Lives on track? Long-term earnings returns to selective school placement in England and Denmark

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Abstract

We explore the influence of between-school ability placement at lower secondary education on earnings across the life course in England and Denmark. We go beyond the mid-career snapshot provided by previous studies by exploiting the availability of four decades worth of earnings data for individuals born in the mid-1950s. Members of this cohort who were judged to be among the most academically able attended grammar schools in England (19 percent) and advanced secondary schools (*Realskole*) in Denmark (51 percent) prior to the start of comprehensivisation. This key difference makes England and Denmark interesting cases for comparison, not least since pro-selection policies have re-emerged in England based on the claim that grammar schools lead to better educational and labour market outcomes. Our analysis of the influence of selective school placement on earnings finds little support for this contention. We find that those from socioeconomically disadvantaged backgrounds were strikingly under-represented in schools ear-marked for higher ability pupils in both countries, even after taking into account social class differences in measured ability. Our analysis for England finds only modest earnings returns to attending a grammar school, totalling just £39,000 across the life course, while in Denmark the lifetime earnings returns to attending *Realskole* are somewhat larger (£194,000). Because those from advantaged backgrounds were substantially over-represented at grammar schools and *Realskoles*, these returns accrue disproportionately to pupils from more advantaged backgrounds. Lower secondary school placement in Denmark accounts for forty percent of the intergenerational reproduction of socioeconomic advantage and disadvantage, more than half of which is due to selection into school types based on socioeconomic background rather than measured ability. Our findings

question the wisdom of expanding grammar schools when they appear to do little to improve individuals' earnings or increase social mobility.

Keywords: educational tracking, school placement, selective education system, grammar schools, earnings, life course

Introduction

Following social and political pressure, many European countries reformed their secondary school systems during the 1960s and 1970s, abolishing early selection into academic or advanced streams. These were held to be middle-class bastions, not fulfilling their original promise (Board of Education 1943) of creating opportunities of social mobility for smart students from all socioeconomic backgrounds including low-income or working class families (Levin 1978). In this period, selection into different types of school on the basis of measured ability was scaled back substantially in England, resulting in a steep fall in the proportion of state educated pupils attending academically selective grammar schools from around twenty-five percent in the mid-1960s to less than five percent by the early 1980s (Danechi 2020). During the same time, selective education systems were completely abolished in the Scandinavian countries of Denmark, Norway, and Sweden, in favour of a fully comprehensive lower secondary school system (Wiborg 2009).

However, selective rather than comprehensive secondary schooling remains the system of choice in most central European countries, regardless of its well-known implications for educational and social inequality (van de Werfhorst and Mijs 2010; Blossfeld et al. 2016). In England there has been a recent resurgence of political interest in expanding the number of grammar school places (Long, Foster and Roberts 2017). In 1998 an Act of Parliament passed by the incoming New Labour government outlawed the creation of new state-funded grammar schools and banned existing schools from introducing selection by ability. However, subsequent changes to the School Admissions code since 2012 by Conservative-led governments have permitted pre-existing grammar schools to expand the number of places they offer, not only within existing school buildings but also by operating a ‘satellite campus’. In 2018, the UK government launched a £50 million Selective Schools Expansion Fund providing capital funding to support the expansion of grammar schools in England (Department for

Education, 2019).Consequently the proportion of pupils attending grammar schools has been slowly but steadily rising (Danechi 2020).

Advocates of grammar school expansion policies argue that more grammar school places would mean more opportunities for higher ability pupils from all socioeconomic backgrounds to access superior schools, leading to improved educational performances and labour market outcomes. However, all existing evidence points to the severe under-representation of socioeconomically disadvantaged pupils in grammar schools in England, even after taking into account differences in measured ability, both in the heyday of selective education (Halsey and Gardner 1953; Douglas 1964) and today (Cullinane 2016; Burgess, Crawford and Macmillan 2018; Jerrim and Sims 2019).

Moreover, a wealth of evidence indicates that grammar school pupils do not perform better in national exams than pupils of comparable ability and social background attending non-selective state-maintained schools (Gorard and Siddiqui 2018), or that they only enjoy a modest attainment gain that comes at the expense of an attainment loss for those attending non-selective state-maintained schools (e.g. Galindo-Rueda and Vignoles 2005; Andrews, Hutchinson and Johnes 2016). Beyond secondary education results, the evidence for England also suggests that grammar school pupils are no more likely than non-selective state school pupils of comparable ability and social background to attend the UK's most academically selective universities (Sullivan et al. 2014; Boliver and Capsada-Munsech 2020).

While there is a large literature on the consequences of selective education for academic attainment in England, only a handful of studies have explored long-term labour market outcomes. One such study found that, comparing individuals of like ability, grammar and secondary modern schools combined were no better for social mobility than the comprehensive schools that replaced them (Boliver and Swift 2011). Another study found no grammar school advantage in high occupational or earnings rewards after controlling for ability and social

background (Sullivan et al. 2018). These studies provide an important rejoinder to the claims repeated by grammar school proponents. However, by focusing on the labour market positions at ages 33 and 42 respectively, these studies offer only a snapshot taken at mid-career stage, which may be failing to pick up later career and/or cumulative effects across the entire life course, especially for those fully exposed to the selective school system (i.e. the 1958 cohort). To address this possibility, we exploit the availability of four decades worth of earnings data for individuals born in 1958 to explore the lifetime earnings returns of attending a grammar rather than a non-selective state-maintained school in England.

As well as taking a life course perspective on these issues, we also take a comparative one, contrasting an English and Welsh cohort with a contemporaneous one in Denmark that was exposed to an extended model of selection by ability at lower secondary school. The Danish case provides a valuable comparison because, even if Denmark is currently widely considered to be among the most economically equal and socially mobile countries in the world (Corak 2013), the cohort born in the middle of the 1950s grew up in a time when inequality was much greater, welfare services much more limited,[1] and ability-based educational streaming in lower secondary school was pronounced. While this system had a similar structure to the English one, a much larger fraction attended the selective track, roughly 50 percent compared to around 20 percent in England. Importantly, the proportion of individuals who attended selective schools in Denmark exceeded the proportion who subsequently achieved service class destinations, whereas in England a smaller proportion of individuals attended selective schools than went on to obtain service class destinations. As we discuss further below, if selective school attendance serves to position individuals in the labour market queue (Bol 2015; Thurow 1975), we expect to see selective school attendees monopolise higher income

[1] In Denmark in 1965, the GINI coefficient was about 0.45 (Atkinson and Søgaard 2015), and total government spending as share of national GDP was only 18 percent (Ortiz-Ospina 2016).

occupations to a greater extent in Denmark than in England. The Danish case therefore provides a useful point of comparison to explore what the case of England might have been like had the number of pupils taught in grammar schools been much greater.

Theoretical framework and literature review

A widely used sociological framework for studying the potential role of education in the process of social mobility is the Origin-Education-Destination (OED) triangle (e.g. Breen and Goldthorpe 2001). Starting with the relationship between class of origin and educational attainment (OE), empirical studies show that those taking the entry exam to access grammar schools (known in England as 'the 11+') are likely to be a biased sample of pupils encouraged by their parents and/or primary school teachers (Atkinson, Gregg and McConnell 2006), among which middle/upper classes are overrepresented and commonly tutored towards passing it (Cribb et al. 2013). Moreover, grammar schools admit a low proportion of students who are eligible for Free School Meals (Jesson 2013). Empirical evidence comparing the educational achievements of pupils in selective (i.e. grammar vs secondary modern schools) and non-selective (i.e. comprehensive schools) areas suggests that grammar school pupils are among the highest achievers in the Graduate Certificate of Secondary Education (GCSE) exams, and in terms of value-added to previous national examinations (Prais 2001; Sullivan and Heath 2002). Yet, this outperformance of grammar school pupils has been shown to be due mainly to the school academic orientation, family income and social selectivity of these schools than to any 'school quality' effect (e.g. Gorard and Siddiqui 2018; Jerrim and Sims 2019). Similarly, the higher rates at which grammar school pupils enter higher education, and elite universities in particular, is a function of prior attainment and socioeconomic background rather than a school effect (Sullivan et al. 2014). These findings are consistent even when using data for different cohorts and statistical sources.

A few studies have placed the focus on longer term economic and occupational outcome differentials between individuals educated in selective and non-selective areas in England controlling for social origin characteristics (ED). Studying cohorts born between 1961 and 1983, Burgess, Dickson and Macmillan (2020) explored to what extent selective schooling increases income inequality, showing that income inequality is larger in selective areas than in comprehensive ones. Boliver and Swift (2011) report similar results for income differentials and social mobility for the 1958 cohort. Sullivan et al. (2018) found no grammar school advantage in gaining access to the highest occupational social class or to the top 5 percent of the earnings distribution after controlling for between-school differences in ability and social background in the 1970 cohort. These results question the effectiveness of grammar schools in selecting pupils with the highest abilities and providing them with better educational and occupational prospects. However, all these studies focus on mid-career returns (ages 33 and 42 respectively), thus potentially not only neglecting cumulative gains throughout the entire life-course but also missing an adequate measure of the permanent income and living standards an individual enjoys (Jarvis and Jenkins 1998; Goldthorpe and McKnight 2006).

