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Date of birth and selective schooling: Some lessons from the 1944 education reforms in England and Wales

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Abstract

We compare the probabilities of selective (grammar) school entry in England and Wales before and after the 1944 Education Act. The Act had direct and indirect influences on the costs of grammar education and on entry-exam coverage, design and marking methodology. Post-1944, grammar school entry among children born in the middle of the school year improved considerably. We argue that age-adjusted group standardized testing was an important contributory factor. The youngest pupils remained significantly disadvantaged. We produce evidence that this is consistent with the practice of streaming (tracking) junior school children at age 7 into classes delineated by average ability.

KEYWORDS

1944 Education Act, age-adjusted test scores, class streaming, date of birth, selective schooling

JEL CLASSIFICATION

I21; I24; I28

1 | INTRODUCTION

We examine the impact of the 1944 Education Act in England and Wales on the probabilities of gaining selective secondary school entry—which in our study period meant attending a state grammar school—for children born at different times during the school year. As a natural experiment, we compare the probabilities before and after the introduction of the Act.[1]

In pre- and post-1944 eras, state primary education covered children aged 5–11. It was divided into infant school for the first 3 years and junior school for the remaining period up to age 11 when most children proceeded to secondary school. Pre-1944, entry into a grammar school was gained via an 11+ exam for some children but non-competitively for others whose parents could afford to pay fees. Post-1944, the Act introduced free state secondary education for all, removed non-competitive entry into state grammar schools, and imposed compulsory 11+ exam testing for all children.

In both eras, two important aspects of early education disadvantaged younger children in respect of subsequent school attainments.[2] First, children either began attending infant school at the start of the school year in which they turned 5 or at the start of one of three school terms in which they turned 5. Respectively, this either involved a large gap in cognitive development between oldest and youngest children or lost education due to staggered entry. Second, streaming or tracking was practised in most large junior schools. Younger children were disproportionately represented in the lower ability classes.

The 1944 Act was associated with a major correction to the fortunes of younger children. There was an exponential rise in 11+ examinees following the introduction of compulsory testing for secondary school selection. This spurred Local Education Authorities (LEAs) to adopt the Moray House standardized group intelligence testing which was easy to administer and with a good reputation of sorting pupils into selective or nonselective secondary schools. Crucially for younger children, the methodology incorporated age-adjusted test scores by month of birth. By 1954, 75% of LEAs had adopted these test designs (Vernon, 1957).

Based on a difference-in-difference estimation approach, we test whether or not the post-1944 changes resulting from the Act impacted on the probabilities of younger primary school children gaining grammar school entry relative to their counterparts in the pre-1944 school system. We find support for significant net improvements in post-1944 grammar school entry among children born in the middle 4 months of the school year relative to the oldest cohort. We argue that a far greater recourse to age-adjusted intelligence testing may well have accounted for this outcome. By contrast, so-called summer children, born May to August, remained stubbornly disadvantaged relative to the older children despite potentially benefitting most from the age adjustments of test scores. We argue that class streaming in junior schools was a major contributory factor behind this finding.

2 | BACKGROUND

Both before and after the 1944 Education Act, state primary and secondary schools catered for the vast majority of children. As summarized in Table 1, there were important similarities and differences between the state school systems in the two time periods.[3] Especially in the smaller primary schools, year cohorts commenced school life at the start of the school year in which children turned 5. Therefore, there was a substantial developmental gap between the oldest and youngest starters. Staggered entry was common in the larger primary schools: children started school at the beginning of the term during which they turned 5.[4] There were three terms—September to

[1]Reforms under the Act have featured in a wide range of research. A major area concerns estimating returns to education, following the seminal study of Harmon and Walker (1995).

[2]A recurring finding in the education literature is that on average older pupils outperform their younger counterparts. Examples include Nightingale (1962), Jinks (1964), Crawford et al. (2007), Crawford et al. (2013 and 2014), Robertson (2011), Black et al. (2011), Mühlenweg and Puhani (2010), Smith (2009), McEwan and Shapiro (2008), Bedard and Dhuey (2006), Puhani and Weber (2005), Glewwe and Jacoby (1995), Sharp (1995), Borg and Falzon (1995), Bell and Daniels (1990).

[3]See Hart et al. (2017) for more detailed comparisons.

[4]There were exceptions. For example, children with working mothers were often allowed to start school at the start of the school year irrespective of date of birth.

TABLE 1 Comparisons of state primary and secondary education in England and Wales before and after the 1944 Education Act

	Before 1944 Act	After 1944 Act
Statutory school starting age	5 years	5 years
Primary school terms	Three terms starting September, January, after Easter	Three terms starting September, January, after Easter
Typical entry into small primary schools	At start of the school year during which reached age of 5	At start of the school year during which reached age of 5
Typical entry into large primary schools	At start of the school term during which reached age of 5 (many exceptions)	At start of the school term during which reached age of 5 (many exceptions)
Class streaming by average ability	Common in large primary schools (ages 7 to 11)	Common in large primary schools (ages 7 to 11) Greater prevalence due to construction of new large primary schools in city suburbs
Method of selection to a grammar school education	Mix of non-competitive entry and competitive exam selection	Competitive exam selection
Age starting secondary school	11/12 years	11/12 years
Group standardized, age-adjusted 11+ exam testing	Limited, though growing, coverage from the mid−1920s.	Dominant selection method.
Principal state selective secondary schools	Secondary (grammar) schools	Grammar schools
Principal state nonselective secondary schools	(Senior departments of) elementary schools	Modern schools
Secondary school fees	Full-fees, partial-fees, and free places	No fees
Minimum school leaving age	14 years	15 years
National school examinations	General School Certificate (age 16) and Higher School Certificate (age 17/18)	General Certificate of Education at Ordinary Level (age 16) and Advanced Level (17/18)

December, January to April and May to August. Under staggered school entry, the oldest children typically enjoyed 3 years in infant school and the youngest just 2 years and one term.[5] At the end of infant school, each year-cohort entered junior school at the same time and this meant that initial age disadvantages to some extent persisted throughout primary education.

