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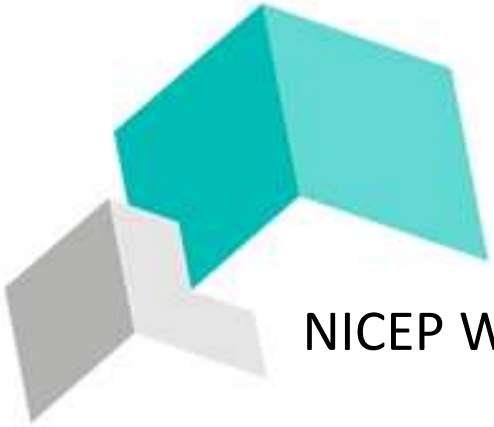

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The causal effect of education on political preferences: Evidence from the UK's higher education expansion

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The causal effect of education on political preferences: evidence from the UK's higher education expansion

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Abstract

We estimate the causal effect of education on political preferences exploiting a large expansion in the supply of higher education in the UK as a result of the Further and Higher Education Act (1992). We use this exogenous policy change to instrument years of schooling and find that an additional year of education decreases the likelihood of voting for the right-of-centre Conservative party by 8.4 percentage points, and decreased the probability of voting 'Leave' in the 2016 Brexit referendum by 4.9pp. *(JEL codes: C26; D72; F68; I21; I23)*

1 Introduction

A large literature within the economics of education has established the causal relationship between education and a host of later life outcomes including *inter alia* earnings (Angrist and Kreuger 1991; Harmon and Walker 1995; Devereux and Hart 2010), employment (Dickson and Smith, 2011), health (Galama et al. 2019), wealth (Girshina 2020), wellbeing (Davies et al 2018), and fertility (McCrary and Royer 2011) – see Buscha and Dickson (2023) for a recent review of this large literature. Research has also shown an impact of education on civic participation and, within this, studies have shown a causal effect of education on political participation in terms of voting in elections (Dee 2004; Milligan et al 2004). However, there is little causal evidence on the impact of education on political *preferences* as revealed in the party that people vote *for*. The relationship between education, in particular higher education, and party preferences has been increasingly under the spotlight in both the US and UK in recent years as political debate has become more partisan and higher education institutions have been accused of indoctrinating their students with a 'woke'

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liberal agenda. In the UK there has been a great deal of interest in the new political cleavages and alliances that have formed since the middle of the last decade when the UK's relationship with the European Union became a prominent political issue following then Prime Minister David Cameron's pre-election promise to hold an "in-out" referendum on membership of the EU should the Conservatives win the 2015 general election. The subsequent 'Brexit' referendum took place in 2016, with a majority of 51% of the electorate voting for the UK to 'Leave' the EU. To date much research has examined the characteristics of the voters for/against Brexit, including differences by education level, however beyond correlational analysis there is scant evidence of the causal effect of education on voting in the referendum.

Understanding the relationship between (higher) education and political preferences is complicated by the array of confounding factors that are associated with the choice to pursue more education and are also likely to affect political preferences. In the UK for example, attendance in higher education is highly stratified by socio-economic background, with those from better-off families much more likely than those from poorer backgrounds to study for a degree in higher education (see Britton and van der Erve 2020). Those from better-off families are typically more likely to vote for the right-of-centre Conservative party which favours lower income taxes, and so to the extent that children inherit political preferences from their parents, there will be a correlation between higher education and voting for the Conservatives.

We overcome this limitation by exploiting a large expansion in higher education attendance in the UK in a relatively short space of time. This created a 'natural experiment' in which some cohorts, born in only a few particular years, are 'treated' with a greater supply of higher education than was available for those born in cohorts immediately before the expansion. This increase in supply of opportunity to pursue higher education started to occur in the final years of 1980s, with the major expansion taking place post-1992 and up until 1994/5. It primarily affects those born 18-years earlier, from the 1974 cohort onwards. It is unlikely that individuals in the affected cohorts would have anticipated such a policy in advance and altered their choices, hence it is reasonable to treat this system-level expansion in opportunities as exogenous from an individual's perspective. We exploit this policy-induced variation to instrument years of schooling and derive an unbiased estimate of the effect of education on voting preferences. We find that an additional year of education decreases the likelihood of voting for the right-of-centre Conservative party by 8.4 percentage points, and decreased the probability of voting 'Leave' in the 2016 'Brexit' referendum

by 4.9pp. We also examine an alternative treatment measure – obtaining a higher education degree. We estimate the causal effect of this treatment to be a 44pp lower probability of voting Conservative, and a 22pp lower probability of voting 'Leave'.

In addition to providing the first causal evidence on the relationship beween education and the Brexit vote, this study is timely because of the current debate around higher education participation in the UK. The prevalence of graduate unemployment (ONS 2019) and underemployment (Green and Henseke 2016; Dickson et al. 2022) raises the public policy question of whether too many individuals are going to university (Bowers-Brown and Harvey 2004) and whether the individual and social returns to a higher education degree still justify the investment. In addition, opinion in some strands of Conservative thinking is against further expansion of the higher education sector, arguing that higher education changes political preferences towards a more liberal social attitude, which they see as having negative consequences for society and is negative from a strategic party political perspective as more liberal attitudes may make graduates less likely to vote for a right-of-centre political party. A vast literature in political science and sociology explores the role of higher education in shaping individual socio-political attitudes and preferences, lending credance to the notion that time spent in higher education is important in developing an individual's political preferences.

At the same time, from an economic perspective it is argued that additional education increases income and is therefore likely to lead individuals to favour lower income taxes, which would extend support to right-of-centre, low-tax, political parties (Romer 1975; Meltzer and Richard 1981). Recent UK research using administrative data sources confirm that higher education substantially increases individual's lifetime earnings (Britton et al 2020), hence this channel from university education to support for Conservative economic policies is credible. Our paper provides empirical evidence to inform these public policy debates.

The paper is organised as follows: in the next two sections we contextualise the study within the existing literature (section 2) and provide the policy context (section 3). We then go on to describe the data (4) and the empirical strategy (5) before presenting results from the main specification (section 6) and alternative specifications (section 7). Finally section (8) offers some concluding comments.

2 Literature

Education and Beliefs/Attitudes

For a number of decades, studies from sociology and psychology have explored some of the plausible mechanisms to explain how and why education influences views and attitudes (Hastie 2007). This literature has found that there is a persistence of socio-political orientation that is formed at a young and impressionable age, usually post-secondary years (Krosnick and Alwin 1989; Hastie 2007), and that there are socialisation processes within higher education (Guimond and Palmer 1990; Mendelberg et al. 2017) that occur either through access to new information and multiple perspectives (Finney 1974), or the normative influences of faculty, or peer effects (Pascarella and Terenzini 1991; Dey 1996). It is also suggested that education works to confirm the dominant or the official culture (Baer and Lambert 1982; Phelan et al. 1995), though within this there are different effects by discipline/subjects chosen at higher education level (Pascarella and Terenzini 1991; Sidanius et al. 2003). There are also network effects that result from the accumulation of social capital at higher education and exert an influence on political preferences (Green, Palmquist and Schickler 2002).

In parallel with this literature exploring channels through which education influences the formation of political attitudes, there is a large literature that looks at the broader determinants of political involvement and participation in voting. However, there is much less focus, certainly within the economics literature, on the relationship between education and the political choices expressed by those who participate in voting i.e. which party people actually voted for.

Making the reasonable assumption that individual political/ideological viewpoints affect voters' preferences amongst parties, there are numerous studies which address the question indirectly by examining the relationship between education and political/ideological views or orientations (see Newcomb 1943, 1957; Newcomb et al. 1967; Astin 1979; Pascarella and Terenzini 1991; Jacoby 1991; Dey 1996; Sidanius et al. 2003; Hastie 2007; Surridge 2016). However, within this literature empirical evidence demonstrating the relationship to be *causal* in nature has been very limited (Pascarella 2006; Scott 2022). The key problem is the endogeneity of education: there are many unobservable characteristics that are likely to influence both the level of education an individual chooses and their political preferences, making it difficult to identify the causal effect of education

on political preferences in the absence of a natural experiment or a longitudinal study with time-variation in individual educational attainment.

