RESEARCH AND ANALYSIS

Impact of calculated grades, centre assessment grades and final grades on inter-subject comparability in GCSEs and A levels in 2020

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Contents

Summary

This is a technical report to describe the impact of the approaches taken to results and outcomes on inter-subject comparability from a statistical point of view. Previous work on inter-subject comparability has shown that, for both GCSE and A level, the rank order of subject difficulty using various statistical techniques appeared to be fairly consistent between years (e.g. He, Stockford and Meadows, 2018; He and Black, 2019). For example, at GCSE, French, German, Latin and music are shown to have greater statistical difficulty fairly consistently across a number of years, while English language, design and technology and English literature have been easier.

This analysis looks at the rank order of overall subject and grade difficulties in 2020, looking at the final issued grades as well as the 'calculated grade' and the centre assessment grade (CAG). This analysis helps to contribute not only to our understanding of grading in 2020, but implications for awarding in 2021.

We found that:

For both GCSEs and A levels, subjects in 2020 were generally graded more leniently than in 2019 at the overall subject level and at individual grades, based on estimated population weighted mean grades (WMGs) and grade difficulties derived using the Rasch model. On average, subjects in 2020 based on CAGs or the final grades were graded considerably more leniently than based on calculated grades. Subjects based on final grades were graded slightly more leniently than based on CAGs. In particular:

- For GCSEs, based on the final grades, on average, subjects in 2020 were graded nearly three-fifths of a grade more leniently at the overall subject level than in 2019. At grades 4, 7 and 9, these were about three-quarters of a grade, one-third of a grade and one-tenth of a grade respectively more lenient.
- For A levels, based on the final grades, on average, subjects in 2020 were graded about half of a grade more leniently at the overall subject level than in 2019. At grades C, A and A*, these were about three-fifths of a grade, one-third of a grade and one-fifth of a grade respectively more lenient.

For both GCSEs and A levels, the range and standard deviation of relative grade difficulties in gradewidth unit estimated using the Rasch model at the overall subject level and at individual grades in 2020 are generally smaller than in 2019, particularly for difficulties estimated based on CAGs and the final grades. The distributions of relative grade difficulties between subjects in 2020, estimated based on CAGs and the final awarded grades, are similar and generally noticeably narrower than the difficulty distributions estimated using calculated grades.

For both GCSEs and A levels, there is substantial variability in changes in grade difficulties from 2019 to 2020 between the subjects based on calculated grades, CAGs and the final grades. Changes in grade difficulties within the same subject also vary at different grades for a large number of subjects. In particular:

- For GCSEs, changes in grade difficulties based on calculated grades are substantially smaller than those estimated based on CAGs and the final grades overall and at grade 4. At grade 7, changes based on calculated grades on average are slightly smaller than those based on CAGs or the final grades. At

grade 9, changes based on calculated grades on average are similar to or slightly larger than those based on CAGs or the final grades.

- For A levels, changes in grade difficulties based on calculated grades overall and at grades C and A, particularly at C, are substantially smaller than those estimated based on CAGs and the final grades. At A*, changes are similar across calculated grades, CAGs and the final grades.

For GCSEs, difficulty rank orders estimated using the Rasch model in 2019 correlate better with those in 2020 estimated using the calculated grades than the rank orders estimated using CAGs or the final grades. Changes in difficulty orders overall and at individual grades in the subjects between 2020 and 2019 based on calculated grades are smaller than those estimated based on CAGs or the final awarded grades.

For A levels, grade difficulty rank orders in 2019 generally correlate slightly better with those in 2020 estimated based on CAGs or the final grades than the rank orders estimated using the calculated grades. Changes in difficulty rank orders based on calculated grades are slightly larger at A and A* than those estimated using CAGs or the final grades.

For both GCSEs and A levels, differences in grade difficulties between CAGs and calculated grades in 2020 show similar levels of variability between the subjects at the overall subject level and at individual grades.

For both GCSEs and A levels, changes in relative grade difficulties between 2020 and 2019 estimated using the Rasch model, in terms of range and standard deviation and difficulty order positions, at the overall subject level and individual grade level are larger than the estimated changes between 2019 and 2018. Consistency in correlations of grade outcomes with prior attainment, inter-subject correlations and Rasch grade difficulty correlations between 2019 and 2020 is similar or slightly weaker than that between 2018 and 2019. In particular:

- Changes in grade difficulty rank order positions from 2019 to 2020 are substantially larger than those from 2018 to 2019.
- For GCSEs, based on the final grades, average rank order position changes (per subject) from 2019 to 2020 at the overall subject level and at grades 4, 7 and 9 are 3.1, 3.5, 3.2 and 3.9 respectively, while these are just 0.8, 0.5, 1.0 and 0.9 from 2018 to 2019 and 1.77, 1.54, 1.77 and 2.06 from 2012 to 2013.
- For A levels, at the overall subject level and at grades C, A and A*, average changes from 2019 to 2020 are 2.4, 2.1, 2.9 and 3.2 respectively based on the final grades, whereas these are 1.4, 1.7, 1.1 and 1.7 from 2018 to 2019.

These differences in impact on inter-subject comparability in GCSEs and A levels in 2020 between calculated grades, CAGs and the final awarded grades reflect differences in the nature of how they were arrived at.

1. Introduction

On 18 March 2020 the Secretary of State for Education told Parliament that, in response to the coronavirus (COVID-19) pandemic, schools and colleges in England would shut to all but the children of critical workers and vulnerable children after 20

March. In line with these measures, exams scheduled for the summer would not take place. The Secretary of State said that the government would work with the education sector and with Ofqual to make sure students who were preparing to take GCSEs, AS, and A level exams in the summer would not be unfairly penalised.

In the direction Ofqual received on 31 March 2020, the Secretary of State explained that, despite the cancellation of exams, it was government policy that students be issued with a set of results that allowed them to progress to further study or employment. The direction confirmed that these students should be issued with calculated results based on their exam centres' judgments of their ability, supplemented by a range of other evidence. The direction further explained that '[i]n order to mitigate the risk to standards as far as possible, the approach should be standardised across centres' and that the distribution of grades should follow a similar profile to that in previous years. The standardisation process used several sources of evidence for each centre, including centre assessment grades (CAGs) and rank order judgements, prior attainment of the 2020 students compared to previous years, and historical profiles of results nationally and for the centre itself (see Ofqual 2020a). Grades arising from this standardisation process were referred to as "calculated grades".

In August 2020, Ofqual announced that instead of calculated grades, students would receive the higher of the CAG or the calculated grade in each subject as their final grade (see Ofqual 2020b). For GCSE candidates, about 94.1% of their final grades were the same as their CAGs. For A level candidates, this was about 97.8% as shown in our report: Summer 2020 results analysis – GCSE, AS and A level.

This analysis represents part of a set of research reports evaluating the impact of the 2020 summer awarding, in order to understand the impact on confidence, how teachers and schools made judgements on centre assessment grades, and how it might impact upon important aspects of examinations in 2021 and beyond.

As part of this evaluation, this technical report investigates the impact of calculated grades, centre assessed grades and the final grades on inter-subject comparability in GCSEs and A levels in 2020 in relation to 2019 from a range of perspectives, including correlations of subject grade outcomes with prior attainment, inter-subject correlations, and relationship between subject grade difficulties. Main findings from the investigation are presented.

2. Data and analysis

2.1 Data

The data analysed in this investigation were the results data supplied to Ofqual by the awarding organisations (AOs), covering 2018-2020 for both GCSEs and A levels. For the GCSE data from 2018, only reformed subjects (awarded with numerical grades) were included in the analysis. In addition, candidates' prior attainment data (mean KS2 scores for GCSEs and mean GCSE scores for A levels) extracted from the National Pupil Database (NPD) were used.

For results to be reliable, only subjects with entries greater than 3,000 for GCSEs and 1,000 for A levels were included in the analysis. Further, for GCSEs, candidates

taking fewer than two subjects were excluded from the analysis. Tables 1 and 2 below list the GCSE and A level subjects from the different years that were included in the analysis.

Table 1 GCSE subjects from 2018, 2019 and 2020 that were analysed (including acronyms for some subjects used in subsequent figures and tables).

Subject	2018	2019	2020
Art and Design: Three-dimensional design (AD_3DStudies)		x	x
Art and Design: Art, craft and design) (AD_ACD)	x	x	x
Art and Design: Fine art (AD_FA)	x	x	x
Art and Design: Graphics (AD_Graphics)	x	x	x
Art and Design: Photography (AD_Photog)	x	x	x
Art and Design: Textile design (AD_Textiles)	x	x	x
Arabic		x	
Biology	x	x	x
Business		x	x
Combined science (Cbd_Science)	x	x	x
Chemistry	x	x	x
Chinese		x	
Citizenship studies (Citi_Studies)	x	x	x
Classical civilisation (Class_Civil)		x	x
Computer Science (Computing)	x	x	x
Design and technology (D&T)		x	x
Dance	x	x	x
Drama	x	x	x
Economics		x	x
English language (Eng_Lang)	x	x	x
English literature (Eng_Lit)	x	x	x
Film_Studies (Film studies)		x	x
Food preparation and nutrition (Food_P&N)	x	x	x
French	x	x	x
Geography	x	x	x
German	x	x	x
History	x	x	x
Italian		x	x
Latin	x	x	x
Mathematics	x	x	x
Media studies (Media_Studies)		x	x
Music	x	x	x
hysical education (PE)	x	x	x
Physics	x	x	x
Polish		x	
Psychology		x	x
Religious studies (RS)	x	x	x
Religious studies: short course (RS_SC)	x	x	x
Sociology		x	x
Spanish	x	x	x
Statistics		x	x
Urdu		x	x
Total	**27**	**42**	**39**

Table 2 A level subjects from 2018, 2019 and 2020 that were analysed (including acronyms for some subjects used in subsequent figures and tables).

Subject	2018	2019	2020
Accounting	x	x	x
Art and Design: Three-dimensional design (AD_3DS)	x	x	x
Art and Design: Art, craft and design (AD_ACD)	x	x	x

Art and Design: Fine art (AD_FA)	x	x	x
Art and Design: Graphics (AD_Graphics)	x	x	x
Art and Design: Photography (AD_Photog)	x	x	x
Art and Design: Textile design (AD_Textiles)	x	x	x
Biology	x	x	x
Business studies (Bus_Studies)	x	x	x
Chemistry	x	x	x
Chinese	x	x	x
Classical civilisation (Class_Civil)	x	x	x
Communication studies (Comm_Studies)	x		
Computer science (Computing)	x	x	x
Dance	x	x	x
Drama and theatre studies (Drama_TS)	x	x	x
Design and Technology: Product design (DT_PD)	x	x	x
Economics	x	x	x
Eng_Lang (English language)	x	x	x
Eng_LangLit (English language and literature)	x	x	x
Eng_Lit (English literature)	x	x	x
Film_Studies (Film studies)	x	x	x
French	x	x	x
Further mathematics (Fur_Maths)	x	x	x
General Studies	x		
Geography	x	x	x
Geology	x	x	
German	x	x	x
History	x	x	x
Health and social care (HSC)	x		
ICT (Information and communication technology)	x		
Latin	x	x	
Law	x	x	x
Mathematics	x	x	x
Media studies (Media_Studies)	x	x	x
Music	x	x	x
Music technology (Music_Tech)	x	x	x
Physical education (PE)	x	x	x
Philosophy	x	x	x
Physics	x	x	x
Polish(M)		x	
Politics	x	x	x
Psychology	x	x	x
Religious studies (RS)	x	x	x
Russian	x		
Sociology	x	x	x
Spanish	x	x	x
Turkish(M)		x	
Total	**46**	**43**	**39**

2.2 Methods of analysis

To facilitate analysis, the numeric grades awarded in GCSEs were retained and U was converted to 0. For A levels, the letter grades were converted into numerical values before analysis: A* to 6, A to 5, B to 4, C to 3, D to 2, E to 1 and U to 0.

The consistency in correlations between subject grade outcomes and prior attainment (represented by KS2 scores for GCSEs and mean GCSE scores for A levels) and inter-subject correlations between 2019 and 2020 was first examined for calculated grades, CAGs and the final awarded grades in 2020.

The relationship between subject grade outcomes and prior attainment was also used to investigate changes in subject weighted mean grade between 2020 and 2019. This involved classifying all candidates in a specific year into one of 10 prior attainment bands based on their mean KS2 scores (for GCSEs) or mean GCSE scores (for A levels). Each score band had similar number of candidates. The proportions of candidates classified into individual score bands were calculated which are referred to as all-candidates' proportions.

For candidates taking a specific subject, average grade in the subject for those falling into individual score bands was calculated. These average grades are multiplied by the corresponding all-candidates' proportions to produce a population weighted mean grade (WMG) for the subject which represents the expected average grade from all candidates should they all have taken that subject and were used as a measure of the overall difficulty (or facility) of the subject. Subjects with high WMG values are relatively easier than subjects with low values. The difficulty or facility of a subject defined this way is independent of the ability distribution of the candidates taking the subject.

The Rasch model was also used to investigate relative subject difficulties at individual grades. Rasch modelling is also based on the relationships between subject grades. In Rasch modelling, for a specific year, each subject is viewed as a polytomous item (characterised by a set of difficulty parameters) in a test, and the grade awarded to an individual candidate (characterised by an ability parameter) in the subject is treated as a score on an item. Scores (grades) on subjects not taken by the candidate are treated as missing. All subjects contained in the analysis form a test. A mathematical function is used to describe the probability of a candidate (with a certain level of ability) succeeding on an item (with a certain level of difficulty).

The difficulty measures of the subjects and ability measures of the candidates are then estimated at the same time and are placed on the same measurement scale. Consistency in subject grade difficulties between 2019 and 2020 can then be examined. Details of how Rasch modelling has been used to study inter-subject comparability in GCSEs and A levels can be found in Coe (2008), Coe, Searle, Barmby, Jones and Higgins (2008), and He, Stockford and Meadows (2018).

The various relationships for GCSE and A level subjects between 2018 and 2019 were also used as a basis for comparing the relationships between 2019 and 2020 with respect to calculated grades, CAGs and the final grades.

In the present study, the focus of analysis is on comparability at grades 4, 7 and 9 between GCSE subjects and grades C, A and A* between A level subjects.

3. Results and discussion

This section discusses results from the analysis. Results for GCSEs are presented first, followed by results for A levels.

3.1 GCSE Subjects

3.1.1 Impact based on relationship with attainment at KS2

Figure 1 shows the relationship between candidates' mean GCSE grade and normalised KS2 score in 2019 and the relationships in 2020 based on calculated grades, centre assessed grades and the final awarded grades for GCSE subjects from 2019 and 2020. While the slopes of the regression lines are similar across the four graphs, the intercepts for 2020 are higher than the intercept for 2019.

This suggests relatively uniform increases in GCSE grade outcomes across the range of KS2 scores from 2019 to 2020 if it is assumed that KS2 scores are comparable between 2019 and 2020 and that the distributions of KS2 scores are similar in both years.

There would be about a tenth of a grade increase in mean GCSE grade across the subjects based on calculated grades and over two-fifths of a grade based on CAGs. There was about half of a grade increase in mean GCSE grade in the final awarded grades in 2020 compared with the grades awarded in 2019.

The increase in the final grade outcomes in 2020 is slightly higher than the increase estimated based on CAGs and substantially higher than the increase estimated using calculated grades. This is expected, as for the vast majority of the candidates, their final grades are the same as their centre assessment grades.

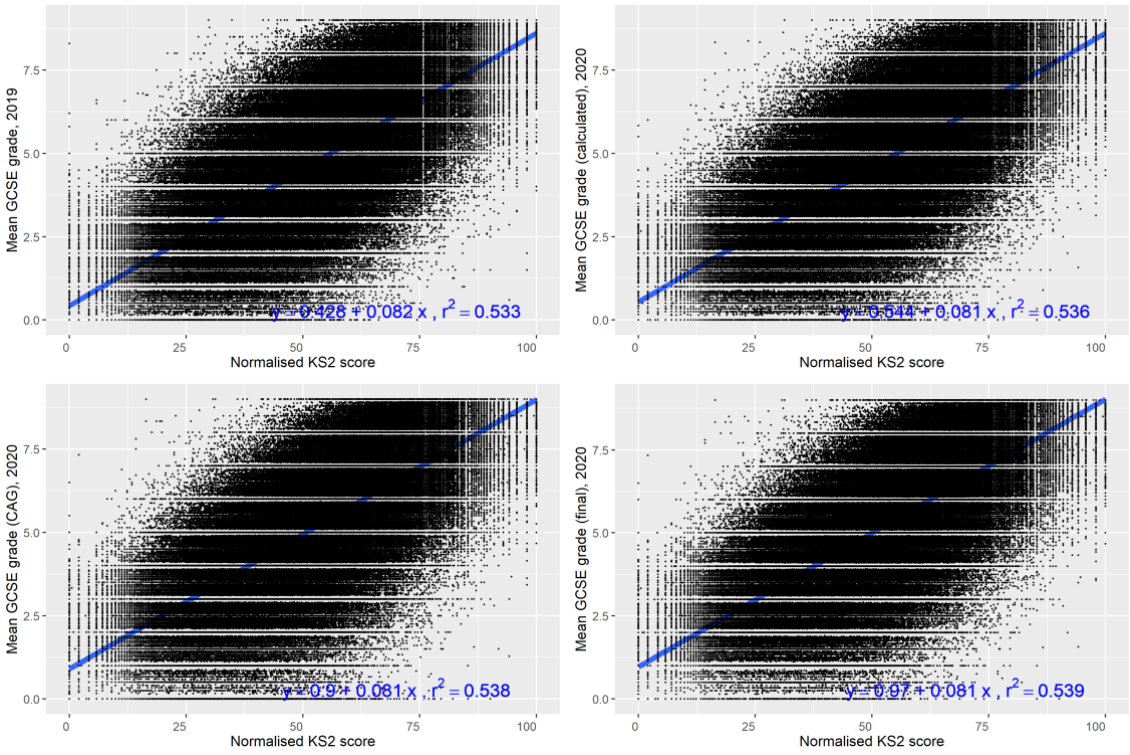

Figure 1 Relationship between candidates' mean GCSE grade and normalised KS2 score in 2019 (top-left) and the relationships in 2020 based on calculated grades (top-right), centre assessed grades (bottom-left) and the final awarded grades (bottom-right) for GCSE subjects from 2019 and 2020.

The graphs in Figure 2 compare population weighted mean grade (WMG) between 2019 and 2020 across the subjects analysed. In the top graph, the subjects are

arranged in descending order based on their weighted mean grades in 2019 (i.e. subjects in the right are more difficult than those in the left in 2019).

As is clear from these graphs, subject weighted mean grades in 2020 are higher than in 2019, particularly so for estimates derived using CAGs or the final grades. WMGs estimated based on the final grades are closely similar to those estimated using CAGs. To a large extent, these graphs are a reflection of those shown in Figure 1 at individual subject level.

The WMGs estimated based on calculated grades for the subjects in 2020 are more consistent with those in 2019 than the WMGs estimated based on CAGs or the final grades.

Further comparison between the WMGs estimated based on calculated grades, CAGs and the final grades indicates that there is a degree of inconsistency in the WMGs across the subjects between calculated grades and CAGs or the final grades (see Figure A1 in Appendix A). WMGs estimated using CAGs and the final grades are highly consistent across the subjects.

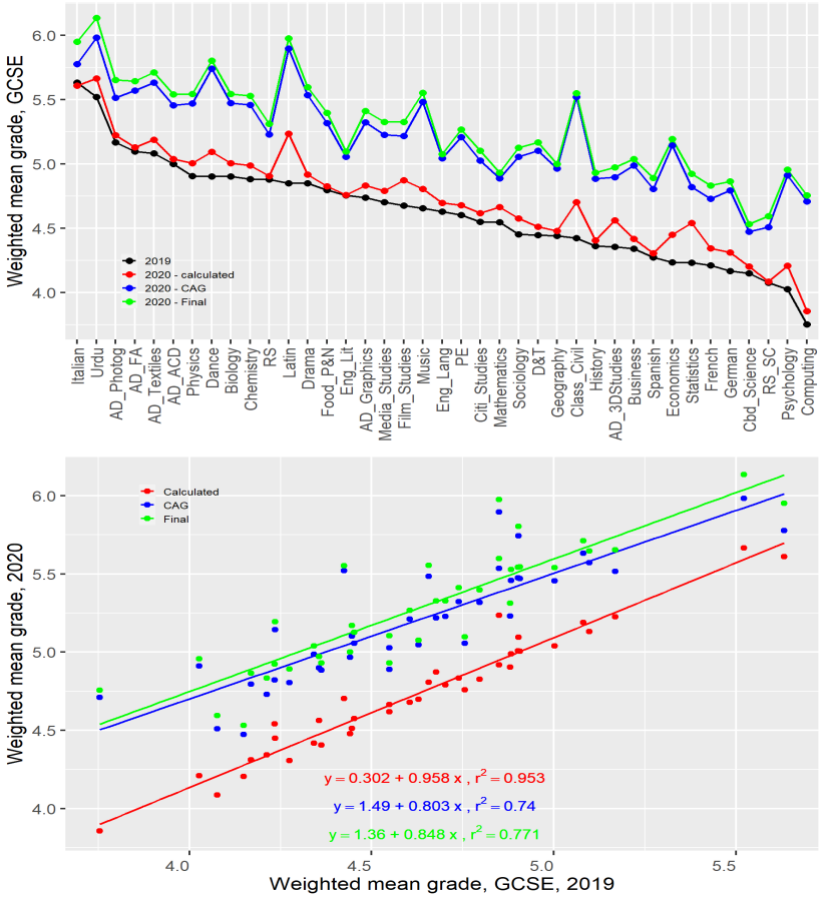

Figure 2 Comparison of weighted mean grades in GCSE subjects between 2019 and 2020. The subjects are arranged in descending order based on their weighted mean grades in 2019 in the top graph.

Figure 3 further compares changes in subject WMGs between 2020 and 2019 (again subjects are arranged in descending order based on their weighted mean grades in 2019. See also Table B1 in Appendix B).

Increase in population WMG based on the final grades in 2020 relative to 2019 varies from 0.31 for Italian to 1.13 for classical civilisation. Latin, classical civilisation and computer science had the largest increases in their population WMGs, whereas subjects such as English literature, mathematics, religious studies and combined science had the smallest increases. Changes estimated using calculated grades in 2020 are substantially smaller than those estimated based on CAGs or the final grades.

Further, changes in WMGs across the subjects based on calculated grades are not consistent with those based on CAGs or the final grades (see Figure A2 in Appendix A). As expected, changes in WMGs between the subjects based on CAGs are highly consistent with those based on the final grades. The range of changes in WMGs based on calculated grades is notably narrower than that based on CAGs or the final grades (see the bottom graph in Figure 3).

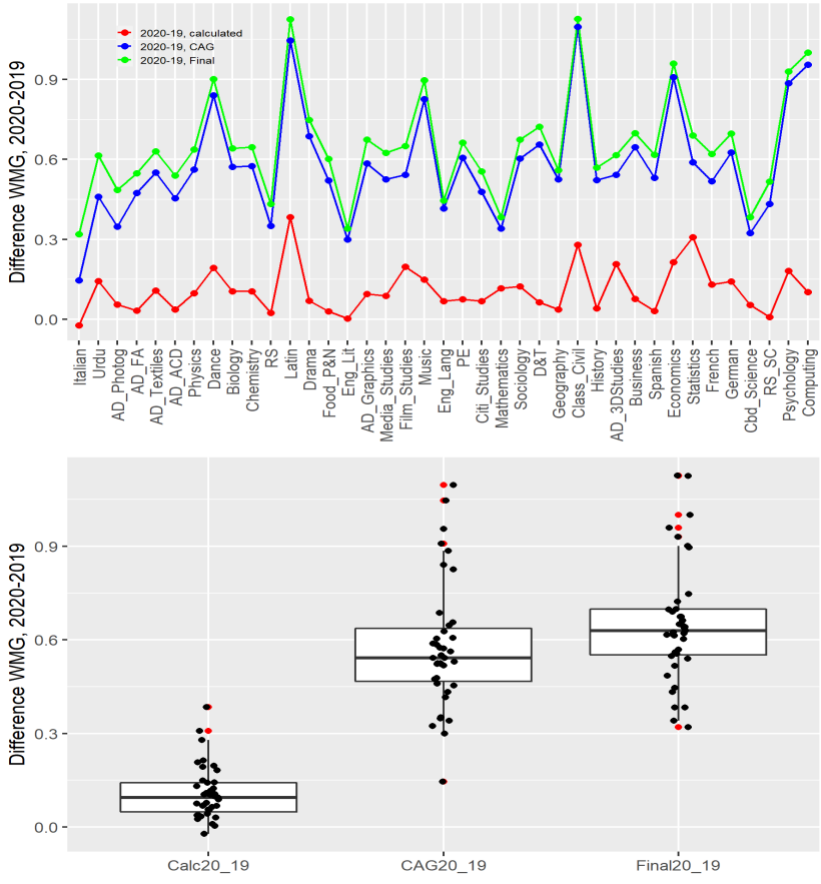

Figure 3 Comparison of changes in population weighted mean grades in GCSE subjects from 2019 to 2020 estimated based on calculated grades, CAGs and the final grades. The subjects are arranged in descending order based on their weighted mean grades in 2019 in the top graph.

Figure 4 compares correlations between subject grades and normalised KS2 scores in 2019 and 2020 (Also see Table B2 in Appendix B). Correlations based on calculated grades, CAGs and the final grades in 2020 are highly consistent with the correlations in 2019, with r^2 over 0.95. We noticed that correlations in 2020 based on CAGs and the final grades are closely similar and are slightly higher than those based on calculated grades.

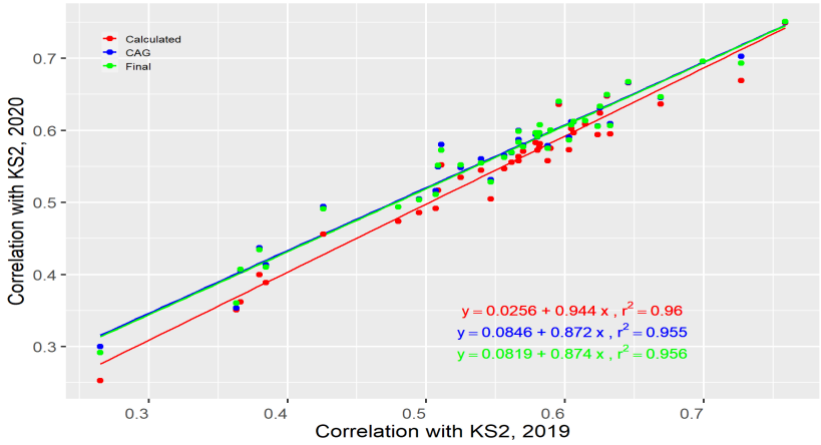

Figure 4 Comparisons of correlations between subject grades and normalised KS2 scores for GCSE subjects in 2019 and 2020.

Figure 5 compares inter-subject correlations between 2019 and 2020 (only subjects with entries greater than 10,000 were included - a total of 28 subjects). The inter-subject correlations for a selection of subjects are listed in Table B3 in Appendix B.

These correlations are again highly consistent between the two years, with r^2 over 0.83. Similar to correlations with KS2 scores, inter-subject correlations in 2020 based on CAGs and the final grades are closely similar and are slightly higher than those based on calculated grades. This probably reflects the assignment of grades to cognate subjects simultaneously by school teachers which would likely increase correlations between cognate subjects.

