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Special Issue: Inequalities and the Curriculum

The relationship between A-level subject choice and league table score of university attended: the 'facilitating', the 'less suitable', and the counter-intuitive

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Abstract

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suitable' subjects. The heterogeneous relationships of professionally-related A-level subjects with university ranking make decision-making for aspirational 16-year-olds problematic: an apparently sensible subject choice for students wishing to prepare for a professional career may, in fact, put them at a disadvantage.

Keywords: A-level subject choice | facilitating subjects | fair access | university league tables

Introduction

University participation for English school students has increased over recent decades, but among university entrants young people from less privileged backgrounds continue to be particularly under-represented at high-status universities (Anders, 2012; Chowdry, Crawford, Dearden, Goodman, & Vignoles, 2013; Sullivan, Parsons, Wiggins, Heath, & Green, 2014), as do students from state, rather than private, schools (Sullivan et al., 2014; Sutton Trust, 2011). This matters to social mobility because it is well-established that higher returns are associated with attending high-status universities (Britton, Dearden, Shephard, & Vignoles, 2016; Chevalier, 2014; Chevalier & Conlon, 2003; Hussain, McNally, & Telhaj, 2009) and particular degrees (Britton et al., 2016; Walker & Zhu, 2011). For example, large professional service firms, recruiters of large numbers of relatively highly paid graduates, have been identified as socially exclusive (Ashley, Duberley, Sommerlad, & Scholarios, 2015; Cook, Faulconbridge, & Muzio, 2012; Milburn, 2009, 2012) with some authors laying at least part of the blame for their social homoge ties (Ashley et al., 20 Mobility Commis and 60–70% of t ies (Ashley et al., 20 to careers in are es from which sing social mobility.

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differential offer rates from universities according to their social background (UCAS, 2016b) and schooling (Boliver, 2013) conditional on having applied in the first place. The Russell Group has suggested that part of the reason for this is that students from less privileged backgrounds apply to university with the 'wrong' subjects and qualifications for the courses for which they apply (Russell Group, 2015). This begs the question of which are the 'right' subjects and qualifications.

A-levels are much the most widely held qualifications amongst English-domiciled university applicants; in 2015, 73% of English 18-year-olds applying to UK university did so with just A-levels and 9% had mixed A-level and BTEC qualifications. Fifteen percent applied with only BTECs (UCAS, 2016a). At age 16+, students following the academic A-level path typically choose four subjects to study at AS-level during Year 12, continuing with three of them to A2-level in Year 13. Until 2015, some 96 A-levels (including double awards) were available for teaching in England, although 27 will no longer be delivered under present reforms. But that still gives a wide variety of subjects from which students may choose, and these choices may make a difference to their chances of acceptance at university in general, and high-status university in particular. As discussed elsewhere in this issue, schools may constrain choices at age 14 (Anders, Henderson, Moulton, & Sullivan, 2018) which has a knock-on effect on A-level choices (Dilnot, 2016). Most students applying to university do so during Year 13 with grades predicted by their schools in each of their A-levels, and offers of places from universities are made in terms of both the A-level subjects being followed and the required grade to be obtained.

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A related question is whether the remaining 63 subjects (pre-reform) are all equally unhelpful in contrast with facilitating subjects. A study of Informed choices and the general admissions guidance of Russell Group universities suggests that some subjects are considered less suitable preparation by some universities. This has led to the production of a taxonomy of A-levels, dividing them into 'facilitating', 'useful', 'less suitable',[2] and 'non-counting' in the context of highly selective university entry (Dilnot, 2015). There is little evidence to date on how the number of these subjects offered at A-level is related to the status of university attended. The taxonomy is reproduced in Appendix 1.

Many of the 'less suitable' A-level subjects have a vocational bent; they include law, accounting, and business. A student making A-level choices at age 16 who aspires to a career in a professional services firm might think that taking an A-level in law, accounting, or business would be helpful in achieving that goal through facilitating admission to a high-status university to read the corresponding subject. But none of these A-levels is described as essential for the corresponding degree in Informed choices, and given that some Russell Group universities at least consider them not good preparation for university study, it may be that choosing these subjects is actually unhelpful in high-status university admission.

