

Preliminary, please do not quote

What Determines Post-Compulsory Educational Choice?

Evidence from the Longitudinal Survey of Young People in England

by

William Collier*, Javier Valbuena* and Yu Zhu†

* School of Economics, University of Kent, Canterbury, CT2 7NP; email: W.J.Collier@kent.ac.uk

* School of Economics, University of Kent, Canterbury, CT2 7NP; email: jv51@kent.ac.uk

† School of Economics, University of Kent, Canterbury, CT2 7NP; email: Y.Zhu-5@kent.ac.uk

Version 2.2 (17/05/10)

ABSTRACT

Using a unique dataset which is rich in both family background and attainment in education, we find that educational attainments at the end of the compulsory schooling stage are powerful predictors for post-compulsory educational choices in England. In particular, the single academic success indicator of achieving the Government's *gold standard in GCSE*, which emphasizes key skills in numeracy and literacy by including the core subjects of Maths and English, is able to explain around 30% of the variation in the proportion of young people studying for academic qualifications. We also investigate the extent to which the impact of initial academic success on post-compulsory educational choices reflects a causal relationship. Our instrumental-variables estimates exploiting variations in birth weight and school starting age induced by school entry rules suggest that over half of the least-squares effect of achieving the *gold standard in GCSEs* on studying for academic qualifications is due to individual heterogeneity (ability bias) or simultaneity bias. However, conditional on the young person is working towards a qualification, there appears to be a highly significant causal effect of achieving the *gold standard* on choosing the academic as opposed to the vocational route.

JEL Subject Codes: I21, J24, P36

Keywords: Academic-Vocational Choice, Instrumental-variable estimation

1. Introduction

Most of the literature on the returns to education is concerned with the differential returns at different levels of qualifications. More recently, researchers have started to look at the rate of return associated with different types of qualifications. There seems to be an agreement, for the UK at least, that returns to academic qualifications are typically higher than those to vocational qualifications at the same level (see e.g. Robinson 1997, Conlon 2001, Dearden et al. 2002, McIntosh 2006 and Dickerson 2008). This pattern also appears to be remarkably robust with respect to the method of estimation and the data source used, as well as the specification of qualifications in regression models (e.g. focusing on the highest qualification or using all qualifications).

A good understanding of the causes of a persistent gap along the academic-vocational lines is not only of academic interest, but also of enormous policy relevance. Indeed, many of the recent educational reforms in the UK, such as introduction of GCSEs, AS Levels, and diplomas, have an explicit aim of '*breaking down the artificial barriers between academic and vocational education*' (DfES 2005).¹

This paper focuses on the determinants of post-compulsory educational choice in the UK, including the choice between the academic-vocational route, using a unique dataset which is rich in both family background and attainment in education, as well as post-16 plans.

We find that educational attainments at the end of the compulsory schooling stage are powerful predictors for post-compulsory educational choices in England. In particular, the single indicator of achieving the Government's *gold standard in GCSE*, which emphasizes the core subjects of Maths and English, is able to explain around 30% of the variation in the proportion of young people studying for academic qualifications.

We then move on to investigate the extent to which the impact of initial academic success on post-compulsory educational choices reflects a causal relationship. Our instrumental-variables estimates exploiting variations in birth weight and school starting age by month of birth induced by school entry rules suggest that over half of the least-squares

¹ GCSE stands for General Certificate of Secondary Education, while AS stands for Advanced Subsidiary.

effect of achieving the *gold standard in GCSEs* on studying for academic qualifications is due to individual heterogeneity (ability bias) or simultaneity bias (reverse causation). However, conditional on the young person is working towards a qualification, there appears to be a highly significant causal effect of achieving the *gold standard* on choosing the academic as opposed to the vocational route.

The remainder of the paper is organized as follows. Section 2 reviews the existing literature. Section 3 outlines the relevant features of the English education system. The data is described in Section 4. Section 5 presents the empirical results. Section 6 concludes.

2. Literature Review

Comparing to the vast economics of education literature that is concerned with the differential returns at different levels of qualifications, the research into the rate of return associated with different types of qualifications is fairly sparse. There have been only a handful of recent empirical studies for the UK which attempt to distinguish between various forms of academic and vocational qualifications.

A key contribution of the human capital theory is the distinction between *general* and *specific* human capital (Becker 1964). General human capital (such as literacy or numeracy) is useful to all employers, while specific human capital refers to skills or knowledge that is useful only to a single occupation or industrial sector. Broadly speaking, one can equate academic qualifications with general human capital and vocational qualifications with specific human capital.

To the best of our knowledge, Robinson (1997) is the first UK study in the parity of returns between academic and vocational qualifications in the labour market. Using the Quarterly Labour Force Survey (QLFS), he concludes that men and women with academic qualifications at one level in the National Qualifications Framework (NQF) earn on average as much as those with vocational qualifications set notionally one level higher. Even controlling for occupations, academic qualifications are still found to be associated with higher earnings.

Using the QLFS and the National Child Development Study (NCDS), Conlon (2001) finds a statistically significant gap in hourly wage in favour of academic qualifications for working age males in the UK, at every level of qualification within the NQF. Moreover, this wage gap is also rising in the level of the qualification hierarchy.

Dearden et al. (2002) also reports higher returns to academic qualifications relative to those to vocational qualifications at the same level, using the QLFS and the NCDS data, as well as the British data from the 1995 International Adult Literacy Survey (IALS). They show that while returns to academic qualifications are homogenous across the distribution of ability, as measured by scores of reading and maths tests taken at age 7, returns to vocational qualifications are significantly higher for low ability individuals.

Unlike earlier studies which focus on the level and type of the **highest** qualifications, both McIntosh (2006) and Dickerson (2008) use the ‘all qualifications’ specifications. Methodologically, the former approach focuses on the **marginal** return, while the latter is concerned with the ‘average’ rate of return, i.e. the return measured across all individuals who hold that particular qualification, holding all other qualifications constant. Despite the differences in model specification, their findings, which are based on the QLFS data, are consistent with earlier studies which find that academic qualifications yield higher returns than vocational ones at the same NQF level. Moreover, they all find that lower level vocational qualifications fare particularly badly, with zero or even negative returns.

Potential causes for a persistent differential return by type of qualifications can be usefully divided into demand side and supply factors. A leading candidate of the demand side explanation is the *skill-biased technological change* (Berman et al., 1994), which increases demand for people with high general human capital, who are quick to learn and to adapt in a fast-changing working environment. The leading supply side explanation is possible self-selection into the academic or vocational qualification track on the basis of ability (Conlon 2005).

In this paper, we are going to focus on supply side factors, which are more relevant for young people at this stage. One particular challenge from an econometric perspective is to address the potential ability bias and endogeneity issues.

3. Relevant features of the English education system

The school education system in England can be divided into three stages: primary education (Reception Year and Year 1 to Year 6), compulsory secondary education (Year 7 to Year 11) and post-compulsory secondary education (Year 12 to Year 13). By law, all children of compulsory school age (between 5 and 16 years old) must receive a full-time education. The current school leaving age of 16 in England and Wales has been in force since September 1973, as a result of the **Raising of School Leaving Age (RoSLA) Order** of 1972.

3.1 School entry and school-exit rules

The academic year in England runs from 1 September to 31 August with three terms starting in September, January, and April, respectively. Under the English education system, children must start school at the beginning of the term after they turn 5. While many local education authorities (LEAs) operate a triple-entry-point system that admits children at the beginning of the term in which they turn 5,² the system that is becoming increasingly popular over time is based on a single-entry-point, under which all children start school in September of the academic year in which they turn 5, regardless of age.³

By law, a child in England is generally not allowed to leave school, on their 16th birthday. For young people in our sample who were born between September 1989 and August 1990, a single school leaving date (introduced in 1997), was set as the last Friday in June in the school year which the child reaches the age of 16.