Hanson et al. (2012) examine the association between students attending liberal arts college and being more liberal politically. Students are surveyed on their political views before and after four years of college and their self-reported measures are compared with those who attended other institutions. The authors use propensity score matching in an attempt to address the endogeneity issue and deal with selection bias. After controlling for different observed confounding factors, the results show a significant positive relationship: those who attend a liberal arts college are more likely to be liberal. Despite this suggestive evidence, the identification assumption remains selection on observables, and it is likely that there are important unobserved differences between those selecting into liberal arts colleges and those studying in other types of institution.

Scott (2022) analyses the 1970 British Cohort Study (BCS) data to examine the effect of graduating from a university on self-reported political values in comparison to those who do not have a higher education degree. Fixed and random effects estimations show that graduates, on average, are less authoritarian, have less racial prejudice but are more economically right wing than the non-graduates. As the two-way fixed effects estimation accounts for unobserved time-invariant heterogeneity but fails in dealing with unobserved time-varying heterogeneity, the study stops short of claiming causality. One potential issue with this study is that the observed items that are used to construct the latent indices of authoritarianism and racial prejudice are not constant across the waves, making interpretation of effect sizes difficult. A further key limitation, as acknowledged by the authors, is that some of the results might be driven by this specific cohort, all of whom were born in a single week in 1970. Our study overcomes that problem as we pool together individuals born across a number of different years.

In a similar identification strategy to our own, Bullock (2021) exploits differences in compulsory schooling laws across different US states to instrument for years of schooling to estimate the causal effect of education on attitudes towards redistribution. The local average treatment effect of secondary education identified across the US states, is to make individuals more conservative in attitude: opposing redistribution of wealth and income, and in their view on the role of government in ensuring a good standard of living or providing health insurance. The effect withstands accounting for cohort, state-year and other political/demographic trends. Financial self-interest is highlighted by this study as the main driver of the positive impact of (secondary) education on conservative

attitudes.

The consensus among the empirical findings is towards education having a liberalising effect on individuals' attitudes, at least on social matters compared to the economic views. However, as outlined above, most of the evidence to date has been correlational, controlling for observable confounders, and assuming selection on observables.

One issue that cannot be satisfactorily disentangled by using terms like 'liberal' or 'conservative' is that they need not always be mutually exclusive. There could be a reasonable overlap of values/attitudes linked to these terms: for instance, an individual could be conservative on matters concerning the economy (such as lower taxes, supporting free trade, promoting privatisation) but also liberal on social and cultural matters (such as supporting same sex relationships, abortion, immigration, euthanasia). This complexity would not be easily identifiable in surveying people using the crude conservative/liberal dichotomy. There is also an issue of potential non-comparability of these terms across various contexts – to be conservative would connote a different set of attitudes or ideas in Sweden compared to USA for example. This problem persists while using self-reported measures, and there is the additional complication of disentangling stated versus revealed preferences – it may be, for example, that some people in the UK are reluctant to identify as a conservative voter in an opinion poll but would vote for the Conservatives in an election. We seek to avoid these issues by using measures of revealed preference as indicated by the party an individual voted for, and a more continuous scale measure of conservatism.

We also address the gap in the literature for studies that examine the causal relationship between (higher) education and actual voting preferences.

Education and Voting Preferences

There is a small literature examining the causal effect of education on voting preference as revealed by the party voted for. Marshall (2015) estimates the causal impact of an additional year in high school on voting preference in the context of the USA. He exploits the variation in compulsory schooling laws across the different states to build a difference-in-differences specification to estimate the impact on voting preferences of increasing the minimum age before a student can drop out (from 15 years to 16, or 17, or more) in certain states, compared to the control group states with a school leaving age of 15 years. Additionally, the variation is also used to instrument for individuals (in a

given birth cohort) years of schooling to produce instrumental variables estimates. The outcomes investigated are (i) supporter of, (ii) intention to vote for, and (iii) actual vote (in previous election) for, the Republication party. Results show a significant positive effect of an additional year in high school on all three measures of preference for the Republican party.

Investigating the same question in the context of the UK, Marshall (2016) exploits the 1947 raising of the school leaving age (RoSLA) reform that increased the minimum school leaving age from 14 to 15. The IV estimates suggest that the extra year spent in high school as a result of RoSLA increased individuals' probability of voting for the Conservative party by 12 pp.

We further the discussion of the relationship between education and political preferences, addressing an important gap in the existing literature. Specifically, our study explores the potential for a non-linear causal relationship between education and Conservative voting. Marshall (2016) showed that the 1947 reform did not have an effect on the participation levels in higher education, therefore highlighting the causal impact identified to be local to the high school education margin (this is also true of Marshall 2015). Our study extends the state of knowledge to investigate whether additional education beyond high school continues to have a causal effect on voting preferences, specifically affecting the likelihood of voting Conservative. To investigate this we exploit the sudden expansion in higher education that happened in the 1990s and the consequent voting preferences in the general elections of 2015, 2017 and 2019. We also examine if the causal impact of education can also be seen in another key political moment, the Brexit referendum (on 23rd June 2016), that has shaped the future course of the UK both politically and economically.

3 UK policy context and the expansion of educational opportunities

Since the 'Raising of the School Leaving Age' (RoSLA) in 1972, young people in the UK are compelled to remain in full-time education up until the end of the school year in which they turn 16 years old. After this, continuing in education is no longer compulsory, and for the majority of young people in the two decades post-RoSLA 1972, this would be the point that they left education to join the labour market. During the first half of 1990s however there was a steep increase in the enrolment in post-compulsory education in the UK (Blanden and Machin 2004). This was precipitated by the expansion in education opportunities resulting from the Further and Higher

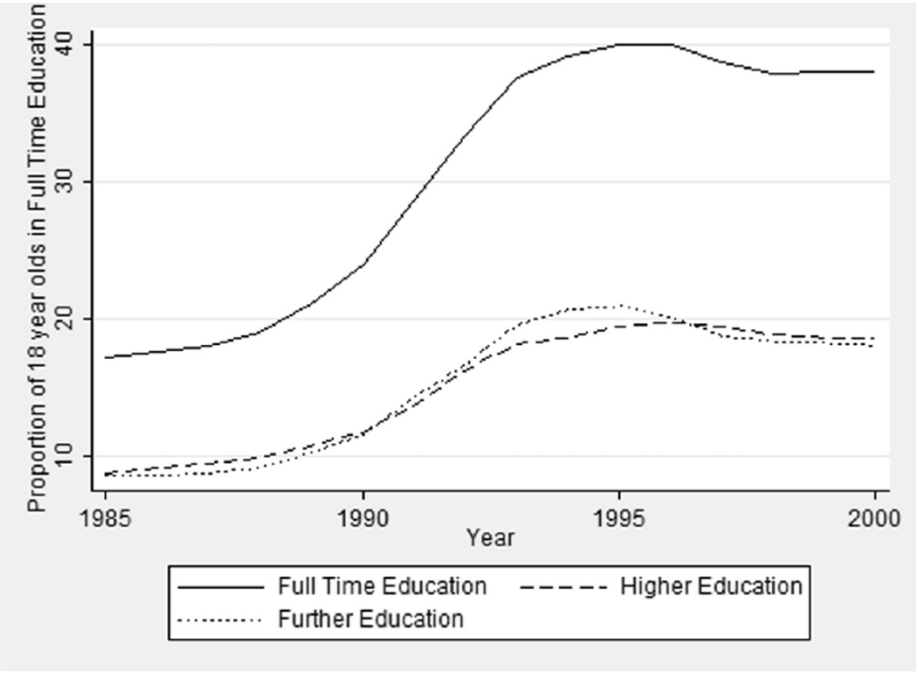
Education Act 1992[1] which saw former polytechnic institutions and a number of other colleges being granted university status. These institutions are now commonly referred to as "post-1992" universities.

There were also additional factors that increased educational attainment and university participation during this time period, as highlighted by Blanden et al. (2003) and Blanden and Machin (2004). The introduction of the General Certificate of Secondary Education (GCSE) examination in 1988, replacing the previous assessment system – which comprised Ordinary levels (O-levels) for the more academic students and Certificates of Seconary Education (CSEs) for the less academic – played an important role in raising overall attainment. The previous system capped the number of students being awarded a passing grade, thereby limiting the number who could continue in education beyond this point. The GCSE reform introduced a relative grading system, removing the limit on attainment within each cohort. This substantially increased the number of students taking examinations that could qualify them for further and higher education. These changes took place at a time of significant change in the structure of the UK economy, as it moved away from traditional manufacturing industries and towards newer technologies and professional services, increasing the demand for more educated labour. Therefore, there was an increase in both the supply of students with sufficient grades to continue beyond compulsory education and the supply of places where they could pursue this education. At the same time demand from the economy encouraged people to attain higher levels of education.

