



CAMBRIDGE ASSESSMENT

Predictive validity of level 3 qualifications

Extended Project, Cambridge Pre-U,
International Baccalaureate, BTEC Diploma

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Cambridge Assessment Research Report

29th July 2014

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How to cite this publication:

Gill, T. & Vidal Rodeiro, C.L. (2014). *Predictive validity of level 3 qualifications: Extended Project, Cambridge Pre-U, International Baccalaureate, BTEC Diploma*. Cambridge Assessment Research Report. Cambridge, UK: Cambridge Assessment.

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EXECUTIVE SUMMARY

Background and aim of the research

Higher education institutions use a range of sources of information to determine who should be offered a place to study one of their courses. These sources of information include, among others, prior educational attainment, personal statements and academic references. Admission practices usually vary between institutions but, in general, prior qualifications and attainment are the main criteria used by those institutions. It is therefore important that such qualifications, when used for university selection purposes, demonstrate that they are valid predictors of academic performance.

In England, the vast majority of students applying to study a course in a higher education institution hold academic qualifications such as AS/A levels. However, increasing proportions of students now enter higher education with alternative qualifications. For example, AS/A levels are sometimes supplemented with or replaced by other academic qualifications such as the Cambridge Pre-U, the International Baccalaureate or the Extended Project. And, recently, there has been an increase of students holding more applied or vocational qualifications such as applied AS/A levels, advanced diplomas, Cambridge Nationals and, particularly, BTECs.

The main aim of this work was therefore to investigate the ability of a range of school leaving qualifications (Cambridge Pre-U, International Baccalaureate, Extended Project and BTEC) that are either alternatives to AS/A levels or are taken alongside them, to predict success in higher education courses. In the context of this research, the predictive validity of a qualification was defined as the effectiveness of the results in that qualification as predictors of undergraduate degree performance.

Methodology

The data used in this research was an extract from the HESA student records dataset, covering all full-time students who started a first degree (expected not to last more than three years) in the academic year 2010/11 in a UK higher education institution and completed it in the academic year 2012/13. The data consisted of the university subject, the mission group of the institution where each student was enrolled and the degree outcome, along with information on prior qualifications and socio-demographic characteristics.

The predictive validity of each qualification was assessed separately, by comparing the grades achieved in the qualification with subsequent degree outcomes. Firstly, descriptive analyses looking into the characteristics of the candidates taking each qualification, their degree courses and the relationship between performance at school/college and the class of degree achieved were carried out. This was followed by multilevel logistic regression analyses to investigate the likelihood of achieving a good degree (first or at least upper second class degrees) given the performance in the prior qualification, while controlling for other factors such as gender, prior educational institution and socio-economic status. The regression models also took into account the mission group of the higher education institution and the subject area studied, as these might have had an effect on the degree class achieved.

Results

Overall, the results of this research showed that attainment in all the qualifications investigated was a good predictor of university degree outcomes. For each qualification considered in this research, the key findings are highlighted below.

Extended Project

There was a good relationship between grades in the Extended Project qualification and degree class at university, with the highest percentage of first class degrees achieved by those getting top grades in the qualification. This suggests that the Extended Project is a good predictor of university performance. This was, in fact, supported by the (statistically significant) positive correlation between Extended Project grade and degree class and by the outcomes of the multilevel logistic regressions.

The Extended Project qualification is usually taken alongside A levels and therefore, it was possible to investigate its predictive validity over and above the effect of A levels. The results of these analyses showed that having an Extended Project qualification was a positive predictor of university performance, even after controlling for A level performance: that is, for two students with the same A level performance the one with the Extended Project qualification had a higher probability of achieving a good degree, particularly a first class degree.

Cambridge Pre-U

Most students combined their Pre-U qualification(s) with AS/A levels, although there was a small proportion of students who took only Pre-U qualifications.

For candidates with at least one Pre-U qualification, there was a good relationship between the average grade obtained in their Pre-U(s) and degree classification at university, with students achieving a first class degree having the highest average performance in the Pre-U. This finding was supported by the (statistically significant) positive correlation between performance in Pre-U qualifications and degree class and by the outcomes of the multilevel logistic regressions.

Students taking at least one Pre-U qualification alongside A levels (or taking Pre-U only) were compared to those taking just A levels in terms of degree classification, after controlling for their overall prior attainment, measured by the UCAS tariff. In this instance, the results showed that there was no statistically significant effect of taking a Pre-U on university performance.

International Baccalaureate

The International Baccalaureate (IB) is essentially an alternative to AS/A levels and therefore was not taken alongside any other qualifications by the students in this research.

The results of the analyses performed here showed that the total points score obtained in the IB had a significant effect on the probability of achieving a good degree (either first or upper second class), suggesting that this qualification was a good predictor of performance at university. The effect of the performance in the IB on the probability of achieving a first class degree outcome was very similar in Russell and non-Russell Group universities. However, its relationship with the probability of achieving at least an upper second class degree was

stronger amongst students at Russell Group institutions than at non-Russell Group institutions.

BTEC

The analysis carried out for this qualification focused on students taking a BTEC Diploma, which is equivalent to three A levels and is usually taken as an alternative to these qualifications. The majority of BTEC students achieved either an upper second class degree or lower second class degree, and a very small percentage achieved a first class degree. This cohort was therefore weaker in terms of university performance than the cohorts of students taking any of the other qualifications investigated in this research.

The outcomes of this research suggested that the BTEC performed less well than the other qualifications considered in this report in terms of how well it predicted university outcomes. In particular, the correlation between the BTEC performance and university degree classification was lower than the correlations between the other qualifications and the degree classification. This result was supported by the outcomes of the multilevel logistic regressions, which also showed that BTEC students were unlikely to get a first class degree, even if they obtained the highest possible grade in the qualification.

However, it should be taken into account that preparing students for university study is not the BTEC's primary purpose.

Further research

This research has demonstrated that the performance in the qualifications considered here (Cambridge Pre-U, IB, Extended Project and BTEC) was generally a good predictor of university outcomes. However, an interesting issue that was not investigated is which of these different qualifications prepares students better for higher education study. In order to carry out such analyses, a common measure of prior attainment such as GCSE results would be needed. Therefore, and subject to data availability, further research could investigate which level 3 qualifications lead to the best degree results for 'equivalent' students.

INTRODUCTION

Higher education (HE) institutions use a range of sources of information to determine who should be offered a place to study one of their courses. These sources of information include, among others, prior educational attainment, personal statements and academic references. Admission practices usually vary between institutions but, in general, the qualifications that young people obtained at school or college and their performance in them (e.g. A level subjects and A level grades) are the main criterion used by those institutions. It is therefore important that such qualifications, when used for university selection purposes, demonstrate that they are valid predictors of academic performance. In the context of this research, the predictive validity of a qualification will be defined as the effectiveness of the results in that qualification as predictors of undergraduate degree performance.

In England, students applying to study a course in a higher education institution hold a wide range of qualifications and combinations of qualifications (see, for example, the HESA website¹ for a list of all available qualifications among accepted students in the 2012/13 academic year). The vast majority of students hold academic qualifications such as AS/A levels (e.g. Connor *et al.*, 2006; Vidal Rodeiro *et al.*, 2013). However, increasing proportions of students now enter higher education with alternative qualifications. For example, AS/A levels are sometimes supplemented with or replaced by other academic qualifications such as the Cambridge Pre-U, the International Baccalaureate or the Extended Project. And, recently, there has been an increase of students holding more applied or vocational qualifications such as applied AS/A levels, advanced diplomas, Cambridge Nationals and, particularly, BTECs.

To date, a number of studies have sought to examine the effects of prior schooling, and particularly the effects of traditional academic qualifications (GCSEs and AS/A levels), on subsequent academic performance of undergraduate students at UK universities.

An early study from Smith and Naylor (2001) presented the results of an analysis of the determinants of academic performance of undergraduate students leaving UK universities in the summer of 1993. Among several statistically significant determinants (such as the previous school attended, social class background or gender) they found that there were significant and sizeable benefits associated with good performance at school and showed that one grade higher at A level raised the probability of a good degree by over nine percentage points.

A five-year study carried out by Kirkup *et al.* (2010) looked at the relationship between prior educational attainment, measured by attainment at school and performance in the Standardized Aptitude Test (SAT®), and degree outcomes of a sample of students who graduated in 2006 in UK universities. The primary aim of this study was to examine whether the addition of the SAT alongside A levels was able to predict higher education outcomes better than A levels alone. The research reported that, of the prior attainment measures considered, average A level points score was the best predictor of degree class, followed by average GCSE points score. Furthermore, the inclusion of GCSE information added usefulness to the predictive power of the A levels.

¹ <http://www.hesa.ac.uk>

Partington (2011) reported on the findings of a more recent study looking at the relationship between different metrics used in admissions to the University of Cambridge and Tripos² performance in a number of different degree subjects. One of the key conclusions of this study was that, for most subjects at university, AS level attainment was the best predictor of Tripos performance. However, he also reported that overall GCSE points score was generally well correlated also.

More recently, the Department of Education (DfE, 2013) investigated whether AS level grades were a useful predictor of whether students achieved a good degree outcome (upper second class degree outcome or better), when knowing their GCSE results. Contrary to the findings reported by Partington (2011), they found that GCSE results were a slightly better predictor than AS level results. Furthermore, knowing AS level results as well as GCSE results did not add, significantly, to the ability to predict degree outcomes.

Another recent study, published by HEFCE (2014), reported that students with better A levels do better in higher education. In particular, they showed that more than 80% of students with grades AAB or above at A level gained first or upper second class degrees compared to approximately 50% or less of those with grades CCC or lower.

The majority of the studies mentioned above took into account factors such as the type of the previous school attended, social class background and gender when investigating the predictive value of the prior qualifications. Some studies also included a series of controls relating to the subject studied and the type of university students were enrolled at. This was crucial as it has been shown that those factors are confounding variables that might obscure the effects of the prior qualifications (see, for example, Ogg *et al.*, 2009).

A more scarce research literature can be found regarding the role of other qualifications as predictors of university performance. Qualifications such as the Cambridge Pre-U or the Extended Project have been introduced recently with the aim to prepare learners for study at university. However, only in the last couple of years has sufficient time elapsed to potentially be able to assess the higher education achievements of students with these qualifications. The uptake of vocational qualifications among university applicants has increased in recent years (e.g. Hayward and Hoelscher, 2011; Vidal Rodeiro *et al.*, 2013). However, relatively small numbers of students with qualifications such as BTECs or OCR Nationals were progressing to higher education prior to 2004 and therefore, the lack of sufficient data might have made it implausible to carry out predictive validity research.

There are, however, a couple of studies that investigated how students with qualifications other than AS/A levels performed at university. Firstly, HESA (2011) showed that there is a clear positive relationship between performance in the International Baccalaureate and proportions of students gaining first class and upper second class honours degrees. Secondly, London Economics (2013) carried out a study comparing the academic outcomes at degree level of students with BTECs and A levels. Their analyses showed that, on average, a higher proportion of learners completing university degrees through the BTEC route achieved a first

² All courses at the University of Cambridge are assessed through examinations in broad subject areas called **Triposes**. Each Tripos is divided into one or more parts and you need to complete a number of parts in one or more Triposes to qualify for a degree. More information about Tripos is available in the University of Cambridge website (<http://www.cam.ac.uk>).

class honours degree compared to individuals following the A level route, although the result was not statistically significant and differed by higher education subject area.

Having the above body of research in mind, it seems worthwhile to carry out further work to investigate if qualifications such as the Pre-U, the International Baccalaureate, the Extended Project, the BTEC or the Cambridge Nationals, which are being used by increasing numbers of students to apply for a place in a higher education course, are valid predictors of academic performance.

Therefore, the main aim of this work is to investigate the ability of a range of school leaving qualifications to predict success (that is, achieve an upper second or first class outcome) in higher education courses. Factors such as the type of the previous school attended, social background, gender, subject studied and type of university will be taken into account when investigating the predictive validity of such qualifications.

In the following, a brief description of each of the school and college qualifications considered in this research is given³.

Extended Project: The Extended Project (EP) is a level 3 qualification that offers students the opportunity to study a topic in depth. It was originally part of the now obsolete Diploma, but is still available as a standalone qualification. It aims to provide students with skills that they will find useful at university (such as planning, research, analysis and autonomous working) by completing a project either based on a subject they are studying or on an area of personal interest. It is equivalent in size to an AS level and is usually taken over a one year period, usually alongside A levels⁴. It is graded, like A levels, from A* to E.

Cambridge Pre-U: The Cambridge Pre-U is an academic qualification designed to prepare students, typically aged 16 to 19, for university study by promoting skills such as independent learning, critical thinking and problem-solving. It was developed by the University of Cambridge International Examinations in consultation with schools and universities, and the first full exam series took place in June 2010. Cambridge Pre-U is available in 25 'principal' subjects (e.g. Mathematics, English, etc.) and also in Global Perspectives and Research (GPR). Principal subjects are taken over two years with exams at the end, whilst the GPR involves the development of research and thinking skills in year one, followed by an extended project in year two⁵. Pre-U qualifications are graded on a scale of nine grades, from distinction 1 (D1) to pass 3 (P3).

International Baccalaureate: The International Baccalaureate (IB) diploma is a two-year programme of study for students aged 16-19 designed to prepare them for university study through acquisition of skills and a positive attitude toward learning. Students are required to study six subjects across five academic disciplines (first language, additional language, social sciences, experimental sciences and mathematics), as well as doing an extended essay (independent research) and studying a theory of knowledge (critical thinking). Subjects are scored on a scale of 1 to 7 points, with an extra 3 points available for the extended essay and theory of knowledge components. This gives a maximum total of 45 points, with 24 being a

³ It was planned to also include Cambridge Nationals in this study. However, initial data exploration showed that, in the period of study, there were very few students taking these qualifications and completing a university degree.

⁴ <http://www.ocr.org.uk/qualifications/projects-extended-project-h856/>

⁵ <http://www.cie.org.uk/programmes-and-qualifications/cambridge-advanced/cambridge-pre-u/curriculum/>

pass. Students take three or four subjects at higher level, and the remaining at subsidiary level⁶.

BTEC Level 3 Nationals: BTEC vocational qualifications are work-related qualifications suitable for a wide range of learners, built to accommodate the needs of employers and also to allow progression to university. They are assessed practically, based on real-life work situations, instead of through written examinations. They can be taken alongside or in place of A levels and are available at three different levels: Award (equivalent to 1 A level), Certificate (2 A levels) and Diploma (3 A levels). Students taking the Diploma usually take one qualification only, in one subject area. For the Diploma the grading scale has nine grades, from DDD to PPP⁷.

DATA

The main source of data for the analyses carried out in this research was the Higher Education Statistics Agency (HESA)⁸. In the following, a brief description of the data is given. For more details see Vidal Rodeiro and Zanini (2014).

The HESA student record dataset contains detailed information on all individual HE students, including the following:

- *Prior qualifications*: this data includes, for each student, type of qualifications, subjects, grades achieved and total UCAS tariff points. Where students re-sat an examination only the highest grade was kept and only qualifications that were graded with at least a pass were included.
- *Student characteristics*: this data includes previous school attended, gender, LSOA⁹ of student's home address and socio-economic status.
- *Institution attended* (anonymised).
- *University mission group*: HE institutions are grouped together into mission groups through which they share ideas and resources regarding issues and procedures in the HE sector. The groups included in this research are: The Russell Group, 1994 Group¹⁰, University Alliance, The Million+ Group and Guild HE. Some universities in the data are not members of any of these groups, but students at these universities are included in the analyses.
- *Course studied*: courses were aggregated into 21 broad subject areas (see Appendix A for a full list), which relate to the principal subject of study. For degrees with more than one subject (e.g. balanced combinations or triple honours) the subject area

⁶ <http://www.ibo.org/diploma/>

⁷ <http://www.edexcel.com/btec/New-to-btec/BTEC-Explained/Pages/default.aspx>

⁸ **Source: HESA Student Record 2010/11 and 2012/13. Copyright Higher Education Statistics Agency Limited 2013. HESA cannot accept responsibility for any inferences or conclusions derived from the data by third parties.**

⁹ A LSOA (lower layer super output area) is a conglomeration of a number of census output areas (each output area has about 150 households). They usually have a minimum population size of 1000 and an average of 1500. There are over 34000 LSOAs in England.

¹⁰ The 1994 Group dissolved in November 2013.

corresponds to the subject with the largest percentage. If a student took a balanced combination (e.g. 50:50 or 33:33:33) then the subject area was 'Combined'.

- *Degree type*: only first degree students were included.
- *Degree class*: First, Upper Second, Lower Second, Third or unclassified.

The data used in this research was restricted to all full-time graduates who were 17-19 years old when they started a first degree (expected not to last more than three years) in the academic year 2010/11 in a UK HE institution, and completed it in the academic year 2012/13. Thus students entering for degrees lasting more than three years (e.g. in medicine, dentistry, veterinary science and in many language or engineering courses) were not included.

Two further student background variables were obtained from different sources, as follows:

- *School type of previous institution*: the HESA previous institution identifier was matched to the National Pupil Database (NPD)¹¹ to obtain this information. School types included were comprehensive schools, independent schools, selective schools, sixth form colleges, further education (FE) colleges, tertiary colleges and other/unknown.
- *Level of deprivation*: the income deprivation affecting children index (IDACI)¹², obtained from the Office for National Statistics (<http://www.neighbourhood.statistics.gov.uk>) shows the percentage of children in the LSOA in which the student resides who live in families that are income deprived.

METHODS

The predictive validity of each qualification (Extended Project, Pre-U, IB and BTEC Diploma) was assessed separately, by comparing the grades achieved in the qualification with subsequent degree outcomes. Thus, for these analyses, the data was restricted to those students taking the qualification in question and with a degree result. Additionally, for two of the qualifications (Extended Project and Pre-U) the effect of having these alongside A levels was assessed by comparing the degree outcomes of students taking at least three A levels with those taking a mixture of A levels and EP / Pre-U.

For each level 3 qualification, descriptive analyses looking into the characteristics of the candidates taking it, their degree courses and the relationship between performance at level 3 and the class of degree achieved, were carried out in a first instance. This was followed by multilevel logistic regression analyses to predict the likelihood of a good degree (first or at least upper second class degrees) given performance in the prior qualification, whilst accounting for student background characteristics, such as gender, school type attended and level of deprivation. The models also took into account the 'mission group' of the institution and the subject area studied by the student, as these may have an effect on the degree class

¹¹ The NPD, compiled by the Department for Education, is a longitudinal database for all children in schools in England that holds data on pupil and school characteristics such as age, gender, and school type, matched to pupil level attainment data (Key Stage 2 to Key Stage 5 assessments and other external examinations).

¹² See page 19 of <http://www.communities.gov.uk/documents/communities/pdf/733520.pdf> for a detailed explanation of this index.

achieved¹³. Additional models to assess the effect of having a Pre-U or an EP qualification alongside A levels were also fitted. In this case a binary indicator of whether or not the student had taken an EP / Pre-U qualification was included, but the EP / Pre-U grade was not.

Logistic regression is a type of regression analysis that is used when the dependent variable is dichotomous (*i.e.* it takes only two values, which usually represent the occurrence or non-occurrence of some event). It is used to predict the probability that the event of interest will occur as a function of the independent variables (see, for example, Hosmer and Lemeshow, 2000).