Disadvantages related to the age gap in respect of delayed entry into primary school may possibly be exaggerated, however. Spring or summer born children starting school in January or April would do so at a more socially and emotionally mature age, which would have helped them integrate better with the learning and social demands of school life. If made to commence in September with everyone else, these younger children would gain additional terms in school but would be starting at or just after the age of four and may have been disadvantaged to the extent that their less mature social patterns and behaviours were set early and to some extent persist into the longer term.

[5]The educational disadvantages of the summer children often stretched beyond this delayed entry effect, deriving from the fact that in their first school year they attended school only during the third term. First, Plowden (1967) reports that in many schools there was spare classroom capacity in the first term of the school year turning into pressure on capacity by the last term resulting in a poorer quality classroom experience due to larger class sizes (see also Williams, 1964). Second, the third term averaged only 9 weeks of teaching before the summer holiday, being broken up by the Whitsun holiday and various pre-summer school activities, including prize days, open days and sports days.

In both eras it was common practice in larger junior schools to stream classes by ability. Typically, A, B, C (...up to D and E in the largest schools) classes were created in descending order of average ability. Children were placed in these classes, principally, on the basis of either an assessment carried out in their infant school or through head-master-approved attainment tests carried out at the start of junior school.[6] Lower average ability-rated class streams correlated positively with the average ages of class pupils and with their average number of terms of infant school (Barker Lunn, 1970, Tables 7.2 and 7.3).[7] Where streaming occurred, less than one quarter of schools took pupils' ages into account in respect of their class allocations (Barker Lunn, 1970, pp.85/6 and Table 7.4). Accordingly, younger children were disproportionately represented in the lower ability streams. This may have produced feelings of failure culminating in longer term impaired academic expectations.[8] Moreover, able children who are streamed at an early age may not themselves have appreciated their future potential for academic catch-up.[9]

By the mid-1950s and into the 1960s, it became widely recognized that class streaming was producing longer term detrimental educational outcomes among some of the more able younger pupils who were demoralized by misplacement into lower class streams (Plowden Report, 1967, Barker Lunn, 1970, Chapter 10; Galton, Simon, & Croll, 1980, p.39). There is strong evidence that most of the class misplacement of children in their early junior school years was not subsequently corrected.[10] As primary education progressed, it became increasingly difficult to differentiate in the lower streamed classes between demotivated able children and children whose class allocation was a good indicator of longer term expected attainment levels.

Most children attending grammar schools, in both the pre- and post-war periods, sat nationally recognized examinations at age 16 and sub-sets of these sat more advanced exams at age 17/18. Nonselective secondary elementary schools pre-1944 and nonselective secondary modern schools post-1944 accounted for the great majority of state school children. With few exceptions, neither provided state-recognized national qualifications. Virtually all children attending nonselective schools finished their school education at the minimum school leaving age (14 years pre-1944, 15 years post-1944). Transfers between selective and nonselective schools were rare.

There were three significant differences between the two eras. As far as the first two of these are concerned, it is not clear what differential impacts, if any, they may have had on younger and older children. The third, was unequivocally designed to help the academic progress of younger children.

First, entry to grammar schools pre-1944 was not comprehensively subject to formal testing in contrast to the universally applied post-1944 11+ exam. Prior to the 1944 Education Act, it was not until 1933 that serious attempts were made to introduce testing as a means of matching student abilities with the academic demands of a grammar school education. Such entry, following the introduction of so-called special places in 1933, was based

[6]For full details of streaming selection methods based on large contemporary samples, see Jackson (1964, p. 18, Table 5) and Barker Lunn (1970, p. 86, Table 7.4).

[7]Campbell (2013) provides recent evidence based on the Millenium Cohort Study for England. She finds that 7 year olds in 2008 who were born in September were more than twice as likely to be placed in the highest class streams compared to their counterparts born in August.

[8]Slavin (1987) highlights potential problems within classes composed of low achievers who are '...deprived of the example and stimulation provided by high achievers, and the fact of being labeled and assigned to a low group is held to communicate low expectations for students which may be self-fulfilling' (p. 296).

[9]Schneeweis and Zweimüller (2014) report on Austrian children born in the 1970s to 1990s who faced the choice at 10 years old between attending an academic or vocational stream. Younger children within year cohorts are found to be 40% less likely to choose the academic route relative to their oldest peers.

[10]Barker Lunn's (1970) research is based on a stratified random sample of 2,000 junior schools carried out in 1963 together with 1964 cross-sectional and longitudinal cohort studies of pupils during all 4 years of junior school attendances. There were significantly higher chances of being allocated to the top A-stream in junior school among children (a) who had attended infant school for the maximum number of terms, and (b) who were born during the period September to December. These advantages were accentuated in schools with more than two class streams per pupil age cohort. Over their four junior school years, (unstandardized) class test scores in English and Arithmetic revealed that 13% of children were in the wrong stream at the end of the first 2 years and 18% at the end of the third year. Only 36% of children found to be in the wrong first year stream were corrected (i.e., demoted or promoted), only 22% in the second year, and only 14% in the third year. On average over all years, three quarters of children found to be in the wrong stream remained in the wrong stream. Through time it was found that able children who remained in lower streams exhibited deteriorating academic performances. This contrasted with improved performances among less able children who were misallocated but remained in high streams (see also Douglas, 1964).

TABLE 2 Secondary school attendance by births before and after 1933

Born	<1933		≥1933		≥1937	
Secondary schools	**No.**	**Col %**	**No.**	**Col. %**	**No.**	**Col. %**
Grammar	161	17.9	553	26.5	472	26
Grammar with fees	45	5	31	1.5	26	1.4
Private	40	4.5	110	5.3	93	5.1
Elementary	288	32.1	40	1.9	16	0.9
Modern	215	23.9	937	44.9	828	45.7
Technical	33	3.7	94	4.5	77	4.2
Comprehensive	30	3.3	264	12.6	252	13.9
Other	86	9.6	58	2.8	49	2.7
Total	898	100	2087	100	1813	100

Source: Authors' calculations using BHPS sample.

on an 11+ entrance exam taken at primary school, at age 11 or 12. In 1933, 52% of secondary grammar school places were allocated in this way and this rose to 69% by 1938 (see Floud, 1954, Appendix 2, Table 2). So even at a late stage, about one-third of pre-war entry was non-competitive.