As a result of these factors, a 93% increase in levels of education participation was observed over a short period of time at the start of the 1990s (Devereux and Fan 2011). This was driven mainly by the cohorts born in the early to mid-1970s who turned 18 at the right time to capitalise on the sudden expansion in higher education places. Figure 1 shows the proportion of 18 year-olds in full-time education at Further or Higher Education institutions between 1985 and 2000. It highlights the rise in participation levels between 1990 and 1995, after which the curve flattens. As we would expect, the increase in HE is particularly associated with the 1992 Higher and Further Education Act.

[1] See: www.legislation.gov.uk/ukpga/1992/13/pdfs/ukpga 19920013 en.pdf

Figure 1: Attendance in further or higher education of 18-year olds, by year



Source: James and Vujić (2019)

4 Data and Descriptives

We use cross-sectional data from the British Election Study (BES) that is publicly available. The BES surveys a random probability sample of all eligible voters in the UK for every general election to capture voting participation, preferences, and attitudes towards political and civil issues (Fieldhouse 2015, 2018, 2021). A set of weights are included in the dataset to ensure that the sample is representative of the target population (Fieldhouse 2021). We pool the post-election survey data for three general elections held in 2015 (n = 3,946), 2017 (n=2,194) and 2019 (n=2,987). In addition, we also use wave 13 of the BES panel data series that surveyed (n=31,197) individuals in 2017 regarding the 'Brexit' referendum.

Relevant variables included in each survey are: if the respondent cast their vote in the respective election; the political party (or the outcome in case of Brexit referendum) that s/he cast his/her vote for; self-reported rating of their political ideology on a 10-point scale with zero indicating left-wing and 10 representing right-wing; age of the respondent; education level and other demographic variables such as sex, ethnicity, and region.

We use the education variable in two ways: firstly, as years of education constructed from the standard years associated with the reported level of education; and secondly, as a binary variable indicating whether or not the respondent has a higher education degree (undergraduate or post-graduate). The outcomes we examine are: i) voting in the election; voting specifically for ii) the Conservative party (right-of-centre), iii) the Labour party (left-of-centre), iv) the Liberal Democrats (centre/centre-left); and v) a continuous variable indicating the measure of being conservative. In addition, for the 2016 Brexit referendum, we also look at vi) respondents intention to vote 'leave' in the Brexit referendum before it took place, and vii) whether they actually voted 'leave'.

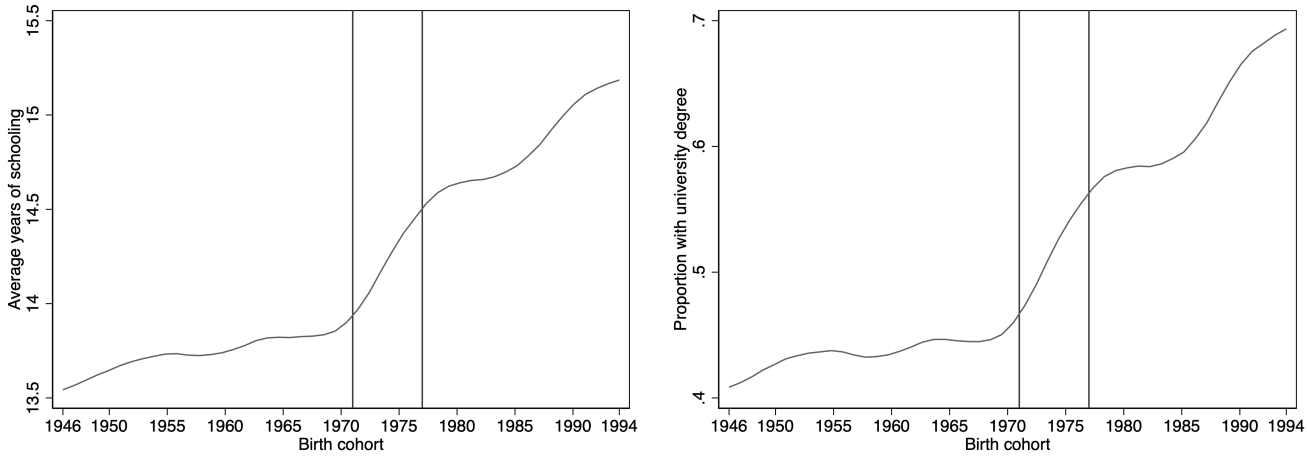
Summary statistics of the pooled post-election survey data is shown in appendix Table A1. The 2015 British Election Survey (BES) data constitutes for 33% of the pooled sample, 2017 and 2019 BES data account for 24% and 43% of the pooled sample respectively. Our sample has 54% female, 86% white British, 1% African, 2% Indian and 2% Pakistani respondents, among other ethnic groups. An average individual in the sample has 13.62 years of education and 41% of the respondents have a degree. We find that 78% of the sample cast their vote in the general elections of 2015, 2017 or 2019, with overall 43% voting for the Conservative party and 34% and 10% voting for Labour party and Liberal Democrats respectively.

We also use a different dataset from the BES panel data series, wave 13, to infer the impacts of education on voting in the Brexit referendum held in 2016. Table A2 presents the summary details of the same characteristics as above but from different dataset. We find that 53% of the sample is female and 91% belongs to white British ethnic group. An average respondent in this sample has 13.96 years of education and 47% of the sample have obtained degree. Therefore the statistics are very similar to the general election sample. Respectively 47% and 49% of the respondents in the survey have an intention to vote 'Leave' and voted 'Leave' in the Brexit referendum.

Figure 2 shows the trends for average years of schooling and the proportion obtaining a degree for the birth cohorts in our elections data. As can be seen from the left panel, average years of schooling was increasing steadily from the start of the 1960s, before levelling off somewhat in the mid-1960s and then climbing again from the start of the 1970s through until around 1976. A similar pattern is seen for degree holding, the trend is generally upwards from the start of the 1960s, levels off and then increases sharply in the first half of the next decade.

We now consider the trends in voting for the right-of-centre Conservative party (left-panel) and

Figure 2: Years of education and degree holding, by birth cohort



Source: Authors' calculations using BES (Wave 13 panel) data.

Figure 3: Conservative vote and voting 'Leave', by birth cohort

Source: Authors' calculations using BES data.

voting 'Leave' in the Brexit referendum (right-panel) for the same birth cohorts, in Figure 3. Although there is some volatility, there is a clear pattern of a falling proportion of people voting Conservative over these cohorts with a particularly sharp downturn in the cohorts born in the first half of the 1970s. In the years immediately before that the Conservatives have approx. 42% of people voting for them, after this it is closer to 28%. Similarly for the proportion voting 'Leave' it is around 52% to 55% in the years immediately before the 1970 birth cohort but then drops dramatically such that it is around 35% for those born in the mid-1970s to mid-1980s and continues to fall thereafter.

These Figures provide suggestive evidence that the rapid expansion of higher education opportunities post-1992 in the UK led to a sharp increase in average years of education and the proportions holding a degree, and that the same cohorts saw a sharp decrease in the proportion voting Conservative and the proportion voting to leave the EU. We now turn to our formal econometric approaches to estimating the relationship between (higher) education and political preferences.