Multilevel modelling is the best technique to use when the structure of the data is hierarchical in some way. Failure to recognise the hierarchical structure would mean underestimating the standard errors of the regression coefficients, leading to an overstatement of the statistical significance. In our data students attended schools and universities and both types of institutions can be a source of random variation. Thus students were grouped by both school and by HE institution. However, schools are not nested within HE institutions and thus a cross-classified structure was used. For a detailed discussion of multilevel logistic regression models with cross-classified random effects see Snijders and Bosker (1999) or Goldstein (2011).

The dependent variable for the regression models was the students' degree classification (*e.g.* first class degree, upper second class degree or above). Generally, the models considered in this report take the following form:

$$\log \frac{p_{i(jk)}}{1 - p_{i(jk)}} = \beta_0 + \beta_1 IV1_{i(jk)} + \beta_2 IV2_{i(jk)} + \dots + \beta_l IVl_{i(jk)} + u_j + u_k + e_{i(jk)}$$

where $p_{i(jk)}$ is the probability of student i in prior institution j and HE institution k of achieving a degree class, $IV1$ to IVl are the independent variables, β_0 to β_l are the regression coefficients, u_j and u_k are random variables at prior institution and HE institution level respectively and $e_{i(jk)}$ is an individual level residual.

The multilevel logistic regression analyses were carried out using the package *lme4* (Bates *et al.*, 2014) in the open source statistical software R (R Core Team, 2013).

A detailed breakdown of the dependent and independent variables included in the multilevel logistic models is presented in Table 1. This is detailed for each of the qualifications investigated. The reason for the inclusion or exclusion of particular variables will be explained within the individual results sections dealing with each qualification.

¹³ Due to the small number of students with particular prior qualifications some models did not include the subject studied.

Table 1: Description of the variables included in the multilevel logistic regression models

	Name	Description	Range of values	EP	Pre-U	IB	BTEC	EP vs. A level	Pre-U vs. A level
Dependent Variable	Students' degree classification	Indicator of degree classification	Discrete variable: 0 did not achieve the degree class; 1 achieved the degree class	✓	✓	✓	✓	✓	✓
	Gender	Student's gender	Discrete variable: male; female	✓	✓	✓	✓	✓	✓
Independent Variables	Level of deprivation (IDACI)	Student's level of deprivation based on the IDACI	Continuous variable: ranges from 0 to 1. Increasing values indicate increasing deprivation	✓	✓		✓	✓	✓
	Type of school	Type of institution the student attended prior to university	Discrete variable: comprehensive; independent; sixth form college; grammar; FE college; Tertiary college; other	✓			✓	✓	✓
	University subject area	University subject area studied	Discrete variable: See Appendix A for a list of subject areas	✓				✓	✓
	University group	University mission group	Discrete variable: Russell Group; other universities	*✓	✓	*✓			*✓
	University group (detailed)	University mission group	Discrete variable: 1994 Group; Guild HE; Million Plus; Other; Russell Group; University Alliance				✓		
	Achievement in level 3 qualification	Grade(s) achieved in the level 3 qualification	EP grade ~ Discrete variable: A* to E Pre-U mean grade ~ (Quasi) continuous variable: range from 1 to 9. IB points score ~ Discrete variable: range from 20 to 45 BTEC Diploma grade ~ Discrete variable: DDD to PPP	✓	✓	✓	✓		
	UCAS tariff	Total UCAS points score achieved in all level 3 qualifications	Continuous variable: ranges from 120 to 1,180						✓
	Mean A level	Average grade across all A level subjects taken	(Quasi-) continuous variable: 1 represents an average of grade E; 6 represents an average of grade A*					✓	
	EP / Pre-U indicator	Indicator of having taken qualification	Discrete variable: 0 did not take qualification; 1 took qualification					✓	✓

✓=included in the model; *=used as a stratifying variable.

For each of the analyses, separate models were run for the probability of achieving a first class degree and for the probability of achieving at least an upper second class degree. For two of the prior qualifications considered (EP and IB) separate models were also run restricting to students attending Russell Group institutions and students attending other institutions. This distinction was made because the Russell Group institutions tend to attract the highest achieving students and therefore the degree outcomes tend to be better in these institutions. It therefore provides a useful point of division to investigate whether the predictive validity of the qualification is different for higher attainers.

RESULTS

The results of the analyses for the four level 3 qualifications are presented in this section, with one sub-section per qualification. Within each sub-section, descriptive statistics are presented first, followed by the results of the multilevel logistic regressions.

Table 2 below presents, for each qualification, the number of students included in the analysis.

Table 2: Number of students in the analysis, by level 3 qualification

Qualification	No. of students¹⁴
Extended Project	4,250
Pre-U	200
IB	2,020
BTEC Diploma	2,900

Note that there were very few students who obtained a degree in 2012/13 and had a Pre-U qualification. The reason for this is that the cohort taking Pre-U in 2009/10 was the first cohort of students who could have obtained the qualifications and for whom sufficient time had elapsed to assess their HE achievements. At that time, the uptake of the Pre-U qualification was still quite low.

For the additional analysis, that is, those comparing Pre-U / EP students to those just taking (at least 3) A levels, the number of students is given in Table 3.

Table 3: Number of students in additional analyses

Qualification	No. of students	No. of A level students
Extended Project	3,795	65,150
Pre-U	200	65,150

¹⁴ In accordance with the HESA's Standard Rounding Methodology the numbers of students in the tables and in commentary throughout this report have been rounded up or down to the nearest multiple of 5.

Extended Project

Descriptive statistics

There were 4,250 students in the data who had obtained an EP qualification and a HE degree. The vast majority of these students took the EP in combination with A levels only. Table 4 presents the number of A levels taken by students alongside the EP. The majority of students (57%) took EP with three A levels, and around 30% took it with four A levels.

Table 4: Number of A levels taken by students with an EP qualification

A levels	No. of students	% of students
1	110	2.6
2	220	5.3
3	2,350	57.0
4	1,220	29.6
5+	225	5.5

Students with an EP qualification (and a degree result) were from at least 750¹⁵ schools, and attended 120 universities / institutions. Table 5 presents information on the background variables used in the analysis.

Table 5 shows that only one third of students with an EP qualification were male. Regarding the type of school, most students attended either comprehensive schools (37.8%) or sixth form colleges (32.6%). There was also quite a high proportion from grammar schools (15.6%) given the percentage of grammar school students in the data, and relatively few from independent schools (7.1%). The largest percentage of EP students went to Russell Group universities (42.4%), followed by Other and University Alliance institutions. EP students were most likely to take subjects related to biological sciences (15.5%), social studies (12.2%) or historical and philosophical studies (11.9%). Very few students took subjects in the languages groups. Finally, EP students tended to perform well on the qualification with 17.5% achieving an A* and 41% achieving an A grade or better.

Table 6 presents the degree outcomes for students with an EP qualification. Around 22% of students achieved a first class outcome and 62% achieved an upper second. This compares to around 17% of A level students achieving first and 61% upper second class outcomes (students taking at least three A levels and no other qualifications).

¹⁵ There were 55 students for whom the school was unknown.

Table 5: Background data of the students with an EP qualification

Variable	No. of students	% of students
Gender		
Female	2,815	66.2
Male	1,435	33.8
School type		
Comprehensive	1,490	37.8
FE college	145	3.7
Grammar	615	15.6
Independent	280	7.1
Sec Mod	30	0.7
Sixth form	1,285	32.6
Tertiary College	100	2.5
<i>Missing</i>	305	
University group		
1994 group	400	9.4
Guild HE	235	5.6
Million Plus	375	8.9
Other	725	17.0
Russell Group	1,800	42.4
University Alliance	715	16.8
Subject group		
Subjects allied to medicine	190	4.4
Biological sciences	660	15.5
Veterinary sciences, agriculture and related subjects	20	0.4
Physical sciences	175	4.1
Mathematical sciences	45	1.1
Engineering	25	0.6
Computer sciences	50	1.2
Technologies	15	0.4
Architecture, building and planning	45	1.1
Social studies	520	12.2
Law	355	8.4
Business and administrative studies	150	3.5
Mass Communications and Documentation	160	3.8
Linguistics, classics and related subjects	455	10.7
European languages, literature and related subjects	5	0.2
Eastern, Asiatic, African, American and Australasian languages, literature and related subjects	5	0.1
Historical and philosophical studies	505	11.9
Creative arts and design	320	7.5
Education	130	3.1
Combined	420	9.9
EP grade		
*	745	17.5
A	1,000	23.5
B	955	22.5
C	795	18.7
D	485	11.4
E	275	6.5

Table 6: Degree classification obtained by students with an EP qualification

Degree classification	No. of students	% of students
First	930	21.9
Upper second	2,640	62.1
Lower second	640	15.0
Third	40	1.0
Unclassified	5	0.1

Table 7 presents the degree outcomes for Russell Group and non-Russell Group students separately.

Table 7: Degree classification obtained by students with an EP qualification, by university mission group

Degree classification	Russell Group		Non-Russell Group	
	No. of students	% of students	No. of students	% of students
First	440	24.6	485	19.9
Upper second	1210	67.2	1430	58.3
Lower second	140	7.8	500	20.3
Third	5	0.4	35	1.4
Unclassified	0	0.1	5	0.1

Students attending Russell Group institutions were more likely to get a first class degree (24.6%) or an upper second class degree (67.2%) than those attending non-Russell Group institutions (19.9% and 58.3% respectively). This is not surprising as Russell Group institutions tend to attract the highest achieving students.

The predictive validity of the EP was first assessed by looking at a cross-tabulation of EP grade and degree class. Students getting an 'unclassified' degree were excluded from this analysis. This is shown in Table 8 and Figure 1 below.

Table 8: Degree classification by EP grade

EP grade	No. of students	% achieving degree class			
		First	Upper Second	Lower Second	Third
*	745	36.2	58.7	5.0	0.1
A	1,000	25.5	65.1	8.9	0.5
B	955	18.9	64.8	15.2	0.8
C	795	15.7	63.0	20.3	0.9
D	485	14.0	59.3	24.8	1.7
E	275	11.7	52.6	31.4	4.4

NB: Only five students achieved an 'unclassified' degree.

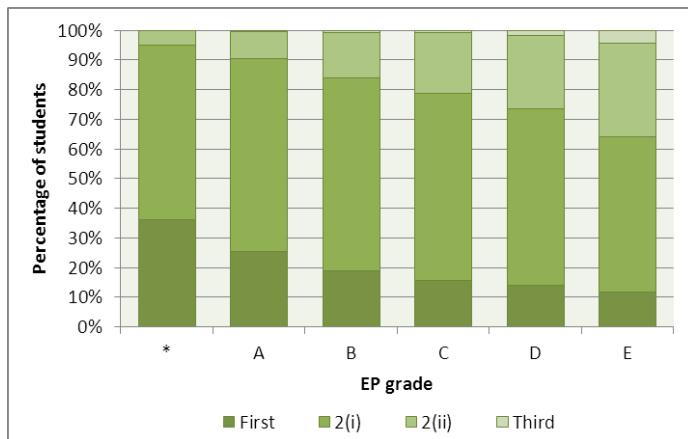


Figure 1: Degree classification by EP grade

Both Table 8 and Figure 1 show a good relationship between EP grade and degree class, with the highest percentage of first class degrees achieved by those getting an A*, followed by those getting an A and so on. This suggests that the EP qualification is a good predictor of performance. This is supported by the (statistically significant) polychoric correlation between EP grade and degree class of 0.3076¹⁶. The United States Department of Labour, Employment Training and Administration published guidelines for interpreting correlation coefficients in predictive validity studies (Department of Labor, Employment and Training Administration, 1999). Coefficients >0.35 are deemed 'very beneficial'; those of 0.21-0.35 as 'likely to be useful', those of 0.11-0.20 as 'dependent on the circumstances' and those <0.11 as 'unlikely to be useful'. Therefore, the above results support the predictive validity of the EP grade for university performance¹⁷.

Regression analyses

Two sets of models were fitted to assess the predictive validity of the EP qualification. The first set of models predicts the degree classification of EP students only, with the independent variables being the EP grade and the background variables described in Table 1. The second set of models investigates the predictive value of the EP over and above the effect of A levels. The independent variables in this second set of models are the A level mean, an indicator of whether or not an EP qualification was taken and background variables as above.

Predictive validity of the Extended Project qualification

Tables 9 and 10 present the parameter estimates (Est.), standard errors (SE), p-values and odds ratios for the models predicting the probability of achieving a first class degree and the

¹⁶ The polychoric correlation coefficient is a measure of association for ordinal variables, such as qualification grades or degree class in this research. Originally proposed by Pearson (1900), this measure of association rests upon an assumption of an underlying continuous joint distribution. Information about each unobserved continuous variable is obtained through an observed ordinal variable that is derived from the unobserved variable by classifying its values into a finite set of discrete, ordered values (Drasgow, 1986).

¹⁷ Note that the Department of Labor, Employment and Training Administration (1999) report was assuming correlations with first year grade point averages. Since the outcomes were continuous as well as being closer in time to the predictors they were likely to be higher than in this research.

probability of achieving at least an upper second class degree, respectively. For the probability of achieving at least an upper second class outcome it was necessary to exclude the subject group variable as when this was included the model failed to converge. In these and all the following tables statistically significant effects are highlighted in bold.

Table 9: Model summary (probability of achieving a first class degree)

Variable		Est.	SE	P-value	Odds ratio
Intercept		-0.3652	0.1525	0.0167	0.6941
EP grade	[*]				
	A	-0.5371	0.1114	<0.0001	0.5845
	B	-0.9882	0.1228	<0.0001	0.3722
	C	-1.2161	0.1385	<0.0001	0.2964
	D	-1.3841	0.1680	<0.0001	0.2506
Gender	[Female]				
	Male	0.1993	0.0858	0.0202	1.2206
Mission group	[Russell Group]				
	Other	0.1024	0.0945	0.2784	1.1078
School type	[Comprehensive]				
	FE college	-0.1631	0.2062	0.4291	0.8495
	Grammar	0.2704	0.1311	0.0391	1.3105
	Independent	-0.0253	0.1722	0.8833	0.9750
	6 th Form College	0.0275	0.1127	0.8073	1.0279
IDACI score		-0.9089	0.3286	0.0057	0.4030
University subject	[Biological sciences]				
	Subjects allied to medicine	0.0116	0.2049	0.9547	1.0117
	Veterinary sciences, agriculture and related	-0.8906	0.7739	0.2498	0.4104
	Physical sciences	-0.4178	0.2286	0.0676	0.6585
	Mathematical sciences	0.3449	0.3456	0.3182	1.4119
	Engineering	0.3200	0.4954	0.5183	1.3772
	Computer sciences	0.6781	0.3376	0.0446	1.9702
	Technologies	0.0539	0.6747	0.9363	1.0554
	Architecture, building and planning	-0.4764	0.4180	0.2544	0.6210
	Social studies	-0.3851	0.1547	0.0128	0.6804
	Law	-0.6942	0.1859	0.0002	0.4995
	Business and administrative studies	0.1431	0.2264	0.5273	1.1539
	Mass Communications and Documentation	0.0200	0.2214	0.9282	1.0202
	Linguistics, classics and related subjects	-0.4342	0.1582	0.0061	0.6478
	European languages, literature and related	0.1010	0.8767	0.9083	1.1062
	Eastern, Asiatic, African, American and Australasian languages and literature	-0.6370	1.1647	0.5844	0.5289
	Historical and philosophical studies	-0.2108	0.1472	0.1522	0.8099
Creative arts and design	0.0215	0.1687	0.8988	1.0217	
Education	-0.2267	0.2680	0.3976	0.7971	
Combined	-0.1891	0.1563	0.2264	0.8277	

Table 10: Model summary (probability of achieving at least an upper second class degree)

Variable		Est.	SE	P-value	Odds ratio
Intercept		3.4729	0.2313	<0.0001	32.2298
EP grade	[*]				
	A	-0.5097	0.2142	0.0173	0.6007
	B	-1.0528	0.2064	<0.0001	0.3490
	C	-1.2873	0.2097	<0.0001	0.2760
	D	-1.4672	0.2215	<0.0001	0.2306
Gender	[Female]				
	Male	-0.0262	0.0989	0.7908	0.9741
Mission group	[Russell Group]				
	Other	-0.6997	0.1596	<0.0001	0.4967
School type	[Comprehensive]				
	FE college	-0.4006	0.1921	0.0371	0.6699
	Grammar	0.3432	0.1895	0.0701	1.4094
	Independent	0.0377	0.2468	0.8786	1.0384
	6 th Form College	-0.1714	0.1328	0.1969	0.8425
IDACI score		-1.1364	0.3212	0.0004	0.3210

The easiest way to interpret the effects of each variable is to use odds ratios. An odds ratio represents the increase in the odds of achieving a degree class (e.g. first) when the value of a categorical independent variable changes from the baseline to a specified category or when the value of a continuous independent variable increases by a specified unit. The actual magnitude of the odds ratios is difficult to interpret (see Osborne (2006) for an extended discussion); however, the relative magnitude of the odds ratios can be very informative. An odds ratio greater than 1 indicates an increase in the likelihood of achieving a degree class, with a greater odds ratio indicating a greater increased likelihood. Conversely, an odds ratio less than 1 indicates a decrease in the likelihood of achieving a degree class, with a smaller odds ratio indicating a larger decrease in likelihood. And, finally, an odds ratio equal to 1 indicates an equal likelihood of achieving a degree class. These relative interpretations of the odds ratios are used to inform brief discussions of the effect of prior qualifications (in this case, the EP qualification) on the outcome variables.

Table 9 shows that the EP grade had a significant effect on the probability of achieving a first class degree, with each higher grade meaning a greater likelihood of getting a first (after accounting for other background variables). This suggests that the EP grade is a good predictor of degree classification. Looking at the odds ratios we can see that those getting a grade A in the EP qualification were only 0.58 as likely to achieve a first than those getting a grade A*. Those getting an E were just 0.20 as likely.

This analysis also shows that there was an association between the background variables included in the model and performance at university. For example, males were 1.22 times more likely to get a first class degree than females. There was only one significant school type effect: students attending a grammar school were more likely than those attending a comprehensive to achieve a first class degree (odds ratio = 1.31). There were four significant subject group effects: students taking social studies, law or linguistics were less

likely and students taking computer science more likely to achieve a first class outcome than those taking biological sciences. Students from disadvantaged areas were less likely to achieve a first class outcome than those from more advantaged backgrounds. Finally, there was no significant effect of the type of university attended (Russell or non-Russell Group) on the probability of achieving a first class degree.

For the probability of at least an upper second, the effect of the EP grade was similar (e.g. odds ratio for an A grade compared to an A* = 0.61). This time, however, gender was not a significant predictor of university performance, but the mission group of the university was: students at a Russell Group university were more likely to get at least an upper second class degree than students in other universities, after accounting for EP grade (increase in odds by a factor of 2). There was no longer a grammar school effect, but students in FE colleges were significantly less likely to achieve at least an upper second class degree than those in comprehensive schools.

However, some caution is necessary in the interpretation of the statistical significance of the results relating to the background variables, because no correction has been made for the impact of making multiple comparisons (for example, comparing several school types with comprehensives and a large number of subject areas with biological sciences). A large number of comparisons increases the likelihood that a statistically significant effect will be found by chance alone. Thus, these findings should be treated with particular caution and may not necessarily be repeated in other studies.