3.2 The National Qualifications Framework (NQF)

At the end of five years of compulsory secondary education, students in England and Wales take exams in a range of subjects at the level of General Certificate of Secondary Education (GCSE). The GCSE is a single subject exam set introduced in 1988 and marked by

² Under the triple-entry-point system, children born between May and August could receive two terms fewer education (in Reception Year) compared with classmates born in the autumn who start in September. The Labour Government decided to bring forward the starting date from the term before a child's fifth birthday to the September after their fourth, following the 2009 Independent Review of the Primary Curriculum by Sir Jim Rose (DCSF 2009, recommendation 14).

³ According to Crawford et al. (2007), around half of the children born between 1997 and 1999 started school in an LEA where this single-entry-point system was in operation.

independent exam boards.⁴ Students usually take at least 5 (there is no upper limit) GCSE exams in different subjects, including mathematics and English. Students are given a letter score of A-G where A is the top grade.⁵ Although grades A-G are all pass grades officially, only grades A to C are given much credence by most employers, and regarded as equivalent to the 'pass' grades in the previous O-Level. GCSEs are part of the *National Qualifications Framework* which is the official qualification accreditation system for the whole UK except for Scotland. A GCSE at grades D–G is a Level 1 qualification, while a GCSE at grades A*–C is a Level 2 qualification. Post-compulsory secondary-education qualifications are Level 3 while Higher Education (HE) qualifications are classified as Levels 4 to 8.

3.3 Educational choice at 16

After taking GCSEs students may leave secondary schooling, or go on to further education colleges (typically for vocational or technical courses) or may take a higher level of secondary school exams known as 'A-Levels' (typically in 2-4 subjects) after a further two years of study. A-Levels (short for Advanced level) are required for university entrance in the UK. Since the introduction of the GCSEs in 1988 has largely removed academic streaming before the age of 16, most young people will only have their first opportunity to choose between the academic and the vocational route once they have completed compulsory education.

⁴ The introduction in 1988 of the GCSE marked a turning point in UK educational system, in removing streaming before the age of 16. Since the 1950s, secondary school students who were academically inclined took Ordinary Level (at age 16) and Advanced Level (at age 18) examinations, which were an essential requirement to enter higher education. Less academically oriented pupils could take the Certificate of Secondary Education (CSE) at 16 before they left school.

⁵ In 1994, the A* grade was introduced to distinguish the very top end of achievement.

4. Data

This paper is based on the Longitudinal Study of Young People in England (LSYPE), also known as Next Steps, which is a major innovative panel study of young people which brings together data from a number of different sources. The study began in 2004, by sampling young people aged between 13 and 14 who were studying in Year 9 in schools in England.

LSYPE is commissioned by the former Department for Education and Skills (DfES) and now managed by the Department for Children, Schools and Families (DCSF), with an aim to improve understanding of the key factors affecting young people's progress in transition from the later years of compulsory education which ends at the age of 16, through any subsequent education or training, to entry into the labour market. Therefore, apart from personal characteristics and family background, LSYPE also gathers detailed information on the young person's attainment in education and post-16 plans, as well as the school(s) the young person attends or has attended.

Over 15,000 young people and their families were interviewed in Wave 1 in 2004. To monitor the progress of the cohort group, annual interviews with the reference young person and their parents or carers have been conducted since then. Moreover, the data have been linked to administrative records such as the *National Pupil Database* (NPD) and other data sources such as geo-demographic data from the 2001 Census. However, for confidentiality reasons, the linked administrative data have not been included in the public-access LSYPE data. Fortunately, a small set of variables extracted from the NPD, covering GCSEs gained and grades, and Key Stage test scores for LSYPE respondents, have been added to the recent releases of the public-access LSYPE file.

In order to fully exploit the rich information in LSYPE to study the choice of the academic-vocational route upon the completion of compulsory education, we have selected a sample of young people who were born in the UK and have given full interviews, together with their mothers, in all 4 waves that are currently available. We exclude any young person who was born either before the 1st September 1989 or after the 31st August 1990 (thus violates the school entry rule). We also exclude a very small number of cases in which the mother is older than 60 (the state retirement age) in Wave 4. This resulted in a final sample of 9190 young people, of which 4570 (49.7%) are boys, for our analysis.

At the time of the Wave 4 interview, 7538 (82%) of these young people are doing school or college courses, or apprenticeships and work-based trainings, which will lead to a qualification. Of these, 5196 (69%) are studying for academic qualifications such as A Levels (including its component units AS and A2 Levels), GCSEs⁶ or AVCEs (Advanced Vocational Certificate in Education)⁷. Over 99% of young people choosing the academic route are studying full-time, comparing to 73% of those choosing the non-academic route.

Table 1 presents summary statistics of all variables used in our empirical analysis, by the gender of the young person in our sample. The first thing to note is that there is a very significant gender gap in our main outcome variable. Upon completion of compulsory education, 61% of all girls are studying for academic qualifications, as opposed to only 52% of all boys.

Around a quarter of young people in our sample are non-white. While there are no significant differences across gender in the probability of being born prematurely (around 28%) or by single parents (around 18%), boys tend to have higher birth weight on average than girls. Boys are also more likely to self-report any disability or long-term health problems, which may or may not affect their schooling, in Wave 1.

Around a quarter of young people are living with a lone mother at age 16 (Wave 4) in our sample. In our econometric analysis, we are going to control for a full list of mother's characteristics in Wave 4, including race, qualifications, partnership status, number of other children (i.e. siblings to the young person) and employment status. We will also control for household income reported in Wave 1. Given the 50% non-response rates of household income, we will include a dummy for missing income variables rather than dropping half of the sample.

There are no notable differences in mother's characteristics across gender lines, except for the chance of being a lone mother. Around a quarter of mothers have post-secondary qualification (NQF4 or above), of which nearly half have degrees. Around 13% of

⁶ Of the 351 young people studying for GCSEs post-compulsory schooling, only 35% have achieved the NQF Level 2 threshold and 8% achieved the *gold standard*, suggesting many of them are retaking subject (or retaking exams) to improve their grades.

⁷ Despite its name, we have decided to treat AVCEs (formerly known as Vocational A Levels) as academic qualifications because they are full-time education based at schools or colleges, unlike traditional vocational routes such as apprenticeships. In our sample, there are only 51 young people taking AVCEs.

mothers have upper-secondary qualifications (NQF3) while almost 30% have NQF2 which is awarded upon successful completion of compulsory education. One in 5 of mothers have no formal qualifications while another 11% have only Level 1. About 30% of mothers report a vocational qualification as her highest qualification.

It is clear that there is significant gender gap in educational attainment at around age 16 in favour of girls: while 57% of girls have achieved the critical benchmark of 5 or more GCSEs at Grades A*-C including Maths and English, only 49% of boys have managed to reach the same standard. Girls are also more likely to achieve Level 2 threshold, which only require *any* 5 GCSEs with grade C or above. Interestingly, boys do almost as well as girls in GCSE Maths. The contextual value added KS2-KS4 scores used by government, which is supposed to measure progress between the time one finishes primary education (Key Stage 2) and the time one completes compulsory secondary education (Key Stage 4), suggest that gender-gap in academic gap actually widens during this stage. One in eight of young people receive free school meals, due to low family income.

Boys are more likely than girls to attend private schools in Wave 1. However, the overall proportion is small, at 4% or below. Around 44% of mothers think the overall quality of the school is very good, and only 10% or less think it is poor (omitted category being *good*). It turns out that the gender gap in actual educational attainment is well reflected by differences in parental aspirations and subjective assessment of the likelihood that the young person will continue in full-time education at 16 and go to higher education.

