



International Baccalaureate and A/AS Level Grades

Dr Mike Treadaway: December 2013

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Introduction

Background

For the past three years, the national dataset of Key Stage 5 (KS5) data has included individual component grades for IB i.e. the grades attained by students in individual subjects. Prior to this, the national dataset included only the overall IB points score.

The availability of this data has enabled a comparison of the distribution of grades for students with similar prior-attainment.

The Department for Education (DfE) and UCAS both provide equivalences for subjects taken at KS5. There are differences, for example:

- DfE equate an IB higher grade 7 (270 points) with an A grade at A-Level (270 Points); and
- UCAS equate an IB higher grade 7 (130 Points) - halfway between an A grade (120 Points) and an A* grade (140 Points).

This paper examines the relationship between attainment at Key Stage 4 (KS4) and outcomes in A-Level, AS-Level, IB Higher and IB Standard subjects. From this we derive revised points for each IB grade which provide, in our view, a better equivalence with outcomes in A-Level and AS-Level subjects.

In determining equivalences we have adopted a principle that, provided sufficient students are included in the analysis, outcomes in IB should be commensurate with those achieved at A or AS level by students with similar attainment at KS4.

Our investigations are grouped into 4 areas:

- Investigations 1a and 1b examine grade distributions for students with similar KS4 attainment;
- Investigation 2 applies the outcomes of 1a/1b and compares DfE, UCAS and FFT equivalences;
- Investigation 3 applies a value-added methodology to check the validity of FFT equivalences;
- Investigation 4 examines provides some comparisons for individual subjects.

Summary

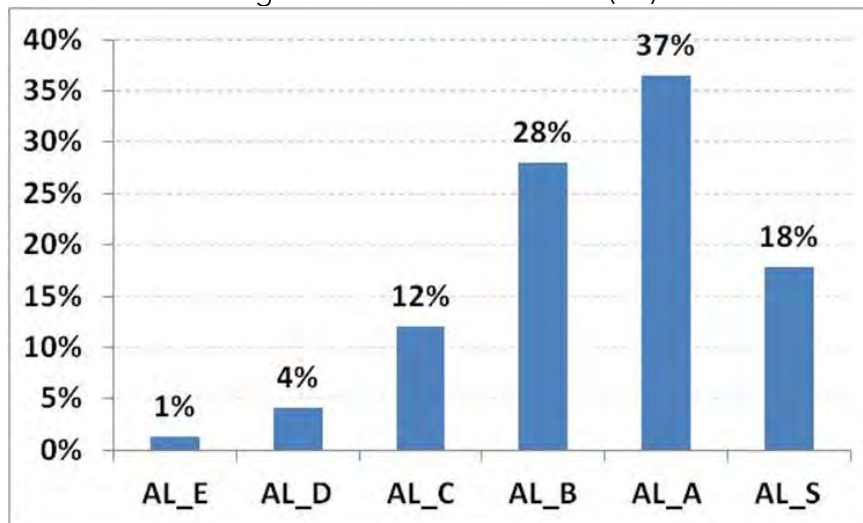
The overall conclusions of our investigations are:

- The points allocated to IB by both DfE and UCAS under-value the attainment of students when compared with the points allocated to A-Levels and AS-Levels; and
- Points derived from a comparison of grade distributions for students with similar KS4 attainment provided a more accurate basis for comparing IB and A / AS – Level outcomes.

