

CEE DP 124

**Post-16 Educational Choices And
Institutional Value Added At Key Stage 5**

**Claire Crawford
Elena Meschi
Anna Vignoles**

**CENTRE FOR THE
ECONOMICS OF
EDUCATION**

January 2011

Published by
Centre for the Economics of Education
London School of Economics
Houghton Street
London WC2A 2AE

© C. Crawford, E. Meschi and A. Vignoles, submitted January 2011

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system or transmitted in any form or by any means without the prior permission in writing of the publisher nor be issued to the public or circulated in any form other than that in which it is published.

Requests for permission to reproduce any article or part of the Working Paper should be sent to the editor at the above address.

The Centre for the Economics of Education is an independent multidisciplinary research centre. All errors and omissions remain the authors.

Executive Summary

In the UK there has historically been a clear demarcation between the academic and vocational routes through education post-16. Generally vocational study is taken either on a part time basis or full time at Further Education colleges. Students who want to take academic qualifications such as A levels have the option to enrol in a school sixth form, a Sixth Form College or a general FE college. The FE route is therefore an important one through our educational system for both vocational and academic students alike. This research investigates which types of students choose to study at these different institutions and whether this choice matters for the achievement of educational outcomes.

The report has a specific focus for comparability reasons. The primary interest is in A level qualifications, studied by 88% of 16-18 year olds in maintained school sixth forms compared to 82% in sixth form colleges and 14 % in general FE , tertiary and specialist colleges. Many FE students take a more diverse range of qualifications than 16-19 students in other forms of provision. This inevitably means that we are considering a subset of FE activities so this report does not provide an evaluation of the effectiveness of FE colleges per se. Whilst this is not such an issue with sixth form based provision, the conclusions about FE colleges should be considered in the context of the broader evidence base on their performance, in terms of their more comprehensive offer to individuals and communities. In summary, FE students are far more diverse than students in other forms of provision and hence there are significant challenges in comparing the performance of FE colleges and other institutions, even when we restrict the comparison to those taking A levels.

In an attempt to cover more of the FE College offer we widened the scope of the analysis to include A-levels and equivalent level 3 qualifications. These qualifications are studied by 93% of 16-18 year olds in maintained school sixth forms compared to 91% in sixth form colleges and 52% in FE colleges. There are methodological problems with including these qualifications in a value added model that uses standard regression which are well covered in the literature, so this element of the study was limited and findings should again be treated with caution. Despite the above issues, this research advances our understanding of institutional value added and is the first to explore this using rich contextual data from the Longitudinal Study of Young People in England.

In this report we determine first what types of student stay on in education past the age of 16 and which types of student enrol in different types of post-16 institution. We then ask whether post-16 institutions matter to pupils' final key stage 5 achievement and specifically whether FE colleges

contribute differently to the gain in pupil attainment for those taking A levels as compared to sixth form based provision (in schools or colleges).

In this paper we assume that the decision process regarding the person's choice of post compulsory education course (if any) is sequential. In other words, we assume that school leavers first decide whether to stay on in full time education or not. If they do decide to continue in full time education, they then decide where they would like to study, i.e. whether they would like to remain in the sixth form based sector (in schools or colleges) or enter the general FE sector. Clearly, a person's choice of institution will be heavily determined by her choice of curricula given that the vast majority of students taking vocational qualifications post-16 enrol in FE colleges rather than schools (Stanton and Fletcher, 2006). To address this issue we do two things. Firstly we estimate models that focus purely on the minority of FE students who take A levels. We then use the Qualifications Curriculum Development Agency tariff¹, which equates other non A level qualifications at key stage 5, to estimate a model which includes pupils taking a wider range of qualifications at key stage 5. We recognise however, that using tariffs to equalise A levels with other non A level key stage 5 qualifications is problematic and we emphasise our A level results, whilst recognising these results are only relevant to a subset of FE students.

In particular, we will answer the following research questions:

- a. What types of student enroll in general FE colleges?
- b. What is the GCSE to A level and KS5 Value Added (VA) and how does it vary by type of post 16 provision?
- c. How much of this apparent difference in value added across types of provision is really down to student intake? In other words, how does the estimate of value added change when we account for detailed pupil characteristics?
- d. How much of the remaining difference in value added across types of provision is really down to previous educational institution. In other words, how does the estimate of the value added change when we account for the characteristics of their pre-16 institution?

We commenced by considering who remains in full time education and specifically who enrolls in FE colleges. We conclude the following:

¹ The QCDA points system is such that a grade A at A level is 270 points, whilst an E grade is 150. Full details of this system and how it relates to the UCAS tariff is given at http://www.dcsf.gov.uk/performance/tables/pilot16_05/annex.shtml.

- Different types of pupils choose to enrol in FE and sixth form based provision.
- The following types of pupils are more likely to enrol in sixth form based provision:
 - More advantaged/ high achieving pupils
 - Pupils in a school with a 6th form
 - Pupils in the most advantaged schools
 - Pupils in a single sex school
 - Pupils in a school with a lower pupil teacher ratio
 - Pupils in comprehensive or community schools.

Specifically, having 5 GCSEs A*-C not only increases the probability of a student remaining in full time education (by 9 percentage points) but also increases the probability of going into sixth form based provision by around 21 percentage points. Socio-economic background also impacts on choice of post 16 institution. For those who remain in full time education, pupils whose parents do a routine job are 10 percentage points more likely to enrol in FE colleges, as compared to those from professional backgrounds. Attitudes also matter: pupils whose parents have high aspirations about their children's educational achievements are more likely to enrol in sixth form based provision than in FE colleges.

We also find that the local area does influence pupils' choice of institution. For example, once pupils in poorer areas have decided to stay in full time education, they are then 14.4 percentage points more likely to choose FE. This could of course reflect the fact that pupils in poorer areas live nearer to FE colleges than pupils in wealthier areas. We cannot discount this explanation as we do not undertake a geographical analysis; however, we note that this finding holds true even when we analyse the decisions made by pupils within particular local authorities.

Generally, the characteristics of the child's school at age 16 do not significantly determine whether or not the young person remains in full time education post-16. But school characteristics do impact on individuals' choice of institution post-16. Whilst this analysis cannot consider geographical issues in detail, the report does consider the choices made by pupils within different local authorities and within local authorities, pupils in more socio-economically advantaged schools with a lower proportion of children eligible for Free School Meals are much more likely to enrol in sixth form based provision post-16.

We therefore conclude from Part 1 of our report, that general FE college enrolment is determined by pupils' prior attainment but also by their family background and their parents' attitude towards education. As FE attendance is socially graded, this is likely to impact on pupil performance at Key

Stage 5 as well. These results clearly illustrate that there is significant selection of pupils into FE provision and that this will tend to bias results if it is not fully accounted for.

We also examined the value added by FE colleges, school sixth forms and 6th form colleges at Key Stage 5 and specifically at A level. For this paper we do not use a random effects model (also known as a multilevel model), as these models have proved problematic to estimate with LSYPE data due to sampling issues. In any case, for robustness we also opt to use matching methods, which preclude such a random effects (multi level) model. There is an extensive debate in the literature about the relative advantages and disadvantage of random effects (multi level) models² and certainly random effects models have the advantage that they can include school characteristics directly. Hence future research could usefully explore the possibility of using statistical weighting methods to enable the estimation of random effects (multi level) models in LSYPE.

We conclude that:

- The type of institution seems to matter most for higher achieving pupils taking A-levels: When we look separately at higher ability students, sixth form colleges add more value at A level than school sixth forms, which in turn add more value than general FE colleges. For higher achieving pupils taking A levels only, 6th form colleges add around 90 additional QCDA points at A level as compared to schools, whilst FE colleges add 67 fewer points than schools.
- For lower achieving students, institutions appear to matter less and the value added across the different types of institutions (schools, 6th form colleges and FE colleges) does not vary significantly.

Findings in more detail:

- Different types of institutions add different value at A level and more generally at Key Stage 5 (using the QCDA total tariff to equalise A level and non A level qualifications). 6th form colleges add most value, followed by school sixth forms and then general FE colleges. We found this hierarchy applies for students studying A-levels³ and for those studying for other qualifications. For example, in our general model of all students, similar pupils taking A levels

² See Clarke, P., Crawford, C., Steele, F. and Vignoles, A. (2010). The choice between fixed and random effects models: some considerations for educational research, Department of Quantitative Social Science Discussion Paper, Institute of Education <http://repec.ioe.ac.uk/REPEc/pdf/qsswp1010.pdf>

³ A relatively small proportion of students study for A levels in FE (equating to 309 students in our sample). 30% of students enrol in FE colleges post 16 and of those in FE colleges around 40% study for A levels.

only in FE colleges achieve 65 fewer points at A level as compared to pupils doing A levels in schools, whilst pupils in 6th form colleges achieve 60 more points. These are sizeable magnitudes of effect equivalent to around two grades at A level;

- Most of the analysis focused on the minority of FE students taking A levels only as this makes for a more similar comparison across institutions. However, we also found that when we considered students taking A levels or other equivalent qualifications at Key Stage 5, the main results still hold though the magnitude of the effects change. FE colleges add 34 fewer points (around one grade) at Key Stage 5 than schools, whilst 6th form colleges add 80 points more.
- Hence, a key finding of these models is that once we allow for the fact that FE colleges admit more disadvantaged pupils from disadvantaged schools and we allow for differences across local authorities in achievement, we still find that those who attend an FE college do somewhat less well at Key Stage 5. However, when we look separately at higher and lower ability students, we find that differences in institutional value added are only statistically significant for the higher ability students. For lower ability students, the patterns are the same but the effects are on the border of statistical significance.
- We also investigated the potential impact of local patterns of post 16 institutional provision on value added at GCSE to A level, in a relatively simplistic manner. We were able to consider the impact of being in a rural area, being in a local authority with a higher proportion of schools with 6th forms and being in a local authority with a higher proportion of students enrolled in general FE. None of these factors influenced pupil value added at Key Stage 5.
- Our analysis allowed us to consider intermediate outcomes, such as whether or not a student enrolls in a university. Unlike the analysis reported above, this part of the research uses administrative data so does not include as wide a range of factors that might influence HE participation, such as parental expectations and pupil attitudes. After allowing for differences in pupils' prior attainment at Key Stage 4 and 5 only, those attending FE colleges are less likely to go to university (by around 4-5 percentage points) than those attending sixth form based provision. Those who do go to university are less likely to attend a high status research intensive institution (broadly a Russell Group institution or equivalent in terms of research quality) though this effect is small (between 1 and 3 percentage points). In other words, our results suggest that FE colleges add less value in terms of longer run outcomes, as well as Key Stage 5 results, although the institutional effects are especially caveated because they cannot control for all the likely influences on HE participation.

We therefore conclude from Parts 2 and 3 of this report that those in general FE colleges, whether doing A levels or other types of Key Stage 5 qualifications, do more poorly in terms of their education attainment than those who opt for sixth form based provision. This result only holds for students who are higher achieving at GCSE level. Furthermore, we only considered students who took either A levels or other level 3 qualifications in FE colleges. FE colleges often take students who have not attained level 2 qualifications and this important role is not considered in our analysis. We also need to be cautious. Our models do allow for a substantial array of factors that influence pupils' choice of post 16 institution and that also influence pupil attainment, such as pupils' socio-economic background. Yet we need to remain aware that despite the richness of our models, this result may still reflect the fact that those who attend FE colleges are more educationally disadvantaged in ways that we do not account for in our model.

The implications of this work are complex. Some existing literature has concluded that FE colleges and schools are similarly effective at Key Stage 5, although the Department has previously undertaken research which suggested FE colleges add less value at A level⁴. This previous literature is based on relatively limited data sets, however, and some studies did not focus specifically on value added at A level. Using richer data and focusing on value added at A level (to ensure greater comparability with school based provision) we find a negative effect from attending FE for higher achieving pupils only. However, since our evidence also shows that those who enroll in FE are more disadvantaged, both educationally and socially, it is extremely hard to separate out the fact that FE colleges cater for lower achieving students from the fact that they also appear to add less value than schools and 6th form colleges. As we move forward towards the raising of the education and training participation age to 18, it is likely that more young people will enroll in FE. It is crucial that we recognize that FE colleges have a harder job to do, working with harder to reach students with lower levels of prior achievement. We also need to monitor carefully the value added by FE colleges and understand why FE colleges appear to struggle to add similar amounts of value added to schools and 6th form colleges at A level for higher ability students.

⁴ http://www.education.gov.uk/rsgateway/DB/SBU/b000467/stats_bulletin_01_04_final.pdf

Post-16 Educational Choices And Institutional Value Added At Key Stage 5

Claire Crawford
Elena Meschi
Anna Vignoles

1	Introduction	1
2	Literature	2
3	Empirical strategy	5
	Part 1: Choice of Provision	5
	Part 2: Pupil attainment models	6
	Part 3: Participation in HE	9
4	Data and Model Specification	10
5	Descriptive Statistics	15
6	Results	23
	Part 1: Choice of provision	23
	Part 2: Pupil attainment	35
	Part 3: Participation in Higher Education	45
7	Conclusions and implications	47
	References	51
	Appendix	53

Tables

Table 1	Main activity at age 17	24
Table 2	Proportion of the cohort enrolled in different types of post-16 provision	25
Table 3	Main activity at 17 by parents' social class, and pupils' attainment at GCSE	26
Table 4	Enrolment in different types of provision at age 17 by parents' social class, and pupils' attainment at GCSE	27
Table 5	Enrolment in different types of provision at age 17 by choice of curricula	28
Table 6	Number of A levels by type of post-16 institution	29
Table 7	Descriptive statistics for those participating in higher education by Key Stage 5 institution	31
Table 8	The determinants of the decision to remain in full time education post-16	35
Table 9	The determinants of the decision to enrol in a FE college versus a school	36
Table 10	The determinants of the decision to remain in full time education post-16 – the role of school characteristics	39
Table 11	The determinants of the decision to enrol in a FE college versus a school – the role of school characteristics	40
Table 12	The determinants of the decision to remain in full time education post-16 – the role of LA characteristics	42
Table 13	The determinants of the decision to enrol in a FE college versus a school – the role of LA characteristics	43
Table 14	The determinants of total A level point score for those taking A levels at KS5 – a value added model	45
Table 15	The determinants of total A level point score for those taking A levels at KS5 – a value added model (augmented by Math and English grades at GCSE)	46
Table 16	The determinants of total A level and equivalent point score at KS5 – a value added model	47
Table 17	The determinants of total A level point score for those who take A levels at KS5 – a value added model by level of prior attainment	48
Table 18	Effect of participation in FE on KS 5 results (ATT) – Matching method	53
Table 19	The likelihood of participating in higher education by type of provision at Key Stage 5	54
Table 20	The likelihood of participating in high status higher education by type of provision at Key Stage 5	55

Figures

Figure 1: Distribution of KS5 A level scores by institution type	29
Figure 2: Distribution of KS5 A level and equivalent scores by institution type	30
Figure 3: Distribution of Propensity Scores (before the matching)	51
Figure 4: Distribution of Propensity Scores (after the matching)	51

1 Introduction

The UK has historically had a clear demarcation between the academic and vocational routes through education post-16. Generally, vocational study is taken either on a part time basis or full time at Further Education colleges. However, students who want to take academic qualifications such as A levels have the option to enrol in school sixth forms, sixth form colleges or general FE colleges. The FE route is therefore an important one through our educational system for both vocational and academic students alike. Currently around 30% of those who remain in full time education post-16 undertake their study within an FE college. In this report we do not address the efficiency of the FE sector as a whole, or even the efficiency of FE provision for all young people. Instead, we ask whether post-16 institutions matter to pupils' educational achievement at Key Stage 5 (A Level and equivalent provision only) and in terms of HE enrolment, and specifically whether FE colleges contribute differently to the gain in pupil attainment at Key Stage 5 than sixth form based provision. Previous evidence from the Department's statistical bulletin has generally found that at A level specifically, FE colleges add less value than school based provision⁵. However, it has also been recognised that comparing students who study A levels in FE colleges with those who are in school based provision is difficult methodologically. The choice between remaining in school for Key Stage 5 or moving into a FE college (or indeed attending a 6th form college) is determined by many factors. Students who attend FE colleges are certainly not the same as those who remain in the school system. For example, in our data, on average students attending FE colleges have lower GCSE grades. FE students also tend to take a smaller total number of A levels (or other qualifications) than do students in school provision. Therefore when considering the effectiveness of different types of post-16 provision, we need to take account of the fact that different types of student sort into different types of provision and that they take different types and numbers of qualifications and indeed different subject combinations. We return to these methodological challenges in the main body of the report.

Crucially however, we need to start by better understanding the determinants of pupils' choice of institution post-16, which is inextricably linked to their choice of curricula, since FE colleges have a higher proportion of students taking vocational options post-16. We also need to determine the factors that influence pupils' educational achievement at Key Stage 5. Whilst there is a huge general literature on the determinants of educational achievement and in particular the factors influencing the achievement and final outcomes of low achieving students (McIntosh, 2004; Cassen and

⁵ See for example http://www.education.gov.uk/rsgateway/DB/SBU/b000467/stats_bulletin_01_04_final.pdf

Kingdon, 2007), the literature on the specific issue of the impact of different types of post-16 provision on pupil attainment is limited (Morris et al, 1999; Owen and Fletcher, 2006; Schagen et al., 2006) ⁶. This report aims to fill this gap in the evidence base by providing a robust quantitative analysis of institutional choice and institutional value added in the post-16 phase, for A level students only and for students taking A level equivalents at Key Stage 5.

In the first part of this report we consider the routes that different types of student take through the system, describing the determinants of a person's choice to stay on in full time education and their choice of institution post-16. In the second part of this report, with these selection issues in mind, we estimate the value added by the different types of post-16 institution. In the third part of the report we consider the impact of institutional choice at Key Stage 5 on the probability of enrolling in higher education.

2 Literature

This report is focused on participation in different types of post-16 education provision and the impact of different types of institution on pupil performance.

Regarding the first topic, the existing literature has mainly focused on the decision to remain in full time education at 16, without exploring the different types of institution chosen (see Clark, Conlon, and Galindo-Rueda, 2005, for a review). Most studies that have used rich individual level survey data have found that the key factor determining post-16 participation is not family background and socio-economic status but prior attainment and in particular performance at GCSE (Rice, 1999; Micklewright, 1989; Dickerson and Jones, 2004; Andrews and Bradley, 1997; Clark, 2002 and 2009). That is not to say family background is not important. For example Micklewright (1989), using the National Child Development Study (NCDS), found an important role for parental education and social class even after controlling for prior attainment and ability. Andrews and Bradley (1997) modelled a

⁶ Much of this evidence base is summarized in Stanton and Fletcher (2005 and 2006).

richer menu of school-leaver choices⁷, and found that exam achievement is the key driver of the decision to stay on and to pursue academic (rather than vocational) qualifications.

Whilst this body of research has not focused specifically on the impact of post-16 institutions on education achievement, some studies have found important school effects on the staying-on decision (e.g. Rice; Andrews and Bradley). Andrews and Bradley (1997), for example, found that school size and school-level exam achievement in particular were important positive determinants of whether or not a pupil stays on in school past age 16.

