604)	(0.1034)	(0.0734)	(0.0482)	(0.1086)	(0.0568)	(0.0992)	(0.0705)
Panel D: 13-15 year old pupils										
English	-0.0265	-0.1061	0.0144	-0.0595	-0.0031	-0.0219	-0.0183	-0.0191	-0.0449	-0.0113
	(0.0280)	(0.0669)	(0.0289)	(0.0568)	(0.0320)	(0.0246)	(0.0621)	(0.0249)	(0.0511)	(0.0275)
Welsh	-0.0023	-0.0818	0.0318	-0.0448	0.0216	0.0116	-0.1171	0.0627	0.0179	-0.0100
	(0.0405)	(0.0892)	(0.0494)	(0.0832)	(0.0572)	(0.0363)	(0.0822)	(0.0445)	(0.0744)	(0.0502)
Panel E: 10-12 year old pupils										
English	0.0110	0.0586	0.0002	0.0449	-0.0154	0.0192	-0.0047	0.0174	0.0161	0.0042
	(0.0357)	(0.0814)	(0.0397)	(0.0715)	(0.0438)	(0.0308)	(0.0775)	(0.0319)	(0.0619)	(0.0368)
Welsh	0.0389	0.2021*	-0.0298	0.0825	-0.0026	-0.0311	-0.0044	-0.0297	0.0428	-0.0613
	(0.0544)	(0.1166)	(0.0636)	(0.1111)	(0.0797)	(0.0476)	(0.1073)	(0.0568)	(0.0960)	(0.0668)

We estimate a Linear Probability Model, controlling for regional annual unemployment rate, median annual pay and educational deprivation by government office regions, and for age, ethnicity, and urban residency. The outcomes are reported as 1 for high aspiration and 0 otherwise. Mean A-levels and University aspirations are 0.82 and 0.85, respectively. Maternal education is classified as high if mothers have an education of A-levels or above. High income households are classified as those with net income of median or above. Sample size for the All pupil panels are 20,411 for A-levels expectations and 18,128 for University expectations. Robust standard errors are reported in parentheses. *, **, *** denote statistical significance at the 10, 5, and 1 percent levels, respectively.

5.2 Mothers' educational aspirations

In this section, we study whether parental aspirations towards their children's A-levels attainment and university participation changed following the passing of the 2010 Higher Education Act. We focus on mothers to avoid sample selection issues arising from absent fathers. Parental aspirations may be more reactive to these policy changes for three reasons: first, parents may follow the news more closely and be better informed about the details of the reform; second, since parents provide substantial financial support for their children's higher education investments, they may be more susceptible to changes in the cost of Higher Education.[16] Finally, parents may be better informed about the returns to such education investments and may have higher preferences for their children's education if they take a more forward-looking long-run perspective on such investments than their children.

Following a similar format, we report estimates of the reform on maternal aspirations in Table 6. For the full population, and separately by gender, we find that the reform had limited and imprecisely estimated effect on parental aspirations both in England and Wales. However, for parents of older pupils we find a large and marginally significant increase in aspiration to study for A-levels in Wales but surprisingly a non-significant reduction in the aspirations to attend university. English mothers also become 4 percentage points less likely to state that they wish their child to attend university, which is statistically significant at the 5% level.

These somehow ambiguous findings hide important heterogeneity in the effect of the reforms by family background. In both England and Wales, less educated mothers become at least 20 percentage points more like to aspire to their child studying for A-level and between 8 and 10 percentage points more likely to want them to go to university. At the same time, more educated mothers revised downwards their aspirations, especially about higher education participation, resulting in a substantial reduction in the aspiration gap by 14 to 17 points.

For household below the median income, we also find a similar patterns. We find a statistically significant decline in university aspirations by about 5 percentage points among all English mothers with higher net household income (column 10), and a rise of similar magnitude in such aspirations

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[16]A 2019 survey of parents whose child is at university reported that 84% of parents financially supported their child during their studies, for an average of £360 per month (Which? University Parent Survey 2019).

among poorer mothers (column 9), and even larger effects in Wales. Again, the results are stronger for mothers whose children are close to making further and higher education choices with the higher education aspiration gap closing by 15 percentage points for pupils aged 13-15 in England, and 23 percentage points in Wales.