To more clearly see the impact of the EP grade on degree performance the regression estimates were transformed into probabilities for particular groups. Figure 2 presents the probability of achieving a first class degree (for female students, from a comprehensive school, taking a biological sciences related degree at a Russell Group institution and with an average IDACI score) and the probability of achieving at least an upper second class degree (for female students, from a comprehensive school, attending a Russell Group institution and with an average IDACI score).

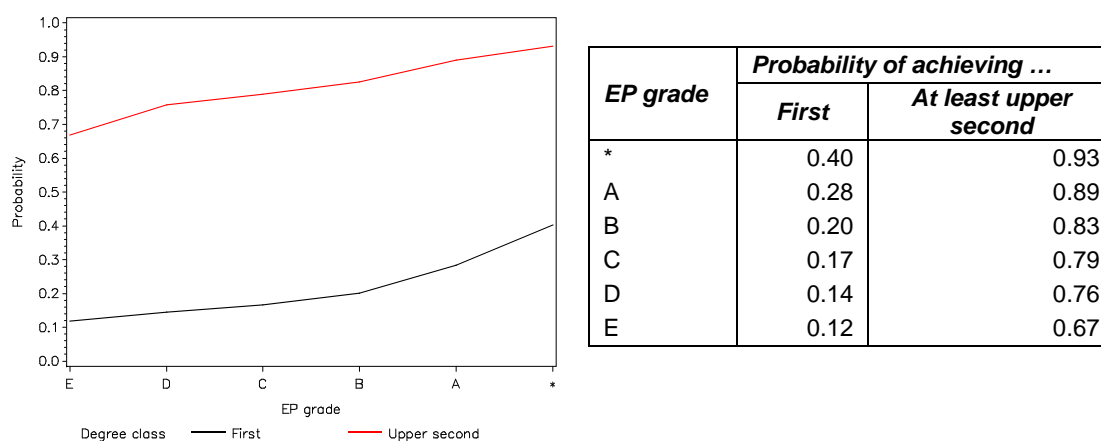


Figure 2: Probability of achieving first / at least an upper second class degrees, by EP grade

Further models were run for students attending Russell Group (RG) institutions and for students attending non-Russell Group (non-RG) institutions separately. In these models the university subject group was excluded due to lack of convergence. Tables 11 and 12 compare the results for the models predicting the probability of a first class degree and the

probability of an upper second class degree, respectively, for the two different groups of students. Only the regression estimates and the odds ratios are presented here (full model results can be found in Appendix B).

Table 11: Model summary (probability of achieving a first class degree, Russell Group and non-Russell Group students)

<i>Variable</i>		<i>Russell Group</i>		<i>Non-Russell Group</i>	
		<i>Est.</i>	<i>Odds ratio</i>	<i>Est.</i>	<i>Odds ratio</i>
Intercept		-0.7675	0.4642	-0.2960	0.7438
EP grade	[*]				
	A	-0.4249	0.6538	-0.6473	0.5235
	B	-0.8482	0.4282	-1.0686	0.3435
	C	-1.0483	0.3505	-1.2638	0.2826
	D	-1.3180	0.2677	-1.3910	0.2488
Gender	[Female]				
	Male	0.3794	1.4613	0.0784	1.0816
School type	[Comprehensive]				
	FE college	-0.1390	0.8702	-0.1560	0.8555
	Grammar	0.1811	1.1986	0.3193	1.3761
	Independent	-0.0023	0.9977	-0.1333	0.8752
	6 th Form College	0.0017	1.0017	0.0101	1.0102
IDACI score		-0.5316	0.5877	-1.2076	0.2989

Table 12: Model summary (probability of achieving at least an upper second class degree, Russell Group and non-Russell Group students)

<i>Variable</i>		<i>Russell Group</i>		<i>Non-Russell Group</i>	
		<i>Est.</i>	<i>Odds ratio</i>	<i>Est.</i>	<i>Odds ratio</i>
Intercept		3.8781	48.3339	2.7616	15.8258
EP grade	[*]				
	A	-0.4171	0.6589	-0.5976	0.5501
	B	-0.9108	0.4022	-1.1970	0.3021
	C	-1.5121	0.2204	-1.3173	0.2679
	D	-0.2358	0.7899	-1.6580	0.1905
Gender	[Female]				
	Male	-0.3369	0.7140	0.0928	1.0973
School type	[Comprehensive]				
	FE college	-0.9383	0.3913	-0.2628	0.7689
	Grammar	0.0241	1.0244	0.5608	1.7521
	Independent	-0.0288	0.9717	-0.1027	0.9024
	6 th Form College	-0.2666	0.7660	-0.1488	0.8618
IDACI score		-2.5063	0.0816	-0.8108	0.4445

Table 11 shows that there was not much difference in the results for the two groups of students. The effect of an A* grade in the EP on the probability of achieving a first class degree (compared to lower grades) was stronger in non-Russell Group universities than in Russell Group ones, but not to a statistically significant degree (according to *t*-tests). The gender effect was only significant for students attending Russell Group institutions, and the IDACI score was only significant for students attending non-Russell Group institutions. There was no effect of the type of the school on the probability of achieving a first class degree when the two groups of universities were considered separately.

Table 12 shows that the effect of achieving a grade A compared to an A* in the EP qualification was not a significant predictor of achieving an upper second class outcome for either group of students. It is unexpected that there was no significant effect on the probability of at least an upper second class outcome of only achieving a grade D in the EP qualification compared to an A* for Russell Group students. Further investigation of this showed there were very few D grade students failing to achieve at least an upper second (6 out of the 74 students achieving a D).

There was no significant gender effect on the probability of achieving an upper second class degree, but there were two school type effects that were significant: Russell Group students who had attended an FE college were less likely to get at least an upper second class degree than those who had attended a comprehensive school; non-Russell Group students who had attended a grammar school were more likely to get at least an upper second class degree than those who had attended a comprehensive school.

Predictive validity of the Extended Project qualification (over and above the effect of A levels)

A further investigation was undertaken into whether having the EP (on top of A levels) was beneficial for university study, as this qualification aims to provide students with skills that they will find useful at university and that might not be gained through traditional A level study.

The performance at university of students taking three or more A levels was analysed, after taking into account A level mean, by whether or not they had taken an EP qualification. Therefore, any students taking the EP who did not also take at least 3 A levels were excluded from this analysis.

Figure 3, which presents the distribution of the mean A level score for students with and without an EP qualification, suggests that the group with an EP qualification was of slightly higher ability on average.

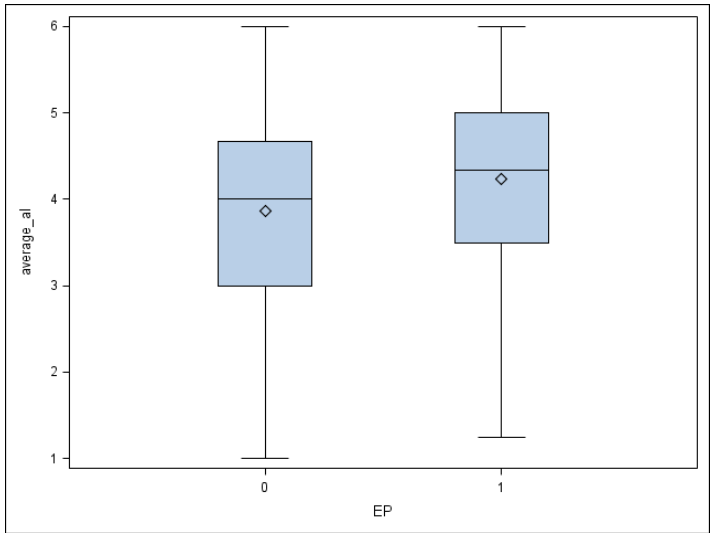


Figure 3: Distribution of mean A level for EP and non-EP students

Figure 4 presents the distribution of mean A level within each degree class for the EP and non-EP students. Within each degree class the EP students had a higher mean A level on average. However, there is a lot of overlap between the two groups, and this analysis takes no account of any background factors that might affect the degree class.

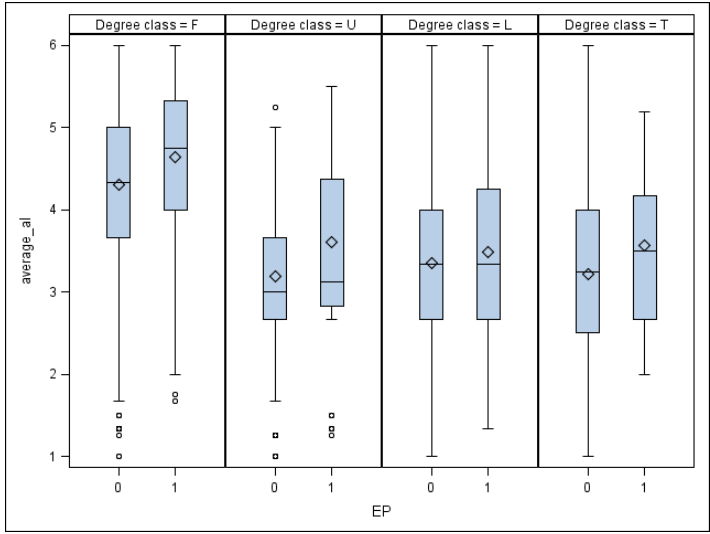


Figure 4: Distribution of mean A level within degree classification for EP and non-EP students

Regression analyses

As before, models were run for the probability of achieving a first or at least an upper second class degree. In those models, a binary indicator of whether or not the students took the EP qualification, and the A level mean to account for prior attainment, were included as independent variables. Background variables were also included in the models, as was the subject taken at university.

Tables 13 and 14 present the results of the models predicting the probability of achieving first and at least upper second class degrees, respectively. Having an EP qualification was a positive predictor of university performance (even after controlling for A level performance): for two students with the same A level performance the one with an EP qualification had a higher probability of achieving a first class degree. Specifically, taking the EP increased the odds of getting a first class degree by a factor of 1.25. Students attending non-Russell Group institutions were more likely to get a first class degree than those attending Russell Group ones, those in comprehensive schools were more likely than those in independent schools or sixth form colleges and students with lower IDACI scores were also more likely than those with a lower score. The gender effect was non-significant. There were a number of significant subject effects, the largest of which were that students taking computer sciences or technology related degrees were more likely to get a first class degree than those taking biological science related courses.

In terms of the probability of achieving at least an upper second class degree, the effect of the EP qualification was again positive and statistically significant. The parameter estimate of 0.2624 means that having an EP increases the odds of getting at least an upper second class degree by a factor of 1.3. For this model there was a significant gender effect, with males having a lower probability of achieving an upper second class degree or above. As with the probability of a first, there were significant positive effects on the probability of achieving at least an upper second class degree for students attending non-Russell Group universities, and for those in comprehensives compared with independent schools or sixth form colleges.

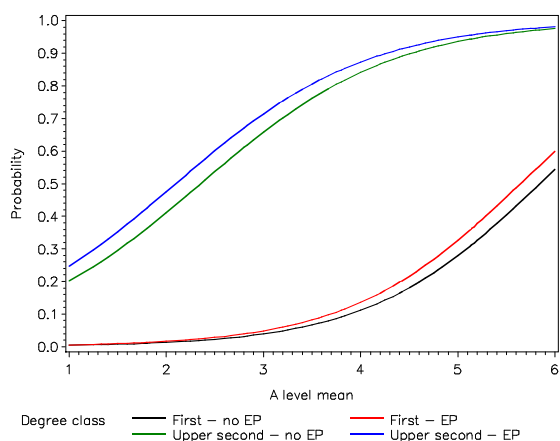
Table 13: Model summary (probability of achieving a first class degree)

Variable		Est.	SE	P-value	Odds ratio
Intercept		-6.5179	0.1466	<0.0001	0.0015
Mean A level		1.1270	0.0191	<0.0001	3.0864
EP	[No]				
	Yes	0.2247	0.0455	<0.0001	1.2520
Gender	[Female]				
	Male	0.0040	0.0248	0.8709	1.0040
Mission group	[Russell Group]				
	Other	0.8899	0.1226	<0.0001	2.4349
School type	[Comprehensive]				
	FE college	-0.0067	0.0834	0.9364	0.9934
	Grammar	-0.0073	0.0436	0.8670	0.9927
	Independent	-0.4361	0.0432	<0.0001	0.6466
	Secondary modern	-0.0735	0.1264	0.5606	0.9291
	6 th Form college	-0.1447	0.0447	0.0012	0.8653
	Tertiary college	-0.0566	0.0912	0.5347	0.9449
IDACI score		-0.4634	0.0940	0.0000	0.6291
University subject	[Biological sciences]				
	Subjects allied to medicine	0.2822	0.0584	<0.0001	1.3261
	Veterinary sciences, agriculture and related	0.3736	0.1813	0.0393	1.4530
	Physical sciences	0.0025	0.0624	0.9680	1.0025
	Mathematical sciences	0.6178	0.0668	<0.0001	1.8549
	Engineering	0.7564	0.1154	<0.0001	2.1306
	Computer sciences	1.2555	0.0963	<0.0001	3.5094
	Technologies	1.0058	0.1797	<0.0001	2.7341
	Architecture, building and planning	-0.1897	0.0991	0.0555	0.8272
	Social studies	-0.1190	0.0436	0.0063	0.8878
	Law	-0.7171	0.0571	<0.0001	0.4882
	Business and administrative studies	0.4249	0.0524	<0.0001	1.5294
	Mass Communications and Documentation	-0.0667	0.0668	0.3179	0.9355
	Linguistics, classics and related subjects	-0.3025	0.0487	<0.0001	0.7390
	European languages, literature and related	-0.5292	0.4488	0.2383	0.5891
	Eastern, Asiatic, African, American and Australasian languages, literature and related	-0.2339	0.3591	0.5149	0.7915
	Historical and philosophical studies	-0.2791	0.0493	<0.0001	0.7565
Creative arts and design	0.0579	0.0510	0.2566	1.0596	
Education	0.0123	0.0789	0.8764	1.0123	
Combined	-0.3001	0.0477	<0.0001	0.7408	

Table 14: Model summary (probability of achieving at least an upper second class degree)

<i>Variable</i>		<i>Est.</i>	<i>SE</i>	<i>P-value</i>	<i>Odds ratio</i>
Intercept		-2.2847	0.1167	<0.0001	0.1018
Mean A level		1.0161	0.0180	<0.0001	2.7624
EP	[No] Yes	0.2624	0.0546	<0.0001	1.3001
Gender	[Female] Male	-0.3152	0.0232	<0.0001	0.7296
Mission group	[Russell Group] Other	0.3100	0.0889	0.0005	1.3634
School type	[Comprehensive] FE college Grammar Independent Secondary modern 6 th Form College Tertiary college	-0.0602 -0.0624 -0.4647 -0.1060 -0.1553 -0.0309	0.0756 0.0455 0.0426 0.1098 0.0420 0.0872	0.4259 0.1708 <0.0001 0.3344 0.0002 0.7228	0.9416 0.9395 0.6283 0.8994 0.8562 0.9695
IDACI score		-0.7492	0.0814	<0.0001	0.4727
University subject	[Biological sciences] Subjects allied to medicine Veterinary sciences, agriculture and related Physical sciences Mathematical sciences Engineering Computer sciences Technologies Architecture, building and planning Social studies Law Business and administrative studies Mass Communications and Documentation Linguistics, classics and related subjects European languages, literature and related Eastern, Asiatic, African, American and Australasian languages, literature and related Historical and philosophical studies Creative arts and design Education Combined	-0.0076 0.2563 -0.2823 -0.7633 -0.1699 0.3830 0.2061 -0.1908 0.0225 -0.3248 0.3593 0.3479 0.1560 0.3795 -0.3436 0.3038 0.3356 0.0454 0.0095	0.0580 0.1516 0.0528 0.0704 0.1012 0.0990 0.1913 0.0914 0.0413 0.0488 0.0515 0.0602 0.0510 0.3851 0.2616 0.0504 0.0496 0.0653 0.0444	0.8956 0.0908 <0.0001 <0.0001 0.0933 0.0001 0.2815 0.0368 0.5862 <0.0001 <0.0001 0.0022 0.3244 0.1890 <0.0001 <0.0001 0.4868 0.8304	0.9924 1.2922 0.7541 0.4661 0.8438 1.4667 1.2288 0.8263 1.0227 0.7227 1.4324 1.4161 1.1688 1.4615 0.7092 1.3551 1.3988 1.0465 1.0095

Figure 5 illustrates the probabilities of achieving first and at least upper second class degrees, for different levels of prior attainment, for students with and without the EP qualification. The probabilities shown are for a female student taking a biological sciences degree at a Russell Group university, from a comprehensive school and with an average IDACI score.



A level mean	Probability of achieving...			
	First		At least upper second	
	No EP	EP	No EP	EP
6	0.54	0.60	0.98	0.98
5	0.28	0.33	0.94	0.95
4	0.11	0.14	0.84	0.87
3	0.04	0.05	0.66	0.71
2	0.01	0.02	0.41	0.48
1	0.00	0.01	0.20	0.25

Figure 5: Probability of achieving first / at least upper second class degrees, by A level mean and EP indicator

Further models were run for students attending Russell Group institutions and for students attending non-Russell Group institutions separately. Table 15 compares the results for the models predicting the probability of a first class outcome and Table 16 compares the results for the models predicting the probability of at least an upper second class outcome for the two different students groups. Only the regression estimates and the odds ratios are presented here (full model results can be found in Appendix C).

The effect of having an EP on the probability of achieving a first class degree was not significant for Russell Group students, but it was significant for non-Russell Group students (Table 15). Furthermore, the effect for the latter group of students was stronger than for all students together (odds ratio = 1.36 vs. 1.25). The effect of mean A level was stronger for Russell Group students than for non-Russell Group students and this difference was statistically significant ($t = 6.39$). The gender effect was not significant for either group. For both Russell and non-Russell Group students attending independent schools had a significant and negative effect on the probability of achieving a first class degree compared to attending comprehensive schools. Non-Russell Group students who had attended sixth form colleges were less likely than those who had attended comprehensives to achieve a first class degree.

Table 16 shows that having an EP qualification had a significant and positive effect on the probability of achieving at least an upper second for both groups of students (increasing the odds by 1.23 for Russell Group students and 1.30 for non-Russell Group students). There was a significant gender effect: male students were less likely to achieve at least an upper second class degree than females. Also, there were a couple of significant school type effects: independent school and sixth form college students (in non-Russell Group universities only) were less likely than students in comprehensive schools to achieve at least an upper second class degree.

