What causes variability in school-level GCSE results year-on-year?

1. Executive summary

Since 2013, Ofqual has looked at the pattern of variability in outcomes of schools and colleges (centres) for particular GCSE subjects as one way of understanding the extent of volatility in the system. Overall, in years when specifications and overall cohorts are stable, one might expect the majority of centres with entries in successive years to have very similar outcomes.

Most centres display little year-on-year variation. However, some centres display large year-on-year variation and some commentators have expressed concerns that the comparable outcomes approach to awarding, in managing 'grade inflation', might be having a differential effect on some centres. Examples often given are of those operating in a more challenging context, for example, those with a significant percentage of students from low socio-economic status backgrounds or with speakers of English as an additional language.

The proportion of students achieving grades A*-C in a number of GCSE subjects was calculated for each common centre in 2014 and 2015, and centre variability defined as the difference between the two. We looked at whether there was any relationship between centre variability and: centre type; stability of entry numbers from year to year; socio-economic measures of the centre - the Income Deprivation Affecting Children Index and the proportion of students eligible for free school meals; and the proportion of students with English as an additional language.

Factors which appear to be associated with centre variability are:
* centre type: selective and independent centres have less variability in A*-C than other centre types. (This is most likely because of the distribution of grades within these centres tends to be comfortably within A*-C rather than straddling or centering on C/D).
* entry stability – centres with stable year-on-year entry numbers are likely to show less variability than those with changes in entry size between years.

Factors which do not seem to have any relationship with centre variability:
* proportion of students entitled to free school meals within the centre.
* deprivation index of the centre.
* proportion of students with English as an additional language in the centre.

We intend to conduct further, more sensitive, analysis when student level data for prior attainment, free school meal eligibility and the deprivation index become available to better understand whether these systematic factors are associated with year-on-year variability.

2. Introduction

Since 2013, Ofqual has looked at the pattern of variability in outcomes of schools and colleges (centres) for particular GCSE subjects as one way of understanding the extent of volatility in the system. We know that individual schools and colleges will often see some variation in the proportion of students achieving particular grades from one year to the next and that this can be due to many factors, including differences in the ability mix of the students, different teaching approaches as well as changes to qualifications. However, in years when specifications and overall cohorts are stable, one might expect the majority of centres with entries in successive years to have similar outcomes (eg centre variability within ± 10%), and few centres to have substantial variability (eg >± 30%). The assumption is that an individual centre's results are unlikely to be very different in two consecutive years. Furthermore, across the cohort as a whole, comparing results for common centres (centres who have entered students for a subject in the two years in question) we might expect that if grades year-on-year are comparable that the mean variability will be zero or close to zero.

In August 2015, Ofqual published a report on the variability in GCSE results for common centres from 2012 to 2015 (Ofqual, 2015). Most common centres displayed little year-on-year variation. However, some centres display large year-on-year variation and there are some commentators have expressed concerns that the comparable outcomes approach to awarding, in managing 'grade inflation', might be having a differential effect on centres operating in a more challenging context.[1] Examples often given are of those operating in a more challenging context, for example, those with a significant percentage of students from low socio-economic status backgrounds or with speakers of English as an additional language.

The aim of this report is to use the results from a number of GCSE subjects for the summer of 2014 and 2015 to explore empirically the relationship between centre variability and certain specific factors. The questions to be addressed are:

- Does the type of centre (e.g. maintained, selective, academy etc) have any relationship with year-on-year variation?
- Do certain centre types exhibit more variation than others?
- To what extent do changes to the number of pupils entering a given subject in successive years affect variation?
- Are there any correlations between measures of socio-economic status and centre variability?

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[1] http://schoolsweek.co.uk/the-job-that-we-love-is-being-undermined/

3. Centres in the analysis

In this study centres with at least 50 candidates for 'large entry subjects' i.e. English/English language (hereafter referred to as English), English literature and mathematics in both 2014 and 2015 were used. Centres with at least 25 candidates or more in both years were considered for all other subjects.

Using the summer 2014 and 2015 GCSE candidate results, the proportions of candidates achieving grades A*-C were calculated for 2014 and 2015. The centre variability is defined as the difference in the proportion of students achieving grades A*-C at GCSE for 2015 compared to 2014. The results for all students and centres are summarised in Table 1 as reported by Ofqual in August 2015 (Ofqual, 2015).

The mean centre variability is the average of the year-on-year difference for each centre and the standard deviation (Std. dev.) is a measure of the spread of the variation – a lower standard deviation corresponds to less variation overall whereas a higher standard deviation corresponds to greater variation overall. With the exception of English, the mean centre variability is within ± 2.5 percentage points of zero and the standard deviation typically less than 16 percentage points. This means that most centres see little year-on-year variation. GCSE English has a slightly different pattern due to instability of the overall entry size of the cohort. Many centres have entered all or some candidates for alternative qualifications. It was shown in the centre variability report (Ofqual, 2015) that on average centres had increased outcomes for English when considering year 11 students only; and when considering only "stable" centres (i.e. centres where entry in 2015 changed by less than 10% compared to entry in 2014) generally less variation was observed in these centres (seen by the lower mean centre variability and standard deviation).