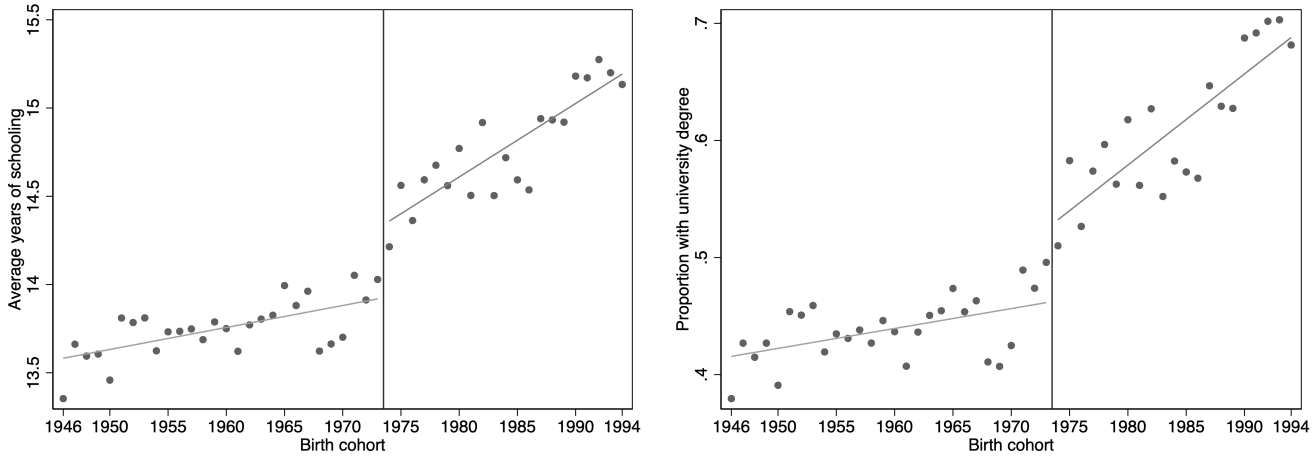
5 Empirical Strategy

We use an empirical strategy, similar to that employed by Devereux and Fan (2011), Machin et al. (2012), James (2015), and James and Vujić (2019), instrumenting education (years of schooling, holding a degree) by the expansion in post-compulsory education in the early 1990s. We treat the expansion of education around this time period as an exogenous change, increasing access, participation and attainment levels of individuals born in the affected cohorts. We can formally establish the relevance of the expansion as an instrument for education in a regression framework, and we present these results below (Tables 1 and 2). With regard to the validity of the instrument, the main concern is the exclusion restriction: though it is not possible to formally test, we need to be confident that being born into a cohort affected by the educational expansion impacts voting preferences 20 years later only through the impact on educational attainment and the role higher education has in shaping political preferences. It is possible that these particular cohorts are affected by other policy changes or societal changes that impact upon their political preferences regardless of their (higher) education. However, it is not obvious that these particular cohorts suffered positively or negatively as a result of Government policy in a way that is strongly and discontinuously different to those born immediately beforehand. The relevant cohorts will have

all turned 18 at a time when the Conservative party was in power and all experienced the early 1990s recession whilst in their late teenage years. As such, it is not clear that any particular cohort would be more politically energised by political events during their teenage years than the immediate cohorts around them. Changes in the proportion voting Conservative (or 'Leave') over birth cohorts are evident pre- and post- the affected cohorts, however these smooth changes will be controlled for in our specifications, allowing the discrete impact of the education expansion to be quantified and used to derive our estimates.

Though the expansion of education began in earnest with the 1988 Education Reform Act (which would affect cohorts from 1970 onwards), the 1992 Further and Higher Education Act led to the creation of a number of new universities (total number of universities went up from 46 to 84 during 1992/93), massively expanding the opportunities for obtaining a higher education degree for cohorts born from 1974 onwards i.e. those completing secondary school in 1992. Figures 4 and 5 below highlight 1974 as a discontinuity point on this basis. The visual evidence confirms this timing: 1972 and 1975 (onwards) look very different regimes with 1973 and 1974 somewhat transitional years.

Figure 4: Years of education and degree holding, by birth cohort, discontinuity plot



Source: Authors' calculations using BES (Wave 13 panel) data.

On this basis we develop the following specifications of the formal models for each of the outcomes (voted in the election, voted Conservative, Labour, Liberal Democrats, Brexit and right-wing scale; intention to vote leave in the Brexit referendum, and voted leave in the referendum).

Least squares:

$$y_i = \alpha + \delta Educ_i + \gamma F(yb_i) + X_i'\beta + \epsilon_i \tag{1}$$

First stage:

$$Educ_i = \psi + \sum_{c=1974}^{1975,1976+} \phi_c cohort_c + \lambda F(yb_i) + X_i'\zeta + \nu_i \tag{2}$$

Second stage:

$$y_i = \theta + \xi \widehat{Educ_i} + \rho F(yb_i) + X_i'\varphi + e_i \tag{3}$$

In each case y_i is the dependent variable, $Educ_i$ is the measure of education – either years of education or a dummy variable for holding a degree – and yb_i is the year of birth of the individual. $F(.)$ is a polynomial function, quadratic for the main specifications. Respondent's ethnicity, sex and region are controlled for in the $\mathbf{X}$ vector. In all the specifications we include dummy variables for the election years (2015, 2017 and 2019) to control for the unobserved differences across the years that could affect the outcome. OLS estimates from equation (1) show the average association of education and outcomes. However, these estimates would be biased due to the endogeneity of education. To address the bias, we instrument education using the expansion of higher education resulting from the 1992 Education Act, which affected the cohorts born in 1974, 1975 and post-1975 (those born before 1974 are the reference group). The differential effects of the reform timing (ϕ_c) are shown in first stage specification, equation (2). In the second stage, specified as equation (3), ξ captures the causal effect of an additional year of schooling (attaining a higher education degree) on the respective outcomes.

6 Results

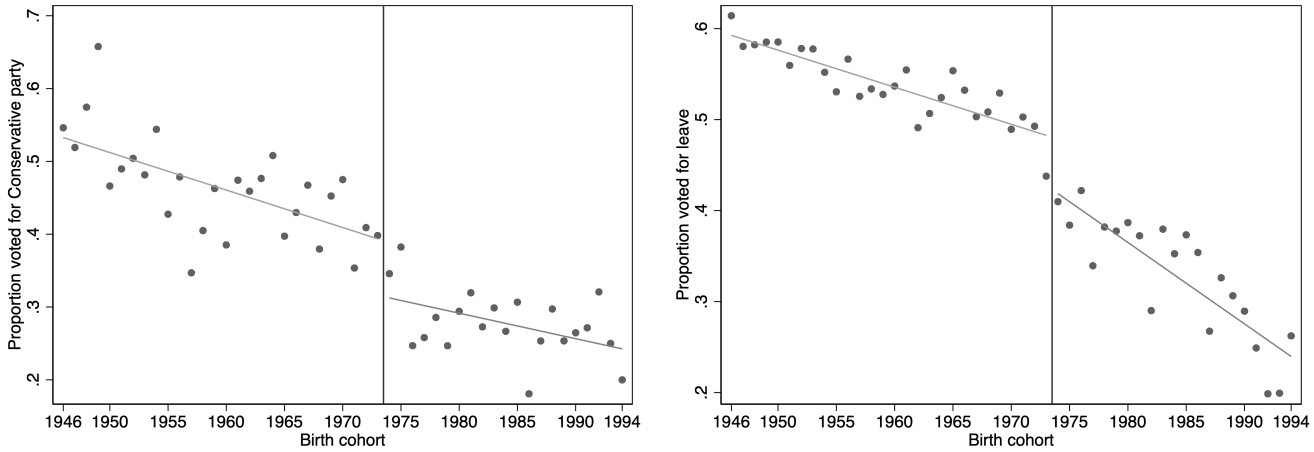
On voting preferences

We present the estimates from the above specifications in Tables 1-4. The first stage (equation (2)) highlights the relevance of the instrument showing the significant impact that cohorts exposed to higher education expansion/reform had on the average years of schooling and the likelihood of obtaining a degree. Table 1 shows that depending on the sample in question, cohorts affected by the expansion increased their years of education by 0.55 to 1 additional year. We see in Table 2 that there was an increase of 0.12 to 0.20 in the proportion of the cohort holding a degree. Both

tables suggest that the magnitude of impact is increased as the reform rolls out i.e. as we move from 1974, 1975 to post-1975. In all cases, the F-values for each of the estimations are above the rule-of-thumb threshold of 10 indicating that we do not have a problem of weak instruments.

Turning to the results in Tables 3 and 4, the OLS estimates suggest a strong positive relationship between voting in the election and education as measured by both years of education and holding a degree. The coefficients are precisely estimated with a magnitude of 3 pp and 15 pp increase for an additional year and obtaining a degree respectively. However, the IV estimates imply this is driven by selection, in each case estimating no significant difference in voting participation by education.

Figure 5: Conservative vote and 'Leave' vote, by birth cohort, discontinuity plot



Source: Authors' calculations using BES data.