Table 15: Model summary (probability of a achieving a first class degree, Russell Group and non-Russell Group students)

<i>Variable</i>		<i>Russell Group</i>		<i>Non-Russell Group</i>	
		<i>Est.</i>	<i>Odds ratio</i>	<i>Est.</i>	<i>Odds ratio</i>
Intercept		-7.5702	0.0005	-5.3404	0.0048
Mean A level		1.3365	3.8056	1.0552	2.8726
EP	[No]				
	Yes	0.0922	1.0966	0.3052	1.3569
Gender	[Female]				
	Male	0.0278	1.0282	-0.0115	0.9886
School type	[Comprehensive]				
	FE college	0.2110	1.2349	-0.0294	0.9710
	Grammar	0.0210	1.0213	0.0050	1.0050
	Independent	-0.4035	0.6680	-0.5181	0.5957
	Secondary modern	-0.2558	0.7743	-0.0419	0.9589
	6 th Form college	-0.0253	0.9750	-0.1783	0.8367
	Tertiary college	0.0769	1.0799	-0.1202	0.8868
IDACI score		-0.4426	0.6423	-0.5081	0.6016
University subject	[Biological sciences]				
	Subjects allied to medicine	0.1608	1.1745	0.3812	1.4640
	Veterinary sciences, agriculture and related	-0.2651	0.7671	0.5091	1.6639
	Physical sciences	-0.1140	0.8922	0.0969	1.1017
	Mathematical sciences	0.2511	1.2854	1.0669	2.9063
	Engineering	-0.1236	0.8838	1.1151	3.0499
	Computer sciences	1.2630	3.5359	1.2502	3.4911
	Technologies	0.9927	2.6985	1.0100	2.7456
	Architecture, building and planning	-0.3954	0.6734	-0.1222	0.8850
	Social studies	-0.2217	0.8012	-0.0682	0.9341
	Law	-0.9477	0.3877	-0.6034	0.5469
	Business and administrative studies	0.0211	1.0213	0.5656	1.7605
	Mass Communications and Documentation	0.2003	1.2217	-0.0696	0.9328
	Linguistics, classics and related subjects	-0.2455	0.7823	-0.4271	0.6524
	European languages, literature and related	-0.2467	0.7814	-0.7973	0.4505
	Eastern, Asiatic, African, American and Australasian languages, literature and related	-0.4147	0.6605	-0.1542	0.8571
	Historical and philosophical studies	-0.1132	0.8930	-0.6617	0.5160
	Creative arts and design	0.0993	1.1044	0.0719	1.0745
	Education	1.1542	3.1716	-0.0881	0.9157
Combined	-0.2272	0.7968	-0.3930	0.6751	

Table 16: Model summary (probability of achieving at least an upper second class degree, Russell Group and non-Russell Group students)

<i>Variable</i>		<i>Russell Group</i>		<i>Non-Russell Group</i>	
		<i>Est.</i>	<i>Odds ratio</i>	<i>Est.</i>	<i>Odds ratio</i>
Intercept		-3.7166	0.0243	-1.7262	0.1780
Mean A level		1.3200	3.7435	0.9488	2.5825
EP	[No]				
	Yes	0.2084	1.2317	0.2592	1.2959
Gender	[Female]				
	Male	-0.4270	0.6524	-0.2805	0.7554
School type	[Comprehensive]				
	FE college	-0.0776	0.9253	-0.0339	0.9667
	Grammar	-0.0720	0.9305	-0.0418	0.9591
	Independent	-0.4417	0.6429	-0.5739	0.5633
	Secondary modern	-0.1737	0.8405	-0.0789	0.9241
	6 th Form college	-0.1181	0.8886	-0.1552	0.8562
	Tertiary college	0.0271	1.0274	-0.0520	0.9493
IDACI score		-0.8969	0.4078	-0.6980	0.4976
University subject	[Biological sciences]				
	Subjects allied to medicine	0.0278	1.0282	0.0426	1.0435
	Veterinary sciences, agriculture and related	0.6624	1.9395	0.1599	1.1733
	Physical sciences	-0.1828	0.8330	-0.2640	0.7680
	Mathematical sciences	-1.0430	0.3524	-0.3600	0.6977
	Engineering	-1.1434	0.3187	0.4303	1.5377
	Computer sciences	0.2852	1.3300	0.4024	1.4955
	Technologies	0.5150	1.6736	0.1343	1.1437
	Architecture, building and planning	0.5607	1.7520	-0.3083	0.7347
	Social studies	0.2683	1.3077	-0.0907	0.9133
	Law	-0.1101	0.8957	-0.4098	0.6638
	Business and administrative studies	0.1093	1.1155	0.3948	1.4841
	Mass Communications and Documentation	1.2198	3.3865	0.2678	1.3071
	Linguistics, classics and related subjects	0.6870	1.9878	-0.0474	0.9537
	European languages, literature and related	-0.5443	0.5803	0.9406	2.5615
	Eastern, Asiatic, African, American and Australasian languages, literature and related	0.1667	1.1814	-0.5398	0.5828
	Historical and philosophical studies	0.8372	2.3098	0.0560	1.0576
	Creative arts and design	1.1156	3.0514	0.2337	1.2632
	Education	1.4330	4.1912	-0.0387	0.9621
Combined	0.0552	1.0568	-0.0036	0.9964	

Cambridge Pre-U

Descriptive statistics

There were 200 students taking at least one Pre-U qualification (excluding short courses) with a degree result. These 200 students accounted for 320 different Pre-U qualifications. Most of the Pre-U qualifications (92%) were in a distinct 'principal' subject, but a significant proportion (9%) achieved the Global Perspectives and Independent Research (GPR) qualification. Table 17 presents the number of Pre-U qualifications (both principal subjects and GPR) taken by these students.

Table 17: Number of Pre-U qualifications

No. of Pre-U taken	No. of students	% of students
1	125	63.2
2	40	18.9
3	25	12.4
4	10	5.5

As shown above, most students took just one Pre-U qualification. Furthermore, almost all (over 85%) of the students with a GPR qualification took only one Pre-U. Table 18 shows which other qualifications students combined their Pre-U with.

Table 18: Combinations of prior qualifications taken by Pre-U students

Combination	No. of students	% of students
A level / Pre-U subject	150	75.6
A level / Pre-U GPR	25	11.9
A level / Pre-U subject / Pre-U GPR	5	2.0
Pre-U only	15	7.5
Extended project / A level / Pre-U subject	5	3.0

Most students combined their Pre-U qualification(s) with A levels only (89.5%). There was a small proportion of students (7.5%) who took only Pre-U qualifications. Of those who combined A level and Pre-U subjects, most took two or three A levels alongside one Pre-U. Those taking two Pre-U subjects tended to take either one or two A levels. Amongst those combining Pre-U GPR with A levels, there was only one student who took fewer than three A levels.

Pre-U students attended at least 30¹⁸ different schools and progressed to 45 different HE institutions.

¹⁸ There were 20 students for whom the school was unknown.

Table 19 presents information on the background variables used in the analysis. This table shows that the Pre-U cohort consisted of slightly more male than female students (56% males vs. 44% females). Regarding the type of school, over 80% of the students attended independent schools, and only 5 students (3%) attended a comprehensive school. This is not surprising, as when the Pre-U was firstly introduced it was mainly offered in independent schools. A large majority of students attended Russell Group universities (81%) and negligible percentages (less than 1%) attended institutions in the Million Plus or Guild HE groups. Pre-U students studied a wide range of different subject areas, the most popular of which were historical and philosophical studies (25.4%) and social studies (24.4%).

Table 19: Background data of the students with a Pre-U qualification

Variable	No. of students	% of students
Gender		
Female	90	44.3
Male	110	55.7
School type		
Comprehensive	5	3.0
Grammar	25	15.0
Independent	135	82.0
Missing	35	
University group		
1994 group	15	7.5
Guild HE	0	0.5
Million Plus	0	0.5
Other	15	7.5
Russell Group	165	81.1
University Alliance	5	3.0
Subject group		
Subjects allied to medicine	0	1.0
Biological sciences	10	5.5
Veterinary sciences, agriculture and related subjects	0	0.5
Physical sciences	10	4.5
Mathematical sciences	5	2.0
Engineering	0	0.5
Computer sciences	0	0.0
Technologies	0	0.0
Architecture, building and planning	0	0.5
Social studies	50	24.4
Law	5	3.5
Business and administrative studies	5	2.5
Mass Communications and Documentation	0	1.0
Linguistics, classics and related subjects	25	12.9
European languages, literature and related subjects	0	0.0
Eastern, Asiatic, African, American and Australasian languages, literature and related subjects	0	0.0
Historical and philosophical studies	50	25.4
Creative arts and design	10	5.0
Education	0	0.0
Combined	20	11.0

Table 20 presents the degree outcomes for the students with a Pre-U qualification. Two thirds of students achieved an upper second class degree and 20.4% achieved a first class degree. This compares with around 17% of A level students achieving first and 61% upper second class outcomes (students taking at least three A levels and no other qualifications).

Table 20: Degree classification for Pre-U students

<i>Degree classification</i>	<i>No. of students</i>	<i>% of students</i>
First	40	20.4
Upper second	135	66.7
Lower second	25	11.4
Third	5	1.5

Table 21 presents the degree outcomes for Russell Group students only¹⁹. This shows that students attending Russell Group universities were more likely (than all Pre-U students) to achieve a first class degree (22.8%).

Table 21: Degree classification for Pre-U students, by university mission group

<i>Degree classification</i>	<i>Russell Group</i>	
	<i>No. of students</i>	<i>% of students</i>
First	35	22.8
Upper second	105	65.4
Lower second	15	9.9
Third	5	1.9

In order to investigate the predictive validity of the Pre-U, a measure of the performance in the qualification by each student was required. Since some students obtained more than one Pre-U it was necessary to calculate a mean Pre-U grade. Pre-U grades are divided up into Distinction, Merit and Pass and then sub-divided into three classifications within each of these (*i.e.* D1 is the highest, followed by D2, D3, M1, M2, etc.). A D3 grade is aligned to a grade A at A level and a P3 (lowest pass) is aligned to a grade E.

Each grade was assigned a numeric value (ranging from 9 for D1 to 1 for P3) and the mean calculated for each student. The distribution of Pre-U mean grades is presented in Figure 6, which clearly shows that most students were towards the top end of the grade distribution, with the mean value of the Pre-U mean equal to 7 (D3).

¹⁹ It was not possible to display the results for students attending non-Russell Group institutions because of the low numbers of students (n=40). HESA's standard rounding methodology states that 'Percentages based on 52 or fewer individuals must be suppressed'.

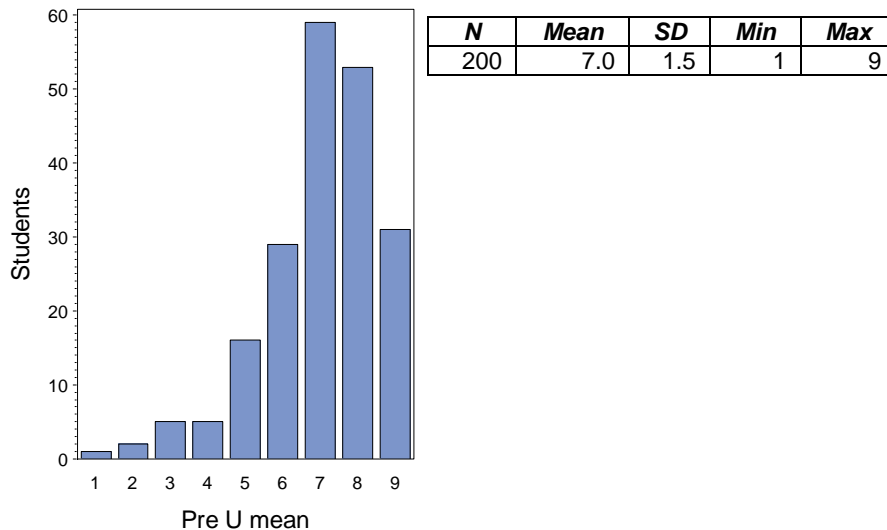


Figure 6: Distribution of mean Pre-U grade for students with a degree result

The predictive validity of the Pre-U was first assessed by looking at the relationship between the performance at Pre-U (measured by the average Pre-U grade) and the class of the degree achieved at university.

Figure 7, which summarises the distribution of the mean Pre-U grade by degree classification, shows that there was a good relationship between Pre-U grade and degree classification, with students achieving a first class degree having the highest mean Pre-U grade, followed by those getting an upper second class outcome. The polychoric correlation (see footnote 16 for a brief explanation of polychoric correlation) between mean Pre-U grade and degree classification was statistically significant (0.3282). Its magnitude places it in the 'likely to be useful' category for interpreting correlation coefficients in predictive validity studies (Department of Labor, Employment and Training Administration, 1999).

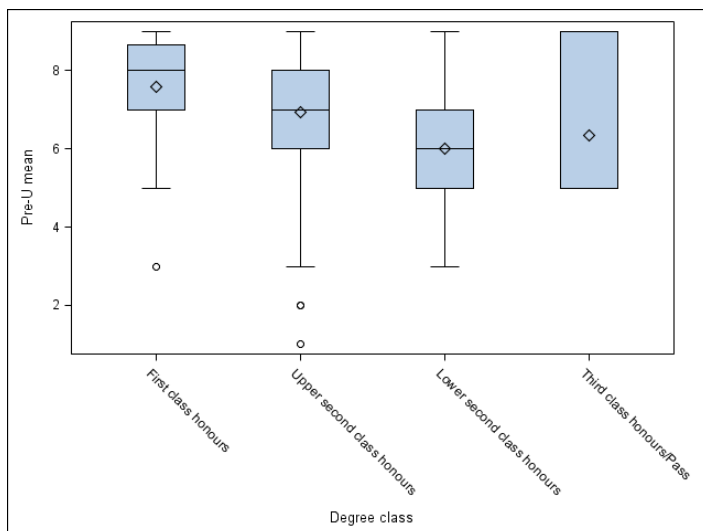


Figure 7: Distribution of mean Pre-U grade by degree classification

Regression analyses

As with the EP analysis two sets of models were fitted in this section. The first set of models predicts the degree classification of Pre-U students only, with the independent variables being the Pre-U mean grade and the background variables as described in Table 19. The second set of models investigates whether having a Pre-U was more beneficial for university study than having A levels only. The independent variables in this set of models were the UCAS tariff (a common measure of achievement for A level and Pre-U students), an indicator of whether or not a Pre-U was taken and other background variables as above.

Predictive validity of the Pre-U qualification

Table 22 presents the parameter estimates (Est.), standard errors (SE), p-values and odds ratios for the model predicting the probability of achieving a first class degree. Table 23 presents the same statistics for the model predicting the probability of achieving at least an upper second class degree.

In this analysis it was necessary to exclude the subject group and the school type variables due to lack of convergence. Furthermore, for the model predicting at least an upper second class degree, the IDACI score was not included as an independent variable, as it was not possible to generate a valid estimate of its effect. This is likely to be because very few Pre-U students failed to achieve at least an upper second class degree and the IDACI score was missing for a substantial proportion of them.

Table 22: Model summary (probability of achieving a first class degree)

Variable		Est.	SE	P-value	Odds ratio
Intercept		-4.4718	1.3242	0.0007	0.0114
Pre-U mean		0.4500	0.1747	0.0100	1.5682
Gender	[Female]				
	Male	-0.2334	0.3997	0.5594	0.7919
Mission Group	[Russell Group]				
	Other	0.3192	0.6341	0.6147	1.3761
IDACI score		-1.6152	1.8015	0.3699	0.1988

In Table 22, the parameter estimate for the mean Pre-U grade was positive and statistically significant, indicating that the probability of getting a first class outcome was greater for higher values of mean Pre-U grade (after accounting for other background variables). This indicates that the Pre-U is a good predictor of university performance. The odds ratio tells us that an increase of one grade in Pre-U mean is associated with an increase in the odds of achieving a first class degree by a factor of 1.57.

With regards to the probability of achieving at least an upper second class degree (Table 23), there was again a significant mean Pre-U effect, indicating that the probability of getting at least an upper second class outcome was greater for higher values of mean Pre-U (after accounting for other background variables). The size of the effect was very similar to that for the probability of a first class outcome. In this instance, there was also a significant gender effect: females were much more likely than males to get at least an upper second class degree (odds increased by a factor of 4).

Table 23: Model summary (probability of achieving an upper second class degree)

Variable		Est.	SE	P-value	Odds ratio
Intercept		0.1826	0.9643	0.8498	1.2004
Pre-U mean		0.4353	0.1664	0.0089	1.5454
Gender	[Female] Male	-1.4233	0.6362	0.0253	0.2409
Mission Group	[Russell Group] Other	0.1758	0.6439	0.7848	1.1922

The effect of the Pre-U on university performance is also displayed in Figure 8 below, which plots the Pre-U mean against the probability of achieving a first or at least an upper second class degree for a typical group of students. In particular, the curves present the probabilities for female students attending a Russell Group institution (and with an average IDACI score).

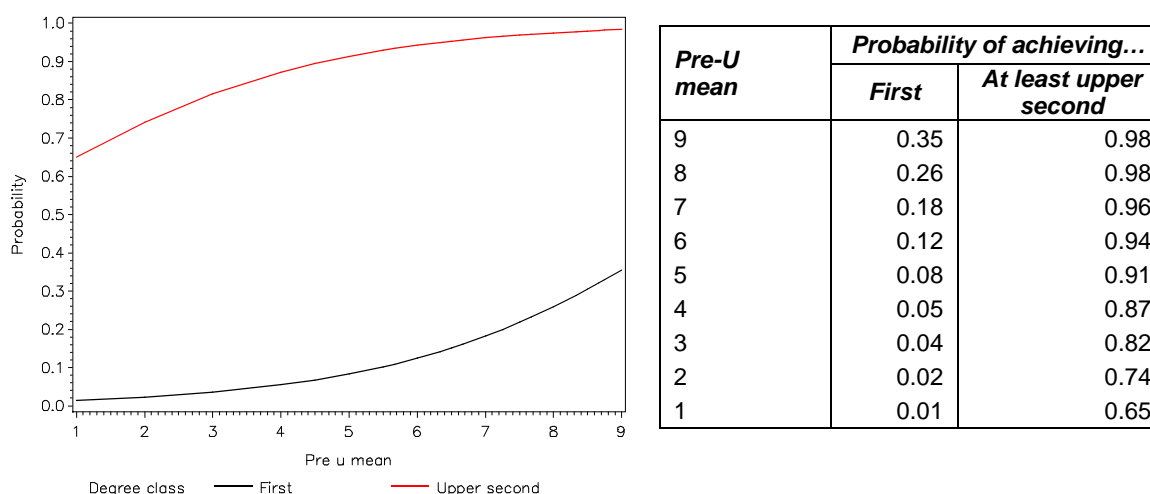


Figure 8: Probability of achieving first / upper second class degrees, by Pre-U mean

Predictive validity of the Pre-U qualification (compared to A levels)

A further investigation was undertaken into whether having a Pre-U was more beneficial for university study than having A levels, as the Pre-U claims to provide students with skills that they will find useful at university and that might not be gained through traditional A level study. Therefore, the performance at university of students taking at least one Pre-U qualification was compared with that of students taking just A levels (after accounting for UCAS tariff).

Figure 9, which presents the distribution of UCAS tariff for students with and without Pre-U, shows that students having Pre-U qualifications (either on their own or alongside A levels) tended to have higher UCAS tariff on average than students with A levels only, implying that they were of higher ability.