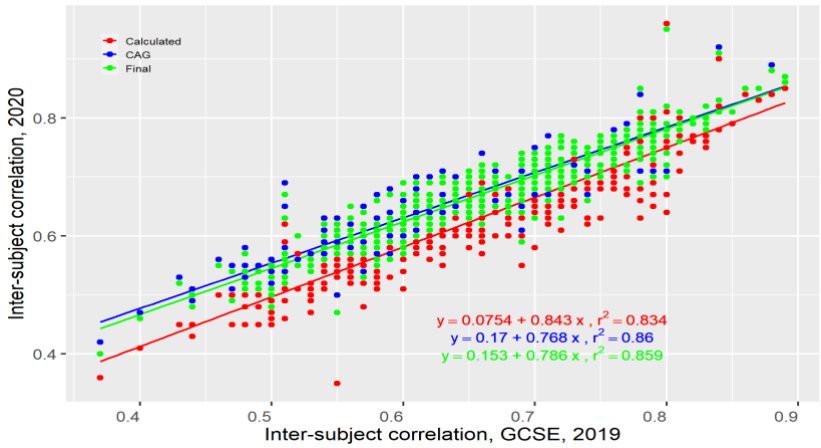

Figure 5 Comparison of inter-subject correlations for GCSE subjects between 2019 and 2020.

3.1.2 Impact based on Rasch modelling

Figure 6 depicts mean difficulties and difficulties at grades 4, 7 and 9 expressed in logits estimated using the Rasch model for GCSE subjects analysed in 2019 and 2020 based on calculated grades, CAGs and the final grades. In each of the graphs in Figure 6, subjects are arranged according to their mean difficulty which was calculated as the mean of difficulties from grade 3 to grade 8. Subjects on the right are more difficult than subjects on the left in terms of average statistical difficulty. However, at individual grade level, the order of grade difficulty can be substantially different from that based on mean difficulty.

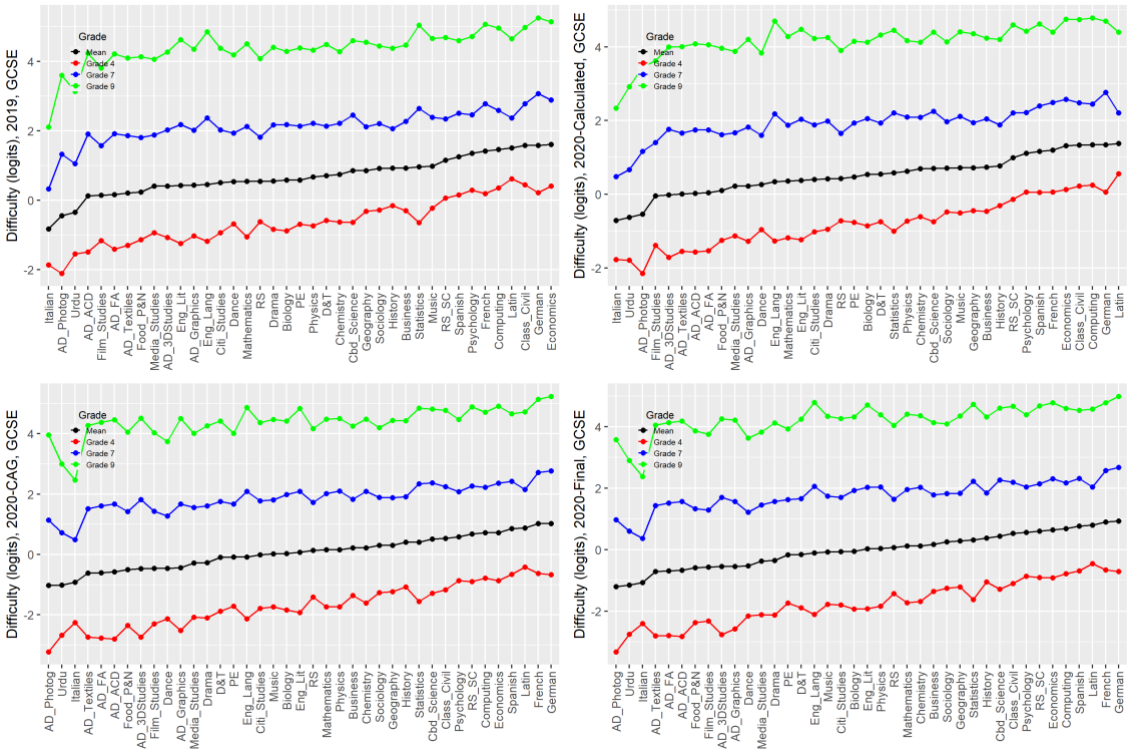

Figure 6 Relative mean difficulties and difficulties at grades 4, 7 and 9 expressed in logits for GCSE subjects from 2019 (top-left) and 2020 based on calculated grades (top-right), CAGs (bottom-left) and the final grades (bottom-right), estimated using the Rasch model. In each of the graphs, subjects are arranged according to their mean difficulty.

Comparison of grade difficulty distributions

To get a clearer understanding of how subject mean difficulty and difficulties at individual grades vary between 2019 and 2020 based on calculated grades, CAGs and the final awarded grades, Figure 7 compares mean grade difficulty and difficulties at grades 4, 7 and 9 between the subjects in 2019 and 2020. In each of the graphs, the subjects are arranged in order of difficulty in 2019. If it is assumed that the ability distributions of the candidates included in the analysis are similar in 2019 and 2020, the difficulties between 2019 and 2020 can be compared directly when the average ability of candidates was set to zero and the unit of logits is used.

As is clear from the graphs, the subjects are generally more leniently graded in 2020 than in 2019 except for some subjects at grade 9 based on CAGs. This is particularly so at grade 4 when judged by difficulties estimated using CAGs or the final awarded grades. Grade difficulties estimated based on CAGs are very slightly higher than those estimated using the final grades, particularly at grade 9.

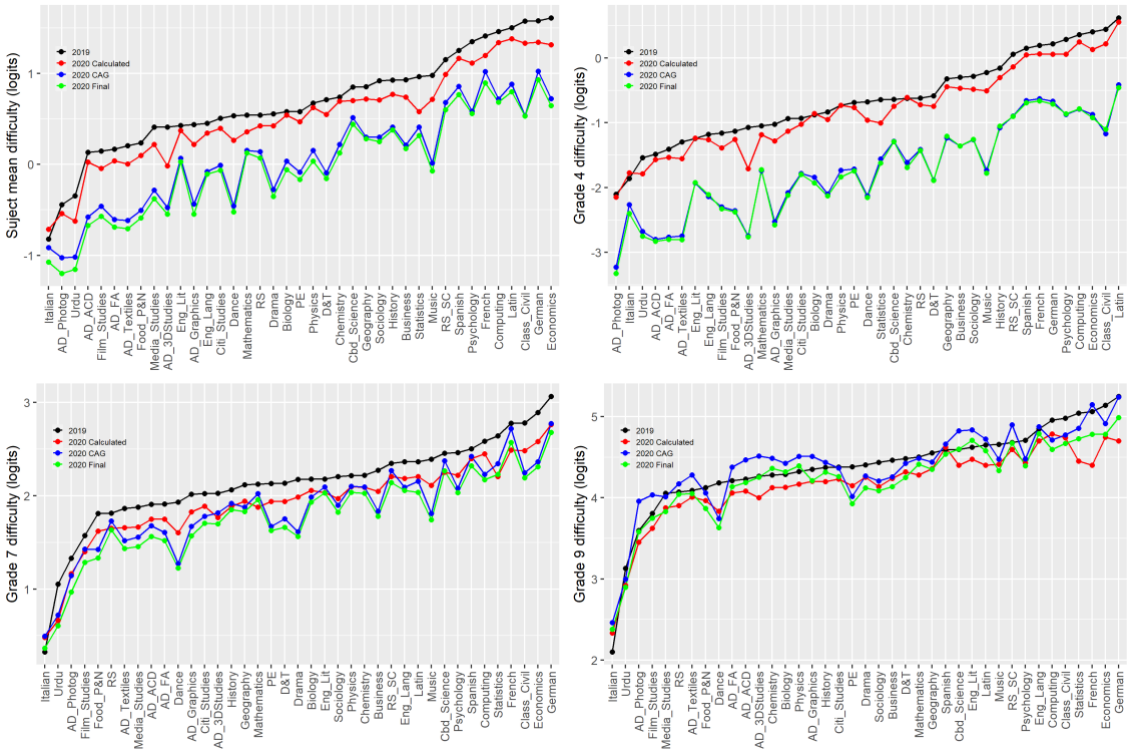

Figure 7 Comparison of mean difficulty (top-left) and difficulties at grades 4 (top-right), 7 (bottom-left) and 9 (bottom-right) for GCSE subjects from 2019 and 2020 estimated using the Rasch model. Subjects are arranged in order of difficulty in 2019.

It is noticed that in Figure 7, counterintuitively, for some of the subjects, the difficulties at grade 9 estimated using the final grades in 2020 were slightly higher than those estimated using calculated grades. This is to some extent a statistical artefact from differences in subject grade distributions between calculated grades and the final grades. For some subjects, there would be relatively larger proportions of candidates receiving good grades lower than 9 as their final grades (for example, grade 4 to grade 8) in comparison with the grade distributions based on calculated grades. This would likely make it relatively statistically harder to obtain higher grades (for example, grade 9) in those subjects based on the final grades. This is also probably why subject difficulties at grade 9 based on CAGs were generally higher than the difficulty estimates based on calculated grades or the final grades.

To see how consistent subject grade difficulty orders are between 2019 and 2020, the scatter plots in Figure 8 further compare grade difficulties between 2019 and 2020 based on calculate grades, CAGs and the final grades.

The difficulties between the two years are highly correlated, with r^2 over 0.94 based on calculated grades and over 0.85 based on CAGs or the final grades, suggesting fairly consistent ordering of subject difficulties between the two years. That is, subjects which are easy (or difficult) in 2019 are also generally easy (or difficult) in 2020.

Further, correlations between grade difficulties based on calculated grades in 2020 and grade difficulties in 2019 are slightly stronger than those based on CAGs or the final grades, suggesting that relative grade difficulties between the subjects estimated using calculated grades are slightly more consistent with the difficulties estimated for 2019 than those estimated using CAGs or the final grades.

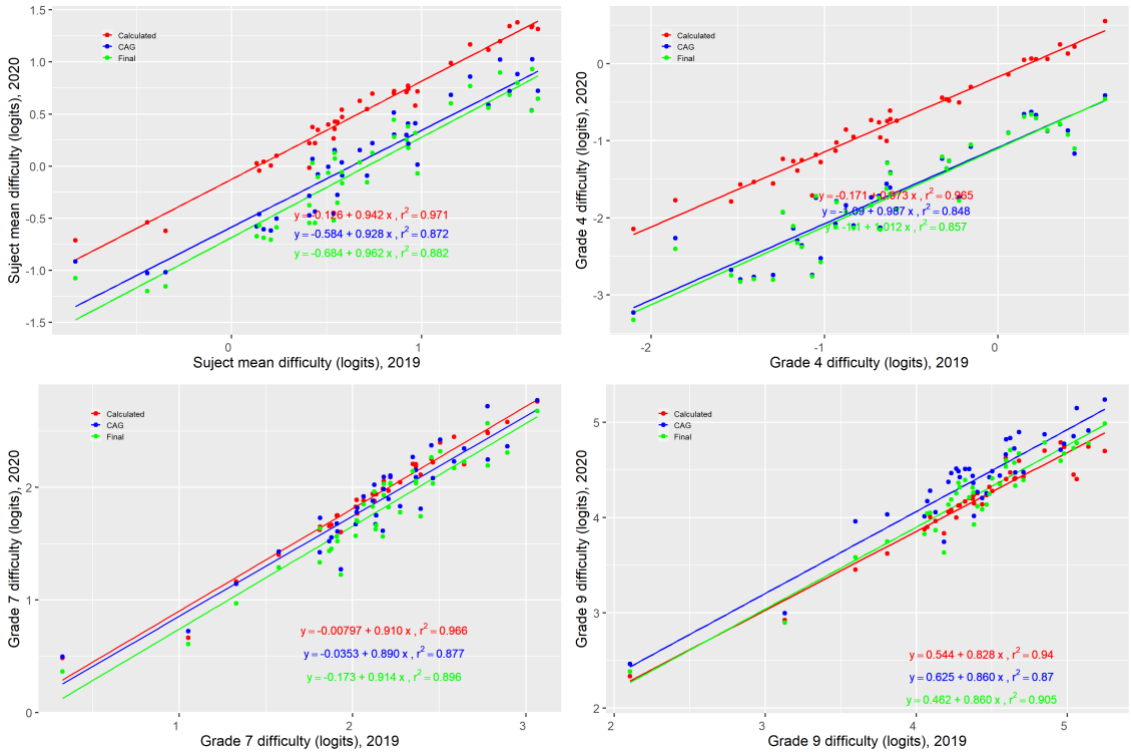

Figure 8 Correlations in grade difficulties derived using the Rasch model between 2020 and 2019 based on calculated grades, CAGs and the final grades.

Figure 9 further illustrates the distributions of mean difficulty and difficulties at grades 4, 7 and 9 for the GCSE subjects in 2019 and 2020. To make the comparison more meaningful, the difficulty unit logits was converted to gradewidth (GW) unit - the average gap in grade difficulty in logits between grade 8 and grade 3 is equivalent to one GW. When producing these plots, the original difficulty of a subject at a grade was subtracted by the mean difficulty of all subjects at that grade. This makes it easier to compare relative difficulties between the subjects at different grades.

Table 3 further shows the range and standard deviation of grade difficulties of the subjects in 2019 and 2020. It is clear from Figure 9 and Table 3 that the 2020 relative grade difficulties (in GW unit) between the subjects have been reduced in

terms of both range and standard deviation compared with the grade difficulties estimated for 2019.

Further, the distributions of relative grade difficulties (in GW unit) between the subjects estimated based on CAGs and the final awarded grades are similar and noticeably narrower than the difficulty distribution estimated using calculated grades.

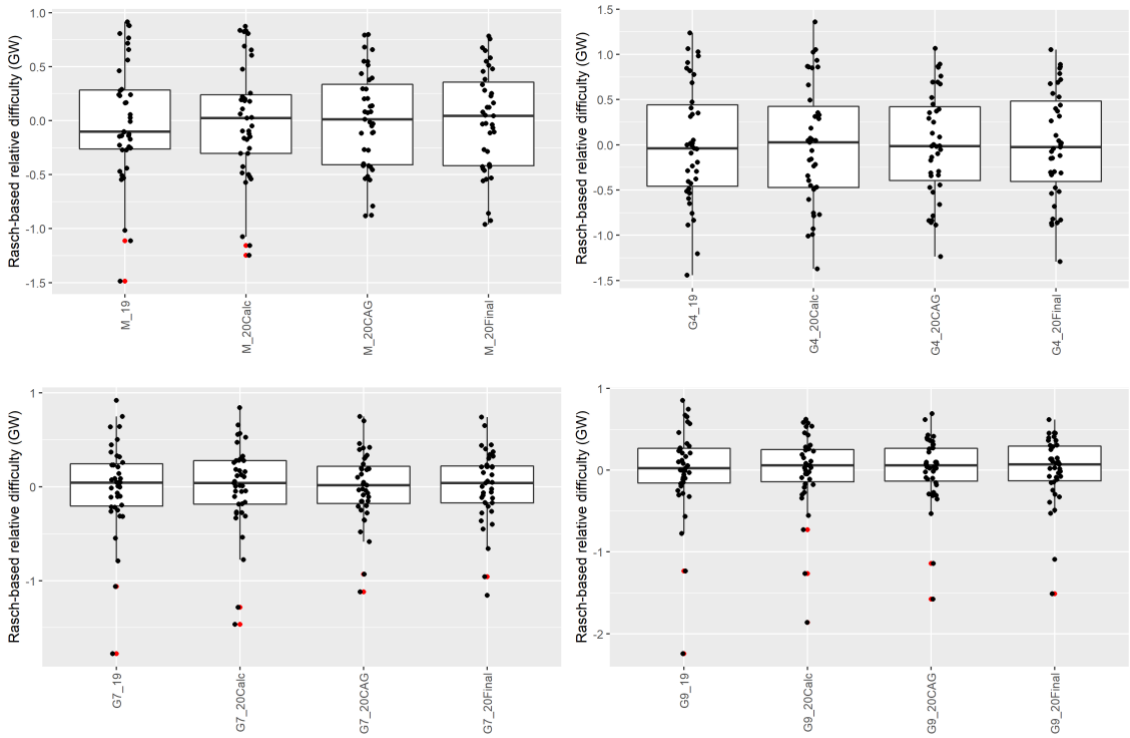

Figure 9 Comparison of distributions of mean difficulty (top-left) and difficulties at grades 4 (top-right), 7 (bottom-left) and 9 (bottom-right) between GCSE subjects in 2019 and 2020.

Table 3 Standard deviation and range of grade difficulties (in GW) for GCSE subjects in 2019 and 2020.

	SD (GW)			
	Mean	**G4**	**G7**	**G9**
19 Final	0.55	0.66	0.49	0.55
20 Calc	0.54	0.67	0.46	0.48
20 CAG	0.46	0.59	0.38	0.42
20 Final	0.47	0.60	0.39	0.41
	Range (GW)			
	Mean	**G4**	**G7**	**G9**
19 Final	2.40	2.68	2.70	3.10
20 Calc	2.12	2.73	2.31	2.48
20 CAG	1.68	2.30	1.86	2.27
20 Final	1.74	2.34	1.89	2.13

Changes in grade difficulties from 2019 to 2020

To get a clearer understanding of how subject grade difficulties have changed from 2019 to 2020 and whether any changes are consistent across calculated grades, CAGs and the final grades, Figure 10 compares changes in grade difficulties in logits based on the different grades (Also see Table B4 in Appendix B).

Changes in grade difficulties of the subjects based on calculated grades are substantially smaller than those estimated based on CAGs and the final grades overall and at grade 4. At grade 7, changes based on calculated grades on average are slightly smaller than those based on CAGs or the final grades. At grade 9, changes based on calculated grades on average are similar to or slightly larger than those based on CAGs or the final grades.

At the overall subject level, average changes in difficulty between 2020 and 2019 are about 0.17 logits based on calculated grades and 0.71 logits based on the final grades. The average grade gap is about 1.01 logits in 2019 and 1.22 logits in 2020 based on final grades. This suggests that on average subjects in 2020 were about one-seventh of a grade and slightly less than three-fifths of a grade more leniently graded than in 2019 based on calculated grades and the final grades respectively. Similarly, subjects were graded about one-tenth of a grade and three-quarters of a grade in 2020 more leniently than in 2019 at grade 4 and about one-fifth of a grade and a third of a grade more leniently at grade 7. At grade 9, subjects were graded about one-tenth of a grade in 2020 more leniently than in 2019 based on calculated grades and the final grades.

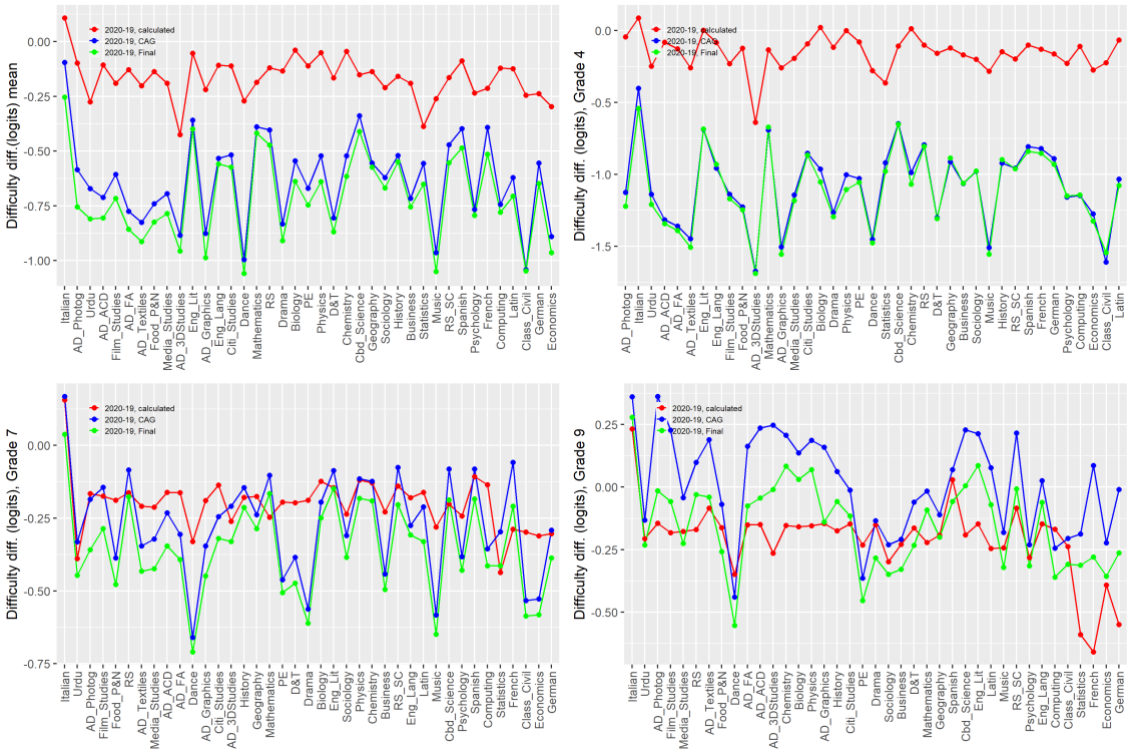

Figure 10 Comparison of changes in Rasch grade difficulties from 2019 to 2020 for GCSE subjects estimated based on calculated grades, CAGs and the final grades. Subjects are arranged in order of difficulty in 2019.

At grade 4, 3D studies and statistics show the largest changes in difficulty from 2019 to 2020 based on calculated grades, while Italian, English literature, biology, physics and chemistry show the smallest changes. However, based on CAGs or the final grades, Italian, English literature, mathematics, religious studies and combined science show the smallest changes in difficulty, whereas 3D studies, graphics, dance, music and classical civilisation show the largest changes.

At grade 7, Urdu, dance and statistics show the largest decreases in difficulty based on calculated grades, whereas Spanish, computer science, biology, physics, chemistry, and citizenship studies are among the subjects with the smallest changes. Based on CAGs or the final grades, dance, drama, music, classical civilisation and economics show the largest decrease in difficulty, while religious studies (including short course), mathematics, English literature, biology, physics, chemistry, combined science, French and Spanish are among the subjects with the smallest changes in difficulty.

At grade 9, based on calculated grades, Spanish showed the smallest changes in grade difficulty from 2019 to 2020, whereas statistics, economics, French and German show the largest decreases in grade difficulty. Based on the final grades, Italian, English literature, biology, chemistry and physics are among the subjects with smallest changes in difficulty, while dance, physical education, computer science, sociology and economics are among those with the largest changes.

To examine how subject grade difficulties have changed from 2019 to 2020 based on difficulties derived using calculated grades, CAGs and the final grades separately, Figure 11 shows distributions of changes in difficulty at grades 4, 7 and 9 and at the overall subject level for the GCSE subjects from 2019 and 2020 (also see Table B5 in Appendix B). In Figure 11, the subjects are arranged in descending order of mean difficulty in 2020. It is clear from the graphs that for the different types of grades, there is substantial variability in changes in grade difficulties between the subjects.

There is substantial variability in changes in grade difficulty from 2019 to 2020 both between subjects and within the same subject. Grade difficulties based on calculated grades show the smallest within-subject variability. Further, while there seems no apparent systematic difference in difficulty changes between individual grades across the subjects based on calculated grades, changes in difficulty at grades 4 and 7, particularly at grade 4, are considerably larger than at grade 9 based on CAGs or the final grades. The variability in difficulty at grade 4 between the subjects also appears to be substantially larger than at the other grades.

For difficulties estimated using calculated grades, 3D studies, French and German had the largest variation in changes in grade difficulty within the same subject, whereas music, history, psychology, media studies and some others showed the smallest variability. Based on the final grades, Italian, German, combined science, and statistics are among the subjects with the smallest within-subject variability in difficulty changes, whereas textile design, 3D studies, classical civilisation and music are among the subjects with the largest within-subject variability.

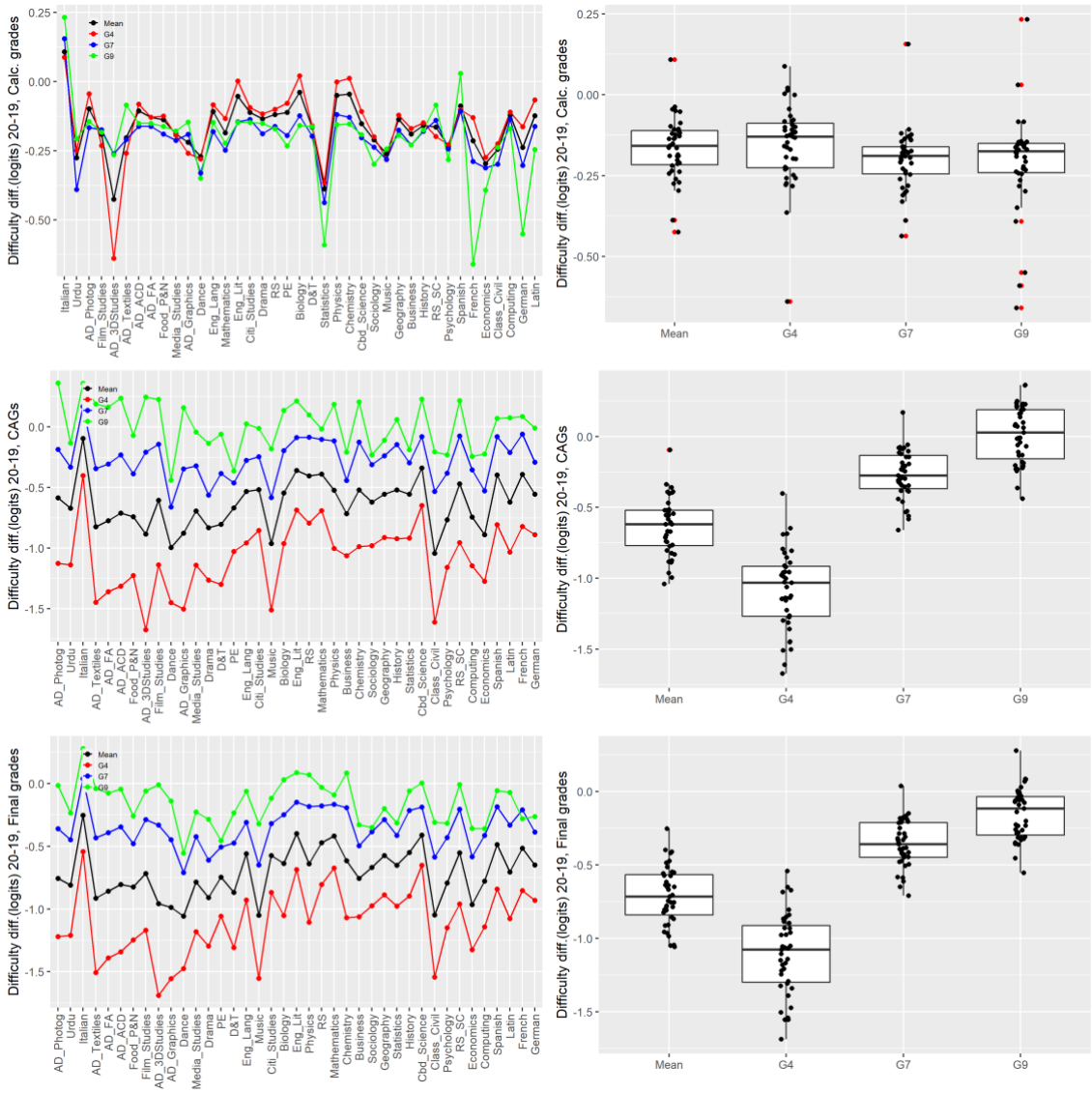

Figure 11 Changes in Rasch grade difficulties from 2019 to 2020 for GCSE subjects estimated based on calculated grades (top), CAGs (middle) and the final grades (bottom). The subjects are arranged in descending order of mean difficulty in 2020.