The plotted variation seen in each of the several thousand centres for mathematics is illustrated in Figure 1. Each bar represents the number of centres with a particular level of variation given in intervals of 2.5 percentage points. For example, the two bars either side of zero correspond to either a drop or increase of up to 2.5 percentage points. The majority of centres are found clustered around zero, meaning that they show little variation. However a few hundred centres have variations outside of ± 15 percentage points, corresponding to a more sizeable increase or decrease in the proportion of students achieving grades A*-C.
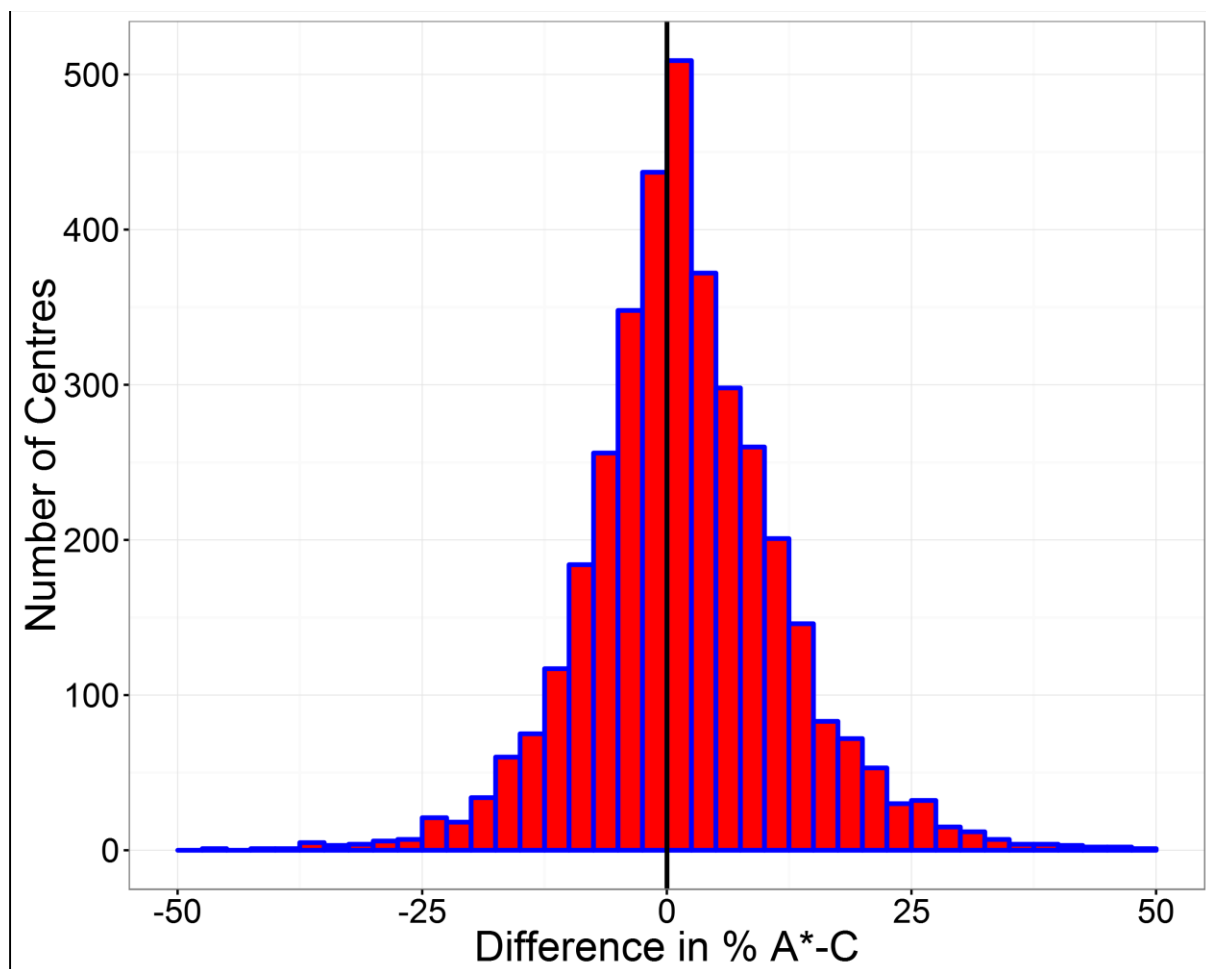
Figure 1. Difference in the proportion of all students achieving grades A*-C in GCSE mathematics for summers 2014 and 2015.

Table 1.
Summary of centre variation for each subject

Subject	Number of centres	Mean centre variability (% A*-C)	Std. dev.
Mathematics	3686	1.79	10.26
English	2620	6.37	15.68
English literature	2581	-0.53	14.28
Additional science	2954	-0.77	17.53
Biology	1729	0.85	10.05

Chemistry	1721	0.68	10.50
French	2074	1.47	15.72
Geography	2874	0.80	13.22
German	707	0.83	15.80
History	3056	1.35	12.76
Physics	1746	0.67	10.05
Science	3045	-2.41	18.84
Spanish	1143	1.08	15.67

4. Entry stability

We wanted to investigate the extent to which centres with changes in entry size were associated with variability in outcomes year-on-year. Another way of expressing this is whether the ability to predict 2015 results on the basis of 2014 results changes according to centre entry stability. Entry stability might have some bearing on outcomes because it may indicate, for example, a change in the student ability profile taking a subject, or represent a change in the nature of provision for a subject in a school.

By way of illustration, we will focus first on GCSE mathematics. The distribution in entry stability for mathematics is shown in Figure 2. Most centres are clustered around zero showing that highly similar numbers of candidates were entered year-on-year for this qualification ie the majority of centres entered similar numbers of candidates from one year to the next. Nearly 50% of all centres are considered "very stable" in entry (ie centres where entry in 2015 changed by less than 10% compared to entry in 2014) and only 6% of centres had a change in entry numbers exceeding 50%.

In the same way, the analysis looked at centres entering candidates in the other subjects. The entry variation was calculated for centres and categorised. Centre variability in outcomes could be analysed according to different criteria for entry stability where the number of entrants did not change by more than 10% (most stringent criteria), 20%, 30%, 40%, 50%, 60%, 70%, 80% and 90% (least stringent criteria) between 2015 and 2014[2]. The result for mathematics is shown in Table 2 and summaries for the other subjects are given in Appendix A.