To contribute to this debate, we use the OED framework to look at the earnings returns to grammar school placement relative to non-grammar placement for a longer time span (up to 55 years old) in the heyday of the selective system, and compare it with the contemporaneous Danish system at the time when a selective secondary school system based on ability was in place.

The interest of the Danish case for England can be summarised in two relevant labour market observations. First, from a supply side perspective, the proportion of pupils taught at academically selective schools at the time was much larger in Denmark (at around 50 percent) than that of England (at about 20 percent). Second, from a demand side standpoint, the occupational structure of the Danish and English cohorts when they reached occupational

maturity (at age 45) is very similar (see Online supplement E). Because of this difference in the 'supply' of individuals with selective schooling (i.e. number of people who will be placed ahead of the queue) but the similarity in the occupational structure (i.e. number of available service class jobs), the share of individuals who achieved typically higher-earning service class destinations was far lower than the proportion who had been educated in selective schools in Denmark and far higher in England. Thus, based on the Job Competition Model (Bol 2015; Thurow 1975), we would expect that selective school attendance serve to position individuals further ahead in the queue for the most economically well-rewarded occupations and, if this is the case, we might expect to see selective school graduates effectively monopolize higher earning occupations in Denmark, but not in England where grammar school graduates are fewer in number than the available opportunities to obtain a well-paying job.

For these reasons, we use Denmark as a point of comparison to explore the consequences of expanding the number of pupils taught in grammar schools on long-term earnings returns. Our study also contributes to better understand the Danish system, as research on lower secondary selective school placement is relatively scarce in Denmark. A 1971 report revealed that the selection into selective secondary schools is based on both ability and socioeconomic background (Ørum 1971). Additionally, Hansen (1995) presents results on the relationship between lower secondary school placement and final educational attainment, as well as unemployment at occupational maturity. Because Hansen's (1995) analyses do not control for the selection into school placement on ability, they do not yield any clear evidence on the returns to selective school placement, nor do they cover economic outcomes spanning the entire life course as these are confined to mid-career outcomes at age 38.

Using the two country cases of England and Denmark, the main questions guiding this study are:

- To what extent does socioeconomic background directly influence selective school placement, taking into account social differences in ability? (RQ1)
- To what extent does selective school placement affect the earnings of individuals over the life course? (RQ2)
- What role does the sorting of pupils into different types of lower secondary school by ability and by socioeconomic background play in the intergenerational reproduction of social inequality? (RQ3)

Selective secondary school systems

England

The 1944 Education Act granted universal secondary education for all children by allocating them to the 'right' type of school (Jesson 2013). The main division was between grammar schools for 'academically' able pupils and secondary 'modern' schools for the majority. Even if the declared intention was granting 'parity of esteem' among school types, grammar schools required passing a selection test at age 10 or 11 known as 'the 11+'. This test assessed children's ability in English, mathematics and reasoning (Jerrim and Sims 2020). The academic focus and the selective entry system of grammar schools came to be seen as the first school choice for most families, leaving secondary modern schools as an alternative for those that could not make it into the grammar system (Jesson 2013). This selective system was in place across England until the mid-1960s. However, since the 'comprehensivisation' movement took off in the late 1960s, the number of comprehensive schools—and the share of pupils taught in these—dramatically increased (Kerckhoff et al. 1996). Theoretically, both grammar and secondary modern school pupils could progress into tertiary education if they passed the (upper) secondary national exams (i.e. O-levels and A-levels at the time) and matched the required entry grades for the selected tertiary education institution. However, far more

grammar school pupils obtained high enough grades to access the most prestigious universities (Sullivan and Heath 2002; Sullivan et al. 2014).

Denmark

The practice of separating students into different school types according to their abilities has a long history in Denmark. Since the middle of the 19th century, the division into advanced lower secondary schools (*Realskole*, derived from the German *Realschule*[2]) and regular schools was commonplace in most large provincial towns. Students were originally streamed from grades 6 through 9, but in 1958 a schooling reform restricted streaming to grades 8 and 9. In this new system, which is the one we study in this paper, students were divided into either a two-year advanced or a regular stream. The purpose of the advanced school was to teach at a higher level for students deemed suited for academic upper secondary education (*Gymnasium*), while regular school was intended for students deemed suited for subsequent vocational training. Advanced schools differed from regular schools through a strong focus on natural science subjects, mathematics and modern languages. Access to an advanced school depended on teachers' recommendation of the child, which they based on an assessment of the child's academic ability and work effort from grades and sometimes tests (Gjerløff et al. 2014). School placement was consequential, as entrance to *Gymnasium* was not possible without a *Realskole* exam.

While the Danish system relied on teacher recommendations, these recommendations were highly correlated with measured cognitive ability. Thus, the Danish and English systems are *de facto* sufficiently similar in terms of selection into the selective tracks on cognitive ability. Moreover, as we return to in a later section, family background affects selection into

[2] While the German *Realschule* consisted of an intermediate track preparing students for vocational working life, the Danish *Realskole* was academic in content and served as a stepping stone to academic upper secondary education (*Gymnasium*).

selective tracks in both countries even net of measured ability, again pointing to that allocation mechanisms to these tracks may not have been formally similar, but comparable in real terms.

Data and methods

Data

To analyse earnings returns to lower secondary school placement, we rely on high-quality survey data from England and Denmark on school cohorts from the late 1960s with comparable pre-selection measures of family background and cognitive ability.

For England, we draw on the 1958 National Child Development Study (NCDS) (University of London, Institute of Education 2019), which follows about 17,000 individuals born in a single week in March 1958, who theoretically accessed lower secondary school in 1969. We rely on the English and Welsh part of the sample (15,000 individuals), excluding Scotland because of its different secondary school system. Following the birth survey, respondents were re-interviewed at ages 7, 11, 16, 23, 33, 42, 46, 50, and 55, allowing us to follow their life course in terms of family background, measured ability, school placement and earnings. The NCDS dataset does not contain weights to compensate for non-response and attrition bias. We therefore use multiple imputation (with 25 imputations), leaving us with a final analytical sample of 9,655 individuals (see Table 1 for descriptive statistics). We follow von Hippel's (2007) method for imputing data and exclude cases with imputed values on the dependent variable (which yields more efficient estimates).[3] Jones, Pastore and Rice (2018) analyse attrition patterns in NCDS and only find small observable differences between respondents who drop out and remain in the survey. Even though lower ability and lower SES

[3] The respective sample sizes after we apply the impute-then-delete approach of von Hippel (2007) are n_{age23} = 7,649; n_{age33} = 7,429; n_{age42} = 7,441; n_{age46} = 5,658; n_{age50} = 6,179; and n_{age55} = 6,556.

respondents are somewhat underrepresented in the sample, the fact that we control for such characteristics in our analysis minimizes any risk of non-response bias in estimation results.

For Denmark, we draw on the Danish Longitudinal Survey of Youth (Jæger 2016), which follows a random sample of 3,151 Danish 7th graders in 1968 (i.e. aged 14, born in or around 1954). The survey is ongoing but for this study we only use sweeps at ages 14, 15 and 19 with very high response rates. We retain more than 80 percent of the original sample and an analytical sample of 2,543 individuals (see Table 2 for descriptive statistics). We correct all analyses for the survey design (i.e. a two-level stratified cluster sample) using appropriate weights. We then link the survey data to the Danish administrative registers via personal identification numbers to analyse earnings trajectories. The registers provide extremely reliable information on earnings from 1980 through 2013 (i.e. from ages 26-59) and information on final educational attainment.

Variables

Earnings

Our main dependent variable is yearly earnings measured at intervals across the life course. We measure yearly earnings as pre-tax earnings from employment in British pound sterling (GBP), deflated to 2018 prices (exchange rate of 1 GBP to 8.42 DKK). We follow conventions in the literature on income mobility and censor the top one percent of the earnings distribution in each country to the value of the 99th percentile to avoid extreme values (Björklund et al. 2002). In England, self-reported earnings information come from six survey waves at ages 23, 33, 42, 46, 50, and 55, while in Denmark earnings information is available in the registers each year between ages 26 and 59. While the reliability of earnings is very high in Denmark, it is likely to be lower in the UK given recall bias. However, because earnings constitute our dependent variable, our point estimates in the empirical analyses will not be biased by country differences in reliability.