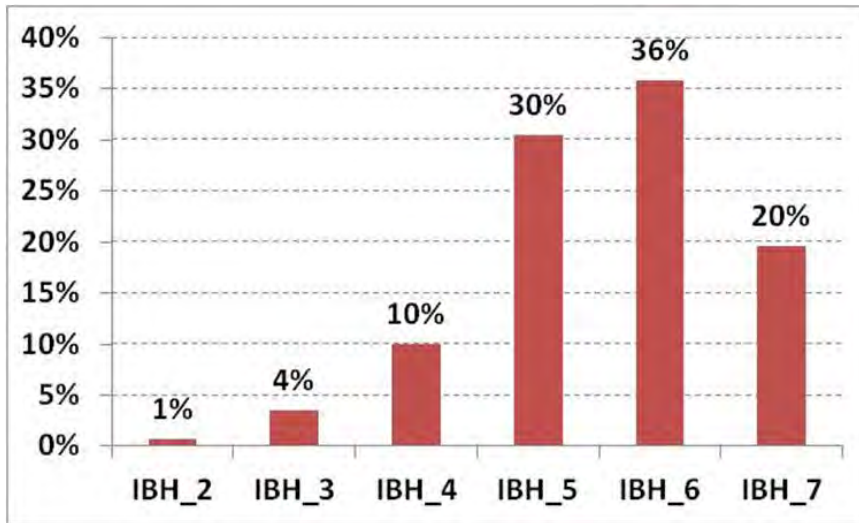
Investigation 1A – Comparability of A-Level (A2) and IB Higher Subjects

Students who take IB tend, on average, to have higher prior attainment than those who take A-Levels. We control for this by comparing students with similar prior-attainment – their capped points score (best 8 subjects) at KS4. In the first instance, we look at students in the top 10% of attainers at KS4:

The distribution of grades achieved at A-level (A2).



The distribution of grades achieved in Higher-Level IB.



The data used is for academic years 2009/10 to 2011/12 combined. The A2 data is based upon a total of 761,468 subject grades and the IB data on a total of 12,880 subject grades.

Overall, the two distributions look very similar. This would suggest an 'equivalence' – based upon the attainment of the specific set of students in this dataset (those in the top 10% of attainers at KS4) – as follows:

IB Higher Grade	A Level Grade
7	A*
6	A
5	B
4	C
3	D
2	E

If we combine them and also show them on a cumulative basis (i.e. the % of students attaining at or above a given grade) by using the equivalences above we find:

A-Level	E	D	C	B	A	A*
IB	2	3	4	5	6	7
A-Level	100%	99%	95%	83%	55%	18%
IB	100%	99%	96%	87%	60%	22%

What happens if we now extend this approach to other students?

For students between the 10th and 20th percentile (based upon their KS4 capped points score):

A-Level	E	D	C	B	A	A*
IB	2	3	4	5	6	7
A-Level	100%	95%	82%	55%	21%	5%
IB	100%	98%	90%	70%	30%	8%

And for those between the 20th and 30th percentile at KS4:

A-Level	E	D	C	B	A	A*
IB	2	3	4	5	6	7
A-Level	100%	92%	71%	37%	10%	2%
IB	100%	96%	86%	58%	23%	6%

Note:

- The KS4 groupings used above are determined using individual student Capped Points Score. This is based upon the students' best 8 subjects using all approved qualifications. This is based upon the students' best 8 subjects using all approved qualifications.
 - Students in the top 10 percent have KS4 scores averaging 55.8 points per subject.
 - Students between the 10th and 20th percentiles have KS4 scores averaging 50.4 points per subject.
 - Students between the 20th and 30th percentiles have KS4 scores averaging 47.5 points per subject.
- In the datasets used for the above analysis, a total of 1,695,225 subject entries were included. Of these, 20,532 (1.2%) were IB subjects.
- The table below shows the distribution of students for IB and A-Level.

Grouping	IB Students	A-Level Students
A (Top 10% at KS4)	64%	46%
B (10 th to 20 th percentile at KS4)	23%	13%
C (20 th to 30 th percentile at KS4)	13%	23%

In all cases, particularly for students below the top 10 percent of attainers at KS4, the % of students attaining at or above a given grade (based upon the equivalence suggested above) is higher for IB than for A-Level. This could arise from a number of factors, including but not limited to:

- Statistical error – students in the top 10% of attainers represent 64% of the cohort in the IB sample used in this investigation; and

- Distribution of KS4 attainment within the broad (10 percent) groupings; and
- Students with lower prior-attainment who take IB are more highly motivated and/or supported than 'similar' students who take A-Level subjects; and
- Independent schools represent a higher proportion of the IB cohort (around 45% of entries) than for A Level (15%) and AS (10%).