Further analysis of changes in grade difficulty from 2019 to 2020 for the subjects based on the different grades in 2020 suggests that changes based on CAGs and the final grades are highly consistent between the subjects but are considerably different from those estimated using calculated grades (see Figure A3, Appendix A).

Changes in grade difficulty rank order positions from 2019 to 2020

To examine how the positions in relative grade difficulties between the subjects based on calculated grades, CAGs and the final grades are changed in 2020 in relation to their positions in 2019, the subjects were rank-ordered based on their difficulties at the overall subject level and at grades 4, 7 and 9 respectively.

The rank orders of the subjects in 2020 were then compared with their rank orders in 2019 for consistency in difficulty order, which is shown in Figure 12. The difficulty rank orders in 2020 estimated based on calculated grades are more consistent with those estimated in 2019 than the difficulty orders estimated using CAGs or the final grades.

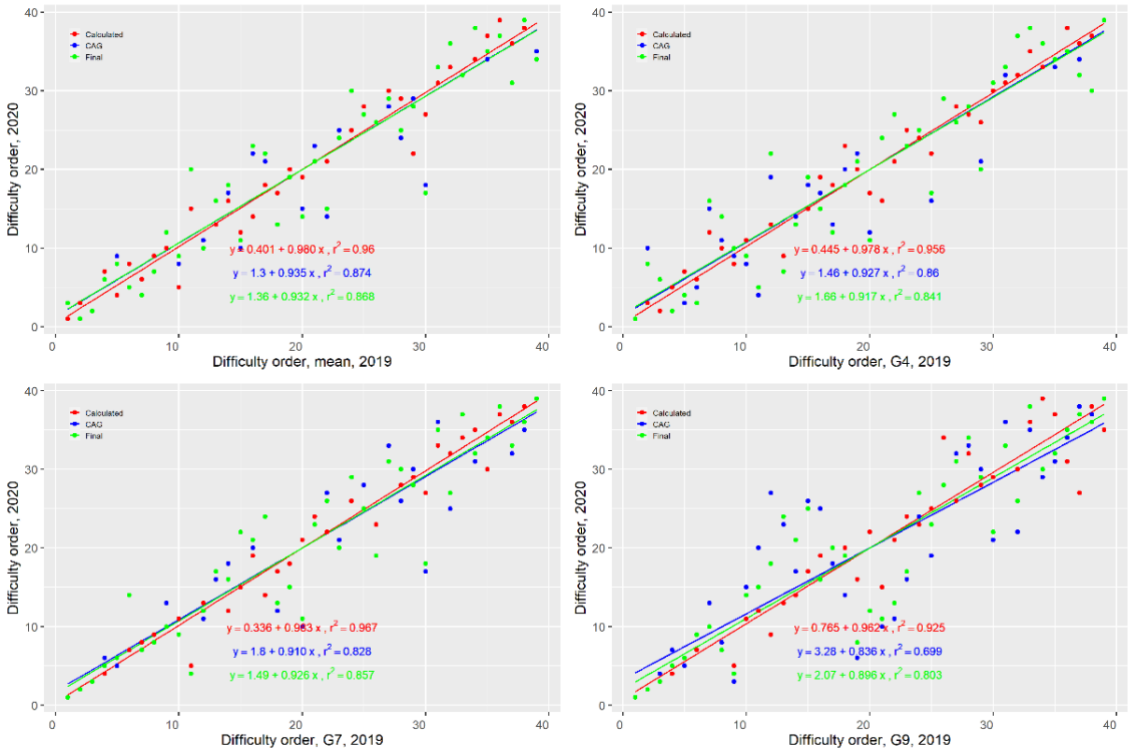

Figure 12 Comparison of subject difficulty orders between 2019 and 2020: mean difficulty (top-left), difficulties at grade 4 (top-right), grade 7 (bottom-left) and grade 9 (bottom-right).

To look at how difficulty orders of individual subjects are affected in more detail, the number of changes in difficulty rank order positions in 2020 relative to those in 2019 for each subject at the overall subject level and at grades 4, 7 and 9 were also calculated.

Figure 13 shows the distributions of changes in difficulty order positions in the subjects between 2020 and 2019. Table 4 further details the changes for individual subjects. It is clear from Figure 13 that changes in difficulty orders from 2019 to 2020 based on calculated grades are substantially smaller than those estimated based on CAGs and the final grades at the overall subject level and also at individual grades.

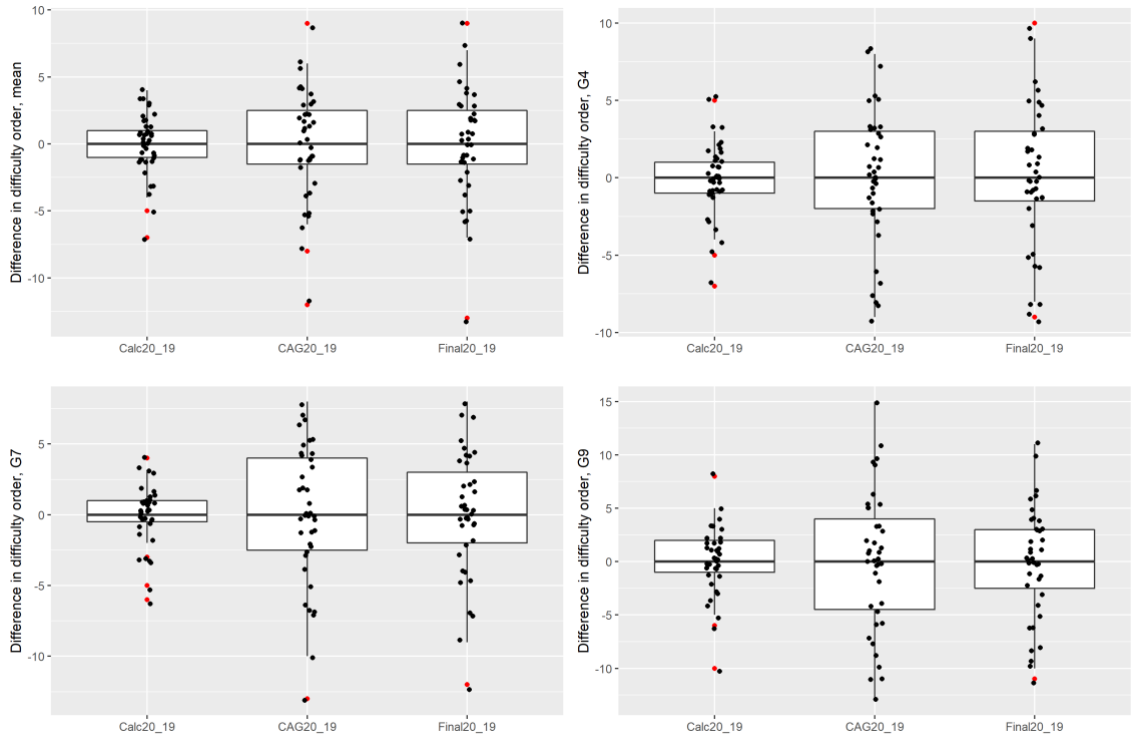

Figure 13 Distributions of changes in difficulty rank order positions in GCSE subjects from 2019 and 2020.

Table 4 Changes in difficulty rank order positions in GCSE subjects from 2019 and 2020*.

Subject	Mean				Subject	G4				Subject	G7				Subject	G9			
	Order in 19	Change				Order in 19	Change				Order in 19	Change				Order in 19	Change		
		Calc	CAG	Final			Calc	CAG	Final			Calc	CAG	Final			Calc	CAG	Final
Italian	1	0	2	2	AD_Photog	1	0	0	0	Italian	1	0	0	0	Italian	1	0	0	0
AD_Photog	2	1	-1	-1	Italian	2	1	8	6	Urdu	2	0	0	0	Urdu	2	0	0	0
Urdu	3	-1	-1	-1	Urdu	3	-1	3	3	AD_Photog	3	0	0	0	AD_Photog	3	0	1	0
AD_ACD	4	3	2	2	AD_ACD	4	1	-2	-2	Film_Studies	4	0	2	1	Film_Studies	4	0	3	1
Film_Studies	5	-1	4	3	AD_FA	5	2	-2	-1	Food_P&N	5	1	0	1	Media_Stud.	5	1	0	1
AD_FA	6	2	-1	-1	AD_Textiles	6	0	-1	-3	RS	6	1	8	8	RS	6	1	3	3
AD_Textiles	7	-1	-3	-3	Eng_Lit	7	5	8	9	AD_Textiles	7	1	0	0	AD_Textiles	7	3	6	3
Food_P&N	8	1	-1	-1	Eng_Lang	8	2	3	6	Media_Stud.	8	1	0	0	Food_P&N	8	0	0	-1
Media_Stud.	9	1	3	3	Film_Studies	9	-1	0	1	AD_ACD	9	1	4	1	Dance	9	-4	-6	-5
AD_3DStud.	10	-5	-2	-1	Food_P&N	10	1	-2	-1	AD_FA	10	1	-1	-1	AD_FA	10	1	5	4
Eng_Lit	11	4	9	9	AD_3DStud.	11	-7	-7	-6	Dance	11	-6	-7	-7	AD_ACD	11	1	9	4
AD_Graph.	12	-1	-1	-2	Mathematics	12	1	7	10	AD_Graph.	12	1	-1	0	AD_3DStud.	12	-3	15	6
Eng_Lang	13	0	3	3	AD_Graph.	13	-4	-6	-6	Citi_Studies	13	3	3	4	Chemistry	13	0	10	11
Citi_Studies	14	2	3	4	Media_Stud.	14	0	0	-1	AD_3DStud.	14	-2	4	2	Biology	14	0	3	7
Dance	15	-3	-5	-4	Citi_Studies	15	0	3	4	History	15	0	7	7	Physics	15	2	11	10
Mathematics	16	-2	6	7	Biology	16	3	1	-1	Geography	16	3	4	5	AD_Graph.	16	3	9	0
RS	17	1	4	5	Drama	17	1	-4	-5	Mathematics	17	-3	7	7	History	17	1	1	3
Drama	18	-1	-5	-5	Physics	18	5	2	0	PE	18	-1	-6	-5	Citi_Studies	18	2	-4	1
Biology	19	1	0	0	PE	19	1	3	2	D&T	19	-1	-4	-4	PE	19	-3	-13	-11
PE	20	-1	-5	-6	Dance	20	-3	-8	-9	Drama	20	1	-10	-9	Drama	20	2	-8	-8
Physics	21	2	2	0	Statistics	21	-5	3	3	Biology	21	3	2	2	Sociology	21	-6	-11	-10
D&T	22	-1	-8	-7	Cbd_Sci.	22	-1	5	5	Eng_Lit	22	0	5	4	Business	22	-1	-11	-9
Chemistry	23	1	2	1	Chemistry	23	2	0	0	Sociology	23	-3	-2	-3	D&T	23	1	-7	-6
Cbd_Sci.	24	1	6	6	RS	24	0	1	1	Physics	24	2	5	5	Mathematics	24	-1	0	3
Geography	25	3	2	2	D&T	25	-3	-9	-8	Chemistry	25	0	3	0	Geography	25	0	-6	-2
Sociology	26	0	0	0	Geography	26	3	3	3	Business	26	-3	-7	-7	Spanish	26	8	2	2
History	27	3	1	2	Business	27	1	-1	-1	RS_SC	27	4	6	4	Cbd_Sci.	27	-1	5	4
Business	28	1	-4	-3	Sociology	28	-1	0	0	Eng_Lang	28	0	-2	2	Eng_Lit	28	4	5	6
Statistics	29	-7	0	-1	Music	29	-3	-8	-9	Latin	29	0	1	-1	Latin	29	-1	1	0
Music	30	-3	-12	-13	History	30	0	1	1	Music	30	-3	-13	-12	Music	30	-1	-9	-8
RS_SC	31	0	2	2	RS_SC	31	0	1	2	Cbd_Sci.	31	2	5	4	RS_SC	31	2	5	2
Spanish	32	1	4	4	Spanish	32	0	5	5	Psychology	32	0	-7	-5	Psychology	32	-2	-10	-6
Psychology	33	-1	-1	-1	French	33	2	5	5	Spanish	33	1	4	4	Eng_Lang	33	3	2	5
French	34	0	4	4	German	34	-1	2	2	Computing	34	1	-3	-2	Computing	34	5	-5	-4
Computing	35	2	-1	0	Psychology	35	-1	-2	-1	Statistics	35	-5	-1	-1	Class_Civil	35	2	-4	-3
Latin	36	3	1	1	Computing	36	2	-1	-1	French	36	1	2	2	Statistics	36	-5	-2	-1
Class_Civil	37	-1	-6	-6	Economics	37	-1	-3	-5	Class_Civil	37	-1	-5	-4	French	37	-10	1	0
German	38	0	1	1	Class_Civil	38	-1	-8	-8	Economics	38	0	-3	-2	Economics	38	0	-1	-2
Economics	39	-4	-4	-5	Latin	39	0	0	0	German	39	0	0	0	German	39	-4	0	0
Total changes		**66**	**122**	**122**	**Total changes**		**66**	**128**	**136**	**Total changes**		**56**	**144**	**126**	**Total changes**		**84**	**194**	**152**

* At the overall subject level and at grades 4, 7 and 9, the subjects are arranged in ascending order of difficulty in 2019 (1 representing the easiest subject and 9 the hardest subject). Positive values mean increase in difficulty order and negative values decrease in difficulty order relative to 2019.

In Table 4, for a specific subject, positive values indicate increases in difficulty order from 2019 to 2020 whereas negative values indicate decreases. Subjects with changes in difficulty positions greater than 5 are highlighted.

Changes at grade 9 are higher than changes at the other grades. At the overall subject level, only Statistics changed its rank order position by 7 (becoming relatively easier in 2020 compared to other subjects) based on calculated grades.

However, based on CAGs and the final grades, English literature, mathematics and combined science have moved up in difficulty by 6 or more positions, whereas design & technology, classical civilisation and music moved down by 6 or more positions.

At grade 4, the difficulty order of Italian, English literature, English language and mathematics moved up by 6 positions or more, whereas 3D studies, graphics, dance, music, design & technology and classical civilisation moved down by 6 or more based on the final awarded grades.

At grade 7, difficulty positions of religious studies, history and mathematics moved up by 6 or more based on CAGs and the final grades, while dance, drama and music moved down by 7 or more in their difficulty order.

At grade 9, 3D studies, chemistry and physics moved up by 6 positions or more in their difficulty order, whereas physical education, drama, sociology, business, design & technology, music and psychology moved down by 6 or more based on CAGs and the final grades.

Total changes in difficulty positions in the subjects based on calculated grades are substantially smaller than those estimated based on CAGs and the final grades at the overall subject level and at individual grades.

Differences in grade difficulties between calculated grades and CAGs in 2020

To see how calculated grades and CAGs impact on inter-subject comparability in 2020 differently, Figure 14 further shows differences between grade difficulties estimated based on CAGs and the difficulties estimated using calculated grades in 2020 (also see Table B6 in Appendix B). In Figure 14, the subjects are arranged in order of mean difficulty estimated for 2019.

Average differences in grade difficulty between CAGs and calculated grades across the subjects are about -0.47 logits (about one-third of a grade more lenient) overall and -0.93 logits (three-fifths of a grade more lenient) at grade 4, -0.07 logits (slightly less than one-tenth of a grade more lenient) at grade 7 and 0.22 logits (about one-seventh of a grade severer) at grade 9. It appears that there is similar level of variability in difficulty differences between the subjects at the overall subject level and at individual grades. Subjects such as classical civilisation, music, dance, graphics, fine art, and art, craft and design are among the subjects with the largest decreases in difficulty from calculated grades to CAGs, whereas English literature, mathematics, combined science, French, German and statistics show the smallest decreases in difficulty.

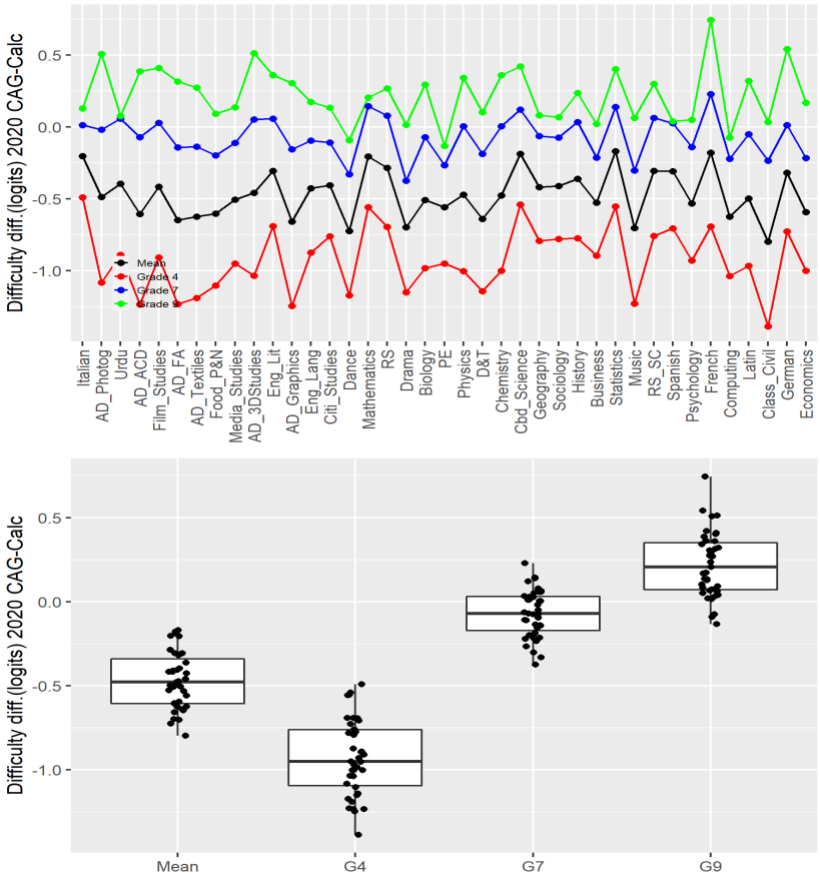

Figure 14 Differences between grade difficulties estimated based on CAGs and the grade difficulties estimated using calculated grades. Subjects are arranged in order of mean difficulty estimated for 2019.

3.1.3 Comparison with relationships between 2018 and 2019

Since letter grades were still being awarded for a considerable number of GCSE subjects in 2018, it is difficult to use the various relationships between 2018 and 2019 as a basis for comparing the relationships between 2019 and 2020. Nevertheless, some of the relationships between 2018 and 2019 were explored. The data from 2018 only contains 27 subjects (see Table 1). Table 5 shows the range and standard deviation of relative grade difficulties (in GW) for the 27 subjects analysed for both 2018 and 2019. These are relatively consistent between the two years.

Table 5 Standard deviation and range of relative grade difficulties (in GW) for GCSE subjects in 2018 and 2019.

	SD (GW)			
	Mean	**G4**	**G7**	**G9**
18 Final	0.50	0.68	0.33	0.33
19 Final	0.48	0.65	0.34	0.34
	Range (GW)			
18 Final	2.18	3.02	1.68	1.54
19 Final	2.03	2.72	1.74	1.65

Figure 15 shows differences in grade difficulties between 2019 and 2018 for the 27 GCSE subjects from the two years (subjects are arranged in order of mean difficulty in 2018). It is to be noted as the two sub-populations taking these subjects may not be directly comparable, and it may be only meaningful to compare the ranges of differences at a specific grade (the bottom graph in Figure 14).

The ranges of changes in grade difficulties shown in Figure 15 are generally smaller than the ranges of differences between the difficulty estimates from calculated grades in 2020 and the difficulty estimates from the final grades in 2019 and substantially smaller than those estimated based on CAGs or the final grades (see Figure 11). The distributions of differences in grade difficulties between 2020 and 2019 based on the final grades are also shown in the bottom graph of Figure 15.

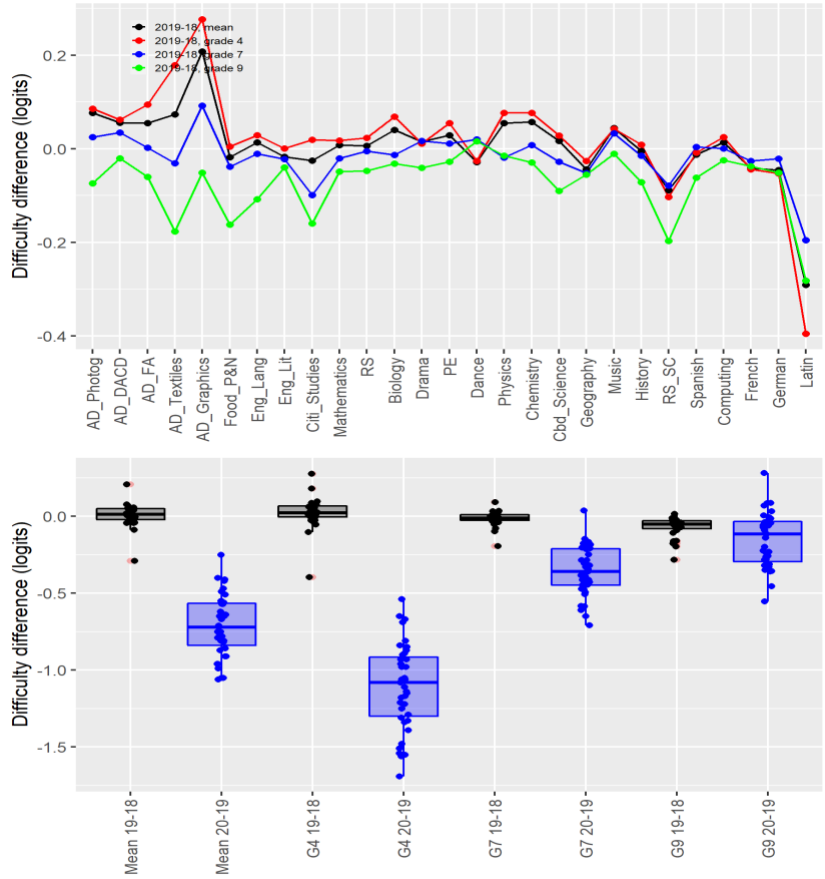

Figure 15 Differences in grade difficulties between 2019 and 2018 for the GCSE subjects from 2018 and 2019. Subjects are arranged in order of mean difficulty in 2018. The distributions of differences in grade difficulties between 2020 and 2019 based on the final grades are also shown in the bottom graph.

The top and middle graphs in Figure 16 further shows correlations between mean GCSE grades and normalised KS2 scores and inter-subject correlations (subjects with entries greater than 10,000 - a total of 23 subjects) between 2018 and 2019 for the GCSE subjects analysed; comparisons of relative grade difficulties between 2018 and 2019; comparison of difficulty rank orders; and the distributions of changes in difficulty rank order positions from 2018 to 2019. Changes of rank order positions for individual

subjects are listed in Table B7 in Appendix B. The various correlations in the various variables between 2018 and 2019 are similar or slightly more consistent than those between 2019 and 2020 seen above.

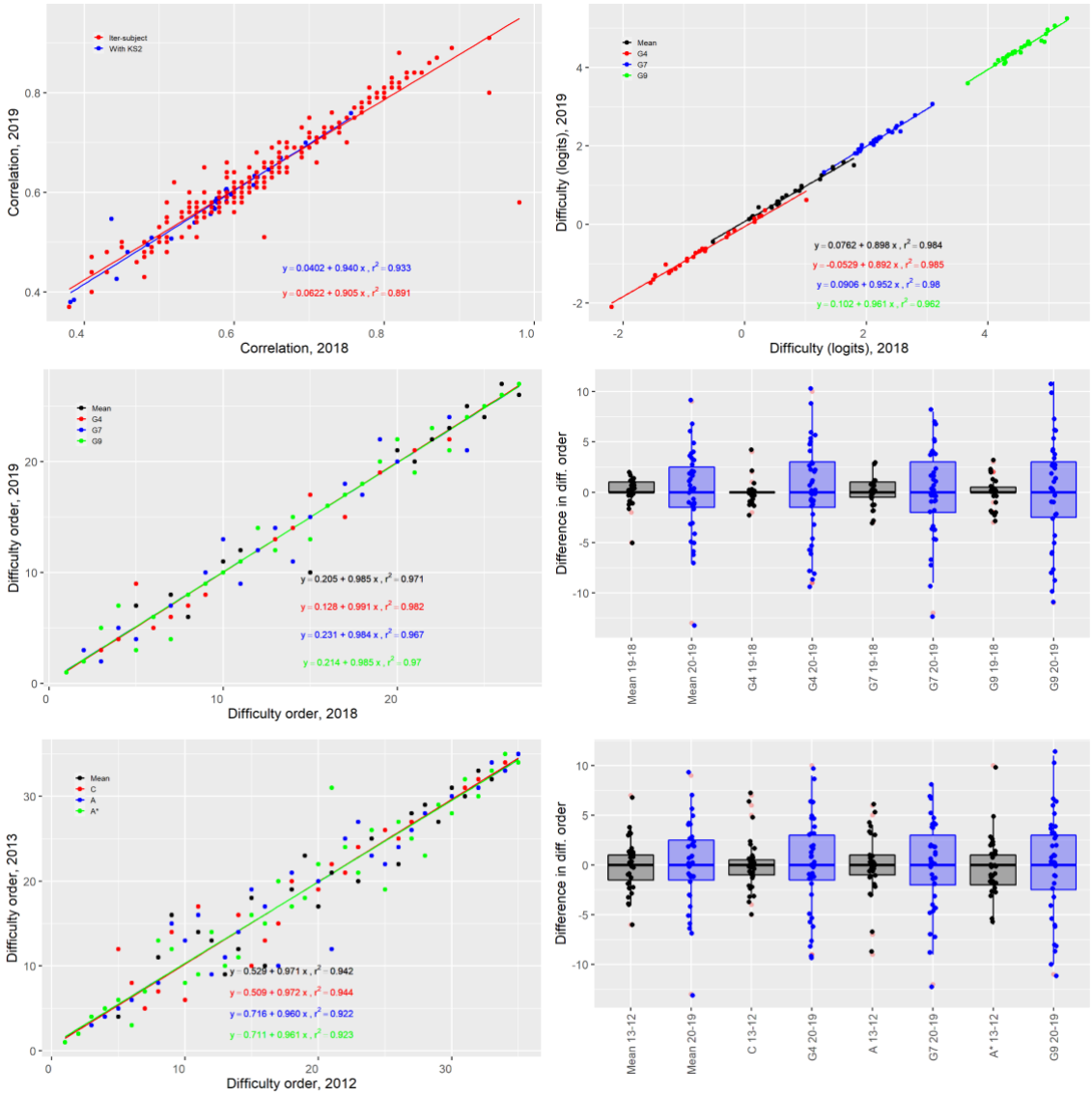

Figure 16 Correlations between mean GCSE grade and normalised KS2 scores and inter-subject correlations between 2018 and 2019 (top-left) for the GCSE subjects analysed; comparisons of grade difficulties between 2018 and 2019 (top-right); comparison of difficulty rank orders (middle-left); distributions of changes in difficulty rank order positions from 2018 to 2019 and those from 2019 to 2020 (middle-right) and comparison of difficulty rank orders (bottom-left) and distributions of changes in difficulty rank order positions from 2012 to 2013 and those from 2019 to 2020 (bottom-right).