Second, in contrast to the provision of universally free secondary school education the post-war state system, pre-war secondary education beyond the minimum school leaving age was either fee-paying or free. About one-third of children were exempt from fees in the 1920s; by 1932 free places had risen to 48% of children, a percentage that remained more or less constant for the remainder of the decade. Obtaining free entry was predicated on a competitive 11+ exam which was open to all children, including those from higher income families.

Third, secondary school selection based on standardized group testing and incorporating test-score adjustments for age differences became the dominant method of 11+ selection post-1944.[11] The intelligence tests typically covered verbal reasoning, English and Arithmetic. The removal of non-competitive entry under the 1944 Act produced an exponential rise in exam candidates and this stimulated greater exam conformity among exam boards. Simplified testing methodology in the late 1940s allowed marking to be undertaken accurately and without judgement by school teachers: answers to individual questions were either right or wrong. Confidence in the tests grew in the mid-1940s as researchers found strong positive correlations between selections resulting from these test designs and subsequent grammar school performances.

It is important to note that there was scepticism among some contemporary educationalists over the success of age-adjusted tests in combatting the educational disadvantages of the able youngest children who had been misplaced into lower grade junior school classes at age 7. For these children, "a 'C' stream complex was developed, the result of which cannot be eradicated by tinkering with age allowances four year later" (Nightingale, 1962 – see also Jinks, 1964).

In both pre- and post-1944, there were variations in examining methodologies for secondary school selection across examining bodies. However, in the pre-1944 era there was a far greater recourse to the use of traditional

[11]Godfrey Thomson developed the standardized Northumberland Mental Test which was incorporated as part of the selection process for the few free grammar school places in the county of Northumberland in 1921. In 1925 at Edinburgh University, he began developments of the so-called Moray House tests. These standardized intelligence tests in verbal reasoning, English and Arithmetic incorporated allowances for age differences across the year groups of examinees (Thomson, 1932). The methodology was applied to 12 score distributions of completed birth months across year groups at the time of the 11+ exam. From estimated percentiles of the distributions of raw test scores, it was possible to estimate an IQ (a so-called Binet IQ, from a normal distribution around 100 with a standard deviation of 15) that corresponded with a given age and score. The body of Thomson's conversion tables consisted of raw scores; they required inverse interpolations to find equivalent IQs. A highly simplified system, based on Lawley (1950), was introduced in Moray House tests in the late 1940s. It produced conversion tables that presented IQs by monthly ages at test and percentile test scores.

testing in English and Arithmetic (featuring essays and solving long sums), interviews (conducted by panels or individuals), primary school progress reports, and other school records. These methods and sources of decision-making usually involved no attempt to adjust for age and, where they did, produced highly unreliable outcomes (Vernon, 1957). It should be added that, while examining deficiencies were common in the pre-war period, about one quarter of post-war LEAs had still not adopted the Moray House tests by the mid-1950s. So a significant proportion of younger children remained subject to the problems encountered by their pre-war counterparts.

3 | DATA

We base our empirical work on the British Household Panel Survey (BHPS). The BHPS is a nationally representative longitudinal survey covering approximately 5,500 households, corresponding to roughly 10,000 individuals, each year from 1991 to 2008. Specifically, we concentrate on individuals born in England and Wales during the period 1915–1953 who attended school during the years 1926–1964 and for whom the BHPS includes a rich set of information regarding gender, month and year of birth, type of school attended and parental qualifications. Depending on the econometric specification adopted, our usable samples are composed of 2,600–2,900 individuals.

Our subsequent estimates are split between those born before 1933, who attended secondary school before the 1944 Education Act came into effect, and those born in or after 1933. We also separate out a sub-sample of those born in or after 1937; their secondary school attendance started after an initial and disruptive 4-year transition period. The process of establishing the new system under the 1944 Act required, especially, an expanded provision of nonselective modern schools. Most grammar schools already existed in the early post-war period while construction, staffing and reorganization were required in respect of nonselective modern schools (Bolton, 2015). This involved new school building, refurbishment of former elementary schools, recruitment and training of new teachers, and setting up administrative systems. In fact, an extension of the minimum school leaving age (from 14 to 15) under the 1944 Act was postponed from April 1945 to April 1947 because of an initial shortfall of an estimated 200,000 school places and 13,000 teachers (see Cabinet Paper, *Raising the School Leaving Age*, National Archives CAB 129/1/117). Up to 1950, about one-third of state secondary school children attended selective grammar schools falling to about one quarter by the mid-1950s.

Table 2 shows the percentage of pupils attending different types of secondary schools by year of birth. Two of the secondary school classifications are potentially problematic. First, there was no fee-paying in post-war state secondary schools. In the data, 26 individuals are recorded as grammar school fee-payers. This was possible for seven of these since they started secondary school before 1944. For the remainder, all of whom started secondary school after 1944 it is not clear what type of private education is being referred to. Given this uncertainty, we report results which both exclude and include these fee-payers. Second, there were 13 comprehensive schools in 1953 rising to 195 in 1964. Comprehensives were designed to cater for a wider range of ability than grammar schools. They account for 13% of pupils in our post-1944 BHPS secondary school samples while we know that in 1964—their peak year in our study—they actually comprised only 7% of pupils in the entire state sector (Mitchell, 1988). We also note that 3% of those born pre-1933 reported that they attended comprehensive school when, at least at the commencement of their secondary education, this was not possible. While there are misreporting explanations, we deal with any uncertainty by reporting results that exclude and include the reported comprehensives.

We focus on the comparative probabilities of gaining selective school entry by age within given year cohorts before and after the 1944 Act Age is measured as whether born September to December (term 1), January to April (term 2), May to August (term 3). From the raw data, Table 3 shows that the selective secondary school system in the later era catered for larger percentages of all children. Also, the oldest children pre-1944 enjoyed a much higher share of selective school places than their younger counterparts. This relative advantage appears to have been significantly eroded post-1944.

TABLE 3 Percentages of total BHPS samples who attended selective secondary school by term of birth

Born	<1933	≥1933
	Percentage of total sample attending selective school	
Sept-Dec (term 1)	28	38
Jan-Apr (term 2)	19	37
May-Aug (term 3)	22	34

Note: This is based on the same data sample as columns (1) and (4) of Table 4. Thus, it excludes both fee-paying schools and comprehensive schools.