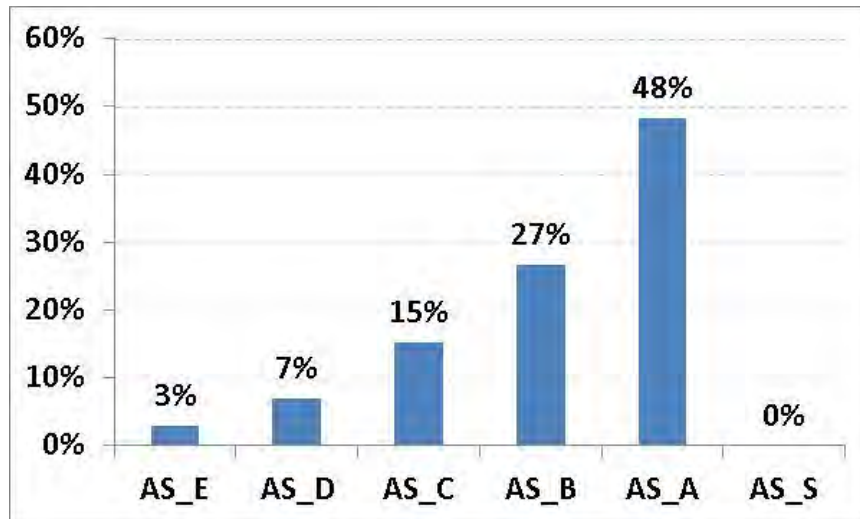
Overall, this investigation would suggest that:

- For students in the top 10 % of attainers at KS4, grades attained in IB compared with those attained in A-Levels are broadly consistent with a scale where a grade 7 at IB is equivalent to an A* at A-Level. A similar pattern is maintained for other grades, with an IB grade 2 equivalent to an E grade at A-Level; and
- For students with lower KS4 attainment, applying the same equivalence scale would result in those taking IB attaining, on average, slightly higher grades than for 'similar' students taking A-Levels.

Investigation 1B – Comparability of AS-Level and IB Standard Subjects

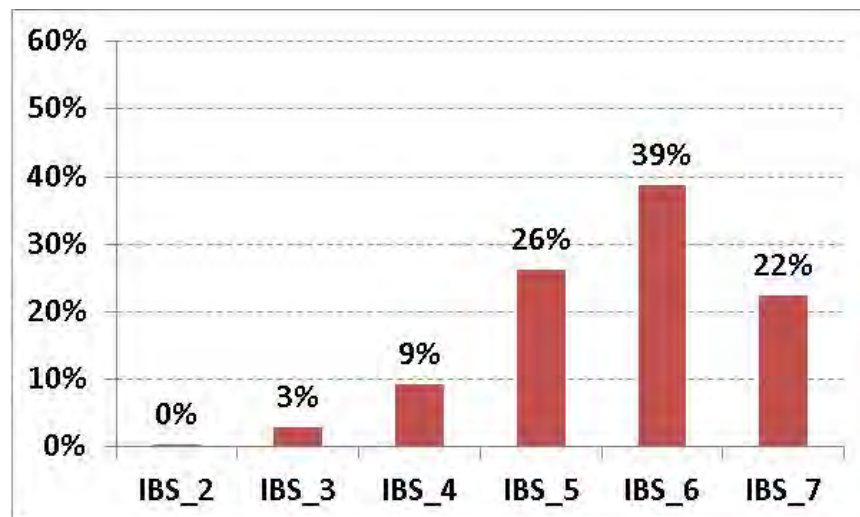
As for Investigation 1A, we compare IB and AS level students with similar prior-attainment based on their capped points score (best 8 subjects) at KS4. In the first instance, we look at students in the top 10% of attainers at KS4:

Distribution of grades achieved at AS-level.