The changes in difficulty rank order positions between 2018 and 2019 are also notably smaller than the changes between 2019 and 2020 estimated using calculated grades, CAGs and the final grades, realising that the number of subjects is substantially smaller

in 2018 than in 2019 and 2020 (see Figure 12). In the middle-right graphs in Figure 16, the distributions of changes in difficulty rank order positions at the overall subject level and at grades 4, 7 and 9 between 2020 and 2019 based on the final grades are also shown.

To make the comparison between changes in difficulty rank order positions more appropriately, the bottom graphs in Figure 16 compare difficulty rank orders at the overall subject level and at grades C, A and A* (used as surrogates for grades 4, 7 and 9 in reformed GCSEs) between 2012 and 2013 (a total of 35 GCSE subjects were included in the analysis) and the distributions of changes in difficulty rank order positions from 2012 to 2013 and those from 2019 to 2020 based on the final grades. Changes in difficulty rank order positions between 2012 and 2013 are also noticeably smaller than the changes between 2019 and 2020 based on the final grades.

For the majority of the subjects, the changes in difficulty order positions are within 2 from 2018 to 2019 and within 3 from 2012 to 2013, while these have increased to about 5 from 2019 to 2020. The average changes of difficulty order positions from 2018 to 2019 and from 2012 to 2013 per subject are about 0.8 and 1.77 overall, 0.5 at grade 4 and 1.54 at grade C, 1.0 at grade 7 and 1.77 at grade A, and 0.9 at grade 9 and 2.06 at A*, respectively. These are 3.1, 3.5, 3.2 and 3.9 respectively from 2019 to 2020 based on the final grades which are substantially larger than the values between 2018 and 2019 or the values between 2012 and 2013.

3.2 A level Subjects

3.2.1 Impact based on relationship with attainment at GCSE

Figure 17 shows the relationship between candidates' mean A level grade and normalised GCSE score in 2019 and the relationships in 2020 based on calculated grades, CAGs and the final awarded grades for A level subjects from 2019 and 2020.

As with the GCSE subjects, the slopes of the regression lines are similar across the four graphs, but the intercepts for 2020 are higher than the intercept for 2019. This also suggests relatively uniform increases in A level grade outcomes across the range of mean GCSE scores in 2020, if it can be assumed that mean GCSE scores are comparable between 2019 and 2020 and that the distributions of mean GCSE scores are similar in both years.

There would be slightly less than a tenth of a grade increase in mean A level grade in 2020 based on calculated grades and over half of a grade based on CAGs. There was over three-fifths of a grade increase in mean A level grade in the final awarded grades in 2020 compared with the grades awarded in 2019, which is higher than the increase estimated based on CAGs.

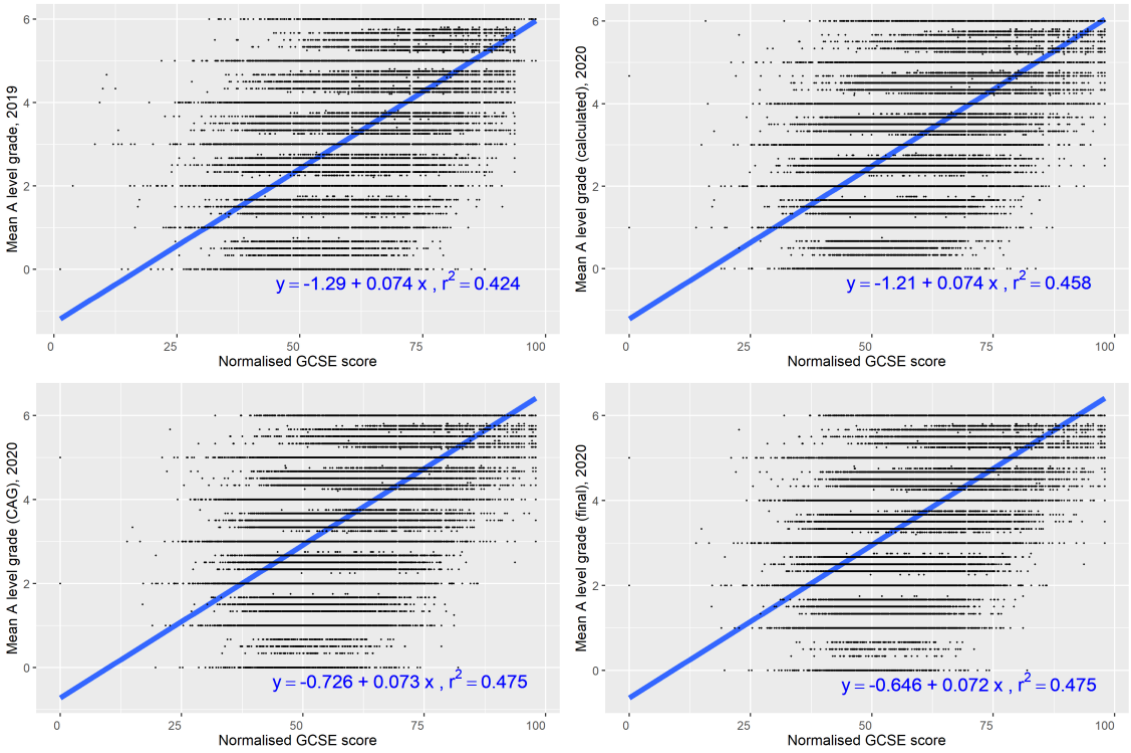

Figure 17 Relationship between candidates' mean A level grade and normalised GCSE score in 2019 (top-left) and the relationships in 2020 based on calculated grades (top-right), centre assessed grades (bottom-left) and the final awarded grades (bottom-right).

The graphs in Figure 18 compare the population WMG between 2019 and 2020 across the A level subjects. The subjects in the top graph are arranged in descending order based on their weighted mean grades in 2019.

As is clear from these graphs, the WMGs in 2020 are higher than in 2019, particularly for estimates derived using CAGs and the final grades. WMGs estimated based on the final grades are closely similar to those estimated using CAGs.

Unlike in GCSEs, the WMGs estimated based on CAGs and the final grades between the subjects in 2020 are slightly more consistent with those estimated for 2019 than the WMGs estimated based on calculated grades.

Further comparison between the WMGs estimated based on calculated grades, CAGs and the final grades indicated that there is some inconsistency in estimated WMGs across the subjects between calculated grades and CAGs or the final grades (see Figure A4 in Appendix A). WMGs estimated using CAGs and the final grades are highly consistent across the subjects.

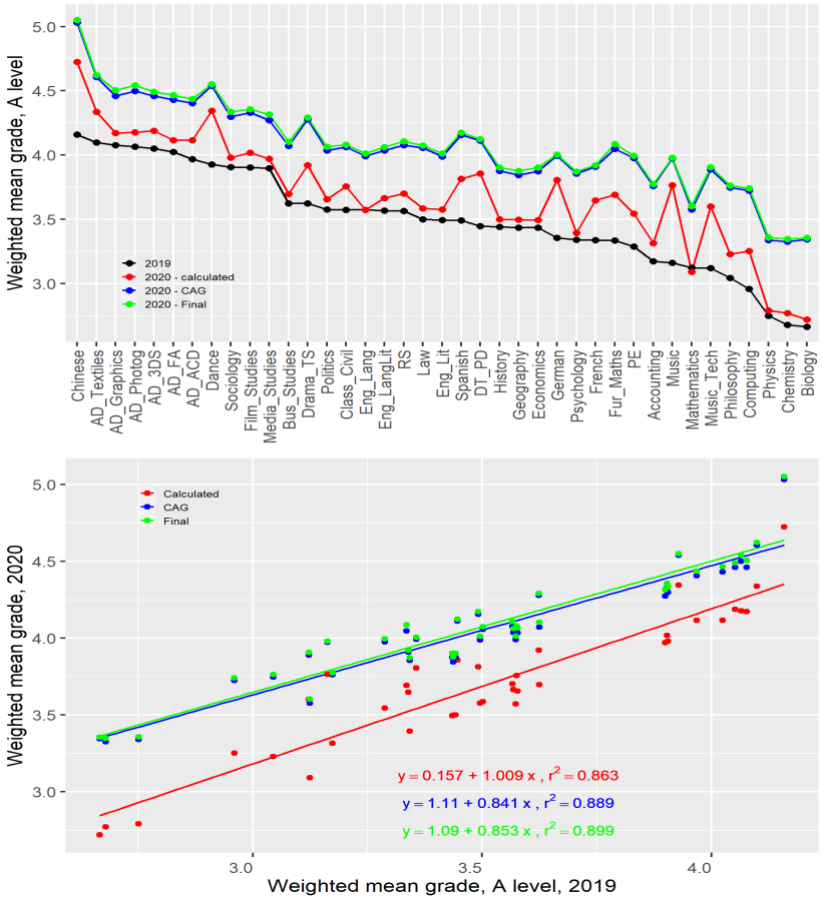

Figure 18 Comparison of population weighted subject mean grades between 2019 and 2020 for A level subjects from 2019 and 2020 (the subjects are arranged according to their population weighted mean grades in 2019 in the top graph).

Figure 19 further compares changes in subject WMGs between 2020 and 2019 (Also see Table B8 in Appendix B). Increase in population WMG based on the final grade in 2020 relative to 2019 varies from 0.42 for Media Studies to 0.89 for Chinese.

Chinese, dance, Spanish, further mathematics, music and music technology are among the subjects with the largest increases in WMGs, whereas subjects such as business studies, sociology and photography are among the subjects with the smallest increases.

Changes estimated using calculated grades in 2020 are substantially smaller than those estimated based on CAGs or the final grades. Further, changes in WMGs across the subjects based on calculated grades are not consistent with those based on CAGs or the final grades (see Figure A5 in Appendix A).

Similar to GCSEs, changes in WMGs estimated based on CAGs are highly consistent with those estimated using the final grades. In contrast to GCSEs, the range of changes based on the calculated grades is notably wider than that based on CAGs or the final grades (see the bottom graph in Figure 19).

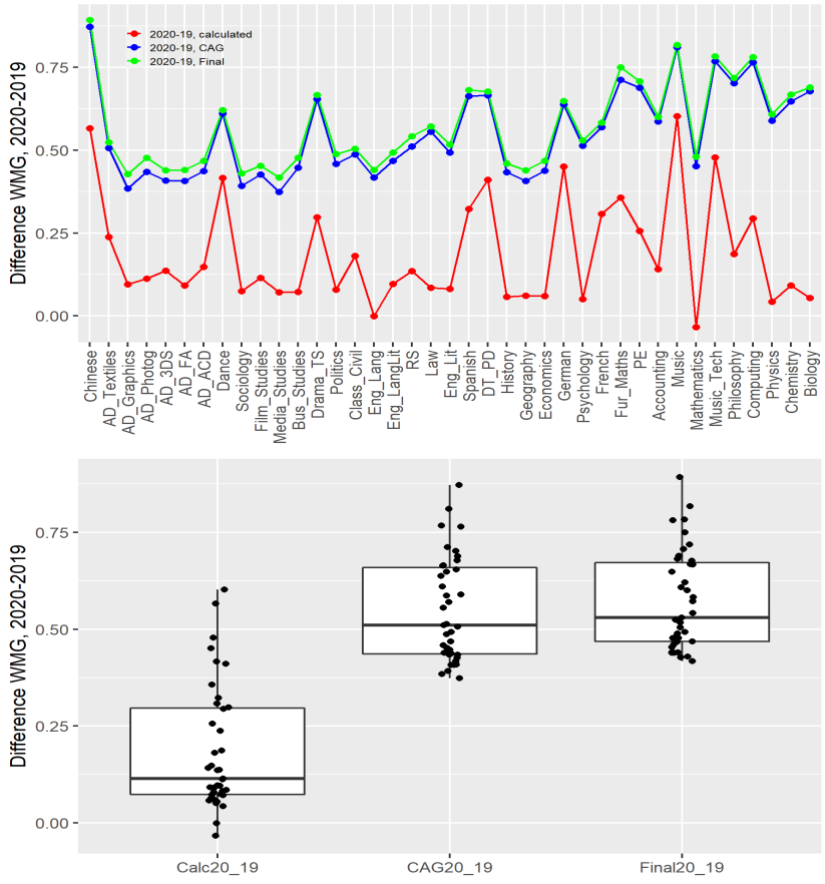

Figure 19 Comparison of changes in population weighted mean grades for A level subjects from 2019 to 2020 estimated based on calculated grades, CAGs and the final grades. Subjects are arranged according to their population weighted mean grades in 2019 in the top graph.

Figure 20 compares correlations between subject grades and normalised mean GCSE scores in 2019 and 2020 (also see Table B9 in Appendix B). Correlations based on calculated grades, CAGs and the final grades in 2020 are highly consistent with the correlations in 2019, with r^2 over 0.80. It is noticed that correlations in 2020 based on CAGs and the final grades are closely similar and are slightly higher than those based on calculated grades.

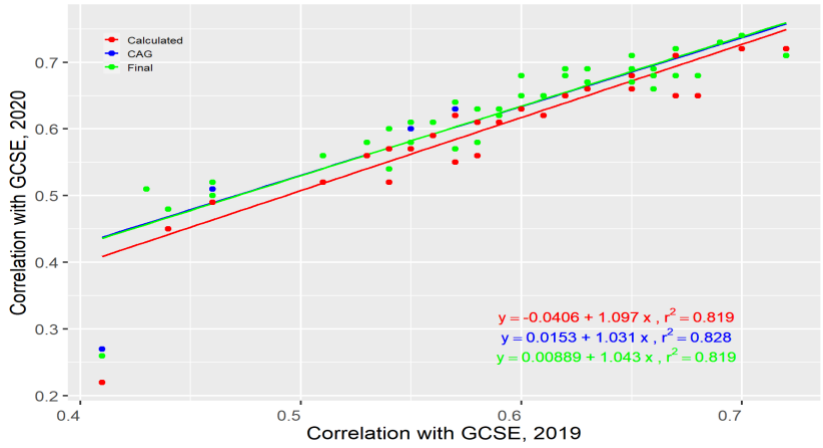

Figure 20 Comparisons of correlations between subject grades and normalised mean GCSE scores between 2019 and 2020.

Figure 21 compares inter-subject correlations between 2019 and 2020 (only subjects with entries greater than 5,000 were included - a total of 28). The inter-subject correlations for a selection of subjects are listed in Table B10 in Appendix B. These correlations are again highly consistent between the two years, with r^2 over 0.63. Similar to correlations with GCSE scores, inter-subject correlations in 2020 based on CAGs and the final grades are closely similar and are slightly higher than those based on calculated grades.

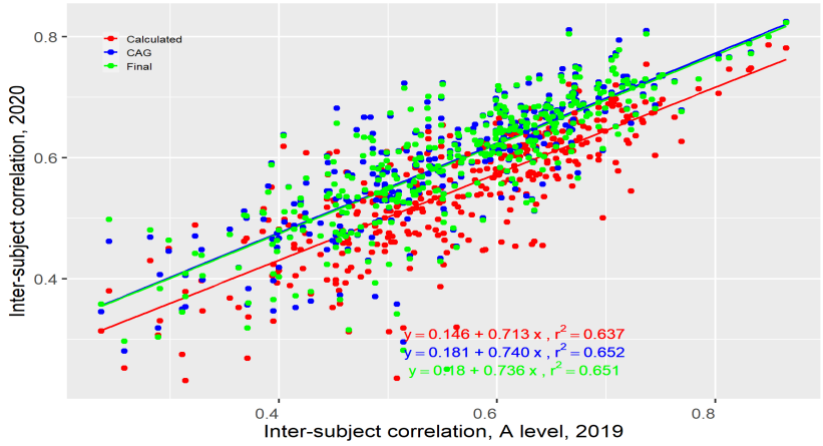

Figure 21 Comparison of inter-subject correlations for A level subjects between 2019 and 2020.

3.2.2 Impact based on Rasch modelling

Figure 22 depicts relative mean difficulties and difficulties at grades C, A and A* expressed in logits estimated using the Rasch model for the A level subjects analysed in 2019 and 2020 based on calculated grades, CAGs and the final grades. In each of the graphs in Figure 22, subjects are arranged in order of mean difficulty.

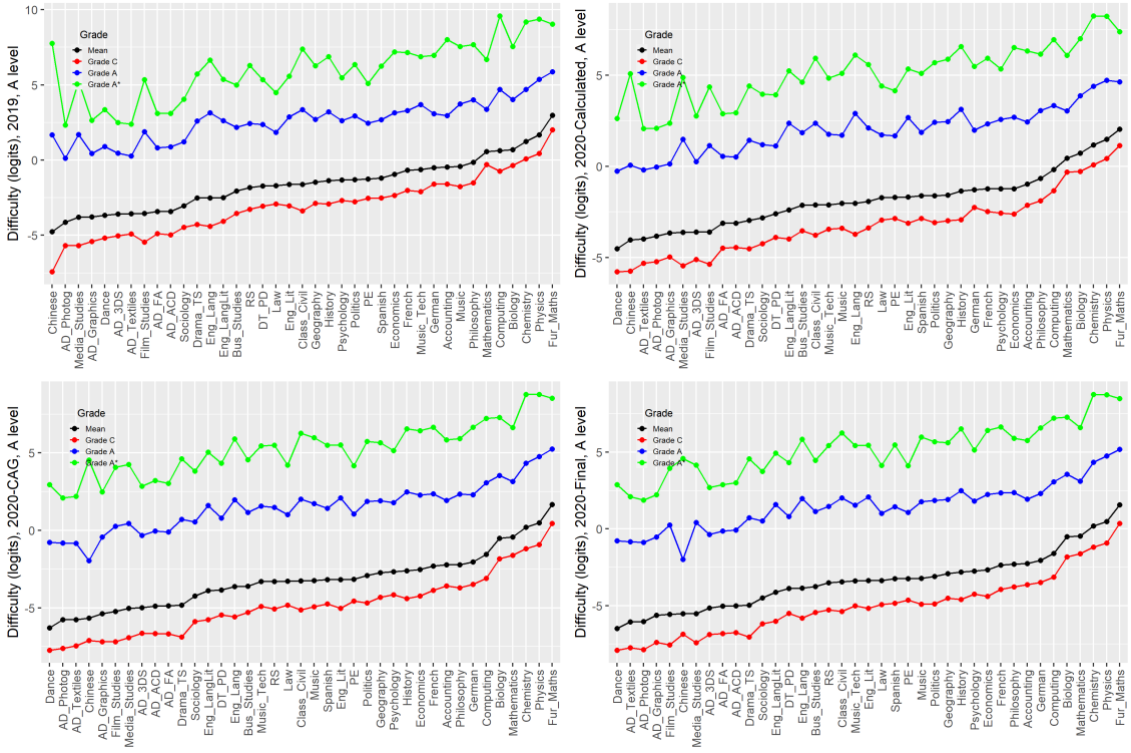

Figure 22 Relative mean difficulties and difficulties at grades C, A and A* expressed in logits for A level subjects from 2019 (top-left) and 2020 based on calculated grades (top-right), CAGs (bottom-left) and final grades (bottom-right), estimated using the Rasch model. In each of the graphs, subjects are arranged according to their mean difficulty.

Comparison of grade difficulty distributions

Figure 23 compares mean grade difficulty and difficulties at grades C, A and A* between the subjects in 2019 and 2020. The subjects in the graphs are arranged in the order of difficulty in 2019. If it is assumed that the ability distributions of the candidates included in the analysis are similar in 2019 and 2020, the grade difficulties in logits between 2019 and 2020 can be compared directly.

Subjects are graded more leniently in 2020 than in 2019 (except for a small number of subjects as judged by difficulties estimated based on calculated grades). This is particularly so for grade difficulties at grade C estimated using CAGs and the final awarded grades. Difficulties estimated based on CAGs are very slightly higher than those estimated using the final grades.

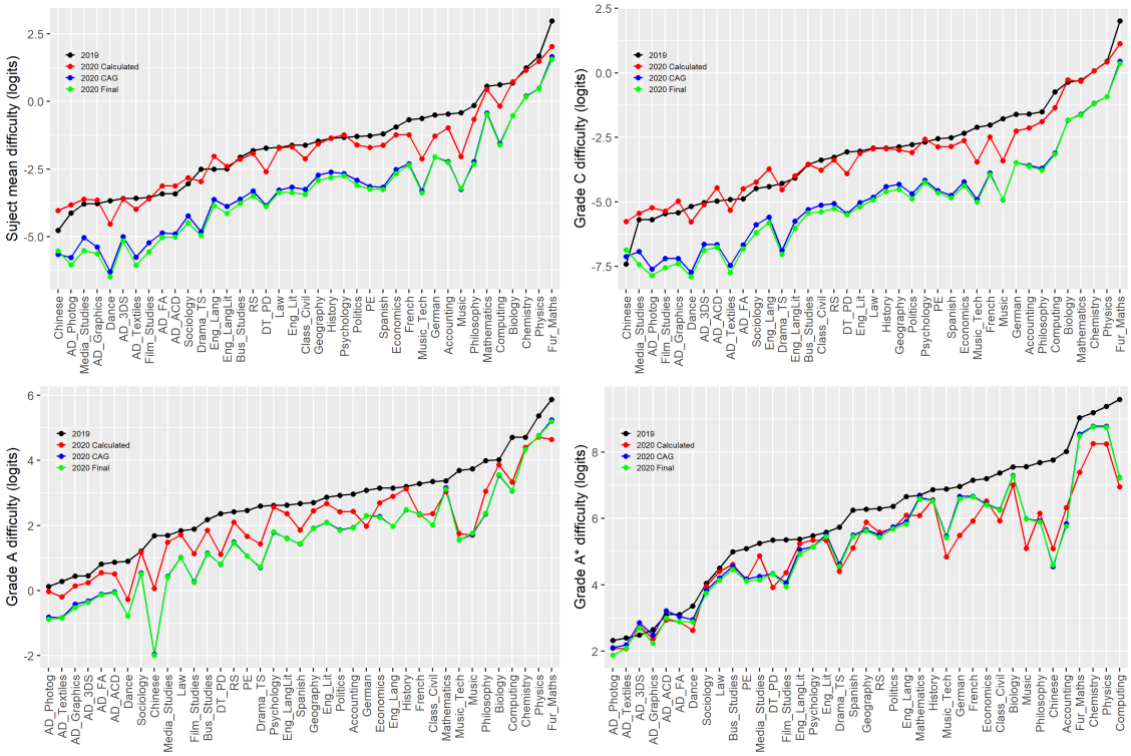

Figure 23 Comparison of mean difficulties (top-left) and difficulties at grades C (top-right), A (bottom-left) and A* (bottom-right) for A level subjects from 2019 and 2020 estimated using the Rasch model. Subjects are arranged in the order of difficulty in 2019.

The scatter plots in Figure 24 further compare subject grade difficulties between 2019 and 2020 based on calculated grades, CAGs and the final grades. The difficulties between the two years are highly correlated, with r^2 over 0.85, again suggesting fairly consistent ordering of subject difficulties between the two years. That is, subjects which are easy (or difficult) in 2019 are also generally easy (or difficult) in 2020. Further, correlations in subject grade difficulties between 2019 and 2020 based on calculated grades, CAGs and the final awarded grades are similar.

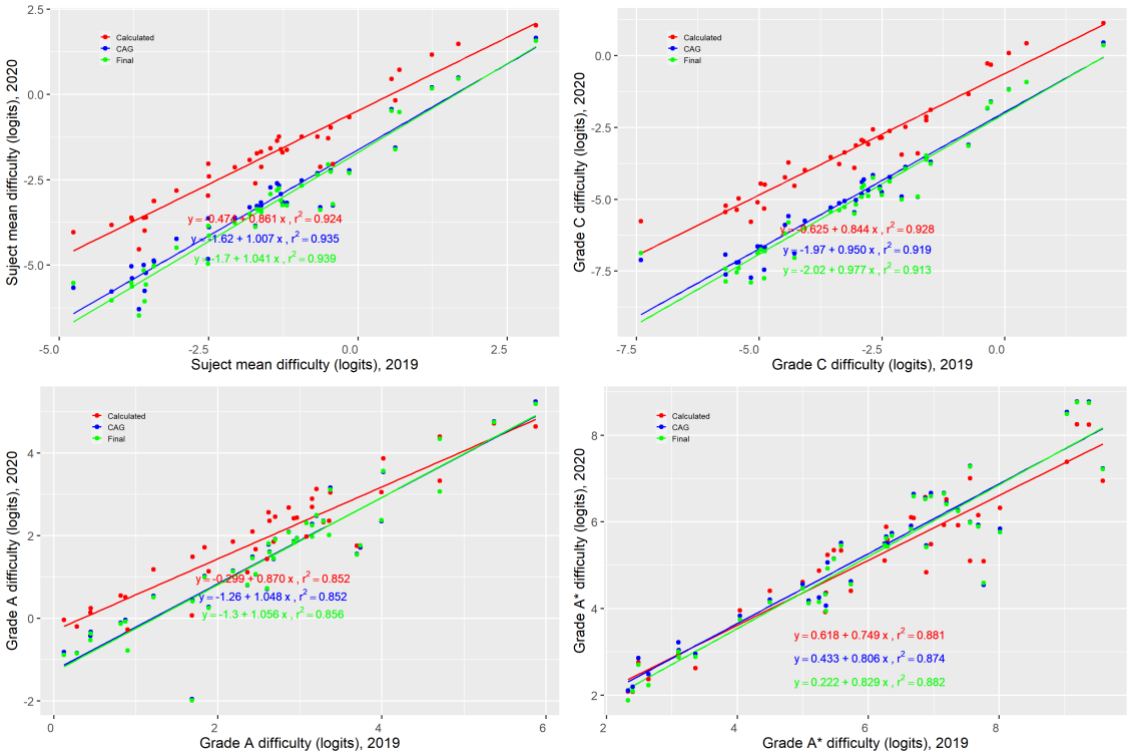

Figure 24 Comparison of mean difficulties and difficulties at grades C, A and A* for the A level subjects from 2019 and 2020 based on calculated grades, CAGs and the final grades, estimated using the Rasch model.

Figure 25 depicts distributions of mean difficulty and difficulties at grades C, A and A* for the A level subjects in 2019 and 2020. As with GCSEs, grade difficulty in these graphs is expressed in GW unit (the average grade gap in logits for A levels is defined as the average gap between grade A and grade D and is used to convert logits to GW) Table 6 further shows the range and standard deviation of grade difficulties in 2019 and 2020. It is clear from Figure 25 and Table 6 that relative grade difficulties (in GW) between the subjects in 2020 have been reduced somewhat in terms of both range and standard deviation compared with the difficulties in 2019 except at grade A where the ranges based on CAGs and the final grades are slightly larger.

Further, distributions of relative grade difficulties (in GW) between the subjects estimated based on CAGs and the final awarded grades are similar and noticeably narrower than the difficulty distributions estimated using calculated grades at grades C and A*. At A, this is slightly wider.