The last column of Table 1 highlights the variables for which the equality of means across gender is rejected at the 5% significance level. It is clear that a pooled specification would be hard to justify given the wide differences in own and mother's characteristics, parental aspirations, as well as educational attainment at 16. Therefore, we will run regressions for boys and girls separately to allow for gender-specific effects, while maintaining a common model specification.

Table 1: Summary Statistics for Family Characteristics

Variable Name	Boys	Girls	Equality at 5%?
Studying for any academic qualifications (dep. var.)	0.518 (0.500)	0.611 (0.487)	No
<i>Young Person (YP)'s Own Characteristics:</i>			
Non-white	0.243 (0.429)	0.274 (0.446)	No
Premature Birth (by 1+ week)	0.280 (0.449)	0.279 (0.449)	
Log birth weight (kilograms)	1.196 (0.208)	1.152 (0.205)	No
Any disability (health problem) in Wave 1	0.153 (0.360)	0.119 (0.324)	No
Any disability (health problem) affecting schooling in Wave 1	0.065 (0.246)	0.051(0.221)	No
Single-parent family at birth	0.188 (0.390)	0.176 (0.380)	
<i>Mother's Characteristics (measured at age 16, or Wave 4):</i>			
Mother non-white	0.223 (0.416)	0.251 (0.434)	No
Mother's highest qualification is degree or above	0.122 (0.327)	0.118 (0.323)	
Mother's highest qualification is NQF4 but below degree	0.138 (0.345)	0.131 (0.338)	
Mother's highest qualification is NQF3	0.135 (0.342)	0.135 (0.342)	
Mother's highest qualification is NQF2	0.285 (0.452)	0.294 (0.456)	
Mother's highest qualification is NQF1	0.115 (0.319)	0.113 (0.317)	
Mother has no qualification (reference category)	0.205 (0.404)	0.211 (0.408)	
Mother's highest qualification is vocational	0.309 (0.462)	0.305 (0.460)	
Mother Married (reference category)	0.704 (0.457)	0.687 (0.464)	
Mother cohabiting	0.059 (0.235)	0.054 (0.227)	
Mother is lone parent	0.238 (0.426)	0.259 (0.438)	No
Indicator for step-family	0.102 (0.302)	0.097 (0.296)	
Number of siblings in the household (to YP)	1.503 (1.167)	1.530 (1.181)	
Any non-resident siblings	0.270 (0.444)	0.278 (0.448)	
Mother works full-time	0.411 (0.492)	0.414 (0.493)	
Mother works part-time	0.314 (0.464)	0.305 (0.460)	
<i>Family incomes (measured at age 13, or Wave 1):</i>			
Log gross annual HH income in Wave 1	5.000 (5.070)	5.044 (5.075)	
Log gross annual HH income in Wave 1 missing	0.503 (0.500)	0.499 (0.500)	
<i>Educational Attainment at age 16 (Wave 4)</i>			
<i>Gold standard in GCSEs</i>	0.487 (0.500)	0.566 (0.496)	No
Achieving NQF Level 2 threshold	0.617 (0.486)	0.705 (0.456)	No
Achieving NQF Level 1 threshold	0.310 (0.462)	0.248 (0.432)	No
Maths A*-C	0.594 (0.491)	0.614 (0.487)	
Maths D-G	0.350 (0.477)	0.352 (0.478)	
Contextual value added KS2-KS4	5.783 (58.066)	7.368 (52.531)	
Contextual value added KS2-KS4 missing	0.069 (0.254)	0.063 (0.242)	
Receiving free school meals	0.122 (0.327)	0.132 (0.338)	
<i>Parental Aspirations at age 13 (Wave 1)</i>			
Private school	0.041 (0.198)	0.034 (0.182)	
Parent think overall quality of school very good	0.432 (0.495)	0.446 (0.497)	
Parent think overall quality of school poor	0.107 (0.309)	0.109 (0.312)	
Parent think YP will continue in full-time education at 16	0.687 (0.464)	0.808 (0.394)	No
Parent would like YP to continue in f-t education at 16	0.776 (0.417)	0.881 (0.325)	No
Parent think YP unlikely to go into Higher Education (HE)	0.333 (0.471)	0.239 (0.427)	No
Parent think YP unlikely to go into HE missing	0.052 (0.222)	0.066 (0.248)	No
Number of Observations	4570	4620	

Notes: Standard errors in parentheses.

5. Findings

5.1 Determinant of post-compulsory educational choices

There has been a heated debate in the economics of education literature on the (relative) roles of family background, school environment (peer effects etc) and ability in determining individual's educational attainment. In this paper, we will aim to contribute to this debate by exploiting the unusually rich information in LSYPE and focus our attention on young people's choice between the pursuit of an academic qualification versus other options in the education system or in the labour market, and to a lesser extent, on the choice between the academic and the vocational route conditional on working towards a qualification. Both issues are of enormous policy relevance, but are poorly understood so far.

Our empirical approach starts by attempting to quantify the relative importance of the different factors emphasized by different researchers in the literature, sometimes due to data availability problems. We proceed by successively adding new sets of control variables in a Linear Probability Model (LPM) of whether to study for academic qualification immediately after the completion of the compulsory education stage. Our baseline model (Model 1) controls for a comprehensive list of own characteristics of the young person and those of the mother which includes race, educational attainment, marital (partnership) status, indicator for step-families and number of siblings, labour market status and family income when the young person was 13. These variables are widely available in labour force or household surveys and have been used extensively in empirical labour economics.

In Model 2 we add the NPD records which include educational attainments at the end of compulsory schooling stage such as indicators for achieving the Government's *gold standard* in GCSE, that is attaining five or more GCSEs at grades A*-C, including Maths and English.⁸ In Model 3, we further add parental aspirations measures and school type from Wave 1, when the young person was aged 13. Finally, we will aim to reduce the most comprehensive specification to a parsimonious model.

⁸ Indeed, the children in our sample are the first school cohort to face the *gold standard*, introduced by the Department for Children, Schools and Families (DCSF) in 2006.

Table 2a and 2b present LPM estimates for models M1 through M3 as well as the parsimonious model for boys and girls respectively. Our baseline model contains most of the family background variables found in the literature. Most of the variables in Model 1 are individually significant, and have the expected signs. For instance, any disability or long-term health problems reported by the young person decreases the chance of pursuing academic qualifications post 16. On the other hand, higher educational qualification of the mother and higher family income are positively related to studying for academic qualification. However, all these family background variables as a whole can only explain no more than 14% of the variation in the proportion studying for academic qualifications for either gender.

It is apparent from Model 2 that passing any qualification threshold in the NQF classification has a positive effect on the chance of studying for academic qualifications. Comparing to someone who leaves school without any qualifications, achieving NQF Level 1 and Level 2 thresholds will increase the chance of studying for academic qualification by 11 and 33 percentage points for boys, or 4 and 29 percentage points for girls. What is really striking is that merely including the core subjects of Maths and English in the 5 GCSE subjects at grades A*-C required to achieve a Level 2 NQF qualification has an *additional* 26 and 22 percentage point effect for boys and girls respectively. While the adjusted-R² measures have tripled for both boys and girls, many of the family background variables, most notably young person's disability and family income, have lost statistical significance in this extended model. This implies that many of the family background variables impact on the outcome only through their effect on prior educational attainment. This result is consistent with Heckman (2008) who finds that family environments of young children are major predictors of cognitive and socio-emotional abilities.

