Date of birth, family background, and the 11 plus exam: short- and long-term consequences of the 1944 secondary education reforms in England and Wales

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Abstract: Research into socio-economic impacts of the 1944 Education Act in England and Wales has been considerable. We concentrate on its two most fundamental innovations. First, it provided free universal secondary education. Second, state-funded pupils were placed into grammar schools or technical schools or secondary modern schools depending on IQ tests at age 11. The secondary modern school pupils experienced relatively poor educational opportunities. This tripartite system dominated secondary education from 1947 to 1964. For this period, we use the British Household Panel Survey to investigate the influences of date of birth and family background on (a) the probability of attending grammar or technical schools, (b) the attainment of post-school qualifications, (c) the longer-term labour market outcomes as represented by job status and earnings. We link results to research into the effects of increasing the school minimum leaving age from 14 to 15, also introduced under the 1944 Act.

1. Introduction

There has been a strong and long term interest among social and behavioural scientists in the effects of early childhood events and experiences on subsequent educational and market outcomes. One very early event in the life cycle is an individual's date of birth. Date or season of birth has been found to affect test scores, educational attainment, qualifications and wages outcomes (see, among others, Jürges and Schneider, 2007; Bedard and Dhuey, 2006; Fredriksson and Ockert, 2006; Grenet 2010; Black et al., 2011; Dobkins and Ferreira, 2010 for a review). This occurs via different mechanisms including maturity effects, relative age effects, length of schooling, and tracking systems. As for post-birth experiences in relation to education and later work activity, there is a large theoretical and empirical literature on the intergenerational transmission of educational and labour market attainments from parents to children. Research includes Dearden, Machin and Reed (1997), Ermisch and Francesconi (2001), Restuccia and Urrutia (2004), and Oreopolous, Page and Stevens (2006).

The radical reforms of the British 1944 Education Act provided early interest among contemporary commentators on the effects of data of birth and parental influences on children's' secondary-level schooling. Attention focussed on the Act's two most important reforms, both of which were enacted in 1947. First, free universal secondary education was provided by the state. It was delivered by schools belonging to a so-called tripartite system, consisting of grammar schools, technical schools, and secondary modern schools (henceforth modern schools). Second, all children were required to take a pivotal exam at the age of 11, performance in which determined which of the three types of schools they subsequently attended. It was known as the 11 plus exam and comprised a set of IQ tests covering arithmetic, general reasoning, and an essay on a prescribed general topic.

One-third of children proceeded to grammar or technical schools, a large majority of whom stayed at school until at least the age of 16 when they sat nationally recognized Ordinary-level (O-level) exams. Many continued in sixth form studies up to the age of 18 when they sat nationally recognized Advanced-level (A-level) exams. About one-quarter of all grammar school pupils proceeded to university (Sampson, 1962). The remaining two-thirds of children faced a starkly contrasting school experience. A typical modern school student left school at the minimum leaving age of 15 with no school qualifications. Crucially, this was accepted by the designers and defenders of the 11 plus exam since, in essence, they regarded it as a vehicle for matching intelligence and associated learning needs with appropriate educational provision.[1] A strong school match at the age of 11 was vital since, once allocated to one of the tripartite schools, it was very unusual for pupils to be able to switch to an alternative type of school.

The officially declared objective of the 11 plus exam was challenged by a few contemporary commentators and researchers who argued that it involved two types of unintended consequences. In the first place, it was suggested that the age structure of primary school education up to the age of 11 produced unequal probabilities of 11 plus exam success linked to the month of the year in which pupils were born. Secondly, while boys and girls from all social strata took the 11 plus exam, the selection procedure in general and the design of the IQ testing in particular were thought to be biased in favour of

[1] This objective closely followed one the recommendations of the Spens Report (1938), commissioned by government in the 1930s to investigate secondary education needs. 'We believe that the selective examination at the age of 11 plus for secondary schools, as ordinarily conducted, is capable of selecting in a high proportion of cases (a) those pupils who quite certainly have so much intelligence, and intelligence of such a character, that without doubt they ought to receive a secondary education of grammar school type; and (b) those pupils who quite certainly would not benefit from such an education.' (Spens Report, Chapter 11, paragraph 140)

children from middle-class social backgrounds. During the operation of the tripartite system, evidence in respect of these two criticisms was somewhat sketchy. Here, we attempt to provide a more in depth evaluation of this important educational experiment that dominated the school lives of the vast majority of British children, especially over the first two decades of its existence.

2. The tripartite education system

The state-funded or so-called 'maintained' tripartite schooling system established by the 1944 Education Act delivered free secondary education via grammar schools[2], technical schools[3] and modern schools[4]. Between 1947 and 1964, this three-tier system offered the only choice of secondary education to the great majority of children in their local education areas (LEAs). The early years marked a period of adjustment.[5] The year 1964 marked the end of official government backing of the system. In 1965, the new Labour government requested LEAs to start planning for and switching towards a radically different comprehensive education system (see Sumner, 2010). Figure 1 illustrates the resulting

[2] Grammar school education emphasised an academic curriculum, covering literature, mathematics, science, old and new languages.

[3] Technical school education placed strong emphasis on applied mechanical sciences and engineering.

[4] The modern curriculum concentrated on practical and basic subjects, including arithmetic, wood work and metal work, domestic work.

[5] As shown in Figure 1, the start of this period marked the highest percentages of pupils (nearly 38%) attending maintained grammar schools. This was due to the fact that many of the secondary schools established since the 1870s were grammar schools. Modern school provision necessitated an expansionary adjustment period involving school re-construction and new construction. Pre-existing elementary schools were converted to modern schools along with a significant increase in new school building.

marked post-war decline of maintained grammar schools, in respect of both numbers of schools and pupils. The empirical work here is based on the British Household Panel Survey (BHPS) and covers individuals who were educated in the tripartite system from years 1947 to 1964. Over this time our sample indicates that 64% of students in state-run secondary education attended modern schools, 31% attended grammar school, and 5% attended technical schools. These relative percentages are in line with data provided by Mitchell (1988) covering all children attending secondary schools in the maintained sectors in England and Wales for the years 1947 to 1964; 66% attended modern schools, 29% grammar schools, and 4% technical schools.

The tripartite schools did not account exhaustively for secondary educational provision. Table 1 shows the BHPS percentages of students between 1947 and 1964 classified by all types of secondary school education – i.e. the maintained tripartite schools and the remainder. Direct grant, or fee-paying, grammar schools accounted for 1.3% of all students and had to make at least 25% of their places available to state primary school children whose education was paid for by the state. Starting as early as 1946, there was a slow emergence of comprehensive schools in several specific locations in England and Wales. They were initially regarded as an experimental alternative to tripartite schools, modelled more towards grammar school educational provision but catering for a much wider range of ability. There were 13 comprehensive schools in 1953 rising to 195 by 1964 (Mitchell, 1988, p. 807). They account for 13% of pupils in our BHPS sample.[6] Following

[6] This BHPS percentage figure of 13% in Table 1 is almost certainly too high. For example, in 1964 comprehensive schools – at their peak number since 1947 - accounted for only 7% of students in the entire maintained sector (calculated from Mitchell, 1988). This could well be due to misreporting. For example, if an individual remained in the same locality in the years following school education and if their former secondary modern school is converted to a

Labour's change of direction, there were 262 comprehensive schools in 1965, 387 in 1966 and 1145 by 1970. Figure 2 shows the numbers of pupils in all maintained schools between 1947 and 1970. The exponential rise of 'other' schools after the mid-1960s is dominated by the growth of comprehensives at the expense of modern and grammar schools. Finally, public school and private school students accounted for the remaining sizeable share of pupils from 1947 to 1964, at 5.2%.