TABLE 4 Date of birth and probability of attending selective school

	≥1933			≥1937		
Born	(1)	(2)	(3)	(4)	(5)	(6)
Term 2	−0.100**	−0.093*	−0.096*	−0.100**	−0.093*	−0.096*
	(0.047)	(0.047)	(0.049)	(0.047)	(0.047)	(0.049)
Term 3	−0.059**	−0.053**	−0.043*	−0.059**	−0.053**	−0.043*
	(0.025)	(0.025)	(0.022)	(0.025)	(0.025)	(0.022)
Post	0.193***	0.071***	0.147***	0.183***	0.064**	0.137***
	(0.027)	(0.025)	(0.027)	(0.027)	(0.025)	(0.028)
(Term 2) (Post)	0.092*	0.105**	0.083	0.108**	0.119**	0.098*
	(0.053)	(0.052)	(0.055)	(0.054)	(0.053)	(0.056)
(Term 3 (Post)	0.007	0.028	−0.016	0.017	0.035	−0.005
	(0.039)	(0.036)	(0.036)	(0.041)	(0.037)	(0.038)
Observations	2,615	2,909	2,691	2,358	2,640	2,429
R-squared	0.067	0.058	0.062	0.067	0.056	0.062
Gender	Yes	Yes	Yes	Yes	Yes	Yes
Year of birth	Yes	Yes	Yes	Yes	Yes	Yes
Parental qualifications	Yes	Yes	Yes	Yes	Yes	Yes
Comprehensive schools	No	Yes	No	No	Yes	No
Grammar with fees	No	No	Yes	No	No	Yes

Note: Every column shows estimated coefficients of separate linear probability models of going to a selective school on seasons of birth before and after the 1944 Education Act. Columns (1) and (4) exclude fee-payers and comprehensives, Columns (2) and (5) exclude fee-payers, Columns (3) and (6) exclude comprehensives. *Term 2* and *Term 3* refer, respectively, to children born during January to April and during May to August ('summer children'). *Term 1* is the reference group of oldest children born during September to December. *Post* is a dummy indicating whether the individual is born after the year 1933 (first three columns) or after 1937 (last three columns), and thus affected by the Education Act. Each regression includes year of birth fixed effects, gender and parental qualifications. Standard errors in parenthesis are clustered at respondents' year of birth ***$p < .01$, **$p < .05$, *$p < .1$.

4 | ESTIMATION

We test whether or not the post-1944 changes highlighted in the foregoing sections impacted on the probabilities of younger primary school children gaining grammar school entry relative to their counterparts in the pre-1944 system. We outline here a linear probability model.[12]

We show results both including and excluding the transition years. In the former case, the first age cohort to be affected by the post-war 11+ exam would have been born in 1933. In the latter case, the first cohort would have been born in 1937.[13]

Let S_i = 1 if individual *i* went to a selective school and S_i = 0 otherwise. Then, setting the oldest year group (*term 1*) as the reference group, the difference-in-difference model of the probability of attending a selective school by age is expressed.

$$S_i = a_0\left(post_i\right) + a_1\left(term2\right)_i + a_2\left(term3\right)_i + a_3\left(post_i * term2\right)_i + a_4\left(post_i * term3\right)_i + \theta Z_i + l_t + e_i \quad (1)$$

where $post_i$ is a dummy taking the value 1 if the individual's birth year is 1933 (1937 omitting the transition period) or later, Z_i is a set of additional controls, and λ_t is a set of year of birth fixed effects. The controls included in Z_i are gender and separate dummy variables indicating whether mother or father has no qualifications, some qualifications or high qualifications.[14]

5 | FINDINGS

Table 4 shows results with respect to Equation (1), the probability of going to a selective school. In the first three columns, we show results for those born during or after 1933, thereby including those taking part of the post-1944 system from the outset. The second three columns, omit those born in the years 1933–1936 who would have avoided the initial disruptive transition period. Columns (1) and (4) present regression results that exclude both fee-paying grammar school attendance and comprehensive schools. Columns (2) and (5) continue to omit fee-paying attendance but include comprehensive schools. Columns (3) and (6) exclude comprehensives and include fee-paying attendance.

Across all reported regressions in Table 4, the significant positive coefficients on the variable *post* in row 3 reflect that, on average, the probability of gaining a selective school place post-1944 was higher than pre-1944 for the oldest children. Rows 1 and 2 indicate that, relative to the oldest children in each year group pre-1944, younger children had significantly lower probabilities of attending a selective school. In general, estimates are consistent across all three regression specifications as well as in the regressions including and omitting the transition period.

The relative probabilities of attending a selective school for a large section of the post-war children are found to be significantly different. When we interact the *term 2* and *post* dummies we obtain positive and significant coefficients across all but one regression specifications. In fact their magnitudes are such as to completely offset the equivalent negative coefficients in row 1 belonging to their pre-war counterparts. In other words, the probability of gaining a selective school place for post-war children who were born during the months of January to April is found to be the same as those born during September to December. This is not the case for the summer children who were born during May to August. They display no significant differences from the negative coefficients of their pre-war counterparts in row 2.[15]

[12]We also estimated the equivalent probit model. The results do not differ quantitatively from the OLS estimates and so we exclude them here.

[13]We extended the transition period up to 6–7 years, considering the first post-transition cohorts as being born in 1939 or 1940, with no significant effects on our reported results.

[14]Difference-in-differences is the most appropriate method in this context as the objective is to compare the relative chances of attending grammar school among seasons of birth/terms. Estimating Equation (1) provides directly the statistical test and the correct standard errors in a parsimonious way. Alternative methods—such as regression discontinuity—would have required splitting the sample across seasons of births—losing power as a result—and computing ad hoc tests and standard errors.

[15]We tested the hypothesis that the coefficients for (Term 2)(Post) equalled those of (Term 3)(Post). At the 5 percent level, this is not supported by the *F*-tests for columns (1) and (3)-(6). The p-value for column (2) is 0.06.