Table 1: First stage estimates for years of education treatment

Dep. var.: Years of Education	Sample: Voted in the election	Sample: Voted Cons./Lab./LD.	Sample: Conser--vative scale
1974	0.6970***	0.5481**	0.6171***
	(0.21317)	(0.2487)	(0.22953)
1975	0.9306***	1.0602***	0.8295***
	(0.23409)	(0.27366)	(0.25654)
>1975	0.8382***	0.8947***	0.8870***
	(0.12631)	(0.15046)	(0.13819)
Year of birth (linear)	✓	✓	✓
Year of birth (quadratic)	✓	✓	✓
Election year FE	✓	✓	✓
Region	✓	✓	✓
Gender	✓	✓	✓
Ethnicity	✓	✓	✓
F value (excluded instruments)	17.66	14.10	15.21
Observations	8571	6383	7311

Table 2: First stage estimates for obtained a degree treatment

Dep. var.: Obtained a degree	Sample: Voted in the election	Sample: Voted Cons./Lab./LD.	Sample: Conser--vative scale
1974	0.1561***	0.1227**	0.1451***
	(0.04221)	(0.04943)	(0.04538)
1975	0.1781***	0.1985***	0.1668***
	(0.04377)	(0.0510)	(0.04694)
>1975	0.1749***	0.1767***	0.1897***
	(0.02486)	(0.02994)	(0.0272)
Year of birth (linear)	✓	✓	✓
Year of birth (quadratic)	✓	✓	✓
Election year FE	✓	✓	✓
Region	✓	✓	✓
Gender	✓	✓	✓
Ethnicity	✓	✓	✓
F value (excluded instruments)	19.71	13.97	18.10
Observations	8571	6383	7311

Table 3: OLS and 2SLS estimates for years of education treatment

	Voted in the election		Voted Conservative		Voted Labour		Voted Lib. Dem.		Conservative scale	
	OLS	IV	OLS	IV	OLS	IV	OLS	IV	OLS	IV
Years of Education	0.0317***	-0.0203	-0.0133***	-0.0838***	0.0028	0.0431	0.0130***	0.0343*	-0.0412***	-0.1289
	(0.00165)	(0.02485)	(0.00239)	(0.03014)	(0.00228)	(0.02914)	(0.00157)	(0.0191)	(0.0091)	(0.10975)
Year of birth (linear)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Year of birth (quadratic)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Election year FE	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Region	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Gender	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Ethnicity	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Observations	8571	8571	6383	6383	6383	6383	6383	6383	7311	7311

Table 4: OLS and 2SLS estimates for obtaining degree treatment

	Voted in the election		Voted Conservative		Voted Labour		Voted Lib. Dem.		Conservative scale	
	OLS	IV	OLS	IV	OLS	IV	OLS	IV	OLS	IV
Obtained degree	0.1479***	-0.0986	-0.0621***	-0.4389***	0.0144	0.2172	0.0632***	0.1832*	-0.1753***	-0.5826
	(0.00855)	(0.11945)	(0.01217)	(0.15407)	(0.01153)	(0.14809)	(0.00778)	(0.09824)	(0.04592)	(0.51377)
Year of birth (linear)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Year of birth (quadratic)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Election year FE	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Region	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Gender	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Ethnicity	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Observations	8571	8571	6383	6383	6383	6383	6383	6383	7311	7311

Turning to the party voted for outcomes, the OLS estimates in Table 3 suggest an additional year of schooling is associated with a reduction of 1.33 pp in the likelihood of voting Conservative. There is no relationship between education and voting Labour, but a positive impact of 1.30 pp on the probability of voting for the Liberal Democrats. However, when we look at the IV estimates, we see an additional year of education leads to a reduction of 8.38 pp in probability of voting for the Conservative party in the elections held in 2015, 2017 and 2019. Obtaining a degree – which would mean at least three years of additional education – is associated with a 6.21pp reduction in the likelihood of voting Conservative in the OLS regressions in Table 4. Notably this is more than three times the OLS coefficient on years of education. We find a similar pattern for the IV estimates: holding a degree reduces the probability of voting Conservative by 43.89 pp. A typical undergraduate degree in the UK takes 3 to 4 years to complete, though may also lead to further study at Masters (1 to 2 additional years) or PhD level (3 to 4 additional years). The estimated effect of obtaining a degree is approximately five times the return to a year of education in voting Conservative, which might suggest that there is an effect of degree attainment over and above the impact of the years of education themselves. The IV estimates similarly imply that the probability of voting for the Liberal Democrats is increased by 3.43pp for every additional year of schooling, and by 18.32pp if obtaining a degree, though these are only marginally significant coefficients.

For self-reported position on the conservative scale, we find a strong negative association between education and being on the right politically. A year of education reduces the conservative scale value by 0.04 and a degree reduces it by 0.18. As with the voting results, the IV estimates are larger – around three times larger in each specification – though in this case the IV estimates are not precisely estimated. The direction of effect and the magnitudes are however in line with the results for voting preferences and previous findings in the literature.

In sum, these results suggest that education does have a causal effect on the probability that an individual votes for the Conservative party, with suggestive evidence that their political values are shifted through education. This effect appears to be stronger than any effect of education leading to an increase in earnings and a preference for lower income tax, leading people to be more likely to vote Conservative. It is notable that the loss of votes for the Conservative party is not translated in these elections into votes for the main opposition party, Labour. If anything it is the Liberal Democrats who have benefited from the expansion of higher education in the early 1990s.

On Brexit

Estimations on the outcomes of Brexit vote are shown in Tables 5-8 below. As with the election estimates in the previous sub-section, we find that the cohorts born after 1974 have higher average years of education of between 0.3 and 0.9 years. The proportion holding a degree increases by 0.07 to 0.19. The F-values from the first stage are around 50 or more in each case, easing any fears over weak instruments. Turning to the effects of education on intention to vote leave and actually voting leave in Tables 7 and 8, we see that an additional year of education is associated with an approx. 0.05 reduction in the probability of intention to vote leave before the referendum or actually voting leave in the referendum, when estimated by OLS. The IV estimates suggest that the impact for those whose education was increased on account of the expansion of education is very similar with reductions of 0.03 to 0.05. This finding is largely repeated in the estimates for holding a degree: for example, Table 8 shows that holding a degree is estimated to lower the probability of voting leave by 0.22 in both the OLS and IV regressions.

Table 5: First stage estimates for years of education treatment

Dep. var: Years of Education	Intention to vote sample	Brexit referendum sample
1974	0.3177***	0.3469***
	(0.12074)	(0.12208)
1975	0.6664***	0.7580***
	(0.13159)	(0.13418)
>1975	0.8866***	0.8548***
	(0.07024)	(0.07250)
Year of birth (linear)	✓	✓
Year of birth (quadratic)	✓	✓
Region	✓	✓
Gender	✓	✓
Ethnicity	✓	✓
F value (excluded instruments)	54.83	49.38
Observations	27025	26443

Table 6: First stage estimates for obtaining a degree treatment

Dep. var: Obtained degree	Intention to vote sample	Brexit referendum sample
1974	0.0698***	0.0721***
	(0.02523)	(0.02563)
1975	0.1426***	0.1595***
	(0.02627)	(0.02696)
>1975	0.1935***	0.1836***
	(0.01483)	(0.01543)
Year of birth (linear)	✓	✓
Year of birth (quadratic)	✓	✓
Region	✓	✓
Gender	✓	✓
Ethnicity	✓	✓
F value (excluded instruments)	58.74	50.48
Observations	27025	26443

Table 7: OLS and 2SLS estimates for years of education treatment

	Intention to vote leave		Voted leave	
	OLS	IV	OLS	IV
Years of Education	-0.0466***	-0.0300**	-0.0496***	-0.0487***
	(0.00117)	(0.01529)	(0.00119)	(0.01625)
Year of birth (linear)	✓	✓	✓	✓
Year of birth (quadratic)	✓	✓	✓	✓
Region	✓	✓	✓	✓
Gender	✓	✓	✓	✓
Ethnicity	✓	✓	✓	✓
Observations	27024	27024	26442	26442

Table 8: OLS and 2SLS estimates for obtaining a degree treatment

	Intention to vote leave		Voted leave	
	OLS	IV	OLS	IV
Obtained degree	-0.2051***	-0.1365*	-0.2169***	-0.2253***
	(0.00585)	(0.07041)	(0.00596)	(0.07641)
Year of birth (linear)	✓	✓	✓	✓
Year of birth (quadratic)	✓	✓	✓	✓
Region	✓	✓	✓	✓
Gender	✓	✓	✓	✓
Ethnicity	✓	✓	✓	✓
Observations	27025	27025	26443	26443

7 Alternative specification

To establish the robustness of our findings we carry-out two robustness checks. Firstly, we run the election model estimates with the sample restricted to respondents born between 1946 to 1994. We do this to ensure that even the youngest in the sample are born within a window that would allow them time to go to higher education and graduate before the first election included in the data (2015). The exclusion of those born pre-1946 balances the number of cohorts either side of 1970, the earliest point at which degree holding started to increase, and means we are excluding those born before/during the second world war. This restricted sample reduces the precision in our estimates but allows us to verify that the findings are not being driven by any unobserved trends among the very oldest cohorts in the sample. Secondly, we use a different econometric technique, regression discontinuity design, to estimate the impact of education on voting preferences.