Gaining a grammar school or technical school place on the basis of the 11 plus exam was not conditional on a predetermined pass/fail mark. At an important margin, moving to either school depended on the relative provision of places through time and across geographical education districts. In the first place, as shown in Figure 1, the percentage share of grammar school places within the maintained school sector declined through time. This trend was aided and abetted in the late 1950s by a surge in 11-year olds entering secondary education following the immediate post-war baby boom. Second, there were large regional differences in the availability of grammar/technical school places. These are shown in Table 2 in terms of percentages of pupils attending grammar and technical schools from our entire BHPS sample. From 1947 to 1964, there was an average 37% to 42% chance of entering one of these elite schools in the South West, Outer London and Wales in contrast to a 30% to 33% chance in Yorkshire and Humberside, the East/West Midlands, the South East, and East Anglia.

Success or failure in the 11 plus exam had potentially serious long-term implications for pupils' future educational and labour market attainments. Once placed, very few transfers took place between modern schools on the one hand and grammar/technical

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comprehensive school then they may report the school's title at the time of the survey. We exclude all those reporting a comprehensive education from our analysis.

schools on the other. While post-school further education opportunities were not ruled out, "schooling at least was settled at the age of 11" (Halsey, Heath, and Ridge, 1980, p.105). Table 1 shows the levels of educational attainment of our BHPS sample. Higher and first degrees as well as O-levels and A-levels overwhelmingly represented those educated at grammar schools and technical schools.[7] Performance in these had significant consequences both in terms of selection into the best jobs at these ages and entry into university and other higher educational institutions. Fewer than 10% of modern pupils took O-level exams and extremely few went on to other institutions to take A-levels, essentially because no appropriate background training had been provided. The most negative legacy of the 1944 Education Act was that 34% of all students left education with no qualifications and the great majority of these had been required to attend modern schools at age 11.

3. Unintended consequences of the tripartite system

The tripartite education system was both structurally very simple and somewhat shockingly radical in its placement of children into secondary education based on IQ tests at the age of 11. Its main *raison d'etre* centred on the claim that placement depended on matching levels of intelligence with suitable school curricula. Detractors noted, however, two unintended consequences of the selection process.

[7] Note, however, that there were relatively few technical schools. From 1947 to 1964 there was an average of only 275 schools. This sector was generally under-resourced and experienced a scarcity of suitably qualified teachers.

3.1 Date of birth

Primary education commenced for most children at the age of 5. They were required to start at an infant school at the beginning of the term of their 5th birthday. Entry dates for these terms were in September, January and after Easter.[8] They then proceeded to junior school in the September following their 7th birthday. This second intake covered one age group at one start-date and so did not reflect the different entry points of the first intake. Therefore, the Easter intake of 5 year-olds led to only two years and one term in infant school in contrast to the September intake with 3 full years of infant education. The disadvantaged so-called summer intake – i.e. those born between May and August - often faced two additional relative disadvantages. 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, to make matters worse the Easter 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.

Like entry into junior school, the 11 plus exam was taken by one entire age group (11 year olds) during a narrow interval of time. By the time of the exam, children born in the months of September to December were predominantly those who had received 7 years, or 21 terms, of primary education, whereas those entering in January or after Easter received 20 or 19 terms, respectively. Therefore, the age disadvantage of children born between

[8] However, it was not uncommon for primary schools to admit children before their 5th birthday (see Plowden Report on primary school education – henceforth Plowden, 1967 – Chapter 10 and Appendix 6). For example, children with working mothers were often admitted at the beginning of the school year in which they turned 5.

May and August was retained. Based on evidence from quite localised geographical areas, including hearsay reporting by head teachers, a number of studies found that performance in junior school and in the 11 plus exam was strongest among those born in September to December and weakest among the 'summer births' from May to August (see Jinks, 1964; Nightingale, 1962). This was observed despite the fact that examiners could adjust marks to allow for age disadvantages.

3.2 Family background

The 1940s education reforms gave rise to a relatively early interest in the effects of family background on children's educational achievements. Soon after the reforms became operational, evidence emerged that children with middle-class parents performed especially well in the 11 plus exam (see Simon and Rubenstein, 1969 for a summary of the empirical literature). Not only did middle-class children appear to have higher probabilities of attending grammar schools compared to their working-class contemporaries but that they also seemed to be better suited to the aims and objectives of grammar school education. There was evidence that they had better academic records and, in conjunction with their parents' aspirations[9], remained for longer periods at school. Based on data collected from 700 London secondary schoolboys, Halsey and Gardner (1953) noted that, following the

[9] There is strong evidence from sociological research that parental encouragement plays an important role in formulating children's longer tern educational plans. For example, in their study of Wisconsin high school seniors Sewell and Shah (1968) find that such encouragement is especially effective among intelligent children within households enjoying high socioeconomic status.

1944 reforms, middle-class boys stood greater chances of gaining grammar school places and achieving academic successes.[10]

Various family-related contributory factors were highlighted during the tripartite years as to why the 11 plus exam system may have been biased in favour of the middle-classes. Children whose fathers were in professional or clerical or supervisory occupations experienced home environments in which the importance of secondary and post-secondary education was generally more strongly recognised. More parental time was devoted to thinking about and supporting children's' secondary educational needs and stronger preferences were expressed for (a) grammar school education, (b) a longer stay at secondary school, (c) the need for post-school further education (Martin, 1954). Middle-class families were more likely to offer support to children's educational needs through such means as helping with early reading, residing in locations with relatively high supplies of grammar school places, financing outside tutoring designed to supplement classroom education (Vernon, 1957).

Over and above these observations, a view emerged that the nature of IQ testing under the 11 plus exam was itself not independent of family circumstances. Criticisms of the methods of measuring intelligence began to emerge (see Heim, 1954), with sociologists pointing out 'the influence of intelligence tests in discriminating against working-class children at eleven plus' (Simon and Rubinstein, 1969). Two of the three parts that

[10] "Working class children, especially those from large families, appear on the whole to fit less easily into the life of a Grammar School than boys from middle-class homes and smaller families. The length of school life preferred by the boy, and (according to him) by his parents, is shorter the lower his social level and the larger his family. Middle-class boys tend to have superior academic records despite the fact that, as a group, they do not differ in measured intelligence from working-class boys in the same schools. The latter, especially those from larger families, seem to have less aspiration and parental pressure towards achievement." (Halsey and Gardner, 1953, p. 75)

comprised the 11 plus exam were especially conducive to home backgrounds in which there was strong access to books, combined with parental involvement and encouragement to read widely. First, there was a test on general reasoning in which the use of language, correct grammar and sentence logic played important roles. Second, students were required to write an essay on a prescribed topical theme. Figure 3 shows the availability of books over the first 10 years of childhood in homes delineated by father's socio economic background. Children with fathers in professional and managerial jobs had clear advantages in this respect. There was reasonable access to books in families with fathers in skilled non-manual occupations or in the armed forces. Otherwise, the predominant position in many households was that of little or no access to books.