Well-informed mothers who understand the cost implications of the reform for their children increase their aspirations that their child will attend university, if less educated or poor, and reduced them otherwise; in line with the heterogeneous effect of the reform on the total costs of attending university. As such, the maternal aspirations gap closes, albeit by a combination of dis- and encouragement effects. Furthermore, we see similar results regarding the importance mothers ascribe to A-level attainment (see columns 2 and 3): while the discouragement effect on the aspirations of more educated mothers is not statistically significant, we find an economically and statistically significant increase of 20 percentage points in the aspirations of lower educated mothers.

In summary, despite the prominent media coverage of the tuition fee increase in the media, we find no evidence that a large increase in the cost of Higher Education discouraged teenagers' aspirations towards advanced qualifications or Higher Education. Yet, we do find that their parents react to the reform. Mothers' university aspirations for their children change in line with the financial incentives the reform sets; richer parents adjust their aspirations downwards in reaction to the substantial increase in the cost of higher education, while poorer parents' aspirations increase in line with the expansion of financial support available to their children in the future, which is combined with insurance against the risk of higher education via the increased repayment threshold. This is observed for mothers whose children are close to making their decisions regarding higher secondary education, who are probably better informed on the costs of higher education than mothers of younger children. These results are consistent with the findings of Azmat and Simion (2018) and Murphy et al. (2019) who estimated that the Higher Education Act 2010 reduced the participation gap in higher education, mostly by its deterrence effect for children originating from higher income families.

Table 6: Estimates of reform impacts on English and Welsh mothers' aspirations towards their children's education

	A-levels Aspirations					University Aspirations				
		Maternal Education		*Household Income*			*Maternal Education*		*Household Income*	
	Overall (1)	Low (2)	High (3)	Low (4)	High (5)	Overall (6)	Low (7)	High (8)	Low (9)	High (10)
Panel A: All pupils										
English	0.0148	0.0609	-0.0026	0.0021	0.0139	-0.0224	0.0307	-0.0329*	0.0522*	-0.0473*
	(0.0288)	(0.0638)	(0.0335)	(0.0573)	(0.0382)	(0.0155)	(0.0336)	(0.0186)	(0.0305)	(0.0243)
Welsh	0.0478	0.1474	-0.0056	0.1278	-0.0448	-0.0070	0.0553	-0.0286	0.1188**	-0.0686
	(0.0482)	(0.1005)	(0.0619)	(0.0970)	(0.0717)	(0.0264)	(0.0550)	(0.0309)	(0.0544)	(0.0446)
Panel B: Female pupils										
English	0.0482	0.0317	0.0358	0.0034	0.0449	-0.0209	0.0025	-0.0217	0.0192	-0.0285
	(0.0389)	(0.0871)	(0.0435)	(0.0785)	(0.0463)	(0.0187)	(0.0429)	(0.0211)	(0.0365)	(0.0285)
Welsh	0.0511	0.1850	-0.0333	0.1494	-0.0573	-0.0279	-0.0262	-0.0132	0.1143*	-0.0963**
	(0.0667)	(0.1381)	(0.0843)	(0.1336)	(0.0956)	(0.0303)	(0.0643)	(0.0425)	(0.0536)	(0.0379)
Panel C: Male pupils										
English	-0.0170	0.0875	-0.0365	0.0088	-0.0260	-0.0236	0.0573	-0.0425	0.0900*	-0.0691*
	(0.0421)	(0.0929)	(0.0499)	(0.0837)	(0.0606)	(0.0245)	(0.0518)	(0.0301)	(0.0495)	(0.0398)
Welsh	0.0431	0.1210	0.0111	0.1190	-0.0490	0.0121	0.1365	-0.0409	0.1371	-0.0529
	(0.0695)	(0.1452)	(0.0887)	(0.1401)	(0.1060)	(0.0428)	(0.0899)	(0.0452)	(0.0909)	(0.0765)
Panel D: Pupils aged 13-15										
English	0.0433	0.2000**	-0.0232	0.0414	0.0231	-0.0391*	0.1033**	-0.0750**	0.0764*	-0.0771**
	(0.0406)	(0.0852)	(0.0504)	(0.0808)	(0.0535)	(0.0232)	(0.0458)	(0.0312)	(0.0459)	(0.0358)
Welsh	0.1298*	0.2373*	0.0484	0.1911	-0.0012	-0.0371	0.0821	-0.0621	0.1920**	-0.1329**
	(0.0680)	(0.1385)	(0.0911)	(0.1375)	(0.1020)	(0.0352)	(0.0706)	(0.0456)	(0.0706)	(0.0577)
Panel E: Pupils aged 10-12										
English	-0.0154	-0.1052	0.0202	-0.0311	0.0011	-0.0050	-0.0503	0.0101	0.0261	-0.0162
	(0.0408)	(0.0957)	(0.0430)	(0.0813)	(0.0544)	(0.0201)	(0.0507)	(0.0192)	(0.0397)	(0.0321)
Welsh	-0.0456	0.0215	-0.0597	0.0544	-0.0913	0.0259	0.0318	0.0055	0.0423	0.0027
	(0.0674)	(0.1446)	(0.0822)	(0.1357)	(0.1003)	(0.0399)	(0.0875)	(0.0414)	(0.0832)	(0.0682)