The estimates for the restricted sample are presented in the appendix Tables Tables A3 – A6. We see in Tables A3 and A4 that the F-values have dropped in this reduced sample, and are now below 10 raising concerns about the strength of the instruments in this sample. However, this is because the 1974 dummy is no longer significant in this sample, whereas the 1975 and 1976+ dummies continue to have a strong effect on years of education and obtaining a degree, increasing these education outcomes by similar though slightly smaller amounts to the main specification.

In the OLS and IV estimates in Tables A5 and A6, we find all of the estimates to be in the same direction of impact as observed in the tables from the main results, and in most cases the significance levels are the same. The magnitudes of the impacts are somewhat larger in these IV estimates – for example the effect of an additional year of schooling on probability of voting Conservative increases from -8.38pp in the main specification to -11.67pp in this robustness check. The impact of obtaining a degree is larger in Table A6 than the corresponding main estimate though it is less precisely estimated and now only marginally significant. While the instruments are weaker in this reduced sample, the overall picture of the results remains consistent with the main estimates in Tables 3 and 4.

The second robustness check is to estimate the model using a 'fuzzy' regression discontinuity design, implemented via a global polynomial approach. Though it is not a 'clean' discontinuity, from from Figure 4 we estimate the RDD imposing the discontinuity at the year 1974 under the rationale that the main reform took place in 1992 and would therefore affect 18 year olds from this point – i.e.

individuals who are born from 1974 onwards. The RDD is implemented via equations (4) and (5) below, with the IV estimate constructed as the ratio of the reduced form to the first stage.

First stage:

$$Educ_i = \varphi_{rdd} + \lambda_{rdd} F_{1rdd}(yb_i) + \gamma_{rdd} I[c \geq 1974]_i + u_i \tag{4}$$

Reduced form:

$$y_i = \alpha_{rdd} + \delta_{rdd} F_{2rdd}(yb_i) + \varphi_{rdd} I[c \geq 1974]_i + \nu_i \tag{5}$$

We estimate the $F_{rdd}(.)$ functions as a polynomials in year of birth of order 2, 3 and 4 as shown in Table 9 for both the elections model and the Brexit model. Our preferred results for the RDD use the third order polynomial as the fourth order seems to overfit the model. Results are robust between the second and third order polynomials. The instrument remains relevant, affecting as it does the years of education and obtaining a degree, in all of the models. In Tables 10 and 11, we present the first stage results for our preferred RDD alongside first stage results from the main specification results reported in section 6 to allow comparison. As can be seen, the first stage effects are of similar magnitude across the estimation methods.

Then in Tables 12 and 13 we present the OLS, IV and RDD results for the return to a year of education and obtaining a degree respectively. Focusing on the impact of education on voting Conservative, the RDD estimate of -0.1137 is very similar to the IV estimate of -0.0838. Similarly, for obtaining a degree the RDD estimate is -0.6086 compared to the IV of -0.4389, so the RDD is larger though less precisely estimated.

Finally, Tables 14 and 15 show the OLS, IV and RDD estimates for intention to vote 'Leave' and actually voting 'Leave' in the Brexit referendum. As has been the case with the previous RDD results, the estimates of the effect of a year of education (obtaining a degree) are larger than the corresponding IV estimates. For example, each year of education is estimated to reduce the probability of voting 'Leave' by 0.0487 in the IV and 0.1004 in the RDD. However, the significance and magnitude of the results are congruent between the two estimation methods and, as can be seen in appendix tables A7-A10 , the reduced form estimates are of similar magnitude for the RDD and IV approaches but given the smaller first stage estimates for the RDD, this inevitably increases the size of the return estimate in the second stage.

Overall, across both of these sets of robustness tests, our results are consistent, and we broadly find

the same pattern of size and significance with respect to all the examined outcomes, suggesting the main results are robustly identifying the causal effect of education on voting preferences.

Table 9: First stage estimates for years of education and for obtaining degree

>= 1974			>= 1974		
Years of Education	Election model	Brexit model	Obtain degree	Election model	Brexit model
Order 2	0.8563***	0.7971***	Order 2	0.1693***	0.1677***
	(0.13670)	(0.06625)		(0.02693)	(0.01393)
F	39.23	144.78	F	39.52	145.04
Order 3	0.5547***	0.6711***	Order 3	0.1036***	0.1276***
	(0.14410)	(0.07405)		(0.02806)	(0.01513)
F	14.82	82.14	F	13.65	71.13
Order 4	0.3555**	0.2501***	Order 4	0.0387	0.0066
	(0.17728)	(0.08928)		(0.03448)	(0.01832)
F	4.02	7.85	F	1.26	0.13
Observations	6388	26442	Observations	6388	26442

Table 10: First stage estimates for years of education for IV and RDD

First stage	Election model			Brexit model		
Years of Education	2SLS		RDD	2SLS		RDD
1974	0.5481**	1974+	0.5547***	0.3461***	1974+	0.6711***
	(0.2487)		(0.14410)	(0.12208)		(0.07405)
1975	1.0602***			0.7571***		
	(0.27366)			(0.13418)		
>1975	0.8947***			0.8527***		
	(0.15046)			(0.07250)		
F	14.10		14.82	49.16		82.14
Observations	6383		6388	26442		26442

Table 11: First stage estimates for obtaining a degree for IV and RDD

First stage	Election model			Brexit model		
Obtained degree	2SLS		RDD	2SLS		RDD
1974	0.1227**	1974+	0.1036***	0.0720***	1974+	0.1276***
	(0.04943)		(0.02806)	(0.02563)		(0.01513)
1975	0.1985***			0.1594***		
	(0.05100)			(0.02696)		
>1975	0.1767***			0.1833***		
	(0.02994)			(0.01543)		
F	13.97		13.65	50.31		71.13
Observations	6383		6383	26442		26442

Table 12: Estimates for years of education

	Voted in the election			Voted Conservative			Voted Labour		
	OLS	IV	RDD	OLS	IV	RDD	OLS	IV	RDD
Years of Education	0.0317***	-0.0203	0.0019	-0.0133***	-0.0838***	-0.1137**	0.0028	0.0431	0.0444
	(0.00165)	(0.02485)	(0.03681)	(0.00239)	(0.03014)	(0.05583)	(0.00228)	(0.02914)	(0.05116)
Year of birth (linear)	✓	✓	✓	✓	✓	✓	✓	✓	✓
Year of birth (quadratic)	✓	✓	✓	✓	✓	✓	✓	✓	✓
Year of birth (cubic)	×	×	✓	×	×	✓	×	×	✓
Election year FE	✓	✓	x	✓	✓	×	✓	✓	×
Region	✓	✓	×	✓	✓	×	✓	✓	×
Gender	✓	✓	×	✓	✓	×	✓	✓	×
Ethnicity	✓	✓	×	✓	✓	×	✓	✓	×
Observations	8571	8571	8580	6383	6383	6388	6383	6383	6388