Of course, home-based influences would not have been confined to the direct educational involvement and financial support of parents but also from the quality of parental care in wider respects. As already indicated in relation to the investigations of Halsey and Gardner (1953), belonging to a small family, even for working-class children, was advantageous. Being an only child or the first born of a group of siblings ensured, at least for some period of time, a monopoly of the available parental attention. The age of parents may also have played a role in respect of the amount of time committed to children and in the intensity of input per period. Moreover, if both parents had professional qualifications, perhaps indicative of joint commitments to related work activities, then they may have been less likely to devote considerable time to child rearing. These and other controls are incorporated in our empirical work.

4. Estimation

We start by investigating the relative importance of age started school, family background, and location on the probability of proceeding to either grammar school or technical school (henceforth jointly labelled 'grammar') on the one hand or modern school on the other. We then proceed to evaluate the relative effects of attending a grammar or a modern school for three types of post-school attainments. These are further education qualifications, labour market occupations, and earnings. On the basis of our initial analysis of family background on type of school attended, we differentiate in our post-school regressions between individuals who enjoyed significant family advantages and those with no family advantages.

Let p_i = 1 if individual *i* went to grammar school following the 11 plus exam and p_i = 0 if she went to a modern school. This is expressed by the probit

$$(1)\ p_i = \gamma_0 + \gamma_1 a_i + S_i\beta + X_i\theta + u_{it}$$

where *a* is absolute age (in months) at the time of the 11 plus examination[11], S_i is a set of family socio-economic characteristics, X_i is a set of additional controls.

Eight time-invariant characteristics are incorporated within S_i. These are (i) availability of books at home during the first 10 years of childhood, (ii) father's socio-economic background, (iii) father's education, (iv) mother's education, (v) age position among household siblings, (vi) father's date of birth, (vii) mother's date of birth, (viii) type of location mostly lived in when young. Binary variables within X_i cover four sets of controls:

[11] See Grenet (2010) for comparative support of this measure.

(a) year of birth, (b) district of birth, (c) year of survey, (d) gender. Full BHPS definitions and descriptions are given in Appendix Table A1.

We illustrate our approach to evaluating post-school attainments with reference to our main earnings equation. For the individuals in our sample who attended a tripartite school between 1947 and 1964, we measure their log of hourly earnings in 2003, represented by $ln\ E_i$ in respect of the *i'th* individual. Let G_i be a dichotomous variable that takes the value of 1 if individual i went to grammar school and 0 if attended a modern school. Similarly, A_i is a dichotomous variable that takes the value of 1 if individual *i* had an advantaged family background and 0 if not advantaged. The indicators of an advantaged family background are derived from the significant estimates in equation (1) belonging to the range of family influences that increased the probability of gaining grammar school entry.

Consider an interaction model such that

(2) $\ln E_i = \beta_0 + \beta_1 G_i + \beta_2 A_i + \beta_3 G_i A_i + Z_i\lambda + \varepsilon_I$,

where $G_i\ A_i$ represents an interaction term and Z_i is a set of controls. Variables within Z_i cover: (i) years of labour market experience, (ii) gender, (iii) year of birth, (iv) district of birth, (v) age position among household siblings, (vii) father's date of birth, (viii) mother's date of birth, (ix) type of location in which home situated. Standard errors are adjusted to account for clustering at year of birth.

If the individual did not go to grammar school, i.e., $G_i = 0$, then equation (2) simplifies to

(3) $\ln E_i = \beta_0 + \beta_2 A_i + Z_i\lambda + \varepsilon_i$

and so β_2 captures the effect of being advantaged by family background and going to a modern school (M_A henceforth) on earnings, relative to no family advantage and going to a modern school (M_N, henceforth), i.e. $(\partial ln(E)/\partial A)$ when $G = 0$. Since M_A and M_N both include innate intelligence - and if we assume intelligence to be roughly equally distributed between advantaged and not-advantaged groups - this tests the relative contribution of parental home background on earnings among those who attended modern school.

If an individual has no family advantage (so $A_i = 0$) then equation (2) becomes

(4) $\ln E_i = \beta_0 + \beta_1 G_i + Z_i\lambda + \varepsilon_i$.

Here, β_1 captures the relative effect of going to grammar school for an individual with no family-based advantage, i.e., $(\partial ln(E)/\partial G)$ when $A = 0$ (G_N, henceforth) with respect to going to a modern school with no advantage (M_N). This emphasises an innate and/or inherited intelligence differential between two individuals with no family advantages, because one went to grammar school and the other did not.

If an individual went to grammar school, i.e. G = 1 in (2), then $(\partial ln(E)/\partial A) = \beta_2 + \beta_3$ measures the effect of going to grammar school with a family advantage (G_A) relative to going to grammar school and with no advantage (G_N). The earnings differential is mostly due to advantageous family influences, if we assume that 'passing' the 11 plus represents equal innate abilities.

The last effect captured by equation (2) is $(\partial Ln(E)/\partial G)$ when $A = 1$, which is $\beta_1 + \beta_3$, or the effect of going to grammar school for an individual with family advantages (G_A) with respect to going to a modern school for a similar individual (M_A). This earnings differential can be interpreted as strongly influenced by relative intellectual ability.

We summarise the four pairs of outcomes captured by equation (2) in Table 3.

We also investigate the effects of types of schooling and family background on (a) post-school qualifications attained and (b) subsequent labour market economic status (i.e., self-reported occupational class of respondent's present job). We simplify the qualifications listed in Table A1 into the ascending order of (i) no qualifications, (ii) O- levels or O- and A-levels, (iii) professional and apprenticeship qualifications, (iv) degree/higher degree qualifications. The occupational class outcomes are ordered by (i) unskilled; (ii) partly skilled; (iii) skilled manual; (iv) skilled non-manual; (v) professional or manager or technical.

We estimate the qualifications and occupational status regressions using both OLS and ordered probits. In the former, we assume cardinality instead of ordinality - i.e. adopting a linear probability model. The ordinal nature of the dependent variables suggests the latter as the most appropriate model. However, for practical purposes, there are usually few qualitative differences between standard OLS and ordered probits (see e.g., Ferrer-i-Carbonell and Frijters, 2004, Angrist and Pischke, 2009). Furthermore, the interpretation of interaction terms in ordered probit is complicated by the nonlinear nature of the model (Ai and Norton, 2003). For these reasons, in what follows we will present results from standard OLS. OLS results are then given within the same structure as our earnings regressions; that is, including interaction effects. Results from our ordered probit regressions are, for the large part, in line with our equivalent OLS findings. We report on the main features of the results from the ordered probits with full details available on request.

5. Data

We base our empirical work on the British Household Panel Survey (BHPS). The BHPS provides individual-level information on household organisation, employment, accommodation, tenancy, income and wealth, housing, health, socio-economic values, residential mobility, marital and relationship history, social support, and individual and household demographics. It covers on average 12,000 individuals per year over the period 1991 to 2008.

We use data for individuals born from 1936 to 1953 and who consequently sat the 11 plus exam from 1947 to 1964. The BHPS provides great detail on individual demographic characteristics (date and district of birth), type of school attended, qualifications, etc. The parental social class variables used in our analysis are available in 1991 and then from 1998 to 2008. For any given individual, and in order to maximise the number of individuals that we are able to include, we use the first available year of these data. This is possible because these variables are fixed through time. The family history variables (e.g. number of books in the household, place of birth, number of siblings etc.) are only given in 2003. Our earnings variable -- the log of hourly earnings -- also refers to 2003; we are able to check for robustness by selecting alternative years. The complete list of variables used in our analysis is presented in Table A1 in the Appendix.