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[2] This includes both positive and negative percentage changes to the number of entrants.
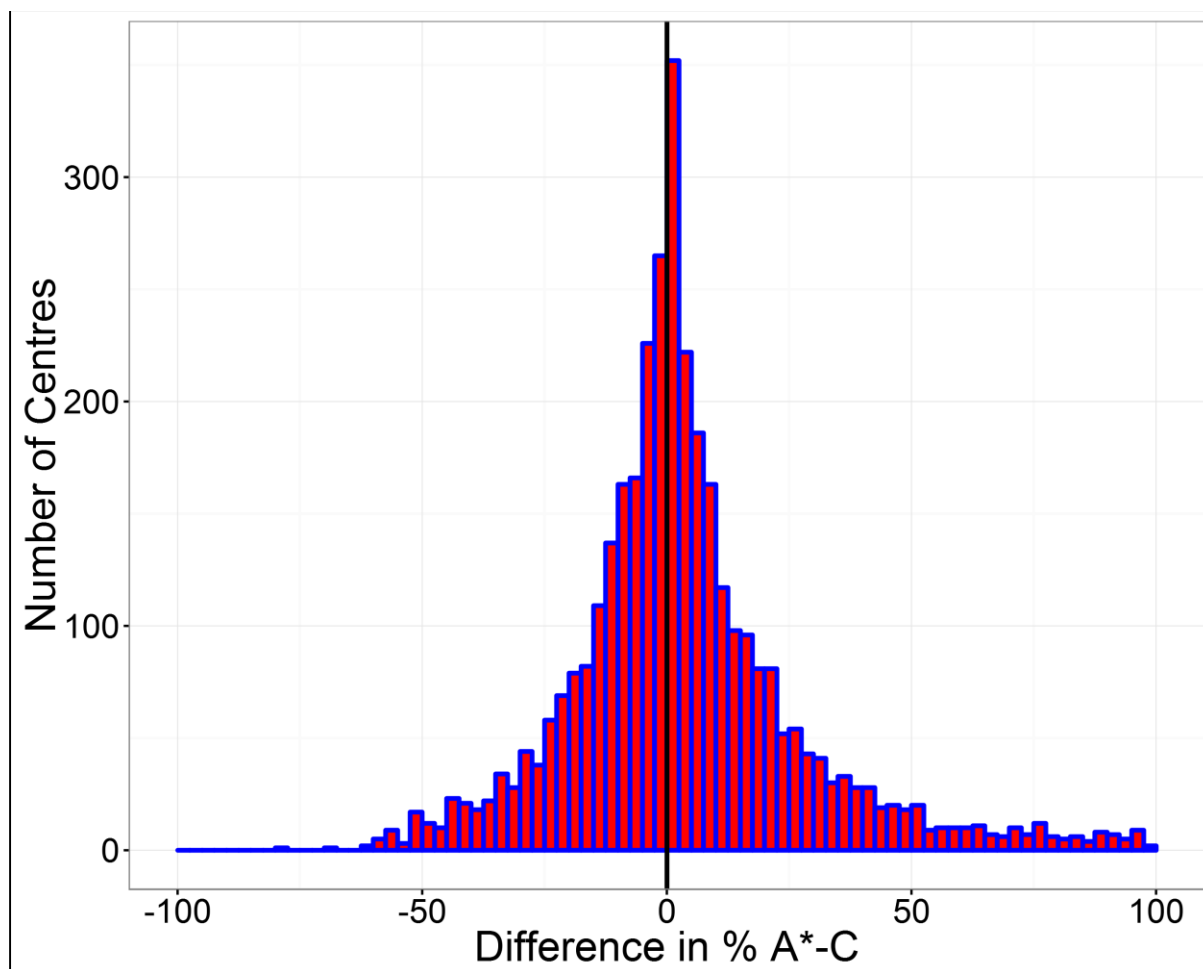
Figure 2. Percentage change in entry between 2015 and 2014 for mathematics.

As the criteria on entry stability is made more stringent the mean centre variability and standard deviation are all observed to decrease, ie centres with stable entry year-on-year generally exhibit less variation in grade outcomes. This increases the predictive power of using the previous year's results to estimate the likely GCSE results of the subsequent year and is seen by an improved correlation between the proportion of students achieving grades A*-C in 2014 and 2015.

Similar results are seen for the other subjects, although the relationship between the proportion of students achieving grades A*-C in 2014 and 2015 is generally weaker. If we correlate the percentage of candidates receiving A*-C in 2015 with the percentage for 2014, chemistry and physics show the weakest correlations between the 2014 and 2015 results (typically 0.55, compared to more than 0.65 for the other subjects), and, interestingly, for both subjects the weakest correlation is observed for the most stable centres (those with entry levels within ± 10%).

Table 2.
Summary of centre variation for mathematics in terms of the change to entry size between 2015 and 2014.

Change in number of entrants (%)	Number of centres	Mean centre variability (% A*-C)	Std. dev.	Correlation between % A*-C 2015 - 2014
All Centres	3686	1.79	10.25	0.85
± 90	3546	1.84	9.68	0.86
± 80	3522	1.85	9.60	0.86
± 70	3486	1.85	9.45	0.86
± 60	3450	1.85	9.39	0.86
± 50	3370	1.72	9.31	0.87
± 40	3219	1.58	9.08	0.87
± 30	2982	1.39	8.79	0.88
± 20	2543	1.24	8.42	0.89
± 10	1748	0.90	7.83	0.90

In summary, generally less variation is observed in centre results year-on-year where entry levels are more stable.

5. Centre type

We now explore whether different types of centre are associated with different patterns of year-on-year variability.