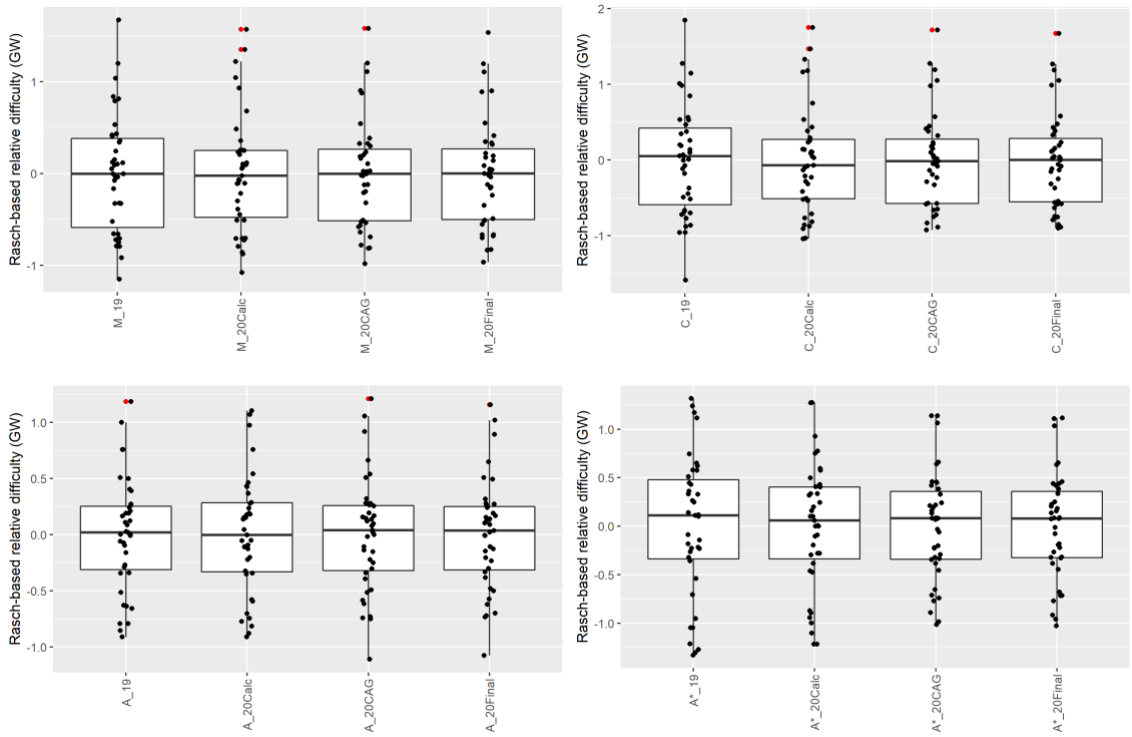

Figure 25 Comparison of distributions of mean difficulty (top-left) and difficulties at grades C (top-right), A (bottom-left) and A* (bottom-right) between A level subjects in 2019 and 2020.

Table 6 Standard deviation and range of relative grade difficulties (in GW) for A level subjects analysed in 2019 and 2020.

	SD (GW)			
	Mean	**C**	**A**	**A***
19 Final	0.64	0.72	0.50	0.73
20 Calc	0.63	0.70	0.52	0.64
20 CAG	0.59	0.63	0.50	0.55
20 Final	0.59	0.63	0.49	0.55
	Range (GW)			
	Mean	**C**	**A**	**A***
19 Final	2.82	3.43	2.09	2.64
20 Calc	2.65	2.79	2.01	2.49
20 CAG	2.56	2.64	2.32	2.15
20 Final	2.50	2.57	2.23	2.14

Changes in grade difficulties from 2019 to 2020

Figure 26 compares changes in subject grade difficulties based on calculated grades, CAGs and the final grades (also see Table B11 in Appendix B). Changes based on calculated grades overall and at grades C and A, particularly at C, are substantially smaller than those estimated based on CAGs and the final grades. At A*, changes in grade difficulties are similar across the three types of grades.

At the overall subject level, average changes in difficulty between 2020 and 2019 are about -0.25 logits based on calculated grades and -1.76 logits based on the final grades. The average grade gap is about 2.75 logits in 2019 and 3.22 logits in 2020 based on the final grades. On average, subjects in 2020 were less than one-tenth of a grade and about half of a grade more leniently graded than in 2019 based on calculated grades and the final grades respectively. Similarly, subjects were graded about one-twentieth of a grade and three-fifths of a grade in 2020 more leniently than in 2019 at grade C and about one-fifth of a grade and one-third of a grade more leniently at grade A. At A*, subjects were graded about one-fifth of a grade more leniently in 2020 than in 2019 based on calculated grades and the final grades.

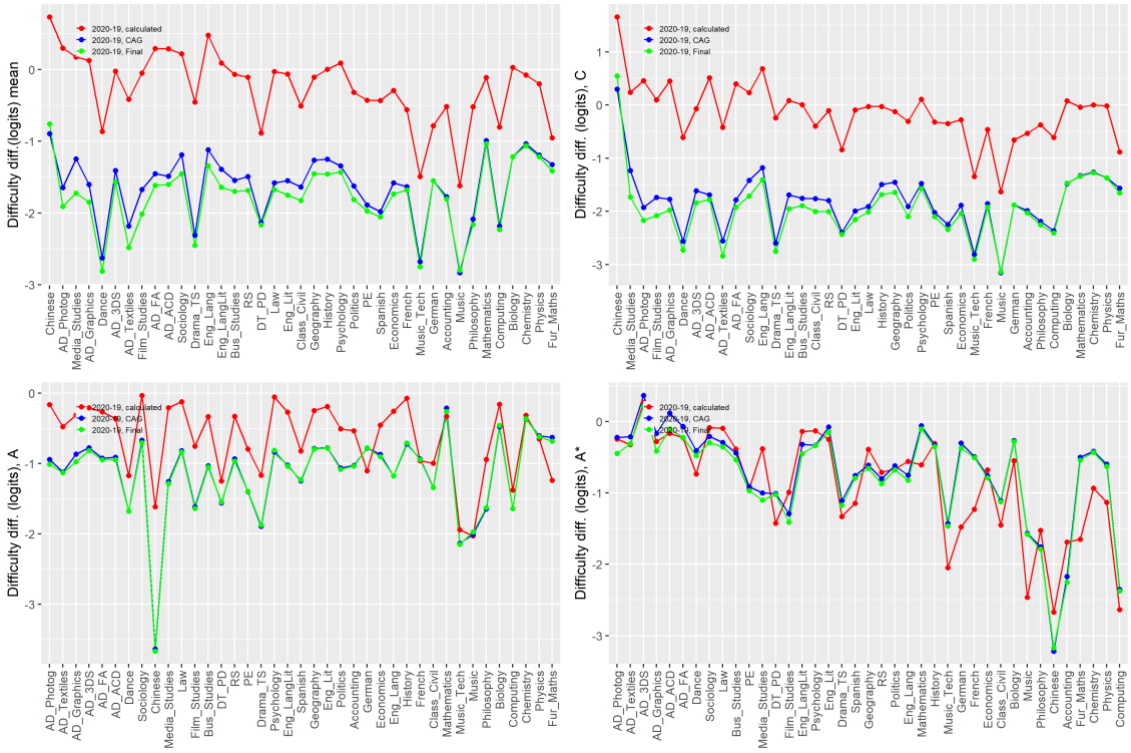

Figure 26 Comparison of changes in Rasch grade difficulties from 2019 to 2020 for A level subjects estimated based on calculated grades, CAGs and the final grades. Subjects are arranged in the order of difficulty in 2019.

Similar to GCSEs, changes in difficulties shown in Figures 26 vary between the subjects overall and at different grades within the same subject. Compared with GCSEs, the patterns of changes based on calculated grades, CAGs and the final grades appear to be slightly more consistent.

At grade C, dance, drama, textile design, music and music technology had the largest decreases in difficulty from 2019 to 2020 based on calculated grades, whereas English language, art, craft and design, graphics, psychology, mathematics, physics, chemistry and biology are among the subjects with the smallest changes in difficulty. However, based on CAGs or the final grades, English language, media studies, chemistry and mathematics are among the subjects with the least decease in difficulty. The difficulty of Chinese at grade C increased in 2020 compared with 2019.

At grade A, Chinese, dance, drama, music and music technology had the largest deceases in difficulty, whereas mathematics, biology, chemistry, psychology, history and sociology had the smallest changes. At A*, Chinese, computer science, music and music technology show the largest decreases in difficulty based on calculated grades and CAGs (or the final grades).

Figure 27 shows distributions of changes in difficulty at grades C, A and A* and at the overall subject level for the A level subjects from 2019 and 2020 based on calculated grades, CAGs and the final grades (also see Table B12 in Appendix B). In Figure 27, the subjects are arranged in descending order of mean difficulty in 2020. There is substantial variability in the changes in grade difficulties between the subjects. There is also some within-subject variability in difficulty changes.

Variation in difficulty changes between the subjects and within the same subject based on calculated grades appears to be smaller than that based on CAGs or the final grades. There appears to be some systematic shift in difficulty changes at different grades. Based on calculated grades, changes at grades A and A* are generally larger than at C. Based on CAGs or the final grades, changes at grade C are generally larger than at A which in turn are larger than changes at A*.

For difficulties estimated using calculated grades, Chinese, accounting and computer science had the largest variation in grade difficulty within the same subject, whereas English literature, English language and literature, geography, history, and law and some others showed least variation. The variability in changes in grade difficulties between the subjects at grade A* is larger than at C and A. For difficulties estimated based on CAGs and the final grades, Chinese, English literature, 3D Studies, dance and textile design had the largest within-subject variation in grade difficulty, while philosophy, computer science, media studies and film studies are among the subjects with least variation.

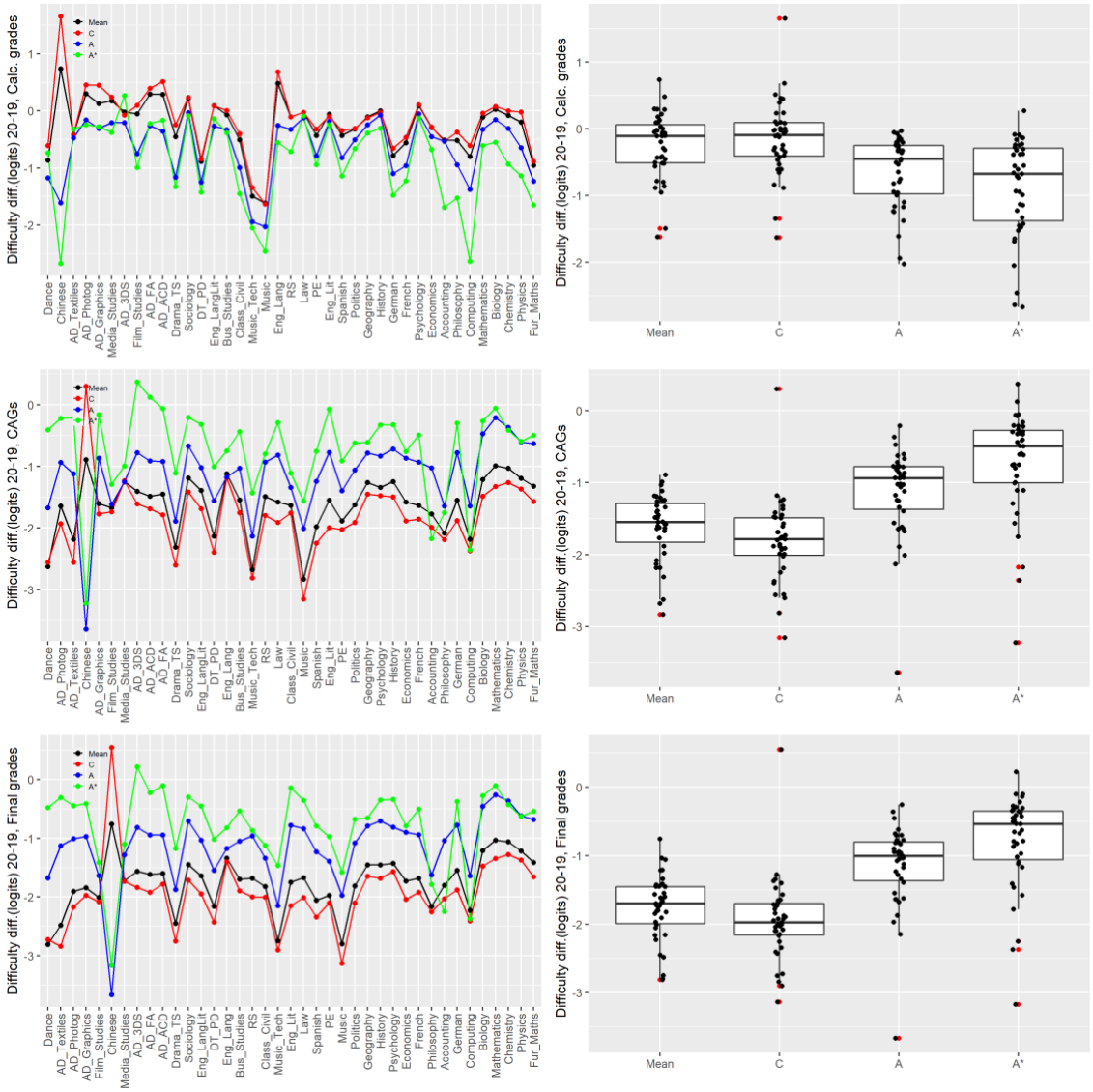

Figure 27 Changes in Rasch grade difficulties from 2019 to 2020 for A level subjects estimated based on calculated grades, CAGs and the final grades. Subjects are arranged in descending order of mean difficulty in 2020

Further analysis indicated that changes in grade difficulties from 2019 to 2020 based on CAGs and the final grades are highly consistent between the subjects but are notably different from those estimated using calculated grades across the subjects (see Figure A6 in Appendix A). Compared with GCSEs, changes in grade difficulties based on calculated grades, CAGs and the final grades are more consistent.

Changes in grade difficulty rank order positions from 2019 to 2020

Figure 28 compares orders of mean difficulties and difficulty orders at grades C, A and A* between the A level subjects in 2020 with their difficulty orders in 2019. Difficulty rank orders between the subjects in 2020 estimated based on CAGs and the final grades are

slightly more consistent with those in 2019 than the difficulty orders estimated using calculated grades.

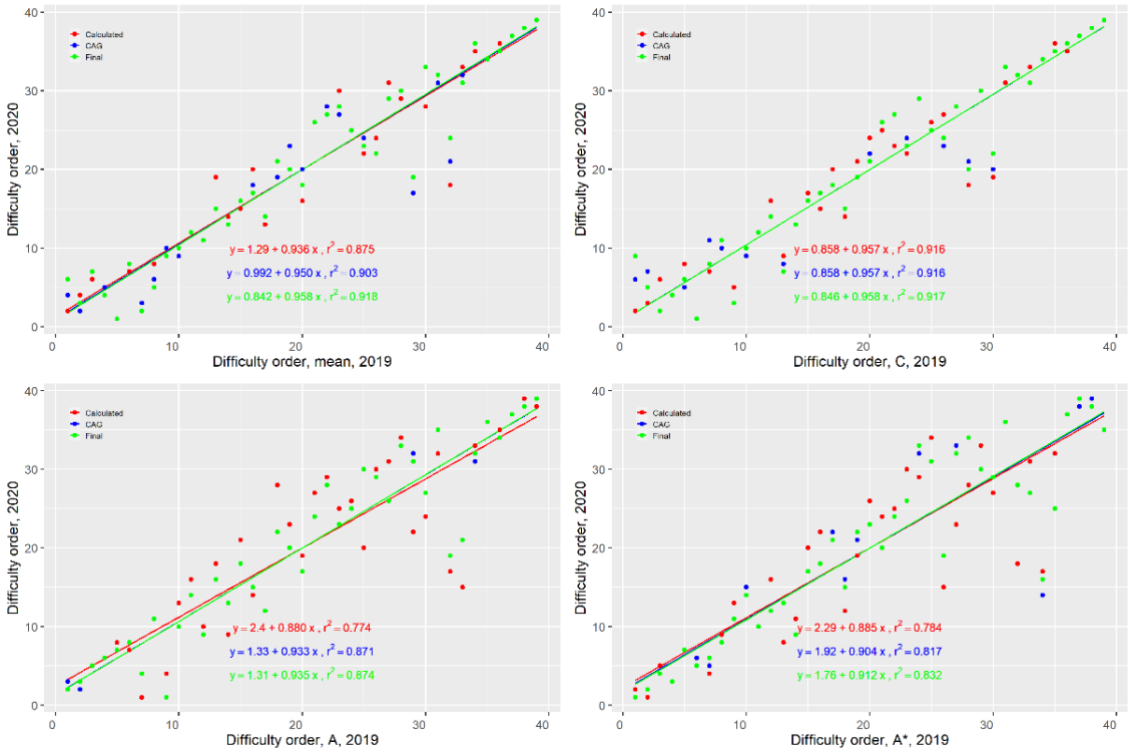

Figure 28 Comparison of subject difficulty orders between 2019 and 2020: mean difficulty (top-left), difficulties at grade C (top-right), A (bottom-left) and A* (bottom-right).

Figure 29 shows distributions of changes in difficulty order positions in the subjects between 2020 and 2019 at the overall subject level and at grades C, A and A*. Table 7 further details the changes for individual subjects.

It is clear from Figure 29 (also see Table 7) that the total number of changes in difficulty order positions from 2019 to 2020 based on CAGs and the final grades are smaller than those based on calculated grades at grades A and A*. At grade C and the overall subject level, the changes are similar across the three types of grades.

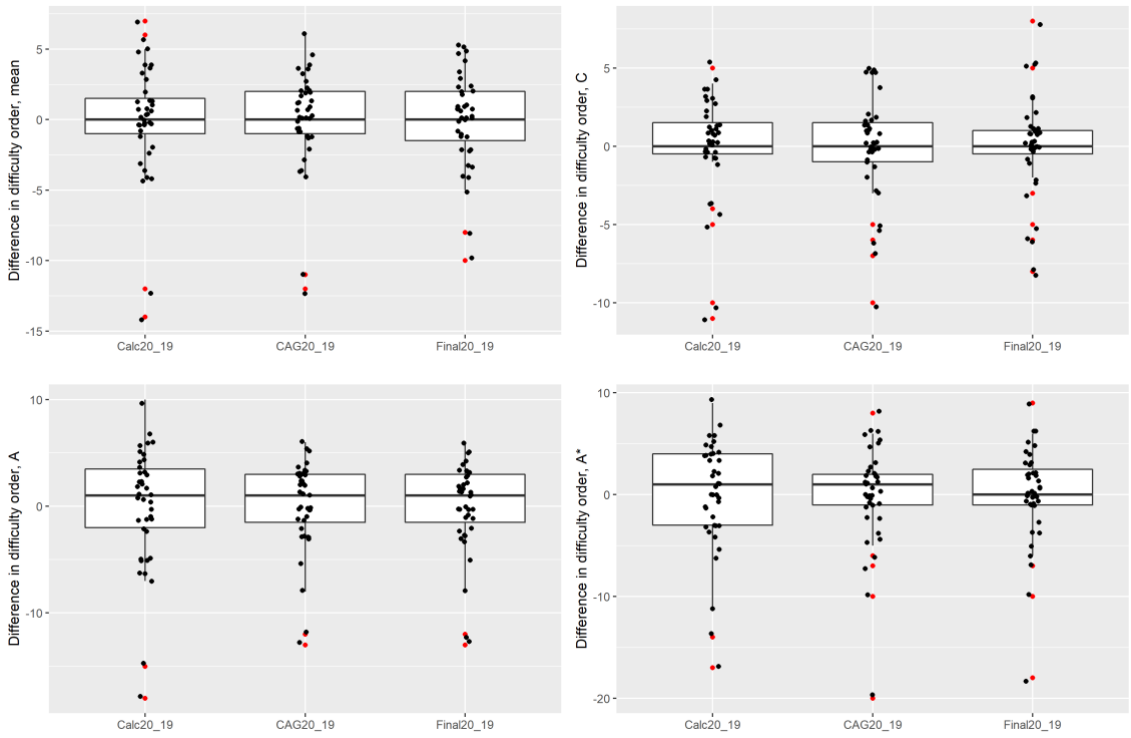

Figure 29 Distributions of changes in difficulty rank order positions in A level subjects from 2019 and 2020.

Table 7 Changes in difficulty rank order positions in A level subjects from 2019 and 2020*.

Subject	Mean				Subject	C				Subject	A				Subject	A*			
	Order in 19	Change				Order in 19	Change				Order in 19	Change				Order in 19	Change		
		Calc	CAG	Final			Calc	CAG	Final			Calc	CAG	Final			Calc	CAG	Final
Chinese	1	1	3	5	Chinese	1	1	5	8	AD_Photog	1	2	2	1	AD_Photog	1	1	0	0
AD_Photog	2	2	0	1	Media_Studies	2	1	5	3	AD_Textiles	2	0	0	1	AD_Textiles	2	-1	0	0
Media_Studies	3	3	4	4	AD_Photog	3	3	-1	-1	AD_Graphics	3	2	2	2	AD_3DS	3	2	1	1
AD_Graphics	4	1	1	0	Film_Studies	4	0	0	0	AD_3DS	4	2	2	2	AD_Graphics	4	-1	-1	-1
Dance	5	-4	-4	-4	AD_Graphics	5	3	0	1	AD_FA	5	3	2	2	AD_ACD	5	2	2	2
AD_3DS	6	1	2	2	Dance	6	-5	-5	-5	AD_ACD	6	1	2	2	AD_FA	6	0	0	-1
AD_Textiles	7	-4	-4	-5	AD_3DS	7	0	4	1	Dance	7	-6	-3	-3	Dance	7	-3	-2	-1
Film_Studies	8	0	-2	-3	AD_ACD	8	3	2	3	Sociology	8	3	3	3	Sociology	8	1	0	0
AD_FA	9	0	1	0	AD_Textiles	9	-4	-6	-6	Chinese	9	-5	-8	-8	Law	9	4	2	2
AD_ACD	10	0	-1	0	AD_FA	10	0	-1	0	Media_Studies	10	3	0	0	Bus_Studies	10	4	5	4
Sociology	11	1	1	1	Sociology	11	1	1	1	Law	11	5	3	3	PE	11	-1	-1	-1
Drama_TS	12	-1	-1	-1	Eng_Lang	12	4	2	2	Film_Studies	12	-2	-3	-3	Media_Studies	12	4	0	0
Eng_Lang	13	6	2	2	Drama_TS	13	-4	-5	-6	Bus_Studies	13	5	3	3	DT_PD	13	-5	0	0
Eng_LangLit	14	0	-1	-1	Eng_LangLit	14	-1	-1	-1	DT_PD	14	-5	-1	-1	Film_Studies	14	-3	-5	-5
Bus_Studies	15	0	1	1	Bus_Studies	15	2	1	1	RS	15	6	3	3	Eng_LangLit	15	5	2	2
RS	16	4	2	1	Class_Civil	16	-1	1	1	PE	16	-2	-1	-1	Psychology	16	6	2	2
DT_PD	17	-4	-3	-3	RS	17	3	1	1	Drama_TS	17	-5	-5	-5	Eng_Lit	17	4	5	4
Law	18	3	1	3	DT_PD	18	-4	-3	-3	Psychology	18	10	4	4	Drama_TS	18	-6	-2	-3
Eng_Lit	19	4	4	1	Eng_Lit	19	2	0	0	Eng_LangLit	19	4	1	1	Spanish	19	0	2	3
Class_Civil	20	-4	0	-2	Law	20	4	2	1	Spanish	20	-1	-3	-3	Geography	20	6	3	3
Geography	21	5	5	5	History	21	4	5	5	Geography	21	6	3	3	RS	21	3	-1	-1
History	22	5	6	5	Geography	22	1	5	5	Eng_Lit	22	7	6	6	Politics	22	3	2	2
Psychology	23	7	4	5	Politics	23	-1	1	0	Politics	23	2	0	0	Eng_Lang	23	7	3	3
Politics	24	1	1	1	Psychology	24	5	5	5	Accounting	24	2	1	1	Mathematics	24	5	8	9
PE	25	-3	-1	-2	PE	25	1	0	0	German	25	-5	5	5	History	25	9	6	6
Spanish	26	-2	-4	-4	Spanish	26	1	-3	-2	Economics	26	4	3	3	Music_Tech	26	-11	-7	-7
Economics	27	4	2	2	Economics	27	1	1	1	Eng_Lang	27	4	-1	-1	German	27	-4	6	5
French	28	1	2	2	Music_Tech	28	-10	-7	-8	History	28	6	5	5	French	28	0	6	6
Music_Tech	29	-12	-12	-10	French	29	1	1	1	French	29	-7	3	2	Economics	29	4	1	1
German	30	-2	3	3	Music	30	-11	-10	-8	Class_Civil	30	-6	-3	-3	Class_Civil	30	-3	-1	-1
Accounting	31	1	0	1	German	31	0	2	2	Mathematics	31	1	4	4	Biology	31	5	5	5
Music	32	-14	-11	-8	Accounting	32	0	0	0	Music_Tech	32	-15	-13	-13	Music	32	-14	-4	-4
Philosophy	33	0	-1	-2	Philosophy	33	0	-2	-2	Music	33	-18	-12	-12	Philosophy	33	-2	-6	-6
Mathematics	34	1	2	2	Computing	34	0	0	0	Philosophy	34	-1	-3	-2	Chinese	34	-17	-20	-18
Computing	35	-1	-1	-1	Biology	35	1	0	0	Biology	35	1	1	1	Accounting	35	-3	-10	-10
Biology	36	0	-1	-1	Mathematics	36	-1	0	0	Computing	36	-1	-2	-2	Fur_Maths	36	1	1	1
Chemistry	37	0	0	0	Chemistry	37	0	0	0	Chemistry	37	0	0	0	Chemistry	37	2	1	2
Physics	38	0	0	0	Physics	38	0	0	0	Physics	38	1	0	0	Physics	38	0	1	0
Fur_Maths	39	0	0	0	Fur_Maths	39	0	0	0	Fur_Maths	39	-1	0	0	Computing	39	-4	-4	-4
Total changes		**102**	**94**	**94**	**Total changes**		**84**	**88**	**84**	**Total changes**		**160**	**116**	**114**	**Total changes**		**156**	**128**	**126**

* At the overall subject level and at grades C, A and A*, the subjects are arranged in ascending order of difficulty in 2019 (1 representing the easiest subject and 9 the hardest subject). Positive values mean increase in difficulty order and negative values decrease in difficulty order relative to 2019.

For individual subjects, at the overall subject level, Music and Music Technology in 2020 were graded considerably more leniently than in 2019, with difficulty positions lowered by 8 or more and 10 or more based on calculated grades, CAGs and the final grades. These two subjects were also graded more leniently in 2020 than in 2019 at grades C and A.

At grade A, Religious Studies, Psychology, English Literature, Geography and History had their difficulty order increased by 6 or more positions based on calculated grades, whereas only English Literature increased its difficulty order by 6 positions based on CAGs and the final grades.

At A*, Psychology, English Language, Geography and History had their difficulty positions increased by 6 or more based on calculated grades, while Mathematics, History and French increased their difficulty positions by 6 or more based on CAGs and the final grades. Accounting had its difficulty order lowered by 10 at A* based on CAGs and the final grades and by only 3 based on calculated grades.

Differences in grade difficulties between calculated grades and CAGs in 2020

Figure 30 further shows differences between grade difficulties estimated based on CAGs and difficulties estimated based on calculated grades (also see Table B13 in Appendix B). In Figure 30, the subjects are arranged in the order of mean difficulty estimated for 2019.