6. Outcomes

Regression equation (1) deals with factors influencing grammar school or modern school entry. Results are shown in Table 4.

We find supporting evidence that month of birth did significantly affect, albeit relatively modestly, the probability of entry into grammar school. Older children at the time of taking the 11 plus exam had improved chances of a favourable outcome. As an alternative to age at the time of taking the exam, we also used (a) month of year born and (b) season of year born (September-December, January-April, and May-August). These confirm that those born between September and December – the first 5-year old entry group during the school year – enjoyed better 11 plus outcomes compared to the two later intakes.

We also show estimates in respect of our key family-related variables. There are four specifications, all of which contain controls for year of birth, district of birth, year of survey, position among siblings in the family[12], and parental year of birth. In specification (1) we include book availability at home. We add in (2) father's socio economic class, in (3) whether father had qualifications, and in (4) whether mother had qualifications.

The availability of books at home – i.e. 'quite a few' or 'lots' relative to no books - during the first 10 years of childhood is comprehensively highly significant across all four specifications. Almost certainly, this variable captures a much wider description of the household environment than the physical presence of books alone. For example, while it is directly reflective of parental reading activity it probably correlates positively with parents' participation in the reading and learning development of their children. Children of fathers who are in professional/managerial or skilled non-manual occupations are also advantaged in respect of exam outcomes. This holds robustly across specifications (2) – (4). The

[12] We find in all our regressions in respect of Table 4 that children from large families, who were positioned third or higher in order of births among siblings, had on average significantly lower probabilities of attending grammar schools. This is supportive of one of the key findings of Halsey and Gardner (1953).

influence of fathers holding some or high qualifications in (3), relative to no qualifications, appears to provide an additonal significant positive influence. However, interestingly, this becomes insignificant when we include, in the full specification (4), the qualification background of mothers. Mothers with high or some qualifications clearly represent a very strong parental influence, dominating the equivalent male outcomes. Based on the first seven waves of the BHPS, Ermisch and Francesconi (2001) also find that mother's educational background had a stronger influence than father's on the educational attainments of their children. This is not a universal finding, however. For example, based on nine cross sections (1994-2001) of the British Family Resources Survey and using the 1970s England and Wales increase in the minimum school leaving age to identify the effect of parental education, Chevalier (2004) finds equally strong effects of both father's and mother's education on children's schooling achievements.

On the basis of the outcomes highlighted in Table 4, we classified children into those with advantaged and those with not-advantaged family backgrounds. We defined a broad and a narrow definition of advantages. Under the broad definition an advantaged individual has a family/home background with at least quite a few books and/or with a professional or managerial or skilled non-manual father and/or with a mother with at least some qualifications. Children with none of these parental and home attributes were classified as not-advantaged. Under the narrow definition, an advantaged individual has a father with a profession or managerial or skilled non-manual job. The main distinction between broad and narrow definitions is that the former represents a wide range of socio-economic influences while the latter is more directly reflective of the likely financial position of the family.

Our two definitions of advantaged are then incorporated in the framework discussed in relation to equations (2) and (4). Dichotomising between children from advantaged and not advantaged family backgrounds we investigate the implications of attending a grammar or a modern school for post-school qualifications, occupational status, and earnings. Results are shown in Table 5 in respect of our broad definition of advantaged and Table 6 for the narrower definition. We show only those results for which a full set of controls are included.

We start by noting two sets of estimates that are consistent across our earnings, qualifications and occupational regressions in both Tables 5 and 6. First, in the case of age at which the 11 plus was taken we find that there are either insignificant or very weakly negative effects. The slight age advantage in respect of success in the 11 plus exam appears to peter out in terms of short- and long-term post-school attainments, suggesting that the date of birth effects are channelled through attending grammar school, which is included in our specifications. Second, we obtain very strong and significant positive male-female differentials in respect of all three measures of post-school attainments.

Earnings outcomes are shown in the first results' columns in Tables 5 and 6. Our earnings data are available for just over one-half of our sample. Given the analysis is confined to individuals who took the 11 plus exam between 1947 and 1964, our 2003 sample of wage earners are aged 50 years and older.[13] Note that in these regressions we control additionally for (a quadratic in) labour market experience, given by age in 2003 minus age when left full time education. We start with Table 5. The estimated semi-elasticity indicates a 35% ($e^{.3} - 1$) earnings advantage in favour of a grammar education for

[13] We undertook the equivalent regressions for several earlier years, with no major implications from the results presented here.

those with no family advantages compared to attending modern schools with no family advantages. This differential remains substantial, at 23%, in respect of grammar school educated individuals with an advantaged family background compared with advantaged individuals who attended modern schools. Within grammar schools and within modern schools there are no significant earnings effects due to family advantages. The foregoing relative earnings grammar-modern advantages are changed somewhat under the narrower definition of advantaged, that is having a father with relatively high occupational status. In this case, from Table 6, not-advantaged grammar educated individuals have a 21% earnings advantage compared to their modern school equivalents while advantaged grammar educated have a substaniial 39% earnings differential compared to their modern school equivalents. Otherwise, outcomes in Tables 5 and 6 are reasonably similar.

The OLS regressions in Table 5 in respect of post-school qualifications contain the same variable structure as for our earnings equations because they enable us to include interaction terms. Unequivocally, a grammar school education resulted in much higher qualification levels than a modern school education. However, among those who attended modern schools, an advantaged family background is associated with significantly better qualification attainments. For those who attended grammar schools there is no significant qualifications differential between advantaged and not-advantaged. Under the narrower advantage definition in Table 6, this last result differs somewhat. If advantage is confined to the occupational class of the father, advantaged grammar school pupils go on to achieve significantly higher qualifications than their not-advantaged equivalents.

Finally, and perhaps unsurprisingly, the estimates with respect to occupational class attainment in Tables 5 and 6 more or less mirror the results obtained for post-school

qualifications. They too underscore the considerable benefits of achieving a grammar school education.

We also estimated the qualification and occupational class interaction models using ordered probit and the results do not diverge significantly from equivalent OLS estimates. In OLS models the sign and magnitude of the interaction term coincides with the marginal effect of the interaction term, but this is never the case for ordered probit or logit (Ai and Norton, 2003). In addition, the interaction effect in an ordered probit is conditional on all the other covariates. Therefore, in order to compare OLS with ordered probit results we have computed predicted probabilities for the four pairs of pupils. The results show that a not-advantaged individual who attended modern school had a 1.3 percent chance of getting the highest qualifications, while an advantaged modern school individual had a slightly higher chance of about 3.3 percent. The predicted probability of obtaining the highest qualifications was much higher if attended grammar school: 17 percent for an advantaged and 14 percent for a not-advantaged individual. Much larger probabilities are associated with belonging to the highest occupational status: an advantaged individual who attended grammar school had 60 percent chance of achieving professional or managerial status, while a not-advantaged individual who attended grammar school had 55 percent chance. The equivalent probability for somebody attending modern school was much lower, 27 percent for an advantaged and 20 percent for a not-advantaged individual.