TABLE 5 Date of birth and probability of attending selective school: gender

Born	≥1933 (1)	(2)	(3)	≥1937 (4)	(5)	(6)
(Term 2) (Post) (Male)	0.031	0.076	0.063	−0.015	0.038	0.014
	(0.098)	(0.093)	(0.102)	(0.096)	(0.091)	(0.100)
(Term 3) (Post) (Male)	−0.025	−0.003	0.009	−0.048	−0.022	−0.014
	(0.084)	(0.084)	(0.099)	(0.085)	(0.086)	(0.100)
R-squared	0.068	0.059	0.063	0.068	0.057	0.062
Observations	2,615	2,909	2,691	2,358	2,640	2,429

Note: Every column shows estimated coefficients of separate linear probability models of going to a selective school on seasons of birth before and after the 1944 Education Act**.** Columns (1) and (4) exclude fee-payers and comprehensives, Columns (2) and (5) exclude fee-payers, Columns (3) and (6) exclude comprehensives. *Term 2* and *Term 3* refer, respectively, to children born during January to April and during May to August ('summer children'). *Term 1* is the reference group of oldest children born during September to December. Each regression includes all the main component of the interaction shown, year of birth fixed effects, gender and parental qualifications. Standard errors in parenthesis are clustered at respondents' year of birth, with ***$p < .01$, **$p < .05$, *$p < .1$.

In our difference-in-difference estimates reported in Table 4, we found no statistical term of birth effects between boys and girls on the probability of attending selective school. The relevant section of these results is shown in Table 5 and provides a useful backdrop to later extensions.

6 | AN IDENTIFICATION ISSUE AND PLACEBO TESTS

Our results indicate that, relative to children born in the Autumn, the 1944 Education Act and its aftermath improved the secondary school prospects of those born between January and April but did not significantly alter the relatively poor outcomes of summer children. In order to attribute the change to the reform itself, we need to rule out the possibility of other factors that might have intervened in the period before 1944. A simple way to test this is to contrast pre-trends in selective school attendance.

Figure 1 compares trends of pupils born in the three seasons (i.e., school terms) in each year before 1944.[16] The number of pupils attending selective schools is increasing in each year and for each term of birth. What is reassuring is that there is no evidence of any divergence in trends before the reform.

More formal placebo tests are provided in Table 6. We introduce placebo reform dummies that turn on at a given year prior to the actual reform. The interaction between these placebo dummies and the term of birth would detect differences in chances to attend grammar school before the reform. More precisely, we run the specification described by model (1) in which *post* takes the value of 1 in a year before the actual reform. For robustness purposes, separate placebo difference-in-differences are run. For instance, the first panel in Table 6 shows the coefficient on interactions between a placebo dummy turned on in 1921 (i.e., 12 years prior to the actual reform), the second panel when the placebo dummy is turned on in 1922 (i.e., 11 years prior to the actual reform), and so on. We look at the interactions with term 2 because Table 4 shows that things improved for these pupils. A positive and statistically significant interaction with any placebo dummy would indicate the presence of trends predating

[16]Figure 1 is a binned scatter plot providing a non-parametric visualisation of the relationship between 'going to grammar school' and year of birth across different seasons of births. Each dot is the mean value of the variable attending grammar school associated with each year of birth. A linear fit is then estimated and plotted on top the scatter points. These graphs were obtained using—binscatter—by Michael Stepner in Stata (https://michaelstepner.com/binscatter/). Using 3-year moving averages to count the number of pupils attending grammar schools reveal the same basic trends.