We estimate a Linear Probability Model, controlling for regional annual unemployment rate, median annual pay and educational deprivation by government office regions, and for age, ethnicity, and urban residency. The outcomes are reported as 1 for high aspiration and 0 otherwise. Mean maternal A-levels and University aspirations are 0.73 and 0.95, respectively. Maternal education is classified as high if mothers have an education of A-levels or above. High income households are those with net income of median or above. Sample size for the All pupil panels are 11,001 for A-levels expectations and 10,971 for University expectations. Robust standard errors are reported in parentheses. *, **, *** denote statistical significance at the 10, 5, and 1 percent levels, respectively.

6 Conclusion

Increasing higher education attendance of students from lower socio-economic backgrounds has been one of the main focuses of policy makers in the UK and in many other developed countries. Despite a wealth of reforms the participation gap by social background has remained stable at about 30 percentage points over the last two decades, both in the UK and the US. While potential reasons for the widely known and persistent socio-economic gap in university participation range from financial constraints, to lack of information about the costs and benefits of a university degree, lower level of preparednesss, differences in debt risk aversion, etc... the origins of the gap are still disputed. A frequent argument is that children from lower socio-economic backgrounds may have lower educational aspirations, and that these may be an important factor in the decision whether to participate in Higher Education.

In this paper, we contribute to the surprisingly scarce evidence on the educational aspirations of teenagers and of their parents. We focus on aspirations towards advanced secondary education qualifications, which are the basis of acceptance into higher education. We study the impact of the Higher Education Act 2010 which substantially raised tuition fees for students but also had redistributive elements (increase in the income threshold at which loan reimbursement starts and extended the generosity of financial support for students from lower socio-economic background). We investigate whether this reform affected the education aspirations of potential future students, i.e. teenagers aged 10 to 15, and of their parents, and whether the redistributive elements of the financing reform help reducing the aspiration gaps by social background.

We exploit variation in the implementation of the 2010 Higher Education act across the constituent countries of Great Britain, in a difference-in-difference approach. Four key findings emerge. First, we find no significant effect of a large increase in tuition fees on the aspiration of teenagers to obtain advanced secondary education qualifications or attend university. Second, while we find significant socio-economic and gender gaps in these aspirations among teenagers at baseline, the Higher Education Act 2010 did not alter them significantly, and despite its redistributive elements, the effects of the reform appear homogeneous. Third, despite large differences in the implementation of the Act between England and Wales, with Welsh pupils not facing increased tuition costs

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but benefiting from redistributive changes in financial study support, the effects on aspirations are very similar between pupils. Despite intensive media coverage around the change of legislation, teenagers' aspirations about higher education investment are not responsive to even large, widely communicated policy changes.

However, our fourth main finding is that parental aspirations for their children do respond to the reform, and their response reflects the financial incentives set by policy-makers. Richer parents adjust their university aspirations downwards in reaction to the substantial increase in the cost of higher education, while poorer parents' aspirations increase in line with the expansion of financial support available to their children in the future, and a reduction in the financial risk of poor labour market outcomes due to increased income threshold at which debt repayment must be made. Altogether, the socio-economic gap in parental aspirations regarding their children going to university shrank substantially.

Our results are thus consitent with previous evidence that teenagers educational aspirations are not predominently shaped by financial considerations over the costs and benefit of higher education but mostly by "consumption value of university' (Belfield et al., 2020), rendering the demand for university education price incencitive. Indeed, the 2010 Higher Education act was found to have little impact on the demand for higher education overall (Azmat and Simion, 2018; Sá, 2019) but reduced the social gap in participation (Azmat and Simion, 2018). Policies to reduce the social gap in participation should thus focus on increasing the "consumption value of university' for children and on lifting parental aspirations for children from lower socio-economic background.