Thus, institutions can matter according to existing literature, at least in determining whether students remain in full time education post-16. As has been said, the literature on the specific issue of the impact of different types of post-16 provision on pupil attainment is limited (Morris et al, 1999; Owen and Fletcher, 2006; Schagen et al., 2006)⁸. Many of these analyses were conducted using aggregated or administrative data with relatively limited information about the background of pupils. However, with these caveats in mind, the consensus from this literature is that the performance of FE colleges is not dissimilar to that of schools, once full allowance has been made for differences in student intake and indeed differences in cost levels across FE colleges, 6th form colleges and schools.

Of particular note is the study by Schagen et al. (2006) which assessed the impact of institutional patterns of post-16 provision on both post-16 participation and learner attainment. This work used linked school data, from PLASC, and data from the Individual Learner Record, to map patterns of provision by area. The research identified the most common patterns of provision across different geographical areas. Overall this research suggested that no one particular pattern of provision had a major advantage in terms of higher participation rates in post-16 full time education. This work relied on administrative data which has relatively limited data about pupils' characteristics, particularly their socio-economic background.

⁷ They distinguish between: staying on and study for academic qualification; staying on and study for vocational qualification; leaving to employment associated with on the job training; leaving to employment associated with general skills training; leaving for GTS; and unemployed.

⁸ Much of this evidence base is summarized in Stanton and Fletcher (2005 and 2006).

Morris et al. (1999) also examined the performance of FE colleges that have created 6th form centres. Their study found no significant relationship between having a 6th form centre and learner outcomes.

Another factor that needs to be considered is that the value added for each pupil will vary according to the exact subject combination taken. The Learning and Skills Council recognized that FE colleges offer a different mix of subjects and that this can affect value added (Stanton and Fletcher, 2006). Certainly most research in this area has restricted analysis to A level students to ensure maximum comparability between FE colleges and schools. In this report we follow the same approach but for the subject analysis focusing on A levels only.

Another strand of research has focused specifically on issues of economies of scale. Given the larger size of FE colleges, this area of research is very relevant to questions about the effectiveness of different types of post-16 institution. Owen and Fletcher (2006), using aggregate institutional data, examined the relationship between institution size, costs and mean value added scores in terms of Key Stage 5 attainment. They found some evidence of economies of scale: mean institutional value added scores were higher for larger institutions. They also examined the quality of management and leadership in different institutions and the breadth of curriculum on offer. In both cases larger institutions appeared superior. Given the lack of individual level data however, this analysis could not take account of pupil sorting. If higher achieving students enrol in larger institutions, this could lead to a spurious association between size and institutional value added. However, work by Schagen et al. (2005), using value added multi level models with individual pupil data, confirmed evidence of economies of scale.

It is also important to consider funding differentials alongside potential differences in attainment. If FE colleges and schools are differentially effective this may be attributable to funding differences. Whilst we do not focus on this issue in this report, we note that there is a funding gap. The Learning and Skills Development Agency (LSDA) found that in 2003/4 funding in school 6th forms was on average around 13% higher than in FE colleges and 6th form colleges. The gap has reduced somewhat: it stood at 9% in 2008 (KPMG, 2008). However, there remains a significant differential in per capita funding levels across the FE and school sector which would potentially impact on the quality of provision across the different types of institutions.

In summary, the existing literature does not suggest that FE colleges are significantly more or less effective than school sixth forms, in terms of Key Stage 5 performance. There is some evidence however, that size of institution may matter, with larger institutions being more effective. Much of

this evidence comes either from aggregate data or individual level data that is not particularly rich, in terms of pupil characteristics. It is important to determine whether this result holds when using richer data and when we allow for the fact that different types of student enrol in different post 16 institutions.

3 Empirical Strategy

Part 1: Choice of Provision

As discussed above, most of the literature that has studied the determinants of individuals' demand for education has focused on the factors affecting the decision to stay on in full time education after the end of compulsory schooling (e.g. Micklewright, 1989; Micklewright, Pearson and Smith, 1990; Rice, 1999). This literature has generally not distinguished the types of institution that are attended. There are some papers that have modelled a wider range of possible destinations after 16 using multinomial logit models (e.g. Andrews and Bradley, 1997). These studies have modelled the choices made post-16 as independent of one another. In other words, they assume that the choice between staying on or not is unrelated to which type of institution to attend post-16. However, such models may be inappropriate if there are correlations between the different choices at age 16, for example because the decision process is sequential.

In this paper we assume that the decision process regarding the person's choice of post compulsory education course (if any) is indeed sequential. In other words, we assume that school leavers first decide to whether to stay on in full time education (FTE) or not. If they do decide to continue in full time education, they then decide where they would like to study, i.e. whether they would like to remain in the school (or sixth form) sector or enter the general FE sector⁹. Clearly a person's choice of institution will be heavily determined by her choice of curricula, given that the vast majority of students taking vocational qualifications post-16 enrol in FE colleges rather than schools (Stanton and Fletcher, 2006). For the model of participation and indeed subsequent analysis of attainment, we do not include pupils enrolled in private (independent) schools at key stage 5 in the analysis. For the model of participation only we also include all students even if they are not studying for A levels.

⁹ This decision process is different from the one described by Clark (2002), who argues that school leavers first decide whether they want to remain in the school sector or not and if they decide to leave the school sector, they have to choose whether to enter the FE sector or leave full time education. We argue that logically the individual decides whether or not to pursue a qualification or drop out of schooling and then determines where it would be optimal for him to study. Qualitatively similar findings emerge however, whichever modelling assumption is made.

However, for models of attainment we need to largely restrict our analysis to those taking A levels, an issue discussed at length in the next section. Where we do this it is clearly indicated in the text.

Therefore, we estimate two models of participation as follows:

$$FTE_{ijl} = \alpha_0 + \beta_k \sum_k X_{ijl}^k + \gamma_k \sum_k S_{jl}^k + \lambda_k \sum_k L_l^k + \varepsilon_{ijl} \quad (1)$$

if $FTE=1$, then:

$$FE_{ijl} = \alpha_0 + \beta_k \sum_k X_{ijl}^k + \gamma_k \sum_k S_{jl}^k + \lambda_k \sum_k L_l^k + \varepsilon_{ijl} \quad (2)$$

where i, j , and l , denote respectively pupil, school attended at 16, and home Local Authority (LA).

FTE is a dummy variable equal to one if the pupil remains in full time education after the end of compulsory school and 0 otherwise. Equation (2) is estimated only for those who stay in full time education ($FTE=1$). For this analysis we group students in schools 6th forms and 6th form colleges together as they have similar characteristics. The variable then takes a value of 1 if the person is enrolled in general FE and 0 if the pupil decides to remain in a 6th form college or school.

X^k are a set of k pupil-level characteristics and family background factors that are likely to affect both the decision to remain in full time education and then the decision of which institution to attend. S^k and L^k are respectively a number of k characteristics at the school level and at the local area level. ε_{ijl} is the usual error term.

We are not able explicitly to consider geographical issues, such as the distance to the nearest provider. This is due to lack of central data on the specific location of college campuses within a local authority. However, to address the fact that different areas may have different patterns of providers, causing pupils to make different choices of institution, we consider models where we look at the choices made within local authorities. We do this by including local authority fixed effects.

Part 2: Pupil attainment models

In the second part of the analysis we study the effectiveness of different types of post-16 provision (school 6th form provision; general FE colleges; 6th form colleges). Again students enrolled in private (independent) schools at key stage 5 are excluded from the analysis. In particular, we will answer the following research questions:

- e. What is the GCSE to Key Stage 5 Value Added (VA) and how does it vary by type of provision?
- f. How much of this apparent difference in value added across types of provision is really down to student intake? In other words, how does the estimate of value added change when we account for detailed pupil characteristics?
- g. How much of the remaining difference in value added is really down to previous educational institution. In other words, how does the estimate of the value added change when we account for the characteristics of their pre 16 institution?

Formally, we estimate the following Value Added model for pupils in maintained schools at age 16:

$$KS5_{ihl} = \alpha_0 + \vartheta KS4_{ihl} + \beta INSTTYPE_{hl} + \delta_k \sum_k X_{ihl}^k + \gamma_k \sum_k S_{16,l}^k + \lambda_l + \varepsilon_{ihl} \quad (3)$$

where i , h and l denote pupil, institution and local authority respectively. The dependent variable is, for some specifications, total A level point score (measured in QCDA points and then standardised) including only students studying A levels. For other specifications it is the total point score for pupil attainment at Key Stage 5 including A level equivalents (again measured in QCDA points and then standardised). This is regressed on results at GCSE (KS4) (including GCSE equivalents) and on a set of dummies ($INSTTYPE$) describing institution types (school 6th form provision¹⁰; FE colleges; 6th form colleges; other). X^k and S^k are a number of k characteristics at the pupil-level and at the school (attended at 16) level respectively. Finally, λ are a set of LA dummies included to account for the different types of post-16 provision at the local area level. ε_{ihl} is the usual error term.

It is important to note who our models of pupil attainment do not cover. Firstly, students in independent schools are omitted from the analysis. Secondly, we focus on those doing A levels only or in some specifications those doing equivalent level 3 qualifications. We do not therefore consider students in FE who are retaking level 2 qualifications nor do we include adults who are enrolled in FE since we are using data for a cohort born in 1990.

The parameter of interest here is β which indicates the average impact of institution types on pupils' VA, i.e on their improvement from GCSE to Key Stage 5. Obviously the differences in VA across different types of provision are also due to differences in the characteristics of the student intake. If pupils are not randomly allocated into types of institution post-16 there will be selection bias. Pupils with certain characteristics will systematically choose particular types of institution, and if these

¹⁰ This is the omitted reference category in the regression.

characteristics also make them higher (or lower) achievers, then the coefficient β will be biased. For example, if young people with higher aspirations enrol in schools and if these higher aspirations make them more likely to be higher achievers regardless of their post-16 institution, the coefficient on their post-16 institution will be upwardly biased. Therefore, based on the analysis in part I of the report, we include a rich set of controls that we know affect the selection into different types of post-16 institution. This should therefore reduce any selection bias. In our modelling we focus on the apparent impact of the young person's post-16 institution when the model firstly includes additional personal characteristics, and secondly includes the different characteristics of the schools attended up to age 16. We can therefore understand the source of the selection bias in our initial estimates of the impact of post-16 institutions.

The method described above is essentially attempting to reduce the bias in our models by including as rich a set of control variables as possible in the OLS model. The data source we use allows us to control for a much richer set of controls than has been possible in the literature to date. Another approach, which also relies on having rich data, is to use propensity-score matching methods. Matching methods are a more flexible way of ensuring that we are comparing as similar a group of students as possible who enrol in sixth form based provision and FE colleges (Heckman et al. 1998). The principle behind the propensity-score matching is that you create two similar and hence comparable groups, one a control group and one a treatment group. You create these groups by first estimating the probability of a person being part of the treatment group using a combination of as many observed characteristics of the groups as possible. This first stage is estimated via a probit model. Each individual in the control and treatment group will then have a propensity-score or probability which indicates the likelihood that the individual would receive the treatment on the basis of his or her observable characteristics. In this case the treatment is attending an FE college. Comparison of outcomes can then be undertaken by comparing treated individuals who have similar propensity-scores to those in the control group. A number of methods can be used to undertake this matching process (Heckman et al. 1998) and in this report we use Nearest Neighbour (NN) based matching methods¹¹, although our results were not dissimilar using kernel methods of matching.

Despite our attempts to remove the selection bias caused by the fact that different types of student enrol in FE as compared to school based provision, we recognise that in the absence of experimental data we can never be confident that we have completely eliminated selection bias. We have however, undertaken a number of robustness checks to reassure the reader of our results. These are discussed when results are presented. In particular, we have recognised that students who study in

¹¹ Full details of these methods in STATA, our econometrics programme, can be found at <http://www.stata.com/meeting/7uk/sianesi.pdf>

FE tend to be less academic and take a smaller number of A levels as compared to their peers in school based provision. For instance, we have estimated models which take account of the fact that FE students take fewer A levels by using a dependent variable which is QCDA points per qualification entered instead of total QCDA points. Our results remained robust.

Part 3: Participation in HE

Whilst we are largely focused on value added at Key Stage 5 in this report, somewhat longer run outcomes are also of interest and in particular the relationship between attending an FE college and the likelihood of participating in higher education. Drawing on previous work by Chowdry et al (2008), we model a linear probability regression model to explore the determinants of HE participation. For this model we again only consider students studying A levels at Key Stage 5. The dependent variable is binary, taking a value of 1 if the person participates in HE and 0 otherwise. Students doing HE in an FE institution are excluded from the analysis.

The regression model is estimated using ordinary least squares (OLS)¹² as follows:

$$HE_{i5} = \alpha + \beta_1 FE_i + \beta_2 X_i + \beta_3 PA_i + \varepsilon_{i5} \quad (4)$$

where FE is a dummy variable indicating whether the person enrolled in a general FE college for Key Stage 5. The coefficient on FE indicates whether someone from an FE college is more or less likely to enrol in HE compared to a similar individual attending a school sixth form or sixth form college. We control for a number of factors, although the administrative data we use for this analysis is more limited than the survey data we use for Part 1 and 2 of the report. So X is a vector of other individual characteristics (gender, ethnicity, FSM etc), PA measures the individual's prior achievement (from age 11 to age 18), ε_{i5} is an error term. We allow for clustering within schools and use robust standard errors clustered by schools, which makes our model equivalent to a random effect (or multi-level) model.¹³

¹² The model is estimated using OLS since we have a large number of school fixed effects to estimate, which becomes unwieldy in STATA when we use a probit model. However, to verify robustness, we have estimated some models using a probit, with very similar results (available from the authors on request).

¹³ Note that it makes little difference to our final results (i.e. those after adding prior attainment) whether we use school fixed effects or simply control for school characteristics.

This phase of the analysis therefore enables us to ask whether someone with the same level of prior achievement at ages 16 and 18 and the same set of personal characteristics is more or less likely to go to university if they attended an FE college, relative to someone using sixth form based provision.

The next section describes the data used and discusses the variables included in the model.

4 Data and Model Specification

Our analysis is largely based on data from the *Longitudinal Study of Young People in England* (LSYPE). The LSYPE is a survey of about 15,000 young people in England who were aged 13 and 14 in 2003/2004 and were then followed over time on an annual basis. The survey covers the secondary school period until year 11 (that marks the end of compulsory schooling) and the last available wave (wave 4) refers to the academic year 2006/07, when the young person has already made the decision as to whether to stay in full time education. If the person decides to remain in full time education, they then decide whether to take an academic or vocational route and which institution to enrol in and the data include full information on where the individual ends up studying. LSYPE also includes a range of variables that may potentially determine these choices, as described below. We use LSYPE sample weights for all our analyses, bar the descriptive statistics tables which show exact numbers to illustrate our sample size.

The LSYPE is a very rich source of information on pupils' personal characteristics, attitudes, experiences, behaviours, expectations and aspirations as well as on family background, household composition and parents' characteristics and aspirations. It therefore constitutes an ideal dataset to study the key factors affecting young people's decisions about their choices post-16 and indeed their attainment at Key Stage 5.

These LSYPE data have been matched to other datasets. First, we matched observations in LSYPE with the *National Pupil Database* (NPD) that provides information on pupils' records in standard national tests (Key Stage tests), and to the *Pupil Level Annual School Census* (PLASC) that contains a number of pupil-level background characteristics and to the *LEA and School Information Service* (LEASIS) that contains school level characteristics. These additional data sets considerably enrich the LSYPE data set, adding in a range of school and pupil level data. They also allow us to model both choice of institution at 16 and Key Stage 5 attainment.

As mentioned in section 3, we start by modelling the decision to remain in full time education at age 16 and their choice of provision. For these models we use a similar set of variables. First, we include variables reflecting personal characteristics and family background. In particular, we include a number of pupil level characteristics taken from PLASC, such as gender, ethnicity, an indicator of Special Educational Needs (SEN), English as an Additional Language, and whether or not the person is in receipt of Free School Meals (FSM).

The literature has emphasized the importance of school attainment as a key determinant of choices at age 16 (see for example Dickerson and Jones, 2004; Rice, 1999). The idea is that ability and attainment affects the likelihood of remaining in education, a person's likely success if they do remain in full time education and also potentially their economic returns to any qualifications they may acquire. We therefore include a number of prior attainment measures. Specifically, we use the NPD/PLASC dataset to create two measures of academic achievement at age 16, i.e. Key Stage¹⁴ 4 (GCSE¹⁵), which is the national exam taken at age 16 before leaving compulsory school. The first measure is a synthetic continuous score averaging scores in different GCSE subjects. We use a capped average point score¹⁶ that takes into account the pupil's eight highest grades. This score has been standardised so that the variable has mean 0 and standard deviation 1 within the LSYPE total sample in wave 3. The second measure of school attainment is a dummy indicating whether the pupil achieved at least 5 GCSEs with grades A*-C, to see whether there are discontinuities at this threshold. This is an important threshold in the education system, affecting the likelihood of being accepted in certain types of post compulsory institution, and can therefore influence the actual possibility of enrolling in specific types of post-16 provision. Both GCSE measures at Key Stage 4 include GCSE equivalents.

In terms of family background, parental income is likely to affect pupils' decision on whether to continue in full time education, since parental income is the primary source of finance when credit markets are imperfect (Kodde and Ritzen, 1985). Furthermore, parents with different incomes may be differently willing or able to subsidise costs during post compulsory education. Unfortunately LSYPE data do not provide a clean measure of parental income. Therefore we use an indicator for each pupil's eligibility for Free School Meals (FSM) to proxy family poverty status¹⁷ and a variable reflecting parental socio-economic status, namely the NS-SEC (National Statistics Socio-Economic

¹⁴ The Key Stage tests are national achievement tests undertaken by all children in state schools. The tests are anonymised and marked by external examiners.

¹⁵ General Certificate of Secondary Education.

¹⁶ According to the new GCSE scoring system introduced between 2002–03 and 2003–04, 58 points were awarded for an A*, 52 for an A, 46 for a B, 40 for a C, 34 for a D, 28 for a E, 22 for F, and 16 for a G. Marks are allocated for standard GCSEs, but also for all qualifications approved for use pre-16, such as entry-level qualifications, vocational qualifications, and AS levels taken early.

¹⁷ See Hobbs and Vignoles (2009) for a discussion on the use of FSM as a proxy for poverty status.

Classification) occupationally based classification¹⁸. Parental education may also be a key factor affecting the schooling decisions of youths, since this affects children's preferences for education and may, moreover, proxy permanent family income better than current income (see Petrongolo and San Segundo, 2002). We measure parental education using two dummies indicating whether the father or the mother has a degree.

The LSYPE dataset also offers a vast array of detailed questions relating to the attitudes, values and behaviour of both parents and pupils, many of which are likely to affect the post compulsory schooling decision. We include a variable describing pupils' attitude toward school in year 11 (the last year of compulsory school), and a variable capturing parents' expectations. The first one is obtained from LSYPE interviews in 2006 and it sums the answers that the young person has given to 12 attitudinal questions relating to how they feel about school¹⁹. The variable ranges from 0 – 48 by assigning values to the variables (using a Likert scale) according to whether they were positive or negative statements²⁰. The higher the score, the more positive is the young person's attitude to school. Parent expectations are measured by a dummy variable indicating whether the parent expected the pupil to stay on in full time education measured when the pupil was in year 9. Including these attitudinal variables is intended to account for what would otherwise be unobserved pupil heterogeneity that might be correlated with the decision about whether to stay on or not.