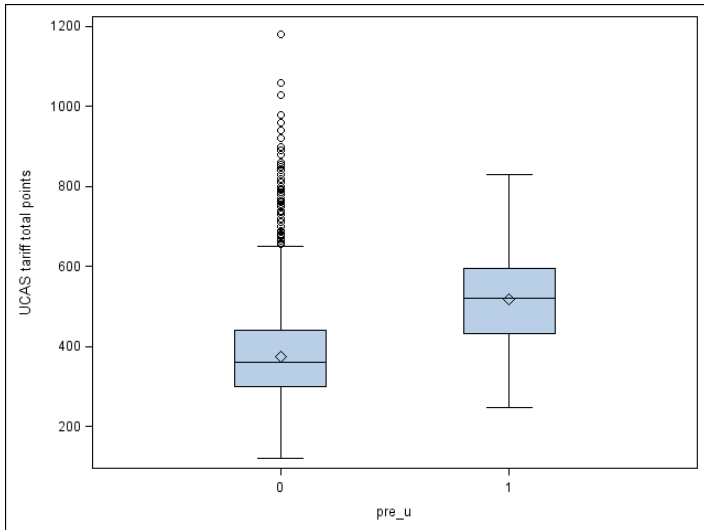


Figure 9: Distribution of UCAS tariff for students with and without Pre-U²⁰

Figure 10, which presents the distribution of the UCAS tariff for students with and without Pre-U qualifications by university degree class, shows that Pre-U students had, on average, higher UCAS tariffs than students with just A levels within each degree class. Indeed, the UCAS tariff for Pre-U students getting an upper second class degree was higher on average than for A level students getting a first class degree. This is, somewhat, surprising; however, the descriptive analysis presented here takes no account of any background variables that may affect performance.

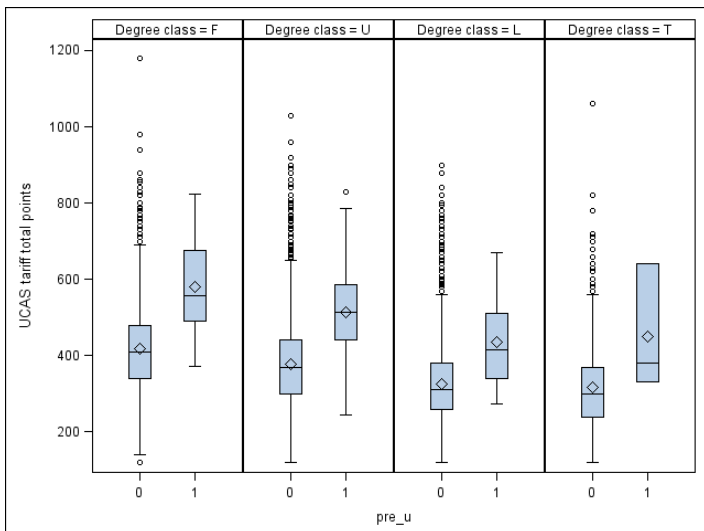


Figure 10: Distribution of UCAS tariff for students with and without Pre-U alongside A levels, by degree classification

²⁰ Note that Pre-U students usually had A levels as well, so the grades from these are included in the tariff.

Regression analyses

These second set of models looks at the probability of achieving a first (or at least an upper second) for both Pre-U and A level students, using UCAS tariff as a predictor and with an indicator of whether or not the students took a Pre-U. As well as the background variables included in previous models, the school type and the subject studied at university were included as fixed effects.

The results from modelling the probability of achieving a first and the probability of achieving at least an upper second class outcome are shown in Tables 24 and 25, respectively.

Having a Pre-U qualification did not have a statistically significant effect on the probability of achieving either a first or at least an upper second class degree, once all the background factors were accounted for. There were, however, some significant effects for the background variables. For example, males were less likely than females to achieve a good degree (either first or at least upper second class) and students from grammar schools, independent schools and sixth form colleges were less likely than students from comprehensive schools to achieve a first or at least an upper second class degree. Russell Group students were significantly less likely to achieve a first class degree than students in other types of universities (although not an upper second class degree or better). There were also several significant subject effects (highlighted in bold font in Tables 24 and 25).

Further models were run for students attending Russell Group institutions and for students attending non-Russell Group institutions, separately. Tables 26 and 27 compare the results for the models predicting the probability of achieving a first or at least an upper second class degree, respectively, for the two different groups of students. Only the coefficient estimates and the odds ratios are presented here, with significant effects in bold. The full model results can be found in Appendix D.

The outcomes from the regression models show that having a Pre-U qualification did not have a statistically significant effect on the probability of achieving a first or at least an upper second class degree in any type of university.

Table 24: Model summary (probability of achieving a first class degree)

<i>Variable</i>		<i>Est.</i>	<i>SE</i>	<i>P-value</i>	<i>Odds ratio</i>
Intercept		-4.8654	0.1209	<0.0001	0.0077
UCAS tariff		0.0080	0.0002	<0.0001	1.0080
Pre-U	[No] Yes	-0.1376	0.2138	0.5197	0.8714
Gender	[Female] Male	-0.0674	0.0257	0.0089	0.9349
Mission group	[Russell Group] Other	0.5877	0.1000	<0.0001	1.7999
School type	[Comprehensive] FE college Grammar Independent Secondary Modern 6 th Form College Tertiary	0.1587 -0.2735 -0.2272 -0.0257 -0.2704 0.0571	0.0934 0.0498 0.0465 0.1312 0.0524 0.1038	0.0893 <0.0001 <0.0001 0.8446 <0.0001 0.5820	1.1720 0.7607 0.7968 0.9746 0.7631 1.0588
IDACI score		-0.3074	0.0974	0.0016	0.7354
Subject	[Biological sciences] Subjects allied to medicine Veterinary sciences, agriculture and related Physical sciences Mathematical sciences Engineering Computer sciences Technologies Architecture, building and planning Social studies Law Business and administrative studies Mass Communications and Documentation Linguistics, classics and related subjects European languages, literature and related Eastern, Asiatic, African, American and Australasian languages, literature and related Historical and philosophical studies Creative arts and design Education Combined	0.2775 0.3141 -0.1210 0.4964 0.5625 1.0903 0.9610 -0.1613 -0.1244 -0.6578 0.4033 -0.0218 -0.2069 -0.9653 -0.3474 -0.2994 0.1218 0.0248 -0.3183	0.0594 0.1764 0.0641 0.0684 0.1159 0.0966 0.1802 0.1011 0.0451 0.0598 0.0531 0.0680 0.0507 0.5387 0.3759 0.0520 0.0515 0.0791 0.0497	<0.0001 0.0749 0.0591 <0.0001 <0.0001 <0.0001 <0.0001 0.1106 0.0058 <0.0001 <0.0001 0.7490 <0.0001 0.0731 0.3554 <0.0001 0.0180 0.7541 <0.0001	1.3199 1.3691 0.8860 1.6427 1.7551 2.9752 2.6143 0.8510 0.8830 0.5180 1.4968 0.9785 0.8131 0.3809 0.7065 0.7413 1.1296 1.0251 0.7274

Table 25: Model summary (probability of achieving at least an upper second class degree)

<i>Variable</i>		<i>Est.</i>	<i>SE</i>	<i>P-value</i>	<i>Odds ratio</i>
Intercept		-1.3210	0.1110	<0.0001	0.2669
UCAS tariff		0.0085	0.0002	<0.0001	1.0085
Pre-U	[No] Yes	0.1649	0.2925	0.5728	1.1793
Gender	[Female] Male	-0.3568	0.0236	<0.0001	0.6999
Mission group	[Russell Group] Other	0.0254	0.0840	0.7629	1.0257
School type	[Comprehensive] FE college Grammar Independent Secondary Modern 6 th Form College Tertiary	0.0993 -0.3044 -0.2524 -0.0337 -0.2546 0.0478	0.0815 0.0494 0.0441 0.1115 0.0468 0.0955	0.2226 <0.0001 <0.0001 0.7626 <0.0001 0.6164	1.1044 0.7376 0.7770 0.9669 0.7752 1.0490
IDACI score		-0.5779	0.0835	<0.0001	0.5611
Subject	[Biological sciences] Subjects allied to medicine Veterinary sciences, agriculture and related Physical sciences Mathematical sciences Engineering Computer sciences Technologies Architecture, building and planning Social studies Law Business and administrative studies Mass Communications and Documentation Linguistics, classics and related subjects European languages, literature and related Eastern, Asiatic, African, American and Australasian languages, literature and related Historical and philosophical studies Creative arts and design Education Combined	-0.0522 0.0726 -0.4018 -0.8951 -0.2971 0.2616 0.1776 -0.2234 0.0295 -0.2524 0.3346 0.3826 0.2129 0.1331 -0.4511 0.2805 0.3389 0.0407 -0.0035	0.0587 0.1511 0.0534 0.0720 0.1023 0.0995 0.1961 0.0921 0.0419 0.0498 0.0515 0.0607 0.0521 0.3880 0.2626 0.0513 0.0499 0.0659 0.0449	0.3740 0.6309 <0.0001 <0.0001 0.0037 0.0086 0.3651 0.0152 0.4810 <0.0001 <0.0001 <0.0001 0.7315 0.0858 <0.0001 <0.0001 0.5367 0.9380	0.9492 1.0753 0.6691 0.4086 0.7429 1.2990 1.1944 0.7998 1.0299 0.7769 1.3974 1.4661 1.2372 1.1424 0.6370 1.3237 1.4033 1.0416 0.9965

Table 26: Model summary (probability of achieving a first class degree, Russell Group and non-Russell Group students)

<i>Variable</i>		<i>Russell Group</i>		<i>Non-Russell Group</i>	
		<i>Est.</i>	<i>Odds ratio</i>	<i>Est.</i>	<i>Odds ratio</i>
Intercept		-4.1303	0.0161	-4.6316	0.0097
UCAS tariff		0.0063	1.0063	0.0090	1.0091
Pre-U	[No] Yes	-0.0039	0.9961	-1.0068	0.3654
Gender	[Female] Male	-0.0688	0.9336	-0.0523	0.9491
School type	[Comprehensive] FE college Grammar Independent Secondary Modern 6 th Form College Tertiary	0.4251 -0.1978 -0.1807 -0.1982 -0.2002 0.1645	1.5297 0.8205 0.8347 0.8202 0.8185 1.1788	0.1332 -0.2893 -0.3319 0.0237 -0.3116 0.0138	1.1425 0.7488 0.7175 1.0239 0.7323 1.0139
IDACI score		-0.2616	0.7699	-0.3037	0.7381
Subject	[Biological sciences] Subjects allied to medicine Veterinary sciences, agriculture and related	0.0996 -0.4374	1.1047 0.6457	0.3774 0.4776	1.4584 1.6122
	Physical sciences Mathematical sciences Engineering Computer sciences Technologies	-0.2790 0.2840 -0.3926 1.1373 0.8749	0.7565 1.3284 0.6753 3.1183 2.3985	0.0114 0.9061 0.9719 1.0906 0.9733	1.0115 2.4746 2.6429 2.9761 2.6467
	Architecture, building and planning Social studies Law Business and administrative studies Mass Communications and Documentation	-0.1950 -0.1283 -0.7654 0.0732 0.1424	0.8229 0.8796 0.4651 1.0760 1.1531	-0.1780 -0.0826 -0.5593 0.5374 -0.0373	0.8369 0.9207 0.5716 1.7115 0.9634
	Linguistics, classics and related subjects European languages, literature and related Eastern, Asiatic, African, American and Australasian languages, literature and related Historical and philosophical studies Creative arts and design Education Combined	-0.0012 -0.2746 -0.4472 -0.0386 0.1333 0.9358 -0.1538	0.9988 0.7599 0.6394 0.9621 1.1425 2.5494 0.8575	-0.3877 -1.8322 -0.4066 -0.6790 0.1053 -0.0679 -0.4202	0.6786 0.1601 0.6659 0.5071 1.1111 0.9343 0.6569

Table 27: Model summary (probability of achieving at least an upper second class degree, Russell Group and non-Russell Group students)

<i>Variable</i>		<i>Russell Group</i>		<i>Non-Russell Group</i>	
		<i>Est.</i>	<i>Odds ratio</i>	<i>Est.</i>	<i>Odds ratio</i>
Intercept		-0.7006	0.4963	-1.4365	0.2377
UCAS tariff		0.0067	1.0068	0.0090	1.0091
Pre-U	[No]				
	Yes	-0.0800	0.9231	0.4991	1.6472
Gender	[Female]				
	Male	-0.4703	0.6248	-0.3149	0.7299
School type	[Comprehensive]				
	FE college	0.2125	1.2368	0.1141	1.1209
	Grammar	-0.3159	0.7291	-0.2850	0.7520
	Independent	-0.1704	0.8434	-0.4067	0.6658
	Secondary Modern	-0.1068	0.8987	-0.0008	0.9992
	6 th Form College	-0.3038	0.7380	-0.2530	0.7765
	Tertiary	0.1257	1.1340	0.0315	1.0320
IDACI score		-0.6687	0.5124	-0.5163	0.5967
Subject	[Biological sciences]				
	Subjects allied to medicine	-0.1204	0.8865	0.0145	1.0146
	Veterinary sciences, agriculture and related	0.2594	1.2961	0.0017	1.0017
	Physical sciences	-0.3660	0.6935	-0.3567	0.7000
	Mathematical sciences	-0.9704	0.3789	-0.5172	0.5962
	Engineering	-1.3986	0.2469	0.3730	1.4521
	Computer sciences	0.1926	1.2124	0.2888	1.3348
	Technologies	0.4669	1.5951	0.1011	1.1063
	Architecture, building and planning	0.6220	1.8627	-0.3813	0.6829
	Social studies	0.3810	1.4638	-0.0852	0.9183
	Law	0.1734	1.1893	-0.3505	0.7043
	Business and administrative studies	0.1737	1.1897	0.3786	1.4602
	Mass Communications and Documentation	1.0788	2.9412	0.3019	1.3524
	Linguistics, classics and related subjects	0.8537	2.3483	0.0073	1.0073
	European languages, literature and related	-0.5784	0.5608	0.6680	1.9503
	Eastern, Asiatic, African, American and Australasian languages, literature and related	-0.0495	0.9517	-0.6525	0.5207
	Historical and philosophical studies	0.9296	2.5334	0.0114	1.0115
	Creative arts and design	1.1256	3.0821	0.2290	1.2573
Education	1.1518	3.1638	-0.0352	0.9654	
Combined	0.1228	1.1306	-0.0161	0.9840	

International Baccalaureate

Descriptive statistics

In the dataset used in this study, just below 2,025 students had IB qualifications and obtained a university degree in 2012/13. There were a number of students with IB qualifications but without an overall points score, who were not included in the analyses. Figure 11 presents the distribution of the IB points score for these students. To give an idea of the ability of these students the modal points score was 33, which has a UCAS tariff of 457. This compares to a UCAS tariff of 420 for three A* grades at A level.

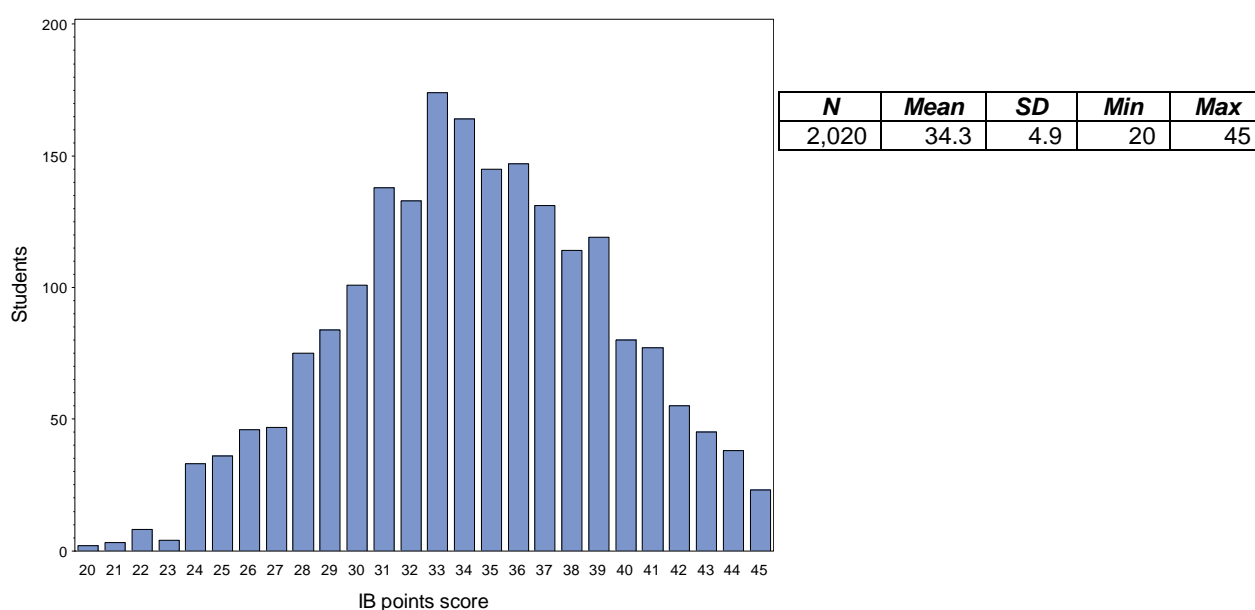


Figure 11: Distribution of IB points score for students with a degree result

There were 180 different schools attended by IB students, but there were a very large percentage of students (38.8%) with no recorded school. It is not known why the data was missing for so many students. IB students progressed to over a hundred different universities.

Table 28 presents information on the background variables used in the analysis. The majority of the students with the IB diploma (56.3%) were female. Regarding the type of school, there were a lot of students for which the school type was missing (62%). Amongst the students for which school type data was available, the most common types were independent and grammar schools. The majority of IB students went to Russell Group universities (57.2%), followed by the 1994 group and 'Other'. IB students were most likely to study a degree in the social studies area (19.5%), followed by business and administrative studies (13.3%), biological sciences (11.6%) and law (9.8%). Just over 10% of the students with an IB diploma were studying for a combined degree.

Table 28: Background data of the students with IB qualifications

Variable	No. of students	% of students
Gender		
Female	1,140	56.3
Male	835	43.7
School type		
Comprehensive	105	13.7
FE college	10	1.3
Grammar	200	26.1
Independent	305	40.0
Sixth form	70	9.0
Tertiary College	75	9.9
<i>Missing</i>	1,255	
University group		
1994 group	325	16.2
Guild HE	35	1.8
Million Plus	55	2.8
Other	310	15.2
Russell Group	1,155	57.2
University Alliance	135	6.8
Subject group		
Subjects allied to medicine	55	2.8
Biological sciences	235	11.6
Veterinary sciences, agriculture and related subjects	5	0.2
Physical sciences	80	3.9
Mathematical sciences	20	1.1
Engineering	30	1.5
Computer sciences	15	0.8
Technologies	10	0.4
Architecture, building and planning	50	2.6
Social studies	395	19.5
Law	200	9.8
Business and administrative studies	270	13.3
Mass Communications and Documentation	45	2.2
Linguistics, classics and related subjects	110	5.5
European languages, literature and related subjects	5	0.2
Eastern, Asiatic, African, American and Australasian languages, literature and related subjects	0	0.1
Historical and philosophical studies	185	9.2
Creative arts and design	80	4.0
Education	20	0.9
Combined	210	10.5

Table 29 presents the percentage of IB students achieving each degree class. Just over 22% achieved a first class degree and 60.4% an upper second class degree. This compares to around 17% of A level students achieving first and 61% upper second class degrees (students taking at least three A levels and no other qualifications).

Table 29: Degree classification obtained by students with IB qualifications

Degree classification	No. of students	% of students
First	445	22.1
Upper second	1,220	60.4
Lower second	320	15.9
Third	25	1.3

Table 30 shows this data broken down by Russell Group and non-Russell Group institutions. Students attending Russell Group universities were more likely to achieve a first class degree (24.3%) or an upper second class degree (63.7%) than those attending other universities (19.2% and 56.1% respectively).