School type

Our main predictor variable is the type of lower secondary school attended. In England, school type is measured at the time of enrolment based on information from a survey of Head Teachers in 1974. Teachers were asked to report not only the designation of the school at that time, but also in 1969 when respondents were aged 11, as some schools changed designation during the period from secondary modern or grammar to comprehensive school (Boliver and Swift 2011). We distinguish five categories: grammar school (19 percent), secondary modern school (33 percent), comprehensive school (39 percent), private school (6 percent), and other school types (3 percent) (e.g. special needs school). Our interest is in comparing earnings returns for state-maintained pupils who were selected by ability into a grammar or non-grammar school (i.e. secondary modern and comprehensive schools). A robustness check, reported in Online supplement B, displays non-differing earnings trajectories for those that attended secondary modern and comprehensive schools both before and after controlling for selection into school by family background and ability. Thus, merging secondary modern and comprehensive schools provides additional statistical power to the analyses. We do not consider privately educated pupils in our analyses because access to these schools is not based on ability tests rather on affording to pay tuition fees.

In Denmark, respondents at age 19 were asked to report the type of lower secondary education they had attended. 51 percent reports having attended an advanced school and 49 percent reports having attended regular school. The yearbook of the Danish national statistical office shows that, in 1968, 48 percent of those attending grade 8 belonged to the selective track, suggesting that the 51 percent we report is very reliable (Statistics Denmark 1970:350).

Ability

To control for selection into lower secondary school type, we rely on three cognitive ability tests in each country. In England, we use the tests for reading comprehension, mathematics,

and general ability measured at age 11. As noted by Jones et al. (2018), these tests closely resemble the components of the 11+ test for grammar school access: reading, mathematics, verbal and non-verbal ability. In Denmark, we rely on cognitive tests administered at age 14, measuring verbal, spatial, and inductive reasoning (Ørum 1971). The verbal ability test is similar to a verbal intelligence test and taps into linguistic comprehension, abstraction, and one's ability to identify relations. The spatial test measures the child's ability to identify three-dimensional figures from a two-dimensional rendering of these figures, thus tapping into the spatial reasoning. The inductive test is based on number series in which children are to complete the final two numbers of a series. This test taps into the general mathematical reasoning. Considered together, the three tests are aimed to reflect fundamental aspects of human reasoning (Ørum 1971: 26).

We also use a single indicator of cognitive ability coded in ranks, which derives from a Principal Components Analysis of the three ability measures in each country. We find that the first component captures 84 percent of the total variation in the ability measures in England and 70 percent in Denmark. Furthermore, factor loadings associated to the three components are very similar, ranging from 0.89-0.93 in England and 0.77-0.87 in Denmark, indicating that the individual components largely tap into the same cognitive ability dimension. Tables 1 and 2 show that access to academically selective schools heavily depends on cognitive ability, with grammar school students on average belonging to the 79th percentile in the ability distribution and non-grammar school students belonging to the 44th percentile. We find a similar distribution for Denmark.

Family background

We control for a range of family background variables including parental education, social class, income, family type, number of siblings and region of origin. In Denmark these variables are all measured at age 14. In England parental education and social class and region of origin

are measured at age 11, whereas parents' income, family type and number of siblings are measured at age 16. As displayed in Tables 1 and 2, academically selective school placement depends on most of these characteristics. In both England and Denmark, students in grammar schools and advanced schools disproportionately come from homes with an intact family (two-parent family) structure, fewer siblings, parents with higher educational attainment, who work in service class occupations and present higher earnings.

Parental education is measured in three categories: *at least some higher education*, *upper secondary education*, and *less than upper secondary education*. In England, the variable is imputed from parents' education leaving age. The main difference between the two countries is that while in Denmark the upper secondary education category mainly covers parents with vocational education in England it applies to parents with A-level or equivalent qualifications.

Parental social class in England is measured using father's Registrar-General's social class scheme, while in Denmark we use the highest of the parents' category using the EGP scheme (Erikson and Goldthorpe 1992).

In England, *parents' annual income* is measured as father's annual net income (mother's if missing), which is imputed from self-reported weekly income. In Denmark, parents' income is measured as a two-year average of annual gross income of the main provider, which was directly obtained from the tax authorities in 1967 and 1968.

Family type is measured with an intact family (two-parent) indicator, and number of siblings both living at home and moved away.

Region of origin is based on the location of the lower secondary school attended by the student. In England, the variable distinguishes the three main areas of England (North, Midlands, and South) and Wales. In Denmark, the variable indicates the urbanicity of the region, distinguishing between cities/large towns (more than 20,000 people), towns (2,000-20,000 people), and villages (less than 2,000 people).

Educational attainment

We control for final educational attainment measured at age 33 in England and age 35 in Denmark to assess to what extent the potential earnings gap by lower secondary school type is mediated by subsequent educational attainment. In England we distinguish between *less than lower secondary*, *lower secondary*, *upper secondary*, *sub-degree tertiary*, and *degree and above*. In Denmark, we distinguish between *(less than) lower secondary*, *academic upper secondary*, *vocational upper secondary*, *short-cycle tertiary (2 years, e.g. dental technician)*, *medium-cycle tertiary (3-4 years, e.g. teacher or nurse)*, and *university degree (5-6 years, e.g. medical doctor)*. We also make use of the detailed information of the Danish educational register to include a detailed 38-category measure based on field of study.

Table 1. Descriptive statistics, England. Means with standard deviations in parentheses

	Grammar school (n = 1,854)	Non-grammar state school (n = 6,957)	Total (n = 9,655)
School type			
Grammar school	100.0	0.0	19.2
Non-grammar state school	0.0	100.0	72.1
Private/direct grant school	0.0	0.0	6.0
Other	0.0	0.0	2.7
Total	100.0	100.0	100.0
Gender			
Male	44.5	48.4	48.0
Female	55.5	51.6	52.0
Total	100.0	100.0	100.0
Parental education			
Higher education	11.4	3.5	6.7
Upper secondary education	36.9	21.5	25.8
Less than upper secondary education	51.7	75.0	67.5
Total	100.0	100.0	100.0
Father's social class			
Professional occupations	9.2	3.5	5.8
Managerial and technical occupations	28.7	14.9	19.2
Skilled non-manual occupations	13.4	8.9	9.9
Skilled manual occupations	33.7	47.3	42.6
Partly-skilled occupations	11.4	19.2	17.0
Unskilled occupations	3.7	6.2	5.5
Total	100.0	100.0	100.0
Father's annual net income, GBP	18,943 (8,612)	16,642 (7,734)	17,479 (8,339)
Intact family			
Yes	90.0	83.5	84.8
No	10.0	16.5	15.2
Total	100.0	100.0	100.0
Number of siblings	2.0 (1.7)	2.5 (2.1)	2.4 (2.0)
Region of origin			
North	32.7	31.0	31.0
Midlands	29.3	29.9	29.5
South	34.2	31.6	33.0
Wales	3.8	7.5	6.5
Total	100.0	100.0	100.0
General ability	0.6 (0.9)	-0.2 (1.0)	0.0 (1.0)
Reading comprehension	0.6 (1.0)	-0.2 (1.0)	0.0 (1.0)
Mathematics test	0.7 (1.0)	-0.2 (0.9)	0.0 (1.0)
Ability rank	71.4 (26.9)	43.0 (27.7)	49.8 (28.9)
Educational attainment at age 33			
Less than lower secondary	4.0	13.6	11.8
Lower secondary	33.3	55.0	48.3
Upper secondary	17.2	11.6	13.1
Sub-degree tertiary	18.4	12.9	14.1
Degree or above	27.1	6.9	12.7
Total	100.0	100.0	100.0

Table 2. Descriptive statistics, Denmark. Means with standard deviations in parentheses

	Advanced school (n = 1,240)	Regular school (n = 1,303)	Total (n = 2,543)
School type			
Advanced school	100.0	0.0	50.7
Regular school	0.0	100.0	49.3
Total	100.0	100.0	100.0
Gender			
Male	44.7	55.9	50.3
Female	55.3	44.2	49.7
Total	100.0	100.0	100.0
Parental education			
Higher education	16.9	3.8	10.5
Upper secondary education	49.4	38.0	43.8
Less than upper secondary education	33.7	58.2	45.6
Total	100.0	100.0	100.0
Parental social class			
Higher service occupations	18.0	4.4	11.1
Lower service occupations	9.8	4.2	7.0
Routine non-manual occupations	10.3	5.4	7.8
Self-employed	12.9	11.9	12.4
Farmers	16.5	17.4	17.0
Skilled manual occupations	16.2	20.1	18.2
Unskilled manual occupations	16.3	36.7	26.6
Total	100.0	100.0	100.0
Main provider's annual gross income, GBP	40,434 (21,256)	31,041 (13,722)	35,673 (18,444)
Intact family			
Yes	93.6	90.5	92.0
No	6.4	9.5	8.0
Total	100.0	100.0	100.0
Number of siblings	1.9 (1.2)	2.4 (1.5)	2.1 (1.4)
Region of origin			
City/Large town (>20,000 people)	50.8	42.4	46.6
Town (2,000-20,000 people)	15.8	14.2	15.0
Village (< 2,000 people)	33.4	43.4	38.4
Total	100.0	100.0	100.0
Verbal ability	0.6 (0.8)	-0.5 (0.9)	0.0 (1.0)
Spatial ability	0.3 (0.9)	-0.3 (1.0)	0.0 (1.0)
Inductive ability	0.5 (0.8)	-0.5 (0.9)	0.0 (1.0)
Ability rank	67.0 (23.6)	34.4 (24.4)	50.5 (29.0)
Educational attainment at age 35			
Lower secondary	19.1	42.3	30.8
Academic upper secondary	8.1	0.6	4.3
Vocational upper secondary	22.8	48.8	36.0
Short-cycle tertiary	5.4	2.9	4.1
Medium-cycle tertiary	30.2	4.9	17.4
University	14.4	0.4	7.3
Total	100.0	100.0	100.0