We then include school type and parental aspirations at age 13 in our most comprehensive model, Model 3. It is unsurprising to see school quality as assessed by the main parent does not matter, given that we have already controlled for actual educational attainment at age 16. On the other hand, parental aspirations as regards the young person's educational attainment are all statistically significant. Some of these variables reflect parental preferences which are likely to differ by parental education, while others could be thought of as proxies for the ability of the young person. It is worth noting that the goodness-of-fit of the regression as measured by the adjusted-R² only improves modestly, while the size of effects of age 16 attainments and mother's qualifications have been markedly reduced.

Given that only one-third of the regressors in Model 3 are statistically significant at the conventional 5% level, we now use the naive stepwise regression technique to arrive at a parsimonious model. The final model presented in the last columns of Table 2a and 2b only contains variables which are statistically significant at the 5% level for either boys or girls, but maintains almost the same explanatory power as in Model 3.

5.2 The importance of achieving the *gold standard* in GCSEs

It is clear from the parsimonious specification that the single most important predictor for studying for academic qualifications at age 16 in England is educational attainment at the end of the compulsory education stage, represented by whether having achieved the NQF Level 2 threshold, and in particular whether having achieved the *gold standard of GCSEs*. Simply passing any 5 GCSEs at grades A*-C would increase the probability of academic studies by around 20 percentage points, while achieving good grades in the core subjects of Maths and English among the 5 subjects, which emphasizes key skills of numeracy and literacy, will add a further 22 percentage points for both boys and girls.

This finding is actually in line with the conventional wisdom (see e.g. Nuffield Foundation 2009) and the Government's views as summarized in a White Paper by the DfES:

“By far the best-known and best-understood qualifications for young people in this country are the GCSE and the A level. The overwhelming majority of young people who do well at GCSE level go on to take A level” – DfES 2005 White Paper, p19

In Table 3a and 3b we will assess the importance of achieving the *gold standard* on the probability of studying for academic qualifications for boys and girls separately, this time starting from a model with the single regressor for achieving the *gold standard*, and then successively adding other age 16 educational attainments and age 13 school type and parental aspirations. Note this time all regressors are subsets of the parsimonious specification in Table 2, reproduced in the last column in Table 3 to facilitate comparison.

It is really striking that the variable for achieving the *gold standard* alone accounts for 32% of the variation in the proportion studying for academic qualification for boys and 28% for girls. Those who passed this critical threshold are 52-57 percentage points more likely to pursue academic qualification than those who failed. A comparison of Model 2 and Model 3

to Model 1 reveals that adding other educational attainment measures and parental aspirations only increases the explanatory power by 11 and 9 percentage points, for boys and girls respectively. Finally, adding all the family background controls in the parsimonious specification merely adds 0.5 percentage points for boys and 1.4 percentage points for girls to the explanatory power of Model 3, a model consisting of educational variables only.

We interpret this as compelling evidence that prior educational attainment represented by whether having achieved the *gold standard in GCSEs*, which emphasizes key skills in numeracy and literacy by including the core subjects, is the overriding determinant for pursuing academic qualifications post 16.

5.3 Determinant of post-compulsory educational choices

Interesting as it might be, we can only interpret this strong relationship we find as a correlation, because of potential ability bias and simultaneity issues (e.g. those who intended to drop out were also less likely to pass GCSEs). For policy interventions, one would be interested in identifying the causal relationship.

Since all Wave 4 educational attainments are effectively jointly determined, we are only going to keep the indicator for having achieved the *gold standard* in the following specifications. We also leave out type of school indicator and parental aspirations from Wave 1, for fear of endogeneity problems. For example, rich parents who are worried about their child's educational performance are more likely to send the child to private schools, which produce superior academic results on average, not least because of better resources (see e.g. Green et al. 2008). However, we do condition on a full set of dummies for mother's educational qualifications and partnership status, but deliberately drop out employment status and family income variables to avoid complications with endogeneity issues.

The causal effect of achieving the *gold standard* is identified through two instrumental variables. The first one exploits the exogenous variation in the relative school starting age (SSA) by month of birth within the same school cohort group, induced by the English school entry policy. Under a single-entry-point system which is getting increasingly popular in recent years, a child born on the 1 September 1989 will be the oldest in this school cohort while another child born on the 31st August 1990 will be the youngest.

Drawing on 18 research studies published from 2000 to 2008 for various countries, the survey by Sharp et al. (2009) concludes that there is overwhelming evidence of statistically significant effects for relative age, i.e. comparing the youngest to the oldest in the academic year group. Pupils who are younger in the year group fare less well in attainment tests, commonly measured by test scores in maths, reading and writing. For recent UK evidence, see e.g. Crawford et al. 2007, and Walker and Zhu 2009.

We do expect some noises in the actual SSA (which we do not observe in our data), due to the fact that different school entry rules are in operation in different LEAs.⁹ However, what matters for our identification is whether month of birth is *statistically* correlated with probability of achieving *gold standard in GCSEs* while having no direct impact on the post-compulsory educational choice. Figure 1 shows that a September-born boy is 7 percentage points more likely than his August-born counterpart to pass the threshold. The corresponding gap for girls is a striking 15 percentage points. This implies that on average, predicted SSA (using the single-entry-point rule) is increasing in the chance of reaching the *gold standard* for both boys and girls.

Our second instrument relies on birth weight. There has been compelling evidence of an adverse effect of low birth weight on school outcomes in the literature. In fact, birth weight has been routinely used as an instrument for schooling differences in within-twins analysis of wages, see e.g. Behrman et al. 1994, Neumark 1999, Behrman et al. 2004 and Miller et al 2005.

Figure 2 suggests a strong positive relationship between birth weight and the probability of achieving the *gold standard*. An underweight (less than 2.5 kg) boy is 9 percentage points less likely than a normal weight (between 2.5 and 4.5 kg) to achieve the gold standard, while the corresponding gap is 6 percentage points for girls. The somewhat surprising results for overweight births (over 4.5 kg) might be due to small cell sizes, as only

⁹ Admittedly, children exposed to multi-entry-points systems will receive different length of education (up to 2 terms) at the end of the compulsory education stage (see Footnote 2). This idea has been exploited by Del Bono and Galindo-Rueda (2004) for the UK and Black et al. (2008) for Norway.

2.6% of boys and 1.1% of girls fall into this category.¹⁰ In our empirical specification, we will use the log of birth weight to proxy the effect of birth weight.¹¹

Table 4 presents Instrumental Variable (IV) estimates with the corresponding LPM results for both boys and girls.¹² The first-stage estimates of the IV model are also shown in the bottom panel of the table, together with the relevant diagnostics tests for validity of instruments. By and large, the family background variables have maintained their signs and statistical significances when we endogenize the *gold standard* indicator, although the sizes of the effects appear to be larger under the IV specification.

In contrast, the IV estimates for achieving the *gold standard* are 60% lower than their LPM counterparts for boys and 45% lower for girls respectively. Moreover, only for girls is the IV estimate marginally statistically significant ($p=0.09$). This implies that over half of the effect of achieving the *gold standard* on going down the academic route is probably driven by individual heterogeneity (ability) or reverse causation.

The diagnostic tests are strongly supportive of the validity of our instruments. All instruments are at least individually significant at the 5% level for both genders. The Cragg-Donald Wald F-statistics for the excluded restrictions are also well above the recommended threshold of 10 in both models, meaning we do not have a weak-instrument problem. Indeed, the F-statistics are above the critical value for 20% relative bias for boys and that for 15% relative bias for girls, implying that our IV estimates have been successful in removing most of the bias in the LPM estimates. Finally, we are also unable to reject the null of exogeneity of instruments according to the Sargan test.

In Table 5, we repeat this exercise using a sample which conditions on the young person is doing school or college courses, or apprenticeships and work-based trainings, which will lead to a qualification (N=7538). In other words, we drop the 18% of young people who are not working towards any qualifications from the reference category. Again, our

¹⁰ Cesur and Rashad (2008) find a negative association between high birth weight (>4.5 kg) and low test scores for children in the US.