Table 30: Degree classification for Pre-U students, by university mission group

Degree classification	Russell Group		Non-Russell Group	
	No. of students	% of students	No. of students	% of students
First	280	24.3	165	19.2
Upper second	735	63.7	485	56.1
Lower second	130	11.4	190	21.9
Third	5	0.6	20	2.3

The predictive validity of the IB was first assessed by looking at the relationship between the IB points and the performance at university. Figure 12, presents the distribution of IB points by class of degree. This shows that there was a good relationship between IB points score and class of degree, suggesting that the IB is a good predictor of performance at university. The polyserial correlation²¹ between IB points and class of degree was statistically significant (0.3721). This level of correlation is deemed to be 'very beneficial' in the context of predictive validity studies (Department of Labor, Employment and Training Administration, 1999).

²¹ The polyserial correlation coefficient is a measure of association between a continuous and an ordinal variable. As in the case of the polychoric correlation described on Page 17, this measure of association rests upon an assumption of an underlying continuous joint distribution. However, in this case, one continuous variable is observed directly, and the other is obtained through an observed ordinal variable that is derived from the continuous unobserved variable by classifying its values into a finite set of discrete, ordered values (Dragow, 1986).

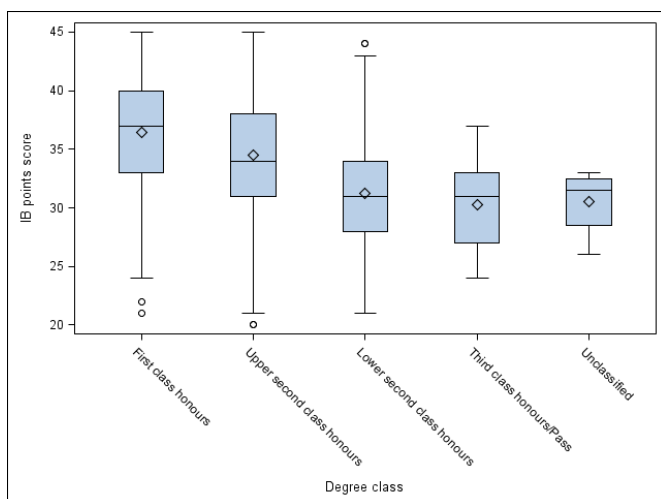


Figure 12: Distribution of IB points score, by degree classification

Regression analyses

A multilevel logistic regression model was used to model the probability of IB students getting a first class degree, with IB points score as a predictor. The ideal modelling approach would have been a cross-classified multilevel logistic model, with students nested in schools and universities. However, the school identifier was missing for about a third of the IB students, so it was decided to just cluster students within universities.

A model was also tried with the subject studied at university included as a fixed effect. However, due to the low numbers of students in some of the subject categories the model failed to converge. The school type was missing for more than half of the IB students so it would be misleading if this was included as a predictor in the model. However, this should not have big implications as it is likely that schools offering the IB are similar in nature (usually independent or high attaining comprehensives and sixth form colleges). The IDACI score was also missing for over half of the students so this was also not included in any of the models.

Tables 31 and 32 present the parameter estimates for the models predicting the probability of achieving a first and at least an upper second class degree, respectively.

Table 31: Model summary (probability of achieving a first class degree)

Variable		Est.	SE	P-value	Odds ratio
Intercept		-6.6762	0.5073	<0.0001	0.0013
IB points score		0.1609	0.0152	<0.0001	1.1745
Gender	[Female]				
	Male	0.2437	0.1120	0.0296	1.2759
Mission Group	[Russell Group]				
	Other	0.5859	0.1490	0.0001	1.7966

Table 32: Model summary (probability of achieving an upper second class degree)

Variable		Est.	SE	P-value	Odds ratio
Intercept		-4.2753	0.5868	<0.0001	0.0139
IB points score		0.1787	0.0166	<0.0001	1.1957
Gender	[Female]				
	Male	-0.2772	0.1236	0.0249	0.7579
Mission Group	[Russell Group]				
	Other	0.0936	0.1501	0.5330	1.0981

The IB points score had a significant effect on the probability of achieving a first class degree, with each extra point increasing the odds of achieving a first by 1.17. This suggests that the IB is a good predictor of university performance. Males were more likely to get a first class degree than females, and students attending non-Russell Group universities were also more likely than those attending Russell Group universities to do so.

The IB points score had a similar effect on the probability of achieving at least an upper second class degree (odds ratio = 1.20 vs. 1.17). However, in this instance, females were more likely than males to get an upper second class degree and there was no significant effect of the mission group on university performance at this level.

The effect of the IB on university performance is also displayed in Figure 13 below, which plots the IB points score against the probability of achieving a first or at least an upper second class degree for a typical group of students. In this case, the curves present the probabilities for female students attending a Russell Group institution.

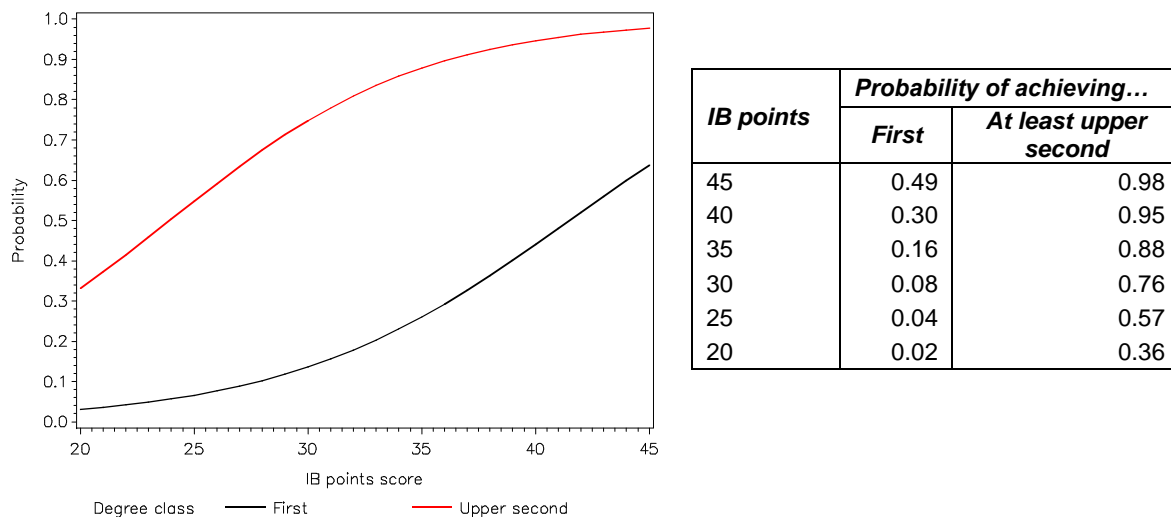


Figure 13: Probability of achieving first / at least upper second class degrees, by IB points score

Further models were run for students attending Russell Group institutions and for students attending non-Russell Group institutions separately. Tables 33 and 34 compare the results for the models predicting the probability of achieving a first and at least an upper second class outcome, respectively, for the two different groups of students. Only the regression estimates and odds ratios are presented here (full models can be found in Appendix E).

Table 33: Model summary (probability of achieving a first class degree, Russell Group and non-Russell Group students)

Variable		Russell Group		Non-Russell Group	
		Est.	Odds ratio	Est.	Odds ratio
Intercept		-7.0690	0.0009	-6.7699	0.0011
IB points score		0.1547	1.1673	0.1656	1.1801
Gender	[Female]				
	Male	0.3263	1.3859	0.1115	1.1179

Table 34: Model summary (probability of achieving at least an upper second class degree, Russell Group and non-Russell Group students)

Variable		Russell Group		Non-Russell Group	
		Est.	Odds ratio	Est.	Odds ratio
Intercept		-5.4931	0.0041	-3.4977	0.0303
IB points score		0.2146	1.2393	0.1560	1.1688
Gender	[Female]				
	Male	-0.3262	0.7216	-0.2387	0.7876

The effect of the IB point score on the probability of achieving a first class degree outcome was very similar in Russell and non-Russell Group universities (odds ratios = 1.17 vs. 1.18, respectively). The relationship between IB points score and probability of getting at least an upper second class degree was stronger amongst students at a Russell Group institution (odds ratio = 1.24) than at a non-Russell Group institution (odds ratio = 1.17). However, this difference was not statistically significant ($t = 1.72$)

BTEC level 3 Diploma

Descriptive statistics

There were 8,130 students taking at least one BTEC qualification with a degree result in the HESA data. Most of these (65.2%) obtained a Diploma only, whilst 15.7% obtained a Certificate only and 14.7% obtained an Award only. The remaining students obtained multiple certificates, awards or combinations of the different size qualifications. The analysis presented here concentrates on the students taking a Diploma only (equivalent to three A levels), and no other qualifications. This meant it was possible to analyse the effect of the diploma result without having to worry about influence from other qualifications (e.g. A levels taken alongside). There were just over 2,900 of students with a level 3 BTEC Diploma who also had a degree result.

The students included in the analyses attended at least 440²² schools and 85 universities / institutions. Table 35 presents the background information for these students.

The majority of students with a BTEC Diploma were female (56.3%). Regarding the type of school, most attended FE colleges (57.1%), followed by tertiary colleges (20.3%) and sixth form colleges (14.2%). Very few students attended independent or grammar schools. There was a good spread of BTEC students amongst most of the university groups, with the highest percentage attending University Alliance institutions (28.3%). Relatively few enrolled in Russell Group universities (3%). By far the most popular subject group for BTEC students was creative arts and design (36.1%), followed by biological sciences (20.3%) and business and administrative studies (7.2%). These subject areas are closely aligned with the BTEC sectors.

The BTEC Diploma is graded into seven separate grades (DDD, DDM, DMM, MMM, MMP, MPP and PPP), depending on points earned in each unit. The letters for the grades are derived from Distinction, Merit or Pass, but the grades represent an overall points score earned, not performance on individual units (*i.e.* DDM does *not* mean gaining a distinction on two units and a merit on one unit). Table 35 shows that a majority of students (55.1%) achieved the highest possible grade on the BTEC diploma (DDD).

²² There were 95 students for which the school was unknown.

Table 35: Background data of the students with a BTEC level 3 Diploma

Variable	No. of students	% of students
Gender		
Female	1,655	56.3
Male	1,265	43.7
School type		
Comprehensive	125	5.3
FE college	1390	59.6
Independent	25	1.0
Secondary Modern	10	0.3
Sixth form	300	12.8
Tertiary College	490	21.0
<i>Missing</i>	570	
University group		
1994 group	135	4.6
Guild HE	590	20.3
Million Plus	635	21.1
Other	650	22.4
Russell Group	85	2.9
University Alliance	810	28.0
Subject group		
Subjects allied to medicine	110	3.7
Biological sciences	590	20.3
Veterinary sciences, agriculture and related subjects	35	1.2
Physical sciences	30	1.1
Mathematical sciences	0	0.0
Engineering	30	1.1
Computer sciences	105	3.7
Technologies	25	0.9
Architecture, building and planning	50	1.8
Social studies	155	5.4
Law	40	1.3
Business and administrative studies	210	7.2
Mass Communications and Documentation	140	4.8
Linguistics, classics and related subjects	5	0.2
European languages, literature and related subjects	0	0.0
Eastern, Asiatic, African, American and Australasian languages, literature and related subjects	0	0.0
Historical and philosophical studies	0	0.1
Creative arts and design	1,045	36.1
Education	190	6.5
Combined	135	4.7
BTEC grade		
DDD	1,600	55.1
DDM	430	14.9
DMM	380	13.1
MMM	300	10.4
MMP	130	4.5
MPP	45	1.5
PPP	15	0.6

Table 36 presents the degree outcomes for students with a BTEC Diploma. Most students achieved either an upper second class degree (43.8%) or lower second class degree (39.3%). Only 9.5% achieved a first class degree. This compares with around 17% of A level students achieving first and 61% upper second class degrees (students taking at least three A levels and no other qualifications).

Table 36: Degree classification obtained by students with a BTEC Diploma

Degree classification	No. of students	% of students
First	275	9.5
Upper second	1,270	43.8
Lower second	1,140	39.3
Third	210	7.2
Unclassified	5	0.2

The predictive validity of the BTEC Diploma was initially assessed by looking at a cross-tabulation of the BTEC Diploma grade and the class of degree obtained at university or HE institution. This is shown in Table 37 and Figure 14 below.

Table 37: Degree classification by BTEC grade

BTEC grade	No. of students	First	Upper Second	Lower Second	Third
DDD	1,600	12.3	48.9	33.9	4.6
DDM	430	8.1	44.1	40.6	7.2
DMM	380	5.3	38.0	46.2	10.6
MMM	300	6.3	32.8	49.7	11.3
MMP	130	2.3	29.0	55.0	13.7
MPP	45	4.5	31.8	38.6	22.7
PPP	15	0.0	25.0	62.5	12.5

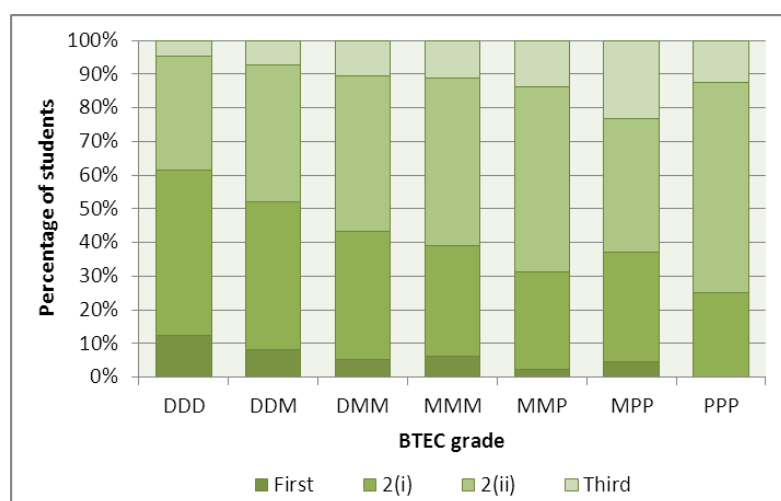


Figure 14: Degree classification by BTEC grade

Both Table 37 and Figure 14 show that even amongst the students achieving the highest BTEC Diploma grade a relatively low percentage obtained a first class outcome (12.3%). Overall, there was a reasonably good relationship between BTEC grade and degree class with the percentage of firsts and upper seconds tending to increase with higher BTEC grades. However, there were a couple of exceptions: there was a higher percentage of students with MMM achieving a first (6.3%) than of students with DMM (5.3%).

The polychoric correlation (see footnote 16 for a brief explanation of polychoric correlation) between BTEC grade and degree class was statistically significant (0.2643). This correlation is somewhat lower than for other level 3 qualifications investigated in this report but it is still in the 'likely to be useful' category in the context of predictive validity studies (Department of Labor, Employment and Training Administration, 1999).

Regression analyses

A multilevel logistic regression model was used to model the probability of BTEC students getting a first or at least an upper second class degree, with BTEC grade as a predictor. In the first instance, models were fitted with the subject studied at university included as a fixed effect. However, due to the low numbers of students in some of the subject categories the models failed to converge. Regarding the school type variable, there were very few students from secondary modern schools or grammar schools, so these were included in the comprehensive school category. In contrast to the other qualifications investigated, the mission group variable was not amalgamated into Russell Group and non-Russell group students. This is because the contrast between Russell Group and others was not as important since only a minority of BTEC students (85) went on to study at a Russell Group institution. Instead, all the mission groups were compared with each other in the models.

Table 38 presents the parameter estimates for the model predicting the probability of achieving a first class outcome and Table 39 presents the same statistics for the model predicting the probability of achieving at least an upper second class outcome.

There was a reasonably good relationship between the BTEC grade and probability of getting a first class outcome (in general, better BTEC grades were related to better performance at university). However, it is interesting to note that the probability of achieving a first class degree was higher for a student with a grade MMM than for a student with a grade DMM (the negative coefficient is lower), although this was not a statistically significant difference. The only background variable with a significant effect was the IDACI score, which was negatively related to the probability of a first, indicating that students with higher level of deprivation were less likely to achieve a first class degree. There were no significant effects of type of school or university on the probability of achieving a first class degree.

Table 39 shows that there was a significant and positive relationship between the BTEC grade and the probability of achieving at least an upper second class degree. However, the parameter estimate for grade MMP (-1.2406) was larger than for grade MPP (-1.0473), which means the probability of at least an upper second was lower for those getting this grade, although not to a statistically significant degree. As above, the IDACI score was significantly and negatively related to the probability of achieving at least an upper second class degree. Students attending a University Alliance institution were more likely to get at

least an upper second class degree than those in other groups (although the difference was only significant compared with the Guild HE or the Russell Group).

Table 38: Model summary (probability of achieving a first class degree)

<i>Variable</i>		<i>Est.</i>	<i>SE</i>	<i>P-value</i>	<i>Odds ratio</i>
Intercept		-1.5929	0.3859	<0.0001	0.2033
BTEC grade	[DDD]				
	DDM	-0.5301	0.2047	0.0096	0.5885
	DMM	-1.0527	0.2554	<0.0001	0.3490
	MMM	-1.0444	0.2781	0.0002	0.3519
	MMP	-1.7994	0.6025	0.0028	0.1654
	MPP/ PPP ²³	-2.1658	1.0333	0.0361	0.1147
Gender	[Female]				
	Male	0.0504	0.1387	0.7166	1.0517
Mission Group	[University alliance]				
	1994 group	-0.6967	0.4805	0.1470	0.4982
	Guild HE	-0.4521	0.2850	0.1127	0.6363
	Million Plus	-0.1765	0.2936	0.5476	0.8382
	Other	-0.2191	0.2780	0.4306	0.8032
	Russell Group	-1.0626	0.6113	0.0822	0.3456
School type	[Comprehensive]				
	FE college	0.1724	0.3443	0.6167	1.1881
	Independent	0.2523	0.7261	0.7282	1.2870
	Sixth form college	-0.7195	0.4338	0.0972	0.4870
	Tertiary college	-0.0292	0.3700	0.9370	0.9712
IDACI score		-1.7792	0.5228	0.0007	0.1688

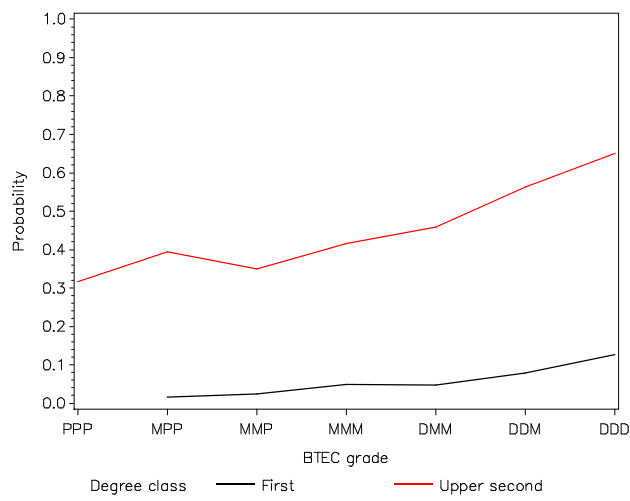
²³ Students achieving the lowest two BTEC grades (MPP and PPP) were combined because there were no students with a PPP who went on to get a first.