A further question is whether all facilitating A-levels are equally facilitating. The very large difference between those entering Russell Group universities rather than non-Russell Group with maths A-level (over 50% compared with less than half that for those with three A-levels entering university in 2012/13) compared with any other subject (Dilnot, 1 th holding maths A ranked universit associated with hav by Dolton and Vigr

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absence of further linkage to UCAS applications data, which are unavailable at the time of this analysis (Machin, 2015), but does allow the role of GCSE[3] performance to be taken into account, which has been shown to be very important in university entry (Crawford, 2014).

I further shed light on the previously unexamined association with university status of vocational A-level subjects related to professional careers in law, accounting, and business. Two of these related A-levels (law and accounting) are taken disproportionately by students from lower SES backgrounds and are rarely offered at private schools. While no causal claims as to their efficacy (or not) in helping students to gain places on accounting, business, and law degrees at highly ranked universities can be made in the absence of linked applications data, this work will provide information about associations to students making A-level choices at age 16 and those who guide them. I proceed by discussing the literature on A-level subject choice and university admission, then set out methods and data. In the last section I discuss results, conclusions, and directions for further research.

Previous literature on A-level subject choices and university admissions

Subject choice, social background, and school type

A-level subject choice can only be part of the explanation for differential participation by SES a variables, and ther eople from more pri 016; Toth, Sammor nces (Gill & Bell, 201 tend to be taken by und, but is also rs (Dilnot, 2016). S rtions of facilitati olleges (Dilnot,). Convers least two 'less suit e offered by

Facilitating subjects—specific content versus general university preparation

Having A-level subjects from particular content-based groups is associated with taking university courses from related subject areas as one might expect, with particularly strong relationships for STEM subjects (Vidal Rodeiro, Sutch, & Zanini, 2013). Clearly for many students the content of their STEM A-level is necessary preparation for entry to a higher-status university.

Informed choices sets out ‘essential’ and ‘useful’ A-level subjects for some 60 popular Russell Group degree courses, where the ‘essential’ subjects are always content related. The majority of the courses listed do have ‘essential’ requirements, and those A-level subjects described as ‘essential’ for any of these degree courses effectively make up the ‘facilitating’ list (Russell Group, 2016). But some very popular courses (for example accounting, business/management, and law) do not have ‘essential’ requirements. It is not clear whether having facilitating, rather than other, A-level subjects might be an advantage in admission to such courses because of their perceived value as good general preparation for university, rather than because of their content.

On average, facilitating subjects are relatively difficult compared with other A-level subjects (Coe, Searle, Barmby, Jones, & Higgins, 2008), and offering more difficult A-level subjects is positively associated with gaining an offer of a place at a high-status university (Noden, Shiner, & Modood, 2014), even when the degree subject is controlled for. This would suggest that it is not only the content of facilitating A-levels that is importa aving maths A-level i oliver, 2013; Chowdry ng advanta c content (becaus d with other univ

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approved list of A-levels and are absent from all non-preferred lists. ‘Less suitable’ subjects are more likely to be taken by students from lower SES backgrounds (Dilnot, 2016) and at non-selective state schools and colleges rather than private or grammar schools (Dilnot, 2016; Gill, 2015b).

Work by Vidal Rodeiro et al. (2013) suggests that doing at least two ‘applied’ or ‘expressive’ A-level subjects (most of which are in the ‘less suitable’ category of the taxonomy) is associated with reduced odds of being at a Russell Group university. Their analysis is based on HESA data for those at university in 2011/12, but not linked to attainment other than A-level results.

Accounting, business, and law A-levels, all of which might be expected to be helpful preparation for university courses in their disciplines, are categorised as ‘less suitable’ in the taxonomy of A-levels because of published reservations by the relatively small number of Russell Group universities publishing general approved lists, and other highly selective universities either remaining silent or stating neutrality about their usefulness. Evidence as to their effectiveness as preparation is largely anecdotal, although Rowbottom (2013) finds that accounting students at a Russell Group university with an accounting A-level perform somewhat worse than those without, by the time they graduate. Fazackerley and Chant (2008) note that while many highly selective universities publicly say law A-level is welcome or do not rule it out, in practice only a handful of applicants at such universities out of cohorts of several hundred are admitted with it. They suggest it seems particularly harsh for most Russell Group universities not to be explicit about what seems to be treated by admissions tutors as

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levels from 2010 to 2012 (KS5 data), and then linked to Higher Education Statistics Agency (HESA) data for starters in 2010–2012. Students were matched not just for 'normal' progression, but where possible when taking an extra year in the sixth form, and for taking one or two gap years before university. Students found only in the HESA and KS5 data (i.e. not at school in England at KS4 or otherwise unmatched) were retained in the dataset. Where students had more than one university instance in the dataset (because they left a university course and subsequently started again), their first instance only was included, as it was to this course that their A-levels would first have admitted them. Some 474,526 observations of students entering UK university with at least three 'counting' A-levels were matched to their school records at KS5, and of these, 451,491 were at universities included in the Times rankings. Of these, 6.5% had some missing demographic or GCSE data, leaving 421,836 complete cases for analysis.