7. Effects of raising the minimum school leaving age under the 1944 Education Act

An additional legislative measure under the 1944 Education Act required that the school minimum leaving age in England and Wales be raised from 14 to 15. This was

enforced from 1947 onwards. Labour market repercussions of the change have featured in the related education literature (Harman and Walker, 1995; Oreopolous, 2006; Devereux and Hart, 2010). It had no more than a modest impact on the subsequent earnings of the affected cohorts. Devereux and Hart (2010) find that raising the minimum school leaving age by one year in 1947 produced a wage return of 4 to 7% for men and a zero return for women.[14] Ironically, major reasons for this weak outcome may well have been due to other reforms in the Act. The introduction of the tripartite secondary school system meant that two-thirds of children received a modern school education that overwhelmingly resulted in no school qualifications. In fact, at least half of these children subsequently achieved no qualifications of any kind. Recent research has supported the notion that it is the attainment of qualifications that lay behind increased wage returns to rises in the minimum English school leaving age (Dickson and Smith, 2011; Grenet, 2012). So there would have been little boost to earnings if the additional year of schooling was undertaken in secondary modern schools. By contrast, most of the one-third who attended a grammar or technical school achieved nationally recognised school qualifications and 53% of these achieved post-school qualifications. Prior to 1947 many of the families of this equivalent group of children might well have afforded to meet the costs of a grammar school education[15] and so the longer term real earnings prospects of advantaged children may well have been little affected.

[14] The effects of raising the minimum school leaving age in England and Wales have also featured in relation to a range of economic and social issues in the literature. Recent examples include Banks and Mazzonna (2012) into links with old age cognitive abilities and Powdthavee (2010) into hypertension. Devereux and Hart (2010) reference other studies and applications.

[15] 80% of those with post-school qualifications came from families in which the father was in a skilled non-manual occupation or above.

This leaves those children with intellectual ability, in the sense of gaining grammar school entry, but with no family advantages, 16% of total grammar school pupils in our data and based on our broad definition of advantaged. This group gained a free grammar school education and, as a result, many of them would have achieved significantly better labour market outcomes than their pre-1947 equivalent cohorts. They are the key individuals driving an increase in aggregate earnings due to the 1947 changes. But this did not result from extending the minimum age of education. Rather, their improved earnings prospects derived from gaining a funded place at grammar school and staying on to at least the age of 16 – and in many cases to 18 and beyond – and thereby attaining valuable school and post-school qualifications.

Table 7 contains the results of a simple exercise designed to measure the effects on aggregate earnings of disadvantaged children receiving free grammar school education due to the 1844 education reforms. We assume that, in the absence of the reforms, only parents of children with advantaged family backgrounds could have afforded to send their children to grammar school. We use both our broad and narrow definitions of advantaged. In the absence of the reforms, we assume that disadvantaged children who went to grammar school would have attended the equivalent of a modern school and earned the average earnings of a disadvantaged modern school student.[16] Re-weighting average aggregate earnings accordingly we find that actual secondary school placements under the 1944 education reforms produced combined male/female earnings increases of between

[16] Of course, these assumptions cannot be entirely accurate. There would be advantaged families under our definition who would not have been able to afford the costs of a grammar school education. As an offset, however, a proportion of intelligent children who lacked family advantages would have achieved a high occupational status even in the absence of the opportunity to attend a grammar school.

1% and 6% higher compared to no free secondary education for disadvantaged children.[17] If the attainment of grammar school and post-school qualifications is the key driver in earnings rises associated with the reforms, then these simple estimates help to explain why Devereux and Hart find only modest earnings effects of an additional compulsory year of secondary education.

8. Conclusions

The single most important policy decision under the 1944 Education Act was to provide free secondary education to children from all classes of British society. However, for two main reasons, the implementation of the policy was largely a failure. First, there was a wide chasm in the quality of secondary school provision as between grammar/technical schools and modern schools. The former provided nationally recognised qualifications to one-third of children and led to distinctly improved chances of achieving post-school higher qualifications. The latter offered two-thirds of children virtually no opportunity for within-school qualifications and provided a platform of learning that was not able to support a broad set of further education and training qualifications. Second, selection into one or other of these secondary schools was predicated on performance in a series of IQ tests at the age of 11. Almost certainly the selection process was tilted in favour of children from middle-class family backgrounds. The absence of subsequent movement between grammar/technical schools and modern schools served seriously to exacerbate the results of this selection bias.

[17] These calculations are based solely on the tripartite secondary system and exclude additional types of schools within the full secondary coverage (see Table 1). The effects on earnings would be smaller within the full system since the education of children belonging to non-tripartite schools would have been largely unaffected by the reforms.

The biggest gainers from the free education provision were children from relatively disadvantaged family backgrounds who gained competitive entry into the grammar school system. These constituted only about 15% of all children attending tripartite schools. A further 20% of children were from more advantaged backgrounds and a high proportion of these may well have received a grammar school education in the absence of the new education policy. For the large majority of the remainder who were required to attend secondary modern schools the policy served generally to stifle educational and post-educational development and this in turn was reflected in relatively poor subsequent labour market outcomes.

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Table 1 Percentages of individuals by educational attainment in England and Wales: BHPS 1947 - 1964

Tripartite system	**Percentage share of total pupils**
Modern	63.7
Technical	5.2
Grammar (maintained)	31.1
Total (1733 individuals)	100.0
All secondary education	**Percentage share of total pupils**
Modern	48.2
Technical	4.0
Grammar (maintained)	24.0
Grammar (fee paying)	1.3
Comprehensive	13.3
Public and other private	5.2
Sixth form college	0.3
Other	2.7
Total (2244 individuals)	100.0
Level of educational attainment	**Percentage share of total individuals**
Higher degree	2.1
First degree	7.0
Teaching qualification	4.9
Other higher qualification	14.2
Nursing qualification	2.1
A-levels	7.9
0-levels	18.8
Commercial qualification (no O-levels)	4.7
Apprenticeship	3.3
Other qualification	1.6
No qualification	33.7
Total (2216 individuals)	100.0

Table 2 Percentages of individuals attending grammar and technical schools by regions of England and Wales: BHPS 1947 - 1964

Region	Grammar/technical schools
Inner London	36.0
Outer London	37.3
North West	38.1
Yorkshire and Humberside	30.3
North	37.7
West Midlands	30.8
South West	40.9
South East	31.7
East Anglia	33.3
East Midlands	32.5
Wales	42.1
Total	36.3

Table 3 Classification of the effects on earnings and earning gaps by school type and family background that can be estimated by Equation (2)

Marginal effect	**Coefficient**	**Pairs**	**Interpretation in respect of expected earnings gaps**
$(\partial \ln(E)/\partial A)$	β_2	$\mathbf{M_A,M_N}$	Both groups 'fail' 11 plus exam. Subsequent earnings gap due primarily to relative family advantage.
	$\beta_2 + \beta_3$	$\mathbf{G_A,G_N}$	Both groups 'pass' 11 plus exam. Subsequent earnings gap due primarily to relative family advantage.
$(\partial \mathrm{Ln}(E)/\partial G)$	β_1	$\mathbf{G_N,M_N}$	One group 'passes' 11 plus, the other group 'fails'. Both groups have no family advantages. Subsequent earnings gap due primarily to relative intellectual ability.
	$\beta_1+\beta_3$	$\mathbf{G_A,M_A}$	One group 'passes' 11 plus, the other group 'fails'. Both groups have family advantages. Subsequent earnings gap due primarily to relative intellectual ability.