Table 39: Model summary (probability of achieving at least an upper second class degree)

<i>Variable</i>		<i>Est.</i>	<i>SE</i>	<i>P-value</i>	<i>Odds ratio</i>
Intercept		0.7296	0.2265	0.0013	2.0742
BTEC grade	[DDD]				
	DDM	-0.3695	0.1172	0.0016	0.6911
	DMM	-0.7860	0.1236	0.0000	0.4557
	MMM	-0.9627	0.1383	0.0000	0.3819
	MMP	-1.2406	0.2087	0.0000	0.2892
	MPP	-1.0473	0.3394	0.0020	0.3509
	PPP	-1.3909	0.6089	0.0224	0.2488
Gender	[Female]				
	Male	-0.0534	0.0822	0.5159	0.9480
Mission Group	[University alliance]				
	1994 group	-0.3499	0.2801	0.2116	0.7048
	Guild HE	-0.5623	0.1714	0.0010	0.5699
	Million Plus	-0.2483	0.1794	0.1662	0.7801
	Other	-0.2857	0.1712	0.0951	0.7515
	Russell Group	-0.7021	0.3007	0.0196	0.4956
School type	[Comprehensive]				
	FE college	0.1667	0.1985	0.4008	1.1815
	Independent	0.6545	0.5475	0.2319	1.9242
	Sixth form college	0.1770	0.2283	0.4382	1.1936
	Tertiary college	0.0835	0.2186	0.7024	1.0871
IDACI score		-0.5647	0.2720	0.0379	0.5685

To more clearly see the impact of the BTEC grade on degree performance the regression estimates were transformed into probabilities for particular groups. Figure 15 presents the probability of achieving a first and at least an upper second class degree, for a female student from a comprehensive school, attending a University Alliance university, with an average IDACI score.

This figure clearly shows that BTEC students were unlikely to get a first class degree, even if they get the highest possible grade (DDD). It is also notable that the lines were not a smooth upward path from lowest to highest BTEC grade, particularly at the lower grades. However, at the higher grades (DMM and above) there was a clear relationship between BTEC and university performance, with higher probabilities of a first (or at least an upper second) for higher BTEC grades.



BTEC grade	Probability of achieving ...	
	First	At least upper second
DDD	0.13	0.65
DDM	0.08	0.56
DMM	0.05	0.46
MMM	0.05	0.42
MMP	0.02	0.35
MPP	0.02	0.39
PPP	n/a	0.32

Figure 15: Probability of achieving first / upper second class degrees, by BTEC grade

DISCUSSION

The purpose of this research was to investigate the predictive validity of several level 3 qualifications that are either alternatives to A levels or are meant to be taken alongside A levels. All of the qualifications investigated are promoted by their developers as being good preparation for higher education (although this is emphasised more in some of the qualifications (e.g. Cambridge Pre-U²⁴, IB²⁵) than others (e.g. BTEC²⁶)). The implication of such statements is that students performing better in the qualification in question should be more likely to perform better in their degree.

The qualifications investigated here differed somewhat in their purpose and relationship to other level 3 qualifications: two of them (IB and BTEC Diploma) are essentially alternatives to A levels and are usually not taken alongside any other qualifications; in contrast, the EP is almost always taken alongside A levels (mainly by those taking three or more A levels). Finally, the Pre-U can be taken alongside, or as an alternative to, A levels or other qualifications.

The results of this research showed, in a first instance, that the attainment in all the qualifications investigated was significantly correlated with university degree outcomes, suggesting there is some relationship between the two. Furthermore, the results of the multilevel logistic regression analyses also point to the validity of each of the qualifications in predicting university performance: students attaining successively higher EP grades were predicted a higher likelihood of a good degree, whilst Pre-U mean grade and IB points score were both positively associated with the probability of a good degree. For the BTEC, in the most part successively higher grades were associated with a higher probability of a good degree, although there were some grades where this was not the case.

Some further analyses were undertaken for the EP and the Cambridge Pre-U qualifications. The EP was a special case in this research because it is usually studied as an additional qualification alongside A levels. This means that it was possible to assess its predictive validity in a different way; namely, does taking the EP *per se* mean better preparation for university study? This was investigated by comparing the degree performance of students with the same A level performance both with and without the EP. The results of these analyses suggested that students with the EP were more likely than those without it to obtain a good degree (odds of achieving a first class degree increased by 1.25 and of achieving at least an upper second class degree by 1.30). It was notable that taking the EP had no significant effect on the probability of achieving a first class degree amongst students attending Russell Group institutions, suggesting that its effect on university performance is less for the highest achieving students. However, some caution is necessary when interpreting these outcomes: the implication is that taking an EP qualification leads to better degree results, but it may instead that taking the EP is an indication of a more motivated student who is then more likely to perform better at university.

²⁴ <http://www.cie.org.uk/programmes-and-qualifications/cambridge-advanced/cambridge-pre-u/>

²⁵ <http://www.ibo.org/diploma/>

²⁶ <http://www.edexcel.com/btec/New-to-btec/BTEC-Explained/Pages/default.aspx>

There was an opportunity to investigate the Cambridge Pre-U qualification in a similar manner, by assessing whether taking Pre-U(s) in place of A level(s) was better preparation for university. Students taking at least one Pre-U alongside A levels (or taking Pre-U only) were compared to those taking just A levels in terms of degree classification, after controlling for prior attainment (UCAS tariff). No statistically significant effect of Pre-U on university performance was found, although it should be noted that the data on Pre-U students was limited (200 students). In some ways this is the result we would expect, because if the UCAS tariff equivalencies for A level and Pre-U are correctly aligned then it is reasonable to suggest that students with the same UCAS tariff *should* have the same probability of a good degree, whichever level 3 qualification they took.

Although it is difficult to make comparisons between the different qualifications in terms of their predictive validity, the BTEC seemed to perform less well than the other qualifications considered in this report in terms of how well it predicts university outcomes. The correlation between the BTEC grade and university degree classification was lower than the correlations between the other qualifications and the degree classification. Furthermore, the results of the multilevel modelling were not entirely consistent in terms of higher probabilities of achieving a good degree for students with higher BTEC grades. However, preparing students for university study is not the BTEC's primary purpose, as the majority of the students taking it do not progress to university (London Economics, 2013).

There were a few limitations to this research which should be acknowledged. The first is that multilevel logistic regression, as any regression technique, can only ascertain relationships between variables; it cannot determine the underlying causal mechanism. Therefore, caution must be taken when interpreting the results of the regression analyses presented here. We cannot be entirely sure that the significant relationships found between performance at university and achievement on the level 3 qualifications were the result of a causal relationship (there might be other factors that cannot be measured and that might have a direct impact on university performance).

Secondly, there were some restrictions to the modelling imposed by the data, either due to missing data or to the relatively low numbers of students taking these qualifications. This meant it was not always possible to include particular variables (e.g. the university subject, school type) as predictors in the models. There was an extra issue with the modelling of the IB: because the school identifier was missing for more than a third of the students it made sense to cluster only by HE institution and not by school. Both of these issues meant excluding some potentially important sources of variation. If similar research is carried out in the future this could be partly solved due to the increasing numbers of students taking the qualifications.

Thirdly, the data in this research did not include the whole cohort of students who started HE courses in 2010/11. In particular, the following groups of students were not considered in the analyses: English students enrolled in HE institutions located in Scotland, where courses usually last four years; students studying medicine, dentistry or veterinary science; students who entered a four year course in languages or engineering.

Finally, it has been claimed that the measure of HE performance used in this research (degree classification) is not standardised across HE institutions or across subjects within the same institution. However, recent research by the Higher Education Policy Institute

(HEPI, 2010), reports that “the standard of degrees is broadly comparable across the system. Not equal or identical but broadly comparable”. The regression models fitted in this research included (where possible) university and degree subject information with the aim to control for differences due to degree outcomes not being perfectly equivalent.

Whilst acknowledging these limitations, this research has demonstrated that attainment in the qualifications investigated is generally a good predictor of university performance. An interesting issue that was not investigated here was whether different qualifications can be compared in terms of how well they prepare students for university. Each qualification claims to be good preparation, but some may be better than others. It would have been possible to investigate this with the data available in this study by using the UCAS tariff as a common measure of prior attainment. However, using this measure would not be ideal because it is not clear that the equivalencies between different qualifications are correctly aligned (Green and Vignoles, 2012). It is also not unreasonable to suggest that equivalent tariff scores for different qualifications should mean equivalent probability of a good degree (*i.e.* that the UCAS tariff takes account of the fact that some qualifications are better preparation for university study). An alternative way of investigating this would be to use GCSE results as prior attainment and see which level 3 qualifications lead to the best degree results for equivalent students. This is a potential area of further research.

REFERENCES

- Bates, D., Maechler, M., Bolker, B. and Walker, S. (2014). *Linear mixed-effects models using Eigen and S4*. R package version 1.0-6. Available at <http://CRAN.R-project.org/package=lme4>.
- Connor, H., Banerji, N. and Sinclair, E. (2006). *Progressing to higher education: vocational qualifications and admissions*. Ormskirk: Action on Access.
- Department of Labor, Employment and Training Administration (1999). *Testing and assessment: an employer's guide to good practices*. Washington DC: Department of Labor, Employment and Training Administration (US).
- DfE (2013). *A comparison of GCSE results and AS level results as a predictor of getting a 2:1 or above at university*. London: Department for Education.
- Dragow, F. (1986). Polychoric and Polyserial Correlations. In S. Kotz and N.L. Johnson, eds., *Encyclopaedia of Statistical Sciences*. New York: John Wiley & Sons.
- Goldstein, H. (2011). *Multilevel Statistical Models (4th edition)*. Chichester: John Wiley & Sons.
- Green, F. and Vignoles, A. (2012). An empirical method for deriving grade equivalence for university entrance qualifications: an application to A levels and the International Baccalaureate. *Oxford Review of Education*, 38(4): 473-491.
- Hayward, G. and Hoelscher, M. (2011). The use of large-scale administrative data sets to monitor progression from vocational education and training into higher education in the UK: possibilities and methodological challenges. *Research in Comparative and International Education*, 6(3): 316–329.
- HEFCE (2014). *Differences in degree outcomes: Key findings*. Bristol: Higher Education Funding Council for England.
- HEPI (2010). *Comparability of Degree Standards?* Oxford: Higher Education Policy Institute.
- HESA (2011). *International Baccalaureate Students studying at UK Higher Education Institutions. How do they fare?* Cheltenham: Higher Education Statistics Agency.
- Hosmer, D.W. and Lemeshow, S. (2000). *Applied Logistic Regression*. Chichester: Wiley.
- Kirkup, C., Wheeler, R., Morrison, J., Durbin, B. and Pomati, M. (2010). *Use of an aptitude test in university entrance: a validity study*. London: Department for Business, Innovation and Skills.
- London Economics (2013). *The outcomes associated with the BTEC route of degree level acquisition*. A report for Pearson. London: London Economics.
- Ogg, T., Zimdars, A. and Heath, A. (2009). Schooling effects on degree performance: a comparison of the predictive validity of aptitude testing and secondary school grades at Oxford University. *British Educational Research Journal*, 35(5): 781-807.

- Osborne, J.W. (2006). Bringing balance and technical accuracy to reporting odds ratios and the results of logistic regression analyses. *Practical Assessment Research and Evaluation*, 11(7).
- Partington, R. (2011). *Predictive effectiveness of metrics in admission to the University of Cambridge*. Cambridge: Cambridge University Admissions Office.
- Pearson, K. (1900). Mathematical contributions to the theory of evolution. VII. On the correlation of characters not quantitatively measurable. *Philosophical Transactions of the Royal Society of London. Series A, Containing Papers of a Mathematical or Physical Character*, 195: 1-47.
- R Core Team (2013). *R: A language and environment for statistical computing*. Vienna, Austria: R Foundation for Statistical Computing. <http://www.R-project.org/>
- Smith, J. and Naylor, R. (2001). Determinants of degree performance in UK universities: a statistical analysis of the 1993 cohort. *Oxford Bulletin of Economics and Statistics*, 63: 29-60.
- Snijders, T. and Bosker, R. (1999). *Multilevel analysis. An introduction to basic and advance multilevel modelling*. London: Sage Publications.
- Vidal Rodeiro, C.L., Sutch, T. and Zanini, N. (2013). *Prior learning of undergraduates in UK higher education institutions*. Internal Report. Cambridge: Cambridge Assessment.
- Vidal Rodeiro, C.L. and Zanini, N. (2014). *The predictive validity of the A* grade at A level for university performance*. Internal Report. Cambridge: Cambridge Assessment.

Appendix A: Subject areas at university

Subjects of study were aggregated into 21 broad subject areas. Students who were studying a mixed course at university were recoded as 'Other/combined', unless more than 50% of the degree was in the same subject area (this included all major/minor combinations, as well as balanced combinations of subjects in the same area and some three-way combinations).

The list below presents the subject areas used in this research.

Subject area

Medicine and dentistry

Subjects allied to medicine

Biological sciences

Veterinary sciences, agriculture and related subjects

Physical sciences

Mathematical sciences

Engineering

Computer sciences

Technologies

Architecture, building and planning

Social studies

Law

Business and administrative studies

Mass Communications and Documentation

Linguistics, classics and related subjects

European languages, literature and related subjects

Eastern, Asiatic, African, American and Australasian languages, literature and related subjects

Historical and philosophical studies

Creative arts and design

Education

Other/combined

Appendix B: Extended Project – full results for Russell Group and non-Russell Group models (EP students only)

Table B1: Students in Russell Group institutions ~ results from multilevel logistic regressions (first class degree)

<i>Variable</i>		<i>Est.</i>	<i>SE</i>	<i>P-value</i>	<i>Odds ratio</i>
Intercept		-0.7675	0.1568	<0.0001	0.4642
EP grade	[*]				
	A	-0.4249	0.1340	0.0015	0.6538
	B	-0.8482	0.1663	<0.0001	0.4282
	C	-1.0483	0.2207	<0.0001	0.3505
	D	-1.3180	0.3708	0.0004	0.2677
E	-1.6386	0.6158	0.0078	0.1942	
Gender	[Female]				
	Male	0.3794	0.1167	0.0011	1.4613
School type	[Comprehensive]				
	FE college	-0.1390	0.3452	0.6872	0.8702
	Grammar	0.1811	0.1658	0.2746	1.1986
	Independent	-0.0023	0.1979	0.9906	0.9977
6 th Form College	0.0017	0.1470	0.9908	1.0017	
IDACI score		-0.5316	0.4996	0.2873	0.5877

Table B2: Students in non-Russell Group institutions ~ results from multilevel logistic regressions (first class degree)

<i>Variable</i>		<i>Est.</i>	<i>SE</i>	<i>P-value</i>	<i>Odds ratio</i>
Intercept		-0.2960	0.1859	0.1114	0.7438
EP grade	[*]				
	A	-0.6473	0.1908	0.0007	0.5235
	B	-1.0686	0.1874	<0.0001	0.3435
	C	-1.2638	0.1934	<0.0001	0.2826
	D	-1.3910	0.2136	<0.0001	0.2488
E	-1.6414	0.2621	<0.0001	0.1937	
Gender	[Female]				
	Male	0.0784	0.1171	0.5029	1.0816
School type	[Comprehensive]				
	FE college	-0.1560	0.2514	0.5349	0.8555
	Grammar	0.3193	0.1928	0.0977	1.3761
	Independent	-0.1333	0.3263	0.6830	0.8752
6 th Form College	0.0101	0.1533	0.9475	1.0102	
IDACI score		-1.2076	0.4274	0.0047	0.2989

Table B3: Students in Russell Group institutions ~ results from multilevel logistic regressions (at least upper second class degree)

<i>Variable</i>		<i>Est.</i>	<i>SE</i>	<i>P-value</i>	<i>Odds ratio</i>
Intercept		3.8781	0.3305	0.0000	48.3339
EP grade	[*]				
	A	-0.4171	0.2874	0.1466	0.6589
	B	-0.9108	0.2960	0.0021	0.4022
	C	-1.5121	0.3104	0.0000	0.2204
	D	-0.2358	0.5954	0.6921	0.7899
E	-2.0252	0.5026	0.0001	0.1320	
Gender	[Female]				
	Male	-0.3369	0.1958	0.0853	0.7140
School type	[Comprehensive]				
	FE college	-0.9383	0.4383	0.0323	0.3913
	Grammar	0.0241	0.3229	0.9404	1.0244
	Independent	-0.0288	0.3975	0.9423	0.9717
	6 th Form College	-0.2666	0.2651	0.3145	0.7660
IDACI score		-2.5063	0.6804	0.0002	0.0816

Table B4: Students in non-Russell Group institutions ~ results from multilevel logistic regressions (at least upper second class degree)

<i>Variable</i>		<i>Est.</i>	<i>SE</i>	<i>P-value</i>	<i>Odds ratio</i>
Intercept		2.7616	0.3226	0.0000	15.8258
EP grade	[*]				
	A	-0.5976	0.3397	0.0785	0.5501
	B	-1.1970	0.3198	0.0002	0.3021
	C	-1.3173	0.3192	0.0000	0.2679
	D	-1.6580	0.3237	0.0000	0.1905
E	-2.0087	0.3359	0.0000	0.1342	
Gender	[Female]				
	Male	0.0928	0.1161	0.4240	1.0973
School type	[Comprehensive]				
	FE college	-0.2628	0.2090	0.2087	0.7689
	Grammar	0.5608	0.2408	0.0199	1.7521
	Independent	-0.1027	0.3313	0.7567	0.9024
	6 th Form College	-0.1488	0.1492	0.3188	0.8618
IDACI score		-0.8108	0.3611	0.0247	0.4445

Appendix C: Extended Project – full results for Russell Group and non-Russell Group models (all students)

Table C1: Students in Russell Group institutions ~ results from multilevel logistic regressions (first class degree)

<i>Variable</i>		<i>Est.</i>	<i>SE</i>	<i>P-value</i>	<i>Odds ratio</i>
Intercept		-7.5702	0.2069	<0.0001	0.0005
Mean A level		1.3365	0.0380	<0.0001	3.8056
EP	[No]				
	Yes	0.0922	0.0643	0.1517	1.0966
Gender	[Female]				
	Male	0.0278	0.0387	0.4730	1.0282
School type	[Comprehensive]				
	FE college	0.2110	0.1681	0.2096	1.2349
	Grammar	0.0210	0.0571	0.7125	1.0213
	Independent	-0.4035	0.0539	<0.0001	0.6680
	Secondary modern	-0.2558	0.2820	0.3644	0.7743
	6 th Form college	-0.0253	0.0634	0.6901	0.9750
	Tertiary college	0.0769	0.1429	0.5905	1.0799
IDACI score		-0.4426	0.1588	0.0053	0.6423
University subject	[Biological sciences]				
	Subjects allied to medicine	0.1608	0.0959	0.0936	1.1745
	Veterinary sciences, agriculture and related	-0.2651	0.4872	0.5864	0.7671
	Physical sciences	-0.1140	0.0975	0.2424	0.8922
	Mathematical sciences	0.2511	0.0938	0.0074	1.2854
	Engineering	-0.1236	0.2520	0.6239	0.8838
	Computer sciences	1.2630	0.1683	<0.0001	3.5359
	Technologies	0.9927	0.3315	0.0028	2.6985
	Architecture, building and planning	-0.3954	0.2118	0.0619	0.6734
	Social studies	-0.2217	0.0669	0.0009	0.8012
	Law	-0.9477	0.0936	<0.0001	0.3877
	Business and administrative studies	0.0211	0.0997	0.8322	1.0213
	Mass Communications and Documentation	0.2003	0.2188	0.3601	1.2217
	Linguistics, classics and related subjects	-0.2455	0.0730	0.0008	0.7823
	European languages, literature and related	-0.2467	0.6699	0.7127	0.7814
	Eastern, Asiatic, African, American and Australasian languages, literature and related	-0.4147	0.6325	0.5120	0.6605
	Historical and philosophical studies	-0.1132	0.0694	0.1029	0.8930
	Creative arts and design	0.0993	0.1092	0.3631	1.1044
	Education	1.1542	0.2317	<0.0001	3.1716
	Combined	-0.2272	0.0751	0.0025	0.7968