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Appendix

1 Correlations between parental and children's aspirations

Table 7 shows the pre-treatment distribution of aspirations of teenagers, fathers, and mothers. Mothers and fathers have similar aspirations towards A-levels and university education while their aspirations looks different from those of their children. Teenagers aspirations towards A-levels and parental aspirations towards A-levels are not comparable because they are constructed using different scales (See Table 2 for how these measures are constructed). University aspirations are constructed using similar scales which makes the comparison between parental and teenagers' aspirations more compatible. Around 95 percent of fathers and mothers want their child to go to university while only 84 percent of teenagers would like to attend university. We test if parental aspirations within the household are different from their teenagers aspirations. In all cases we reject the null that there are no differences in aspirations within the household. We also estimate the correlation between parental and teenagers aspirations. The reported phi correlation coefficients show that there is a weak positive correlation between the aspiration levels of parents and their children. These correlations are statistically significant but are small in magnitude.

Table 7: Parental and children aspirations regarding education - pre-treatment

	Teenagers			Mothers			Fathers		
Aspirations	Mean	Std.	Obs.	Mean	Std.	Obs.	Mean	Std.	Obs.
A-levels	0.8163	0.3872	6,033	0.7349	0.4414	3,968	0.7499	0.4332	2,067
$H_0 : asp_{parent} - asp_{child} = 0$									
p-value					0.0000			0.0000	
$Cor(asp_{parent}, asp_{child})$					0.1289			0.1237	
p-value					0.000			0.000	
University	0.8450	0.3619	5,589	0.9551	0.2070	3,967	0.9506	0.2166	2,067
$H_0 : asp_{parent} - asp_{child} = 0$									
p-value					0.0000			0.0000	
$Cor(asp_{parent}, asp_{child})$					0.1076			0.1588	
p-value					0.0000			0.0000	

Note: All aspiration variables are based on binary definitions of high and low aspirations where high (low) aspirations are reported as 1 (0). The table reports phi correlation coefficients between aspirations of parents and teenagers. Source: Understanding Society (waves 1-3, 2009-2011).

2 Robustness of identification strategy

In this section we study the robustness of our results to scenarios which could result in failure of our identification strategy. We first drop those individuals who were interviewed around the time of the reform and could be partially treated (see section 2.1). Next, we study if our results are robust to exclusion of a sample of individuals who were affected by Raising of School Leaving Age (ROSLA) in England (See section 2.2).

2.1 Reform Awareness

Our identifications strategy relies on the assumption that teenagers prior to the reform announcement were not affected by the reform while after the reform all teenagers became aware of the reform. Indeed, Figure 1 shows that there was a large peak in search for tuition fees term in December 2010. This figure also shows that there are some smaller spikes in the search for tuition fees in October and November 2010 indicating that pupils might have became aware of the discussions around the tuition fees reform announcement and therefore our pre-treatment observations might be partially treated. Similarly, following the reform, from January until May 2011, there was a prolonged increase in search for tuition fees pointing out that there could have been a lag in learning about the reform and teenagers might not have been all treated after the reform. In both of these cases, including these individuals in control/treatment will understate our results. To address these issues, we drop those individuals who were interviewed between October 2010 - May 2011.

Table 8 reports the estimated results for teenagers. The estimates in columns 1 and 4 show that in line with our main findings the reform did not have a statistically significant impact on A-levels or university aspirations of pupils. We further evaluate the heterogeneous impacts of the reform by socio-economic status; i.e. maternal education. We classify teenagers whose mothers had an education of A-levels or above as higher socio-economic status (see columns 3 and 6), the rest are classified as lower socio-economic status and the impact for them are reported in columns 2 and 5. Similar to our main estimates, these estimates do not suggest that the reform changed the existing aspirations gap between teenagers form lower and higher socio-economic backgrounds. The results in Panel B explore the robustness of our results by household income. Households with net income

Table 8: The robustness of results to possibility of reform awareness - teenagers' aspiration

	A-Levels			University		
	Overall (1)	Low (2)	High (3)	Overall (4)	Low (5)	High (6)
Panel A: Maternal education						
English	-0.0303	-0.0522	-0.0077	-0.0205	-0.0192	-0.0173
	(0.0241)	(0.0564)	(0.0259)	(0.0212)	(0.0526)	(0.0221)
Welsh	0.0032	0.0271	-0.0048	-0.0065	-0.0734	0.0248
	(0.0359)	(0.0779)	(0.0432)	(0.0321)	(0.0716)	(0.0398)
# of obs	17885	17885	17885	15831	15831	15831
Panel B: Household net income						
English	-0.0303	-0.0151	-0.0293	-0.0205	-0.0251	-0.0185
	(0.0241)	(0.0486)	(0.0292)	(0.0212)	(0.0430)	(0.0251)
Welsh	0.0032	0.0275	-0.0143	-0.0065	0.0250	-0.0336
	(0.0359)	(0.0728)	(0.0506)	(0.0321)	(0.0647)	(0.0444)
# of obs	17885	17848	17848	15831	15805	15805