We also include a variable measuring the number of hours (if any) worked during the school term. This should control for different tastes and preferences toward labour market working and for possible links with the labour market before completing compulsory schooling.

One important aim of our analysis is to investigate the role of the characteristics of the secondary school attended in year 11, the last year of compulsory education, in determining pupils' decisions post-16. Therefore we included in the model different school level variables created using data from LEASIS, EDUBASE and PLASC. In particular, we insert measures of school disadvantage (the school percentage of students eligible for FSM; the school percentage of students belonging to an ethnic minority group), of school type (whether the school attended has a sixth form school or not;

18 According to this classification occupations are grouped in 7 categories: higher managerial and professional occupations; lower managerial and professional occupations; intermediate occupations; small employers and own account workers; lower supervisory and technical occupations; semi-routine occupations; routine occupations. Further details on the classification of social classes and occupations can be found at: http://www.statistics.gov.uk/methods_quality/ns_sec.

19 The specific items are: 1) I am happy when I am at school; 2) School is a waste of time for me; 3) School work is worth doing; 4) Most of the time I don't want to go to school; 5) People think my school is a good school; 6) On the whole I like being at school; 7) I work as hard as I can in school; 8) In a lesson, I often count the minutes till it ends; 9) I am bored in lessons; 10) The work I do in lessons is a waste of time; 11) The work I do in lessons is interesting to me; 12) I get good marks for my work. For each of these items pupils have to say whether they a) strongly agree; b) agree; c) disagree; or d) strongly disagree.

²⁰ For further details see the LSYPE user guide, available at

http://www.data-archive.ac.uk/doc/5545/mrdoc/pdf/5545wave_three_documentation.pdf

whether the school is a single-sex school and dummies for different types of institutions²¹), of school level outcomes (percentage of pupils achieving at least 5 GCSEs with grades A* to C) and of resource inputs (pupil-teacher ratio; school size). We also control for any peer group effect by including a variable measuring the percentage of pupils staying on in full time education at the school attended in year 11²². The idea is that the utility associated with post-secondary education could be higher when more of the peer group also participate (see for example Thomas and Webber, 2001 and 2009).

We also want to understand the role of neighbourhood characteristics on pupils' decisions. We therefore include in the model some variables defined at the Local Authority (LA) level. In order to capture conditions in the local labour market which may impact on the decision to remain in full time education or not (Clark, 2002), we include the unemployment rate for the 16-19 age group²³. The literature has in fact underlined that the youth local unemployment rate may affect the individual's demand for education: high youth unemployment rates may discourage early school leaving, by reducing the expected gain from job search and by reducing the opportunity cost of schooling (see Micklewright, Pearson and Smith, 1990; Rice, 1999; Petrongolo and San Segundo, 2002; Clark, 2009).

Peer effects are again captured by a variable describing the percentage (at LA level) of pupils staying on in school after 16. LAs may also differ in terms of patterns of institutional provision and this can potentially influence the choice of institution *ceteris paribus*. However, some caution is required here. We want to include pre-existing measures of current patterns of provision that the student may take into account when making their decision. We therefore include measures *based on data from the previous cohort* of patterns of provision at the LA level, namely two variables measuring a) the proportion of the total number of pupils who are in full time education post-16 who are enrolled in FE and b) the percentage of the total number of secondary schools in each LA that have a sixth form.

Finally we control for a measure of local area deprivation by including the Income Deprivation Affecting Children Index, (IDACI) which is provided in PLASC and is defined at the Super Output Area

21 The different types of institution are: City Technology College (CTC); Community School (CY); Foundation School (FD); Voluntary Aided School (VA); Voluntary Controlled School (VC).

22 Using PLASC and ILR (Individualised) we are able to follow the whole population of pupils in state schools after the end of compulsory education and to determine who is staying in FTE (those staying in schools are recorded in PLASC, while those staying in further education colleges are recorded in ILR). Therefore for each school (and LA) we calculate the proportion of pupils in FTE at age 17 as a fraction of the school (LA) whole population in school at age 16 (i.e. in the last year of compulsory schooling).

23 Data on unemployment rates at the LA level have been downloaded from the Annual Population Survey (APS) through NOMIS website.

(SOA)²⁴ level. The IDACI measure shows the percentage of children in each SOA who live in families that are income deprived (i.e. in receipt of Income Support, Income based Jobseeker's Allowance, Working Families' Tax Credit or Disabled Person's Tax Credit below a given threshold). An IDACI score of, for example, 0.24 means that 24% of children aged less than 16 in that SOA are living in families that are income deprived.

Table A1 in the appendix provides descriptive statistics of all the variables we included in the analysis for the sample as a whole.

The second part of this report models value added in pupil attainment at Key Stage 5. We undertook a range of analyses using different measures of attainment at KS5. Firstly, we restricted our analysis to those who study for A-levels specifically, as opposed to those who study vocational qualifications at KS5. For these models, attainment at KS5 is measured using the total A-level point score obtained from the Key Stage 5 NPD cumulative file. This variable is measured in QCDA points and has a standard deviation of 259. It is standardised for use in the regressions, with mean equal to zero, standard deviation of 1. We did this since the A level group of students is likely to be more similar and hence comparing results from this group across FE, school sixth forms and 6th form colleges makes for better comparator groups. However, we recognise that some students, particularly those enrolling in FE, may choose a mix of qualifications. If we focus only on their A level attainment we would be missing part of their educational achievement. Hence we also undertook analyses that included the total point score at KS5, including vocational equivalent qualifications. This variable is measured in QCDA points and has a standard deviation of 258. It is standardised for use in the regressions, with mean equal to zero, standard deviation of 1. To test the robustness of our results we also ran specifications which used a student's total A level QCDA points per qualification entered as the dependent variable. This should allow for the fact that FE college students take fewer qualifications than those in school based provision. We prefer the specification that uses total points since this is a better measure of the total achievement of a student, however the results were similar using both approaches.

It is likely that the same set of factors influencing whether or not the young person remains in full time education post-16 will also influence their attainment at Key Stage 5. Therefore in the model of pupil attainment we include the identical set of personal characteristic, family background, prior attainment, peer and neighbourhood variables as described above. Prior attainment in both the A

²⁴ A Super Output Area is a unit of geography created by the Office for National Statistics (ONS) for collecting, aggregating and reporting statistics. There are three layers of SOAs (i.e. three different but related geography boundaries). The IDACI index is defined at the Lower Layer (commonly known as Lower Layer Super Output Area, LLSOA). The minimum population in each LLSOA is 1000, while the mean population is around 1500. There are 34,378 LSOAs in England and Wales.

level model and the vocational equivalent model is measured using the standardised capped average GCSE point score and a dummy variable indicating whether the person achieved 5 A*-C GCSEs, including GCSE equivalents. However, for this part of the analysis we also include dummy variables indicating the types of institution (school; FE college; Sixth form college) attended at Key Stage 5. We do not include characteristics of the institution attended at Key Stage 5 as unfortunately we have only a limited amount of information about the institution they attend post-16. For the matching approach we also use the same set of covariates described above.

Lastly, in part 3 of the report we run models based on administrative data. Specifically, we use individual-level administrative data for one cohort of students in England who sat Key Stage 4 tests (at age 16) in 2001–02 (Cohort 1). These data comprise the English National Pupil Database (NPD), the National Information System for Vocational Qualifications (NISVQ) and individual student records held by the Higher Education Statistics Agency (HESA). These data are not as rich as LSYPE in terms of personal characteristics but do include ethnicity, gender, whether the person has English as an additional language, whether they were eligible for Free School Meals at 16 and whether they have special educational needs. Additionally, we construct a measure of their socio-economic background based on the pupil's entitlement to free school meals (recorded at age 16), their Index of Material Deprivation score (IMD) score based on their postcode, their ACORN type²⁵ based on their postcode and three related area based measures from the 2001 Census (socio-economic status, highest educational qualification and housing tenure). Full details of how this measure is constructed are in Chowdry et al. 2008. The advantage of using these administrative data is that they include complete measures of prior attainment from Key Stage 2 through to Key Stage 5 and then record whether or not the individual participated in higher education. Therefore, in comparison with the LSYPE data used for parts 1 and 2 of the analysis, it has weaker measures of family background but more comprehensive measures of prior attainment.

5 Descriptive Statistics

As is evident from Table 1 below, nearly three quarters (72%) of the cohort remain in full time education after the end of the compulsory schooling phase. Nine percent are engaged in full time paid work, 8% combine part time work and some kind of education or training, and just over one in ten are engaged doing “something else”. This latter category will include those who are not in

²⁵ This is available at postcode level from CACI in 2009, and is constructed using a range of information on demographic and socio-economic characteristics, financial holdings and property details, amongst others.

education, employment or training after they leave school at age 16, i.e. who are NEET. Official estimates of the NEET rate for 16 year olds was 5.5% in 2007 and 79% of this age group were in full time education²⁶. This is comparable with the data below which indicates that 80% of LSYPE respondents are in either full time education or combining work with some kind of education and training.

Table 1: Main activity at age 17

	Freq.	Percent	Cum.
FT education	8,162	76.65	76.65
full time paid work	736	6.91	83.56
part college part employer	172	1.62	85.18
Apprenticeship	557	5.23	90.41
something else	1,021	9.59	100
Total	10,648	100	

Table 2 indicates that around half of those who remain in full time education after the end of the compulsory schooling phase attend a secondary school. Around 15% attend a 6th form college, whilst around 30% are enrolled in a Further Education college of some description. The data on type of institution for this analysis comes from the LSYPE survey itself. This distribution is broadly consistent with the figures from national official statistics. According to these statistics, in 2007 about 79 percent of 16 year olds were enrolled in FTE. Among these about 46.8 percent are going into schools, 13.9 percent in Sixth Form colleges and 39.2 percent in General FE, tertiary and specialist colleges²⁷.

Table 2: Proportion of the cohort enrolled in different types of post-16 provision

Post16 education	Freq.	Percent	Cum.
Schools	4,020	49.34	49.34
Sixth Form College	1,227	15.06	64.4
General FE/Tertiary College	2,409	29.57	93.97
Other	491	6.03	100
Total	8,147²⁸	100	

²⁶ Source: <http://www.dcsf.gov.uk/rsgateway/DB/STR/d000913/NEETQBQ42009final.pdf>

²⁷ These data come from the DCSF Research & Statistics Gateway, available at <http://www.dcsf.gov.uk/rsgateway/DB/SFR/s000849/index.shtml>

²⁸ Out of the 8166 pupils that are recorded as being enrolled in FTE (see table 1), we only have information on post-16 institution for 8,147. There are 15 pupils who declared themselves to be in FTE but did not provide any information on their post 16 institution

As has already been discussed, the decision to remain in full time education varies systematically according to pupils' characteristics or, more specifically, the characteristics of their parents. Hence whilst nearly 90% of young people who come from a higher managerial and professional background are in full time education at age 17, only 59% of young people from routine occupation backgrounds are in full time education at that age. What is also obvious from Table 3 is the importance of prior attainment. Hence students who do not achieve 5 A*-C GCSEs are much less likely to remain in full time education (54% in FTE) as compared to students who do achieve this (92% in FTE).

Table 3: Main activity at 17 by parents' social class, and pupils' attainment at GCSE

	FT education	full time paid work	part time coll, part time work	Apprentice ship	Something else	Total
<i>By parents' social class</i>						
High managerial & professional	88.81	3.85	1.74	2.67	2.93	100
Low managerial & professional	80.3	6.5	1.85	4.11	7.24	100
Intermediate occupation	73.7	7.88	0.93	6.68	10.81	100
Small empl. and own work	72.53	11.45	2.12	3.99	9.92	100
Low supervisory & technical work	64.3	13.48	2.22	7.97	12.03	100
Semi-routine	66.7	9.64	2.51	5.78	15.37	100
Routine	58.99	12.15	2.12	7.77	18.96	100
Not currently working	62.45	8.72	1.48	7.5	19.84	100
Total	72.14	8.61	1.87	5.63	11.75	100
<i>By whether got 5 A*-C GCSE</i>						
No	53.51	14.1	2.93	9.27	20.19	100
Yes	92.05	2.81	0.67	1.84	2.63	100
Total	72.35	8.58	1.83	5.64	11.61	100
<i>By quintiles of GCSE score (1st quint: bottom score; 5th: top score)</i>						
1	42.43	16.14	2.83	10.09	28.52	100
2	63.29	13.73	2.86	7.8	12.33	100
3	79.5	6.25	1.76	4.67	7.81	100
4	90.75	2.79	0.88	2.66	2.92	100
5	95.18	1.39	0.44	1.51	1.47	100
Total	72.35	8.58	1.83	5.64	11.61	100

Note: Row percentage

The type of provision the student is enrolled in at age 17 also varies by socio-economic background and prior attainment. Whilst 63% of students from professional backgrounds undertake their Key Stage 5 in schools, only 35% of pupils whose parents have routine jobs undertake their Key Stage 5 in schools. Hence, there is a clear social gradient, with more advantaged students more likely to enrol in schools and 6th form colleges and students from poorer backgrounds much more likely to enrol in FE. Much of this social gradient is likely to be governed by students' prior attainment, however, which is heavily correlated with social class. Hence, 70% of those in the top quintile of GCSE scores enrol in schools and only 11% in FE, whilst 60% of those in the bottom quintile of GCSE scores enrol in FE colleges and only 22% enrol in schools. While schools and FE colleges significantly differ in terms of prior attainment of their students, schools and sixth form colleges have pupils with similar results at GCSE. The mean value of the standardised capped GCSE score for pupils enrolled in schools at Key Stage 5 is 0.58, which is not statistically different from the average value for pupils going into sixth form colleges (0.51). In contrast the average standardised GCSE scores for pupils going into FE colleges is significantly lower (-0.10). For this reason, where necessary, we shall group sixth form college and school pupils together.

Table 4: Enrolment in different types of provision at age 17 by parents' social class, and pupils' attainment at GCSE

	<i>Schools</i>	<i>Sixth Form colleges</i>	<i>FE colleges</i>	<i>Other</i>	<i>Total</i>
<i>By parents' social class</i>					
High managerial & professional	63.1	16.31	15.85	4.74	100
Low managerial & professional	56.65	15.1	24.15	4.1	100
Intermediate occupation	51.57	13.44	27.39	7.6	100
Small empl. and own work	52.16	12.11	30.21	5.52	100
Low supervisory & technical work	40.58	11.94	40.04	7.43	100
Semi-routine	45.27	9.29	37.55	7.89	100
Routine	35.47	11.68	42.23	10.62	100
Not currently working	39.42	11.29	39.57	9.72	100
Total	50.1	13.3	30.04	6.55	100
<i>By whether got 5 A*-C GCSE</i>					
0	28.54	8.02	51.87	11.57	100
1	63.31	16.58	16.51	3.6	100
Total	50.16	13.34	29.88	6.61	100
<i>By quintiles of GCSE score (1st quint: bottom score; 5th: top score)</i>					

1	22.26	4.58	57.85	15.31	100
2	29.29	10.83	49.89	9.99	100
3	50.85	14.76	29.34	5.04	100
4	61.07	16.77	18.25	3.9	100
5	70.16	15.7	11.04	3.1	100
Total	50.16	13.34	29.88	6.61	100

Note: row percentages

Students' choice of provision is of course partly determined by the courses that they wish to enrol in at Key Stage 5. Individuals studying for A levels, AS levels and A2 qualifications are far more likely to enrol in schools (94% do so) than those studying some other type of Key Stage 5 qualification. It is also evident that schools and 6th form colleges are similar in terms of their enrolments, with the vast majority (around 90%) studying for A levels, AS levels or A2s. Equally, those enrolled in FE colleges are far less likely to study A level, AS level or A2 level courses. This again reinforces the point that our study is only considering a subset of FE students, namely those who are studying A levels and hence are more comparable with students in school based provision at 16-19.

Table 5: Enrolment in different types of provision at age 17 by choice of curricula

<i>Percentages</i>	<i>Whether studying for A-levels/ AS-levels/A2 levels</i>		
	<i>No</i>	<i>Yes</i>	
Schools	6.63	93.37	100
Sixth Form College	10.44	89.56	100
General FE/Tertiary College	57.38	42.62	100
Total	18.84	81.16	100

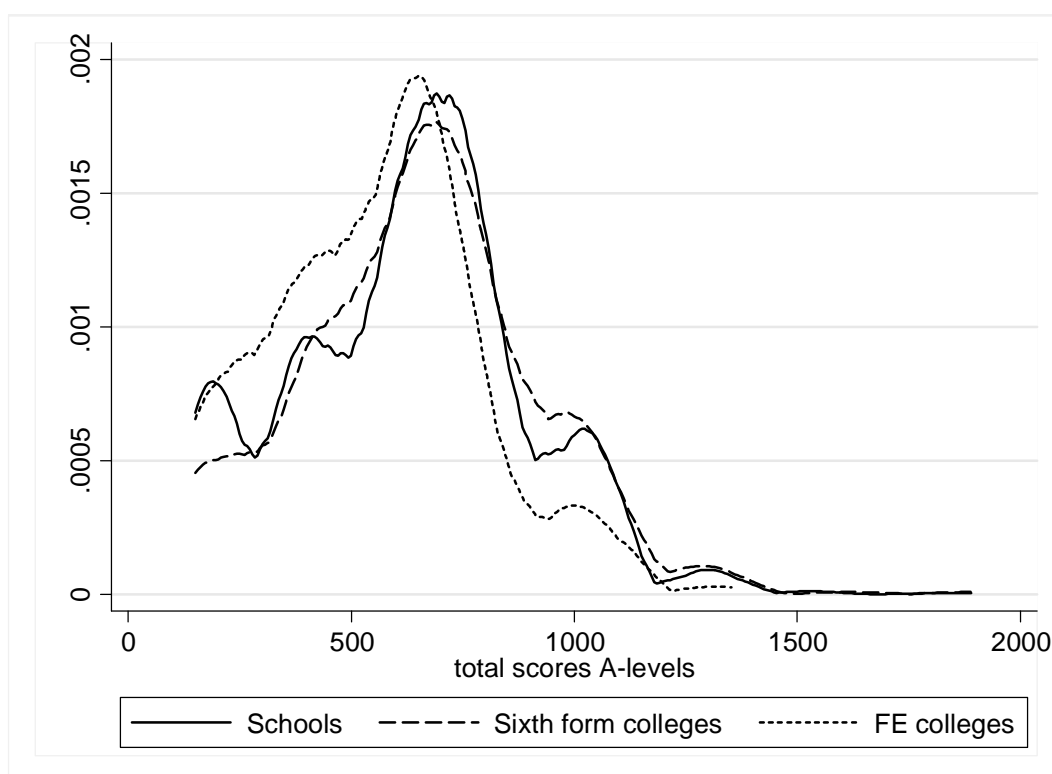
In the second part of this report we focus on pupil attainment. This required us to merge the LSYPE data to the National Pupil Database information on pupils' attainment at GCSE and at Key Stage 5. For this analysis, identification of post 16 institution comes from the administrative data set. In the process of this match we lose observations and we end up with a sample size of 5,249 individuals for whom we have Key Stage 5 and LSYPE data²⁹. Furthermore, some of these individuals in the LSYPE survey did not provide full information on all the variables used in the analysis. This means actual sample sizes are somewhat smaller for the regressions. This is not a problem for our sample of

²⁹ This loss of sample size when we use the administrative data is why we use LSYPE survey data to identify post 16 institution for Part 1 of the report. It enables us to have a larger sample size. The LSYPE and NPD indicator of post 16 institution are closely aligned as we might expect, although using the latter does result in smaller sample size.

young people in schools but it does mean we only have a usable sample size of 1206 pupils in FE colleges for whom we have full information. Among these pupils, we need to select those taking A-levels and therefore our sample size of students in FE further reduces to 309 individuals. This is of course a relatively small number and we should interpret results with this in mind.