Empirical strategy

The empirical analysis comprises three steps corresponding to the three research questions. First, we analyse the extent to which selection into lower secondary schools depends on the ability and socioeconomic background of students. To visualise the influence of socioeconomic background across the ability distribution, we estimate a logistic regression model predicting selective school placement as a function of parental education interacted with the single indicator of cognitive ability using a cubic polynomial fit to allow for flexibility. Furthermore, we conduct a stepwise regression analysis to assess how much of the association between parental education and selective school placement is mediated by differences in ability and how much is unmediated, i.e. primary and secondary effects (Boudon 1974).

Second, we model the earnings trends by school type using a nonparametric trend specification (i.e. age dummies) in a conventional linear regression with robust cluster standard errors, accounting for panel clustering of respondents. We subsequently add covariates to examine to what extent between-school gaps in the raw or unconditional trends can be explained by these covariates. By interacting all covariates with the age dummies, we allow for the possibility that patterns of confounding differ across the life cycle. The full regression model is given by:

$$Earnings_{it} = \beta_0 + \beta_1 age_{it} + \beta_2 school_i + \beta_3 X_i + \beta_4 age_{it} \times school_i + \beta_5 age_{it} \times X_i + \varepsilon_{it}$$

Where X_i is a vector of pre-selection covariates, including gender, parental education, social class, income, family type, number of siblings, region of origin, each of the three ability measures and the three ability measures squared. We graph our results using average marginal predictions implied by the estimated regression model. As the English data do not include earnings information for each year between ages 23 and 55, we rely on a linear interpolation

between adjacent data points to visualise how the between-school gap in earnings accumulate over the life course.

To examine whether our main results conceal systematic differences between populations, we conduct additional analyses where we interact school type with gender, parental education, and ability group. We report the substantive results from these analyses in the results section and refer to Online supplement C for model output.

Given potential concerns with applying linear regression to control for selection into school placement, we also conduct six supplementary analyses that each assesses the stability of our results under different model specifications. Results from these analyses are presented in Online supplement D and show that our preferred model specification is robust to (a) using doubly robust estimation; (b) excluding observations outside the region of common support; (c) including additional control variables on individual ability and family resources; (d) including observations with imputed earnings; (e) including top 1 percent earnings; and (f) excluding reading and mathematics tests in the English earnings model, ensuring that the between-country comparison is not hampered by differences in ability measures.

Third, we examine to what extent unequal selection into school accounts for the socioeconomic advantages passed down from parents to children by posing the counterfactual question: How would patterns of intergenerational mobility have looked did selection into schools not depend on family background? We rely on the OED framework in which the mediating role of education in the association between social origins and destinations is estimated using basic rules of path analysis. However, instead of entering the educational (E) variable – lower secondary school placement – directly in this model framework, we use the estimated OE association from step one and the net ED association controlling for selection on ability and family background from step two. This strategy allows us to approximate, net of measured ability, the mediating influence of lower secondary school placement on the

intergenerational reproduction of socioeconomic advantage (i.e. the association between parental education and child earnings). By relying on the estimated primary and secondary effects of the OE association, we can furthermore assess the extent to which the reproduction of socioeconomic advantage is driven by unequal selection into school types based on socioeconomic background rather than merit (as proxied by measured ability).

Results and discussion

Selection into school type

To examine the degree of selection into school types on cognitive ability and family background (RQ1), Figure 1 plots predicted probabilities from logistic regression models of school type on the single indicator of cognitive ability by parental education. The figure highlights two main elements: selection strongly depends on measured ability, and on social origin. In England, only a few children located in the bottom third of the ability distribution gain access to grammar schools, documenting the high minimum requirements of these schools.[4] For children in the remainder of the ability distribution, the likelihood of placement in a grammar school increases gradually, logically peaking at the very top of the distribution. In Denmark, the association between cognitive ability and probability of placement in an advanced school is close to linear throughout the ability distribution. If we look at the influence of selection based on social origin, we see that in England this is particularly noticeable in the middle of the ability distribution, where rates of accessing grammar schools are twice as high for pupils with higher educated parents than for pupils whose parents have less than upper secondary education (39 percent vs 17 percent). In Denmark, social differences are larger in absolute terms and persist throughout the ability distribution. In the middle of the ability

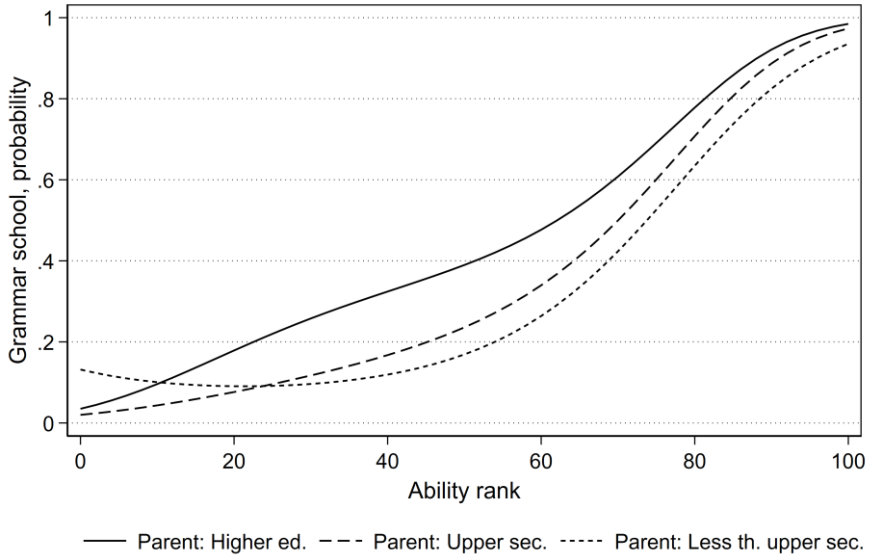
[4] We analyse selection into lower secondary school type for areas of England where students are assigned to grammar and secondary modern schools based on the 11+ test, leaving out students in comprehensive schools, who did not undergo selection.

distribution, children with higher educated parents present a probability of being placed in an advanced school twice as high as children whose parents have less than upper secondary education (79 percent vs 38 percent).[5]

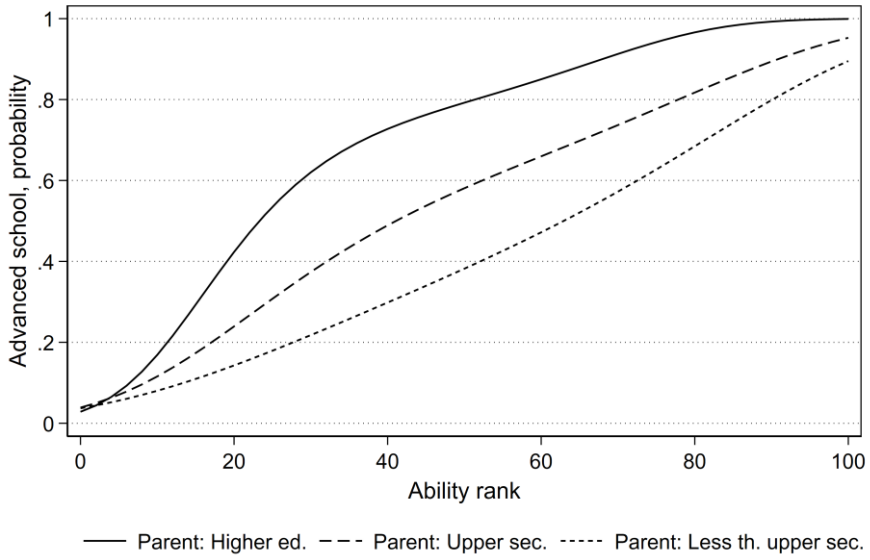
[5] In England, the difference in grammar school attendance between pupils with higher educated parents and pupils whose parents have less than upper secondary education is statistically significant from the 30th percentile and throughout the ability distribution. In Denmark, the difference is statistically significant from the 20th percentile.