We estimate a Linear Probability Model, controlling for the annual unemployment rate, median annual pay and educational deprivation by government office regions, and for age, ethnicity, and urban residency. Outcomes are binary variables where high aspirations are reported as 1 and low aspirations are reported as 0. Mean A-levels and University aspirations of teenagers are 0.82 and 0.84, respectively. Mean A-levels and university aspirations of mothers are 0.73 and 0.95, respectively. Robust standard errors are reported in parentheses. *, **, *** denote statistical significance at the 10, 5, and 1 percent levels, respectively.

of median or above are classified as high-income. Similar to our main results, we find no evidence that English and Welsh students from families with a higher household net income nor students from poorer families changed their aspirations following the policy change.

Table 9 reports the robustness of our results for mothers' aspirations towards education of their children. Similarly, the overall estimates in column 1 of Panel A are close to zero and are not statistically significant. Our results for heterogeneous impacts of the reform by maternal education and net household income are also qualitatively similar to what we find in the main results. We find that the reform had a discouragement effect on aspirations of mothers to send their children to university among more educated English mothers. However, due to a smaller sample these results are not statistically significant. Panel B reports the heterogeneous impacts by household income and we can see a decrease in aspirations of both English and Welsh mothers from higher income households (see column 6 in Panel B) but a decrease in aspirations for mothers from poorer households (column 5 in panel A). However, by reducing the sample our estimates are less precise and only the effects for Welsh mothers from poorer economic backgrounds remains statistically significant. The overall conclusion from this exercise is that our results are robust to exclusion of

Table 9: The robustness of results to possibility of reform awareness - mothers' aspirations towards education of their children

	A-Levels			University		
	Overall	Low	High	Overall	Low	High
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Maternal education						
English	0.0361	0.0402	0.0250	-0.0145	0.0197	-0.0225
	(0.0304)	(0.0676)	(0.0351)	(0.0144)	(0.0302)	(0.0178)
Welsh	0.0421	0.1221	-0.0033	0.0125	0.0671	-0.0182
	(0.0516)	(0.1075)	(0.0672)	(0.0262)	(0.0538)	(0.0286)
# of obs	9619	9619	9619	9593	9593	9593
Panel B: Household net income						
English	0.0361	-0.0135	0.0421	-0.0145	0.0463	-0.0385
	(0.0304)	(0.0604)	(0.0404)	(0.0144)	(0.0281)	(0.0248)
Welsh	0.0421	0.1255	-0.0530	0.0125	0.1130**	-0.0509
	(0.0516)	(0.1041)	(0.0777)	(0.0262)	(0.0538)	(0.0452)
# of obs	9619	9614	9614	9593	9588	9588

We estimate a Linear Probability Model, controlling for the annual unemployment rate, median annual pay and educational deprivation by government office regions, and for age, ethnicity, and urban residency. Outcomes are binary variables where high aspirations are reported as 1 and low aspirations are reported as 0. Mean A-levels and University aspirations of teenagers are 0.82 and 0.84, respectively. Mean A-levels and university aspirations of mothers are 0.73 and 0.95, respectively. Robust standard errors are reported in parentheses. *, **, *** denote statistical significance at the 10, 5, and 1 percent levels, respectively.

partially treated individuals and our results remain qualitatively similar.

2.2 Robustness to Raising of School Leaving Age (ROSLA)

In 2008, the UK government announced that the compulsory years of education in England will be increased from 16 to 17 in 2013 and from 17 to 18 in 2015. Students in England, Scotland and Wales can leave education at the age of 16, however, English students are required to stay either in full-time education, or spend 20 hours in training, or start an apprenticeship or traineeship after the age of 16. Hence ROSLA could only affect English students but not Scottish and Welsh pupils. This raise in years of education could potentially affect aspirations towards education as it could signal the importance of years of schooling to both teenagers and their parents. Therefore, our estimates of the impact of the reform could be affected in a way that the negative estimates could be understated while the positive effects could be overstated. In what follows we study whether children whose years of education was affected by the reform respond differently than those who were not affected by the reform.