As can be seen from Figure 1 below, students in FE colleges have lower A level scores than those in schools and 6th form colleges. Note that this graph shows the distribution of A level scores only, dropping individuals who take vocational options. We use the pupil's A level QCDA point score for this analysis³⁰. The picture does not take account of student intake and as we saw earlier in Table 3, the characteristics of students enrolled in FE and schools are very different, with the latter being more advantaged and higher achieving at GCSE.

Figure 1: Distribution of KS5 A level scores by institution type



The number of A levels acquired by type of provision is shown in Table 6. 57% of those in FE colleges do not acquire any A levels, whilst two thirds of students enrolled in schools or 6th form colleges achieve 3 or more A levels. Students in FE colleges who do take A levels take fewer of them. Thus an

³⁰ The UCAS tariff equivalencies to the QCDA scores are shown at http://www.dcsf.gov.uk/performance/tables/pilot16_05/annex.shtml.

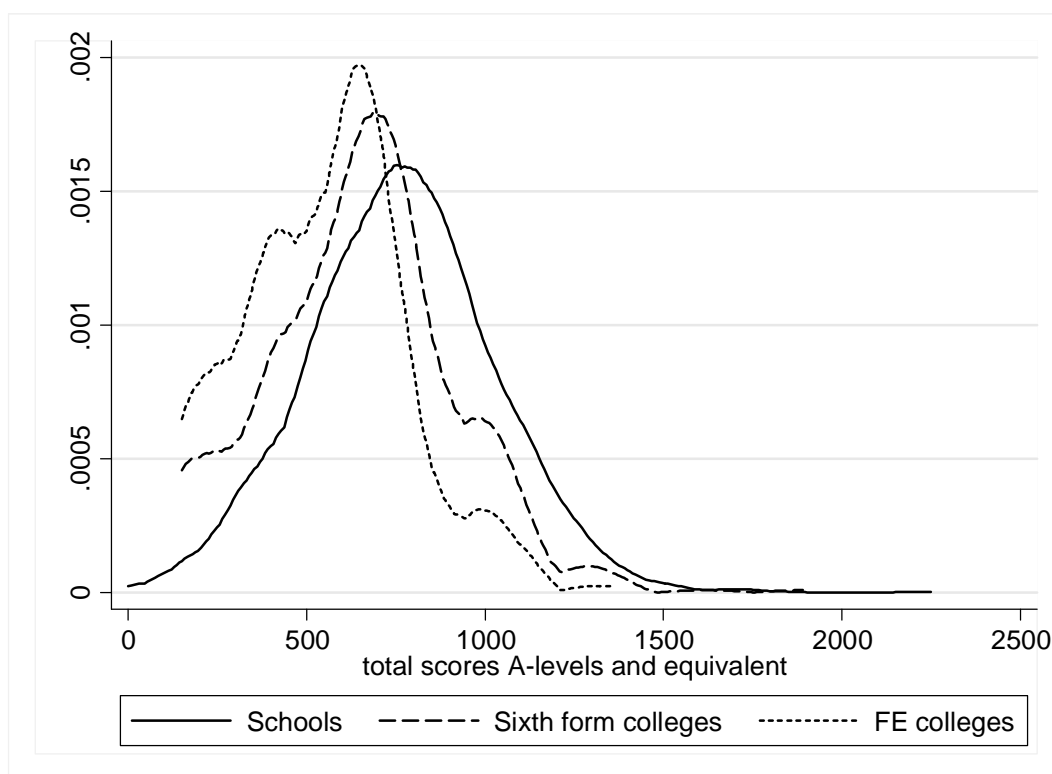
important point to highlight here is that where we focus on A levels only, we are assessing the value added of FE colleges, as compared to schools, for a minority of FE Students (i.e. the 43% who are doing A levels).

Table 6: Number of A levels by type of post-16 institution

	<i>Schools</i>	<i>Sixth Form colleges</i>	<i>General FE</i>	<i>Total</i>
No A level entries				
0	6.63	10.44	57.38	18.25
1	10.79	8.19	5.85	9.44
2	15.51	14.83	10.58	14.55
3	45.54	43.3	21.91	39.7
4	19.18	20.76	4.09	16.09
5	2.11	2.25	0.19	1.77
6	0.18	0.12	0	0.15
7	0.07	0.12	0	0.06
Total	100	100	100	100

Much of the analysis in the report focuses on the effectiveness of post-16 institutions for those doing A levels. However, we also use a specification where the dependent variable is the student's total point score at KS5, which includes level 3 vocational equivalent qualifications as well. This has the advantage of including the attainment of non A level students into the analysis. It has the disadvantage however, of grouping a much more heterogeneous group of students together in the model. We would therefore tend to place greater weight on the robustness of our results which focus on A level students only. The next figure shows the distribution of the total point scores in A-level and equivalents in the three types of institutions and it confirms that pupils in schools and sixth form colleges still tend to have better performance than pupils in FE. Again we use the QCDA point score for this analysis.

Figure 2: Distribution of KS5 A level and equivalent scores by institution type



We also use the full population of students from the administrative data for part 3 of this report, which focuses on HE participation. Descriptive statistics for the cohort who could potentially enter HE in 2001/2 are provided in table 7. The table shows the characteristics of those who are participating in university in 2001/2 by whether or not they attended a FE college or sixth form based provision (including 6th form college) at Key Stage 5. Those who were enrolled in FE colleges are more deprived, slightly less likely to be male or white British and more likely to have English as an additional language. Those in FE colleges have lower GCSE and A level achievement, consistent with the LSYPE descriptive statistics discussed earlier.

Table 7: Descriptive statistics for those participating in higher education by Key Stage 5 institution

Characteristic	FE		Difference
	college	School	
FSM-eligible	0.075	0.041	0.034**
Least deprived quintile ³¹	0.308	0.404	-0.096**
2nd deprivation quintile	0.239	0.263	-0.024**
3rd deprivation quintile	0.203	0.176	0.026**
4th deprivation quintile	0.147	0.103	0.043**
Most deprived quintile	0.104	0.053	0.051**
Male	0.414	0.446	-0.032**
White British	0.791	0.826	-0.036**
English as an additional language	0.139	0.104	0.035**
Non-statemented SEN	0.524	0.54	-0.015**
Achieved 5 A*-C GCSE grades (including English & Maths)	0.864	0.907	-0.043**
No KS5 points	0.003	0.001	0.002**
1-180 KS5 points	0.194	0.149	0.046**
181-300 KS5 points	0.346	0.35	-0.004
301+ KS5 points	0.457	0.5	-0.044**
Passed A-level Biology	0.133	0.201	-0.068**
Passed A-level Chemistry	0.103	0.148	-0.045**
Passed A-level Physics	0.068	0.112	-0.044**
Passed A-level Maths	0.157	0.203	-0.046**
Passed A-level History	0.129	0.193	-0.064**
Passed A-level Economics	0.036	0.051	-0.014**
Passed A-level English	0.091	0.052	0.039**
Passed A-level Modern Languages	0.054	0.081	-0.026**
Sample n	85273	184881	

6 Results

Part 1: Choice of provision

The following tables show the results of the sequential model discussed in section 3. Equations (1) and (2) are estimated using a Linear Probability Model (LPM) and therefore the coefficients can be interpreted as marginal effects. We first focus on the role of personal characteristics and family background (Tables 8 and 9). In particular, we study the role of these factors in the two sequential decisions, namely whether to stay on in full time education and then which type of institution to

³¹ This deprivation index, whereby the first quintile is the least deprived, is described in the earlier data section and in Chowdry et al. 2008.

study in. In Table 8 we look at the staying-on decision, while in Table 9 we investigate whether the same factors are equally important in the choice between sixth form based provision and further education colleges³².

Tables 10 and 11 then present the role of school characteristics in both decisions. Tables 12 and 13 focus on neighbourhood factors and patterns of provision at the LA level.

Table 8 and Table 9 are organised as follows: as we move from the left to the right, we gradually include more controls. In the first column, we only include pupils' characteristics from PLASC (gender, ethnicity, whether eligible for FSM, month of birth, whether English as an Additional Language). In columns 2 and 3 we include prior achievement at GCSE (Key Stage 4), using a continuous measure (standardised capped average GCSE point score) and a dummy indicating whether the pupil achieved at least 5 GCSEs with grades A*-C. The latter is included to see whether there are discontinuities at this threshold. In column 4 we include variables describing parental background (parents' occupation and education). Variables reflecting pupils' attitude and behaviours as well as parents' expectations are added in Column 5. We do not control explicitly for the distance from the pupil's house to their nearest provider, due to data limitations for non-school provision. However, we do consider the choices made within local authorities to allow for different patterns of institutional provision in different local authorities. Column 6 therefore includes dummy variables for the set of Local Authorities, to allow for any unobserved factors at LA level that might influence decisions. The joint significance of the LA variables is reported at the bottom of the table.

Gender

Table 8 clearly shows that females are more likely to stay in full time education and this result is robust to the inclusion of different controls including prior attainment. Hence for a given level of GCSE score, females are more likely to remain in full time education. Table 9 indicates, however, that gender is not significant in determining students' choice of provision post-16.

Prior attainment

As expected, and consistent with the previous literature, academic achievement matters both for the decision to remain in full time education beyond age 16 and a young person's choice of institution at Key Stage 5. We have two measures of attainment in our models, namely GCSE point score and whether the individual achieved 5 A*-C grades at GCSE. Both measures of attainment are

³² In this part of the analysis the sample is made of all pupils enrolled in schools and in FE colleges, regardless of their curricula choices. We therefore include in the model pupils pursuing both academic and vocational courses.

always significant in the two models: thus better GCSE results are associated with both a higher probability of staying on in full time education after 16, and a higher probability of choosing to study in sixth form based provision rather than an FE college. It is interesting that pupils who achieve 5 A*-C GCSE have an additional probability of remaining in full time education and opting for sixth form based provision, even after controlling for their overall GCSE point score. This suggests a threshold effect, presumably because many post-16 institutions require a young person to have 5 A*-C grades at GCSE as an entry requirement. The magnitude of this threshold effect appears to be sizable: in particular, if we look at column 3, it seems that obtaining at least 5 GCSEs with grades higher than C increases the probability of staying in FTE by 19 percentage points and – once the student decided to stay in FTE – increases the probability of going into sixth form provision rather than into an FE college by 25 percentage points. The magnitude of the coefficients on our prior attainment measures reduces as we move from left to right across both Table 8 and Table 9, as we add more family background and attitudinal variables. In the fully specified model (column 6), having 5 GCSEs A*-C increases the probability of remaining in FTE by 9 percentage points and the probability of going into sixth form provision by 21 percentage points. This suggests that whilst a student's performance at GCSE has an independent impact on both the decision to remain in full time education and to opt for sixth form based provision, prior attainment is correlated with family background and attitudes towards schooling. Some of the strong link between prior attainment and choice of institution post-16 is actually attributable to family background and attitudes. As we add additional variables measuring family background and attitudes to our model, we therefore reduce the apparent impact of prior attainment.

Family background

A person's socio-economic background does influence their probability of staying on in full time education after the end of compulsory school, as suggested by the previous literature. Table 8, column 1 suggests that individuals who are in receipt of free school meals at age 16 (the only measure of socio-economic background in PLASC) are significantly less likely to remain in full time education. This result becomes statistically insignificant once we include pupils' prior attainment and other family background variables from LSYPE. This is as expected as these richer LSYPE measures of family background are more informative than the individual's FSM status about the socio-economic status of the pupil. In particular, parental education is an important determinant of the decision to stay in full time education and this result is consistent across specifications, although the magnitude of the effect is lower than that of prior attainment. In the fully controlled specification (col. 6) the probability of staying in full time education increases by 3.2 (2.8) percentage points for pupils whose father (mother) has a degree. Moving to Table 19, again we see that socio-economic background influences choice of institution post-16. Once someone has decided to stay in full time education,

FSM status increases the probability of choosing an FE college. However the coefficient on FSM is statistically significant only when we do not include additional controls beyond the limited set available in the school administrative data. In particular, once we control for prior achievement the FSM coefficient becomes insignificant. However, other richer measures of family background are significantly related to choice of institution post-16. Parental occupation in particular is an important determinant of the choice between FE and sixth form based provision. Pupils whose main parent is doing a routine job are significantly more likely (their probability increases by about 10 percentage points) to enrol in FE colleges rather than sixth form provision, as compared those whose main parent does a professional job.

Ethnicity

Ceteris paribus, ethnic minority groups are more likely to stay on in full time education (Table 9) and to choose to undertake their Key Stage 5 in sixth form provision rather than a FE college. Similarly Table 9 indicates that English as an additional language pupils are more likely to stay on in full time education post-16. EAL status has no impact on choice of provision post-16.

Attitudes

Pupils with a more positive attitude towards their schooling during year 9 are more likely to remain in full time education and to opt for sixth form provision at Key Stage 5. Our measure of attitude towards school is measured before final decisions about post-16 choices are made.

Parents' expectations for their children, again as measured in year 9, are very significant in both the decision to stay on post-16 and the student's choice of institution. Young people whose parents had higher expectations about the educational achievement of their children in year 9 are significantly more likely to remain in full time education post-16. Furthermore, having decided to stay on in full time education, pupils whose parents have high expectations are then more likely to enrol in sixth form based provision than in FE colleges.

Hours of work

The number of hours worked by the student during term time is associated with a significantly reduced probability of remaining in full time education. This maybe due to the fact that the student has links with the job market that pushes them out into the world of work. However, given that a student has made the decision to remain in full time education, hours worked during term time has no significant impact on the decision about what type of institution chosen at Key Stage 5. This variable is potentially problematic however, as the direction of causality could be in the reverse

direction. For example, students who plan to leave school at 16 may opt to work more during term time in preparation.

Table 8: The determinants of the decision to remain in full time education post-16

	(1)	(2)	(3)	(4)	(5)	(6)
Female	0.098*** (0.013)	0.078*** (0.011)	0.073*** (0.011)	0.075*** (0.011)	0.064*** (0.011)	0.062*** (0.011)
FSM	-0.112*** (0.030)	-0.004 (0.028)	0.011 (0.028)	0.000 (0.032)	-0.008 (0.032)	-0.004 (0.032)
SEN	-0.159*** (0.022)	0.064*** (0.024)	0.071*** (0.023)	0.067*** (0.023)	0.074*** (0.022)	0.076*** (0.022)
Other white	0.062 (0.045)	-0.001 (0.039)	-0.007 (0.037)	-0.016 (0.037)	-0.028 (0.037)	-0.038 (0.040)
Bangladeshi	0.130*** (0.035)	0.097*** (0.034)	0.099*** (0.033)	0.094*** (0.033)	0.070** (0.033)	0.047 (0.034)
Caribbean	0.174*** (0.029)	0.178*** (0.031)	0.184*** (0.032)	0.178*** (0.033)	0.143*** (0.031)	0.155*** (0.032)
Chinese	0.195*** (0.034)	0.082 (0.051)	0.079 (0.052)	0.061 (0.051)	0.054 (0.050)	0.034 (0.048)
Indian	0.119*** (0.024)	0.077*** (0.026)	0.072*** (0.025)	0.068*** (0.025)	0.037 (0.024)	0.032 (0.027)
Pakistani	0.106*** (0.031)	0.120*** (0.030)	0.129*** (0.030)	0.121*** (0.030)	0.083*** (0.030)	0.061* (0.031)
African	0.233*** (0.019)	0.211*** (0.026)	0.216*** (0.026)	0.191*** (0.025)	0.145*** (0.023)	0.158*** (0.027)
Mixed	0.133*** (0.023)	0.096*** (0.022)	0.081*** (0.022)	0.070*** (0.022)	0.060*** (0.022)	0.056** (0.023)
Other	0.138*** (0.039)	0.093** (0.043)	0.092** (0.041)	0.079* (0.041)	0.059 (0.038)	0.056 (0.039)
EAL	0.106*** (0.026)	0.096*** (0.026)	0.099*** (0.025)	0.112*** (0.025)	0.090*** (0.024)	0.089*** (0.025)
GCSE/KS4 (std scores)		0.197*** (0.008)	0.121*** (0.010)	0.114*** (0.010)	0.093*** (0.010)	0.099*** (0.010)
5 GCSE A*-C			0.214*** (0.017)	0.201*** (0.017)	0.174*** (0.017)	0.167*** (0.017)
SEC: Low managerial & professional				-0.000 (0.016)	0.007 (0.015)	0.014 (0.015)
SEC: Intermediate occ.				0.003 (0.024)	0.007 (0.022)	0.012 (0.022)
SEC: Small empl. and own work				-0.034 (0.024)	-0.009 (0.023)	0.003 (0.022)
SEC: Low supervisory & technical work				-0.048** (0.020)	-0.035* (0.019)	-0.029 (0.019)
SEC: Semi-routine				-0.028 (0.024)	-0.024 (0.024)	-0.017 (0.023)
SEC: Routine				-0.041* (0.024)	-0.033 (0.023)	-0.023 (0.023)
Not currently working				-0.003 (0.028)	0.004 (0.027)	0.015 (0.027)
Father with degree				0.045*** (0.013)	0.036*** (0.013)	0.032** (0.013)
Mother with degree				0.038*** (0.013)	0.032** (0.012)	0.028** (0.013)

School attitude (Y9)					0.006*** (0.001)	0.006*** (0.001)
No hours worked					-0.006*** (0.001)	-0.007*** (0.001)
Parent want yp to stay in FTE (Y9)					0.154*** (0.018)	0.149*** (0.018)
Constant	0.698*** (0.011)	0.640*** (0.010)	0.540*** (0.013)	0.555*** (0.018)	0.267*** (0.036)	0.431*** (0.039)
LA dummies	no	No	no	No	no	yes
<i>F test (joint significance LA dummies)</i>						464.01***
Observations	6757	6757	6757	6757	6757	6757
R-squared	0.060	0.194	0.226	0.232	0.263	0.283

Notes: Standard errors in parentheses; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$;
Reference categories: Male; Ethnicity=White; SEC=Higher Managerial and Professional

Local Authority Effects

In both Table 9 and 10 we include local authority dummy variables. These are included to allow for otherwise unobserved characteristics of local authorities that may impact on young people's choices. In both models, the local authority dummies are jointly significant, suggesting that even after controlling fully for a pupil's prior attainment and family background, neighbourhood or local area still has an impact. Whether this is a neighbourhood or peer effect, as opposed to factors related to LA policy on education we cannot say.