Centres are classified into 14 categories such as Secondary Comprehensive, City Academy, and independent. The classification of centre types is in Appendix B. All centres were classified according to their status in 2015.

A summary of the results of this analysis for GCSE mathematics is in Figure 3 and is tabulated for all subjects in Appendix C. It is apparent that:

- City Academies (category 13) and Community, Voluntary Aided Controlled centres (CVACS): Secondary Comprehensive (category 1) together accounted for over 70% of all centres for all subjects. The mean number of candidates entered per centre in 2015 and 2014 (n_{2015} and n_{2014} respectively) and the standard deviation of candidates entered per centre in 2015 and 2014 (σ_{2015} and σ_{2014} respectively) are very similar between the two centre types overall. The general variability in outcomes year-on-year seen in these centres is almost identical.
- In terms of year-on-year entry numbers, independent and selective centres are consistently the most stable. On average they enter the smallest number of candidates each year and show the smallest variation in the number of candidates entered. Typically, these centre types also show the least centre variation in A*-C. This is most likely because of the grade distribution in these centres; year-on-year they have more candidates in the top of the grade range and fewer candidates year-on-year straddling the C/D region of the grade scale.
- With the exception of independent and selective centres, centre variation is generally similar across all centre types.
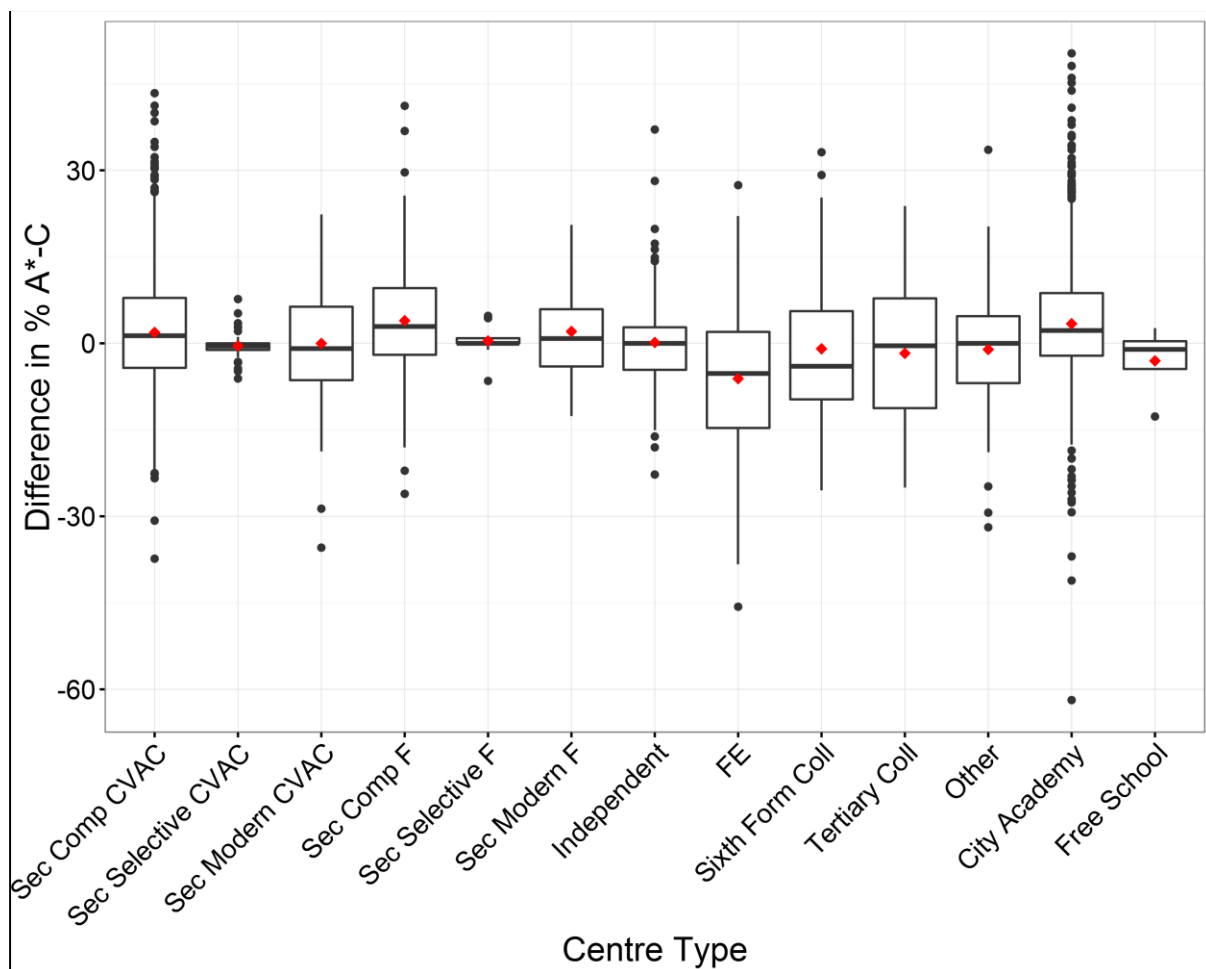
Figure 3. Box plot of the difference in percentage A*-C in mathematics for the various centre types. The mean difference is given by the red diamond.

6. Profile of students in schools – socio-economic status and English as an additional language

In this section, we look at centre variation and its relationship with characteristics of candidates, such as indicators of socio-economic status (SES) and the proportion of students with English as an additional language (EAL). Although centres with lower SES may perform more poorly at GCSE than other centres, we wanted to look at whether there was any systematic year-on-year variation in outcomes associated with measures of low SES.