Figure 1. Selection into lower secondary school type by ability rank and parental education

England



Denmark



These findings confirm previous research (e.g. Galindo-Rueda and Vignoles 2005; Manning and Pischke 2006; Gorard and Siddiqui 2018), showing that cognitive ability is a strong predictor of grammar/advanced school placement, but social origin still has a direct influence on school placement over and above its association with cognitive ability. In the terminology of Boudon (1974), we can conclude that secondary effects of social origin are operating at this educational transition point. To examine the relative magnitude of primary and secondary effects, we further estimate a linear probability model of school type, initially on parental education and then additionally entering each of the three ability measures squared. Using the model reported in Online supplement A, we disentangle the influence of parental education on school placement due to differences in ability between social classes (primary effects) from the influence that is direct and unmediated by ability (secondary effects). In England, we find that most of the influence of parental education on school placement operates via differences in ability, leaving a relatively modest secondary effect share of 30 percent when comparing the highest and lowest parental education group. In Denmark, ability mediates less of the influence of parental education, leaving 56 percent of the effect unmediated. In sum, even if in both countries selection into academically-selective lower secondary schools depends on a mix of cognitive ability and family background characteristics, the English school system at the time appears to have been more successful than the Danish at placing pupils into different types of school largely, albeit not solely, on the basis of merit.

School placement and earnings over the life cycle

Figure 2 displays three models of life course earnings profiles by lower secondary school placement in England and Denmark (RQ2). Figure 2a first shows the gross earnings gap throughout the life course between academically selective and non-academically selective schools, only controlling for gender. In both countries, differences by lower secondary school

placement are large and of similar magnitude. The trend is also similar, as the earnings gap grows early in the career and stabilises when individuals are in their mid-30s.

However, Figures 2b and 2c show that once we control for the three pre-selection ability tests and all family background indicators the between-school earnings gap dramatically declines. Ability is by far the strongest confounder, but family background also explains an additional portion. In England, the net gap is considerably smaller than the gross gap, the former only reaching statistical significance at ages 23 (about 700 GBP per year) and 55 (about 3,200 GBP per year). In Denmark, the net gap is zero when respondents are in their mid-20s, increases in their 30s, and peaks from age 41 to age 59 at 6,000 to 8,000 GBP per year, which amounts to about a 20 percent academically selective school premium.

In Figure 3 we report four models of lifetime cumulative earnings. The first model only adjusting for gender displays a comparable gross between-school earnings gaps of 255,000 GBP in England and 335,000 GBP in Denmark. Once controlling for pre-selection ability (second model) and family characteristics (third model) the net lifetime gap in cumulative earnings decreases to 39,000 GBP in England, and 194,000 GBP in Denmark. Thus, the selection into school placement on ability and family background explains 85 percent of the raw gap in England and a mere 42 percent in Denmark.

Our fourth model contains estimates of the between-school gap in cumulative earnings controlling for respondents' final educational attainment. In both countries, educational attainment explains a substantial part of the gap. Subsequent educational pathways mediate 65 percent of the modest gap in England, leaving only a small residual and statistically insignificant gap. In Denmark, mediation is 45 percent using the broad attainment measure and 60 percent using the detailed measure with 38 educational categories. In absolute terms, the mediation via educational attainment is strongest in Denmark, but a substantial lifetime cumulative earnings gap of 80,000 GBP remains unexplained. This finding suggests that early

school placement creates institutional path dependencies that ultimately lead to very large economic returns, but also that differential pathways do not provide a complete explanation of the between-school earnings gap.

One could wonder whether the economic returns to advanced schooling are similar for men and women, given that the cohorts under study grew up in a time when women began to access the workforce, particularly the higher professions. Online supplement C shows that men in both England and Denmark appear to enjoy a higher return to advanced school placement than women, which establishes when respondents are in their start 30s. The gender difference is only statistically significant in England, suggesting that men are rewarded more than women for attending grammar schools. The online supplement also shows that there are no statistically significant interaction effects between school placement and parental education or cognitive ability.

Figure 2. Earnings profiles by lower secondary school placement

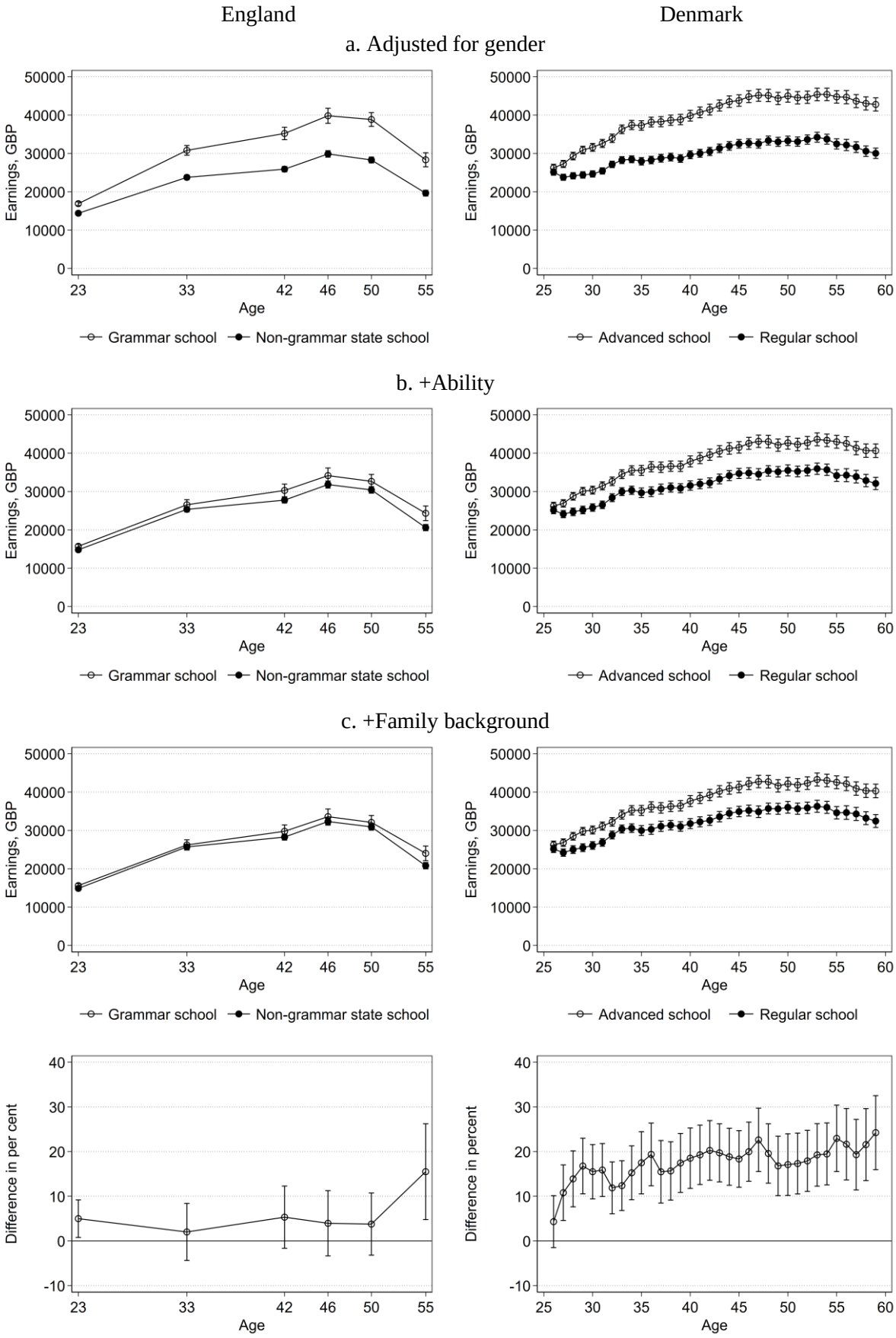
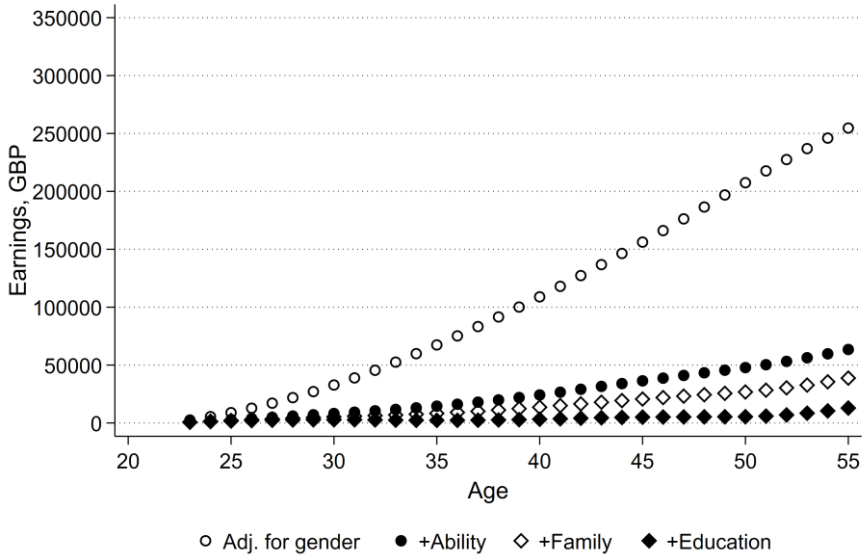
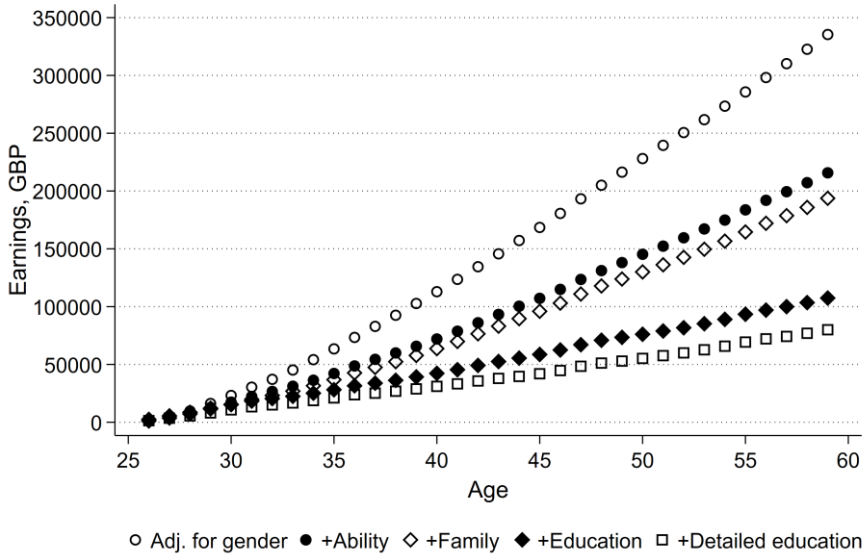