Most previous work on high-status university entry has used dichotomous outcome variables (such as Russell Group attendance or not) to examine relationships between high-status participation and variables of interest. It is desirable, though, to use an interval-level variable, both because of the improved tractability of statistical analysis methods and because it avoids the somewhat arbitrary cut off between universities of different types and because traditional groupings of universities may be over-simplified (Boliver, 2015). Such a variable is available in the UK, in the form of several published rankings based on computed quality scores for universities, and for departments within universities. Three rankings of UK universities are produced annually to guide students in making applications: The Times/Sunday Times Good University Guide,[4] the Guardian Universi ion produce gs differ from the ude a measure ilable, but only ran e University Guid nber of unive mes guide. The Tim rankings because and includin o the longest espected.

Scores were used rather than ranks in the analysis because they better capture the distance between universities. The analysis was repeated using ranks and the results footnoted.[5] Overall university scores from the Times are given in Appendix 2. Scores are those published in 2012 for students making applications for 2013, and are based on data from 2008 to 2011, coterminous with the cohorts examined. This approach is preferred to that adopted by Chevalier (2014) of deriving a quality measure from the individual indicators in the Times Good University Guide for ease of interpretation of results. Robustness checks were performed using a derived quality measure and results footnoted. Overall scores for the institution rather than those relating to departments were used as future employers are likely to have knowledge of overall university prestige but not of individual departments (Chevalier, 2014). For the period relevant to these entrants, the Times guide covered 116 UK universities, and excluded very small and specialist institutions.

The number of facilitating, useful, and 'less suitable' A-levels attempted by each student, and whether they had attempted A-levels in maths, accounting, business, or law, was calculated from KS5 data. Lists of facilitating, useful, and 'less suitable' subjects were taken from the taxonomy (Dilnot, 2015).

Prima facie evidence of the relationships between A-levels from the different categories and score of university attended is set out in Figure 1. Students in the sample were split into quintiles according to the score of university attended, and the mean number of A-levels from different categories computed by quintile.

Figure 1. Mean number of A-levels from each category by quintile of score of university attended