Average differences in grade difficulty between CAGs and calculated grades across the subjects are about -1.38 logits (about two-fifths of a grade more lenient) overall and -1.67 logits (about half of a grade more lenient) at grade C, -0.50 logits (about one-seventh of a grade more lenient) at grade A, and 0.15 logits (about one-twentieth of a grade severer) at grade A*. It appears that there is similar level of variability in grade difficulty differences between the subjects at the overall subject level and at individual grades.

At grade C, some of the art and design subjects had the largest decreases in difficulty from calculated grades to CAGs, while Chinese, media studies, classical civilisation, mathematics, further mathematics and geography had the smallest decreases.

At grade A, Chinese, media studies, and English language are among the subjects with the largest decreases in difficulty, whereas French, music, mathematics, chemistry and physics had the smallest decreases. At A*, Chinese, media studies and accounting had the largest decreases in difficulty from calculated grades to CAGs, whereas German, French, music, and further mathematics had increased their relative difficulty from calculated grades to CAGs.

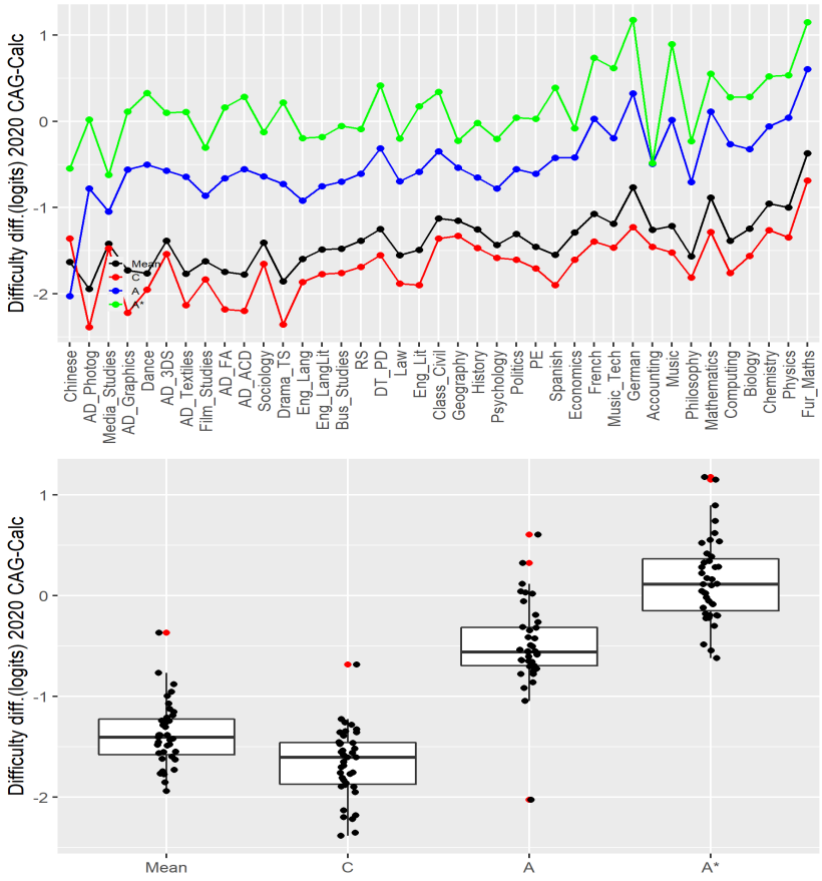

Figure 30 Differences between grade difficulties estimated based on CAGs and difficulties estimated based on calculated grades. Subjects are arranged in the order of mean difficulty estimated for 2019.

3.2.3 Comparison with relationships between 2018 and 2019

Table 8 shows the range and standard deviation of relative difficulties (in GW) for A level subjects from 2018 and 2019. These are relatively consistent between the two years.

Table 8 Standard deviation and range of grade difficulties (in GW) for A level subjects analysed in 2018 and 2019.

	SD (GW)			
	Mean	**C**	**A**	**A***
18 Final	0.63	0.71	0.49	0.73
19 Final	0.65	0.74	0.50	0.72
	Range (GW)			
18 Final	2.69	3.31	1.94	2.83
19 Final	2.86	3.48	2.12	2.68

Figure 31 shows differences in subject grade difficulties between 2019 and 2018 (Subjects are arranged in order of mean difficulty in 2018). The ranges of changes

shown in Figure 31 are generally smaller than the ranges of differences between difficulty estimates from calculated grades, CAGs and the final grades in 2020 and the difficulty estimates from the final grades in 2019 (see Figure 27). The distributions of differences in grade difficulties between 2020 and 2019 based on the final grades are also shown in the bottom graph of Figure 31.

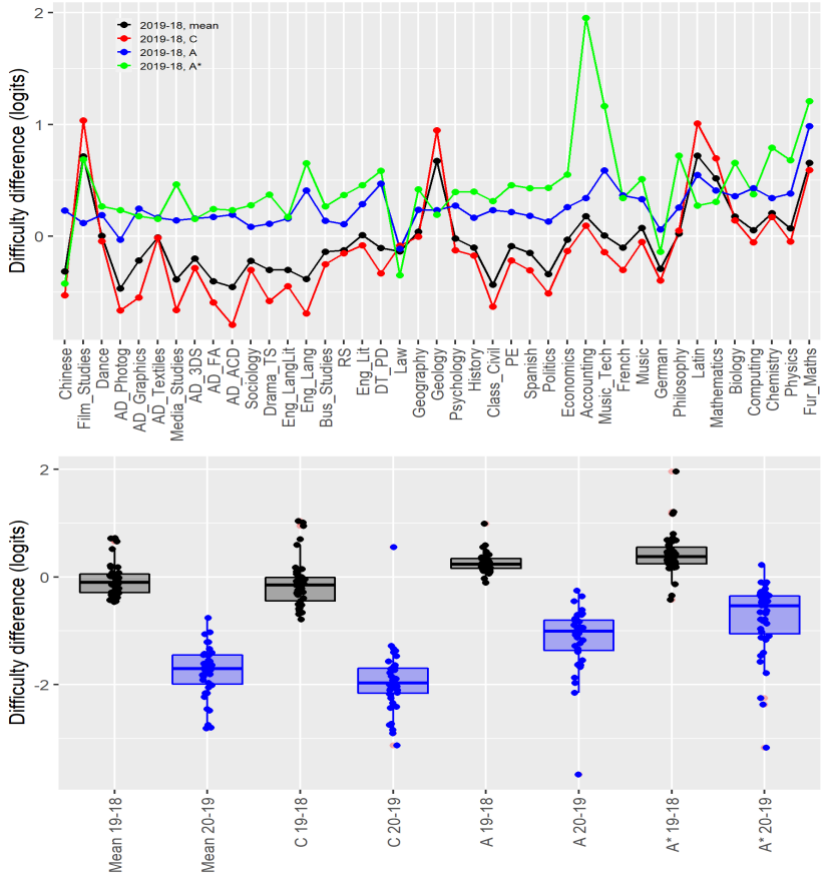

Figure 31 Differences in grade difficulties between 2019 and 2018 for the A level subjects from 2018 and 2019. Subjects are arranged in order of mean difficulty in 2018. The distributions of differences in grade difficulties between 2020 and 2019 based on the final grades are also shown in the bottom graph.

Figure 32 shows correlations between mean A level grades and normalised mean GCSE scores and inter-subject correlations (subjects with entries greater than 5,000) between 2018 and 2019 for the A level subjects analysed; comparisons of relative grade difficulties between 2018 and 2019; comparison of difficulty rank orders; and the distributions of changes in difficulty positions from 2018 to 2019.

Changes of rank order positions for individual subjects are listed in Table B14 in Appendix B. The various correlations in the various variables between 2018 and 2019 are generally slightly more consistent than those between 2019 and 2020.

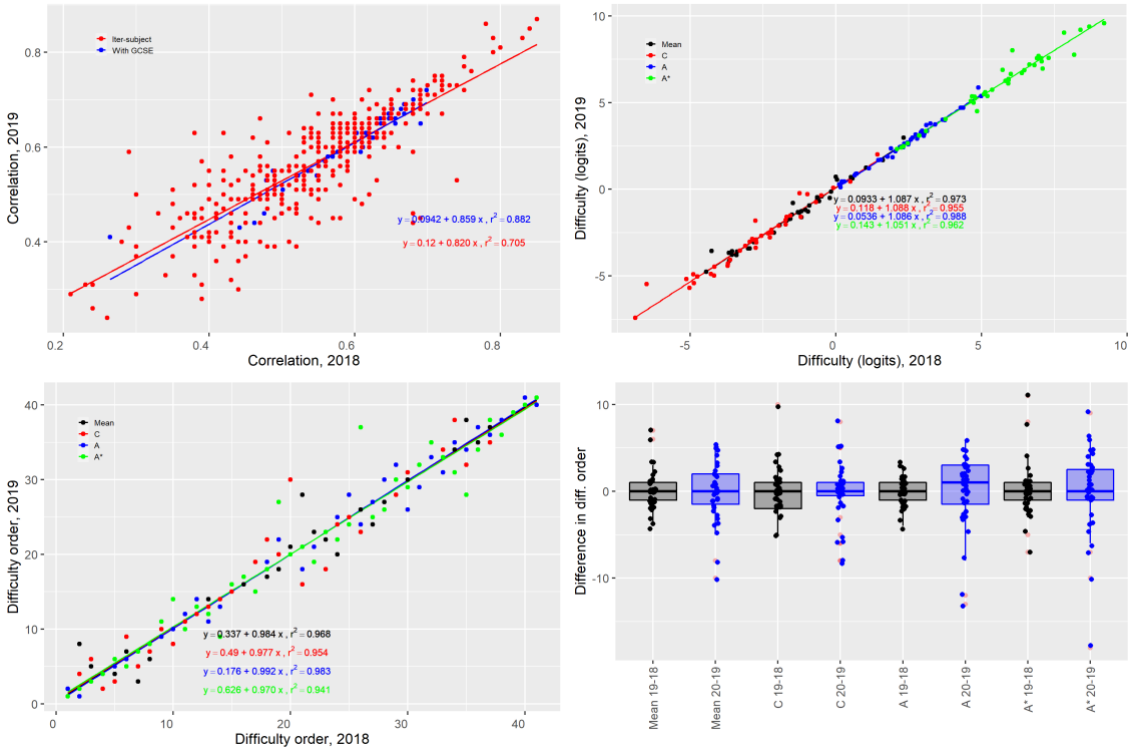

Figure 32 Correlations between mean A level grade and normalised GCSE score and inter-subject correlations between 2018 and 2019 (top-left) for the A level subjects analysed; comparisons of grade difficulties between 2018 and 2019 (top-right); comparison of difficulty rank orders (bottom-left); and distributions of changes in difficulty rank order positions from 2018 to 2019 and those from 2019 to 2020 (bottom-right).

Changes in difficulty rank order positions between 2018 and 2019 are also notably smaller than those between 2019 and 2020 estimated using calculated grades, CAGs and the final grades (see Figure 29). In the bottom-right graphs in Figure 32 shows the distributions of changes in difficulty rank order positions at the overall subject level and at grades C, A and A* between 2020 and 2019 based on the final grades.

For the majority of the subjects, changes in difficulty order positions from 2018 to 2019 are generally within 3, while these went up to about 5 from 2019 to 2020. The average changes of difficulty order positions from 2018 to 2019 per subject are 1.4 overall, 1.7 at grade C, 1.1 at grade A and 1.7 at A* respectively. These are 2.4, 2.1, 2.9 and 3.2 respectively from 2019 to 2020 based on the final grades.

4. Concluding remarks

This report looked at the impact on inter-subject comparability of calculated grades, centre assessment grades and the final awarded grades in GCSEs and A levels in 2020 through empirical analysis of the relationships between subject grades and

between subject grades and prior attainment and Rasch modelling. Results from the analyses indicate that:

- For both GCSEs and A levels, correlations of grade outcomes with prior attainment and inter-subject correlations are highly consistent between 2019 and 2020. Values based on CAGs and the final grades in 2020 are closely similar and are slightly higher than the values based on calculated grades.

- For both GCSEs and A levels, subjects in 2020 were generally graded more leniently than in 2019 at the overall subject level and at individual grades based on estimated population weighted mean grades and grade difficulties derived using the Rasch model. This is particularly so for WMGs and Rasch grade difficulties estimated using CAGs or the final grades. On average, subjects in 2020 based on CAGs or the final grades were graded considerably more leniently than based on calculated grades. Subjects based on final grades were graded slightly more leniently than based on CAGs.

  For GCSEs, based on the final grades, on average, subjects in 2020 were graded nearly three-fifths of a grade more leniently at the overall subject level than in 2019. At grades 4, 7 and 9, these were about three-quarters of a grade, one-third of a grade and one-tenth of a grade respectively more lenient.

  For A levels, based on the final grades, on average, subjects in 2020 were graded about half of a grade more leniently at the overall subject level than in 2019. At grades C, A and A*, these were about three-fifths of a grade, one-third of a grade and one-fifth of a grade respectively more lenient.

- For both GCSEs and A levels, the range and standard deviation of relative grade difficulties in gradewidth unit estimated using the Rasch model at the overall subject level and at individual grades in 2020 are generally smaller than in 2019, particularly for difficulties estimated using CAGs or the final grades. Distributions of relative grade difficulties between subjects in 2020 estimated based on CAGs and the final awarded grades are similar and generally noticeably narrower than the difficulty distributions estimated using calculated grades.

- For GCSEs, correlations in subject grade difficulties between 2019 and 2020 estimated using the Rasch model based on calculated grades are slightly stronger than those estimated using CAGs or the final grades. For A levels, these correlations are broadly similar across calculated grades, CAGs and the final grades.

- For both GCSEs and A levels, there is substantial variability in changes in grade difficulties from 2019 to 2020 between the subjects based on calculated grades, CAGs and the final grades. Changes in grade difficulties within the same subject also vary at different grades for a large number of subjects.

  For GCSEs, changes in grade difficulties based on calculated grades are substantially smaller than those estimated based on CAGs and the final grades overall and at grade 4. At grade 7, changes based on calculated grades on average are slightly smaller than those based on CAGs or the final grades. At

grade 9, changes based on calculated grades on average are similar to or slightly larger than those based on CAGs or the final grades.

For A levels, changes in grade difficulties based on calculated grades overall and at grades C and A, particularly at C, are substantially smaller than those estimated based on CAGs and the final grades. At A*, changes are similar across calculated grades, CAGs and the final grades.

- For GCSEs, difficulty rank orders estimated using the Rasch model in 2019 correlate better with those in 2020 estimated using calculated grades than the rank orders estimated using CAGs or the final grades. Changes in difficulty orders overall and at individual grades in the subjects between 2020 and 2019 based on calculated grades are smaller than those estimated based on CAGs or the final awarded grades. For A levels, grade difficulty rank orders in 2019 generally correlate slightly better with those in 2020 estimated based on CAGs or the final grades than the rank orders estimated using calculated grades. Changes in difficulty rank orders based on calculated grades are slightly larger than those estimated using CAGs or the final grades at A and A*.

- For both GCSEs and A levels, differences in grade difficulties between CAGs and calculated grades in 2020 show similar level of variability between the subjects at the overall subject level and at individual grades.

- For both GCSEs and A levels, changes in relative grade difficulties between 2020 and 2019 estimated using the Rasch model, in terms of range and standard deviation and difficulty order positions, at the overall subject level and individual grade level are larger than the estimated changes between 2019 and 2018. Consistency in correlations of grade outcomes with prior attainment, inter-subject correlations and Rasch grade difficulty correlations between 2019 and 2020 is similar or slightly weaker than that between 2018 and 2019.

  Changes in grade difficulty rank order positions from 2019 to 2020 are substantially larger than those from 2018 to 2019. For GCSEs, based on the final grades, average changes (per subject) from 2019 to 2020 at the overall subject level and at grades 4, 7 and 9 are 3.1, 3.5, 3.2 and 3.9 respectively, while these are 0.8, 0.5, 1.0 and 0.9 from 2018 to 2019 and 1.77, 1.54, 1.77 and 2.06 from 2012 to 2013. For A levels, at the overall subject level and at grades C, A and A*, average changes from 2019 to 2020 are 2.4, 2.1, 2.9 and 3.2 respectively based on the final grades, whereas these are 1.4, 1.7, 1.1 and 1.7 from 2018 to 2019.

These differences in impact on inter-subject comparability in GCSEs and A levels in 2020 between calculated grades, CAGs and the final awarded grades reflect differences in the nature of how they were arrived at.

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Appendix A Additional figures

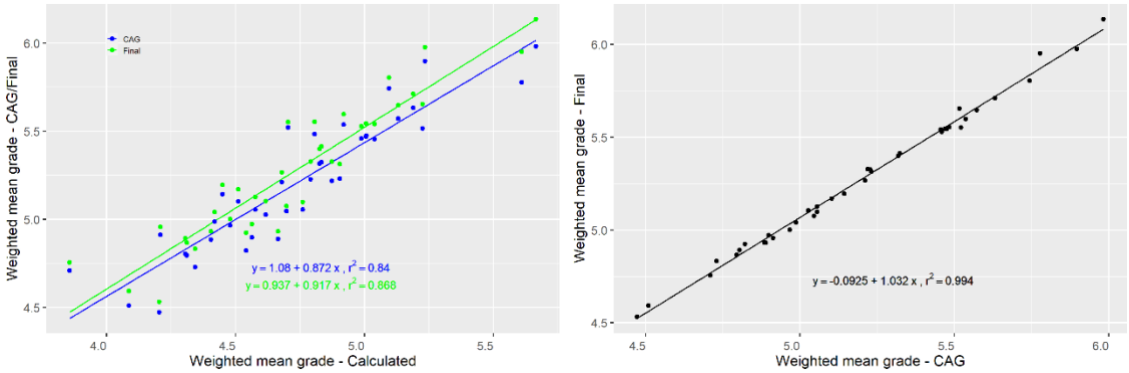

Figure A1 Comparison of weighted mean grades in GCSE subjects between 2019 and 2020 based on calculated grades, CAGs and the final grades.

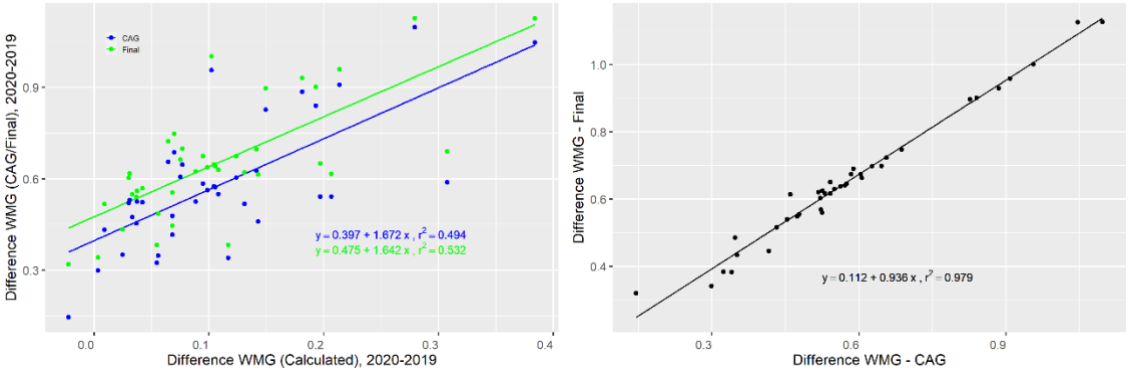

Figure A2 Comparison of changes in population weighted mean grades in GCSE subjects from 2019 to 2020 estimated based on calculated grades, CAGs and the final grades.

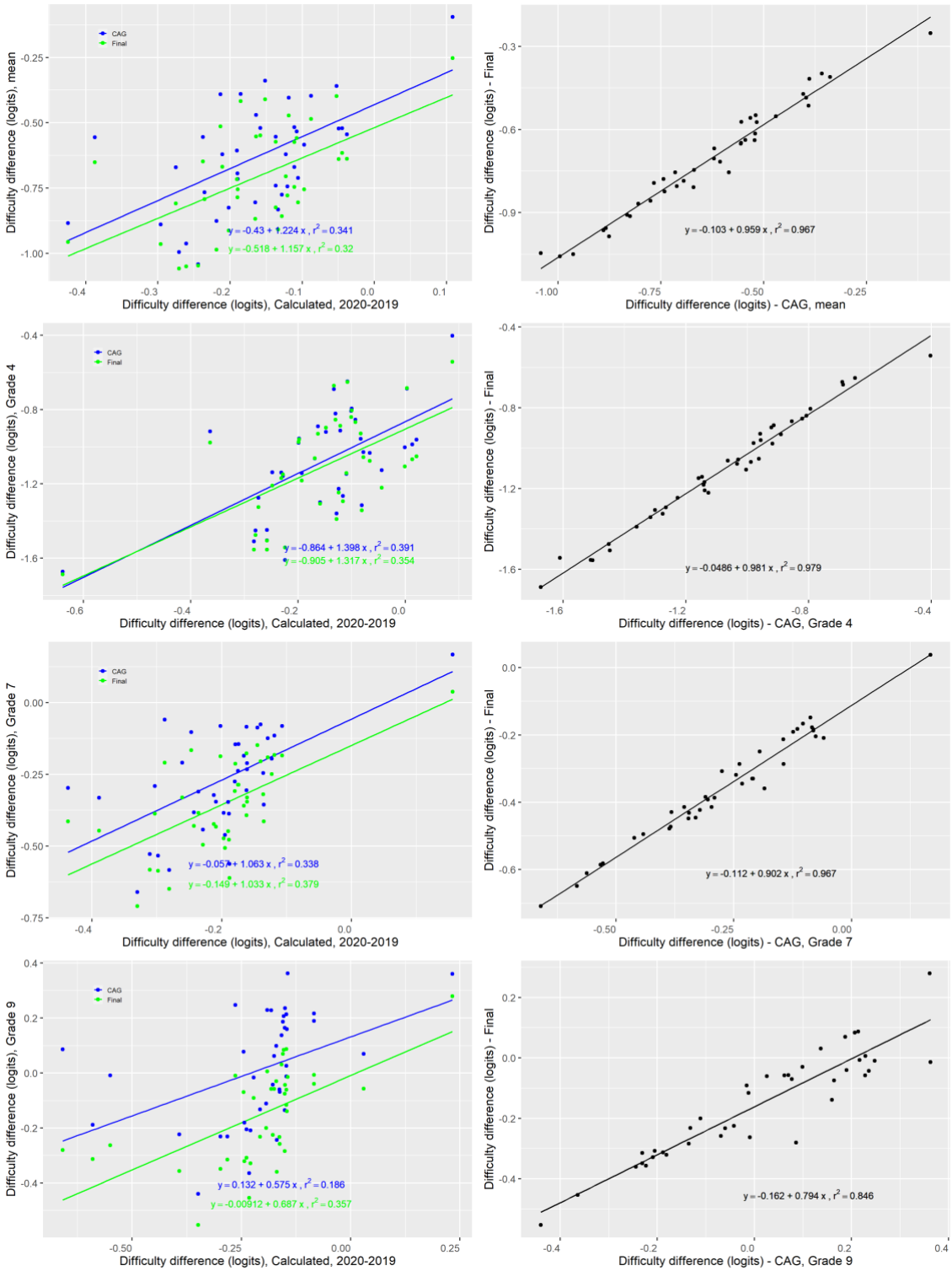

Figure A3 Comparison of changes in grade difficulties from 2019 to 2020 for GCSE subjects estimated based on calculated grades, CAGs and the final grades derived using the Rasch model.

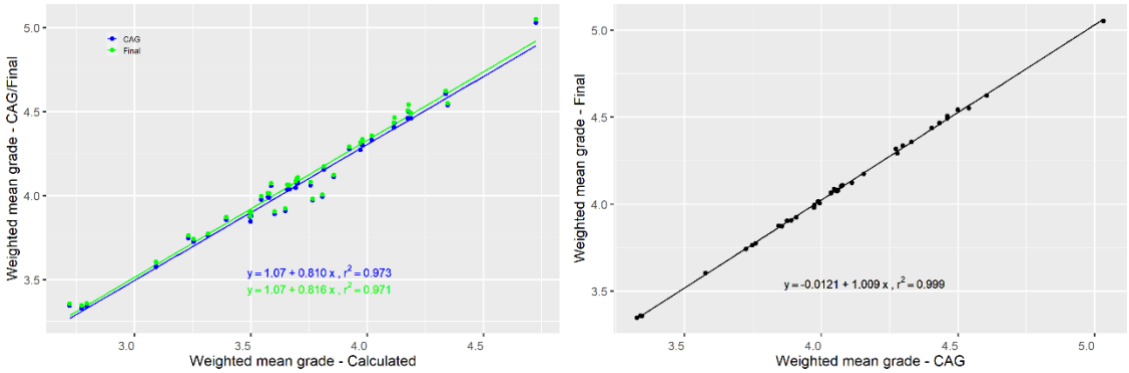

Figure A4 Comparison of weighted mean grades in A level subjects between 2019 and 2020 based on calculated grades, CAGs and the final grades.

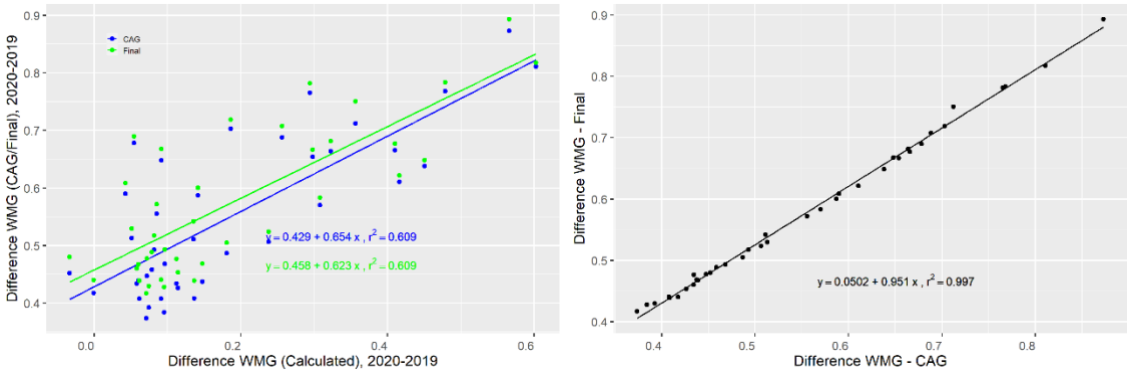

Figure A5 Comparison of changes in population weighted mean grades in A level subjects from 2019 to 2020 estimated based on calculated grades, CAGs and the final grades.