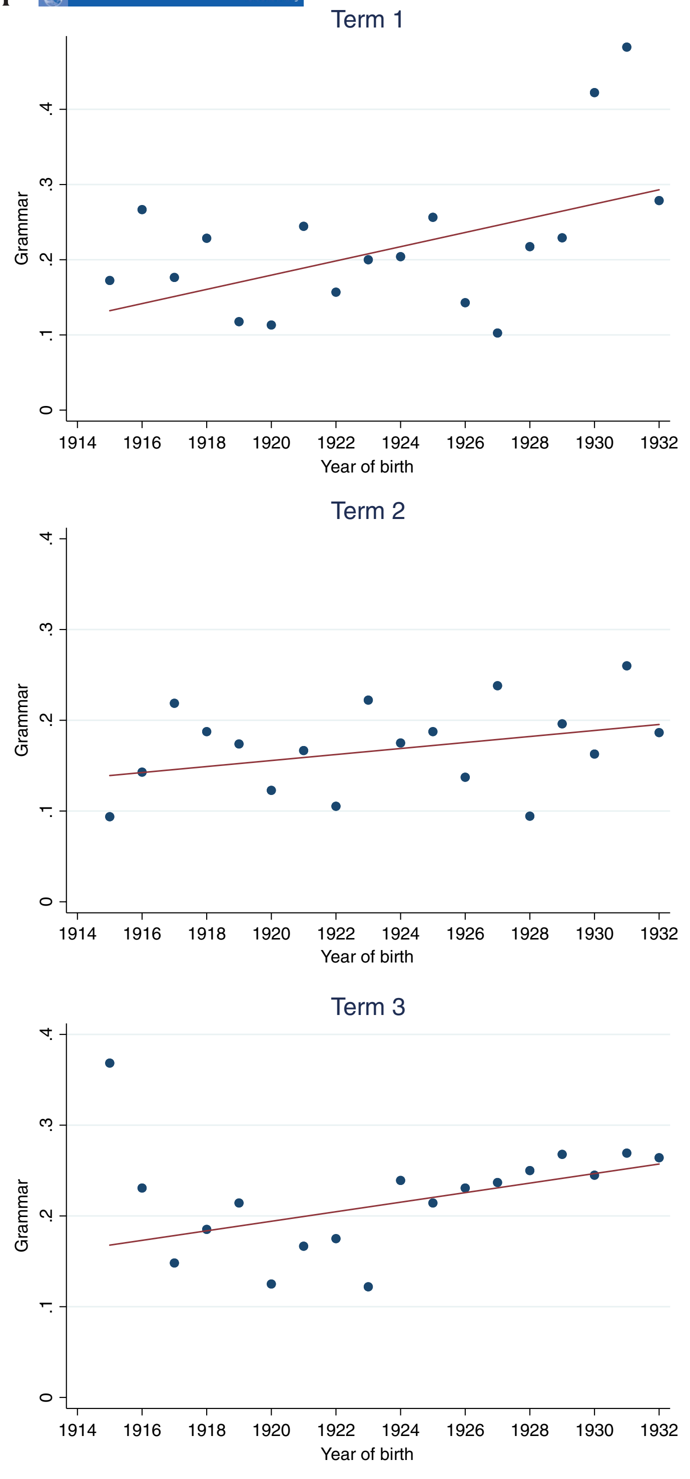

FIGURE 1 Pre-trends: Binned scatter plots and linear fits of going to grammar school prior to the 1944 Education Act by season of birth (school terms). Note: Each plot is a binned scatter plot providing a non-parametric visualisation of the relationship between 'going to grammar school' and year of birth across different seasons of births for individuals born that were born before the cut-off date established by the 1944 Education Act. The linear trends are parallel across seasons of birth. *Term 1*, *Term 2* and *Term 3* refer, respectively, to children born during September to December, during January to April and during May to August [Colour figure can be viewed at wileyonlinelibrary.com]

TABLE 6 Placebo estimates of the probability of attending selective school prior to the reform

	(1)	(2)	(3)
(Term 2) (Post 1921)	−0.056	−0.030	−0.109
	(0.060)	(0.062)	(0.077)
(Term 3) (Post 1921)	−0.013	0.008	0.021
	(0.028)	(0.025)	(0.045)
(Term 2) (Post 1922)	−0.047	−0.023	−0.071
	(0.052)	(0.053)	(0.070)
(Term 3) (Post 1922)	−0.051	−0.031	−0.004
	(0.037)	(0.034)	(0.041)
(Term 2) (Post 1923)	−0.048	−0.024	−0.079
	(0.046)	(0.047)	(0.060)
(Term 3) (Post 1923)	−0.030	−0.009	−0.002
	(0.038)	(0.036)	(0.037)
(Term 2) (Post 1924)	−0.069	−0.041	−0.092*
	(0.045)	(0.043)	(0.053)
(Term 3) (Post 1924)	−0.033	−0.009	−0.003
	(0.035)	(0.033)	(0.034)
(Term 2) (Post 1925)	−0.043	−0.024	−0.069
	(0.045)	(0.041)	(0.050)
(Term 3) (Post 1925)	−0.039	−0.021	−0.033
	(0.033)	(0.031)	(0.039)
(Term 2) (Post 1926)	−0.059	−0.040	−0.082*
	(0.044)	(0.040)	(0.047)
(Term 3) (Post 1926)	−0.063*	−0.045	−0.055
	(0.035)	(0.034)	(0.039)
(Term 2) (Post 1927)	−0.038	−0.026	−0.058
	(0.043)	(0.039)	(0.047)
(Term 3) (Post 1927)	−0.065*	−0.048	−0.053
	(0.034)	(0.032)	(0.037)
(Term 2) (Post 1928)	−0.070	−0.055	−0.081*
	(0.048)	(0.044)	(0.047)
(Term 3) (Post 1928)	−0.070**	−0.050	−0.062*
	(0.033)	(0.031)	(0.036)
(Term 2) (Post 1929)	−0.030	−0.014	−0.038
	(0.054)	(0.051)	(0.055)
(Term 3) (Post 1929)	−0.050	−0.025	−0.053
	(0.037)	(0.036)	(0.035)
(Term 2) (Post 1930)	0.002	0.015	−0.012
	(0.055)	(0.052)	(0.054)

(Continues)

TABLE 6 (Continued)

	(1)	(2)	(3)
(Term 3) (Post 1930)	−0.046	−0.022	−0.049
	(0.036)	(0.034)	(0.035)
(Term 2) (Post 1931)	0.042	0.056	0.039
	(0.056)	(0.054)	(0.059)
(Term 3) (Post 1931)	−0.029	−0.005	−0.025
	(0.038)	(0.036)	(0.038)
(Term 2) (Post 1932)	0.075	0.088	0.071
	(0.054)	(0.053)	(0.057)
(Term 3) (Post 1932)	−0.005	0.019	−0.010
	(0.040)	(0.038)	(0.038)
Observations	2,615	2,909	2,691
Gender	Yes	Yes	Yes
Year of birth	Yes	Yes	Yes
Parental qualifications	Yes	Yes	Yes
Comprehensive schools	No	Yes	No
Grammar with fees	No	No	Yes

Note: Each panel shows estimates from separate regressions of going to grammar school on term of birth interacted with a placebo dummy turned on few years before the actual reform (born post 1921, post 1922, etc.). *Term 2* and *Term 3* refer, respectively, to children born during January to April and during May to August ('summer children'). *Term 1* is the reference group of oldest children born during September to December. Each regression includes year of birth fixed effects, gender and parental qualifications. Standard errors in parenthesis are clustered at respondents' year of birth, with $^{**}p < .05$, $^{*}p < .10$.

the 1944 Act. The vast majority of the interaction effects are not statistically distinguishable from zero. When they are statistically significant they are so at 10% level and the estimates have opposite sign (negative instead of positive). This confirms our identification assumption.

7 | GEOGRAPHICAL LOCATION, GENDER AND CLASS STREAMING

Only larger primary schools could undertake class streaming given that this practice was predicated on annual pupil intakes requiring at least two classes per age cohort.[17] Age disadvantages among younger school children occurred in both streamed and non-streamed school environments but the former involved the additional and potentially irreparable disadvantages resulting from a misplacement of able young pupils into lower class streams. While the BHPS does not provide direct information on class streaming, it does offer interesting indirect insights. As shown in Table 7, BHPS data are broken down into different kinds of geographical locations, classified in terms of where children mostly lived when young. Two of these, villages and rural/countryside locations, are substantially more likely to be dominated by small non-streamed primary schools with one class intake per year,[18] com-

[17]As reported by Jackson (1964), there were 23,191 primary schools in England and Wales in 1962. He assumed that a school needed to have at least 300 children between 7 and 11 to allow class streaming. There were 2,892 such schools, or 12.5% of the total. In a questionnaire survey, he attempted to sample one in three of these larger schools ending up with a sample of 660 schools. Of these, 96% practised class streaming. In England in 1965, 20% of 20,789 primary schools contained over 300 pupils, with 7% over 400 pupils (Plowden Report , Table 14, para. 460).