¹¹ A quadratic term is dropped from the final specification due to lack of statistical significance.

¹² The corresponding Probit models produce very similar marginal effects to the LPM estimates, and are only shown in the Appendix.

instruments easily pass the diagnostic tests. Moreover, the IV estimates are statistically significant for both boys and girls. While the size of the IV estimate for boys is still around 30% lower than the OLS counterpart, the size of the causal effect for girls is virtually identical to the OLS estimate. We interpret this as evidence of a strong causal effect of academic success at the compulsory education stage, as represented by achieving the *gold standard*, on choosing the academic as opposed to the vocational route, especially for girls, conditional on the young person is working towards a qualification.

Table 2a: Linear Probability Model, Boys

Studying for any academic qualifications	Model 1	Model 2	Model 3	Parsi- monious
<i>Young Person(YP)'s Own Characteristics:</i>				
Non-white	0.060*	0.049	0.017	
Premature Birth (by 1+ week)	-0.004	-0.016	-0.018	
Log birth weight (kilograms)	0.013	-0.050	-0.057*	
Any disability (health problem) in Wave 1	-0.009	0.001	-0.003	
Any disability (health problem) affecting schooling in Wave 1	-0.190***	-0.029	-0.011	
Single-parent family at birth	-0.029	0.011	0.016	
<i>Mother's Characteristics (measured at age 16, or Wave 4, unless stated otherwise :</i>				
Mother non-white	0.155***	0.108***	0.066**	0.078***
Mother's highest qualification is degree+	0.366***	0.110***	0.060***	0.038***
Mother's highest qualification is NQF4	0.340***	0.106***	0.073***	
Mother's highest qualification is NQF3	0.227***	0.048*	0.027	
Mother's highest qualification is NQF2	0.115***	0.009	0.014	
Mother's highest qualification is NQF1	0.008	-0.038*	-0.027	
Mother's highest qualification is vocational	-0.080***	-0.024	-0.018	
Mother cohabiting	-0.111***	-0.046*	-0.041	-0.046*
Mother is lone parent	-0.121***	-0.042**	-0.038**	-0.044***
Indicator for step-family	-0.064**	-0.039*	-0.028	-0.023
No of siblings in the HH (to YP)	-0.039***	-0.014**	-0.014***	-0.013**
Any non-resident siblings	-0.062***	-0.031**	-0.027	
Mother works full-time	-0.018	-0.037**	-0.025	
Mother works part-time	0.014	-0.026	-0.005	
Log gross annual HH income in Wave 1	0.037***	0.003	-0.007	
Log gross annual HH income in Wave 1 missing	0.394***	0.050	-0.048	
<i>Educational Attainment at age 16 (Wave 4)</i>				
<i>Gold standard in GCSEs</i>		0.264***	0.213***	0.221***
Achieving NQF Level 2 threshold		0.334***	0.217***	0.188***
Achieving NQF Level 1 threshold		0.106***	0.041	
Maths A*-C		0.002	-0.011	
Maths D-G		-0.091***	-0.078	-0.061***
Contextual value added KS2-KS4		0.000***	0.001***	0.001***
Contextual value added KS2-KS4 missing		0.072***	-0.023	
Receiving free school meals		-0.027	-0.036*	
<i>Parental Aspirations at age 13 (Wave 1)</i>				
Private school			0.129***	0.121***
Parent think overall quality of school very good			0.016	
Parent think overall quality of school poor			-0.013	
Parent think YP will continue in full-time education at 16			0.084***	0.090***
Parent would like YP to continue in f-t education at 16			0.072***	0.070***
Parent think YP unlikely to go into Higher Education (HE)			-0.161***	-0.168***
Parent think YP unlikely to go into HE missing			-0.121***	-0.124***
Adj-R ²	0.139	0.397	0.437	0.435

Notes: N=4570. * p<0.1; ** p<0.05; *** p<0.01.

Table 2b: Linear Probability Model, Girls

Studying for any academic qualifications	Model 1	Model 2	Model 3	Parsi- monious
<i>Young Person (YP)'s Own Characteristics:</i>				
Non-white	0.106***	0.057*	0.038	
Premature Birth (by 1+ week)	0.040**	0.023	0.026*	
Log birth weight (kilograms)	0.104***	0.065**	0.062**	
Any disability (health problem) in Wave 1	0.023	0.035	0.036	
Any disability (health problem) affecting schooling in Wave 1	-0.172***	0.048	-0.034	
Single-parent family at birth	-0.067***	-0.027	-0.029*	
<i>Mother's Characteristics (measured at age 16, or Wave 4, unless stated otherwise):</i>				
Mother non-white	0.140***	0.110***	0.083***	0.101***
Mother's highest qualification is degree+	0.336***	0.110***	0.074***	0.064***
Mother's highest qualification is NQF4	0.299***	0.090***	0.062**	
Mother's highest qualification is NQF3	0.195***	0.035	0.017	
Mother's highest qualification is NQF2	0.135***	0.030	0.022	
Mother's highest qualification is NQF1	0.028	-0.015	-0.020	
Mother's highest qualification is vocational	-0.074***	-0.027	-0.027	
Mother cohabiting	-0.103***	-0.078***	-0.072***	-0.081***
Mother is lone parent	-0.122***	-0.054***	-0.053***	-0.070***
Indicator for step-family	-0.086***	-0.055**	-0.050**	-0.062***
No of siblings in the HH (to YP)	-0.025***	-0.009	-0.009	-0.009*
Any non-resident siblings	-0.071***	-0.021	-0.017	
Mother works full-time	-0.011	-0.013	0.010	
Mother works part-time	0.032*	0.003	0.006	
Log gross annual HH income in Wave 1	0.040***	0.010	0.004	
Log gross annual HH income in Wave 1 missing	0.368***	0.098	0.044	
<i>Educational Attainment at age 16 (Wave 4)</i>				
<i>Gold standard in GCSEs</i>		0.216***	0.196***	0.220***
Achieving NQF Level 2 threshold		0.289***	0.195***	0.207***
Achieving NQF Level 1 threshold		0.044	-0.002	
Maths A*-C		0.071	0.050	
Maths D-G		-0.004	-0.001	-0.035
Contextual value added KS2-KS4		0.001***	0.001***	0.001***
Contextual value added KS2-KS4 missing		0.069***	0.069***	
Receiving free school meals		-0.016	-0.029	
<i>Parental Aspirations at age 13 (Wave 1)</i>				
Private school			0.068	0.088***
Parent think overall quality of school very good			0.007	
Parent think overall quality of school poor			-0.033*	
Parent think YP will continue in full-time education at 16			0.068***	0.073***
Parent would like YP to continue in f-t education at 16			0.077***	0.073***
Parent think YP unlikely to go into Higher Education (HE)			-0.145***	-0.151***
Parent think YP unlikely to go into HE missing			-0.086***	-0.092***
Adj-R ²	0.134	0.362	0.389	0.387

Notes: N=4620. * p<0.1; ** p<0.05; *** p<0.01.