Table 9: The determinants of the decision to enrol in a FE college versus a school

	(1)	(2)	(3)	(4)	(5)	(6)
Female	-0.002 (0.016)	0.005 (0.014)	0.010 (0.014)	0.008 (0.013)	0.013 (0.013)	0.013 (0.013)
FSM	0.116*** (0.036)	0.016 (0.033)	-0.014 (0.034)	-0.023 (0.042)	-0.018 (0.042)	-0.018 (0.039)
SEN	0.281*** (0.026)	0.027 (0.028)	0.002 (0.027)	0.004 (0.026)	-0.007 (0.025)	0.004 (0.025)
Other white	-0.156*** (0.049)	-0.091** (0.045)	-0.079* (0.045)	-0.073 (0.045)	-0.061 (0.044)	-0.070* (0.041)
Bangladeshi	-0.129** (0.055)	-0.108** (0.053)	-0.109** (0.054)	-0.114** (0.054)	-0.098* (0.053)	-0.123*** (0.045)
Caribbean	-0.050 (0.047)	-0.099** (0.045)	-0.112** (0.045)	-0.106** (0.044)	-0.091** (0.044)	-0.074* (0.044)
Chinese	-0.206** (0.098)	-0.111 (0.116)	-0.111 (0.113)	-0.099 (0.111)	-0.095 (0.112)	-0.055 (0.108)
Indian	-0.182*** (0.043)	-0.152*** (0.041)	-0.147*** (0.043)	-0.149*** (0.043)	-0.128*** (0.042)	-0.098*** (0.036)

Pakistani	-0.085 (0.052)	-0.109** (0.048)	-0.120** (0.048)	-0.119** (0.049)	-0.095** (0.048)	-0.090** (0.042)
African	-0.113** (0.046)	-0.128*** (0.047)	-0.139*** (0.045)	-0.128*** (0.044)	-0.098** (0.042)	-0.071 (0.046)
Mixed	-0.136*** (0.033)	-0.105*** (0.032)	-0.095*** (0.032)	-0.086*** (0.031)	-0.079*** (0.030)	-0.072** (0.029)
Other	-0.085 (0.064)	-0.064 (0.060)	-0.061 (0.060)	-0.060 (0.061)	-0.044 (0.059)	-0.056 (0.050)
EAL	0.010 (0.039)	0.000 (0.036)	-0.013 (0.037)	-0.025 (0.037)	-0.014 (0.036)	-0.020 (0.032)
KS4 (std scores)		-0.219*** (0.011)	-0.131*** (0.013)	-0.123*** (0.013)	-0.112*** (0.013)	-0.118*** (0.013)
5 GSCE A*-C			-0.259*** (0.022)	-0.245*** (0.023)	-0.226*** (0.023)	-0.211*** (0.021)
SEC: Low managerial & professional				0.018 (0.020)	0.013 (0.019)	0.016 (0.017)
SEC: Intermediate occ.				0.008 (0.031)	0.005 (0.031)	0.011 (0.027)
SEC: Small empl. and own work				0.043 (0.029)	0.026 (0.029)	0.002 (0.026)
SEC: Low supervisory & technical work				0.111*** (0.027)	0.099*** (0.027)	0.087*** (0.025)
SEC: Semi-routine				0.072** (0.030)	0.067** (0.031)	0.058** (0.028)
SEC: Routine				0.105*** (0.031)	0.092*** (0.031)	0.097*** (0.029)
Not currently working				0.060* (0.034)	0.050 (0.034)	0.049 (0.032)
Father with degree				-0.000 (0.019)	0.003 (0.019)	-0.001 (0.018)
Mother with degree				-0.036** (0.018)	-0.033* (0.018)	-0.027 (0.017)
School attitude (Y9)					-0.004*** (0.001)	-0.004*** (0.001)
No hours worked					0.003 (0.002)	0.003 (0.002)
Parent want yp to stay in FTE (Y9)					-0.157*** (0.025)	-0.140*** (0.023)
Constant	0.301*** (0.016)	0.421*** (0.016)	0.561*** (0.019)	0.511*** (0.026)	0.769*** (0.051)	0.712*** (0.068)
LA dummies	No	no	no	No	no	Yes
<i>F test (joint significance LA dummies)</i>						763.86***
Observations	5052	5052	5052	5052	5052	5052
R-squared	0.049	0.170	0.209	0.218	0.233	0.340

Notes: Standard errors in parentheses; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$;

Reference categories: Male; Ethnicity=White; SEC=Higher Managerial and Professional

School effects

Table 10 explores the role of school characteristics on pupils' decisions post-16. Specifically, table 10 measures the relationship between the characteristics of the pupil's *Key Stage 4* school and the student's subsequent decision to remain in full time education (or not). Note that these tables focus on the role of school characteristics but they also include all the personal characteristics and prior attainment measures shown in tables 8 and 9. Most of the variables included in table 10 are insignificant. Generally, the characteristics of the child's school at age 16 do not significantly determine whether or not the young person remains in full time education post-16. For some specifications it also appears that pupils in high performing schools, measured by the percentage of pupils achieving at least 5 GCSEs with grades A*-C, are actually more likely to leave full time education. This result may be attributable to the fact that these higher performing schools tend to have a higher achieving pool of pupils from which to choose from for their 6th form. Hence, lower achieving pupils in these schools may be actually more likely to drop out. We tested this by running separate regressions for low and high achieving pupils and we found that this result is indeed particularly significant for low achievers (pupils who obtained less than 5 GCSEs with grades A*-C) and only holds for schools with a sixth form. This confirms our interpretation that in high achieving schools with 6th forms, lower achieving pupils may be more likely to drop out, presumably as a result of either being prevented from entering the 6th form or from thinking that they are not high enough achievers in comparison with their higher achieving peers. Pupils in disadvantaged schools, namely those with a high percentage of FSM pupils, are more likely to leave full time education.

Overall, however, school characteristics do not seem to play an important role in affecting the staying on decision and pupil characteristics and family background factors are more important (Tables 8 and 9).

Table 10: The determinants of the decision to remain in full time education post-16 – the role of school characteristics

	(1)	(2)	(3)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Sixth form	0.011 (0.011)									0.032 (0.024)	0.047 (0.029)
% staying in FTE		0.000 (0.000)								-0.000 (0.000)	-0.000 (0.001)
% achieving 5 GCSE AC			-0.000 (0.000)							-0.001 (0.001)	-0.001** (0.001)
% FSM				-0.001 (0.001)						-0.002** (0.001)	-0.003*** (0.001)
City technology college					-0.110*** (0.017)					-0.089*** (0.019)	-0.062* (0.036)
Foundation					-0.007 (0.014)					-0.006 (0.015)	-0.009 (0.019)
Voluntary Aided					0.011 (0.016)					0.012 (0.017)	0.018 (0.019)
Voluntary Controlled					-0.015 (0.040)					-0.011 (0.042)	0.010 (0.034)
School size						-0.000 (0.000)				-0.000 (0.000)	-0.000 (0.000)
PT ratio							0.003 (0.003)			0.002 (0.004)	0.001 (0.004)
Prop non white British								0.013 (0.027)		0.057* (0.032)	0.009 (0.044)
Single sex									-0.016 (0.014)	-0.014 (0.017)	-0.020 (0.018)
All other controls	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	Yes
LA dummies	no	no	no	no	no	no	No	no	no	no	Yes
<i>F test (joint significance LA dummies)</i>	-	-	-	-	-	-	-	-	-	-	104.84***
Observations	6582	6582	6582	6582	6582	6582	6582	6582	6582	6582	6582
R-squared	0.264	0.264	0.264	0.264	0.264	0.264	0.264	0.264	0.264	0.266	0.288

Note: controls include pupils' gender, FSM status, SEN status, ethnicity, standardised results at Key Stage 4, whether got at least 5 GCSE with grades A*-C, attitude toward school in year 9, number of hours worked during term time, parents' SEC, parents' education and parents' expectations .

Table 11: The determinants of the decision to enrol in a FE college versus a school – the role of school characteristics

	(1)	(2)	(3)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Sixth form	-0.219*** (0.024)									-0.050 (0.036)	-0.045 (0.044)
% staying in FTE		-0.004*** (0.000)								-0.003*** (0.001)	-0.004*** (0.001)
% achieving 5 GCSE AC			-0.002*** (0.001)							0.002** (0.001)	0.002*** (0.001)
% FSM				0.005*** (0.001)						0.001 (0.001)	0.002 (0.002)
City technology college					-0.126** (0.055)					-0.037 (0.058)	0.027 (0.061)
Foundation					-0.078*** (0.025)					-0.018 (0.022)	-0.002 (0.026)
Voluntary Aided					-0.076*** (0.025)					-0.033 (0.026)	0.016 (0.027)
Voluntary Controlled					-0.137*** (0.032)					-0.072* (0.040)	0.009 (0.042)
School size						-0.000*** (0.000)				-0.000 (0.000)	0.000 (0.000)
PT ratio							0.018*** (0.007)			0.004 (0.006)	-0.009 (0.007)
Prop non white British								-0.047 (0.048)		-0.007 (0.052)	0.039 (0.061)
Single sex									-0.048** (0.023)	0.017 (0.023)	0.028 (0.032)
All other controls	yes	yes	Yes	yes	yes	yes	yes	yes	yes	yes	yes
LA dummies	no	no	No	no	no	no	no	no	no	no	Yes
<i>F test (joint significance LA dummies)</i>	-	-	-	-	-	-	-	-	-	-	250.83***
Observations	4927	4927	4927	4927	4927	4927	4927	4927	4927	4927	4927
R-squared	0.283	0.285	0.239	0.240	0.242	0.247	0.238	0.235	0.235	0.292	0.369

Note: controls include pupils' gender, FSM status, SEN status, ethnicity, standardised results at Key Stage 4, whether got at least 5 GCSE with grades A*-C, attitude toward school in year 9, number of hours worked during term time, parents' SEC, parents' education and parents' expectations .

School characteristics do, however, impact significantly on individuals' choice of institution post-16, as shown in Table 11 above. Specifically, pupils who were enrolled in certain types of institutions at age 16 are more likely to enrol in sixth form based provision for their Key Stage 5. Pupils in schools with a high percentage of pupils staying on in full time education, i.e. more advantaged schools, are more likely to enrol in a sixth form provision post-16 (note we control separately for whether the school has a 6th form so this is potentially a peer effect or the result of advice and guidance at these schools encouraging pupils towards this type of provision, rather than the effect of having 6th form provision on site). We control for differences across local authorities by including LA dummies and the effect of being in a school with a high proportion of pupils staying on post-16 on the likelihood of choosing sixth form based provision increases. This again confirms that this is not a supply side effect, simply reflecting the greater availability of this type of provision in certain LAs. Rather, it indicates that within local authorities, pupils in the most advantaged schools are much more likely to enrol in sixth form based provision post-16.

Other school characteristics are also significant. Pupils in schools with a high percentage of pupils achieving at least 5 GCSEs with grades A*-C are also more likely to enrol in sixth form based provision post-16. Students in a comprehensive or community school are significantly more likely to enrol in FE colleges, as compared to other types of school. Pupils in single sex schools and schools with a lower pupil teacher ratio are also more likely to enrol in sixth form based provision.

Clearly, a pattern is evident from these results. Broadly, students who attend schools with a more advantaged intake and with higher performing students are more likely to remain in sixth form based provision. Even if we do not interpret the results presented here as causal, it is certainly evident from the analysis so far that more advantaged pupils, higher achieving pupils and pupils in more advantaged schools tend to favour sixth form based provision post-16.

Local Authority characteristics

Table 12 below shows the association between LA characteristics and the likelihood of a pupil choosing to remain in full time education. For these regressions, whilst we include all the personal, family and school characteristics described earlier, we exclude LA fixed effects in order to identify the effect of LA characteristics. Generally, these LA variables are insignificant. However, the IDACI score of the LA is significant and indicates that pupils in disadvantaged and poor neighbourhoods are less likely to stay in full time education (i.e. their probability of remaining in full time education decreases by 8.8 percentage points), even controlling in a comprehensive manner for their personal

characteristics and their school characteristics. Table 13 confirms that this variable is also a significant determinant of choice of provision at Key Stage 5. Once pupils in poorer areas have decided to stay in full time education, they are then 14.4 percentage points more likely to choose FE. This is a striking result given that the LSYPE data we are using is very rich and we have controlled for a very wide array of personal characteristics, family background measures etc.

In table 14 the variables describing the pattern of provision at LA level are also significant. For instance, the higher the proportion of schools with sixth forms in the LA, the more likely a pupil is to stay in sixth form based provision post-16. This is a simple supply effect: by definition, your chances of studying in sixth form provision will be higher if that is the dominant pattern of provision in a LA. The proportion of pupils enrolled in FE from a previous cohort is also significant, i.e. in areas where previously a higher proportion of pupils enrolled in FE, a pupil also has a higher probability of enrolling in FE, conditional on family background, prior attainment and LA neighbourhood characteristics.

Table 12: The determinants of the decision to remain in full time education post-16 – the role of LA characteristics

	(1)	(2)	(3)	(4)	(5)	(6)
Unemployment rate 16-19	-0.000 (0.001)					0.000 (0.001)
IDACI score		-0.073* (0.041)				-0.088** (0.042)
% schools with sixth forms			-0.008 (0.021)			-0.018 (0.037)
% staying in FTE				-0.000 (0.000)		0.000 (0.001)
% in FE post-16					0.000 (0.000)	0.000 (0.001)
Constant	0.256*** (0.039)	0.277*** (0.036)	0.273*** (0.037)	0.272*** (0.038)	0.261*** (0.040)	0.248*** (0.080)
All other controls	Yes	yes	yes	yes	Yes	yes
Observations	6308	6757	6752	6744	6757	6291
R-squared	0.270	0.263	0.263	0.263	0.263	0.271

Note: controls include pupils' gender, FSM status, SEN status, ethnicity, standardised results at Key Stage 4, whether got at least 5 GCSE with grades A*-C, attitude toward school in year 9, number of hours worked during term time, parents' SEC, parents' education and parents' expectations .

Table 13: The determinants of the decision to enrol in a FE college versus a school – the role of LA characteristics

	(1)	(2)	(3)	(4)	(5)	(6)
Unemployment rate 16-19	-0.002 (0.001)					-0.001 (0.001)
IDACI score		0.112** (0.055)				0.145** (0.057)
% schools with sixth forms			-0.152*** (0.039)			0.150*** (0.055)
% staying in FTE				-0.004*** (0.001)		-0.008*** (0.001)
% in FE post-16					0.003*** (0.001)	-0.002** (0.001)
All other controls	yes	yes	yes	yes	yes	Yes
Constant	0.787*** (0.057)	0.755*** (0.051)	0.833*** (0.053)	0.901*** (0.053)	0.616*** (0.056)	1.045*** (0.089)
Observations	4724	5052	5048	5044	5052	4713
R-squared	0.242	0.234	0.239	0.251	0.245	0.262

Note: controls include pupils' gender, FSM status, SEN status, ethnicity, standardised results at Key Stage 4, whether got at least 5 GCSE with grades A*-C, attitude toward school in year 9, number of hours worked during term time, parents' SEC, parents' education and parents' expectations.

Part 2: Pupil attainment

In this section of the report we estimate the value added at Key Stage 5 by different types of post-16 institution, focusing first only on those who are taking A levels. Table 14 estimates the determinants of a pupil's total A level point score (as has been said, for these regressions the variable is standardised and has a mean of zero and standard deviation of one). The model controls for the myriad of personal characteristics, pupil attitudes, school characteristics and LA characteristics that we included in our model of institutional choice. As we move from left to right across the table more characteristics are included and we can observe the sensitivity of the coefficients of interest. Only the coefficients on 6th form colleges and FE colleges are shown, as these are of primary interest. The base case is pupils in school based provision.

Thus, in column 1 we see that controlling only for pupils' prior attainment at GCSE, FE college students have significantly lower achievement at A level, as compared to both 6th form colleges and school based provision. Including pupil prior attainment does reduce the magnitude of the negative

coefficient on the FE variable substantially, i.e. the apparent effect from attending a FE college reduces dramatically once we take account of the fact that FE colleges admit lower achieving students. However as we move from left to right and we add additional pupil and school level characteristics, the FE coefficient remains negative but becomes insignificant. Thus once we also allow for the fact that FE colleges tend to admit more disadvantaged pupils from the most disadvantage schools, the FE effect starts to disappear. Interestingly though, once we control for LA effects, i.e. any factors specific to the local authority, the FE effect becomes negatively significant once again and increases in magnitude somewhat (becomes more negative). This model specification is akin to examining the relative performance of institutions *within* a local authority and thus arguably is more likely to be comparing like with like than the specification without local authority effects. The addition of local authority effects increases the FE effect. This implies that there must be a positive relationship between being in a FE college and average achievement levels in a local authority. If FE colleges tend to be located in LAs which have other characteristics that are correlated with higher pupil value added this would explain why when we model within local authorities and take the local authority effect away, we find FE colleges themselves have with lower value added. When we look within LAs, FE colleges appear to do worse than schools in terms of value added, even after controlling for the prior attainment, characteristics and schools of the student intake and crucially pupil attitudes. This is consistent with previous Departmental findings using a similar methodology but considerably less rich data³³. Specifically, similar pupils in FE colleges achieve 65 fewer points at A level as compared to pupils in schools, whilst pupils in 6th form colleges achieve 60 more points. This is a sizeable magnitude of effect given that the difference between A level grades is 30 points. Below we undertake a number of robustness checks, including a matching methodology, to verify this result.

What is also noticeable from Table 14 is that when we allow for pupil prior attainment, pupil characteristics (including pupil attitudes), school characteristics and LA (fixed) effects, this sharply increases the positive magnitude and significance of the coefficient on 6th form colleges. This table therefore seems to suggest that 6th form colleges add more value and FE colleges add less value at Key Stage 5 than school sixth forms. This model controls for a wide range of pupil and school factors. However, it is of course still possible that pupils sort into post-16 institutions on the basis of *unobservable* factors that may be correlated with achievement. This source of bias cannot be eliminated with our methodological approach.

³³ http://www.education.gov.uk/rsgateway/DB/SBU/b000467/stats_bulletin_01_04_final.pdf

Table 14: The determinants of total A level point score for those taking A levels at KS5 – a value added model.

	(1)	(2)	(3)	(4)	(5)
Sixth form Colleges	0.102 (0.072)	0.107* (0.061)	0.144** (0.059)	0.211** (0.082)	0.228*** (0.088)
FE colleges	-0.243*** (0.084)	-0.166** (0.081)	-0.126* (0.076)	-0.046 (0.084)	-0.250*** (0.090)
<i>Prior attainment</i>		✓	✓	✓	✓
<i>Pupil characteristics</i>			✓	✓	✓
<i>School characteristics (16)</i>				✓	✓
<i>LA dummies</i>					✓
Observations	2749	2749	2749	2749	2749
R-squared	0.008	0.275	0.311	0.347	0.422

Notes: Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1
The reference (omitted) category for *institution types* is *schools*.

A possible reason why pupils in FE colleges have lower performance at A level as compared with pupils in schools could be that FE students took different, arguably less academic, subjects at GCSE. We therefore also control for the grades achieved in Full GCSE English and Full GCSE Math (see table 15). We include grades as separate dummies to account for a possible non linear effect, with the reference categories (omitted) being the lowest grades in English and Math respectively. The magnitude of the effect from these grades on achievement at Key Stage 5 is small. However, as expected the negative effect associated with attending a FE college reduces once we account for differences in the prior GCSE scores of FE entrants by including measures of their GCSE grades in maths and English. This implies some of the apparent negative effect of FE colleges is in fact a selection effect, caused by less able students enrolling in FE.