[18]Plowden Report (1967, Chapter 14) discusses rural and village primary education in the early post-war era.

TABLE 7 Locations of individuals in the BHPS sample

Type of area mostly lived in when young	Frequency	Percent
Inner city	379	10.95
Suburban area	835	24.13
Town	829	23.96
Village	884	25.55
Rural or countryside	416	12.02
Mixed/moved around	117	3.30
Total	3,460	100.00

pared to the more populated inner city, suburban and town locations. Accordingly, we extended the regression model in (1) by adding dummies for inner city or suburb or town (which we label CST and compare to a rural/countryside area or a village.) and their interactions with the *post* and terms of birth dummies.

Results of the post-1944 probabilities of attending a selective school after allowing for locational differences are shown in the top section of results in Table 8.[19] For simplicity of exposition, we report only on the coefficients of the triple difference. Negative estimated coefficients indicate that the chances of attending a selective school were relatively poorer in the post-1944 era for younger children (born during the months of term 2 and term 3) who were largely brought up in a city, suburban or town location compared to rural/village locations. (We note that caution over interpretation needs to be emphasized given relatively large standard errors on most coefficients.) While these findings are in line with adverse effects of class streaming in larger primary schools, we cannot rule out other influences. For example, smaller school environments in less densely populated locations may have enjoyed better staff/student ratios.

We can, however, provide an interesting robustness check in support of the streaming hypothesis. Boys were more likely than girls to be adversely affected by class streaming in junior schools. Between the ages of 7 and 10 boys were considerably less likely to be placed in A-streamed classes than girls. Evidence provided by Barker Lunn (1970) for the year 1964 is provided in Table 9 in respect of 2-streamed and 3- or 4- streamed schools.[20] Do we obtain different outcomes when we add the male/female distinction to our triple differences specification that separates more populated and less populated locations? Results of these quadruple differences are shown in the bottom section of Table 8 results. Again acknowledging some large standard errors, negative effects for young male pupils in city/town/suburb areas are now accentuated. This contrasts with the findings shown in Table 5 that in the absence of locational disaggregation we find no male–female differential effects of term of birth between males and females.

8 | CONCLUSIONS

The work here belongs to a large number of studies that have investigated the disadvantages of children whose birthdays fall towards the end of the school year. This problem became increasingly recognized in England and Wales in the immediate post-war era. Our principal interest in the 1944 Education Act concerns its impact on an

[19]We omit the category, 'mixed/moved around' in Table 7 from these regressions.

[20]Class streaming was principally based on assessments of performances in English and Arithmetic. Barker Lunn (1970, Chapter 7) provides evidence that girls tended to be better at English and boys better at Arithmetic. Many students are not equally good in both subjects. It is suggested that the preponderance of girls in A-streams may have resulted from school assessments of ability placing more weight on English comprehension and proper usage than on Arithmetic.

TABLE 8 Date of birth and probability of attending selective school: location

Born	≥ 1933 (1)	(2)	(3)	≥ 1937 (4)	(5)	(6)
(Term 2) (Post) (CST)	−0.172*	−0.102	−0.227**	−0.148	−0.074	−0.200**
	(0.088)	(0.090)	(0.087)	(0.095)	(0.095)	(0.094)
(Term 3) (Post) (CST)	−0.135	−0.077	−0.177*	−0.092	−0.033	−0.134
	(0.092)	(0.090)	(0.096)	(0.092)	(0.090)	(0.097)
R-squared	0.073	0.062	0.068	0.072	0.060	0.067
Observations	2,535	2,818	2,608	2,284	2,555	2,352
(Term 2) (Post) (CST) (Male)	−0.281	−0.219	−0.298	−0.218	−0.164	−0.232
	(0.218)	(0.201)	(0.241)	(0.222)	(0.202)	(0.246)
(Term 3) (Post) (CST) (Male)	−0.268	−0.185	−0.339**	−0.210	−0.142	−0.286*
	(0.165)	(0.156)	(0.163)	(0.170)	(0.161)	(0.168)
R-squared	0.076	0.066	0.072	0.077	0.064	0.072
Observations	2,535	2,818	2,608	2,284	2,555	2,352
Gender	Yes	Yes	Yes	Yes	Yes	Yes
CST dummies	Yes	Yes	Yes	Yes	Yes	Yes
Year of birth	Yes	Yes	Yes	Yes	Yes	Yes
Parental qualifications	Yes	Yes	Yes	Yes	Yes	Yes
Comprehensive schools	No	Yes	No	No	Yes	No
Grammar with fees	No	No	Yes	No	No	Yes

Note: Every column shows estimated coefficients of separate linear probability models of going to a selective school on seasons of birth before and after the 1944 Education Act and living in an area where class streaming would have been likely. Columns (1) and (4) exclude fee-payers and comprehensives, Columns (2) and (5) exclude fee-payers, Columns (3) and (6) exclude comprehensives. *Term 2* and *Term 3* refer, respectively, to children born during January to April and during May to August ('summer children'). *Term 1* is the reference group of oldest children born during September to December. The reference locations are rural areas and villages. Each regression includes all the constitutive terms (dummies) of the interaction shown, year of birth fixed effects, gender and parental qualifications. Standard errors in parenthesis are clustered at respondents' year of birth, with ** $p < .05$, * $p < .10$.

TABLE 9 Percentages of boys and girls in A-stream classes at start and end of junior school in 1964

	2- stream primary schools: Boys	Girls	3- or 4-stream primary schools: Boys	Girls
Age: 7+	48%	58%	30%	40%
Total children in all classes (=100%)	559	518	895	832
Age: 10+	50%	56%	32%	41%
Total children in all classes (=100%)	635	576	819	774

Source: Data extracted from Tables 7.19a and 7.19b, Barker Lunn (1970, p.395).

initiative already in place on a relatively small scale in the 1920s and 1930s. This was standardized group intelligence testing incorporating age-adjusted test scores. Compulsory 11+ testing introduced under the Act caused an exponential rise in 11+ exam candidates, a rise that was to be further boosted by the post-war baby boom.