This report focusses on the following three parameters:

- The Income Deprivation Affecting Children Index (IDACI) score for each centre. The IDACI measures the proportion of children who live in low income households in a local area and is based upon the postcode of the centre.

- The percentage of students known to be eligible for free school meals (FSM) within the school.
- Although it is not a measure of SES, the percentage of students in the centre whose first language is other than EAL is also considered.

The IDACI score is for the 'super output area' (SOA)[3] in which the centre's postcode lies. It ranges from 0 to 1, with 0 and 1 being the least and most deprived areas respectively. It was obtained using the IDACI tool from the Department for Education (DfE)[4], which matches the postcode of the centre with its associated IDACI score. In the absence of individual pupil data, this is used as a proxy for that of the cohort in the school.

The percentage of candidates eligible for free school meals and whose first language was not English was also obtained from the DfE[5]. The percentages provided are for each centre and are not available on a candidate level. It was therefore assumed that these percentages were representative of the cohort of candidates who took examinations within each centre. This data is missing for the majority of independent centres. Centres with missing data are excluded from subsequent analysis.

There are some potential weaknesses with these measures. While they give some information about the context in which any centre operates, being 'centre-level' information, these measures are not as fine-grained as they might be. First, IDACI, as a measure based on the postcode of the school, may or may not be a good proxy for the IDACI profile of students attending the school, depending upon the degree to which the postcode of the school is representative of that school's catchment area and/or intake. Ideally, this analysis would incorporate student-level IDACI data. We intend to build this data into a more sophisticated analysis when it becomes available. Second, the measures of FSM and EAL relate to the proportions of students in the whole school rather than in KS4 specifically. Again, the intention is to build student-level EAL and FSM (combined with other predictors of performance such as KS2 performance) into a future analysis when the data becomes available.

The correlations between IDACI, EAL, FSM and the proportion of students achieving grades A*-C at 2015 (ie outcomes, *not* centre variability) was calculated are summarised in Table 3. A low to moderate negative correlation with centre FSM proportion was observed for all subjects. This indicates that for a given subject a centre's overall performance at GCSE can be partially explained by the percentage of students known to be eligible for free school meals. Generally, very little correlation is observed with either IDACI or EAL.

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[3] https://data.gov.uk/dataset/lower-layer-super-output-areas-2001-to-lower-layer-super-output-areas-2011-to-local-authority-d

[4] http://www.education.gov.uk/cgi-bin/inyourarea/idaci.pl

[5] https://www.gov.uk/government/statistics/schools-pupils-and-their-characteristics-january-2015

This approach was extended to the correlation between IDACI, EAL, FSM and centre variability. The results are summarised in Table 4. The correlation between mathematics and FSM is illustrated in Figure 4. The data shows that there is no correlation between centre variability and the three variables. This implies that although centres with lower SES may perform more poorly at GCSE overall, these factors have no relevance when explaining a centre's variability in outcomes between 2014 and 2015.

Table 3.
Correlation of proportion of students achieving grades A*-C at 2015 with respect to IDACI, EAL and FSM

Subject	IDACI	EAL	FSM
Mathematics	-0.31	-0.13	-0.58
English	-0.17	-0.08	-0.43
English literature	-0.19	-0.04	-0.42
Additional science	-0.08	0.04	-0.21
Biology	-0.08	-0.02	-0.28
Chemistry	-0.07	0.01	-0.27
French	-0.12	-0.02	-0.24
Geography	-0.22	-0.11	-0.46
German	0.03	0.10	-0.20
History	-0.20	0.01	-0.44
Physics	-0.08	-0.02	-0.26
Science	-0.13	0.03	-0.29
Spanish	-0.12	0.04	-0.23