Figure 3. Lower secondary school placement gap in cumulative earnings

England



Denmark



Selective schools and the reproduction of socioeconomic advantage

We finally address the counterfactual question (RQ3): 'How would patterns of intergenerational mobility have looked if selection into schools depended exclusively on the merits of students and not the resources of their families?' We draw on the OED framework in which social origins (O, parental education) is modelled to influence social destinations (D, lifetime cumulative earnings) via educational attainment (E, lower secondary school placement). Although this framework ordinarily is used to assess the degree to which final educational attainment mediates the association between origins and destinations, we are interested specifically in the mediation via early school placement. We present results of this analysis in Table 3.

Table 3. How much of the gap in lifetime cumulative earnings by parental education does lower secondary school placement explain?

	England	Denmark
O-->E	0.419	0.444
E-->D	38,746	193,714
O-->D	385,178	137,371
Total O-->D	401,409	223,317
Share of total O-->D due to O-->E-->D	4.0%	38.5%
Of which ability selection (primary effects of O-->E) constitutes	2.8%	16.9%
Of which social origin selection (secondary effects of O-->E) constitutes	1.2%	21.6%

Note: O = parental education (higher vs less than upper secondary). E = lower secondary school placement. D = lifetime cumulative earnings.

We calculate the total OD association as the gap in lifetime earnings between individuals whose parents have a higher education and individuals whose parents have less than upper secondary education.[6] We find that the gap in lifetime earnings by parental

[6] Furthermore, the OE association is given from the selection model in Online supplement A and the ED association given O is provided in Figure 3. Using basic rules of path analysis, the OD association given E is calculated by subtracting the product of OE and ED from the total OD association (405,606-0.419*39,057 = 389,244 for England).

education is 80 percent larger in England than in Denmark, implying a larger degree of social mobility in Denmark. However, our main interest is how much of this gap can be explained by the unequal selection into lower secondary schools by parental education. We find that only 4 percent (0.419*38,746/401,409) of socioeconomic reproduction in England results from the unequal selection into schools. The explanation of this low mediation percentage is due to the limited influence of school placement on lifetime earnings. Conversely, in Denmark we find that a substantial 39 percent of the gap in lifetime earnings by parental education is mediated by lower secondary school placement. One may consider some of this mediation to be meritocratic to the extent that it reflects differences in measured cognitive abilities among children of different social origins. Thus, we can estimate the part of the mediation that solely results from the secondary effects of social origin, which we found earlier to constitute 56 percent of the total selection into advanced schools by parental education This finding implies that if lower secondary school placement in Denmark had been based solely on the (measured) cognitive abilities of children—as politically intended—and not directly on their social origin, then the total gap in lifetime earnings by parental education could have been reduced by more than a fifth. Because this counterfactual estimate depends on the assumption that we have controlled for all important sources of selection into selective schools, this estimate should most likely be taken as an upper limit to how much the lifetime earnings gap by parental education could be reduced.

Conclusions

In this paper we have utilised rich longitudinal data on the lifetime earnings of two cohorts educated in the heyday of selective education in England and Denmark to test some of the main claims made by proponents of a selective system of education at lower secondary level. First and perhaps foremost, our findings debunk the notion that selective education systems

effectively channel the most able pupils into grammar schools in England and *Realskoles* in Denmark, showing that social background also plays a major role such that among pupils of average measured ability those with higher educated parents access such schools at twice the rate of those whose parents had less than secondary education.

Second, our findings for England discredit the claim that grammar school attendance increases pupils' earnings potential, with 85 percent of the apparent earnings return to grammar school attendance shown to be attributable to the social background and measured ability of individuals, rather to an effect of the type of school attended. In Denmark, in contrast, the social background and measured ability of individuals accounted for less than half of the higher earnings accruing to those who attended advanced secondary schools; the net return amounting to nearly £200,000 over a working life spanning four decades.

Importantly, however, our findings for Denmark challenge a third assertion of proponents of selective education systems, namely that schools ostensibly reserved for higher ability pupils play a key role in promoting social mobility. The Danish case suggests that those from advantaged backgrounds indirectly benefit the most from the net earnings return to attending *Realskoles*, due to their substantial over-representation in such schools. Consequently, in Denmark, around a fifth of the total association between social origins and earnings appears to be the result of family background-based selection in lower secondary schools.

There are at least two ways of making sense of the country differences in earnings returns to selective school placement that we find. First, as Denmark unlike England had a rigid system in which advanced school placement was a prerequisite to enter academic upper secondary education and subsequently higher education, the institutional pathways following initial school placement differed considerably. Still, our empirical findings show that although

final educational attainment explains a substantial portion of the between-school gap in cumulative earnings in Denmark, it does not fully explain the country differences in these gaps.

Second, the country differences can be viewed from a labour market demand perspective: educational credentials are not only rewarded in the labour market because of the human capital they reflect but also because of the relative position in the labour queue to which they provide access (Bol 2015; Thurow 1975). In the Danish labour market of the 1970s, in which advanced school graduates made up half of the labour queue, these candidates likely seized virtually all well-paying service class jobs, leaving only lower tier opportunities (unskilled and skilled jobs) for regular school graduates. In contrast, in England grammar school graduates were a minority, leaving more opportunity for job seekers without a grammar school education to obtain a well-paying job.

Thus, an important implication of our findings is that expanding the number of grammar school places in England is unlikely to reap any of the purported benefits. On the contrary, our findings for the Danish case, in which some 50 percent of all pupils were educated in selective schools, suggest that a large increase in the number of grammar school pupils in England is more likely to increase rather than reduce intergenerational social reproduction.

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[Online supplements to article in *British Journal of Sociology*]

Lives on track? Long-term earnings returns to selective school placement in England and Denmark

Supplement A: Primary and secondary effects of social origin

Table A1. Selection into grammar/advanced school by parental education, OLS regression models unadjusted and adjusted for ability

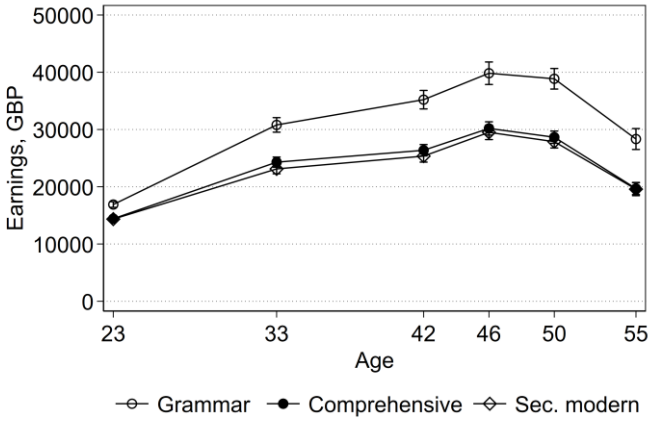
	England			Denmark		
	Model 1 (Unadjusted)	Model 2 (Adjusted for ability)	Secondary effect share	Model 1 (Unadjusted)	Model 2 (Adjusted for ability)	Secondary effect share
Parental education (Less th. upper sec.)						
Upper sec.	0.248	0.055	22%	0.199	0.135	68%
	(0.019)	(0.017)		(0.024)	(0.020)	
Higher	0.419	0.125	30%	0.444	0.249	56%
	(0.035)	(0.030)		(0.035)	(0.030)	
Constant	0.281			0.379		
	(0.010)			(0.017)		

Note: Standard errors in parenthesis. Model 2 adjusts for each of the three ability measures squared.