Table 3a: The Importance of achieving the *gold standard in GCSEs*, Boys

Studying for any academic qualifications	Model 1	Model 2	Model 3	Parsi- monious
<i>Educational Attainment at age 16 (Wave 4)</i>				
<i>Gold standard in GCSEs</i>	0.567***	0.299***	0.222***	0.221***
Achieving NQF Level 2 threshold		0.268***	0.192***	0.188***
Contextual value added KS2-KS4		0.000***	0.001***	0.001***
Maths D-G		-0.073***	-0.058***	-0.061***
<i>Parental Aspirations at age 13 (Wave 1)</i>				
Private school			0.121***	0.121***
Parent think YP will continue in FTED at 16			0.090***	0.090***
Parent would like YP to continue in FTED at 16			0.078***	0.070***
Parent think YP unlikely to go into HE			-0.195***	-0.168***
Parent think YP unlikely to go into HE missing			-0.137***	-0.124***
<i>Mother's Characteristics (measured at age 16, or Wave 4):</i>				
Mother non-white				0.078***
Mother's highest qualification is degree+				0.038**
Mother cohabiting				-0.046*
Mother is lone parent				-0.044***
Indicator for step-family				-0.023
No of siblings in the HH (to YP)				-0.013**
Adj-R ²	0.321	0.366	0.430	0.435

Notes: N=4570. * p<0.1; ** p<0.05; *** p<0.01.

Table 3b: The Importance of achieving the *gold standard in GCSEs*, Girls

Studying for any academic qualifications	Model 1	Model 2	Model 3	Parsi- monious
<i>Educational Attainment at age 16 (Wave 4)</i>				
<i>Gold standard in GCSEs</i>	0.523***	0.277***	0.230***	0.220***
Achieving NQF Level 2 threshold		0.284***	0.216***	0.207***
Contextual value added KS2-KS4		0.001***	0.001***	0.001***
Maths D-G		-0.0400*	-0.032	-0.035
<i>Parental Aspirations at age 13 (Wave 1)</i>				
Private school			0.092***	0.088***
Parent think YP will continue in FTED at 16			0.077***	0.073***
Parent would like YP to continue in FTED at 16			0.078***	0.073***
Parent think YP unlikely to go into HE			-0.181***	-0.151***
Parent think YP unlikely to go into HE missing			-0.094***	-0.092***
<i>Mother's Characteristics (measured at age 16, or Wave 4):</i>				
Mother non-white				0.101***
Mother's highest qualification is degree+				0.064***
Mother cohabiting				-0.081***
Mother is lone parent				-0.070***
Indicator for step-family				-0.062***
No of siblings in the HH (to YP)				-0.009*
Adj-R ²	0.283	0.331	0.373	0.387

Notes: N=4620. * p<0.1; ** p<0.05; *** p<0.01.