As mentioned in sections 3 and 4, we focus primarily on the relative effectiveness of FE colleges for those doing A levels, since this is a more homogeneous group. However, we report below a table (table 16) where we use as a dependent variable the total GCE A Level and equivalent points score based on QCDA points, i.e. including vocational equivalent qualifications. Including vocational qualifications is likely to be more important for FE colleges since A level students are a minority in FE colleges and students are more likely to do a mix of vocational and academic qualifications in FE colleges. The table shows that the negative effect of FE colleges still holds, but is reduced in the final

specification to 34 points, which is equivalent to around one A Level grade. In other words even when we extend the analysis to students taking a broader range of qualifications at Key Stage 5, we continue to find that FE colleges are relatively less effective than schools.

Table 15: The determinants of total A level point score for those taking A levels at KS5 – a value added model (augmented by Math and English grades at GCSE)

	(1)	(2)	(3)	(4)	(5)
Sixth form Colleges	0.102 (0.072)	0.107* (0.061)	0.145*** (0.050)	0.142** (0.070)	0.138* (0.074)
FE colleges	-0.243*** (0.084)	-0.166** (0.081)	-0.065 (0.065)	-0.052 (0.071)	-0.196*** (0.075)
A* in GCSE English			1.303*** (0.267)	1.211*** (0.250)	1.120*** (0.218)
B in GCSE English			0.900*** (0.261)	0.813*** (0.244)	0.730*** (0.211)
C in GCSE English			0.582** (0.257)	0.500** (0.240)	0.404* (0.208)
D in GCSE English			0.145 (0.259)	0.074 (0.243)	0.011 (0.209)
E in GCSE English			-0.118 (0.268)	-0.170 (0.253)	-0.236 (0.219)
A* in GCSE Math			1.440*** (0.233)	1.400*** (0.224)	1.500*** (0.187)
A in GCSE Math			1.001*** (0.225)	0.986*** (0.217)	1.064*** (0.183)
B in GCSE Math			0.719*** (0.225)	0.720*** (0.218)	0.816*** (0.180)
C in GCSE Math			0.506** (0.221)	0.508** (0.215)	0.635*** (0.177)
D in GCSE Math			0.405* (0.229)	0.421* (0.223)	0.532*** (0.186)
E in GCSE Math			0.351 (0.262)	0.335 (0.260)	0.457** (0.225)
F in GCSE Math			0.491 (0.336)	0.554 (0.353)	0.715** (0.304)
<i>Prior attainment</i>		✓	✓	✓	✓
<i>Pupil characteristics</i>			✓	✓	✓
<i>School characteristics (16)</i>				✓	✓
<i>LA dummies</i>					✓
Observations	2748	2748	2748	2748	2748
R-squared	0.008	0.275	0.476	0.489	0.544

Table 16: The determinants of total A level and equivalent point score at KS5 – a value added model

	(1)	(2)	(3)	(4)	(5)
Sixth form Colleges	0.214*** (0.072)	0.235*** (0.061)	0.269*** (0.059)	0.304*** (0.067)	0.309*** (0.066)
FE colleges	-0.508*** (0.059)	-0.161*** (0.051)	-0.093* (0.050)	-0.064 (0.056)	-0.127** (0.056)
<i>Prior attainment</i>		✓	✓	✓	✓
<i>Pupil characteristics</i>			✓	✓	✓
<i>School characteristics (16)</i>				✓	✓
<i>LA dummies</i>					✓
Observations	3343	3343	3343	3343	3343
R-squared	0.057	0.350	0.392	0.423	0.494

Table 17 then estimates the main model (where the dependent variable is the total A level QCDA score for A level students only) but by level of prior attainment. The sample is divided into low achievers, those in the bottom two quintiles of the Key Stage 4 distribution (calculated only for those who stay in FTE and take A-Levels), and higher achievers, i.e. those in the top two quintiles of the KS4 distribution. The problem with this approach is that our already small sample size of FE students is reduced further and in particular there are far fewer high achieving students who attend FE colleges, making comparisons problematic. The results from Table 17 suggest that for high and low achieving pupils, FE colleges are no less effective than schools once the full range of controls are included in the model. However, the FE coefficient is negative and on the border of statistical significance, suggesting there may be a negative effect (particularly for high achieving pupils) that is insignificant due to our small sample size. This finding therefore merits further investigation in larger data sets (see part 3 below). What is most striking from Table 17 is that 6th form colleges only add more value at A level than schools for higher achieving pupils. Of course there is an issue about comparability, in that FE colleges have many more lower achieving pupils than do schools and 6th form colleges. To make a fair comparison, therefore, we must ensure that there is an adequately sized group of similar pupils in all types of provision. Our matching approach described below addresses this problem by ensuring comparability in the control group (pupils in schools) and the treatment group (pupils in FE colleges).

Table 17: The determinants of total A level point score for those who take A levels at KS5 – a value added model by level of prior attainment

	(1)	(2)	(3)	(4)	(5)
High achievers					
Sixth form Colleges	0.150 (0.112)	0.104 (0.107)	0.199** (0.101)	0.484*** (0.126)	0.350*** (0.125)
FE colleges	-0.318** (0.155)	-0.335** (0.148)	-0.199 (0.139)	0.075 (0.144)	-0.255* (0.144)
<i>Prior attainment</i>		v	v	V	V
<i>Pupil characteristics</i>			v	V	V
<i>School characteristics (16)</i>				V	v
<i>LA dummies</i>					v
Observations	1093	1093	1093	1093	1093
R-squared	0.013	0.076	0.178	0.267	0.439
Low achievers					
Sixth form Colleges	0.129* (0.076)	0.116 (0.072)	0.148** (0.070)	0.062 (0.112)	0.069 (0.124)
FE colleges	-0.033 (0.083)	-0.007 (0.081)	-0.013 (0.081)	-0.066 (0.101)	-0.143 (0.122)
<i>Prior attainment</i>		v	v	V	V
<i>Pupil characteristics</i>			v	V	V
<i>School characteristics (16)</i>				V	v
<i>LA dummies</i>					v
Observations	1110	1110	1110	1110	1110
R-squared	0.004	0.112	0.153	0.172	0.300

Notes: Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

The reference (omitted) category for *institution types* is *schools*.

Low (high) achievers= bottom (top) two quintiles of the distribution of KS4 (for those who stay in FTE and take A-Levels).

It is also worth noting that the negative coefficient on the FE college variable increases in all the above models when we add dummy variables for each LA. Thus when we look within local authorities at the effect of institution type, i.e. allowing for some local area effects, the negative impact from attending an FE college actually increases.

Although the coefficients on all the other control variables are not shown in the above tables, we did also consider the relationship between background variables and pupils' A level attainment by type of institution (see Appendix table A3). When we did this, it does appear that the relationship

between prior attainment and A level score is somewhat weaker in FE colleges than in schools and 6th forms. In other words, a person's GCSE attainment was a poorer predictor of their total A level point score in an FE college than in school based provision. We also found a number of differences in the impact of personal characteristics across institution type. This is consistent with FE colleges having lower value added for some groups of pupils. However, interpretation of these differences needs to be done cautiously since many FE colleges and schools will not have the full range of pupils represented in the student body. This was a major factor behind pursuing a propensity score matching approach.

We also recognise that students in FE take fewer A levels, as described earlier. Our preferred models presented above use a dependent variable that measures the total attainment of the student i.e. total points at A level or total points at key stage 5 including A level equivalents. These are arguably the most appropriate measures of the total academic value added by the post 16 institution since clearly we need to measure the impact of institution on both the quantity and quality of qualifications acquired. For completeness however, we also estimated a model which used total QCDA points per qualification entered (for A levels only), again using standardised test scores. This specification assesses whether ignoring the number of qualifications taken and focusing simply on average point score per qualification, students in FE colleges still do worse than students in school based provision. This is indeed the case although the magnitude of the negative coefficient for FE colleges is reduced somewhat to just -0.094, which is equivalent to three points per A level entry. This suggests that most of the negative FE effect identified above is linked to total A level points rather than average points. The positive coefficient for sixth form colleges is of a similar magnitude to our other models, at +0.255, and is equivalent to nine A level points, or a third of a grade.

Area / competition effects

Another research question of interest for this report was the potential impact of patterns of institutional provision on value added at GCSE to A level. We anticipated that there may be potentially beneficial competition effects where there is mixed provision in an area, as different types of providers compete for students. Due to data limitations however, we were unable to include rich measures of the extent of the genuine competition between different types of providers and could not explicitly model the geographical distance between students and the institution they attended. We were however, able to consider the impact of being in a rural area (the argument being that competition is likely to be less in such areas), being in a local authority with a higher proportion of schools with 6th forms and being in a local authority with a higher proportion of

students enrolled in FE. The coefficients on these variables were insignificant at the 5% level, suggesting that our admittedly crude indicators of the extent of potential competition in an area were insignificant drivers of pupil attainment.

Matching estimation

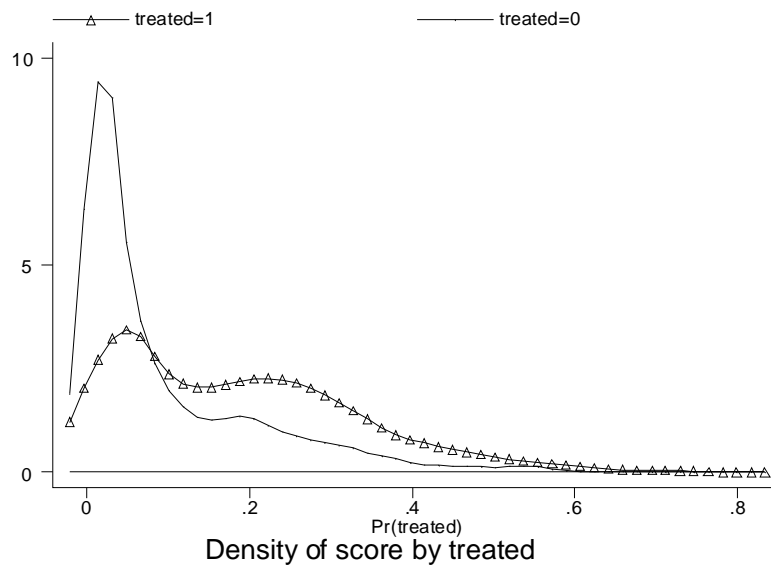
This section reports the results of the estimates based on the matching method. As explained above, to “recover the average treatment effect on the treated, the matching method tries to mimic *ex post* an experiment by choosing a comparison group from among the non-treated such that the selected group is as similar as possible to the treatment group in terms of their observable characteristics” (Blundell et al., 2003, p. 12).

In our case the *treated* are the pupils attending FE colleges and the *control* group is made of pupils in schools and 6th form colleges. The analysis in Part 1 of this report clearly indicates that the two groups are significantly different in terms of observable characteristics. The Hotelling test on the null hypothesis that the vector of means of all these variables are equal for the two groups yields an F statistic of 43.528 and a P-value of 0.000 suggesting we have to reject the null hypothesis that the two groups are similar. This confirms that pupils are not randomly distributed across institution types, and that there is indeed a process of selection that we need to take into account.

We estimate a probit model of the likelihood of enrolling in FE (as compared to school based provision). This gives us a propensity score for each individual, indicating the likelihood of an individual enrolling in FE on the basis of their personal characteristics, prior attainment and school. For the matching method to have empirical content it is required that there is an overlap in the characteristics and by implication the propensity scores, across the FE and school groups. In other words, there needs to be a common support such that all treated individuals (in FE colleges) have a counterpart in the non-treated population (in schools/6th form colleges).

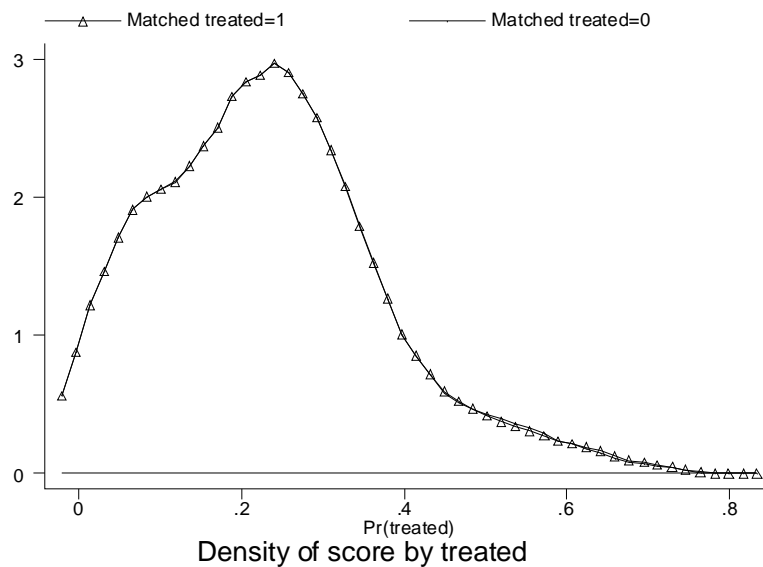
We check for the existence of adequate common support by looking at the distribution of the propensity scores for the treated and the non-treated groups (Figure 3). As is evident, there is a considerable overlap in the two distributions meaning that we have a good common support and it is possible to find an adequate comparison group for those in FE colleges from those in school based provision.

Figure 3: Distribution of Propensity Scores (before the matching)



We also examined the distribution of propensity scores after the matching process using the Nearest Neighbour method (imposing a caliper of 0.5%³⁴). As is evident from figure 4, we have aligned the propensity scores very successfully.

Figure 4: Distribution of Propensity Scores (after the matching)



³⁴ NN matching faces the risk of bad matched if the closest neighbour is far away. This can be avoided by imposing a tolerance level on the maximum propensity score distance (calliper) so that bad matches are avoided and the matching quality increases (Caliendo and Kopeinig, 2005). We imposed a calliper of 0.005 which leads to the loss of 12 treated.

The quality of the matching is also assessed by looking at how well matching has balanced the observable characteristics between the two groups. Table A4 in appendix shows that the matching has balanced our regressors and has by implication decreased the selection bias, to the extent that it is based on observable characteristics³⁵. To assess balance, we have to look at both the bias and the mean differences between treatment and control groups in the matched sample. A test of the joint insignificance of the difference in the means of all the variables also leads us to accept the null that overall the two groups are jointly balanced.

Table 18 reports the difference in the mean total A level point score for those taking A levels only in FE colleges compared to those in school/6th form college provision also taking A levels (for the matched sample). This provides us with what is known as the average treatment effect on the treated, i.e. the impact of attending FE on those who attended FE (ATT). Two estimates are provided. The first comes from a model which includes only pupil and school level variables in the matching process. The second estimate also includes local authority effects in the matching model.

Table 18: effect of participation in FE on KS 5 results (ATT) – Matching method

	<i>Match on all the X</i>	<i>Match on all the X plus LA dummies</i>
ATT	-0.110	-0.239**
(standard error)	(0.099)	(0.134)

The results from the matching model essentially confirm the findings from the earlier OLS estimates: once we take selection into account, the FE college coefficient is negative but not significant. This suggests FE colleges do not significantly differ from schools/6th form colleges in terms of the value they add between GCSE and A level. However, if we control for LA effects, the negative effect of attending an FE college becomes significant, suggesting that within each LA, students in FE colleges make less progress for a given level of prior attainment than do those in schools/6th form colleges. The confirmation of our original OLS findings from the matching model is reassuring, although the

³⁵ The table reports two rows for each variable: unmatched and matched. In each row, it shows the mean of the variable for the treatment group and the mean for the control group. It also shows the “% standardized bias,” and the % reduction in bias, which is how much of this bias was eliminated by matching.

matching approach cannot take account of selection into FE colleges on the basis of unobserved factors, i.e. variables that we do not have in our data. Given the richness of LSYPE data we are reasonably confident of our reliance on observable characteristics.

Part 3: Participation in Higher Education

In this section of the report we consider intermediate outcomes, namely participation in higher education, from attending sixth form based provision as compared to FE college. Specifically we use the administrative data discussed earlier to model pupils' trajectories from Key Stage 2 into HE (or not). In table 19 below we show the coefficient on just one variable, namely whether or not the person obtained their A levels in an FE institution, where the base case is individuals who acquired their A levels at school or in a 6th form college. However, the model controls for the full range of personal and school characteristics available in the administrative data (these tables are available at Table A5 in the appendix). A key point to note, however, is that for this analysis we are relying on data that is not as rich as the analysis in part 1 and 2 of the report. This means we are somewhat less confident we have controlled fully for other factors that might influence HE participation, such as parental attitudes. However, the sample sizes we have for this part of the analysis are considerably larger and therefore there is a trade off between richness of the data and statistical precision.

The results from Table 19 suggest that there is an FE effect for both males and females. Both men and women are around 4-5 percentage points less likely to participate in higher education if they acquired their A levels in FE. This is a key result as the model controls fully for these young people's prior attainment, including as it does their Key Stage 2, Key Stage 3 and GCSE results, as well as detailed information on their A level grades and subjects taken. What this table is telling us is that for students with exactly the same level of prior attainment, there is a reduced probability of going to university if the student went to an FE college. This may not be due to bias against FE college students from universities, since all these FE students acquired A levels and are not attempting to enter HE with alternative qualification profiles. It may not even reflect the quality of education FE colleges provide. Rather it may be that the types of student who enrol in FE colleges are less likely to go on to higher education than their peers in sixth form based provision for other reasons. One possibility for example, is that they come from families with lower aspirations about their children attending HE. Another equally plausible explanation would be that FE colleges do not encourage their students to enrol in HE to the same extent as schools or sixth form colleges. Whatever the

explanation, this finding of a negative effect for attending FE in terms of HE participation is consistent with the FE effect we observed when using LSYPE data to model value added at Key Stage 5.

Table 19: The likelihood of participating in higher education by type of provision at Key Stage 5

	Overall Participation	
	Females	Males
Obtained A-levels via FE	-0.041**	-0.047**
Controls for:		
Pupil characteristics		
Key Stage 2, 3 and 4 achievement		
Observations	205669	166813
R-squared	0.235	0.265

* significant at 5%; ** significant at 1%

Another issue we can consider is the nature of HE participation undertaken by different types of student. In table 20 we limit the sample to students who are participating in university and then model their likelihood of attending a high status (research intensive) institution, as defined earlier. Again we see that, controlling for a range of pupil and school characteristics (table A5 in the appendix), students who enter HE from an FE college are significantly less likely to enrol in a high status higher education institution. The effect is not particularly large however, particularly for males, which seems to suggest that whilst attending an FE college may be associated with lower aspirations to go to university generally, those who do go to a university from an FE college are not much less likely to have high aspirations in terms of their choice of institution.

Table 20: The likelihood of participating in high status higher education by type of provision at Key Stage 5

	Participation in a high status institution	
	<i>Females</i>	<i>Males</i>
Obtained A-levels via FE	-0.028**	-0.012**
	[0.003]	[0.003]
Observations	152472	117682
R-squared	0.368	0.429

* significant at 5%; ** significant at 1%

7 Conclusions and Implications

We commenced by considering who remains in full time education and specifically who enrolls in FE colleges. We conclude the following:

- Different types of pupils choose to enrol in FE and sixth form based provision.
- The following types of pupils are more likely to enrol in sixth form based provision:
 - More advantaged/ high achieving pupils
 - Pupils in a school with a 6th form
 - Pupils in the most advantaged schools
 - Pupils in a single sex school
 - Pupils in a school with a lower pupil teacher ratio
 - Pupils in comprehensive or community schools.