Since our sample covers data from 2009-2015, all teenagers could be aware of this increase in

the schooling age. The 2013 reform increased years of schooling of teenagers who were born after September 1 1997. Based on this threshold, we divide the sample into two parts: (i) Binding sample which comprises of English teenagers who were younger than 18 year old in 2015 [17] for whom ROSLA-2013 and ROSLA-2015 were binding; (ii) for the rest of the sample the reform is not binding and we classify them as the non-binding sample. It is worth mentioning that since Welsh and Scottish students were not affected by this reform, the composition of sample for them remains the same in both non-binding and binding samples. One problem with such stratification is that the children in the non-biding sample will be younger after the reform compared to children in the binding sample. Since younger children in general have lower aspirations towards education, this stratification might result in overestimation of the impact of the reform in the binding sample and underestimation in the non-binding sample.

Panels A and B in Table 10 report the the heterogeneous estimates of the impact of the reform on teenagers' aspirations by maternal education. Panel A reports the results for the sample who were not affected by ROSLA reform (non-binding sample), while panel B for those who were affected by ROSLA (binding sample). Our results do not point to differences in the estimates for the binding and non-binding samples. Similar to our main results we find that the impact of the reform on English students are close to zero. Panels C and D report the results by household net income and similarly we do not find that the reform changed teenagers' aspirations towards higher education.

Table 11 reports the estimates for mothers' aspirations toward education of their teenagers. Comparing Panel A and Panel B, we do not find any evidence that the impact of the reform on mothers of those teenagers who were affected by ROSLA are qualitatively different than the sample who were not affected. Similar to our main findings, we find a negative impact of the reform on university aspirations of English mothers from higher socio-economic backgrounds (See column 6). The estimates for the binding and non-binding sample are very similar; however, in the non-binding sample we have too few observations to get a statistically significant impact of the reform. The heterogeneous estimates by household net income for these two samples are similar. We find a positive impact of the reform for university aspirations of English mothers who are form poorer

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[17]note that we cannot use date of birth to specify this threshold because month of birth is not available in our database

Table 10: Robustness of teenagers' aspirations estimates to ROSLA reform

	A-Levels			University		
	Overall (1)	Low (2)	High (3)	Overall (4)	Low (5)	High (6)
	Maternal Education					
Panel A: Non-binding sample						
English	-0.0091	-0.0287	0.0071	0.0128	-0.0328	0.0220
	(0.0258)	(0.0549)	(0.0275)	(0.0231)	(0.0513)	(0.0234)
Welsh	0.0122	0.0439	-0.0017	-0.0065	-0.0638	0.0199
	(0.0330)	(0.0714)	(0.0395)	(0.0293)	(0.0658)	(0.0356)
# of obs	7593	7593	7593	6945	6945	6945
Panel B: Binding sample						
English	-0.0101	-0.0178	-0.0001	0.0071	-0.0061	0.0050
	(0.0231)	(0.0532)	(0.0251)	(0.0202)	(0.0499)	(0.0211)
Welsh	0.0165	0.0406	0.0045	-0.0035	-0.0655	0.0241
	(0.0329)	(0.0713)	(0.0395)	(0.0292)	(0.0657)	(0.0355)
# of obs	17866	17866	17866	15768	15768	15768
	HH Net Income					
Panel C: Non-binding sample						
English	-0.0091	0.0001	-0.0124	0.0128	-0.0533	0.0310
	(0.0258)	(0.0481)	(0.0302)	(0.0231)	(0.0426)	(0.0258)
Welsh	0.0122	0.0092	0.0090	-0.0065	0.0277	-0.0313
	(0.0330)	(0.0674)	(0.0474)	(0.0293)	(0.0594)	(0.0406)
# of obs	7593	7588	7588	6945	6941	6941
Panel D: Binding sample						
English	-0.0101	0.0025	-0.0177	0.0071	-0.0073	0.0006
	(0.0231)	(0.0462)	(0.0278)	(0.0202)	(0.0408)	(0.0237)
Welsh	0.0165	0.0108	0.0122	-0.0035	0.0293	-0.0293
	(0.0329)	(0.0674)	(0.0473)	(0.0292)	(0.0592)	(0.0405)
# of obs	17866	17832	17832	15768	15744	15744

We estimate a Linear Probability Model, controlling for the annual unemployment rate, median annual pay and educational deprivation by government office regions, and for age, ethnicity and urban residency. Outcomes are binary variables where high aspirations are reported as 1 and low aspirations are reported as 0. Mean A-levels and university aspirations of teenagers are 0.82 and 0.84, respectively. Robust standard errors are reported in parentheses. *, **, *** denote statistical significance at the 10, 5, and 1 percent levels, respectively.

households while a negative income for English mothers from richer households. The differences by household income are larger for the non-binding sample and are statistically significant while for the sample who were affected by the reform these estimates are not statistically significant.