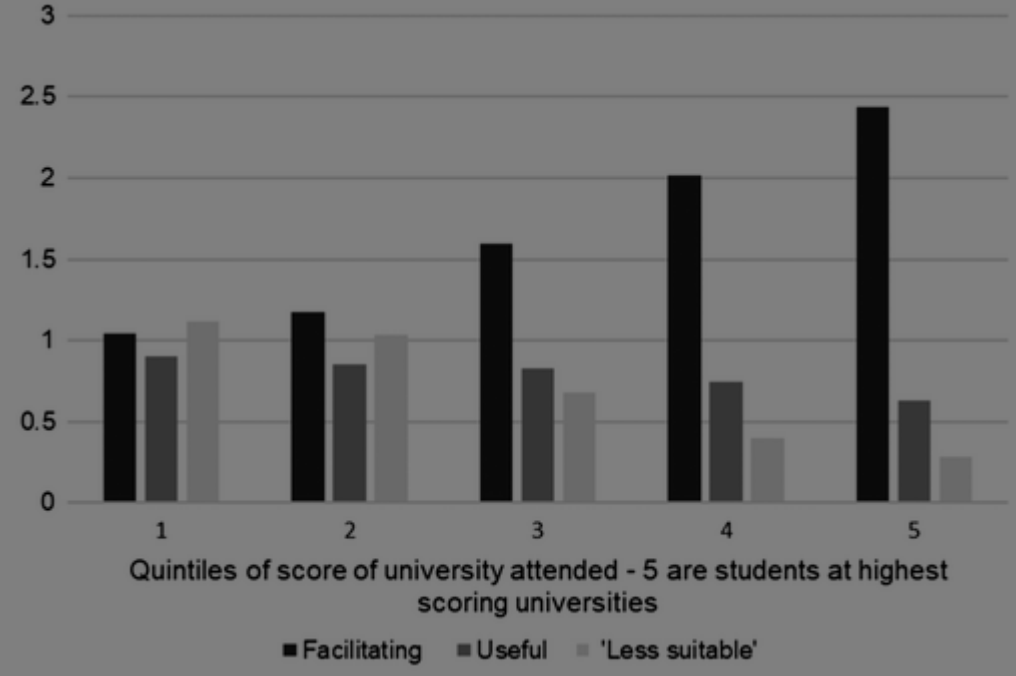

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Figure 1 shows that for the quintile of students at lowest scoring universities, on average students had around one from each category of A-levels. As the scores of university attended increase, the mean number of facilitating subjects per student increases, whilst the number of ‘less suitable’ A-levels per student decreases, and the number of ‘useful’ A-levels stays relatively stable.

The total number of ‘counting’ A-levels (i.e. excluding general studies and critical thinking) was calculated for each student at KS5, enabling the association with subjects from particular groups to be disentangled from the association with the total number of subjects offered.

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the attributes of local and very local areas and free school meal (FSM) eligibility. Quintiles were constructed for the whole cohort at KS4. FSM and local area data are not observable for students in private schools. These students, again following Chowdry et al. (2013), are assumed to be from families of higher SES than most maintained school and college students, and were therefore included in the top SES quintile. Dealing with the private school students in this way left only 4.1% missing data. Robustness checks on a common dataset for observations with non-missing data for all three measures show negligible differences in the coefficients of subject choice variables.

Descriptive statistics are given in Table 1, for all students in the sample split by school type, and for the three degree course subjects of accounting, business, and law. The mean score of university attended of students from private school is 690 (so Birmingham or Reading would be 'mean universities' for these students) and grammar schools 659 (Manchester or Kent). The mean score of university attended for students from non-selective state schools and colleges is much lower (581 for non-selective state schools, 574 for sixth form colleges, and 544 for FE). These scores follow the pattern of average SES quintile by school type, as well as points held in the best three A-levels by school type, with the highest being those from private schools (767 points) and the lowest from FE colleges (676 points). Accounting and business students are, on average, at lower scoring universities than all students taken together, with mean scores of 554 and 531 respectively. Law students are, on average, at higher scored institutions, although still slightly below the mean for all degree courses.

Table 1. Descriptive statistics for sample.

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proportions for law at FE and sixth form colleges of 13.9% and 12.6% of students. The proportions of those doing business are much more similar across school type.

Subject choices also vary considerably by the three degree courses examined, despite none generally having A-level pre-requisites. Maths is held by 67% of accounting degree students, whilst for business and law students the proportions are 17.5% and 16.8% respectively. Business A-level is held by almost half of students studying for business degrees, and almost a third of those reading accounting. Law A-level is also extremely popular among those doing law degrees (held by 42.4%). Accounting is held by 21.7% of accounting degree students, a rather less popular choice than either business or maths.

Methods

Previous work (Boliver, 2013; Chowdry et al., 2013; Noden et al., 2014; Shiner & Noden, 2015; Vidal Rodeiro et al., 2013) suggests that prior academic attainment, social background, gender, school type, prior application attempts, and university course group are all important in university participation, and for the rank of university attended. These factors are therefore all controlled for in investigating the role of A-level subjects.

The measure of best three A-levels is the single best predictor of rank of university attended, as might be expected. A squared term is included for the observed non-linearity ared were significa p year is used as

Observa le factors such as cations are likely ervable factor this case because e analysis, and are llow for the 'effects' dvantage of using th sampling

between and within effects differ: for example, the relationship between university score and number of facilitating subjects found by comparing two students in the same school (the within effect) is different from that between two otherwise similar students who are at schools with different mean numbers of facilitating subjects taken (the between effect). Including the school mean of each level 1 (individual) variable in the model allows the within and between effects to differ, and effectively relaxes the assumption that there is no correlation between the level 2 error and the level 1 variables.

The models to be estimated are of the form:

(1)

where Y_{ij} is the score of university attended by individual i from school j.

Using the random coefficients estimator means that the β_{nw} are the within (fixed effect) coefficients for the individual level variables. A positive coefficient on the 'within' subject choice variable is interpreted as an increase in mean score of university attended by students with a particular subject, or one from a particular group, rather than any other subject, or one from any other group, compared with other students at the same school. The coefficient term (β_{nb}–β_{nw}) of the school mean of each variable is the difference between the within and the between effects, and is known as the contextual effect.