Note: The AS distribution shows 0% for A* because this grade is not available for AS subjects.

Distribution of grades achieved in Standard-Level IB.



The data used is for academic years 2009/10 to 2011/12 combined. The A2 data is based upon a total of 909,941 subject grades and the IB data on a total of 11,667 subject grades.

If we combine them and also show them on a cumulative basis (i.e. the % of students attaining at or above a given grade) by using the same equivalences as for A2 (E1) and equivalences shifted down by a grade (E2) this would give:

IB Higher Grade	AS Grade (E1)	AS Grade (E2)
7	A*	A
6	A	B
5	B	C
4	C	D
3	D	E
2	E	E

For students in the top 10 percent (based upon their KS4 capped points score):

AS-Level	E	D	C	B	A	A*
IB-Std	2	3	4	5	6	7
AS-Level	100%	97%	90%	76%	48%	0%
IB-Std (E1)	100%	99%	94%	83%	58%	23%
IB-Std (E2)	100%	94%	83%	58%	23%	0%

For students between the 10th and 20th percentile (based upon their KS4 capped points score):

A-Level	E	D	C	B	A	A*
IB	2	3	4	5	6	7
A-Level	100%	90%	71%	43%	16%	0%
IB-Std (E1)	100%	96%	82%	58%	29%	11%
IB-Std (E2)	100%	82%	58%	29%	11%	0%

And for those between the 20th and 30th percentile at KS4:

A-Level	E	D	C	B	A	A*
IB	2	3	4	5	6	7
A-Level	100%	83%	57%	28%	8%	0%
IB-Std (E1)	100%	93%	74%	48%	23%	7%
IB-Std (E2)	100%	74%	48%	23%	7%	0%

Apart from the third group, where numbers of IB candidates are relatively small, IB grade equivalences look to be somewhere between E1 and E2, but closer to E1.

Overall, subject to similar caveats expressed in Investigation 1, this would suggest that:

- For students in the top 10 % of attainers at KS4, grades attained in IB standard subjects compared with those attained in AS-Levels do not have direct equivalents on the 'A to E' scale; and
- Equivalence appears to vary according to prior attainment.

Investigation 2 – Comparability of DfE, UCAS points

In this investigation we examine the relationship between attainment at KS4 and points attained in subjects at KS5 for:

- Students taking 3, 4 or 5 A-Levels (A2); and
- Students taking IB using
 - DfE Points Scores
 - UCAS Points Scores (converted to DfE Scale)
 - FFT Points Scores (using equivalences suggested by investigation 1)

The data used covers 3 years in total (2009/10, 2010/11 and 2011/12). Prior to this, grades in individual IB subjects were not included in the national dataset. Also, the data for some students does not include all 3 higher and/or all 3 standard grade IB subjects. This investigation is restricted to students who have data for 3 higher and 3 standard grade IB subjects – around 83% of the total IB cohort available for analysis.

We have compared the outcomes in IB with:

- Students taking 3 A2 subjects; and
- Students taking 3, 4 or 5 A2 subjects
 - Students taking 3 A2 subjects form around 73% of the 'A2' cohort
 - Where a student has taken more than 3 A2 subjects we calculate the points equivalent for 3 subjects by multiplying their average points score per subject by 3. This enables a fair comparison with IB students.

We have also made comparisons for:

- All students;
- Students in maintained schools; and
- Students in independent schools.