Table 4 Average marginal effects after probit of going to grammar or technical school

	(1)	(2)	(3)	(4)
Age when took the 11 +	0.005*	0.006**	0.007***	0.006**
	(0.003)	(0.003)	(0.002)	(0.003)
Male	0.041	0.031	0.027	0.029
	(0.027)	(0.026)	(0.030)	(0.029)
Books at home between 0-10 years of age (ref cat: no books)				
Quite few	0.171***	0.142***	0.132***	0.130***
	(0.027)	(0.030)	(0.029)	(0.027)
Lots	0.253***	0.201***	0.156***	0.138***
	(0.024)	(0.023)	(0.025)	(0.021)
Socio-economic class of father (ref cat: unskilled)				
Professional/Manager		0.220***	0.176***	0.127*
		(0.060)	(0.068)	(0.066)
Skilled non-manual		0.190***	0.156**	0.118*
		(0.065)	(0.070)	(0.068)
Skilled manual		0.007	-0.026	-0.039
		(0.054)	(0.057)	(0.058)
Partly skilled		0.004	-0.021	-0.038
		(0.052)	(0.058)	(0.057)
Absent, dead or unemployed		-0.036	-0.061	-0.073
		(0.066)	(0.072)	(0.068)
Parental education (ref cat: no qualifications)				
Father with some qualifications			0.088**	0.047
			(0.040)	(0.047)
Father with high qualifications			0.111***	0.035
			(0.028)	(0.032)
Mother with some qualifications				0.176***
				(0.045)
Mother with high qualifications				0.187***
				(0.052)
Controls	Yes	Yes	Yes	Yes
Observations	1,391	1,391	1,305	1,276

Standard errors in parentheses are adjusted for clusters in years of birth. *** p<0.01, ** p<0.05, * p<0.1. All regressions include dummies for year of birth, district of birth, year of survey, position in family and parental year of birth. Average marginal effects are obtained by (a) computing how much the probability (i.e. going to grammar or technical school = 1) changes when the variable of interest changes by one unit (in case of continuous variable) or from 0 to 1 (in case of dummy variable) for each individual and (b) by taking the average of all these changes.

Table 5 Earnings, qualification and occupational class OLS regression coefficients and interaction effects. [Broad definition of advantaged.]

	Log of earnings	Qualifications	Occupational class
Regression coefficients			
Age when took the 11 +	-0.003	-0.012*	-0.007
	(0.006)	(0.006)	(0.010)
Male	0.313***	0.325***	0.196***
	(0.040)	(0.047)	(0.058)
Grammar (β_1 or G_N vs M_N)	0.300**	0.857***	0.954***
	(0.113)	(0.140)	(0.102)
Advantaged (β_2 or M_A vs M_N)	0.114	0.277***	0.235*
	(0.077)	(0.066)	(0.126)
Grammar x Advantaged (β_3)	-0.097	-0.146	-0.187
	(0.160)	(0.161)	(0.149)
Interaction effects			
(β_1+β_3) or (G_A vs M_A)	0.203***	0.710***	0.768***
	(0.064)	(0.067)	(0.108)
(β_2+β_3) or (G_A vs G_N)	0.017	0.131	0.048
	(0.120)	(0.135)	(0.100)
Year of survey	Yes	Yes	Yes
Year of birth	Yes	Yes	Yes
District of birth	Yes	Yes	Yes
Position in family	Yes	Yes	Yes
Parental year of birth	Yes	Yes	Yes
Years of labour market experience	Yes	-	-
Second order polynomial of experience	Yes	-	-
Observations	611	1,378	1,080
R-squared	0.353	0.271	0.213

Notes: Standard errors in parentheses are adjusted for clusters in years of birth. *** p<0.01, ** p<0.05, * p<0.1. All regressions are OLS. Advantage pupils are define as having a father in skilled non-manual occupation and above and/or mother with some/high qualifications and/or quite a few or lots of books at home. The first column shows the earnings regression. The dependent variable is log of hourly earnings in 2003 (see text for details). The dependent variable in the second column is qualifications ordered in the following 4 categories: (i) no qualifications, (ii) 0-levels or O- and A-levels, (iii) professional and apprenticeship qualifications, (iv) degree/higher degree qualifications. The third column shows estimates of social class of the respondent. Social class is ordered in the following 5 categories: (i) unskilled, (ii) partly skilled, (iii) skilled manual, (iv) skilled non-manual, (v) professional/manager.

Table 6 Earnings, qualification and occupational class OLS regression coefficients and interaction effects. [Narrow definition of advantaged.]

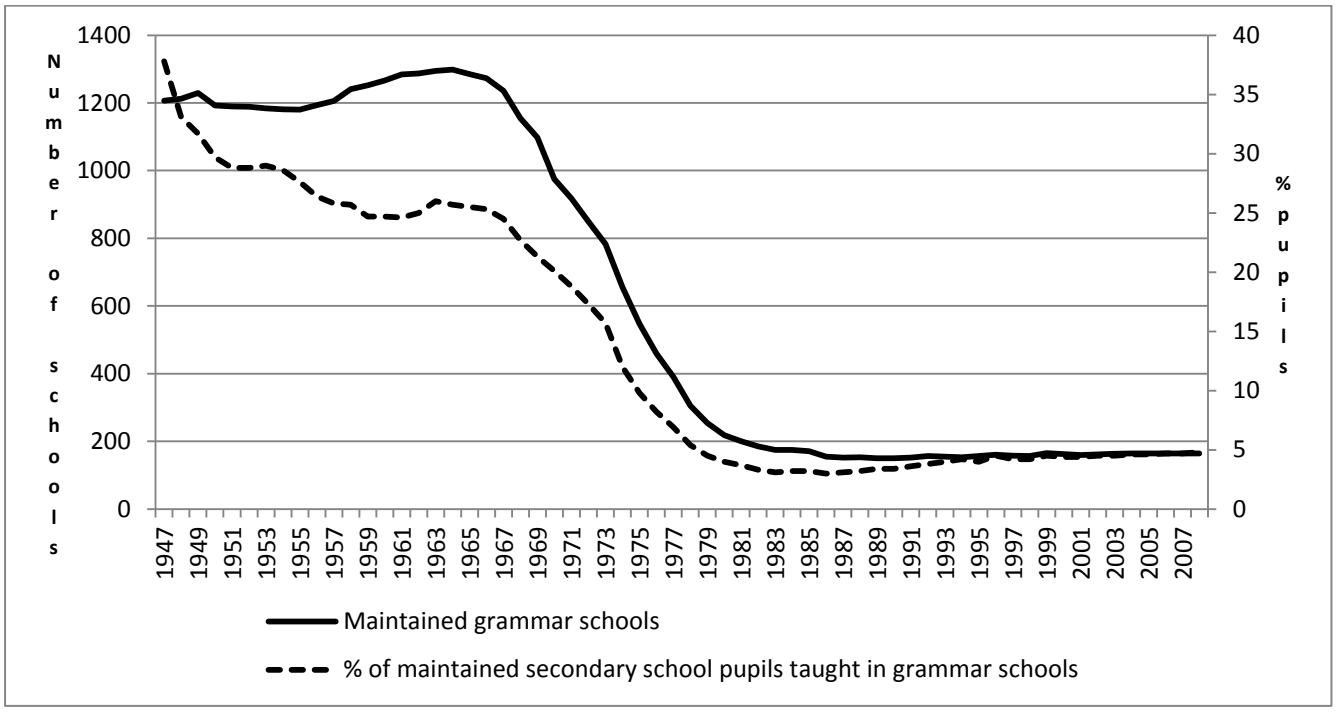
	Log of earnings	Qualifications	Occupational class
Regression coefficients			
Age when took the 11 +	-0.003	-0.005	-0.011*
	(0.006)	(0.011)	(0.006)
Male	0.301***	0.168***	0.292***
	(0.036)	(0.056)	(0.049)
Grammar (β_1 or G_N vs M_N)	0.194***	0.860***	0.717***
	(0.029)	(0.076)	(0.064)
Advantaged (β_2 or M_A vs M_N)	-0.082	0.502***	0.246**
	(0.069)	(0.171)	(0.096)
Grammar x Advantaged (β_3)	0.133*	-0.303	0.047
	(0.066)	(0.212)	(0.128)
Interaction effects			
(β_1+β_3) or (G_A vs M_A)	0.327***	0.556***	0.764***
	(0.078)	(0.193)	(0.118)
(β_2+β_3) or (G_A vs G_N)	0.050	0.198***	0.293***
	(0.043)	(0.074)	(0.057)
Year of survey	Yes	Yes	Yes
Year of birth	Yes	Yes	Yes
District of birth	Yes	Yes	Yes
Position in family	Yes	Yes	Yes
Parental year of birth	Yes	Yes	Yes
Years of labour market experience	Yes	-	-
Second order polynomial of experience	Yes	-	-
Observations	611	1,378	1,080
R-squared	0.350	0.274	0.226