The coefficient γ shows the relationship between university score and school type, the only term in the model which only varies at school level. The elements $u_j+\varepsilon_{ij}$ are the school-le

Effective ts reading accounti ely for each course.

Result

Table 2 g odel 1 shows th ehensive school is cores (the

having extra A-levels for a given number of facilitating subjects and best three A-level points compared with a student's school mean is positively associated with score, there is a significant negative relationship of university score with school mean number of A-levels, once the school mean number of facilitating A-levels, school mean marks from best three A-levels, and all else in the model are controlled for. This 'between' effect suggests that each increase of one in school mean number of non-facilitating A-levels not adding to its mean A-level score from best three subjects is associated with being at a university scoring seven points lower. Doing A-level maths (model 2) compared with someone in the same school with the same number of facilitating subjects but not doing maths is associated with a seven-point premium. The 'between' effect of schools is also important. Students at hypothetical schools where everyone does maths are on average at universities scoring 16 points higher than those at schools where no-one does maths, at 5% confidence. Being at a grammar school or private school rather than a comprehensive is associated with a premium of around four or five points on average. A negative relationship of slightly larger magnitude is observed for those at FE and sixth form colleges.

Table 2. Association of Times league table score with A-level subject choice across all university subjects.

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Model 3 shows that the number of 'less suitable' subjects chosen is significantly negatively correlated with score of university attended, with a slightly larger magnitude than tha vantage is seen her and private schools colleges are even fur subjects is controlle

Cont ess suitable' A-levels, niversity score, su ching. The 'betwee mewhat smaller,

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The relationship between facilitating subjects and university scores for students studying accounting, business, and law is shown in models 1 and 2 of Table 3. Despite none of these courses having pre-requisite A-level subjects, each facilitating subject is associated with attending universities with a score of between around 6 and 11 points higher, with maths conveying a further premium, particularly for business (14 points). Even for law students, having maths is associated with a premium over other facilitating subjects (six points). For neither of these models is there a significant contextual (between minus within) effect of mean number of facilitating subjects for the school.

Table 3. Association of Times league table score with A-level subject choice for students studying accounting, business, and law at university.

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Model 3 shows the negative association of university score with 'less suitable' subjects; it is slightly smaller for these three degree courses than for all students together, although still negative and significant, and largest for law students (–13 points). For all three subjects FE college students are at lower scoring universities than comprehensive school students (at 5% confidence).

All three models show large, positive differences in score of university attended between private and comprehensive school students (around 18 points for accounting and 13 f udying business round 10 points.

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represents a comparison of the related A-level with any non-facilitating A-level, and finally model 7 controls for the total number of ‘less suitable’ A-levels, so showing the relationship with ranking if the related A-level is swapped with any other ‘less suitable’ subject.

Table 4. Association of Times league table score with choosing the course-related A-level rather than an A-level from another category for students studying accounting, business, and law at university.

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The results show considerable differences for the three subjects examined. For accounting students, having accounting A-level is associated with no significant difference in score compared with a facilitating subject, any other subject, and any other non-facilitating subject. It is associated with an increase in score of eight points compared with holding other ‘less suitable’ subjects. On the other hand, business A-level seems more helpful for admission to higher ranked university to read business than accounting is for accounting degrees. Although swapping business for a facilitating subject is associated with being at a university with six fewer points and swapping it for any other subject shows a very small relationship, swapping it for any non-facilitating subject and any other ‘less suitable’ subject shows significant positive relationships (6 and 10 points respectively).

Models 4 [illegible] at lower scoring [illegible] ilitating subject [illegible] itating subject [illegible] s suitable’ subject, [illegible] ls are availabl[illegible]

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type is controlled for. For two students with otherwise similar characteristics, one with three facilitating subjects and one with none, this difference equates to being at Bristol rather than Leicester, or Oxford Brookes rather than Gloucestershire in 2013 rankings. This is consistent with previous literature and given that university subject group is controlled for seems not just to be an artefact of the way degree courses with facilitating pre-requisites are distributed through the rankings.