Figure 1: Effect of Month of Birth on Attaining the *Gold standard in GCSEs*

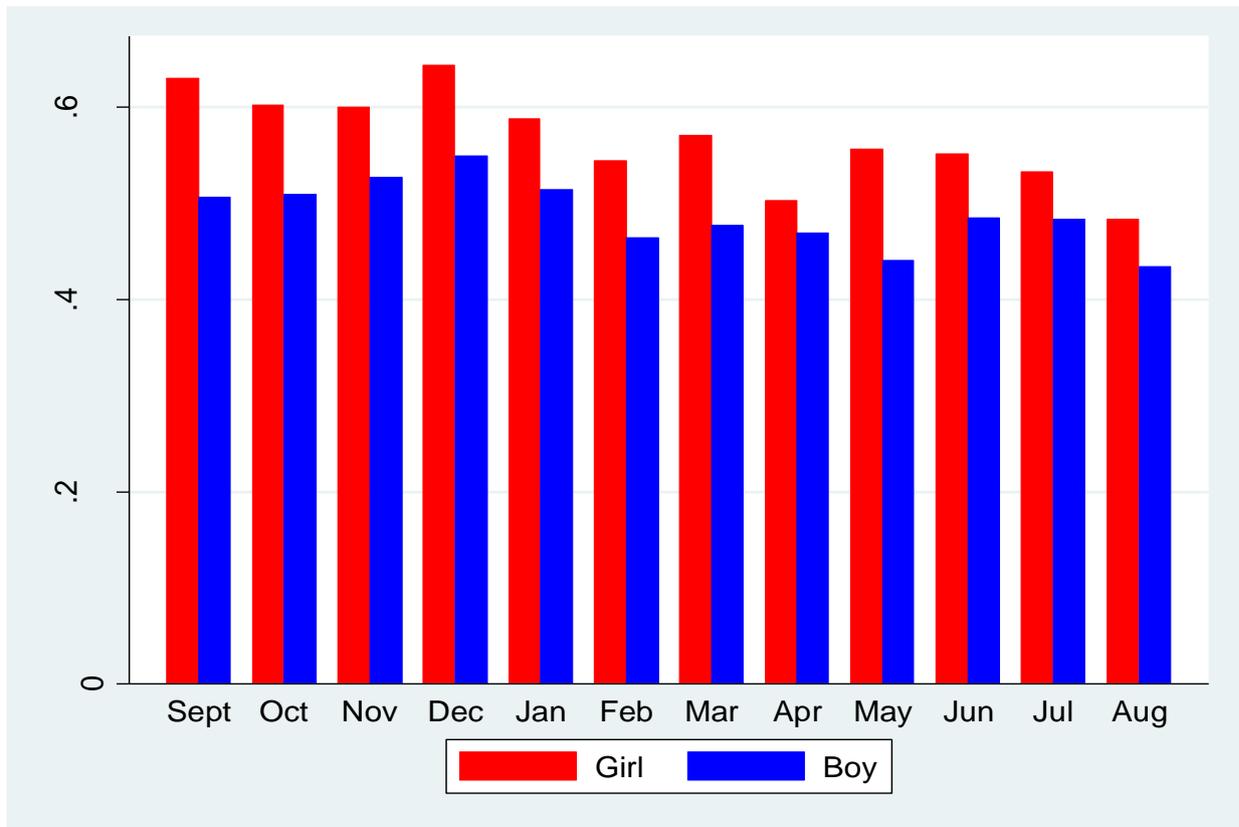


Figure 2: Effect of Birth Weight on Attaining the *Gold standard in GCSEs*

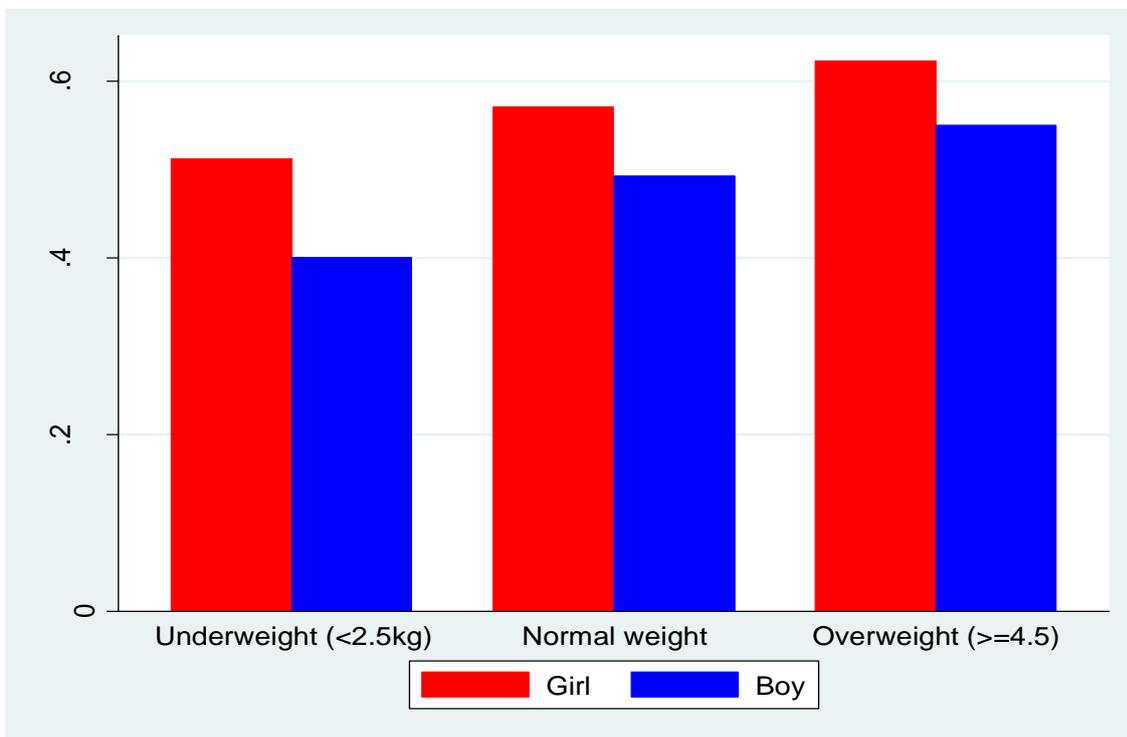


Table 4: Comparing LPM with IVs, All young people aged 16/17

Studying for any academic qualifications	BOYS		GIRLS	
	OLS	IV	OLS	IV
<i>(Second Stage) Results:</i>				
Gold standard in GCSEs	0.517 (0.013)	0.208 (0.194)	0.475 (0.013)	0.265 (0.155)
<i>Mother's Characteristics (measured at age 16 or Wave 4):</i>				
Mother non-white	0.170 (0.016)	0.192 (0.022)	0.170 (0.015)	0.193 (0.023)
Mother's highest qualification is degree+	0.146 (0.023)	0.293 (0.095)	0.146 (0.023)	0.251 (0.081)
Mother's highest qualification is NQF4	0.137 (0.029)	0.275 (0.092)	0.129 (0.029)	0.221 (0.074)
Mother's highest qualification is NQF3	0.078 (0.024)	0.181 (0.069)	0.064 (0.025)	0.137 (0.060)
Mother's highest qualification is NQF2	0.029 (0.019)	0.089 (0.043)	0.051 (0.019)	0.099 (0.040)
Mother's highest qualification is NQF1	-0.030 (0.023)	-0.002 (0.030)	-0.002 (0.023)	0.017 (0.028)
Mother's highest qualification is vocational	-0.029 (0.018)	-0.065 (0.029)	<i>-0.032</i> (0.019)	-0.054 (0.025)
Mother cohabiting	<i>-0.046</i> (0.028)	-0.093 (0.042)	-0.090 (0.028)	-0.105 (0.031)
Mother is lone parent	-0.077 (0.014)	-0.127 (0.035)	-0.087 (0.014)	-0.124 (0.031)
Indicator for step-family	-0.048 (0.021)	-0.073 (0.027)	-0.066 (0.022)	-0.089 (0.028)
No of siblings in the HH (to YP)	-0.014 (0.005)	-0.026 (0.009)	-0.007 (0.005)	<i>-0.013</i> (0.007)
Adj-R ²	0.354	0.272	0.317	0.278
Observations	4570		4620	
<i>First Stage Results:</i>				
Log birth weight (kilograms)		0.113 (0.038)		0.066 (0.033)
Relative (school starting) age in months		-0.007 (0.002)		-0.011 (0.002)
<i>Diagnostic Tests:</i>				
Cragg-Donald Wald F-stat for excluded Restrictions (p-value)		11.21 (0.000)		16.86 (0.000)
Critical Value for 10% relative bias		19.93		19.93
Critical Value for 15% relative bias		11.59		11.59
Critical Value for 20% relative bias		8.75		8.75
Sargan (Anderson-Rubin /Hansen) $\chi^2_{(1)}$ (P-value)		0.029 (0.866)		3.750 (0.053)

Notes: Standard errors in parentheses. **Bold** and *italic* cases indicate statistical significance at the 5% and the 10% levels respectively.

Table 5: Comparing LPM with IVs, Conditional on Working towards a Qualification

Studying for any academic qualifications	BOYS		GIRLS	
	OLS	IV	OLS	IV
<i>(Second Stage) Results:</i>				
Gold standard in GCSEs	0.476 (0.014)	0.350 (0.177)	0.432 (0.013)	0.435 (0.128)
<i>Mother's Characteristics (measured at age 16 or Wave 4):</i>				
Mother non-white	0.129 (0.017)	0.133 (0.018)	0.146 (0.016)	0.146 (0.017)
Mother's highest qualification is degree+	0.101 (0.025)	<i>0.155</i> (0.080)	0.121 (0.024)	<i>0.120</i> (0.062)
Mother's highest qualification is NQF4	0.102 (0.033)	<i>0.156</i> (0.082)	0.115 (0.030)	<i>0.114</i> (0.059)
Mother's highest qualification is NQF3	<i>0.047</i> (0.027)	0.084 (0.059)	0.056 (0.026)	0.055 (0.048)
Mother's highest qualification is NQF2	0.020 (0.022)	0.045 (0.042)	0.046 (0.020)	0.046 (0.033)
Mother's highest qualification is NQF1	-0.036 (0.028)	-0.022 (0.034)	-0.002 (0.025)	-0.002 (0.026)
Mother's highest qualification is vocational	-0.022 (0.021)	-0.035 (0.028)	-0.047 (0.019)	-0.047 (0.023)
Mother cohabiting	-0.036 (0.033)	-0.054 (0.042)	-0.076 (0.030)	-0.075 (0.033)
Mother is lone parent	-0.069 (0.017)	-0.087 (0.030)	-0.084 (0.014)	-0.084 (0.027)
Indicator for step-family	<i>-0.046</i> (0.025)	<i>-0.051</i> (0.027)	-0.047 (0.023)	<i>-0.046</i> (0.027)
No of siblings in the HH (to YP)	-0.016 (0.006)	-0.020 (0.009)	-0.008 (0.006)	-0.008 (0.007)
Adj-R ²	0.298	0.283	0.287	0.287
Observations	3612		3926	
<i>First Stage Results:</i>				
Log birth weight (kilograms)		0.132 (0.038)		0.079 (0.036)
Relative (school starting) age in months		-0.008 (0.002)		-0.013 (0.002)
<i>Diagnostic Tests:</i>				
Cragg-Donald Wald F-stat for excluded Restrictions (p-value)		11.88 (0.000)		21.44 (0.000)
Critical Value for 10% relative bias		19.93		19.93
Critical Value for 15% relative bias		11.59		11.59
Critical Value for 20% relative bias		8.75		8.75
Sargan (Anderson-Rubin /Hansen) $\chi^2_{(1)}$ (P-value)		0.000 (0.991)		3.521 (0.061)

Notes: Standard errors in parentheses. **Bold** and *italic* cases indicate statistical significance at the 5% and the 10% levels respectively.

6. Conclusions

This paper is concerned with the determinants of educational choices, including the choice between the academic and the vocational route, immediately after the completion of compulsory education in England. While earlier studies have convincingly demonstrated that returns to academic qualifications are significantly higher than those to vocational qualifications at notionally equivalent levels for the UK, there are hardly any empirical studies that have assessed the relative contributions of family background, prior educational attainment and attributes of schools.

Using a unique dataset which is rich in both family background and attainment in education, we find that all family background variables combined explain no more than 14% of the variation in whether to pursue academic qualification upon completion of compulsory education at age 16 for either boys and girls. In contrast, educational attainments at the end of the compulsory schooling stage are much powerful predictors for post-compulsory educational choices. In particular, the single academic success indicator of achieving the Government's *gold standard in GCSE*, i.e. attaining 5 or more GCSEs including Maths and English at grades A*-C, which emphasizes key skills in numeracy and literacy, is able to explain around 30% of the variation in the proportion of young people studying for academic qualifications. Moreover, many family background variables, most notably family income and child's disability indicators, are no longer statistically significant once we include age 16 educational attainment, implying the former impact on the outcome mainly through their effect on the latter.