The equivalences (points allocated to grades) used were:

A2			AS		
Grade	Points_DFE	Points_UCAS	Grade	Points_DFE	Points_UCAS
A*	300	140			
A	270	120	A	135	60
B	240	100	B	120	50
C	210	80	C	105	40
D	180	60	D	90	30
E	150	40	E	75	20
U	0	0	U	0	0

IB Higher							
Grade	Points_DFE	Points_FFT	Points_UCAS	Points_UCAS_D	DFE_Grade	UCAS_Grade	FFT_Grade
7	270	300	130	285	A	A*/A	A*
6	225	270	110	255	B/C	A/B	A
5	195	240	80	210	C/D	C	B
4	165	210	50	165	D/E	D/E	C
3	0	180	20	75	U	<E	D
2	0	150	0	0	U	U	E
1	0	0	0	0	U	U	U
0	0	0	0	0	U	U	U

IB Standard							
Grade	Points_DFE	Points_FFT	Points_UCAS	Points_UCAS_D	DFE_Grade	UCAS_Grade	FFT_Grade
7	135.0	135	70	150.0	A	A+	A
6	112.5	120	59	133.5	B/C	A-	B
5	97.5	105	43	109.5	C/D	C+	C
4	82.5	90	27	85.5	D/E	D-	D
3	0.0	75	11	39.0	U	<E	E
2	0.0	0	0	0.0	U	U	U
1	0.0	0	0	0.0	U	U	U
0	0.0	0	0	0.0	U	U	U

In the above tables:

- Points_DFE shows the points allocated by DfE to each grade in A2/AS/IB Higher / IB Standard;
Points_FFT shows the points which would be allocated to each grade based upon investigations 1A and 1B.
- Points_UCAS shows the points allocated by UCAS to each grade in A2/AS/IB Higher / IB Standard;
- Points_UCAS_D represents the UCAS points converted to the DfE scale. For example, a grade 6 in IB Higher is allocated 110 points by UCAS. This is halfway between the points allocated by UCAS to A2 grades of B (120 UCAS points) and C (100 UCAS points). DfE allocate 270 points to A2 grade A and 240 points to A2 grade B – so we set POINTS_UCAS_D at 255 (halfway between 270 and 240) for a grade 6 in IB Higher.
- DFE_Grade shows, for IB subjects, the A2 or AS grade equivalent to the points shown in the Points_DFE column;
- UCAS_Grade shows, for IB subjects, the A2 or AS grade equivalent to the points shown in the Points_UCAS column;
- FFT_Grade shows, for IB subjects, the A2 or AS grade equivalent to the points shown in the Points_FFT column.

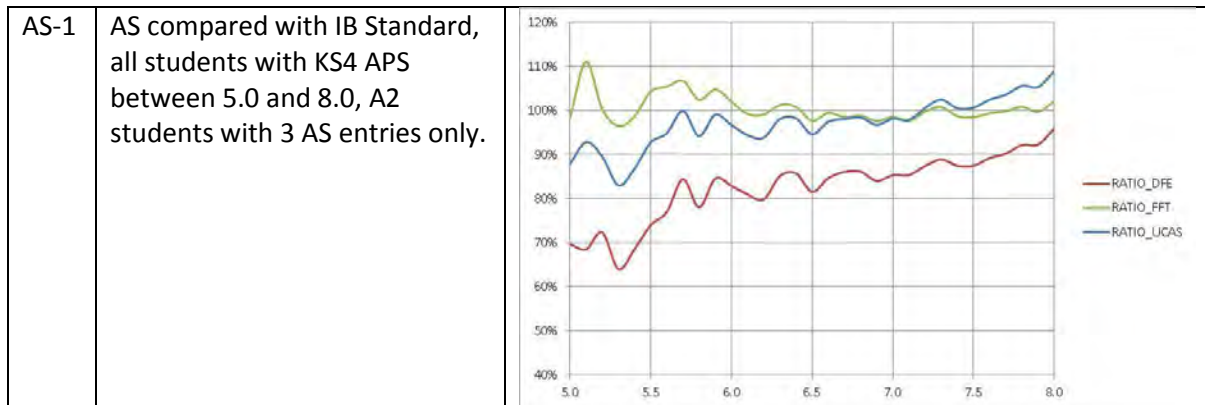
The analysis, for A2 / IB Higher involved:

- Calculating the total points score (using Points_DFE) for each student with 3 A2 entries;
- Calculating the average points score (using Points_DFE) for each student with 3, 4 or 5 A2 entries and then multiplying by 3 to give a 'total points for 3 entries' score;
- Calculating the total points score for each student with 3 IB Higher entries
 - Using Points_DFE, Points_UCAS_D, Points_FFT;
- Calculating the average for each of the above for students grouped by their KS4 average score in GCSE subjects. We have used 8 points for a GCSE grade A* down to 0 points for a U (ungraded). Data is shown for students ranging from a score of 5.0 (average of C in GCSE subjects) to 8.0 (A* in all GCSE subjects);
- Using the A2 Points_DFE score as a reference point, calculating the ratio of Points_DFE, Points_UCAS_D and Points_FFT;
- On the basis of our definition of equivalence stated in the background section we would expect, if equivalence between A2/IB Higher was working correctly, that the ratio would be 1 (100%) i.e. points for students taking 3 A2 subjects should be the same as for students with the same KS4 attainment taking 3 IB Higher subjects.

The analysis for AS / IB Standard took a similar approach.

Charts below show the outcomes for combinations summarised in the following table:

Chart	Details	
A2-1	A2 compared with IB Higher, all students with KS4 APS between 5.0 and 8.0, A2 students with 3 A2 entries only.	<p>This line chart shows the percentage of students achieving A2 compared to IB Higher for three groups: DFE (red), FFT (green), and UCAS (blue). The x-axis represents KS4 APS scores from 5.0 to 8.0, and the y-axis represents the percentage from 40% to 120%. The FFT group consistently shows the highest ratio, starting at approximately 100% at a 5.0 APS score and remaining near 100% through 8.0. The UCAS group starts at about 80% and rises to nearly 100%. The DFE group starts at approximately 70% and increases to about 90%.</p>
A2-2	A2 compared with IB Higher, all students with KS4 APS between 5.0 and 8.0, A2 students with 3, 4 or 5 A2 entries.	<p>This line chart shows the percentage of students achieving A2 compared to IB Higher for three groups: DFE (red), FFT (green), and UCAS (blue). The x-axis represents KS4 APS scores from 5.0 to 8.0, and the y-axis represents the percentage from 40% to 120%. The FFT group consistently shows the highest ratio, starting at approximately 100% at a 5.0 APS score and remaining near 100% through 8.0. The UCAS group starts at about 80% and rises to nearly 100%. The DFE group starts at approximately 70% and increases to about 90%.</p>
A2-3	A2-2 for maintained schools	<p>This line chart shows the percentage of students achieving A2 compared to IB Higher for three groups: DFE (red), FFT (green), and UCAS (blue) specifically for maintained schools. The x-axis represents KS4 APS scores from 5.0 to 8.0, and the y-axis represents the percentage from 40% to 120%. The FFT group consistently shows the highest ratio, starting at approximately 100% at a 5.0 APS score and remaining near 100% through 8.0. The UCAS group starts at about 80% and rises to nearly 100%. The DFE group starts at approximately 70% and increases to about 90%.</p>
A2-4	A2-2 for independent schools	<p>This line chart shows the percentage of students achieving A2 compared to IB Higher for three groups: DFE (red), FFT (green), and UCAS (blue) specifically for independent schools. The x-axis represents KS4 APS scores from 5.0 to 8.0, and the y-axis represents the percentage from 40% to 120%. The FFT group consistently shows the highest ratio, starting at approximately 100% at a 5.0 APS score and remaining near 100% through 8.0. The UCAS group starts at about 80% and rises to nearly 100%. The DFE group starts at approximately 70% and increases to about 90%.</p>



Overall, the outcomes of this investigation suggest that:

- The allocation of points to IB subjects by DfE and UCAS under-value the attainment of students when compared to the points allocated to AS and A-Level (A2) subjects;
- The differences are larger for lower prior-attainment students;
- The differences are consistent across maintained and independent schools; and
- Using the points derived from our investigations (1a and 1b) provides outcomes consistent with AS / A2 subjects (taking into account KS4 prior attainment).