Using a random effects model allows for the investigation of the role of school-level variables in the models. School type was seen to be significant for all three models across all university subjects, with FE and sixth form college students being at lower scoring universities compared with comprehensive schools overall, and private and grammar school students at higher scoring ones, even after controlling for prior attainment and subject choice groups. This could, of course, be a result of selection (where those students have chosen to apply) but whether the reason is a lack of aspirational applications or acceptance rates varying systematically by school type, there is still a gap.

The answer to the question of whether there is something especially facilitating about maths A-level appears to be ‘yes’. On average, having maths rather than any other facilitating subject is associated with a seven-point premium across all subjects. There is likely to be wide variation in this premium by degree course[8] but the overall relationship is significantly positive.

The number of ‘less suitable’ A-level subjects taken is shown to be significantly negatively related to the score of university, even after attainment and degree course are cont ber of Russell G suggests that mor t be useful.

For all th facilitating subject litating subje ntent. Whether cilitating A-levels, o erable skills is beyon (and somewh ese course

these subjects. The role of specific subject A-levels varies considerably between these three degree courses. Accounting A-level is done by relatively few students. It is not associated with a significantly lower ranking than facilitating subjects, on average, but neither is it helpful, except compared with other ‘less suitable’ subjects. Business, on the other hand, seems a relatively helpful choice compared with all but facilitating subjects. It is noteworthy that it is done by a much larger proportion of private school students than accounting or law.

The results for law students are consistent with the anecdotal evidence that higher ranking universities ‘don’t like’ law A-level. Having law A-level is associated with a score discount of 19 points compared with swapping it for a facilitating A-level and 10 points compared with any non-facilitating one. Students taking it, of whom much the highest proportions are at sixth form and FE colleges, are apparently not putting themselves at the advantage that they might reasonably have expected.

Before dismissing law (or indeed any other A-level) as potentially unhelpful for university entry, it is important to consider both the aspirations of students taking it, and the context of their other subjects. Students may be unconcerned about the ranking of university they attend. But given that 42% of those reading law with at least three A-levels have law A-level, it is likely some students will have taken it to aid them to get into a high-ranking university, and the results described here are likely to be counter-intuitive for these students. The context matters too: if a student is choosing between law and another ‘less suitable’ subject, then it might be entirely sensible to choose law to see whether it is a subject they enjoy. On the other hand, if the choice is betwee ity applicati atively rare, to be ad r those using th troduced legal ap the picture is uncle

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should be taken in choosing ‘less suitable’ A-levels, even if they seem to relate to the degree course eventually followed. Using university application data to link to NPD and HESA data at the individual applicant level will help further understand these relationships.

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Notes on contributor

Catherine Dilnot is a Senior Lecturer at Oxford Brookes University. Her research interest is in fair access to university and to leading professions, particularly the accounting profession, concentrating on the role of subject choice. She qualified as a chartered accountant before embarking on her career in teaching and research.

Acknow

I am gra for their advice, a nal Pupil Data d by the Depa etation of results.

Notes

1. A group of 24 high-status research-intensive UK universities.

2. ‘Less suitable’ subjects are those where reservations are expressed by at least one Russell Group university as to appropriateness for university study. The original taxonomy further split this category according to whether or not subjects are ever described as useful for the related degree course at a Russell Group university. Most of the subjects never so described have been discontinued in current reforms. The aggregated version of the taxonomy is therefore used in this analysis.

3. High stakes examinations taken at age 16.

4. The Times overall university rankings are a weighted linear function of eight standardised indicators: student satisfaction, research quality, services and facilities spend, completion rates, entry standards, student–staff ratio, good honours, and graduate prospects. The first two have a weighting of 1.5 each, and the remainder 1 each. The last four indicators are adjusted for subject mix at the university. The top university is then given 1000 points and the others scaled accordingly (O’Leary, 2012).

5. All analyses are also performed with ranks, rather than scores. The relationships observed are substantively unchanged.

6. Plotting lowess curves for a random sample of the data suggests that the relationship of A-level score with score of university attended is non-linear, with a flat line between university score and best three A-level scores until a little above 500 QCA points (the equivalent of DDE at A-level), and an increasing gradient thereafter.

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Appendix 1

Table A1. Taxonomy of A-levels available for teaching 2014/15.[1]

Table

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Notes: [1]Subjects with no entries in England/combined with other subject in National Pupil Database are marked ‘n’; those to be discontinued are marked ‘d’; applied A-levels are marked ‘*’.

[2]Includes six additional endorsements/pathways

[3]Information and communication technology.

Appendix 2

Table A2

Table

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