Table 4.
Correlation of centre variation with respect to IDACI, FSM and EAL

Subject	IDACI	EAL	FSM
Mathematics	0	-0.07	0.02
English	0.02	-0.03	0.06
English literature	0	0.03	-0.04
Additional science	-0.02	0	-0.06
Biology	0	0.03	0
Chemistry	0.02	0.02	0.04
French	0.06	0.02	0.11
Geography	0.07	0.02	0.05
German	0.02	-0.02	0.06
History	0.03	0.04	0.02
Physics	0.01	0	-0.01
Science	0.01	0.02	-0.04
Spanish	0.01	0.01	0.03
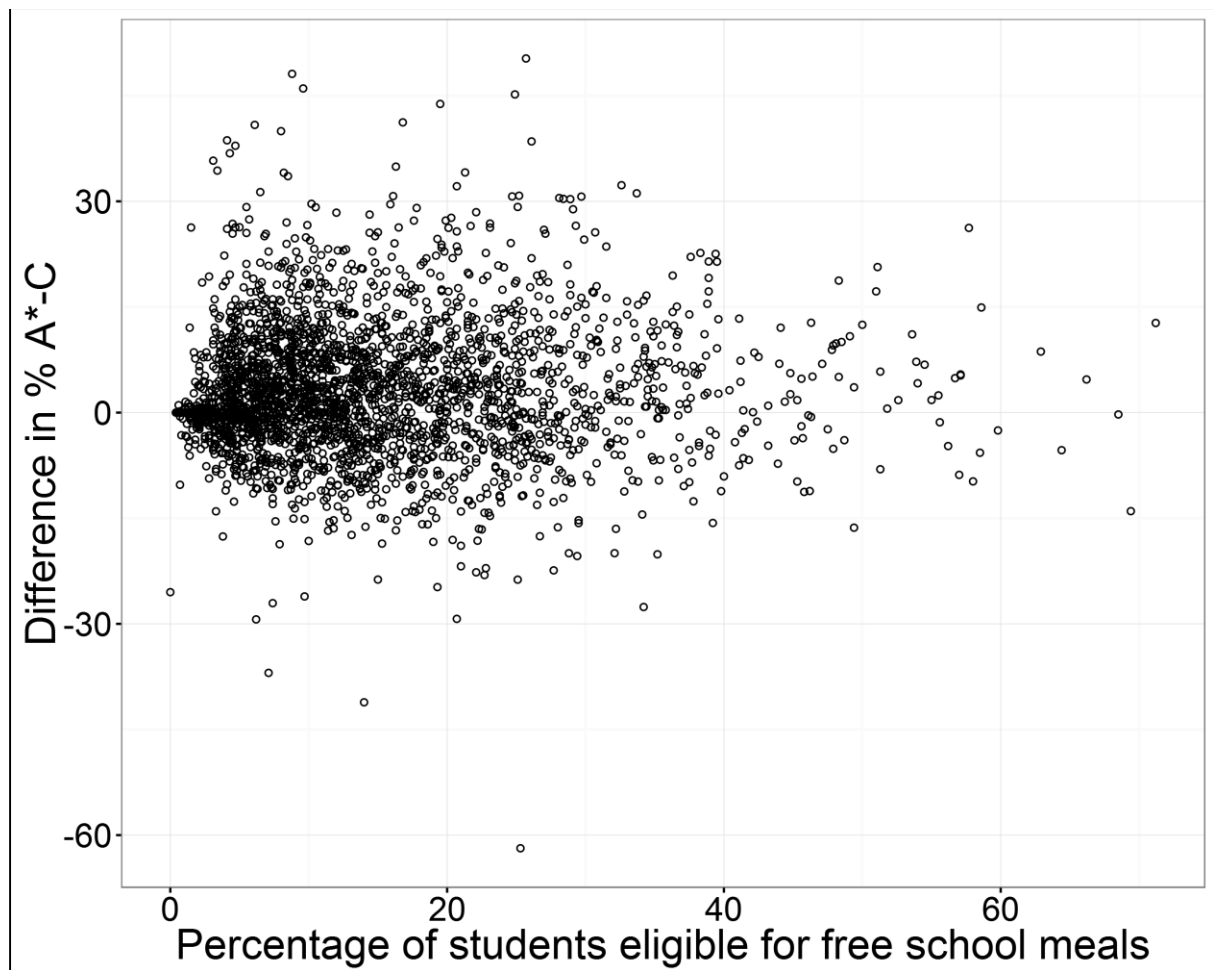
Figure 4. Scatter plot showing the relation between centre variation and the percentage of students eligible for free school meals.

Each centre was grouped into deciles for FSM, EAL and IDACI, allowing comparisons between distributions of variability with increasing levels of deprivation (Appendix D). The results for mathematics and FSM are tabulated in Table 5 and illustrated in Figure 5.

Considerably less variability is observed in the first decile compared to the remaining deciles; a direct result of the majority of selective centres falling in this category and skewing the data. Centre variation is similar across all but the first decile. There is no clear evidence to suggest that increasing levels of FSM has a systematic negative impact on centre variability outcomes between 2014 and 2015.

Table 5.

GCSE mathematics: mean centre variability and standard deviation for FSM by decile.

Decile	Percentage of students eligible for FSM	Number of centres	Mean variability (% A*-C)	Standard deviation
1	0 – 3.9	272	0.95	6.18
2	3.9 – 5.7	272	3.54	8.29
3	5.7 - 7.6	271	2.98	8.71
4	7.6 – 9.6	272	4.10	9.23
5	9.6 – 11.8	271	3.80	9.34
6	11.8 – 14.6	272	2.00	8.99
7	14.6 – 18.3	272	3.01	10.04
8	18.3 – 22.9	271	3.47	11.23
9	22.9 – 29.1	272	3.13	11.77
10	29.2 – 79.1	271	3.55	9.73
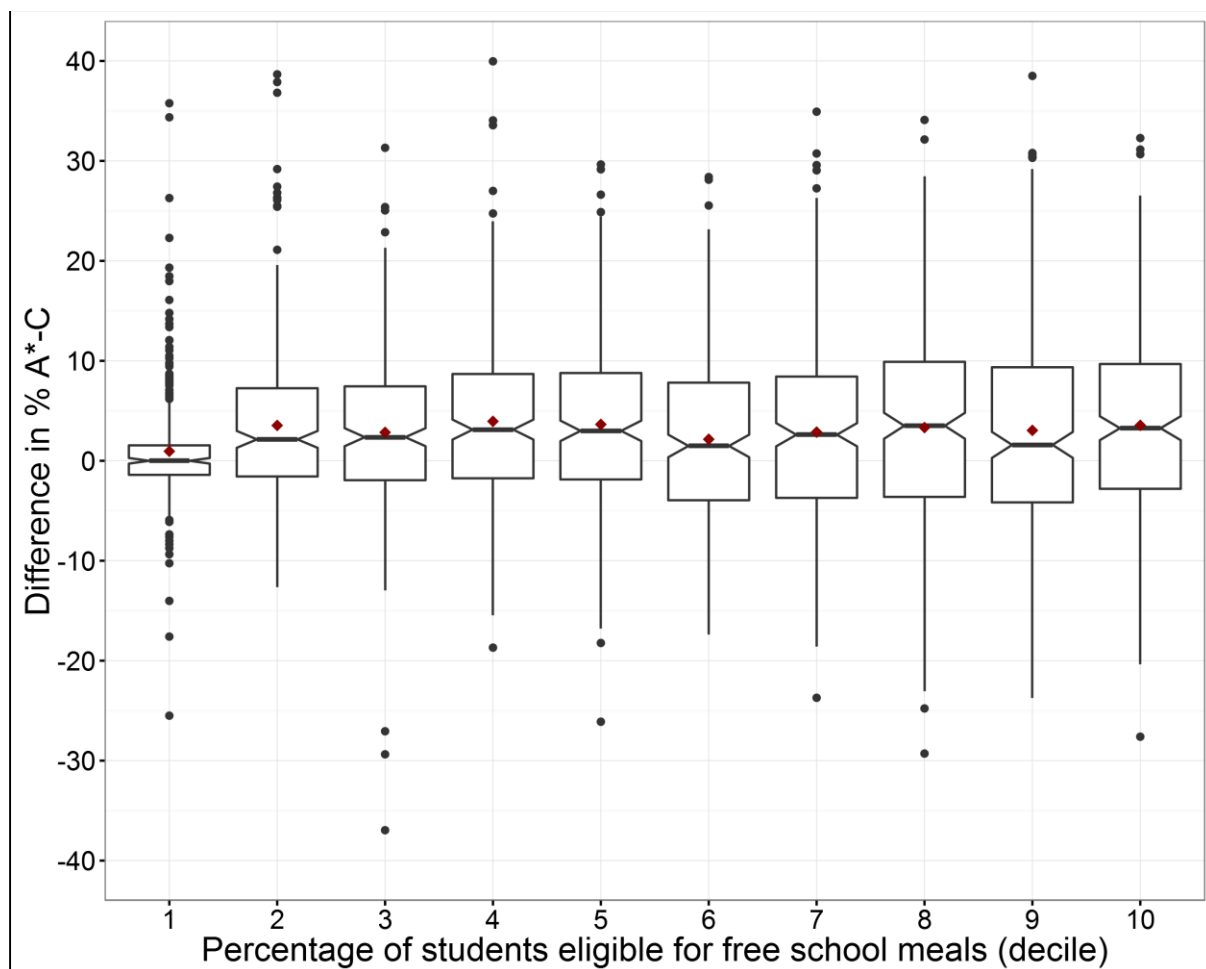
Figure 5. Boxplot of centre variation for FSM deciles. The mean variation is denoted by the red diamond.