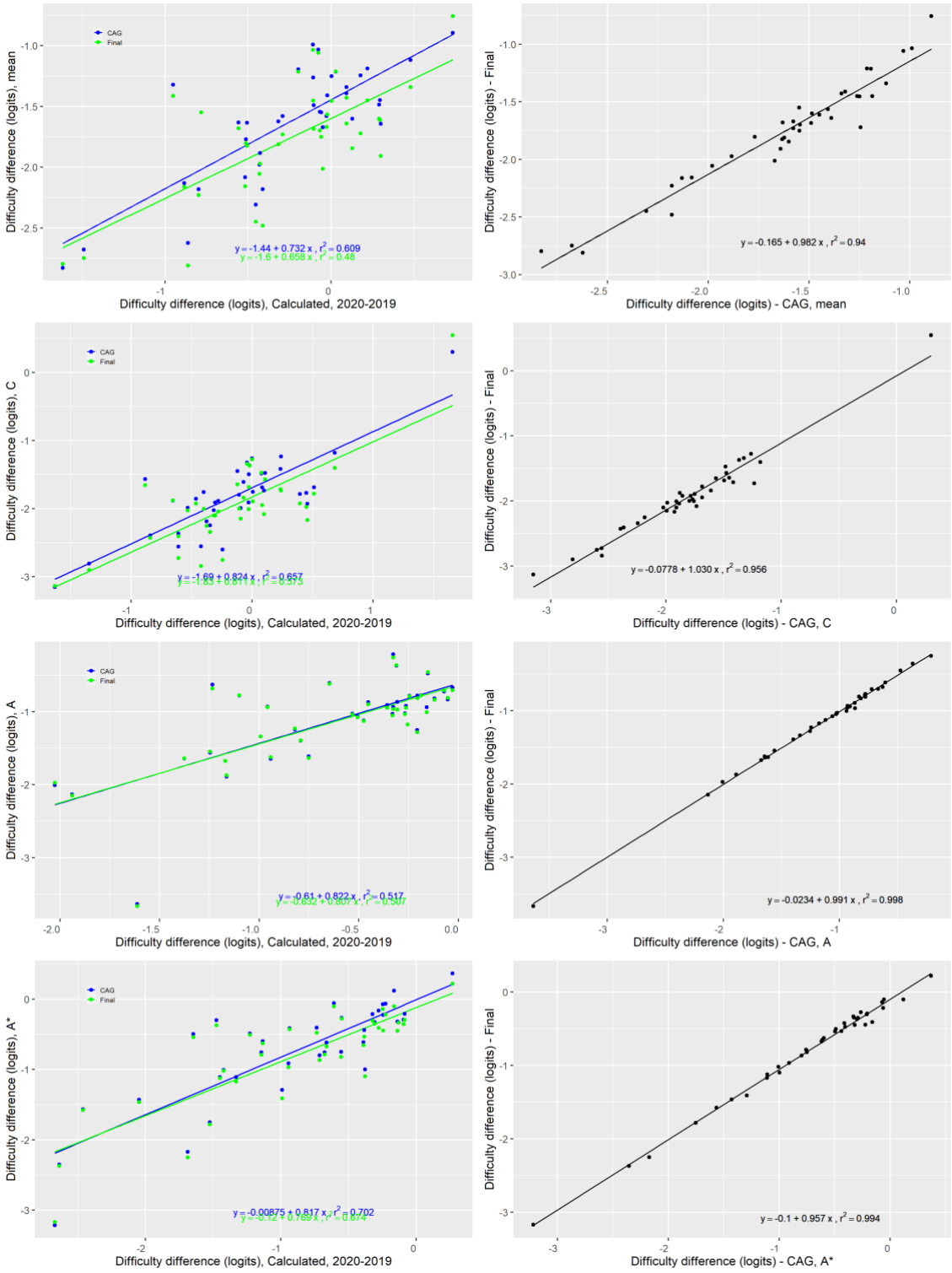

Figure A6 Comparison of changes in grade difficulties from 2019 to 2020 for A level subjects estimated based on calculated grades, CAGs and the final grades derived using the Rasch model.

Appendix B Additional tables

Table B1 Changes in population weighted mean grades in GCSE subjects from 2019 to 2020 estimated based on calculated grades, CAGs and the final grades

Subject	Calculated	CAG	Final
Italian	-0.02	0.15	0.32
Urdu	0.14	0.46	0.61
AD_Photog	0.06	0.35	0.49
AD_FA	0.03	0.47	0.55
AD_Textiles	0.11	0.55	0.63
AD_ACD	0.04	0.45	0.54
Physics	0.10	0.56	0.64
Dance	0.19	0.84	0.90
Biology	0.11	0.57	0.64
Chemistry	0.10	0.58	0.65
RS	0.02	0.35	0.43
Latin	0.38	1.05	1.13
Drama	0.07	0.69	0.75
Food_P&N	0.03	0.52	0.60
Eng_Lit	0.00	0.30	0.34
AD_Graphics	0.09	0.58	0.67
Media_Studies	0.09	0.53	0.62
Film_Studies	0.20	0.54	0.65
Music	0.15	0.83	0.90
Eng_Lang	0.07	0.42	0.45
PE	0.08	0.61	0.66
Citi_Studies	0.07	0.48	0.55
Mathematics	0.12	0.34	0.38
Sociology	0.12	0.60	0.67
D&T	0.06	0.66	0.72
Geography	0.04	0.53	0.56
Class_Civil	0.28	1.10	1.13
History	0.04	0.52	0.57
AD_3DStudies	0.21	0.54	0.62
Business	0.08	0.65	0.70
Spanish	0.03	0.53	0.62
Economics	0.21	0.91	0.96
Statistics	0.31	0.59	0.69
French	0.13	0.52	0.62
German	0.14	0.63	0.70
Cbd_Science	0.05	0.32	0.38
RS_SC	0.01	0.43	0.52
Psychology	0.18	0.89	0.93
Computing	0.10	0.96	1.00

Table B2 Correlation of grade outcomes with normalized KS2 score for GCSE subjects from 2018 to 2020.

Subject	18_Final	19_Final	20_Calc	20_CAG	20_Final
AD_3DStudies		0.37	0.36	0.41	0.41
AD_ACD	0.46	0.48	0.47	0.49	0.49
AD_FA	0.48	0.49	0.49	0.50	0.50
AD_Graphics	0.38	0.38	0.40	0.44	0.43
AD_Photog	0.39	0.38	0.39	0.41	0.41
AD_Textiles	0.44	0.43	0.46	0.49	0.49
Biology	0.63	0.63	0.60	0.61	0.61
Business		0.63	0.62	0.63	0.63
Cbd_Science	0.63	0.61	0.61	0.61	0.61
Chemistry	0.58	0.59	0.56	0.58	0.58

Citi_Studies	0.55	0.54	0.54	0.56	0.55
Class_Civil		0.57	0.56	0.60	0.60
Computing	0.66	0.67	0.64	0.65	0.65
D&T		0.59	0.57	0.60	0.60
Dance	0.49	0.51	0.52	0.55	0.55
Drama	0.58	0.58	0.58	0.59	0.60
Economics		0.62	0.59	0.61	0.61
Eng_Lang	0.65	0.65	0.67	0.67	0.67
Eng_Lit	0.60	0.60	0.64	0.64	0.64
Film_Studies		0.51	0.55	0.58	0.57
Food_P&N	0.59	0.58	0.58	0.59	0.60
French	0.57	0.56	0.55	0.56	0.56
Geography	0.70	0.70	0.70	0.70	0.70
German	0.57	0.57	0.56	0.59	0.58
History	0.63	0.63	0.65	0.65	0.65
Italian		0.27	0.25	0.30	0.29
Latin	0.44	0.55	0.50	0.53	0.53
Mathematics	0.76	0.76	0.75	0.75	0.75
Media_Studies		0.52	0.53	0.55	0.55
Music	0.57	0.58	0.58	0.61	0.61
PE	0.59	0.61	0.60	0.61	0.61
Physics	0.59	0.60	0.57	0.59	0.59
Psychology		0.58	0.57	0.59	0.59
RS	0.57	0.57	0.57	0.58	0.58
RS_SC	0.59	0.60	0.60	0.61	0.61
Sociology		0.56	0.56	0.57	0.57
Spanish	0.52	0.51	0.49	0.52	0.51
Statistics		0.73	0.67	0.70	0.69
Urdu		0.36	0.35	0.35	0.36

Table B3 Inter-subject correlation for a selection of GCSE subjects from 2018 to 2020.

18 Final											
	Biology	Chemistry	Eng_Lang	Eng_Lit	French	Geography	German	History	Mathematics	Physics	Spanish
Biology	1.00	0.89	0.66	0.66	0.64	0.80	0.64	0.74	0.81	0.87	0.60
Chemistry		1.00	0.60	0.62	0.63	0.77	0.64	0.71	0.82	0.89	0.61
Eng_Lang			1.00	0.83	0.63	0.79	0.63	0.78	0.72	0.58	0.55
Eng_Lit				1.00	0.62	0.79	0.62	0.78	0.69	0.58	0.55
French					1.00	0.69	0.75	0.67	0.64	0.62	0.64
Geography						1.00	0.69	0.86	0.81	0.75	0.62
German							1.00	0.66	0.65	0.62	0.61
History								1.00	0.74	0.69	0.62
Mathematics									1.00	0.84	0.56
Physics										1.00	0.58
Spanish											1.00
19 Final											
	Biology	Chemistry	Eng_Lang	Eng_Lit	French	Geography	German	History	Mathematics	Physics	Spanish
Biology	1.00	0.89	0.66	0.65	0.62	0.79	0.61	0.73	0.82	0.87	0.58
Chemistry		1.00	0.60	0.60	0.62	0.76	0.62	0.70	0.82	0.89	0.58
Eng_Lang			1.00	0.84	0.62	0.80	0.61	0.78	0.72	0.59	0.54
Eng_Lit				1.00	0.61	0.79	0.61	0.79	0.69	0.59	0.54
French					1.00	0.67	0.70	0.65	0.63	0.61	0.66
Geography						1.00	0.68	0.86	0.81	0.75	0.60
German							1.00	0.65	0.64	0.61	0.59
History								1.00	0.73	0.69	0.60
Mathematics									1.00	0.84	0.55
Physics										1.00	0.57
Spanish											1.00
20 Calc											
	Biology	Chemistry	Eng_Lang	Eng_Lit	French	Geography	German	History	Mathematics	Physics	Spanish
Biology	1.00	0.85	0.67	0.66	0.58	0.73	0.59	0.68	0.76	0.83	0.54
Chemistry		1.00	0.61	0.62	0.58	0.70	0.58	0.65	0.77	0.85	0.54
Eng_Lang			1.00	0.90	0.65	0.81	0.66	0.80	0.75	0.60	0.57
Eng_Lit				1.00	0.65	0.80	0.66	0.80	0.74	0.60	0.57
French					1.00	0.67	0.70	0.66	0.63	0.57	0.60
Geography						1.00	0.67	0.84	0.80	0.69	0.59
German							1.00	0.66	0.64	0.57	0.60

History								1.00	0.75	0.64	0.60
Mathematics									1.00	0.78	0.55
Physics										1.00	0.53
Spanish											1.00
20 CAG											
	Biology	Chemistry	Eng_Lang	Eng_Lit	French	Geography	German	History	Mathematics	Physics	Spanish
Biology	1.00	0.87	0.70	0.69	0.62	0.75	0.62	0.71	0.80	0.85	0.59
Chemistry		1.00	0.65	0.66	0.62	0.73	0.63	0.69	0.80	0.87	0.59
Eng_Lang			1.00	0.92	0.67	0.82	0.69	0.81	0.77	0.63	0.60
Eng_Lit				1.00	0.68	0.81	0.70	0.81	0.74	0.64	0.61
French					1.00	0.70	0.75	0.69	0.66	0.61	0.66
Geography						1.00	0.70	0.85	0.81	0.72	0.63
German							1.00	0.70	0.68	0.61	0.68
History								1.00	0.76	0.68	0.64
Mathematics									1.00	0.81	0.59
Physics										1.00	0.58
Spanish											1.00
20 Final											
	Biology	Chemistry	Eng_Lang	Eng_Lit	French	Geography	German	History	Mathematics	Physics	Spanish
Biology	1.00	0.86	0.70	0.68	0.61	0.75	0.62	0.70	0.79	0.85	0.59
Chemistry		1.00	0.64	0.65	0.61	0.72	0.62	0.68	0.80	0.87	0.58
Eng_Lang			1.00	0.91	0.67	0.82	0.69	0.81	0.76	0.63	0.60
Eng_Lit				1.00	0.67	0.81	0.69	0.81	0.74	0.63	0.60
French					1.00	0.69	0.74	0.69	0.65	0.60	0.65
Geography						1.00	0.70	0.85	0.81	0.71	0.62
German							1.00	0.70	0.67	0.60	0.67
History								1.00	0.76	0.67	0.64
Mathematics									1.00	0.81	0.58
Physics										1.00	0.57
Spanish											1.00

Table B4 Changes in Rasch grade difficulties (logits) for GCSE subjects from 2019 to 2020 estimated based on calculated grades, CAGs and the final grades.

Subject	Mean			Grade 4			Grade 7			Grade 9		
	Calc	CAG	Final	Calc	CAG	Final	Calc	CAG	Final	Calc	CAG	Final
AD_3DStudies	-0.42	-0.88	-0.96	-0.64	-1.67	-1.69	-0.26	-0.21	-0.33	-0.26	0.25	-0.01
AD_ACD	-0.11	-0.71	-0.81	-0.08	-1.32	-1.34	-0.16	-0.23	-0.35	-0.15	0.24	-0.04
AD_FA	-0.13	-0.77	-0.86	-0.13	-1.36	-1.39	-0.16	-0.31	-0.39	-0.15	0.16	-0.08
AD_Graphics	-0.22	-0.88	-0.99	-0.26	-1.50	-1.56	-0.19	-0.35	-0.45	-0.15	0.16	-0.14
AD_Photog	-0.10	-0.58	-0.75	-0.04	-1.13	-1.22	-0.17	-0.19	-0.36	-0.14	0.36	-0.01
AD_Textiles	-0.20	-0.82	-0.91	-0.26	-1.45	-1.51	-0.21	-0.35	-0.43	-0.08	0.19	-0.04
Biology	-0.04	-0.54	-0.64	0.02	-0.96	-1.05	-0.12	-0.20	-0.25	-0.16	0.14	0.03
Business	-0.19	-0.72	-0.76	-0.17	-1.06	-1.06	-0.23	-0.44	-0.50	-0.23	-0.21	-0.33
Cbd_Science	-0.15	-0.34	-0.41	-0.11	-0.65	-0.65	-0.20	-0.08	-0.19	-0.19	0.23	0.01
Chemistry	-0.04	-0.52	-0.62	0.01	-0.99	-1.07	-0.13	-0.12	-0.19	-0.15	0.21	0.08
Citi_Studies	-0.11	-0.52	-0.57	-0.09	-0.85	-0.87	-0.14	-0.25	-0.32	-0.15	-0.01	-0.12
Class_Civil	-0.24	-1.04	-1.05	-0.22	-1.61	-1.54	-0.30	-0.53	-0.59	-0.24	-0.21	-0.31
Computing	-0.12	-0.74	-0.78	-0.11	-1.15	-1.14	-0.14	-0.36	-0.41	-0.17	-0.24	-0.36
D&T	-0.16	-0.80	-0.87	-0.16	-1.30	-1.31	-0.20	-0.38	-0.47	-0.16	-0.06	-0.23
Dance	-0.27	-1.00	-1.06	-0.28	-1.45	-1.48	-0.33	-0.66	-0.71	-0.35	-0.44	-0.55
Drama	-0.13	-0.83	-0.91	-0.12	-1.27	-1.29	-0.19	-0.56	-0.61	-0.15	-0.14	-0.28
Economics	-0.30	-0.89	-0.96	-0.27	-1.28	-1.33	-0.31	-0.53	-0.58	-0.39	-0.22	-0.36
Eng_Lang	-0.11	-0.53	-0.56	-0.08	-0.96	-0.93	-0.18	-0.28	-0.31	-0.15	0.03	-0.06
Eng_Lit	-0.05	-0.36	-0.40	0.00	-0.69	-0.69	-0.15	-0.09	-0.15	-0.15	0.21	0.09
Film_Studies	-0.19	-0.61	-0.72	-0.23	-1.14	-1.17	-0.17	-0.14	-0.29	-0.18	0.23	-0.06
Food_P&N	-0.14	-0.74	-0.82	-0.12	-1.23	-1.25	-0.19	-0.39	-0.48	-0.16	-0.07	-0.26
French	-0.21	-0.39	-0.51	-0.13	-0.82	-0.85	-0.29	-0.06	-0.21	-0.66	0.09	-0.28
Geography	-0.14	-0.55	-0.57	-0.12	-0.91	-0.89	-0.18	-0.24	-0.29	-0.19	-0.11	-0.20
German	-0.24	-0.56	-0.65	-0.16	-0.89	-0.93	-0.30	-0.29	-0.39	-0.55	-0.01	-0.26
History	-0.16	-0.52	-0.55	-0.15	-0.92	-0.90	-0.18	-0.15	-0.21	-0.18	0.06	-0.06
Italian	0.11	-0.09	-0.25	0.09	-0.40	-0.54	0.16	0.17	0.04	0.23	0.36	0.28
Latin	-0.12	-0.62	-0.71	-0.07	-1.03	-1.08	-0.16	-0.21	-0.33	-0.25	0.08	-0.07
Mathematics	-0.19	-0.39	-0.42	-0.13	-0.69	-0.67	-0.25	-0.10	-0.17	-0.22	-0.02	-0.09
Media_Studies	-0.19	-0.69	-0.79	-0.19	-1.14	-1.18	-0.21	-0.32	-0.42	-0.18	-0.04	-0.23
Music	-0.26	-0.96	-1.05	-0.28	-1.51	-1.55	-0.28	-0.58	-0.65	-0.24	-0.18	-0.32
PE	-0.11	-0.67	-0.75	-0.08	-1.03	-1.06	-0.20	-0.46	-0.51	-0.23	-0.36	-0.45
Physics	-0.05	-0.52	-0.64	0.00	-1.00	-1.11	-0.12	-0.12	-0.18	-0.16	0.19	0.07
Psychology	-0.24	-0.77	-0.79	-0.23	-1.16	-1.15	-0.24	-0.38	-0.43	-0.28	-0.23	-0.32
RS	-0.12	-0.40	-0.47	-0.10	-0.79	-0.81	-0.16	-0.08	-0.18	-0.17	0.10	-0.03
RS_SC	-0.16	-0.47	-0.55	-0.20	-0.96	-0.96	-0.14	-0.08	-0.20	-0.08	0.22	-0.01
Sociology	-0.21	-0.62	-0.67	-0.20	-0.98	-0.98	-0.24	-0.31	-0.38	-0.30	-0.23	-0.35
Spanish	-0.09	-0.40	-0.49	-0.10	-0.81	-0.84	-0.11	-0.08	-0.18	0.03	0.07	-0.06
Statistics	-0.39	-0.56	-0.65	-0.36	-0.92	-0.98	-0.44	-0.30	-0.41	-0.59	-0.19	-0.31
Urdu	-0.28	-0.67	-0.81	-0.25	-1.14	-1.21	-0.39	-0.33	-0.45	-0.21	-0.13	-0.23

Table B5 Changes in Rasch grade difficulties (logits) for GCSE subjects from 2019 to 2020 estimated based on calculated grades, CAGs and the final grades

Subject	Calculated grades				CAGs				Final grades			
	Mean	G4	G7	G9	Mean	G4	G7	G9	Mean	G4	G7	G9
AD_3DStudies	-0.42	-0.64	-0.26	-0.26	-0.88	-1.67	-0.21	0.25	-0.96	-1.69	-0.33	-0.01
AD_ACD	-0.11	-0.08	-0.16	-0.15	-0.71	-1.32	-0.23	0.24	-0.81	-1.34	-0.35	-0.04
AD_FA	-0.13	-0.13	-0.16	-0.15	-0.77	-1.36	-0.31	0.16	-0.86	-1.39	-0.39	-0.08
AD_Graphics	-0.22	-0.26	-0.19	-0.15	-0.88	-1.50	-0.35	0.16	-0.99	-1.56	-0.45	-0.14
AD_Photog	-0.10	-0.04	-0.17	-0.14	-0.58	-1.13	-0.19	0.36	-0.75	-1.22	-0.36	-0.01
AD_Textiles	-0.20	-0.26	-0.21	-0.08	-0.82	-1.45	-0.35	0.19	-0.91	-1.51	-0.43	-0.04
Biology	-0.04	0.02	-0.12	-0.16	-0.54	-0.96	-0.20	0.14	-0.64	-1.05	-0.25	0.03
Business	-0.19	-0.17	-0.23	-0.23	-0.72	-1.06	-0.44	-0.21	-0.76	-1.06	-0.50	-0.33

Cbd_Science	-0.15	-0.11	-0.20	-0.19	-0.34	-0.65	-0.08	0.23	-0.41	-0.65	-0.19	0.01
Chemistry	-0.04	0.01	-0.13	-0.15	-0.52	-0.99	-0.12	0.21	-0.62	-1.07	-0.19	0.08
Citi_Studies	-0.11	-0.09	-0.14	-0.15	-0.52	-0.85	-0.25	-0.01	-0.57	-0.87	-0.32	-0.12
Class_Civil	-0.24	-0.22	-0.30	-0.24	-1.04	-1.61	-0.53	-0.21	-1.05	-1.54	-0.59	-0.31
Computing	-0.12	-0.11	-0.14	-0.17	-0.74	-1.15	-0.36	-0.24	-0.78	-1.14	-0.41	-0.36
D&T	-0.16	-0.16	-0.20	-0.16	-0.80	-1.30	-0.38	-0.06	-0.87	-1.31	-0.47	-0.23
Dance	-0.27	-0.28	-0.33	-0.35	-1.00	-1.45	-0.66	-0.44	-1.06	-1.48	-0.71	-0.55
Drama	-0.13	-0.12	-0.19	-0.15	-0.83	-1.27	-0.56	-0.14	-0.91	-1.29	-0.61	-0.28
Economics	-0.30	-0.27	-0.31	-0.39	-0.89	-1.28	-0.53	-0.22	-0.96	-1.33	-0.58	-0.36
Eng_Lang	-0.11	-0.08	-0.18	-0.15	-0.53	-0.96	-0.28	0.03	-0.56	-0.93	-0.31	-0.06
Eng_Lit	-0.05	0.00	-0.15	-0.15	-0.36	-0.69	-0.09	0.21	-0.40	-0.69	-0.15	0.09
Film_Studies	-0.19	-0.23	-0.17	-0.18	-0.61	-1.14	-0.14	0.23	-0.72	-1.17	-0.29	-0.06
Food_P&N	-0.14	-0.12	-0.19	-0.16	-0.74	-1.23	-0.39	-0.07	-0.82	-1.25	-0.48	-0.26
French	-0.21	-0.13	-0.29	-0.66	-0.39	-0.82	-0.06	0.09	-0.51	-0.85	-0.21	-0.28
Geography	-0.14	-0.12	-0.18	-0.19	-0.55	-0.91	-0.24	-0.11	-0.57	-0.89	-0.29	-0.20
German	-0.24	-0.16	-0.30	-0.55	-0.56	-0.89	-0.29	-0.01	-0.65	-0.93	-0.39	-0.26
History	-0.16	-0.15	-0.18	-0.18	-0.52	-0.92	-0.15	0.06	-0.55	-0.90	-0.21	-0.06
Italian	0.11	0.09	0.16	0.23	-0.09	-0.40	0.17	0.36	-0.25	-0.54	0.04	0.28
Latin	-0.12	-0.07	-0.16	-0.25	-0.62	-1.03	-0.21	0.08	-0.71	-1.08	-0.33	-0.07
Mathematics	-0.19	-0.13	-0.25	-0.22	-0.39	-0.69	-0.10	-0.02	-0.42	-0.67	-0.17	-0.09
Media_Studies	-0.19	-0.19	-0.21	-0.18	-0.69	-1.14	-0.32	-0.04	-0.79	-1.18	-0.42	-0.23
Music	-0.26	-0.28	-0.28	-0.24	-0.96	-1.51	-0.58	-0.18	-1.05	-1.55	-0.65	-0.32
PE	-0.11	-0.08	-0.20	-0.23	-0.67	-1.03	-0.46	-0.36	-0.75	-1.06	-0.51	-0.45
Physics	-0.05	0.00	-0.12	-0.16	-0.52	-1.00	-0.12	0.19	-0.64	-1.11	-0.18	0.07
Psychology	-0.24	-0.23	-0.24	-0.28	-0.77	-1.16	-0.38	-0.23	-0.79	-1.15	-0.43	-0.32
RS	-0.12	-0.10	-0.16	-0.17	-0.40	-0.79	-0.08	0.10	-0.47	-0.81	-0.18	-0.03
RS_SC	-0.16	-0.20	-0.14	-0.08	-0.47	-0.96	-0.08	0.22	-0.55	-0.96	-0.20	-0.01
Sociology	-0.21	-0.20	-0.24	-0.30	-0.62	-0.98	-0.31	-0.23	-0.67	-0.98	-0.38	-0.35
Spanish	-0.09	-0.10	-0.11	0.03	-0.40	-0.81	-0.08	0.07	-0.49	-0.84	-0.18	-0.06
Statistics	-0.39	-0.36	-0.44	-0.59	-0.56	-0.92	-0.30	-0.19	-0.65	-0.98	-0.41	-0.31
Urdu	-0.28	-0.25	-0.39	-0.21	-0.67	-1.14	-0.33	-0.13	-0.81	-1.21	-0.45	-0.23

Table B6 Differences in Rasch grade difficulties (logits) between CAGs and calculate grades for GCSE subjects from 2020.

Subject	Mean	G4	G7	G9
AD_3DStudies	-0.46	-1.03	0.05	0.51
AD_ACD	-0.61	-1.23	-0.07	0.39
AD_FA	-0.65	-1.23	-0.14	0.32
AD_Graphics	-0.66	-1.25	-0.16	0.31
AD_Photog	-0.49	-1.08	-0.02	0.51
AD_Textiles	-0.62	-1.19	-0.14	0.27
Biology	-0.51	-0.98	-0.07	0.30
Business	-0.53	-0.89	-0.21	0.02
Cbd_Science	-0.19	-0.54	0.12	0.42
Chemistry	-0.48	-1.00	0.01	0.36
Citi_Studies	-0.41	-0.76	-0.11	0.14
Class_Civil	-0.80	-1.39	-0.24	0.03
Computing	-0.62	-1.04	-0.22	-0.08
D&T	-0.64	-1.14	-0.19	0.10
Dance	-0.72	-1.17	-0.33	-0.09
Drama	-0.70	-1.15	-0.37	0.02
Economics	-0.59	-1.00	-0.22	0.17
Eng_Lang	-0.43	-0.87	-0.09	0.17
Eng_Lit	-0.31	-0.69	0.06	0.36
Film_Studies	-0.42	-0.91	0.03	0.41
Food_P&N	-0.60	-1.10	-0.20	0.09

French	-0.18	-0.69	0.23	0.75
Geography	-0.42	-0.79	-0.06	0.08
German	-0.32	-0.73	0.01	0.54
History	-0.36	-0.77	0.03	0.24
Italian	-0.20	-0.49	0.01	0.13
Latin	-0.50	-0.97	-0.05	0.32
Mathematics	-0.20	-0.56	0.14	0.21
Media_Studies	-0.50	-0.95	-0.11	0.14
Music	-0.70	-1.23	-0.30	0.06
PE	-0.56	-0.95	-0.27	-0.13
Physics	-0.47	-1.00	0.00	0.34
Psychology	-0.53	-0.93	-0.14	0.05
RS	-0.29	-0.69	0.08	0.27
RS_SC	-0.31	-0.76	0.06	0.30
Sociology	-0.41	-0.78	-0.07	0.07
Spanish	-0.31	-0.71	0.03	0.04
Statistics	-0.17	-0.55	0.14	0.40
Urdu	-0.40	-0.89	0.06	0.08

Table B7 Changes in difficulty rank order positions in GCSE subjects from 2018 and 2019.