	Voted Liberal Democrats			Conservative scale		
	OLS	IV	RDD	OLS	IV	RDD
Years of Education	0.0130***	0.0343*	0.0621*	-0.0412***	-0.1289	-0.1082
	(0.00157)	(0.01910)	(0.03434)	(0.00910)	(0.10975)	(0.17708)
Year of birth (linear)	✓	✓	✓	✓	✓	✓
Year of birth (quadratic)	✓	✓	✓	✓	✓	✓
Year of birth (cubic)	×	×	✓	×	×	✓
Election year FE	✓	✓	×	✓	✓	×
Region	✓	✓	×	✓	✓	×
Gender	✓	✓	×	✓	✓	×
Ethnicity	✓	✓	×	✓	✓	×
Observations	6383	6383	6388	7311	7311	7317

Table 13: Estimates for obtaining a degree

	Voted in the election			Voted Conservative			Voted Labour		
	OLS	IV	RDD	OLS	IV	RDD	OLS	IV	RDD
Obtained degree	0.1479***	-0.0986	0.0094	-0.0621***	-0.4389***	-0.6086**	0.0144	0.2172	0.2376
	(0.00855)	(0.11945)	(0.18378)	(0.01217)	(0.15407)	(0.30176)	(0.01153)	(0.14809)	(0.27384)
Year of birth (linear)	✓	✓	✓	✓	✓	✓	✓	✓	✓
Year of birth (quadratic)	✓	✓	✓	✓	✓	✓	✓	✓	✓
Year of birth (cubic)	×	×	✓	×	×	✓	×	×	✓
Election year FE	✓	✓	×	✓	✓	×	✓	✓	×
Region	✓	✓	×	✓	✓	×	✓	✓	×
Gender	✓	✓	×	✓	✓	×	✓	✓	×
Ethnicity	✓	✓	×	✓	✓	×	✓	✓	×
Observations	8571	8571	8580	6383	6383	6388	6383	6383	6388

	Voted Liberal Democrats			Conservative scale		
	OLS	IV	RDD	OLS	IV	RDD
Obtained degree	0.0632***	0.1832*	0.3324*	-0.1753***	-0.5826	-0.5196
	(0.00778)	(0.09824)	(0.18603)	(0.04592)	(0.51377)	(0.85007)
Year of birth (linear)	✓	✓	✓	✓	✓	✓
Year of birth (quadratic)	✓	✓	✓	✓	✓	✓
Year of birth (cubic)	×	×	✓	×	×	✓
Election year FE	✓	✓	×	✓	✓	×
Region	✓	✓	×	✓	✓	×
Gender	✓	✓	×	✓	✓	×
Ethnicity	✓	✓	×	✓	✓	×
Observations	6383	6383	6388	7311	7311	7317

Table 14: Estimates for years of education

	Intention to vote leave			Voted leave		
	OLS	IV	RDD	OLS	IV	RDD
Years of Education	-0.0466***	-0.0300**	-0.0740***	-0.0496***	-0.0487***	-0.1004***
	(0.00117)	(0.01529)	(0.02188)	(0.00119)	(0.01625)	(0.02197)
Year of birth (linear)	✓	✓	✓	✓	✓	✓
Year of birth (quadratic)	✓	✓	✓	✓	✓	✓
Year of birth (cubic)	×	×	✓	×	×	✓
Election year FE	✓	✓	×	✓	✓	×
Region	✓	✓	×	✓	✓	×
Gender	✓	✓	×	✓	✓	×
Ethnicity	✓	✓	×	✓	✓	×
Observations	27024	27024	27024	26442	26442	26442

Table 15: Estimates for obtaining a degree

	Intention to vote leave			Voted leave		
	OLS	IV	RDD	OLS	IV	RDD
Obtained degree	-0.2051***	-0.1365*	-0.3874***	-0.2169***	-0.2253***	-0.5281***
	(0.00585)	(0.07041)	(0.11628)	(0.00596)	(0.07641)	(0.11856)
Year of birth (linear)	✓	✓	✓	✓	✓	✓
Year of birth (quadratic)	✓	✓	✓	✓	✓	✓
Year of birth (cubic)	×	×	✓	×	×	✓
Election year FE	✓	✓	×	✓	✓	×
Region	✓	✓	×	✓	✓	×
Gender	✓	✓	×	✓	✓	×
Ethnicity	✓	✓	×	✓	✓	×
Observations	27024	27024	27024	26442	26442	26442

8 Conclusion

Previous research has shown the correlational association between education and political preferences in the UK, and in particular the negative relationship between (higher) education and voting to 'Leave' the EU in the 2016 Brexit referendum. Here we provide the first causal evidence of the effect of (higher) education on voting in that referendum. Furthermore, we add to the literature on the causal effect of education on political preferences – extending previous causal work (Marshall, 2016) which focused on the local average treatment effect at the high school margin. Our estimates suggest that in contrast to additional secondary schooling which increased the vote for the Conservative party, higher education reduces the probability of voting Conservative. There is however only suggestive evidence that this is because people with higher education are likely to score lower on the conservative scale as a result of their higher education.

Estimates from our empirical analysis of the British Election Survey data show that increases in average years of education, driven by an expansion of higher education, and in particular the attainment of a degree, affects an individual's political preferences as revealed by the party they choose to vote for. An additional year of education reduces the probability of voting Conservative by 8.4pp, and obtaining a degree reduces the probability by 44pp. Attaining more education as a result of HE expansion is also associated with a lower probability of voting 'Leave' in the 2016 'Brexit' referendum – each additional year lowering the probability by 5pp and a degree lowering the probability by 22pp.

It appears that the effect of higher education on voting preferences does not work primarily through the income tax preference channel. Individuals who gained higher education as a result of the early 1990s expansion of HE in the UK are less likely to vote for the Conservative party than similar individuals who did not benefit from the expansion. Therefore any preference for a lower tax party resulting from additional income associated with higher education graduation, is overwhelmed by other factors associated with the higher education experience. Exploring more precisely what these factors are, and the processes through which experience of higher education translates into voting behaviours remains an important avenue for future research across the social sciences.

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Appendix

Tables A1 and A2 contain summary statistics for the main and Brexit samples. Tables A3 to A6 contain the first stage and second stage estimates of the model estimated on a reduced sample of

those born 1946-1994. Tables A7 to A10 contain the reduced form estimates corresponding to the main estimated models.

Table A1: Summary statistics – main (election) sample

Variable	Obs	Mean	Std dev	Min	Max
Voted in the election	9,065	0.78	0.42	0	1
Voted Conservative	6,697	0.43	0.49	0	1
Voted Labour	6,697	0.34	0.47	0	1
Voted Liberal Democrats	6,697	0.10	0.30	0	1
Conservative scale	7,669	4.98	1.99	0	10
Years of Education	8,817	13.62	2.56	11	18
Obtained degree	8,817	0.41	0.49	0	1
Year of birth	8,896	1964.89	18.20	1918	2001
Election year of 2015	9,127	0.33	0.47	0	1
Election year of 2017	9,127	0.24	0.43	0	1
Election year of 2019	9,127	0.43	0.50	0	1
Female	9,090	0.54	0.50	0	1
Ethnicity					
British	9,127	0.86	0.35	0	1
Irish	9,127	0.01	0.10	0	1
Gypsy or Irish Traveller	9,127	0.00	0.03	0	1
Any other White background	9,127	0.01	0.11	0	1
White and Black Caribbean	9,127	0.00	0.07	0	1
White and Black African	9,127	0.00	0.04	0	1
White and Asian	9,127	0.00	0.07	0	1
Any other ethnic background	9,127	0.00	0.06	0	1
Indian	9,127	0.02	0.14	0	1
Pakistani	9,127	0.02	0.13	0	1
Bangladeshi	9,127	0.00	0.07	0	1
Chinese	9,127	0.00	0.06	0	1
Any other Asian background	9,127	0.00	0.07	0	1
African	9,127	0.01	0.12	0	1
Caribbean	9,127	0.01	0.10	0	1
Any other Black background	9,127	0.00	0.04	0	1
Arab	9,127	0.00	0.05	0	1
Any other ethnic group	9,127	0.01	0.11	0	1
Prefer not to say	9,127	0.02	0.12	0	1
Region					
East Midlands	9,127	0.07	0.26	0	1
London	9,127	0.11	0.31	0	1
North East	9,127	0.05	0.21	0	1
North West	9,127	0.13	0.34	0	1
Scotland	9,127	0.09	0.29	0	1
South East	9,127	0.13	0.34	0	1
South West	9,127	0.09	0.28	0	1
Wales	9,127	0.05	0.23	0	1
West Midlands	9,127	0.10	0.30	0	1
Yorkshire & Humber	9,127	0.09	0.29	0	1
East of England	9,127	0.09	0.29	0	1