Table 11: Robustness of mothers' aspirations estimates towards education of their children to ROSLA reform

	A-Levels			University		
	Overall	Low	High	Overall	Low	High
	(1)	(2)	(3)	(4)	(5)	(6)
	Maternal Education					
Panel A: Non-binding sample						
English	0.0081	0.0519	-0.0042	-0.0269	0.0276	-0.0361
	(0.0345)	(0.0716)	(0.0406)	(0.0189)	(0.0384)	(0.0229)
Welsh	0.0388	0.1487	-0.0146	-0.0119	0.0543	-0.0329
	(0.0483)	(0.1004)	(0.0618)	(0.0264)	(0.0551)	(0.0310)
# of obs	4354	4354	4354	4352	4352	4352
Panel A: Binding sample						
English	0.0293	0.0610	0.0125	-0.0237	0.0315	-0.0346*
	(0.0296)	(0.0651)	(0.0344)	(0.0157)	(0.0340)	(0.0189)
Welsh	0.0504	0.1489	-0.0037	-0.0068	0.0540	-0.0279
	(0.0482)	(0.1006)	(0.0618)	(0.0264)	(0.0550)	(0.0310)
# of obs	9325	9325	9325	9294	9294	9294
	HH Net Income					
Panel A: Non-binding sample						
English	0.0081	0.0153	-0.0009	-0.0269	0.0681*	-0.0618**
	(0.0345)	(0.0658)	(0.0452)	(0.0189)	(0.0357)	(0.0274)
Welsh	0.0388	0.1205	-0.0487	-0.0119	0.1137**	-0.0704
	(0.0483)	(0.0965)	(0.0711)	(0.0264)	(0.0544)	(0.0446)
# of obs	4354	4352	4352	4352	4350	4350
Panel A: Binding sample						
English	0.0293	-0.0171	0.0397	-0.0237	0.0389	-0.0402
	(0.0296)	(0.0587)	(0.0396)	(0.0157)	(0.0311)	(0.0249)
Welsh	0.0504	0.1253	-0.0408	-0.0068	0.1179**	-0.0676
	(0.0482)	(0.0970)	(0.0716)	(0.0264)	(0.0544)	(0.0446)
# of obs	9325	9322	9322	9294	9291	9291

We estimate a Linear Probability Model, controlling for the annual unemployment rate, median annual pay and educational deprivation by government office regions, and for urban residency. Outcomes are binary variables where high aspirations are reported as 1 and low aspirations are reported as 0. Mean A-levels and university aspirations of mothers are 0.73 and 0.95, respectively. Robust standard errors are reported in parentheses. *, **, *** denote statistical significance at the 10, 5, and 1 percent levels, respectively.

2.3 Robustness to different model specifications

In the main section of the paper, we reported the estimates of Equation 1 which includes time trends and quadratic time trends as control variables. Here, we analyse the robustness of those estimates by estimating a more flexible specification in which we replace the time trends with year fixed effects. The specification takes the following form:

$$Aspiration_{ictk} = \alpha + \beta_0 E_{ic} \times T_t + \beta_1 W_{ic} \times T_t + \beta_2 E_{ic} + \beta_3 W_{ic} + \gamma X_{ictk} + \mu_t + \epsilon_{ictk} \qquad (3)$$

$Aspiration_{ictk}$ denotes the aspiration of individual i living in country c, in government office region k in year t. E_{ic} and W_{ic} are binary variables to indicate individuals living in England and Wales, respectively. T_t is equal to one after the treatment has been introduced, and zero otherwise. The vector of controls X_{ictk} is composed of four groups. It includes time-variant individual characteristics such as urban residency and a flexible control for the teenagers' age; time-invariant individual characteristics such as ethnicity, gender or race; time-varying region specific characteristics such as unemployment rate and yearly log median annual pay; and time-invariant region characteristics such as education deprivation in 2012, measured by the proportion of adults who have no education or have left full-time education at the age of 16 or below. Finally, μ_t are year fixed effects to flexibly control for time variation in the demand for Higher Education. The error term ϵ_{ictk} is assumed to be orthogonal to all the right hand side variables. The parameters of interest are β_0 and β_1 which describe how the aspirations of English and Welsh individuals evolve differently from those of Scottish individuals after the introduction of the reform.