Specifically, having 5 GCSEs A*-C not only increases the probability of a student remaining in full time education (by 9 percentage points) but also increases the probability of going into sixth form based provision by around 21 percentage points. Socio-economic background also impacts on choice of post 16 institution. For those who remain in full time education, pupils whose parents do a routine job are 10 percentage points more likely to enrol in FE colleges, as compared to those from professional backgrounds. Attitudes also matter: pupils whose parents have high aspirations about their children's educational achievements are more likely to enrol in sixth form based provision than in FE colleges.

We also find that the local area does influence pupils' choice of institution. For example, once pupils in poorer areas have decided to stay in full time education, they are then 14.4 percentage points more likely to choose FE. This could of course reflect the fact that pupils in poorer areas live nearer to FE colleges than pupils in wealthier areas. We cannot discount this explanation as we do not undertake a geographical analysis; however, we note that this finding holds true even when we analyse the decisions made by pupils within particular local authorities.

Generally, the characteristics of the child's school at age 16 do not significantly determine whether or not the young person remains in full time education post-16. But school characteristics do impact on individuals' choice of institution post-16. Whilst this analysis cannot consider geographical issues

in detail, the report does consider the choices made by pupils within different local authorities and within local authorities, pupils in more socio-economically advantaged schools with a lower proportion of children eligible for Free School Meals are much more likely to enrol in sixth form based provision post-16.

We therefore conclude from Part 1 of our report, that general FE college enrolment is determined by pupils' prior attainment but also by their family background and their parents' attitude towards education. As FE attendance is socially graded, this is likely to impact on pupil performance at Key Stage 5 as well. These results clearly illustrate that there is significant selection of pupils into FE provision and that this will tend to bias results if it is not fully accounted for.

We also examined the value added by FE colleges, school sixth forms and 6th form colleges at Key Stage 5 and specifically at A level. For this analysis we largely restricted our analysis to those studying A levels in FE and this is, as has been said, a minority of FE students. In some specifications we also consider other level 3 equivalent qualifications but we do not, for example consider adults in FE or indeed those students doing level 2 qualifications. We conclude that:

- The type of institution seems to matter most for higher achieving pupils taking A-levels: When we look separately at higher ability students, sixth form colleges add more value at A level than school sixth forms, which in turn add more value than general FE colleges. For higher achieving pupils taking A levels only, 6th form colleges add around 90 additional QCDA points at A level as compared to schools, whilst FE colleges add 67 fewer points than schools.
- For lower achieving students, institutions appear to matter less and the value added across the different types of institutions (schools, 6th form colleges and FE colleges) does not vary significantly.

Findings in more detail:

- Different types of institutions add different value at A level and more generally at Key Stage 5 (using the QCDA total tariff to equalise A level and non A level qualifications). 6th form colleges add most value, followed by school sixth forms and then general FE colleges. We

found this hierarchy applies for students studying A-levels³⁶ and for those studying for other qualifications. For example, in our general model of all students, similar pupils taking A levels only in FE colleges achieve 65 fewer points at A level as compared to pupils doing A levels in schools, whilst pupils in 6th form colleges achieve 60 more points. These are sizeable magnitudes of effect equivalent to around two grades at A level;

- As has been said, most of the analysis focused on the minority of FE students taking A levels only as this makes for a more similar comparison across institutions. However, we also found that when we considered students taking A levels or other equivalent qualifications at Key Stage 5, the main results still hold though the magnitude of the effects change. FE colleges add 34 fewer points (around one grade) at Key Stage 5 than schools, whilst 6th form colleges add 80 points more.
- Hence, a key finding of these models is that once we allow for the fact that FE colleges admit more disadvantaged pupils from disadvantaged schools and we allow for differences across local authorities in achievement, we still find that those who attend an FE college do somewhat less well at Key Stage 5. However, when we look separately at higher and lower ability students, we find that differences in institutional value added are only statistically significant for the higher ability students. For lower ability students, the patterns are the same but the effects are on the border of statistical significance.
- We also investigated the potential impact of local patterns of post 16 institutional provision on value added at GCSE to A level, in a relatively simplistic manner. We were able to consider the impact of being in a rural area, being in a local authority with a higher proportion of schools with 6th forms and being in a local authority with a higher proportion of students enrolled in general FE. None of these factors influenced pupil value added at Key Stage 5.
- Our analysis allowed us to consider intermediate outcomes, such as whether or not a student enrolls in a university. Unlike the analysis reported above, this part of the research uses administrative data so does not include as wide a range of factors that might influence HE participation, such as parental expectations and pupil attitudes. After allowing for differences in pupils' prior attainment at Key Stage 4 and 5 only, those attending FE colleges are less likely to go to university (by around 4-5 percentage points) than those attending sixth form based provision. Those who do go to university are less likely to attend a high status research intensive institution (broadly a Russell Group institution or equivalent in terms of research quality) though this effect is small (between 1 and 3 percentage points). In

³⁶ A relatively small proportion of students study for A levels in FE (equating to 309 students in our sample). 30% of students enrol in FE colleges post 16 and of those in FE colleges around 40% study for A levels.

other words, our results suggest that FE colleges add less value in terms of longer run outcomes, as well as Key Stage 5 results, although the institutional effects are especially caveated because they cannot control for all the likely influences on HE participation.

We therefore conclude from Parts 2 and 3 of this report that those in general FE colleges, whether doing A levels or other types of Key Stage 5 qualifications, do more poorly in terms of their education attainment than those who opt for sixth form based provision. This result only holds for students who are higher achieving at GCSE level. Furthermore, we only considered students who took either A levels or other level 3 qualifications in FE colleges. FE colleges often take students who have not attained level 2 qualifications and this important role is not considered in our analysis. We also need to be cautious. Our models do allow for a substantial array of factors that influence pupils' choice of post 16 institution and that also influence pupil attainment, such as pupils' socio-economic background. Yet we need to remain aware that despite the richness of our models, this result may still reflect the fact that those who attend FE colleges are more educationally disadvantaged in ways that we do not account for in our model.

The implications of this work are therefore complex. Some existing literature has concluded that FE colleges and schools are similarly effective at Key Stage 5, although the Department has previously undertaken research which suggested FE colleges add less value at A level³⁷. This previous literature is based on relatively limited data sets however and some studies did not focus specifically on value added at A level. Using richer data and focusing on value added at A level (to ensure greater comparability with school based provision) we find a negative effect from attending FE for higher achieving pupils only. However, since our evidence also shows that those who enroll in FE are more disadvantaged, both educationally and socially, it is extremely hard to separate out the fact that FE colleges cater for lower achieving students from the fact that they also appear to add less value than schools and 6th form colleges. As we move forward towards the raising of the education and training participation age to 18, it is likely that more young people will enroll in FE. It is crucial that we recognize that FE colleges have a harder job to do, working with harder to reach students with lower levels of prior achievement. We also need to monitor carefully the value added by FE colleges and understand why FE colleges appear to struggle to add similar amounts of value added to schools and 6th form colleges at A level for higher ability students.

³⁷ http://www.education.gov.uk/rsgateway/DB/SBU/b000467/stats_bulletin_01_04_final.pdf

References

- Andrews, M. and Bradley, S. (1997): "Modelling the transition from school and the demand for training in the United Kingdom", *Economica*, **64**, 387–413.
- Becker, G. (1964): "Human capital", New York: National Bureau of Economic Research.
- Blundell, R., Dearden, L. and Sianesi, B. (2003): "Evaluating the impact of education on earnings in the UK: Models, methods and results from the NCDS," IFS Working Papers W03/20, Institute for Fiscal Studies.
- Caliendo, M. and Kopeinig, S. (2005) "Some Practical Guidance for the Implementation of Propensity Score Matching," IZA Discussion Papers 1588, Institute for the Study of Labor (IZA).
- Chowdry, H., Crawford, C., Dearden, L. and Goodman, A. (2008) Understanding the determinants of participation in higher education and the quality of institute attended: analysis using administrative data. Institute of Fiscal Studies http://www.ifs.org.uk/publications.php?publication_id=4234 .
- Clark, D. (2002), "Participating in Post-Compulsory Education in England: What explains the boom and bust?", CEE Discussion Paper No. 24.
- Clark, D. (2009): "Do Recessions Keep Students in School? The Impact of Youth Unemployment on Enrolment in Post-Compulsory Education in England", *Economica*, forthcoming.
- Clark, D., Conlon, G. and Galindo-Rueda, F. (2005): "Post-Compulsory Education and Qualification Attainment", in Machin, S. and A. Vignoles (eds.) *What's the Good of Education? The Economics of Education in the United Kingdom*, Princeton University Press: Princeton
- Dearden, L. Leslie McGranahan, L. and Sianesi, B. (2004): "Returns to Education for the Marginal Learner: Evidence from the BCS70," CEE Discussion Papers 0045, Centre for the Economics of Education, LSE.
- Dickerson, A. and Jones, P., (2004), "Estimating the impact of a minimum wage on the labour market behaviour of 16 and 17 years old", *Research Report for the Low Pay Commission*.
- Heckman, J.J., Ichimura, H. and Todd, P.E. (1998), "Matching as an Econometric Evaluation Estimator", *Review of Economic Studies* 65, 261-294.
- Hobbs, G. And Vignoles, A. (2009) 'Is children's free school meal 'eligibility' a good proxy for family income?', *British Educational Research Journal*, 1469-3518, First published on 22 July 2009.
- Kodde, D. and Ritzen, J., (1985): "The demand for education under capital markets imperfections", *European Economic Review*, **28** (3), pp. 347–355.
- KPMG LLP (2008) *The Funding Gap: A project to assess the progress made in reducing the funding gap between school sixth forms and FE colleges*, final report for the Learning and Skills Council, <http://readingroom.lsc.gov.uk/Lsc/National/nat-fundinggap-may08.pdf> .

- McIntosh, S. (2004) 'The Impact of Vocational Qualifications on the Labour Market Outcomes of Low-Achieving School-Leavers', Centre for Economic Performance Discussion Paper No. 621.
- Micklewright, J., (1989): "Choice at sixteen", *Economica*, **56** (221), pp. 25–39.
- Micklewright, J., Pearson, M. and Smith, S., (1990): "Unemployment and early school leaving", *Economic Journal*, **100** (400), pp. 163–169.
- Morris, A., Davies, P. and Bromley, R, (1999) *Sixth form centres in FE colleges*. A report for the DfEE. FEDA.
- Owen, G. & Fletcher, M. (2005) *The funding gap: Funding in schools and colleges for full time students aged 16-18*. LSDA Research Report. London: LSDA.
- Owen, G. and Fletcher, M. (2006) Size matters. Economies of scale in schools and colleges. London: LSN.
- Petrongolo, B. and San Segundo, M. J. (2002): "Staying-on at school at 16: the impact of labor market conditions in Spain", *Economics of Education Review*, **21**(4), 353-65.
- Rice, P. (1999) "The Impact of Local Labour Markets on Investment in Further Education: Evidence from the England and Wales Youth Cohort Studies", *Journal of Population Economics*, **12** (2), 287-312.
- Schagen, I. *et al.* (2006) Do post-16 structures matter? Evaluating the impact of local patterns of provision. London: LSN.
- Stanton, G. (2004) *The organisation of full-time 14-19 provision in the state sector*. Nuffield Review Working Paper 13, www.nuffield14-19review.org.uk
- Stanton, G. & Fletcher, M. (2005) *National institutional patterns and the effects of these on aspects of participation, attainment and progression*. Nuffield Review Institutional Dimension series Discussion Paper 2, www.nuffield14-19review.org.uk.
- Stanton, G. and Fletcher, M (2006) '14-19 Institutional arrangements in England: a research perspective on collaboration, competition and patterns of post-16 provision', Nuffield Review of 14-19 Education and Training, Working Paper 38, September 2006.
- Styles, B. & Fletcher, M. (2006) *Provision for learners aged 14-16 in the FE sector - An initial analysis*. LSDA Research Report. London: LSDA.
- Thomas, W. and Webber, D.J. (2001): "'Because my friends are': The impact of peer groups on the intention to stay-on at sixteen", *Research in Post-Compulsory Education*, **6**(3), pp.339–54.
- Thomas, W. and Webber, D.J. (2009): "Choice at 16: school, parental and peer group effects", *Research in Post-Compulsory Education*, **14**(2), pp. 119–141.

Appendix

Table A1: Summarising descriptive statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Female	6780	0.490	0.500	0	1
FSM	6780	0.092	0.289	0	1
SEN	6780	0.132	0.338	0	1
White – reference	6780	0.695	0.460	0	1
Other white	6780	0.015	0.122	0	1
Bangladeshi	6780	0.047	0.211	0	1
Caribbean	6780	0.021	0.144	0	1
Chinese	6780	0.002	0.044	0	1
Indian	6780	0.077	0.266	0	1
Pakistani	6780	0.068	0.252	0	1
African	6780	0.021	0.144	0	1
Mixed	6780	0.042	0.201	0	1
Other	6780	0.012	0.107	0	1
Eng Additional Language	6780	0.209	0.407	0	1
KS4 std scores	6780	0.254	0.885	-2.32	4.34
5 GSCE A*-C	6780	0.564	0.496	0	1
NS-SEC: High managerial & professional	6780	0.139	0.346	0	1
NS-SEC: Low managerial & professional	6780	0.273	0.446	0	1
NS-SEC: Intermediate occupation	6780	0.054	0.225	0	1
NS-SEC: Small empl. and own work	6780	0.076	0.265	0	1
NS-SEC: Low supervisory & technical work	6780	0.137	0.344	0	1
NS-SEC: Semi-routine	6780	0.085	0.278	0	1
NS-SEC: Routine	6780	0.107	0.309	0	1
Not currently working	6780	0.129	0.336	0	1
Father has a degree	6780	0.147	0.354	0	1
Mother has a degree	6780	0.114	0.318	0	1
School attitude scale (Y9)	6780	34.743	6.747	2	48
No hours worked	6780	1.839	3.735	0	37
Parent want yp to stay in FTE	6780	0.836	0.370	0	1
Variables at school level					
Sixth form school	6745	0.617	0.486	0	1
% staying in FTE	6767	35.629	26.594	0	100
%achieving 5 GSCE AC	6780	57.330	18.345	0	100
% FSM	6765	11.653	11.698	0	85.39
Community school	6664	0.674	0.469	0	1
City Tech College	6664	0.008	0.088	0	1
Foundation	6664	0.170	0.375	0	1
Independent	6664	0.000	0.021	0	1
Voluntary Aided	6664	0.114	0.318	0	1
Voluntary Controlled	6664	0.034	0.182	0	1
School size	6765	1143.962	346.512	70	2438
PT ratio	6765	16.544	1.747	5.762	23.553
Prop non white British	6765	0.253	0.286	0	1
Single sex school	6765	0.122	0.327	0	1
Variables at LA level					
Unemp rate (16-19)	6329	21.880	10.156	5.9	67.1
IDACI score	6780	0.202	0.175	0.003	0.981
% in sixth form school	6775	0.459	0.263	0	1
% staying in FTE	6767	34.022	16.124	0.538	69.211
% in FE on tot FTE	6780	55.966	18.837	21.504	98.232

Table A2: The determinants of remaining in full time education and choice of post-16 provision by gender

	Females		Males	
	<i>1st choice</i>	<i>2nd choice</i>	<i>1st choice</i>	<i>2nd choice</i>
FSM	0.021 (0.045)	-0.084 (0.061)	-0.039 (0.046)	0.043 (0.052)
SEN	0.090*** (0.034)	0.027 (0.039)	0.068** (0.028)	-0.040 (0.035)
Other white	-0.009 (0.042)	-0.078 (0.066)	-0.055 (0.057)	-0.037 (0.056)
Bangladeshi	0.052 (0.039)	-0.082 (0.064)	0.093* (0.050)	-0.113 (0.083)
Caribbean	0.127*** (0.026)	-0.084 (0.058)	0.164*** (0.054)	-0.097 (0.064)
Chinese	0.047 (0.051)	-0.203*** (0.067)	0.066 (0.073)	0.027 (0.218)
Indian	0.043 (0.029)	-0.126** (0.052)	0.027 (0.039)	-0.135** (0.056)
Pakistani	0.048 (0.038)	-0.112* (0.063)	0.098** (0.043)	-0.093 (0.062)
African	0.088*** (0.030)	-0.100 (0.061)	0.181*** (0.033)	-0.097* (0.059)
Mixed	0.054** (0.027)	-0.078* (0.041)	0.070** (0.033)	-0.080** (0.036)
Other	0.088** (0.045)	-0.026 (0.097)	0.025 (0.059)	-0.059 (0.070)
EAL	0.065** (0.029)	-0.022 (0.050)	0.127*** (0.039)	-0.006 (0.050)
GCSE/KS4 (std scores)	0.084*** (0.013)	-0.118*** (0.018)	0.101*** (0.014)	-0.104*** (0.018)
5 GCSEs A*-C	0.163*** (0.022)	-0.191*** (0.029)	0.186*** (0.023)	-0.269*** (0.031)
SEC: Low managerial & professional	-0.024 (0.018)	0.008 (0.026)	0.039* (0.022)	0.020 (0.026)
SEC: Intermediate occ.	-0.027 (0.028)	-0.016 (0.040)	0.044 (0.037)	0.026 (0.043)
SEC: Small empl. and own work	-0.025 (0.030)	-0.012 (0.040)	0.004 (0.033)	0.069 (0.043)
SEC: Low supervisory & technical	-0.036 (0.025)	0.128*** (0.038)	-0.034 (0.028)	0.063* (0.035)
SEC: Semi-routine	-0.070** (0.031)	0.115*** (0.041)	0.020 (0.035)	0.014 (0.045)
SEC: Routine	-0.104*** (0.032)	0.048 (0.043)	0.038 (0.034)	0.137*** (0.043)
SEC: Not working	-0.062* (0.036)	0.094* (0.053)	0.068* (0.038)	0.016 (0.044)

Father with degree	0.018 (0.016)	-0.018 (0.024)	0.052*** (0.019)	0.022 (0.029)
Mother with degree	0.030** (0.014)	-0.037 (0.026)	0.034* (0.020)	-0.034 (0.024)
School attitude (Y9)	0.006*** (0.001)	-0.004*** (0.002)	0.005*** (0.001)	-0.004** (0.002)
No hours worked	-0.006*** (0.002)	0.003 (0.003)	-0.007*** (0.002)	0.003 (0.002)
Parent want yp to stay in FTE (Y9)	0.114*** (0.027)	-0.160*** (0.036)	0.172*** (0.023)	-0.156*** (0.031)
Constant	0.388*** (0.051)	0.771*** (0.072)	0.230*** (0.051)	0.786*** (0.069)
Observations	3320	2625	3460	2448
R-squared	0.225	0.222	0.280	0.257

Table A3: Separate models by institution types- Dependent variable: KS5 average score (A-level only)