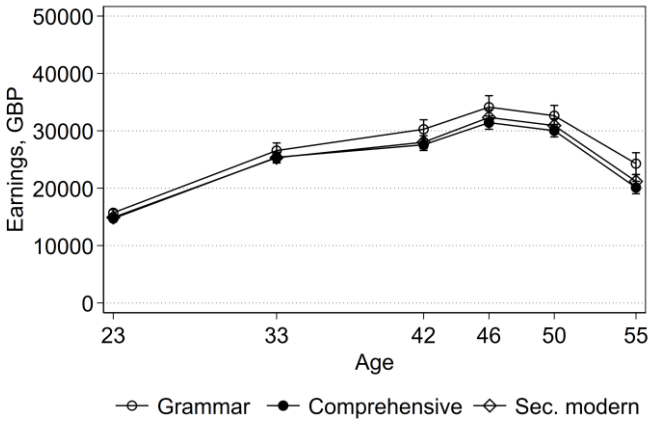
Supplement B: Earnings returns to comprehensive and secondary modern schools

Figure B1. Earnings profiles by lower secondary school placement in England, differentiating between comprehensive and secondary modern non-grammar state schools

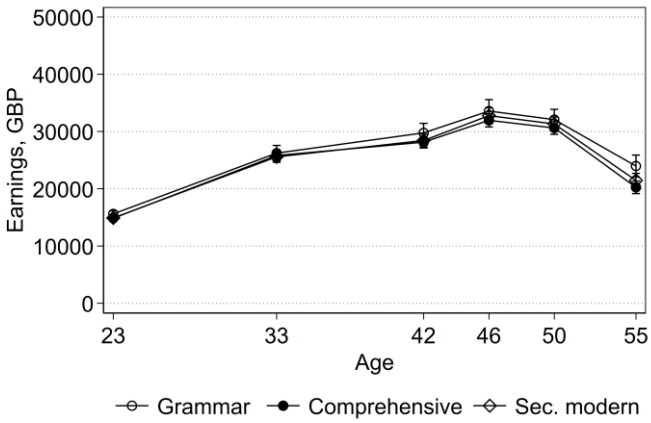
a. Adjusted for gender



b. +Ability



c. +Family background



Supplement C: Heterogeneities in earnings returns by subgroup

Figure C1. Lower secondary school placement gap in earnings by gender, parental education and ability, adjusted for selection

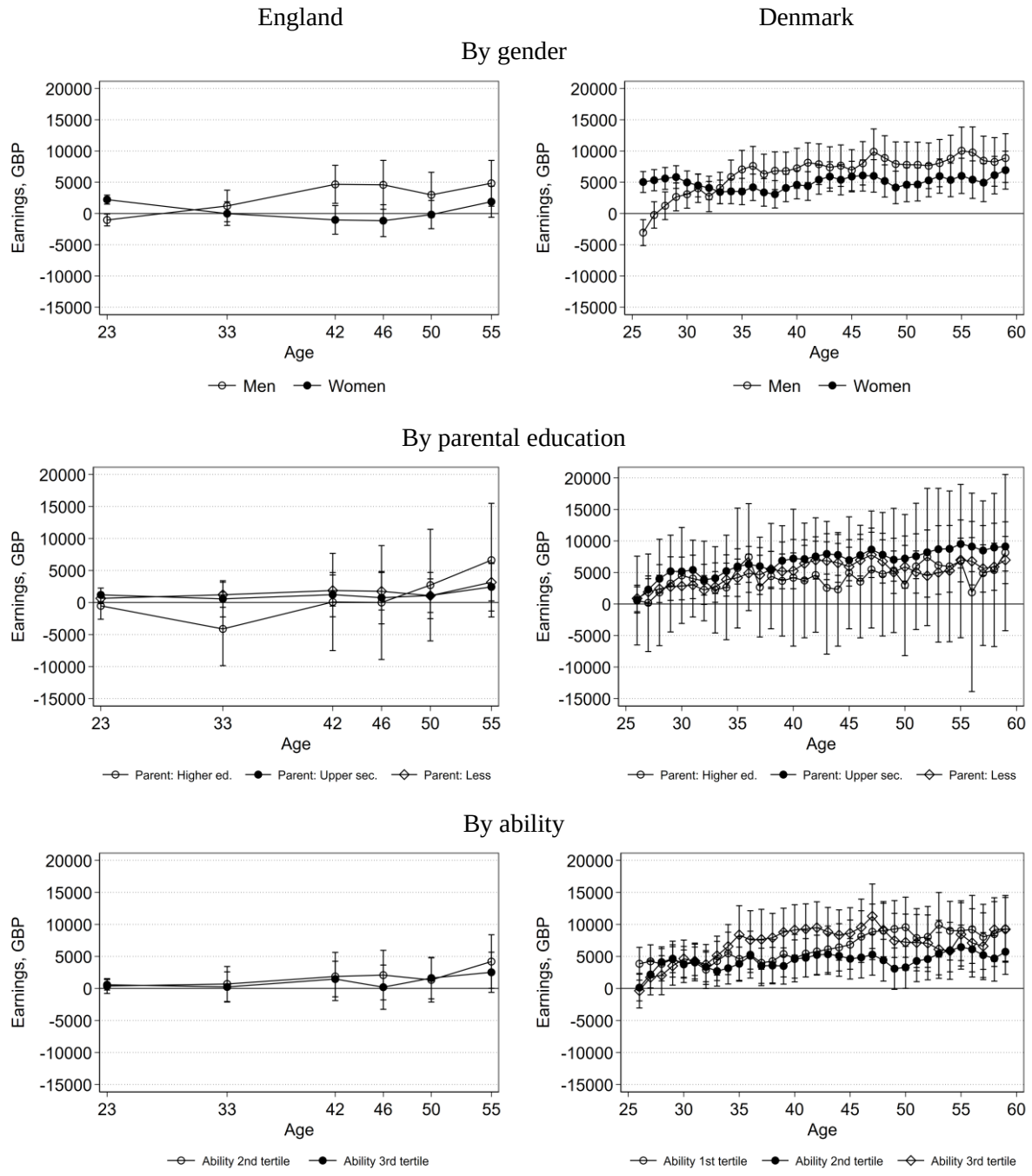


Table C1. Lower secondary school placement gap in lifetime cumulative earnings by gender, parental education and ability

	Coef.	Std. err.	t test	p value	95% conf. interval	
					Lower	Upper
England						
Lifetime cumulative earnings gap	38,746	19,372	2.00	0.046	738	76,754
Earnings gap by gender						
Men	82,265	31,425	2.62	0.009	20,603	143,927
Women	5,537	21,453	0.26	0.796	-36,553	47,628
Difference	76,728	35,722	2.15	0.032	6,637	146,818
Earnings gap by parental education						
Higher	-9,447	76,299	-0.12	0.901	-159,228	140,333
Upper sec.	35,193	33,682	1.04	0.296	-30,924	101,309
Less than upper sec.	48,604	23,931	2.03	0.043	1,594	95,613
Difference: Higher vs Upper sec.	-44,640	84,000	-0.53	0.595	-209,628	120,347
Difference: Higher vs Less than upper sec.	-58,051	80,799	-0.72	0.473	-216,777	100,675
Difference: Upper sec. vs Less than upper sec.	-13,411	39,756	-0.34	0.736	-91,484	64,662
Earnings gap by ability tertile group						
2nd tertile	47,672	32,813	1.45	0.147	-16,738	112,081
3rd tertile	30,479	28,065	1.09	0.278	-24,598	85,556
Difference	17,193	43,099	0.40	0.690	-67,411	101,797
Denmark						
Lifetime cumulative earnings gap	193,714	28,082	6.90	<0.001	138,647	248,781
Earnings gap by gender						
Men	220,283	41,684	5.28	<0.001	138,545	302,021
Women	168,980	30,263	5.58	<0.001	109,637	228,323
Difference	51,303	45,832	1.12	0.263	-38,568	141,175
Earnings gap by parental education						
Higher	143,828	141,339	1.02	0.309	-133,344	421,000
Upper sec.	227,756	39,765	5.73	<0.001	149,776	305,737
Less than upper sec.	169,424	39,100	4.33	<0.001	92,747	246,102
Difference: Higher vs Upper sec.	-83,928	145,803	-0.58	0.565	-369,854	201,998
Difference: Higher vs Less than upper sec.	-25,596	144,955	-0.18	0.860	-309,858	258,666
Difference: Upper sec. vs Less than upper sec.	58,332	51,284	1.14	0.255	-42,237	158,901
Earnings gap by ability tertile group						
1st tertile	219,571	49,926	4.40	<0.001	121,672	317,469
2nd tertile	147,001	38,004	3.87	<0.001	72,479	221,523
3rd tertile	236,789	50,935	4.65	<0.001	136,911	336,666
Difference: 1st vs 2nd	72,570	59,991	1.21	0.227	-45,066	190,206
Difference: 1st vs 3rd	-17,218	69,518	-0.25	0.804	-153,537	119,101
Difference: 2nd vs 3rd	-89,788	60,521	-1.48	0.138	-208,464	28,888

Supplement D: Robustness checks

Given potential concerns with applying linear regression to control for selection into school placement, we conduct six supplementary analyses that each assesses the stability of our results under different model specifications (see Figure D1 and Table D1).