For AS qualifications there is no A* grade. The distribution of IB Standard grades would suggest that a grade 7 might be better than a grade A at AS. Were such an approach to be adopted then the ratio (FFT) in chart AS-1 would rise to be above 100%. Given that the IB Standard subjects require 2 years of study this could be justified. Further work (beyond the scope of this paper) would be needed to investigate this conjecture.

Investigation 3 – Using a Value-Added Approach

In the FFT value-added analysis for KS5 outcomes, data is analysed for each subject type and subject separately. This means that it is not possible to directly compare, for example, value-added outcomes in individual IB subjects with those in the same subject at A2 and AS level. Also, FFT value-added analyses are only undertaken for individual subjects where there are 1000 or more entries in a given academic year. This means that a significant proportion of IB subjects are excluded from VA analysis.

In this investigation, a dataset was created by combining A2, AS, IB Higher and IB standard grade subjects covering 3 years (2009/10, 2010/11 and 2011/12). The dataset was coded so that, for VA analysis, IB higher level subjects were grouped with A2 and IB standard level subjects were grouped with AS.

The FFT VA analysis involves converting each grade to a score and then analysing this data using a multinomial regression approach¹. For A2 and AS subjects the conversion is as follows:

A2 Grade	Score	AS Grade	Score
A*	300		
A	270	A	270
B	240	B	240
C	210	C	210
D	180	D	180
E	150	E	150
U	0	U	0

For IB subjects, the initial analysis used DfE points scores to determine the score for each grade. The DfE Score is calculated as POINTS divided by ASIZE (Qualification Size). The VA Score is determined by finding the closest point on the 300, 270, 240, 210, 180, 150 scale to the DfE Score.

¹ Note: The analysis is normally done in 2 stages – firstly overall pass rate (i.e. outcome is 0 if Score=0 and 1 if Score>0) and then analysis of all cases where grades is a pass (i.e. Score>0). For this investigation, only stage 2 (analysis of passes) was done.

IB HL Grade	DfE Score	VA Score		IB SL Grade	DfE Score	VA Score
7	270	270		7	270	270
6	225	210		6	225	210
5	195	180		5	195	180
4	165	150		4	165	150
3	0	0		3	0	0
2	0	0		2	0	0
1	0	0		1	0	0
0	0			0	0	0

The VA analysis run using this dataset produces an estimate of the probability of achieving each grade. This output was then analysed by:

- Calculating an overall estimated score by taking the probability for each grade (A* to E for A2/IB HL and A to E for AS/IB SL) and multiplying by the score for that grade (300 to 150); and
- Calculating VA_DIFF (Actual Score – Estimated Score).

Across the whole dataset, VA_DIFF is zero. If this is split for subject type then significant differences were apparent:

- The overall VA_DIFF for IB HL was 32 points lower than for A2; and
- The overall VA_DIFF for IB SL was 46 points lower than for AS.

Such large differences in VA (equivalent to a grade for IB HL and 1.5 grades for IB SL) could mean that attainment in IB is, for the same KS4 score, much lower for IB candidates than for those taking A2/AS subjects. This seems unlikely and, given the outcomes of Investigation 1, it would seem more likely that the DfE points scores are under-valuing the grades attained in IB subjects.

The dataset was revised to use scores for IB subjects more in line with the outcomes from Investigation 1, i.e.:

IB HL Grade	VA Score		IB SL Grade	VA Score
7	300		7	270
6	270		6	240
5	240		5	210
4	210		4	180
3	180		3	150
2	150		2	0
1	0		1	0
0			0	0

Using this approach resulted in the differences in overall VA_DIFF between A2/IB HL and AS/IB SL being much reduced – to around 3 points (i.e. one fifth of a grade). The fact that the VA_DIFF scores are much closer suggests that the points scores in the above table are more appropriate i.e. that the points currently allocated to IB subjects in DfE calculations under-value the attainment in IB subjects.