In Figure 5 it is possible to more clearly see the distribution of both 'positive' and 'negative' variability as well as the mean variation. It does not appear that centres experiencing the greatest negative variability are associated with the highest proportions of FSM.

Similar results are observed for English language (Table 6 and Figure 6). Centre variability is observed to be very similar between the 2nd and 10th decile. Again, there is no evidence to suggest that centres with higher levels of FSM were negatively impacted in 2015 compared to 2014.

Table 6.

Mean centre variation and standard deviation for FSM deciles.

Decile	Percentage of students eligible for FSM	Number of centres	Mean variability (% A*-C)	Standard deviation
1	0 – 3.5	179	3.09	10.08
2	3.5 – 5.0	179	7.58	14.79
3	5.0 – 6.7	179	5.87	14.99
4	6.7 – 8.4	179	8.26	15.60
5	8.4 – 10.3	178	9.80	17.77
6	10.3 – 12.8	179	12.13	17.01
7	12.8 – 15.8	179	11.80	17.64
8	15.8 – 20.1	179	9.82	16.20
9	20.1 – 26.5	179	11.41	16.57
10	26.6 – 71.2	178	8.44	15.47
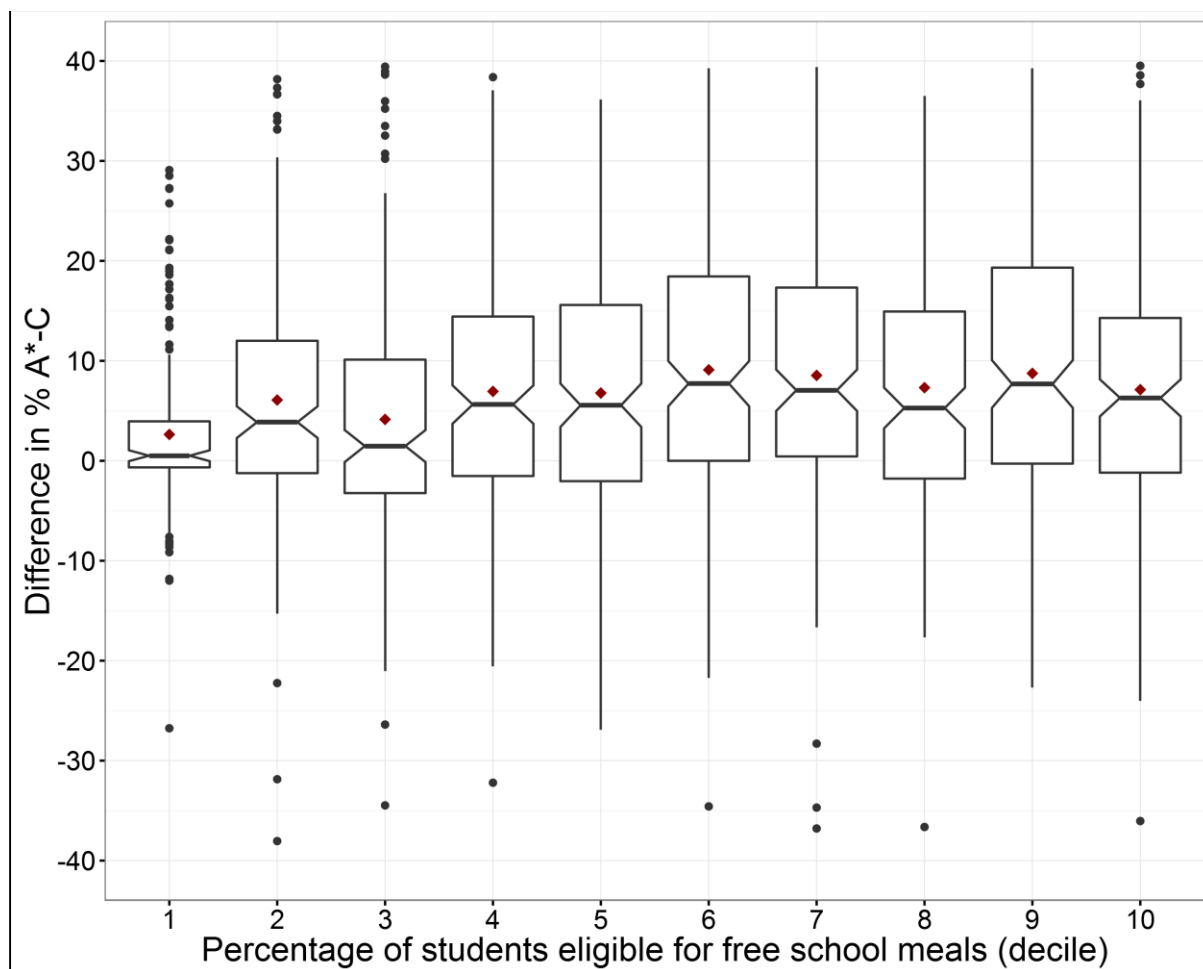
Figure 6. Boxplot of centre variability for FSM deciles. The mean variation is denoted by the red diamond.