A first concern is that the multivariate linear regression model does not accurately depict the true relations among school placement and pre-selection covariates with the earnings outcome. We conduct a doubly robust estimation combining multivariate regression with weighting by the propensity score of school placement, so that the estimator is robust to misspecification of either (but not both) of these models. Results show that the doubly robust estimator produces similar although slightly less efficient estimates than our preferred specification.

A second concern is a potential lack of overlap in the covariate distribution between students in the two school types. This is particularly evident in the English data where only few students in the bottom third of the ability distribution attend grammar schools. Using the propensity score of grammar school attendance we estimate a version of the earnings model that restricts the analysis to students located in the region of common support. However, results are similar to those in the original specification.

A third concern is that we have not sufficiently controlled for student characteristics that determine selection into school placement. We use a range of NCDS additional potential confounding variables measured before students are streamed into school types. These variables include birthweight, an indicator of mother smoking during pregnancy, additional ability tests at age 7, a social behaviour score, and a factor of cultural capital in the home environment. We find that adding these variables to the model leads the cumulative earnings returns to grammar school placement to reach statistical insignificance. Nonetheless, their

addition do not substantively change the results, indicating that our preferred specification adequately captures the relevant dimensions of selection.

A fourth concern is that excluding cases with imputed values on the dependent variable affects the results. However, we find that including cases with imputed earnings provides very similar although less efficient results.

A fifth concern is that by censoring the top one percent of the earnings distribution to the value of the 99th percentile, we may miss important between-school differences in top earnings. Nonetheless, including top earnings increases earnings levels among grammar school pupils and non-grammar state-school pupils to the same degree, leaving the cumulative earnings gap virtually unaffected, although less precisely estimated.

A sixth concern is that the ability measures in the English and Danish data do capture the same underlying dimensions of abilities and skills, hampering a between-country comparison of estimates. A conservative test of the comparative analysis is to exclude the reading and mathematics tests from the earnings model, thereby only controlling for the measure of general ability at age 11. Although excluding these measures from the model increases the between-school gap in lifetime earnings to 88,000 GBP in England, this gap is still significantly smaller than the one found in Denmark. Overall, different model specifications provide very similar results, which supports the choice of our preferred specification.

Figure D1. Robustness tests of earnings profiles by lower secondary school placement in England

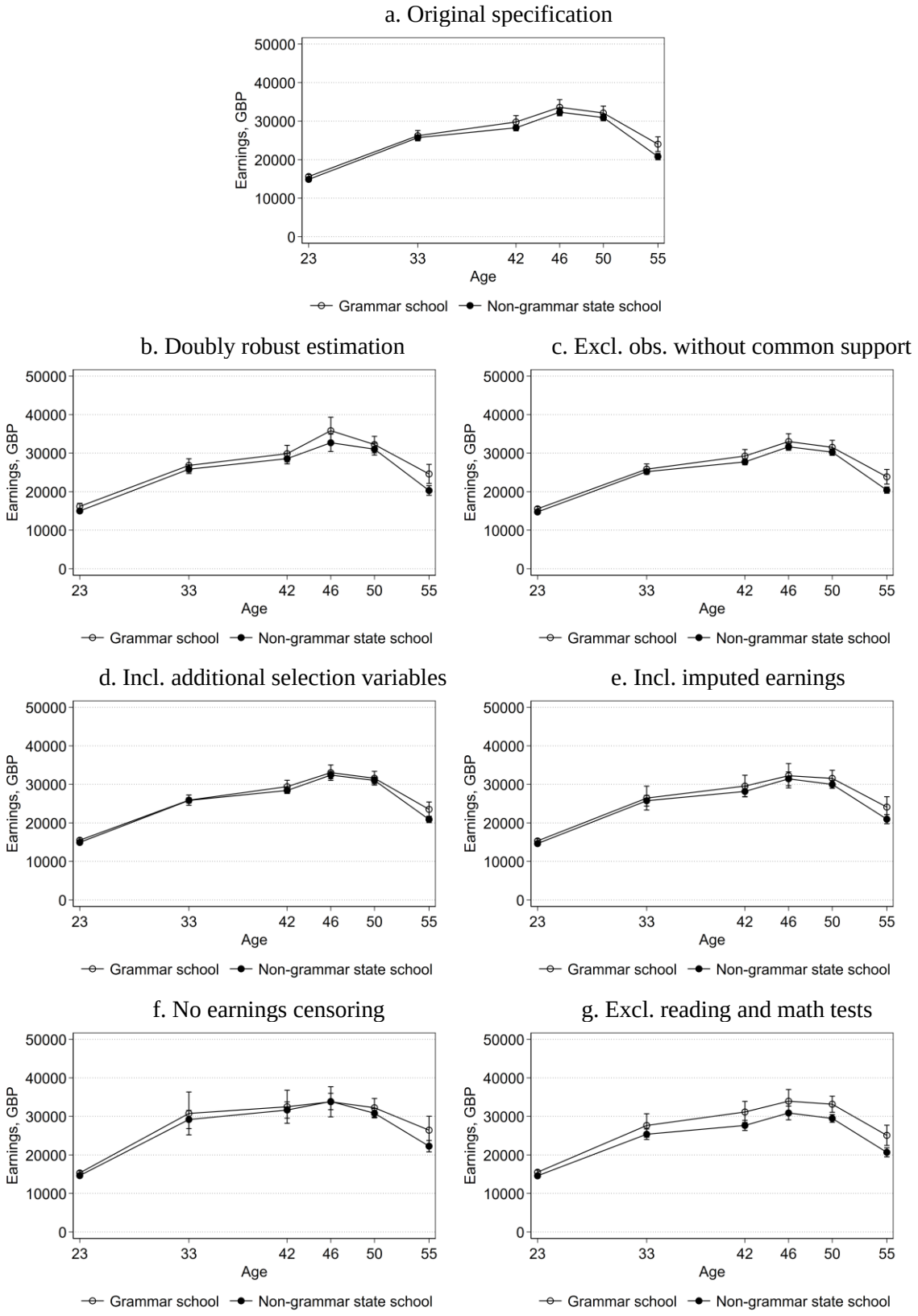


Table D1. Robustness tests of lower secondary school placement gap in lifetime cumulative earnings in England

	Coef.	Std. err.	t test	p value	95% conf. interval

					Lower	Upper
a. Original specification	38,746	19,372	2.00	0.046	738	76,754
b. Doubly robust estimation	54,894	22,902	2.40	0.017	9,972	99,816
c. Excl. obs. without common support	41,886	19,570	2.14	0.033	3,489	80,283
d. Incl. additional selection variables	23,232	19,325	1.20	0.230	-14,685	61,149
e. Incl. imputed earnings	39,057	24,576	1.59	0.113	-9,385	87,500
f. No earnings censoring	42,937	41,547	1.03	0.302	-38,747	124,621
g. Excl. reading and math tests	88,050	18,808	4.68	0.000	51,154	124,945

Supplement E: Occupational structure

Table E1. Occupational status at age 46 in England and age 45 in Denmark by school type

	England			Denmark		
	Grammar school	Non-grammar state school	Total	Advanced school	Regular school	Total
	(n = 1,854)	(n = 6,957)	(n = 9,655)	(n = 1,240)	(n = 1,303)	(n = 2,543)
Higher service class occupations	22.0	9.3	13.0	20.9	4.8	12.7
Lower service class occupations	40.4	29.5	32.1	31.8	9.2	20.3
Other occupations	37.6	61.2	54.9	47.3	86.0	67.0
Total	100.0	100.0	100.0	100.0	100.0	100.0

Note: Measured using the National Statistics Socio-economic Classification (NS-SEC) in England and the EGP class scheme in Denmark.