Notes: Standard errors in parentheses are adjusted for clusters in years of birth. *** p<0.01, ** p<0.05, * p<0.1. All regressions are OLS. Advantage pupils are defined as having a father in skilled non-manual occupation and above. The first column shows the earnings regression. The dependent variable is log of hourly earnings in 2003 (see text for details). The dependent variable in the second column is qualifications ordered in the following 4 categories: (i) no qualifications, (ii) 0-levels or O- and A-levels, (iii) professional and apprenticeship qualifications, (iv) degree/higher degree qualifications. The third column shows estimates of social class of the respondent. Social class is ordered in the following 5 categories: (i) unskilled, (ii) partly skilled, (iii) skilled manual, (iv) skilled non-manual, (v) professional/manager.

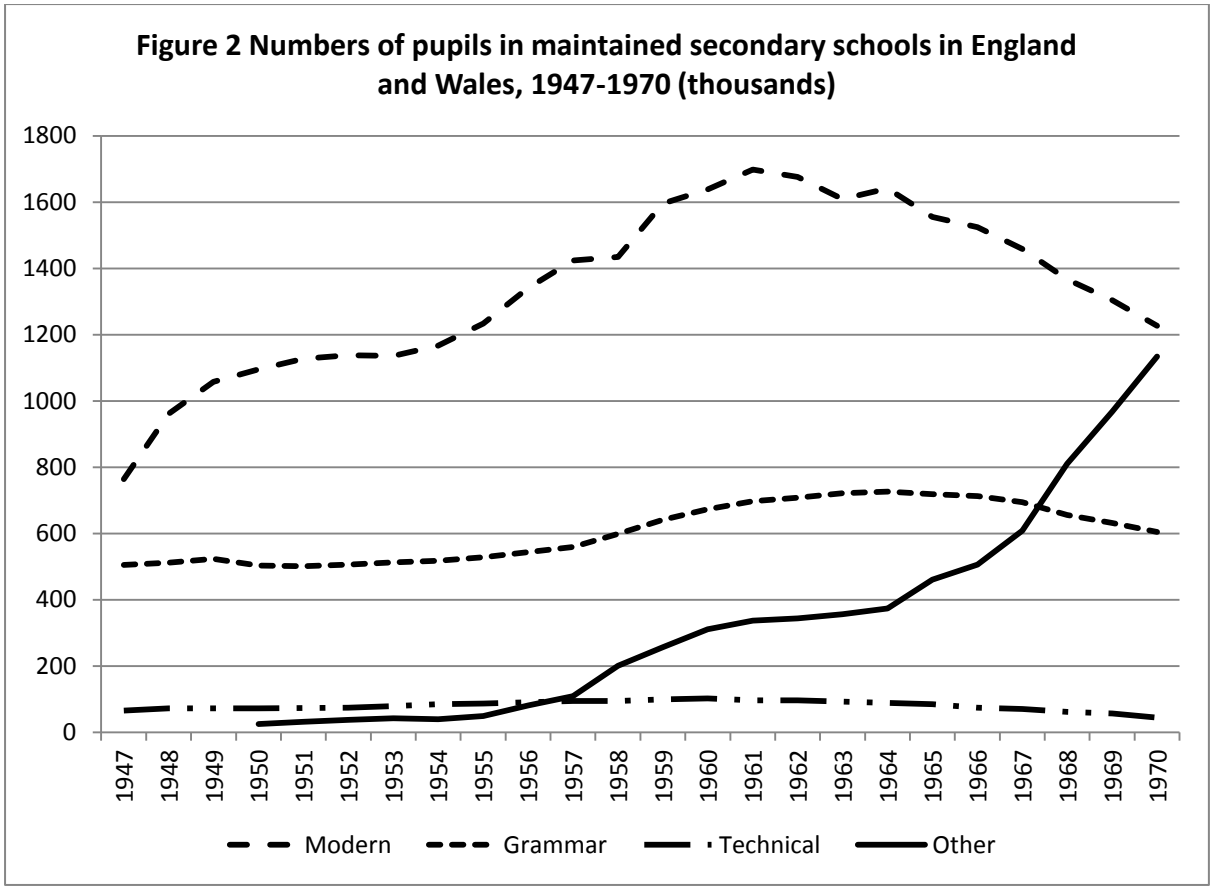
Table 7 Estimated percentage aggregate earnings increases by switching disadvantaged students who passed the 11 plus exam from modern to grammar schools

Definition of Advantaged	2003 Earnings	1991-2008 Average Real Earnings
	Percentage change	Percentage change
Father in skilled non-manual occupation and above and/or mother with some/high qualifications and/or quite a few or lots of books at home	1.46	1.29
Father in skilled non-manual occupation and above	5.53	5.91

Figure 1 Maintained grammar schools and their share of pupils in the maintained secondary school sector, England and Wales 1947-2008



Source: Bolton (2009)



Source: Mitchell (1988)

Figure 3 Availability of books at home by father's socio economic background: children aged 0 to 10 between 1947 and 1964 (BHPS 2003)