Research developments in the mid-1940s produced greater efficiency and simplicity in methods of marking and evaluating standardized, age-adjusted test scores and led to the tests being widely adopted throughout LEAs. The potential for significantly improving the chances of younger children gaining grammar school places was realized in the case of those born in the middle 4 months of the school year.

There was no comparable improvement among the summer children born in the last 4 months of the school year. Their chances of increasing their share of grammar school places did not materialize. We argue that this importantly related to the system of streaming (or tracking) in the larger junior schools, a feature of school organization in both pre- and post-1944 eras. At the age of 7, able young children were often misplaced into lower ability classes due to an ad hoc range of selection methods that usually did not include allowances for month of birth. For most, initial placement errors were not subsequently rectified. By the time they sat their 11+ exams, age-adjusted testing could not adequately correct for their unsuitable training and their personal lack of awareness of, or belief in, their true potential.

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REFERENCES

Barker Lunn, J.C. (1970). *Streaming in the primary school: A longitudinal study of children in streamed and non-streamed junior schools*. Slough: National Foundation for Educational Research.

Bedard, K., & Dhuey, E. (2006). The persistence of early childhood maturity: International evidence of long-run age effects. *Quarterly Journal of Economics*, *121*, 1437–1472.

Bell, J., & Daniels, S. (1990). Are summer-born children disadvantaged? The birthdate effect in education. *Oxford Review of Education*, *16*, 67–80.

Black, S. E., Devereux, P. J., & Salvanes, K. G. (2011). Too young to leave the nest? The effects of school starting age. *Review of Economics and Statistics*, *93*, 455–467.

Bolton, P. (2015). Grammar school statistics. House of Commons, Briefing Paper No. 13 98.

Borg, M., & Falzon, J. (1995). Birth date and sex effects on scholastic attainment of primary school children: A cross-sectional study. *British Educational Research Journal*, *21*(1), 61–74.

Campbell, T. (2013). In-school ability grouping and the month of birth effect. CLS Cohort Studies, Working paper 2013/1.

Crawford, C., Dearden, L., & Greaves, E. (2013). When you are born matters: Evidence for England. IFS Reports, Institute for Fiscal Studies, No. R80, ISBN, 9781909463080 http://dx.dol.org/10.1920/re.ifs.2013.0080.

Crawford, C., Dearden, L., & Greaves, E. (2014). The drivers of month-of-birth differences in children's cognitive and non-cognitive skills. *Journal of the Royal Statistical Society Series A*, *177*, 829–860.

Crawford, C., Dearden, L., & Meghir, C. (2007). *When you are born matters: The impact of date of birth on child cognitive outcomes in England*. London: Centre for the Economics of Education.

Douglas, J. W. B. (1964). *The home and the school*. London: MacGibbon and Key.

Floud, J. (1954). The education experience of the adult population of England and Wales at (July 1949). In D. V. Glass (Ed.), *Social Mobility in Britain*. London: Routledge and Kegan Paul Ltd.

Galton, M., Simon, B., & Croll, P. (1980). *Inside the primary classroom*. London: Routledge and Kegan Paul.

Glewwe, P., & Jacoby, H. G. (1995). An economic analysis of delayed primary school enrollment in a low income country: The role of early childhood nutrition. *The Review of Economics and Statistics*, *77*, 156. https://doi.org/10.2307/2110001

Harmon, C., & Walker, I. (1995). Estimates of the economic returns to schooling in the United Kingdom. *American Economic Review*, *85*, 1278–1286.

Hart, R. A., Moro, M., & Roberts, J. E. (2017). Who gained from the introduction of free universal secondary education in England and Wales? *Oxford Economic Papers*, *69*, 707–733.

Jackson, B. (1964). *Streaming: An education system in miniature*. London: Routledge and Kegan Paul.

Jinks, P. C. (1964). An investigation of the effect of date of birth on subsequent school performance. *Educational Research*, *6*, 220–225.

Lawley, D. N. (1950). A method of standardizing group tests. *British Journal of Mathematical and Statistical Psychology*, *3*, 86–89.

McEwan, P. J., & Shapiro, J. S. (2008). The benefits of delayed primary school enrolment: Discontinuity estimates using exact birth dates. *Journal of Human Resources*, *43*, 1–29.

Mitchell, B. R. (1988). *British historical statistics*. Cambridge: Cambridge University Press.

Mühlenweg, A. M., & Puhani, P. A. (2010). The evolution of the school-entry age effect in a school tracking system. *Journal of Human Resources*, *45*, 407–438. https://doi.org/10.3368/jhr.45.2.407

Nightingale, T. W. (1962). The May to August births. Journal of the Durham Institute of Education, November.

Puhani, P., & Weber, A. (2005). Does the early bird catch the worm? Instrumental variable estimates of educational effects of age of school entry in Germany. IZA Discussion Paper no. 1827.

Plowden Report. (1967). *Children and their primary schools*. London: HMSO.

Robertson, E. (2011). The effects of quarter of birth on academic outcomes at the elementary school level. *Economics of Education Review.*, *30*, 300–311. https://doi.org/10.1016/j.econedurev.2010.10.005

Schneeweis, N., & Zweimüller, M. (2014). Early tracking and the misfortune of being young. *Scandinavian Journal of Economics*, *116*, 394–428.

Sharp, C. (1995). What's age got to do with it? A study of patterns of school entry and the impact of season of birth on school attainments. *Educational Research*, *36*, 251–265. https://doi.org/10.1080/0013188950370304

Slavin, R. (1987). Ability grouping and student achievement in elementary schools: A best-evidence synthesis. *Review of Educational Research*, *57*, 293–336.

Smith, J. (2009). Can regression discontinuity help answer an age-old question in education? The effect of age on elementary and secondary school achievement, *The B.E. Journal of Economic Analysis & Policy*, *9*, 1–30.

Thomson, G. H. (1932). The standardization of group tests and the scatter of intelligence quotients. *British Journal of Educational Psychology*, *2*, 92–112.

Vernon, P. E. (1957). *Secondary school selection*. London: Methuen.

Williams, P. (1964). Date of birth, backwardness and educational organisation. *British Journal of Educational Psychology*, *34*, 247–255.

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