Investigation 4 – Variation by Subjects

In this section we describe initial work to compare IB and A2 grades for specific subjects. The outcomes are limited by the ways in which subjects are coded within the national dataset. For example:

- Mathematics in IB subjects is coded with mapping of '2330' – Further Mathematics;
- All Modern Foreign Language subjects in IB are coded as '6310' – Other Languages;
- English in IB subjects is coded within '6400' – Untranslated Literature.

The following table shows, for students in the top 10% of attainers at KS4 and for subjects linked using their mapping values:

- Number of records for IB and A2;
- Percentage with IB grade 4 or higher and with A2 grade C or higher;
- Percentage with IB grade 6 or higher and A2 grade A or A*.

Subjects coded differently in IB to A2 and those with fewer than 100 IB entrants are excluded. The tables show data for students in the top 10% of attainers at KS4.

Table 4.1: IB Higher and A-Level (A2) Subjects

SUBJECT	Mapping	N_IBH	N_A2	IB_4+	A2_C+	IB6+	A2_A+
Biology	1010	1679	81680	98%	93%	55%	50%
Chemistry	1110	1591	76384	91%	93%	48%	50%
Physics	1210	685	46117	92%	91%	48%	51%
Mathematics (Further)	2330	967	21832	82%	96%	36%	68%
Geography	3910	623	29991	100%	99%	85%	63%
History	4010	1393	49916	100%	98%	68%	56%
Economics	4410	591	23739	99%	98%	79%	63%
Logic/ Philosophy	4790	322	3496	100%	94%	70%	44%
Psychology	4850	478	34262	99%	95%	57%	52%
Classics (General)	6500	148	283	100%	99%	93%	52%
Music	7010	125	7044	100%	95%	64%	45%

Note: Comparing IB higher 4+ with A2 C+ and IB higher 6+ with A2 A+ is based upon using the equivalences derived from previous investigations.

Table 4.2: IB Standard and AS-Level Subjects

SUBJECT	MAPPING	N_IBH	N_AL	IB_5+	AL_C+	IB7	AL_A
Biology	1010	979	95759	90%	89%	22%	42%
Chemistry	1110	489	95840	71%	87%	17%	39%
Physics	1210	341	61409	73%	88%	18%	45%
Mathematics	2330	1549	33002	69%	93%	16%	67%
Geography	3910	197	32587	99%	95%	43%	60%
History	4010	425	58500	96%	93%	20%	44%
Economics	4410	271	28807	98%	92%	43%	50%
Logic/ Philosophy	4790	181	4868	98%	87%	35%	34%
Psychology	4850	384	41904	96%	90%	33%	44%
Other Classical Languages	6650	139	33	99%	100%	68%	42%

Note: Comparing IB standard 5+ with AS C+ and IB standard 7 with AS A is based upon using the equivalences derived from previous investigations.

Overall:

Subject	IB Higher / A-Level (A2)	IB Standard (AS)
Biology	Similar	IB Lower
Chemistry	Similar	IB Lower
Physics	Similar	IB Lower
Mathematics	IB Lower	IB Lower
Geography	IB Higher	IB Lower
History	Similar	IB Lower
Economics	IB Higher	Similar
Logic/ Philosophy	IB Higher	Similar
Psychology	Similar	IB Lower
Classics (General)	IB Higher	N/A
Other Classical Languages	N/A	IB Higher
Music	IB Higher	N/A

Note:

- For Chemistry and Physics, attainment in IB grade 6 or above is broadly equivalent to attainment in AS of grade A.
- For other subjects where attainment at IB 7 is lower than AS grade A, attainment at IB 6+ is broadly equivalent to attainment at B+ in AS.

A more detailed investigation will be needed to examine comparisons between subjects more accurately. Such an investigation would also be improved if work was undertaken to 'map' subjects currently coded differently for IB and A2.