We also investigate the extent to which the impact of initial academic success on post-compulsory educational choices reflects a causal relationship, not least because of policy considerations. Our instrumental-variables estimates exploiting variations in birth weight and school starting age by month of births induced by school entry rules suggest that the IV estimates for achieving the *gold standard* are 60% lower than their LPM counterparts for boys, and 45% lower for girls respectively. And only in the latter case is the IV estimate marginally statistically significant ($p=0.09$). This implies that much (over half) of the effect of achieving the *gold standard* on going down the academic track is probably driven by individual heterogeneity (ability) or reverse causality.

However, if we exclude the 18% or so young people who are not working towards any qualifications from our sample, then the IV estimates for studying for academic

qualifications (as opposed to vocational ones) are statistically significant for both boys and girls. While the size of the IV estimate for boys is still around 30% lower than the OLS counterpart, the size of the causal effect for girls is virtually identical to the corresponding OLS estimate. Therefore, conditional on the young person is working towards a qualification, there appears to be a strong causal effect of academic success at the compulsory education stage, as represented by achieving the *gold standard*, on choosing the academic as opposed to the vocational route, especially for girls.

Our results are consistent with a substantial and persistent earnings gap between the academic and vocational qualifications at the same level in the National Qualifications Framework, and clearly at odds with a notional parity of esteem of the two tracks when young people make their educational choices upon completion of compulsory schooling.

Another cause for concern, especially from an equity perspective, is the fact that the chance of academic success in the UK appears to be heavily affected by birth weight and months of birth. While the former is knowingly related to socio-economic factors which might need expensive long-term solutions, the latter is a pure artefact created by the school-entry rules operating in the country and hence warrants early policy interventions to counterbalance the apparent disadvantage of a young school starting age.

References

- Becker, G. (1964), *Human Capital*, Chicago University Press.
- Behrman, J., Rosenzweig, M. And P. Taubman (1994), 'Endowments and the allocation of schooling in the family and in the Marriage market: the Twins Experiment', *Journal of Political Economy*, 52, 1131-1174.
- Behrman, J. and M. Rosenzweig (2004), 'The returns to birthweight', *Review of Economics and Statistics*, 86, 586-601.
- Berman, E., J. Bound and Z. Griliches (1994), 'Changes in the Demand for Skilled Labor Within US Manufacturing: Evidence from the Annual Survey of Manufactures', *The Quarterly Journal of Economics*, 109, 367-397.
- Black, S., P. Devereux, and K.G. Salvanes (2008), 'Too Young to Leave the Nest? The Effects of School Starting Age', *NBER Working Paper*, No. 13969.
- Cesur, R. And I. Rashad (2008), 'High Birth Weight and Cognitive Outcomes', *NBER Working Paper*, No. 14524.
- Conlon, G. (2001), 'The Differential in Earnings Premia Between Academically and Vocationally Trained Males in the United Kingdom', *CEEDP 0011*, London School of Economics.
- Conlon, G. (2005), 'The Determinants of Undertaking Academic and Vocational Qualifications in the United Kingdom', *Education Economics*, 13, 299 – 313.
- Crawford, C., Dearden, L. and C. Meghir (2007), 'When You Are Born Matters: the Impact of Date of Birth on Child Cognitive Outcomes in England', *IFS Commentary*, www.ifs.org.uk/docs/born_matters_report.pdf.
- DCSF (Department for Children, Schools and Families) (2009), *Independent Review of the Primary Curriculum*, the Stationery Office.
- Dearden, L., McIntosh, S., Myck, M. and A. Vignoles (2002), 'The Returns to Academic and Vocational Qualifications in Britain', *Bulletin of Economic Research*, 54(3), 249-274.
- Dearden, L., McGranahan, L. and B. Sianesi (2004), 'An In-depth Analysis of the Returns to National Vocational Qualifications Obtained at Level 2', *CEE DP46*, London School of Economics.

- Del Bono, D. and F. Galindo-Rueda (2004), 'Do a Few Months of Compulsory Schooling Matter? The Education and Labour Market Impact of School Leaving Rules', *IZA DP* 1233.
- DfES (Department for Education and Skills) (2005), *14-19 Education and Skills*, White Paper, the Stationery Office.
- Dickerson, A. (2008), 'The Distribution and Returns to Qualifications in the Four Countries of the UK', *Sector Skills Development Agency Research Report*, 21A.
- Green, F., Machin, S., Murphy, R. and Y. Zhu (2008), 'Competition for Private and State School Teachers'. *Journal of Education and Work*, 21(5), 383-404.
- Heckman, J.J. (2008), 'Schools, Skills and Synapses', *IZA DP* 3515.
- McIntosh, S. (2006), 'Further Analysis of the Returns to Academic and Vocational Qualifications', *Oxford Bulletin of Economics and Statistics*, 68, 225–251.
- Miller, P., Mulvey, C. And N. Martin (2005), 'Birth weight and schooling and earnings: estimates from a sample of twins', *Economics Letters*, 86, 387–392.
- Nuffield Foundation, (2009), *The Nuffield Review of 14-19 Education*. <http://www.nuffield14-19review.org.uk/>.
- Robinson, P. (1997), 'The Myth of Parity of Esteem: Earnings and Qualifications', *Centre for Economic Performance Discussion Paper*, No. 354, London School of Economics.
- Sharp, C., George, N., Sargent, C., O'Donnell, S. and M. Heron (2009), *International Thematic Probe: The Influence of Relative Age on Learner Attainment and Development*, National Foundation for Educational Research.
- Walker, I. and Y. Zhu (2009), 'The Causal Effect of Teen Motherhood on Worklessness', *University of Kent Studies in Economics*, 09/17.

Appendix

**Table A1: Probit Estimates, Marginal Effects
Studying for any academic qualifications**

	All Young People		Young People Working towards a Qualification	
	BOYS	GIRLS	BOYS	GIRLS
<i>(Second Stage) Results:</i>				
<i>Gold standard in GCSEs</i>	0.538 (0.014)	0.490 (0.014)	0.485 (0.015)	0.436 (0.016)
<i>Mother's Characteristics (measured at age 16 or Wave 4):</i>				
Mother non-white	0.234 (0.021)	0.207 (0.018)	0.156 (0.020)	0.157 (0.015)
Mother's highest qualification is degree+	0.202 (0.030)	0.189 (0.026)	0.129 (0.027)	0.150 (0.020)
Mother's highest qualification is NQF4	0.187 (0.037)	0.153 (0.032)	0.122 (0.034)	0.115 (0.026)
Mother's highest qualification is NQF3	0.106 (0.033)	0.077 (0.031)	0.052 (0.032)	0.060 (0.027)
Mother's highest qualification is NQF2	<i>0.045</i> (0.027)	0.068 (0.024)	0.024 (0.027)	0.056 (0.021)
Mother's highest qualification is NQF1	-0.037 (0.034)	0.002 (0.030)	-0.035 (0.035)	0.008 (0.027)
Mother's highest qualification is vocational	-0.042 (0.026)	<i>-0.040</i> (0.024)	-0.026 (0.026)	-0.054 (0.023)
Mother cohabiting	-0.064 (0.040)	-0.121 (0.039)	-0.044 (0.043)	-0.086 (0.039)
Mother is lone parent	-0.107 (0.020)	-0.113 (0.019)	-0.087 (0.022)	-0.099 (0.018)
Indicator for step-family	-0.065 (0.031)	-0.088 (0.029)	-0.053 (0.033)	-0.057 (0.029)
No of siblings in the HH (to YP)	-0.022 (0.008)	-0.010 (0.007)	-0.021 (0.008)	-0.009 (0.007)
Pseudo R ²	0.284	0.283	0.287	0.287
Observations	4570	4620	3612	3926

Notes: Standard errors in parentheses. **Bold** and *italic* cases indicate statistical significance at the 5% and the 10% levels respectively.