Subject	Mean	G4	G7	G9
AD_ACD	0	0	1	3
AD_FA	0	0	0	0
AD_Graphics	2	4	0	0
AD_Photog	0	0	0	0
AD_Textiles	0	0	-1	-2
Biology	2	0	0	0
Cbd_Science	0	0	1	-2
Chemistry	0	2	1	0
Citi_Studies	0	0	-2	-2
Computing	1	0	0	0
Dance	-5	-2	0	2
Drama	0	0	1	1
Eng_Lang	1	-1	0	0
Eng_Lit	-2	-1	0	1
Food_P&N	-1	-1	-1	-3
French	-1	0	0	0
Geography	0	0	-3	0
German	1	0	0	0
History	-1	0	1	-1
Latin	-1	0	-3	-2
Mathematics	1	-1	0	0
Music	1	0	3	2
PE	1	0	3	2
Physics	0	0	-1	0
RS	1	0	1	0
RS_SC	0	-1	-2	1
Spanish	0	1	1	0

Table B8 Changes in population weighted mean grades in A level subjects from 2019 to 2020 estimated based on calculated grades, CAGs and the final grades

Subject	Calculated	CAG	Final
Chinese	0.57	0.87	0.89

AD_Textiles	0.24	0.51	0.52
AD_Graphics	0.10	0.38	0.43
AD_Photog	0.11	0.43	0.48
AD_3DS	0.14	0.41	0.44
AD_FA	0.09	0.41	0.44
AD_ACD	0.15	0.44	0.47
Dance	0.42	0.61	0.62
Sociology	0.07	0.39	0.43
Film_Studies	0.11	0.43	0.45
Media_Studies	0.07	0.37	0.42
Bus_Studies	0.07	0.45	0.48
Drama_TS	0.30	0.65	0.67
Politics	0.08	0.46	0.49
Class_Civil	0.18	0.49	0.50
Eng_Lang	0.00	0.42	0.44
Eng_LangLit	0.10	0.47	0.49
RS	0.14	0.51	0.54
Law	0.09	0.56	0.57
Eng_Lit	0.08	0.49	0.52
Spanish	0.32	0.66	0.68
DT_PD	0.41	0.67	0.68
History	0.06	0.43	0.46
Geography	0.06	0.41	0.44
Economics	0.06	0.44	0.47
German	0.45	0.64	0.65
Psychology	0.05	0.51	0.53
French	0.31	0.57	0.58
Fur_Maths	0.36	0.71	0.75
PE	0.26	0.69	0.71
Accounting	0.14	0.59	0.60
Music	0.60	0.81	0.82
Mathematics	-0.03	0.45	0.48
Music_Tech	0.48	0.77	0.78
Philosophy	0.19	0.70	0.72
Computing	0.29	0.77	0.78
Physics	0.04	0.59	0.61
Chemistry	0.09	0.65	0.67
Biology	0.05	0.68	0.69

Table B9 Correlation of grade outcomes with normalized GCSE score for A level subjects from 2018 to 2020.

Subject	**18_Final**	**19_Final**	**20_Calc**	**20_CAG**	**20_Final**
Accounting	0.48	0.53	0.56	0.58	0.58
AD_3DS	0.44	0.43	0.51	0.51	0.51
AD_ACD	0.56	0.57	0.55	0.57	0.57
AD_FA	0.56	0.58	0.56	0.58	0.58
AD_Graphics	0.48	0.46	0.49	0.51	0.50
AD_Photog	0.46	0.44	0.45	0.48	0.48
AD_Textiles	0.50	0.46	0.50	0.52	0.52
Biology	0.70	0.72	0.72	0.71	0.71
Bus_Studies	0.56	0.57	0.62	0.63	0.64
Chemistry	0.65	0.66	0.66	0.66	0.66
Chinese	0.26	0.41	0.22	0.27	0.26
Class_Civil	0.64	0.65	0.68	0.71	0.71
Comm_Studies	0.54				
Computing	0.66	0.68	0.65	0.68	0.68
Dance	0.49	0.55	0.57	0.60	0.61
Drama_TS	0.62	0.62	0.65	0.68	0.68
DT_PD	0.67	0.67	0.65	0.68	0.68
Economics	0.63	0.66	0.68	0.69	0.69
Eng_Lang	0.61	0.63	0.67	0.69	0.69

Eng_LangLit	0.62	0.63	0.66	0.67	0.67
Eng_Lit	0.67	0.69	0.73	0.73	0.73
Film_Studies	0.61	0.60	0.63	0.65	0.65
French	0.60	0.61	0.62	0.65	0.65
Fur_Maths	0.55	0.54	0.52	0.54	0.54
General_Studies	0.58				
Geography	0.68	0.70	0.72	0.74	0.74
Geology	0.69	0.65			
German	0.55	0.56	0.59	0.61	0.61
History	0.65	0.67	0.71	0.72	0.72
HSC	0.60				
ICT	0.57				
Latin	0.65	0.68			
Law	0.54	0.55	0.58	0.58	0.58
Mathematics	0.58	0.59	0.63	0.62	0.62
Media_Studies	0.61	0.59	0.61	0.62	0.63
Music	0.61	0.60	0.65	0.68	0.68
Music_Tech	0.52	0.54	0.57	0.60	0.60
PE	0.64	0.65	0.66	0.69	0.69
Philosophy	0.66	0.65	0.67	0.67	0.67
Physics	0.65	0.67	0.68	0.68	0.68
Polish(M)		0.45			
Politics	0.63	0.62	0.68	0.68	0.69
Psychology	0.66	0.66	0.68	0.68	0.68
RS	0.60	0.63	0.67	0.69	0.69
Russian	0.36				
Sociology	0.57	0.58	0.61	0.63	0.63
Spanish	0.50	0.51	0.52	0.56	0.56
Turkish(M)		0.40			

Table B10 Inter-subject correlation for a selection of A level subjects from 2018 to 2020.

18 Final												
	Biology	Chemistry	Eng_Lang	Eng_LangLit	Eng_Lit	French	Fur_Maths	Geography	History	Mathematics	Physics	Spanish
Biology	1.00	0.84	0.58	0.56	0.61	0.60	0.64	0.65	0.63	0.75	0.83	0.50
Chemistry		1.00	0.53	0.57	0.59	0.60	0.71	0.61	0.62	0.80	0.85	0.51
Eng_Lang			1.00	0.65	0.70	0.49	0.37	0.57	0.63	0.53	0.43	0.46
Eng_LangLit				1.00		0.42	0.66	0.60	0.66	0.63	0.68	0.37
Eng_Lit					1.00	0.58	0.42	0.65	0.68	0.59	0.61	0.55
French						1.00	0.51	0.55	0.59	0.52	0.62	0.61
Fur_Maths							1.00	0.63	0.57	0.79	0.75	0.43
Geography								1.00	0.70	0.59	0.61	0.49
History									1.00	0.59	0.60	0.52
Mathematics										1.00	0.79	0.48
Physics											1.00	0.54
Spanish												1.00
19_Final												
	Biology	Chemistry	Eng_Lang	Eng_LangLit	Eng_Lit	French	Fur_Maths	Geography	History	Mathematics	Physics	Spanish
Biology	1.00	0.85	0.58	0.56	0.61	0.61	0.65	0.68	0.65	0.79	0.83	0.55
Chemistry		1.00	0.54	0.55	0.57	0.62	0.71	0.65	0.64	0.81	0.87	0.55
Eng_Lang			1.00		0.67	0.53		0.64	0.65	0.53	0.42	0.50
Eng_LangLit				1.00		0.47		0.63	0.60	0.63	0.46	0.46
Eng_Lit					1.00	0.56	0.39	0.66	0.68	0.59	0.61	0.53
French						1.00	0.40	0.53	0.56	0.58	0.61	0.60
Fur_Maths							1.00	0.53	0.45	0.80	0.77	0.49
Geography								1.00	0.71	0.59	0.64	0.51
History									1.00	0.61	0.60	0.54
Mathematics										1.00	0.83	0.51
Physics											1.00	0.55
Spanish												1.00
20 Calc												
	Biology	Chemistry	Eng_Lang	Eng_LangLit	Eng_Lit	French	Fur_Maths	Geography	History	Mathematics	Physics	Spanish
Biology	1.00	0.79	0.59	0.64	0.64	0.56	0.58	0.65	0.64	0.71	0.75	0.50
Chemistry		1.00	0.61	0.65	0.61	0.56	0.58	0.62	0.64	0.75	0.78	0.47
Eng_Lang			1.00		0.72	0.53	0.44	0.66	0.64	0.58	0.61	0.46
Eng_LangLit				1.00		0.51		0.64	0.67	0.54	0.58	0.31
Eng_Lit					1.00	0.59	0.50	0.68	0.71	0.63	0.64	0.55
French						1.00	0.48	0.52	0.59	0.54	0.53	0.62
Fur_Maths							1.00	0.54	0.51	0.71	0.63	0.54

Geography								1.00	0.72	0.58	0.62	0.51
History									1.00	0.62	0.66	0.53
Mathematics										1.00	0.75	0.49
Physics											1.00	0.46
Spanish												1.00
20 CAG												
	Biology	Chemistry	Eng_Lang	Eng_LangLit	Eng_Lit	French	Fur_Maths	Geography	History	Mathematics	Physics	Spanish
Biology	1.00	0.80	0.63	0.61	0.66	0.60	0.67	0.69	0.69	0.73	0.79	0.55
Chemistry		1.00	0.69	0.72	0.65	0.61	0.64	0.66	0.67	0.77	0.83	0.54
Eng_Lang			1.00		0.81	0.60	0.57	0.74	0.70	0.64	0.56	0.50
Eng_LangLit				1.00		0.53		0.68	0.71	0.54	0.54	0.32
Eng_Lit					1.00	0.63	0.55	0.74	0.75	0.66	0.68	0.61
French						1.00	0.47	0.57	0.62	0.56	0.56	0.66
Fur_Maths							1.00	0.57	0.53	0.77	0.68	0.53
Geography								1.00	0.77	0.63	0.67	0.54
History									1.00	0.65	0.70	0.59
Mathematics										1.00	0.77	0.53
Physics											1.00	0.51
Spanish												1.00
20 Flinal												
	Biology	Chemistry	Eng_Lang	Eng_LangLit	Eng_Lit	French	Fur_Maths	Geography	History	Mathematics	Physics	Spanish
Biology	1.00	0.80	0.62	0.61	0.67	0.60	0.67	0.69	0.68	0.73	0.79	0.55
Chemistry		1.00	0.68	0.72	0.65	0.61	0.64	0.67	0.67	0.77	0.82	0.54
Eng_Lang			1.00		0.80	0.60	0.57	0.73	0.70	0.64	0.57	0.49
Eng_LangLit				1.00		0.54		0.68	0.71	0.53	0.54	0.32
Eng_Lit					1.00	0.64	0.54	0.73	0.75	0.65	0.68	0.60
French						1.00	0.48	0.57	0.62	0.56	0.57	0.65
Fur_Maths							1.00	0.57	0.54	0.76	0.68	0.54
Geography								1.00	0.77	0.62	0.67	0.54
History									1.00	0.65	0.70	0.58
Mathematics										1.00	0.77	0.53
Physics											1.00	0.51
Spanish												1.00

Table B11 Changes in Rasch grade difficulties (logits) for A level subjects from 2019 to 2020 estimated based on calculated grades, CAGs and the final grades

Subject	Mean			C			A			A*		
	Calc	CAG	Final	Calc	CAG	Final	Calc	CAG	Final	Calc	CAG	Final
Accounting	-0.51	-1.77	-1.80	-0.53	-1.99	-2.03	-0.53	-1.03	-1.04	-1.69	-2.17	-2.25
AD_3DS	-0.02	-1.41	-1.57	-0.07	-1.61	-1.84	-0.21	-0.78	-0.81	0.27	0.37	0.22
AD_ACD	0.29	-1.49	-1.60	0.51	-1.69	-1.78	-0.36	-0.91	-0.94	-0.16	0.12	-0.10
AD_FA	0.30	-1.45	-1.61	0.40	-1.79	-1.92	-0.26	-0.92	-0.95	-0.23	-0.06	-0.22
AD_Graphics	0.13	-1.60	-1.85	0.45	-1.77	-1.97	-0.31	-0.87	-0.97	-0.28	-0.16	-0.41
AD_Photog	0.30	-1.64	-1.91	0.46	-1.93	-2.17	-0.16	-0.94	-1.01	-0.24	-0.22	-0.45
AD_Textiles	-0.41	-2.18	-2.48	-0.42	-2.56	-2.84	-0.48	-1.12	-1.13	-0.32	-0.21	-0.31
Biology	0.03	-1.21	-1.21	0.08	-1.48	-1.47	-0.15	-0.47	-0.46	-0.55	-0.26	-0.28
Bus_Studies	-0.07	-1.55	-1.70	0.01	-1.75	-1.89	-0.33	-1.03	-1.05	-0.38	-0.44	-0.53
Chemistry	-0.08	-1.03	-1.06	0.00	-1.26	-1.28	-0.31	-0.37	-0.36	-0.93	-0.41	-0.43
Chinese	0.74	-0.89	-0.76	1.66	0.30	0.55	-1.61	-3.64	-3.67	-2.67	-3.22	-3.17
Class_Civil	-0.51	-1.63	-1.82	-0.40	-1.76	-2.00	-0.99	-1.34	-1.34	-1.45	-1.11	-1.12
Computing	-0.80	-2.18	-2.23	-0.61	-2.37	-2.41	-1.38	-1.64	-1.64	-2.64	-2.35	-2.37
Dance	-0.86	-2.62	-2.81	-0.61	-2.56	-2.73	-1.17	-1.67	-1.68	-0.73	-0.41	-0.48
Drama_TS	-0.45	-2.31	-2.45	-0.24	-2.60	-2.75	-1.16	-1.89	-1.87	-1.33	-1.11	-1.17
DT_PD	-0.88	-2.13	-2.16	-0.84	-2.39	-2.43	-1.25	-1.56	-1.55	-1.42	-1.01	-1.02
Economics	-0.29	-1.58	-1.73	-0.28	-1.88	-2.04	-0.45	-0.87	-0.90	-0.68	-0.76	-0.79
Eng_Lang	0.48	-1.12	-1.34	0.68	-1.18	-1.40	-0.26	-1.17	-1.18	-0.55	-0.75	-0.82
Eng_LangLit	0.09	-1.39	-1.64	0.08	-1.69	-1.95	-0.27	-1.02	-1.03	-0.14	-0.32	-0.45
Eng_Lit	-0.06	-1.55	-1.75	-0.09	-1.99	-2.15	-0.19	-0.78	-0.78	-0.25	-0.07	-0.14
Film_Studies	-0.05	-1.67	-2.01	0.10	-1.74	-2.08	-0.75	-1.61	-1.64	-0.99	-1.29	-1.41
French	-0.56	-1.63	-1.68	-0.46	-1.86	-1.92	-0.96	-0.93	-0.94	-1.23	-0.49	-0.51
Fur_Maths	-0.95	-1.32	-1.41	-0.88	-1.57	-1.65	-1.23	-0.63	-0.68	-1.65	-0.50	-0.54
Geography	-0.11	-1.26	-1.45	-0.12	-1.45	-1.64	-0.25	-0.78	-0.79	-0.39	-0.61	-0.65
German	-0.78	-1.55	-1.55	-0.66	-1.88	-1.88	-1.10	-0.78	-0.77	-1.48	-0.30	-0.37
History	0.00	-1.25	-1.45	-0.03	-1.49	-1.68	-0.07	-0.72	-0.71	-0.31	-0.33	-0.35
Law	-0.03	-1.58	-1.67	-0.03	-1.91	-2.01	-0.12	-0.82	-0.83	-0.09	-0.29	-0.35
Mathematics	-0.11	-0.99	-1.03	-0.04	-1.33	-1.34	-0.33	-0.21	-0.26	-0.61	-0.06	-0.10
Media_Studies	0.18	-1.24	-1.72	0.24	-1.23	-1.73	-0.21	-1.25	-1.28	-0.38	-1.00	-1.10
Music	-1.62	-2.83	-2.80	-1.63	-3.15	-3.13	-2.03	-2.01	-1.97	-2.46	-1.57	-1.58
Music_Tech	-1.49	-2.68	-2.75	-1.35	-2.81	-2.90	-1.94	-2.13	-2.15	-2.05	-1.43	-1.46
PE	-0.43	-1.88	-1.97	-0.32	-2.02	-2.10	-0.79	-1.40	-1.39	-0.94	-0.91	-0.97
Philosophy	-0.52	-2.08	-2.16	-0.38	-2.19	-2.25	-0.94	-1.65	-1.62	-1.53	-1.75	-1.78
Physics	-0.20	-1.19	-1.21	-0.02	-1.37	-1.37	-0.65	-0.61	-0.62	-1.13	-0.60	-0.63
Politics	-0.32	-1.62	-1.81	-0.31	-1.91	-2.10	-0.51	-1.06	-1.08	-0.66	-0.62	-0.68
Psychology	0.09	-1.34	-1.43	0.11	-1.48	-1.57	-0.05	-0.83	-0.81	-0.13	-0.33	-0.33
RS	-0.10	-1.49	-1.68	-0.11	-1.80	-2.00	-0.33	-0.93	-0.96	-0.71	-0.80	-0.87
Sociology	0.22	-1.19	-1.45	0.24	-1.42	-1.71	-0.03	-0.67	-0.70	-0.08	-0.21	-0.29
Spanish	-0.43	-1.98	-2.05	-0.35	-2.24	-2.34	-0.82	-1.24	-1.23	-1.14	-0.76	-0.79

Table B12 Changes in Rasch grade difficulties (logits) for A level subjects from 2019 to 2020 estimated based on calculated grades, CAGs and the final grades

Subject	Calculated grades				CAGs				Final grades			
	Mean	C	A	A*	Mean	C	A	A*	Mean	C	A	A*
Accounting	-0.51	-0.53	-0.53	-1.69	-1.77	-1.99	-1.03	-2.17	-1.80	-2.03	-1.04	-2.25
AD_3DS	-0.02	-0.07	-0.21	0.27	-1.41	-1.61	-0.78	0.37	-1.57	-1.84	-0.81	0.22
AD_ACD	0.29	0.51	-0.36	-0.16	-1.49	-1.69	-0.91	0.12	-1.60	-1.78	-0.94	-0.10
AD_FA	0.30	0.40	-0.26	-0.23	-1.45	-1.79	-0.92	-0.06	-1.61	-1.92	-0.95	-0.22
AD_Graphics	0.13	0.45	-0.31	-0.28	-1.60	-1.77	-0.87	-0.16	-1.85	-1.97	-0.97	-0.41
AD_Photog	0.30	0.46	-0.16	-0.24	-1.64	-1.93	-0.94	-0.22	-1.91	-2.17	-1.01	-0.45
AD_Textiles	-0.41	-0.42	-0.48	-0.32	-2.18	-2.56	-1.12	-0.21	-2.48	-2.84	-1.13	-0.31

Biology	0.03	0.08	-0.15	-0.55	-1.21	-1.48	-0.47	-0.26	-1.21	-1.47	-0.46	-0.28
Bus_Studies	-0.07	0.01	-0.33	-0.38	-1.55	-1.75	-1.03	-0.44	-1.70	-1.89	-1.05	-0.53
Chemistry	-0.08	0.00	-0.31	-0.93	-1.03	-1.26	-0.37	-0.41	-1.06	-1.28	-0.36	-0.43
Chinese	0.74	1.66	-1.61	-2.67	-0.89	0.30	-3.64	-3.22	-0.76	0.55	-3.67	-3.17
Class_Civil	-0.51	-0.40	-0.99	-1.45	-1.63	-1.76	-1.34	-1.11	-1.82	-2.00	-1.34	-1.12
Computing	-0.80	-0.61	-1.38	-2.64	-2.18	-2.37	-1.64	-2.35	-2.23	-2.41	-1.64	-2.37
Dance	-0.86	-0.61	-1.17	-0.73	-2.62	-2.56	-1.67	-0.41	-2.81	-2.73	-1.68	-0.48
Drama_TS	-0.45	-0.24	-1.16	-1.33	-2.31	-2.60	-1.89	-1.11	-2.45	-2.75	-1.87	-1.17
DT_PD	-0.88	-0.84	-1.25	-1.42	-2.13	-2.39	-1.56	-1.01	-2.16	-2.43	-1.55	-1.02
Economics	-0.29	-0.28	-0.45	-0.68	-1.58	-1.88	-0.87	-0.76	-1.73	-2.04	-0.90	-0.79
Eng_Lang	0.48	0.68	-0.26	-0.55	-1.12	-1.18	-1.17	-0.75	-1.34	-1.40	-1.18	-0.82
Eng_LangLit	0.09	0.08	-0.27	-0.14	-1.39	-1.69	-1.02	-0.32	-1.64	-1.95	-1.03	-0.45
Eng_Lit	-0.06	-0.09	-0.19	-0.25	-1.55	-1.99	-0.78	-0.07	-1.75	-2.15	-0.78	-0.14
Film_Studies	-0.05	0.10	-0.75	-0.99	-1.67	-1.74	-1.61	-1.29	-2.01	-2.08	-1.64	-1.41
French	-0.56	-0.46	-0.96	-1.23	-1.63	-1.86	-0.93	-0.49	-1.68	-1.92	-0.94	-0.51
Fur_Maths	-0.95	-0.88	-1.23	-1.65	-1.32	-1.57	-0.63	-0.50	-1.41	-1.65	-0.68	-0.54
Geography	-0.11	-0.12	-0.25	-0.39	-1.26	-1.45	-0.78	-0.61	-1.45	-1.64	-0.79	-0.65
German	-0.78	-0.66	-1.10	-1.48	-1.55	-1.88	-0.78	-0.30	-1.55	-1.88	-0.77	-0.37
History	0.00	-0.03	-0.07	-0.31	-1.25	-1.49	-0.72	-0.33	-1.45	-1.68	-0.71	-0.35
Law	-0.03	-0.03	-0.12	-0.09	-1.58	-1.91	-0.82	-0.29	-1.67	-2.01	-0.83	-0.35
Mathematics	-0.11	-0.04	-0.33	-0.61	-0.99	-1.33	-0.21	-0.06	-1.03	-1.34	-0.26	-0.10
Media_Studies	0.18	0.24	-0.21	-0.38	-1.24	-1.23	-1.25	-1.00	-1.72	-1.73	-1.28	-1.10
Music	-1.62	-1.63	-2.03	-2.46	-2.83	-3.15	-2.01	-1.57	-2.80	-3.13	-1.97	-1.58
Music_Tech	-1.49	-1.35	-1.94	-2.05	-2.68	-2.81	-2.13	-1.43	-2.75	-2.90	-2.15	-1.46
PE	-0.43	-0.32	-0.79	-0.94	-1.88	-2.02	-1.40	-0.91	-1.97	-2.10	-1.39	-0.97
Philosophy	-0.52	-0.38	-0.94	-1.53	-2.08	-2.19	-1.65	-1.75	-2.16	-2.25	-1.62	-1.78
Physics	-0.20	-0.02	-0.65	-1.13	-1.19	-1.37	-0.61	-0.60	-1.21	-1.37	-0.62	-0.63
Politics	-0.32	-0.31	-0.51	-0.66	-1.62	-1.91	-1.06	-0.62	-1.81	-2.10	-1.08	-0.68
Psychology	0.09	0.11	-0.05	-0.13	-1.34	-1.48	-0.83	-0.33	-1.43	-1.57	-0.81	-0.33
RS	-0.10	-0.11	-0.33	-0.71	-1.49	-1.80	-0.93	-0.80	-1.68	-2.00	-0.96	-0.87
Sociology	0.22	0.24	-0.03	-0.08	-1.19	-1.42	-0.67	-0.21	-1.45	-1.71	-0.70	-0.29
Spanish	-0.43	-0.35	-0.82	-1.14	-1.98	-2.24	-1.24	-0.76	-2.05	-2.34	-1.23	-0.79

Table B13 Differences in Rasch grade difficulties (logits) between CAGs and calculate grades for A level subjects from 2020.

Subject	**Mean**	**C**	**A**	**A***
Accounting	-1.26	-1.46	-0.49	-0.48
AD_3DS	-1.39	-1.54	-0.57	0.10
AD_ACD	-1.78	-2.20	-0.55	0.28
AD_FA	-1.74	-2.18	-0.66	0.16
AD_Graphics	-1.73	-2.22	-0.56	0.12
AD_Photog	-1.94	-2.38	-0.78	0.02
AD_Textiles	-1.77	-2.13	-0.64	0.11
Biology	-1.24	-1.56	-0.32	0.29
Bus_Studies	-1.48	-1.76	-0.70	-0.05
Chemistry	-0.96	-1.26	-0.06	0.52
Chinese	-1.63	-1.36	-2.03	-0.55
Class_Civil	-1.13	-1.36	-0.35	0.34
Computing	-1.38	-1.76	-0.27	0.28
Dance	-1.76	-1.95	-0.50	0.33
Drama_TS	-1.85	-2.35	-0.73	0.22
DT_PD	-1.25	-1.55	-0.31	0.42
Economics	-1.29	-1.60	-0.42	-0.08
Eng_Lang	-1.60	-1.86	-0.92	-0.20
Eng_LangLit	-1.48	-1.77	-0.75	-0.18
Eng_Lit	-1.49	-1.90	-0.59	0.17

Film_Studies	-1.62	-1.83	-0.86	-0.30
French	-1.07	-1.39	0.03	0.74
Fur_Maths	-0.37	-0.68	0.61	1.15
Geography	-1.15	-1.33	-0.54	-0.22
German	-0.77	-1.23	0.32	1.18
History	-1.25	-1.47	-0.65	-0.02
Law	-1.55	-1.88	-0.70	-0.20
Mathematics	-0.88	-1.28	0.12	0.55
Media_Studies	-1.42	-1.47	-1.05	-0.62
Music	-1.21	-1.52	0.02	0.90
Music_Tech	-1.19	-1.46	-0.19	0.62
PE	-1.46	-1.71	-0.61	0.03
Philosophy	-1.56	-1.81	-0.70	-0.23
Physics	-1.00	-1.35	0.04	0.54
Politics	-1.31	-1.60	-0.56	0.04
Psychology	-1.43	-1.58	-0.78	-0.20
RS	-1.39	-1.69	-0.61	-0.09
Sociology	-1.41	-1.65	-0.64	-0.12
Spanish	-1.55	-1.90	-0.42	0.39

Table B14 Changes in difficulty rank order positions in A level subjects from 2018 and 2019

Subject	**Mean**	**C**	**A**	**A***
Accounting	3	1	1	11
AD_3DS	-2	-1	0	0
AD_ACD	0	-2	0	-1
AD_FA	0	1	0	1
AD_Graphics	-1	-2	0	0
AD_Photog	-2	-2	-1	0
AD_Textiles	1	3	1	0
Biology	0	-2	1	1
Bus_Studies	0	0	-1	-1
Chemistry	0	0	0	0
Chinese	0	0	0	-2
Class_Civil	-4	-5	-2	-3
Computing	-2	-2	0	0
Dance	2	3	0	0
Drama_TS	0	0	-3	0
DT_PD	-1	-5	2	1
Economics	-1	0	0	1
Eng_Lang	-1	0	3	-1
Eng_LangLit	1	0	0	-2
Eng_Lit	2	2	0	1
Film_Studies	6	2	1	4
French	-2	-2	2	-1
Fur_Maths	0	0	1	1
Geography	1	4	3	0
Geology	7	10	1	-3
German	-2	-3	-4	-7
History	-1	-1	-2	-2
Latin	3	4	1	-2
Law	-1	1	-2	-5
Mathematics	-1	1	3	-2
Media_Studies	-4	-2	0	-1
Music	1	1	-1	0
Music_Tech	0	-1	1	8

PE	0	0	1	2
Philosophy	0	1	-1	3
Physics	0	0	-1	0
Politics	-3	-3	-2	0
Psychology	1	0	1	1
RS	0	1	-2	-2
Sociology	0	0	0	0
Spanish	0	-2	-1	0
Accounting	3	1	1	11
AD_3DS	-2	-1	0	0

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