Table 12 reports the estimates of the overall impact of the rise in the cost of university on aspirations regarding completing A-levels, and intentions to attend university. Columns 1 and 3 control for year fixed effects (as described in Equation 3), while columns 2 and 4 impose a second order polynomial on pre- and post reform time trends (in year-quarter, according to Equation 1). The estimates of the key parameters are close to zero for English teenagers (relative to their Scottish counterfactual) in both specifications, and are not statistically significant (see columns 1 and 2 in panel A for A-level aspirations and columns 3 and 4 for university aspirations). Hence, we find no evidence that the reform which almost tripled university tuition fees in England, had an impact on pupils' aspirations to obtain A-levels or attend university and our results are robust to which specifications is used. We also split our sample by age and gender and find similar results across bot specifications for these subgroups. In addition, we neither find that Welsh students' aspirations are affected by the reform.

Table 12: Estimates of reform impacts on English and Welsh teenagers' educational aspirations

| | A-Levels | | University | |
	(1)	(2)	(3)	(4)
Panel A: All				
English	-0.0137	-0.0110	-0.0067	-0.0019
	(0.0196)	(0.0223)	(0.0177)	(0.0194)
Welsh	0.0124	0.0157	-0.0086	-0.0051
	(0.0310)	(0.0329)	(0.0279)	(0.0292)
# of obs	20411	20411	18128	18128
Panel B: Female pupils				
English	-0.0175	-0.0311	-0.0120	-0.0159
	(0.0236)	(0.0274)	(0.0204)	(0.0222)
Welsh	-0.0083	-0.0226	-0.0162	-0.0221
	(0.0368)	(0.0395)	(0.0309)	(0.0325)
# of obs	10190	10190	9297	9297
Panel C: Male pupils				
English	-0.0079	0.0118	0.0045	0.0171
	(0.0307)	(0.0343)	(0.0285)	(0.0316)
Welsh	0.0221	0.0434	-0.0142	-0.0038
	(0.0486)	(0.0510)	(0.0462)	(0.0482)
# of obs	10221	10221	8831	8831
Panel D: 13-15 year old pupils				
English	-0.0191	-0.0265	-0.0218	-0.0219
	(0.0243)	(0.0280)	(0.0222)	(0.0246)
Welsh	0.0049	-0.0023	0.0119	0.0116
	(0.0379)	(0.0405)	(0.0346)	(0.0363)
# of obs	10803	10803	9676	9676
Panel E: 10-12 year old pupils				
English	-0.0052	0.0110	0.0082	0.0192
	(0.0320)	(0.0357)	(0.0284)	(0.0308)
Welsh	0.0225	0.0389	-0.0404	-0.0311
	(0.0519)	(0.0544)	(0.0459)	(0.0476)
# of obs	9608	9608	8452	8452
Year Fixed Effects	Yes	No	Yes	No
Quadratic time trend	No	Yes	No	Yes
Post-reform quadr. time trend	No	Yes	No	Yes

controlling for regional annual unemployment rate, median annual pay and educational deprivation by government office regions, and for age, ethnicity, and urban residency. The outcomes are binary variables where high aspirations are reported as 1 and low aspirations are reported as 0. Mean A-levels and University aspirations are 0.82 and 0.84, respectively. Robust standard errors are reported in parentheses. *, **, *** denote statistical significance at the 10, 5, and 1 percent levels, respectively.

2.4   Event Study

The difference-in-difference identification strategy adopted here relies on the assumption that aspirations of the treated (pupils and mothers residing in Wales and England) and control (pupils and their mothers residing in Scotland) groups follow a pre-reform parallel trend. We check for the existence of parallel trends by plotting the event study graphs which illustrate whether in each quarter there was a difference in the aspirations of the treated and control groups relative to the quarter of the reform; i.e. the fourth quarter of 2010.

Figure 2 plots the event study graphs for mothers' aspirations towards A-levels and university education of their older teenagers that is the group for which we find statistically significant effects of the reform. The left panel reports the results for English mothers and the right panel for Welsh mothers. We do not find a statistically significant difference in pre-reform aspirations of neither Welsh nor English mothers compared to their Scottish counterparts.

Figure 2: Event Study - Mothers' educational aspirations for children aged 13-15 years old

(a) England   (b) Wales