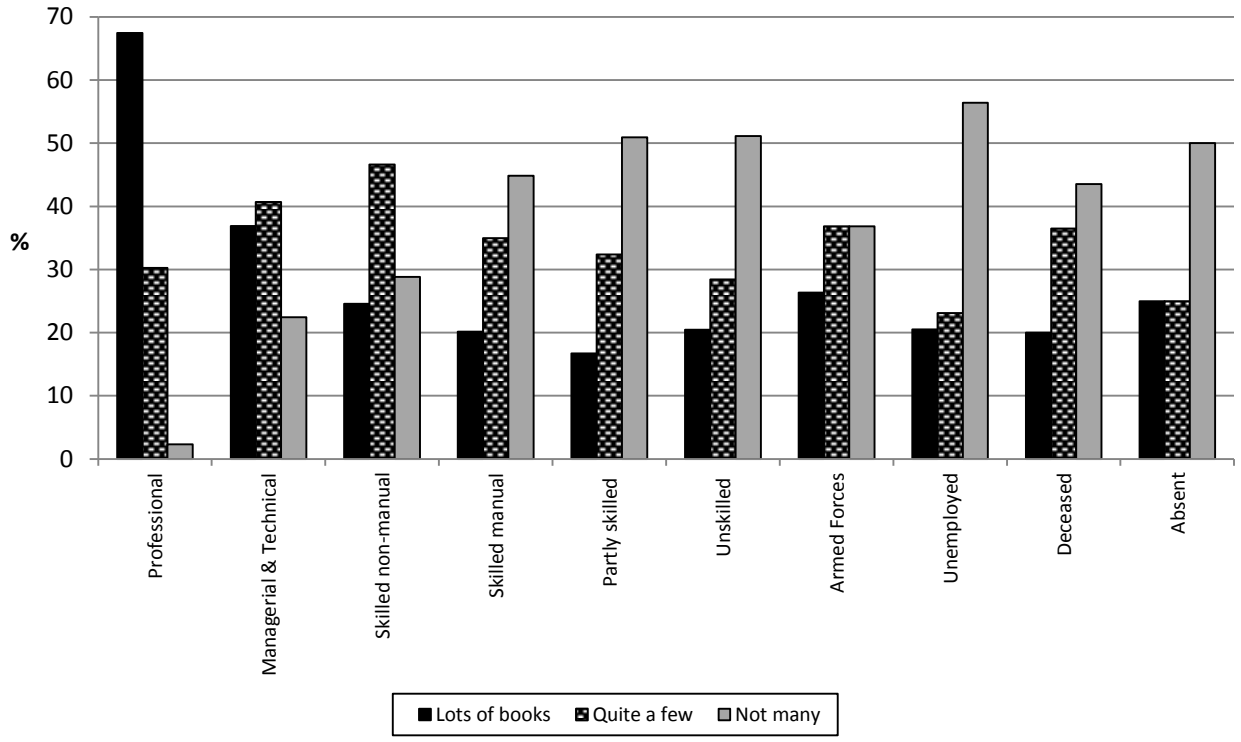


Figure 4 Position among children in the family

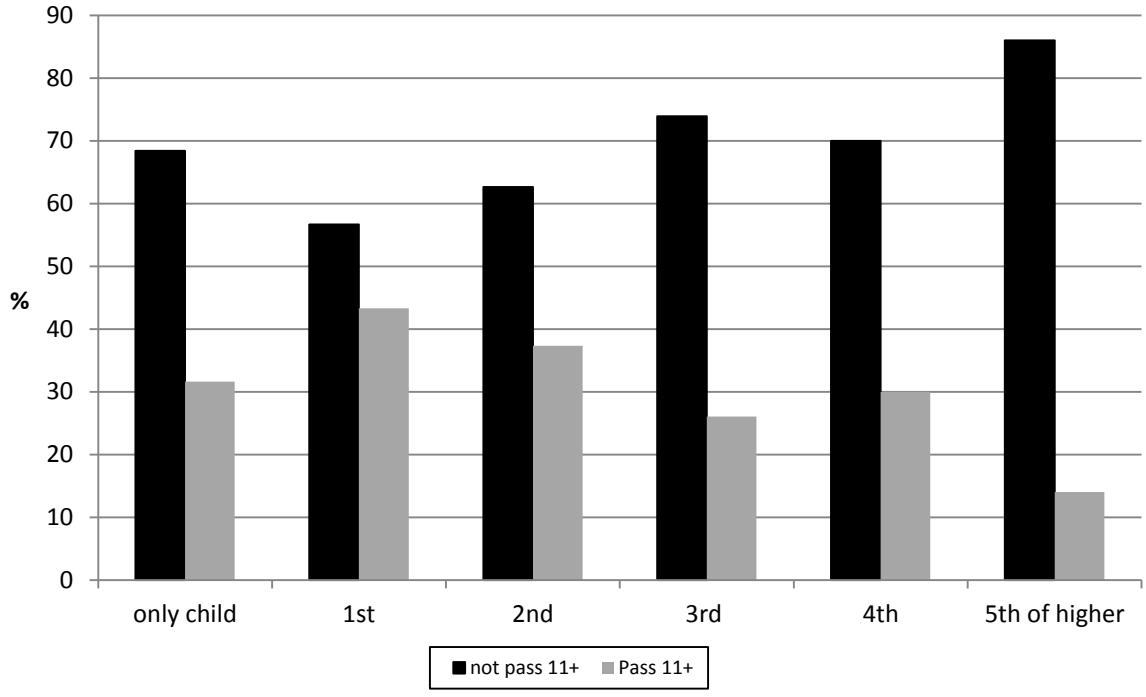


Table A1. List of variables used in the analysis. All variables taken from or computed from (different waves of) the BHPS

A. Independent variables	
Grammar school	Dummy variable taking the value of one if respondent attended grammar school
Age when took the 11 plus	Age in months computed using respondent's date of birth
Gender (Female is ref. cat.)	Dummy variable taking the value of one if respondent's is male
Books at home between 0-10 years of age (ref cat: no books)	Self reported number of books when age between 0 to 10 (dummy variables)
Quite few	Dummy variable
Lots	Dummy variable
Socio-economic class of father (ref cat: unskilled)	Self-reported socio-economic class of father's job (dummy variables)
Professional/Manager	Dummy variable
Skilled non manual	Dummy variable
Skilled manual	Dummy variable
Partly skilled	Dummy variable
Absent, dead or unemployed	Dummy variable
Parental education (ref cat: no qualifications)	
Father with some qualifications	Dummy variable
Father with high qualifications	Dummy variable
Mother with some qualifications	Dummy variable
Mother with high qualifications	Dummy variable
Position in family (ref cat: only child)	
First child	Dummy variable
Second child	Dummy variable
Third child	Dummy variable
Fourth child	Dummy variable
Fifth or later child	Dummy variable
District of birth dummies	32 county dummy variables
Area of birth (ref cat: inner city)	Type of area most lived when respondent was young

Suburban area Town Village Rural or countryside Mixed/moved around	Dummy variable Dummy variable Dummy variable Dummy variable Dummy variable
Respondent's job experience	Experience is approximated by using the difference between the age of the respondent in 2003 and the age in which he or she left full time education
Survey year	Dummy variables
Respondent's date of birth	Dummy variables
Year of father's birth	Dummy variables
Year of mother's birth	Dummy variables
B. Dependent variables	
Log of hourly earnings	Hourly pay was computed by dividing (gross pay per month) by the (number of hours normally worked per week) multiplied by 4.33, which represents the standard number of weeks in a month
Qualifications None A and O levels Professional and apprenticeship Degree	Respondent's qualification This includes: teaching, nursing, commercial (no O-levels), CSE grade 2-5 (or 4-5 in Scotland), apprenticeship and BHPS residual categories "other qualifications" or "other higher qualifications"
Social class	Social class of respondent's present job
Unskilled Partly skilled Skilled manual Skilled non manual Professional/Manager	