Table C2: Students in non-Russell Group institutions ~ results from multilevel logistic regressions (first class degree)

<i>Variable</i>		<i>Est.</i>	<i>SE</i>	<i>P-value</i>	<i>Odds ratio</i>
Intercept		-5.3404	0.1091	<0.0001	0.0048
Mean A level		1.0552	0.0222	<0.0001	2.8726
EP	[No] Yes	0.3052	0.0633	<0.0001	1.3569
Gender	[Female] Male	-0.0115	0.0320	0.7203	0.9886
School type	[Comprehensive] FE college Grammar Independent Secondary modern 6 th Form college Tertiary college	-0.0294 0.0050 -0.5181 -0.0419 -0.1783 -0.1202	0.0919 0.0572 0.0689 0.1384 0.0501 0.1011	0.7490 0.9300 <0.0001 0.7619 0.0004 0.2348	0.9710 1.0050 0.5957 0.9589 0.8367 0.8868
IDACI score		-0.5081	0.1148	<0.0001	0.6016
University subject	[Biological sciences] Subjects allied to medicine Veterinary sciences, agriculture and related Physical sciences Mathematical sciences Engineering Computer sciences Technologies Architecture, building and planning Social studies Law Business and administrative studies Mass Communications and Documentation Linguistics, classics and related subjects European languages, literature and related Eastern, Asiatic, African, American and Australasian languages, literature and related Historical and philosophical studies Creative arts and design Education Combined	0.3812 0.5091 0.0969 1.0669 1.1151 1.2502 1.0100 -0.1222 -0.0682 -0.6034 0.5656 -0.0696 -0.4271 -0.7973 -0.1542 -0.6617 0.0719 -0.0881 -0.3930	0.0739 0.1987 0.0818 0.0988 0.1339 0.1175 0.2131 0.1127 0.0590 0.0722 0.0619 0.0715 0.0682 0.6179 0.4356 0.0796 0.0583 0.0850 0.0629	<0.0001 0.0104 0.2359 <0.0001 <0.0001 <0.0001 <0.0001 0.2781 0.2476 <0.0001 <0.0001 0.3306 <0.0001 0.1969 0.7234 <0.0001 0.2177 0.3002 <0.0001	1.4640 1.6639 1.1017 2.9063 3.0499 3.4911 2.7456 0.8850 0.9341 0.5469 1.7605 0.9328 0.6524 0.4505 0.8571 0.5160 1.0745 0.9157 0.6751

Table C3: Students in Russell Group institutions ~ results from multilevel logistic regressions (at least an upper second class degree)

<i>Variable</i>		<i>Est.</i>	<i>SE</i>	<i>P-value</i>	<i>Odds ratio</i>
Intercept		-3.7166	0.2253	<0.0001	0.0243
Mean A level		1.3200	0.0439	<0.0001	3.7435
EP	[No] Yes	0.2084	0.0992	0.0356	1.2317
Gender	[Female] Male	-0.4270	0.0466	<0.0001	0.6524
School type	[Comprehensive] FE college Grammar Independent Secondary modern 6 th Form college Tertiary college	-0.0776 -0.0720 -0.4417 -0.1737 -0.1181 0.0271	0.2157 0.0735 0.0665 0.3044 0.0766 0.1808	0.7189 0.3268 <0.0001 0.5682 0.1231 0.8810	0.9253 0.9305 0.6429 0.8405 0.8886 1.0274
IDACI score		-0.8969	0.1746	<0.0001	0.4078
University subject	[Biological sciences] Subjects allied to medicine Veterinary sciences, agriculture and related Physical sciences Mathematical sciences Engineering Computer sciences Technologies Architecture, building and planning Social studies Law Business and administrative studies Mass Communications and Documentation Linguistics, classics and related subjects European languages, literature and related Eastern, Asiatic, African, American and Australasian languages, literature and related Historical and philosophical studies Creative arts and design Education Combined	0.0278 0.6624 -0.1828 -1.0430 -1.1434 0.2852 0.5150 0.5607 0.2683 -0.1101 0.1093 1.2198 0.6870 -0.5443 0.1667 0.8372 1.1156 1.4330 0.0552	0.1041 0.3686 0.0934 0.1020 0.1715 0.1996 0.4077 0.2782 0.0788 0.1057 0.1101 0.3163 0.1106 0.5826 0.5025 0.0989 0.1689 0.4105 0.0883	0.7896 0.0723 0.0505 <0.0001 <0.0001 0.1531 0.2065 0.0438 0.0007 0.2975 0.3207 0.0001 <0.0001 0.3502 0.7401 <0.0001 <0.0001 0.0005 0.5318	1.0282 1.9395 0.8330 0.3524 0.3187 1.3300 1.6736 1.7520 1.3077 0.8957 1.1155 3.3865 1.9878 0.5803 1.1814 2.3098 3.0514 4.1912 1.0568

Table C4: Students in non-Russell Group institutions ~ results from multilevel logistic regressions (at least an upper second class degree)

Variable		Est.	SE	P-value	Odds ratio
Intercept		-1.7262	0.0807	<0.0001	0.1780
Mean A level		0.9488	0.0197	<0.0001	2.5825
EP	[No] Yes	0.2592	0.0654	0.0001	1.2959
Gender	[Female] Male	-0.2805	0.0267	<0.0001	0.7554
School type	[Comprehensive] FE college Grammar Independent Secondary modern 6 th Form college Tertiary college	-0.0339 -0.0418 -0.5739 -0.0789 -0.1552 -0.0520	0.0790 0.0546 0.0551 0.1157 0.0447 0.0917	0.6678 0.4447 <0.0001 0.4953 0.0005 0.5704	0.9667 0.9591 0.5633 0.9241 0.8562 0.9493
IDACI score		-0.6980	0.0912	<0.0001	0.4976
University subject	[Biological sciences]				
	Subjects allied to medicine	0.0426	0.0702	0.5443	1.0435
	Veterinary sciences, agriculture and related	0.1599	0.1655	0.3342	1.1733
	Physical sciences	-0.2640	0.0645	<0.0001	0.7680
	Mathematical sciences	-0.3600	0.1042	0.0006	0.6977
	Engineering	0.4303	0.1314	0.0011	1.5377
	Computer sciences	0.4024	0.1126	0.0004	1.4955
	Technologies	0.1343	0.2171	0.5363	1.1437
	Architecture, building and planning	-0.3083	0.0980	0.0017	0.7347
	Social studies	-0.0907	0.0488	0.0634	0.9133
	Law	-0.4098	0.0553	<0.0001	0.6638
	Business and administrative studies	0.3948	0.0577	<0.0001	1.4841
	Mass Communications and Documentation	0.2678	0.0623	<0.0001	1.3071
	Linguistics, classics and related subjects	-0.0474	0.0583	0.4160	0.9537
	European languages, literature and related	0.9406	0.5516	0.0881	2.5615
	Eastern, Asiatic, African, American and Australasian languages, literature and related	-0.5398	0.3134	0.0850	0.5828
	Historical and philosophical studies	0.0560	0.0596	0.3473	1.0576
	Creative arts and design	0.2337	0.0528	<0.0001	1.2632
Education	-0.0387	0.0675	0.5669	0.9621	
Combined	-0.0036	0.0512	0.9444	0.9964	

Appendix D: Cambridge Pre-U – full results for Russell Group and non-Russell Group models (all students)

Table D1: Students in Russell Group institutions ~ results from multilevel logistic regressions (first class degree)

Variable		Est.	SE	P-value	Odds ratio
Intercept		-4.1303	0.1341	<0.0001	0.0161
UCAS tariff		0.0063	0.0002	<0.0001	1.0063
Pre-U	[No] Yes	-0.0039	0.2300	0.9863	0.9961
Gender	[Female] Male	-0.0688	0.0410	0.0936	0.9336
School type	[Comprehensive] FE college Grammar Independent Secondary Modern 6 th Form College Tertiary	0.4251 -0.1978 -0.1807 -0.1982 -0.2002 0.1645	0.1967 0.0660 0.0589 0.2869 0.0768 0.1608	0.0307 0.0027 0.0022 0.4897 0.0091 0.3063	1.5297 0.8205 0.8347 0.8202 0.8185 1.1788
IDACI score		-0.2616	0.1668	0.1170	0.7699
Subject	[Biological sciences] Subjects allied to medicine Veterinary sciences, agriculture and related Physical sciences Mathematical sciences Engineering Computer sciences Technologies Architecture, building and planning Social studies Law Business and administrative studies Mass Communications and Documentation Linguistics, classics and related subjects European languages, literature and related Eastern, Asiatic, African, American and Australasian languages, literature and related Historical and philosophical studies Creative arts and design Education Combined	0.0996 -0.4374 -0.2790 0.2840 -0.3926 1.1373 0.8749 -0.1950 -0.1283 -0.7654 0.0732 0.1424 -0.0012 -0.2746 -0.4472 -0.0386 0.1333 0.9358 -0.1538	0.0972 0.4830 0.1012 0.0956 0.2503 0.1679 0.3248 0.2108 0.0692 0.0992 0.1012 0.2216 0.0756 0.6639 0.6269 0.0729 0.1122 0.2303 0.0782	0.3057 0.3651 0.0058 0.0030 0.1167 <0.0001 0.0071 0.3549 0.0638 <0.0001 0.4695 0.5204 0.9872 0.6792 0.4757 0.5960 0.2351 <0.0001 0.0494	1.1047 0.6457 0.7565 1.3284 0.6753 3.1183 2.3985 0.8229 0.8796 0.4651 1.0760 1.1531 0.9988 0.7599 0.6394 0.9621 1.1425 2.5494 0.8575

Table D2: Students in non-Russell Group institutions ~ results from multilevel logistic regressions (first class degree)

<i>Variable</i>		<i>Est.</i>	<i>SE</i>	<i>P-value</i>	<i>Odds ratio</i>
Intercept		-4.6316	0.0996	<0.0001	0.0097
UCAS tariff		0.0090	0.0002	<0.0001	1.0091
Pre-U	[No] Yes	-1.0068	0.5779	0.0815	0.3654
Gender	[Female] Male	-0.0523	0.0329	0.1119	0.9491
School type	[Comprehensive] FE college Grammar Independent Secondary Modern 6 th Form College Tertiary	0.1332 -0.2893 -0.3319 0.0237 -0.3116 0.0138	0.1002 0.0628 0.0710 0.1422 0.0563 0.1098	0.1839 <0.0001 <0.0001 0.8679 <0.0001 0.9002	1.1425 0.7488 0.7175 1.0239 0.7323 1.0139
IDACI score		-0.3037	0.1181	0.0101	0.7381
Subject	[Biological sciences] Subjects allied to medicine Veterinary sciences, agriculture and related Physical sciences Mathematical sciences Engineering Computer sciences Technologies Architecture, building and planning Social studies Law Business and administrative studies Mass Communications and Documentation Linguistics, classics and related subjects European languages, literature and related Eastern, Asiatic, African, American and Australasian languages, literature and related Historical and philosophical studies Creative arts and design Education Combined	0.3774 0.4776 0.0114 0.9061 0.9719 1.0906 0.9733 -0.1780 -0.0826 -0.5593 0.5374 -0.0373 -0.3877 -1.8322 -0.4066 -0.6790 0.1053 -0.0679 -0.4202	0.0756 0.1955 0.0833 0.1008 0.1354 0.1189 0.2182 0.1165 0.0607 0.0749 0.0630 0.0735 0.0711 1.0373 0.4768 0.0823 0.0593 0.0863 0.0651	<0.0001 0.0145 0.8908 <0.0001 <0.0001 <0.0001 <0.0001 0.1265 0.1738 <0.0001 <0.0001 0.6116 <0.0001 0.0773 0.3938 <0.0001 0.0758 0.4313 <0.0001	1.4584 1.6122 1.0115 2.4746 2.6429 2.9761 2.6467 0.8369 0.9207 0.5716 1.7115 0.9634 0.6786 0.1601 0.6659 0.5071 1.1111 0.9343 0.6569

Table D3: Students in Russell Group institutions ~ results from multilevel logistic regressions (at least an upper second class degree)

<i>Variable</i>		<i>Est.</i>	<i>SE</i>	<i>P-value</i>	<i>Odds ratio</i>
Intercept		-0.7006	0.1829	0.0001	0.4963
UCAS tariff		0.0067	0.0003	<0.0001	1.0068
Pre-U	[No] Yes	-0.0800	0.3432	0.8157	0.9231
Gender	[Female] Male	-0.4703	0.0474	<0.0001	0.6248
School type	[Comprehensive] FE college Grammar Independent Secondary Modern 6 th Form College Tertiary	0.2125 -0.3159 -0.1704 -0.1068 -0.3038 0.1257	0.2443 0.0773 0.0675 0.3000 0.0813 0.1876	0.3843 <0.0001 0.0116 0.7218 0.0002 0.5026	1.2368 0.7291 0.8434 0.8987 0.7380 1.1340
IDACI score		-0.6687	0.1786	0.0002	0.5124
Subject	[Biological sciences] Subjects allied to medicine Veterinary sciences, agriculture and related Physical sciences Mathematical sciences Engineering Computer sciences Technologies Architecture, building and planning Social studies Law Business and administrative studies Mass Communications and Documentation Linguistics, classics and related subjects European languages, literature and related Eastern, Asiatic, African, American and Australasian languages, literature and related Historical and philosophical studies Creative arts and design Education Combined	-0.1204 0.2594 -0.3660 -0.9704 -1.3986 0.1926 0.4669 0.6220 0.3810 0.1734 0.1737 1.0788 0.8537 -0.5784 -0.0495 0.9296 1.1256 1.1518 0.1228	0.1047 0.3587 0.0928 0.1033 0.1708 0.2030 0.4024 0.2806 0.0801 0.1084 0.1101 0.3145 0.1130 0.5637 0.4866 0.1013 0.1736 0.4057 0.0892	0.2500 0.4696 0.0001 <0.0001 <0.0001 0.3428 0.2459 0.0266 <0.0001 0.1098 0.1146 0.0006 0.0000 0.3048 0.9190 <0.0001 <0.0001 0.0045 0.1688	0.8865 1.2961 0.6935 0.3789 0.2469 1.2124 1.5951 1.8627 1.4638 1.1893 1.1897 2.9412 2.3483 0.5608 0.9517 2.5334 3.0821 3.1638 1.1306

Table D4: Students in non-Russell Group institutions ~ results from multilevel logistic regressions (at least an upper second class degree)

<i>Variable</i>		<i>Est.</i>	<i>SE</i>	<i>P-value</i>	<i>Odds ratio</i>
Intercept		-1.4365	0.0816	<0.0001	0.2377
UCAS tariff		0.0090	0.0002	<0.0001	1.0091
Pre-U	[No]				
	Yes	0.4991	0.5686	0.3801	1.6472
Gender	[Female]				
	Male	-0.3149	0.0272	<0.0001	0.7299
School type	[Comprehensive]				
	FE college	0.1141	0.0848	0.1783	1.1209
	Grammar	-0.2850	0.0586	<0.0001	0.7520
	Independent	-0.4067	0.0563	<0.0001	0.6658
	Secondary Modern	-0.0008	0.1177	0.9947	0.9992
	6 th Form College	-0.2530	0.0496	<0.0001	0.7765
	Tertiary	0.0315	0.0997	0.7520	1.0320
IDACI score		-0.5163	0.0937	<0.0001	0.5967
Subject	[Biological sciences]				
	Subjects allied to medicine	0.0145	0.0710	0.8386	1.0146
	Veterinary sciences, agriculture and related	0.0017	0.1663	0.9920	1.0017
	Physical sciences	-0.3567	0.0655	<0.0001	0.7000
	Mathematical sciences	-0.5172	0.1055	<0.0001	0.5962
	Engineering	0.3730	0.1344	0.0055	1.4521
	Computer sciences	0.2888	0.1135	0.0110	1.3348
	Technologies	0.1011	0.2263	0.6552	1.1063
	Architecture, building and planning	-0.3813	0.0995	0.0001	0.6829
	Social studies	-0.0852	0.0496	0.0855	0.9183
	Law	-0.3505	0.0565	<0.0001	0.7043
	Business and administrative studies	0.3786	0.0581	<0.0001	1.4602
	Mass Communications and Documentation	0.3019	0.0632	<0.0001	1.3524
	Linguistics, classics and related subjects	0.0073	0.0597	0.9026	1.0073
	European languages, literature and related	0.6680	0.5589	0.2320	1.9503
	Eastern, Asiatic, African, American and Australasian languages, literature and related	-0.6525	0.3183	0.0404	0.5207
	Historical and philosophical studies	0.0114	0.0607	0.8507	1.0115
	Creative arts and design	0.2290	0.0534	<0.0001	1.2573
	Education	-0.0352	0.0685	0.6078	0.9654
Combined	-0.0161	0.0519	0.7561	0.9840	

Appendix E: International Baccalaureate – full results for Russell Group and non-Russell Group models (IB students only)

Table E1: Students in Russell Group universities ~ results from multilevel logistic regressions (first class degree)

<i>Variable</i>		<i>Est.</i>	<i>SE</i>	<i>P-value</i>	<i>Odds ratio</i>
Intercept		-7.0690	0.7513	<0.0001	0.0009
IB points score		0.1547	0.0196	<0.0001	1.1673
Gender	[Female]				
	Male	0.3263	0.1429	0.0224	1.3859

Table E2: Students in Russell Group universities ~ results from multilevel logistic regressions (at least an upper second class degree)

<i>Variable</i>		<i>Est.</i>	<i>SE</i>	<i>P-value</i>	<i>Odds ratio</i>
Intercept		-5.4931	0.9169	0.0000	0.0041
IB points score		0.2146	0.0264	0.0000	1.2393
Gender	[Female]				
	Male	-0.3262	0.1882	0.0829	0.7216

Table E3: Students in non-Russell Group universities ~ results from multilevel logistic regressions (first class degree)

<i>Variable</i>		<i>Est.</i>	<i>SE</i>	<i>P-value</i>	<i>Odds ratio</i>
Intercept		-6.7699	0.7803	<0.0001	0.0011
IB points score		0.1656	0.0236	<0.0001	1.1801
Gender	[Female]				
	Male	0.1115	0.1803	0.5364	1.1179

Table E4: Students in non-Russell Group universities ~ results from multilevel logistic regressions (at least an upper second class degree)

<i>Variable</i>		<i>Est.</i>	<i>SE</i>	<i>P-value</i>	<i>Odds ratio</i>
Intercept		-3.4977	0.6653	0.0000	0.0303
IB points score		0.1560	0.0220	0.0000	1.1688
Gender	[Female]				
	Male	-0.2387	0.1650	0.1480	0.7876