Table A2: Summary statistics – Brexit sample

Variable	Obs	Mean	Std dev	Min	Max
Intention to vote leave	28,840	0.47	0.50	0	1
Voted leave	28,139	0.49	0.50	0	1
Years of Education	29,127	13.96	2.47	11	18
Obtained degree	29,127	0.47	0.50	0	1
Year of birth	31,194	1964.48	15.94	1924	1999
Female	31,194	0.53	0.50	0	1
Ethnicity					
White British	31,194	0.91	0.28	0	1
Any other white background	31,194	0.04	0.19	0	1
White and Black Caribbean	31,194	0.00	0.05	0	1
White and Black African	31,194	0.00	0.03	0	1
White and Asian	31,194	0.00	0.06	0	1
Any other mixed background	31,194	0.00	0.07	0	1
Indian	31,194	0.01	0.09	0	1
Pakistani	31,194	0.00	0.06	0	1
Bangladeshi	31,194	0.00	0.04	0	1
Any other Asian background	31,194	0.00	0.05	0	1
Black Caribbean	31,194	0.00	0.05	0	1
Black African	31,194	0.00	0.05	0	1
Any other black background	31,194	0.00	0.02	0	1
Chinese	31,194	0.00	0.07	0	1
Other ethnic group	31,194	0.00	0.06	0	1
Prefer not to say	31,194	0.01	0.08	0	1
Region					
North East	31,194	0.03	0.18	0	1
North West	31,194	0.08	0.27	0	1
Yorkshire and the Humber	31,194	0.07	0.25	0	1
East Midlands	31,194	0.05	0.23	0	1
West Midlands	31,194	0.06	0.24	0	1
East of England	31,194	0.07	0.26	0	1
London	31,194	0.09	0.28	0	1
South East	31,194	0.10	0.31	0	1
South West	31,194	0.07	0.25	0	1
Wales	31,194	0.06	0.24	0	1
Scotland	31,194	0.10	0.31	0	1
Northern Ireland	31,194	0.21	0.41	0	1

Table A3: First stage estimates for years of education (1946-1994) - Election model

Dep. var.: Years of Education	Sample: Voted in the election	Sample: Voted Cons./Lab./LD.	Sample: Conser--vative scale
1974	0.4791**	0.2759	0.3646
	(0.21668)	(0.25223)	(0.23343)
1975	0.6869***	0.7598***	0.5453**
	(0.23728)	(0.27765)	(0.25991)
>1975	0.5671***	0.5718***	0.5420***
	(0.14629)	(0.17292)	(0.16046)
Year of birth	✓	✓	✓
Year of birth (quadratic)	✓	✓	✓
Election year FE	✓	✓	✓
Region	✓	✓	✓
Gender	✓	✓	✓
Ethnicity	✓	✓	✓
F value (excluded instruments)	6.68	4.89	4.45
Observations	6768	4979	5752

Table A4: First stage estimates for obtaining degree (1946-1994) - Election model

Dep. var.: Years of Education	Sample: Voted in the election	Sample: Voted Cons./Lab./LD.	Sample: Conser--vative scale
1974	0.1056**	0.0583	0.0859*
	(0.04290)	(0.05011)	(0.04615)
1975	0.1213***	0.1267**	0.1001**
	(0.04456)	(0.05200)	(0.04774)
>1975	0.1013***	0.0829**	0.0981***
	(0.02867)	(0.03405)	(0.03135)
Year of birth	✓	✓	✓
Year of birth (quadratic)	✓	✓	✓
Election year FE	✓	✓	✓
Region	✓	✓	✓
Gender	✓	✓	✓
Ethnicity	✓	✓	✓
F value (excluded instruments)	5.98	3.15	4.12
Observations	6768	4979	5752

Table A5: OLS and 2SLS estimates for years of education (1946-1994) - Election model

	Voted in the election		Voted Conservative		Voted Labour		Voted Lib. Dems.		Conservative scale	
	OLS	IV	OLS	IV	OLS	IV	OLS	IV	OLS	IV
Years of Education	0.0350***	0.0025	-0.0139***	-0.1167**	0.0034	0.0575	0.0133***	0.0526	-0.0457***	-0.2870
	(0.00188)	(0.03823)	(0.00267)	(0.05443)	(0.00257)	(0.04951)	(0.00174)	(0.03319)	(0.00990)	(0.20875)
Year of birth (linear)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Year of birth (quadratic)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Election year FE	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Region	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Gender	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Ethnicity	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Observations	6768	6768	4979	4979	4979	4979	4979	4979	5752	5752

Table A6: OLS and 2SLS estimates for obtaining degree (1946-1994) - Election model

	Voted in the election		Voted Conservative		Voted Labour		Voted Lib. Dems.		Conservative scale	
	OLS	IV	OLS	IV	OLS	IV	OLS	IV	OLS	IV
Obtained degree	0.1660***	0.0151	-0.0634***	-0.6862*	0.0177	0.2690	0.0644***	0.3704	-0.2010***	-1.3991
	(0.0097)	(0.2068)	(0.0136)	(0.3637)	(0.013)	(0.311)	(0.0086)	(0.2276)	(0.0502)	(1.1144)
Year of birth (linear)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Year of birth (quadratic)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Election year FE	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Region	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Gender	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Ethnicity	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Observations	6768	6768	4979	4979	4979	4979	4979	4979	5752	5752

Table A7: Reduced form estimates - Election model

	Voted in the election	Voted Conservative	Voted Labour	Voted Lib. Dem.	Conservative scale
1974	-0.0119	-0.0727	-0.0270	0.0699**	0.0615
	(0.03459)	(0.04758)	(0.04513)	(0.02984)	(0.17907)
1975	-0.0138	-0.0102	-0.0083	0.0305	-0.1218
	(0.03528)	(0.04929)	(0.04676)	(0.03091)	(0.18186)
>1975	-0.0189	-0.0983***	0.0609**	0.0279	-0.1286
	(0.02062)	(0.02904)	(0.02755)	(0.01821)	(0.10820)
Year of birth (linear)	✓	✓	✓	✓	✓
Year of birth (quadratic)	✓	✓	✓	✓	✓
Election year FE	✓	✓	✓	✓	✓
Region	✓	✓	✓	✓	✓
Gender	✓	✓	✓	✓	✓
Ethnicity	✓	✓	✓	✓	✓
Observations	8571	6383	6383	6383	7311

Table A8: Reduced form estimates for RDD (3rd order polynomial) - Election model

	Voted in the election	Voted Conservative	Voted Labour	Voted Lib. Dem.	Conservative scale
>= 1974	0.0011	-0.0631**	0.0246	0.0345*	-0.0620
	(0.02096)	(0.02761)	(0.02786)	(0.01790)	(0.10089)
Year of birth (linear)	✓	✓	✓	✓	✓
Year of birth (quadratic)	✓	✓	✓	✓	✓
Year of birth (cubic)	✓	✓	✓	✓	✓
Year of birth (quartic)	×	×	×	×	×
Election year FE	×	×	×	×	×
Region	×	×	×	×	×
Gender	×	×	×	×	×
Ethnicity	×	×	×	×	×
Observations	8580	6388	6388	6388	7317

Table A9: Reduced form estimates - Brexit model

	Intention to vote leave	Voted leave
1974	-0.0425*	-0.0432*
	(0.02444)	(0.02502)
1975	-0.0656**	-0.0689**
	(0.02561)	(0.02688)
>1975	-0.0217	-0.0361**
	(0.01443)	(0.01507)
Year of birth (linear)	✓	✓
Year of birth (quadratic)	✓	✓
Region	✓	✓
Gender	✓	✓
Ethnicity	✓	✓
Observations	27024	26442

Table A10: Reduced form estimates for RDD (3rd order polynomial) - Brexit model

	Intention to vote leave	Voted leave
>= 1974	-0.0479***	-0.0674***
	(0.01457)	(0.01495)
Year of birth (linear)	✓	✓
Year of birth (quadratic)	✓	✓
Year of birth (cubic)	✓	✓
Year of birth (quartic)	×	×
Election year FE	×	×
Region	×	×
Gender	×	×
Ethnicity	×	×
Observations	27024	26442