	Schools	Sixth form colleges	FE colleges
KS4 (std scores)	0.830*** (0.039)	0.821*** (0.071)	0.694*** (0.119)
Female	-0.010 (0.040)	-0.079 (0.076)	0.152 (0.126)
FSM	0.010 (0.139)	-0.126 (0.205)	-0.404 (0.312)
SEN	-0.145 (0.109)	-0.145 (0.235)	0.337 (0.353)
Other white	-0.021 (0.144)	0.274 (0.264)	-0.014 (0.430)
Bangladeshi	-0.026 (0.146)	-0.001 (0.326)	-0.486 (0.420)
Caribbean	-0.077 (0.158)	-0.117 (0.301)	-0.552 (0.485)
Chinese	0.635** (0.304)	0.943 (0.861)	-1.746 (1.184)
Indian	-0.166 (0.104)	0.109 (0.238)	-0.160 (0.310)
Pakistani	-0.096 (0.126)	-0.081 (0.267)	-0.462 (0.364)
African	-0.022 (0.142)	-0.368 (0.358)	-0.332 (0.455)
Mixed	-0.029 (0.086)	-0.017 (0.167)	0.080 (0.317)
Other	-0.157 (0.192)	-0.230 (0.571)	1.093* (0.582)
EAL	0.075 (0.093)	-0.196 (0.219)	-0.117 (0.266)
SEC: Low managerial & professional	0.001 (0.052)	-0.081 (0.109)	-0.045 (0.171)
SEC: Intermediate occ.	-0.016 (0.087)	0.018 (0.182)	-0.048 (0.283)
SEC: Small empl. and own work	-0.058 (0.084)	-0.567*** (0.182)	0.063 (0.230)
SEC: Low supervisory & technical work	-0.113 (0.078)	-0.208 (0.150)	0.012 (0.232)
SEC: Semi-routine	-0.147* (0.088)	0.090 (0.186)	-0.295 (0.324)
SEC: Routine	-0.275*** (0.094)	-0.219 (0.173)	0.234 (0.293)
Not currently working	-0.059 (0.105)	-0.005 (0.197)	0.231 (0.297)
Father with degree	0.166*** (0.050)	0.246** (0.104)	0.432*** (0.152)
Mother with degree	0.093* (0.053)	0.138 (0.103)	0.018 (0.185)
School attitude (Y9)	-0.000 (0.003)	0.004 (0.007)	0.005 (0.010)

No hours worked	-0.004 (0.006)	-0.011 (0.013)	0.006 (0.018)
Parent want yp to stay in FTE (Y9)	0.203** (0.093)	0.393** (0.194)	0.137 (0.231)
Sixth form	-0.348*** (0.115)	-0.406* (0.241)	0.058 (0.432)
% staying in FTE	0.005* (0.003)	0.007 (0.005)	0.001 (0.009)
% achieving 5 GSCE AC	0.005** (0.002)	-0.008* (0.004)	-0.007 (0.006)
% FSM	-0.006 (0.005)	-0.016** (0.007)	-0.013 (0.010)
City technology college	-0.872*** (0.227)		
Foundation	-0.073 (0.070)	-0.068 (0.136)	0.559* (0.314)
Independent	-0.428 (0.888)		
Voluntary Aided	-0.064 (0.074)	-0.334** (0.148)	-0.123 (0.242)
Voluntary Controlled	0.543*** (0.113)	-0.431 (0.302)	0.172 (0.459)
School size	-0.000 (0.000)	0.000 (0.000)	-0.000 (0.000)
PT ratio	-0.025 (0.018)	-0.029 (0.033)	-0.003 (0.047)
Prop non white British	-0.267 (0.173)	0.164 (0.319)	0.511 (0.570)
Single sex	0.285*** (0.080)	-0.138 (0.142)	0.013 (0.217)
LA dummies	yes	yes	yes
Constant	-0.252 (0.514)	0.008 (1.133)	-0.502 (1.313)
Observations	1959	533	257
R-squared	0.446	0.524	0.563

Standard errors in parentheses; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table A4: Test of balance between observables in the two groups (treated and non treated)

Variable	Sample	Mean		%bias	%reduc bias	t- test	
		Treated	Control			t	p> t
Female	<i>Unmatched</i>	0.58755	0.55317	6.9		1.06	0.291
	<i>Matched</i>	0.58776	0.60816	-4.1	40.6	-0.46	0.646
FSM	<i>Unmatched</i>	0.12451	0.04691	28		5.25	0
	<i>Matched</i>	0.10204	0.08571	5.9	79	0.62	0.537
SEN	<i>Unmatched</i>	0.02724	0.03235	-3		-0.44	0.657
	<i>Matched</i>	0.02857	0.02449	2.4	20.2	0.28	0.779
Other white	<i>Unmatched</i>	0.01946	0.02062	-0.8		-0.13	0.9
	<i>Matched</i>	0.02041	0.0449	-17.5	-1997.7	-1.53	0.128
Bangladeshi	<i>Unmatched</i>	0.11673	0.04125	28.2		5.4	0
	<i>Matched</i>	0.09388	0.0898	1.5	94.6	0.16	0.876
Caribbean	<i>Unmatched</i>	0.02335	0.01739	4.2		0.68	0.494
	<i>Matched</i>	0.02449	0.02041	2.9	31.5	0.3	0.761
Chinese	<i>Unmatched</i>	0.00389	0.00364	0.4		0.06	0.949
	<i>Matched</i>	0.00408	0	6.7	-1521.3	1	0.318
Indian	<i>Unmatched</i>	0.10117	0.10028	0.3		0.04	0.964
	<i>Matched</i>	0.10612	0.0898	5.4	-1746.4	0.61	0.544
Pakistani	<i>Unmatched</i>	0.06615	0.05499	4.7		0.74	0.46
	<i>Matched</i>	0.06939	0.06122	3.4	26.8	0.36	0.715
African	<i>Unmatched</i>	0.01556	0.02305	-5.4		-0.77	0.44
	<i>Matched</i>	0.01633	0.01633	0	100	0	1
Mixed	<i>Unmatched</i>	0.03891	0.05702	-8.5		-1.21	0.227
	<i>Matched</i>	0.03673	0.06939	-15.3	-80.4	-1.61	0.107
Other	<i>Unmatched</i>	0.01167	0.01011	1.5		0.24	0.813
	<i>Matched</i>	0.01224	0.00408	7.9	-422	1	0.316
EAL	<i>Unmatched</i>	0.29961	0.21108	20.4		3.27	0.001
	<i>Matched</i>	0.28571	0.25714	6.6	67.7	0.71	0.478
GCSE/KS4 (std scores)	<i>Unmatched</i>	0.74371	0.86313	-20.9		-3.11	0.002
	<i>Matched</i>	0.75275	0.75986	-1.2	94	-0.15	0.884
5 GCSEs A*-C	<i>Unmatched</i>	0.93385	0.92883	2		0.3	0.765
	<i>Matched</i>	0.93061	0.94694	-6.5	-225.2	-0.75	0.452
SEC: Low managerial & professional	<i>Unmatched</i>	0.28405	0.3518	-14.6		-2.18	0.03
	<i>Matched</i>	0.29388	0.33061	-7.9	45.8	-0.88	0.381
SEC: Intermediate occ.	<i>Unmatched</i>	0.05837	0.06227	-1.6		-0.25	0.805
	<i>Matched</i>	0.05714	0.03673	8.6	-422.4	1.07	0.287
SEC: Small empl. and own work	<i>Unmatched</i>	0.07782	0.06874	3.5		0.54	0.586
	<i>Matched</i>	0.08163	0.05714	9.4	-169.8	1.07	0.287
SEC: Low supervisory & technical work	<i>Unmatched</i>	0.11284	0.09745	5		0.79	0.432
	<i>Matched</i>	0.11837	0.11837	0	100	0	1
SEC: Semi-routine	<i>Unmatched</i>	0.05058	0.06712	-7		-1.02	0.308
	<i>Matched</i>	0.05306	0.06939	-6.9	1.3	-0.75	0.452
SEC: Routine	<i>Unmatched</i>	0.06615	0.06389	0.9		0.14	0.888

	<i>Matched</i>	0.06122	0.06122	0	100	0	1
SEC: Not working	<i>Unmatched</i>	0.16342	0.07562	27.3		4.85	0
	<i>Matched</i>	0.14286	0.12245	6.3	76.8	0.66	0.506
Father with degree	<i>Unmatched</i>	0.23346	0.25111	-4.1		-0.62	0.534
	<i>Matched</i>	0.23673	0.2449	-1.9	53.7	-0.21	0.833
Mother with degree	<i>Unmatched</i>	0.1323	0.19895	-18		-2.58	0.01
	<i>Matched</i>	0.13878	0.17551	-9.9	44.9	-1.12	0.265
School attitude (Y9)	<i>Unmatched</i>	35.012	36.585	-26.2		-4.16	0
	<i>Matched</i>	35.253	35.351	-1.6	93.8	-0.17	0.861
No hours worked	<i>Unmatched</i>	1.7821	1.6773	3.1		0.49	0.627
	<i>Matched</i>	1.8041	1.8857	-2.4	22.1	-0.27	0.787
Parent want yp to stay in FTE (Y9)	<i>Unmatched</i>	0.92218	0.95471	-13.5		-2.32	0.021
	<i>Matched</i>	0.92653	0.9102	6.8	49.8	0.66	0.51
Sixth form	<i>Unmatched</i>	0.25292	0.73959	-111.3		-16.93	0
	<i>Matched</i>	0.26531	0.25306	2.8	97.5	0.31	0.758
% staying in FTE	<i>Unmatched</i>	16.434	46.125	-123.7		-16.86	0
	<i>Matched</i>	16.987	15.966	4.3	96.6	0.56	0.578
% achieving 5 GSCE AC	<i>Unmatched</i>	55.51	65.535	-61.4		-8.52	0
	<i>Matched</i>	55.935	55.023	5.6	90.9	0.72	0.473
% FSM	<i>Unmatched</i>	15.187	8.7741	49.6		9.17	0
	<i>Matched</i>	13.957	14.572	-4.8	90.4	-0.49	0.624
Foundation	<i>Unmatched</i>	0.08949	0.22847	-38.7		-5.18	0
	<i>Matched</i>	0.09388	0.08571	2.3	94.1	0.32	0.753
Voluntary Aided	<i>Unmatched</i>	0.0856	0.15042	-20.2		-2.82	0.005
	<i>Matched</i>	0.0898	0.08571	1.3	93.7	0.16	0.873
Voluntary Controlled	<i>Unmatched</i>	0.01946	0.0461	-15		-1.99	0.047
	<i>Matched</i>	0.02041	0.02449	-2.3	84.7	-0.3	0.761
School size	<i>Unmatched</i>	1002	1202.9	-64.7		-9.21	0
	<i>Matched</i>	1002	1010.2	-2.6	96	-0.33	0.744
PT ratio	<i>Unmatched</i>	16.851	16.622	14.2		2.26	0.024
	<i>Matched</i>	16.876	16.865	0.7	95	0.07	0.941
Prop non white British	<i>Unmatched</i>	0.29283	0.25979	11		1.78	0.076
	<i>Matched</i>	0.27953	0.28418	-1.6	85.9	-0.17	0.869
Single sex	<i>Unmatched</i>	0.1323	0.17954	-13		-1.9	0.058
	<i>Matched</i>	0.11429	0.10612	2.3	82.7	0.29	0.773

Table A5: The relationship between post 16 institution and participation in higher education

	Overall Participation		Participation in a high status institution	
	<i>Females</i>	<i>Males</i>	<i>Females</i>	<i>Males</i>
Obtained A-levels via FE	-0.041** [0.003]	-0.047** [0.003]	-0.028** [0.003]	-0.012** [0.003]
2nd deprivation quintile	-0.026** [0.002]	-0.031** [0.003]	-0.031** [0.003]	-0.026** [0.003]
3rd deprivation quintile	-0.037** [0.003]	-0.044** [0.003]	-0.055** [0.003]	-0.041** [0.004]
4th deprivation quintile	-0.048** [0.003]	-0.049** [0.004]	-0.066** [0.004]	-0.039** [0.004]
Most deprived quintile	-0.046** [0.004]	-0.051** [0.005]	-0.056** [0.004]	-0.032** [0.005]
Cohort 2003	-0.008 [0.007]	-0.014* [0.007]	-0.024** [0.008]	-0.037** [0.007]
Other White	0.030** [0.008]	0.014 [0.014]	0.040** [0.007]	0.043** [0.008]
Black African	0.149** [0.008]	0.166** [0.011]	0.071** [0.009]	0.042** [0.012]
Black Caribbean	0.168** [0.009]	0.158** [0.012]	0.049** [0.008]	0.040** [0.012]
Other Black	0.109** [0.014]	0.131** [0.017]	0.054** [0.014]	0.070** [0.017]
Indian	0.170** [0.006]	0.182** [0.008]	0.042** [0.007]	0.015* [0.007]
Pakistani	0.116** [0.009]	0.154** [0.010]	0.049** [0.010]	0.026** [0.009]
Bangladeshi	0.096** [0.012]	0.120** [0.012]	0.078** [0.013]	0.065** [0.012]
Chinese	0.063** [0.010]	0.094** [0.012]	0.063** [0.012]	0.057** [0.012]
Other Asian	0.090** [0.011]	0.105** [0.013]	0.085** [0.016]	0.043** [0.016]
Mixed ethnicity	0.064** [0.008]	0.073** [0.010]	0.055** [0.010]	0.040** [0.010]
Other ethnicity	0.075** [0.008]	0.096** [0.010]	0.080** [0.009]	0.024* [0.010]
EAL	0.043** [0.005]	0.047** [0.007]	0.008 [0.006]	0.012 [0.006]
SEN (with statement)	0.046* [0.019]	0.048** [0.013]	0.002 [0.019]	0.025 [0.013]
SEN (without statement)	0.018* [0.007]	0.024** [0.007]	0.013 [0.008]	0.024** [0.007]
Month of Birth (MOB): October	0.002	-0.001	-0.008	-0.002

	[0.004]	[0.005]	[0.005]	[0.005]
MOB: November	-0.004	0	-0.003	0.005
	[0.004]	[0.005]	[0.005]	[0.005]
MOB: December	-0.003	0.003	-0.002	0.007
	[0.004]	[0.005]	[0.005]	[0.005]
MOB: January	-0.002	0.004	-0.011*	0.008
	[0.004]	[0.005]	[0.005]	[0.005]
MOB: February	-0.001	0.003	-0.002	0.012*
	[0.004]	[0.005]	[0.005]	[0.005]
MOB: March	0	-0.001	0	0.011*
	[0.004]	[0.005]	[0.005]	[0.005]
MOB: April	0.004	0.010*	-0.005	0.011*
	[0.004]	[0.005]	[0.005]	[0.005]
MOB: May	0.004	-0.002	0.005	0.005
	[0.004]	[0.005]	[0.005]	[0.005]
MOB: June	-0.001	0.002	0.002	0.004
	[0.004]	[0.005]	[0.005]	[0.005]
MOB: July	-0.003	0.007	0.005	0.010*
	[0.004]	[0.005]	[0.005]	[0.005]
MOB: August	0.002	0.010*	0.004	0.006
	[0.004]	[0.005]	[0.005]	[0.005]
2 nd quintile (KS2)	-0.016**	-0.007	0.001	0.001
	[0.006]	[0.008]	[0.006]	[0.006]
3 rd quintile (KS2)	-0.022**	-0.016*	-0.009	-0.001
	[0.007]	[0.008]	[0.006]	[0.007]
4 th quintile (KS2)	-0.020**	-0.014	-0.019**	-0.006
	[0.007]	[0.008]	[0.006]	[0.007]
5 th quintile (KS2)	-0.019**	-0.015	0.007	0.008
	[0.007]	[0.008]	[0.006]	[0.007]
2 nd quintile (KS3)	-0.011	0.014	0.012	-0.009
	[0.009]	[0.011]	[0.008]	[0.009]
3 rd quintile (KS3)	-0.026**	-0.012	0.018*	-0.013
	[0.009]	[0.011]	[0.008]	[0.009]
4 th quintile (KS3)	-0.022*	-0.018	0.012	-0.021*
	[0.010]	[0.012]	[0.009]	[0.010]
5 th quintile (KS3)	-0.024*	-0.017	0.035**	-0.005
	[0.010]	[0.012]	[0.009]	[0.010]
2 nd quintile (KS4)	0.057*	0.063**	-0.006	0.011
	[0.023]	[0.024]	[0.034]	[0.028]
3 rd quintile (KS4)	0.105**	0.101**	0.001	0.009
	[0.022]	[0.024]	[0.034]	[0.028]
4 th quintile (KS4)	0.150**	0.145**	-0.009	0.002
	[0.023]	[0.024]	[0.034]	[0.028]
5 th quintile (KS4)	0.174**	0.152**	0.046	0.074**
	[0.023]	[0.024]	[0.034]	[0.028]
% GCSE (A*-C)	0.039**	0.022**	-0.002	-0.006
	[0.004]	[0.004]	[0.003]	[0.004]

2 nd quintile (KS5)	0.176**	0.192**	-0.016**	-0.001
	[0.004]	[0.004]	[0.003]	[0.003]
3 rd quintile (KS5)	0.279**	0.306**	0.020**	0.055**
	[0.004]	[0.004]	[0.004]	[0.004]
4 th quintile (KS5)	0.351**	0.371**	0.118**	0.183**
	[0.004]	[0.005]	[0.005]	[0.006]
5 th quintile (KS5)	0.387**	0.403**	0.218**	0.304**
	[0.005]	[0.005]	[0.006]	[0.008]
Achieved level 3 (age 18)	0.243**	0.265**	-0.006	-0.011*
	[0.005]	[0.005]	[0.007]	[0.005]
Passed biology at GCE A Level	0.057**	0.045**	0.030**	0.035**
	[0.002]	[0.003]	[0.003]	[0.004]
Passed chemistry at GCE A Level	0.008**	0.010**	0.121**	0.107**
	[0.003]	[0.003]	[0.004]	[0.004]
Passed physic at GCE A Level	0.033**	0.041**	0.092**	0.081**
	[0.004]	[0.003]	[0.006]	[0.004]
Passed math at GCE A Level	0.016**	0.035**	0.080**	0.106**
	[0.003]	[0.003]	[0.004]	[0.004]
Passed history at GCE A Level	0.055**	0.048**	0.082**	0.060**
	[0.002]	[0.003]	[0.003]	[0.003]
Passed economics at GCE A Level	0.008	0.010*	0.106**	0.082**
	[0.005]	[0.004]	[0.008]	[0.005]
Passed English at GCE A Level	0.027**	0.024**	-0.021**	-0.012*
	[0.004]	[0.005]	[0.004]	[0.006]
Passed Modern Language at GCE A Level	0.031**	0.039**	0.110**	0.085**
	[0.003]	[0.004]	[0.004]	[0.006]
Total GCE A Level standardised scores: 1-100			0.005	0.008*
			[0.004]	[0.003]
Total GCE A Level standardised scores: 101-200			-0.007	0.006
			[0.004]	[0.004]
Total GCE A Level standardised scores: 201-300			0.055**	0.042**
			[0.006]	[0.006]
Total GCE A Level standardised scores: 301+			0.082**	0.074**
			[0.011]	[0.009]
gceatsd_1819== 1.0000			-0.052**	-0.005
			[0.005]	[0.004]
gceatsd_1819== 2.0000			0.038**	0.105**
			[0.005]	[0.005]
gceatsd_1819== 3.0000			0.217**	0.240**
			[0.007]	[0.007]
gceatsd_1819== 4.0000			0.296**	0.294**
			[0.008]	[0.008]
Observations	205669	166813	152472	117682
R-squared	0.235	0.265	0.368	0.429