7. Summary

The majority of centres show little year-on-year variation in the proportion of candidates achieving A*-C in a number of GCSE subjects between 2014 and 2015. As entry within these centres becomes more stable, generally less centre variation is observed and typically the correlation between 2014 and 2015 outcomes improves further.

Centre type has little impact on variability. While it was found that independent and selective centres consistently exhibited the least variation, both in terms of entry and variability in outcome, the profiles of other centre types' variability were broadly similar. The results from city academies and secondary comprehensive CVACs were very similar to each other with almost identical centre variability. Other centre types were found to generally show more centre variability although this could be a result of the smaller number of centres.

Although centres with higher proportions of students entitled to free school meals were associated with lower outcomes at GCSE, this was found to have no bearing

on a centre's variability year-on-year (as is illustrated in Figure 5). Furthermore, no relationship between SES and the most extreme centre variations were observed.

Any attempt to explain a centre's variability must consider the individual circumstances surrounding each centre in far more detail. Centres generally exhibit less variability when their entry size is stable; an indirect measure of pupil ability being more consistent. This suggests changes in pupil ability between cohorts should be considered. We intend to conduct further, more sensitive, analysis when student level data for prior attainment, free school meal eligibility and the deprivation index become available to better understand whether these systematic factors are associated with year-on-year variability.

References

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https://www.gov.uk/government/statistics/schools-pupils-and-their-characteristics-january-2015. Retrieved January 5, 2016

Ofqual. (2015). Variability in GCSE Results for Individual Schools and Colleges Key points, 1–31.

Appendix A
Stability

English

Change in number of entrants (%)	Number of centres	Mean centre variability (% A*-C)	Std.dev.	Correlation
All Centres	2620	6.37	15.68	0.720
± 90%	2383	5.69	14.36	0.750
± 80%	2343	5.58	14.25	0.753
± 70%	2292	5.51	13.92	0.762
± 60%	2222	5.02	13.33	0.778
± 50%	2137	4.57	12.97	0.788
± 40%	2027	4.16	12.59	0.799
± 30%	1852	3.51	11.75	0.821
± 20%	1602	2.80	11.03	0.836
± 10%	1170	2.15	9.89	0.864

English literature

Change in number of entrants (%)	Number of centres	Mean centre variability (% A*-C)	Std.dev.	Correlation
All Centres	2581	-0.53	14.28	0.682
± 90%	2481	0.09	13.54	0.710
± 80%	2472	0.12	13.45	0.713
± 70%	2439	0.28	13.15	0.719
± 60%	2406	0.42	13.00	0.724
± 50%	2331	0.47	12.75	0.732
± 40%	2195	0.63	12.39	0.744
± 30%	2050	0.80	11.98	0.755
± 20%	1814	0.88	11.28	0.778
± 10%	1332	0.94	11.34	0.762

Additional science

Change in number of entrants (%)	Number of centres	Mean centre variability (% A*-C)	Std.dev.	Correlation
All Centres	2954	-0.77	17.53	0.607
± 90%	2735	-0.04	16.86	0.630
± 80%	2679	0.04	16.73	0.633
± 70%	2620	0.18	16.63	0.639
± 60%	2544	0.25	16.49	0.643
± 50%	2414	0.47	16.28	0.652
± 40%	2220	0.53	15.96	0.664
± 30%	1957	0.42	15.68	0.677
± 20%	1549	0.63	15.03	0.704
± 10%	917	1.34	14.57	0.701

Biology

Change in number of entrants (%)	Number of centres	Mean centre variability (% A*-C)	Std.dev.	Correlation
All Centres	1729	0.85	10.05	0.679
± 90%	1682	1.01	9.75	0.683
± 80%	1660	1.03	9.68	0.683
± 70%	1638	1.10	9.63	0.688
± 60%	1606	1.19	9.55	0.690
± 50%	1564	1.12	9.35	0.696
± 40%	1460	1.10	9.30	0.700
± 30%	1322	0.92	9.08	0.713
± 20%	1119	0.77	9.23	0.709
± 10%	733	1.01	8.86	0.725

Chemistry

Change in number of entrants (%)	Number of centres	Mean centre variability (% A*-C)	Std.dev.	Correlation
All Centres	1721	0.68	10.50	0.559
± 90%	1676	0.78	10.24	0.564
± 80%	1659	0.84	10.27	0.565
± 70%	1635	0.94	10.11	0.572
± 60%	1613	0.97	10.08	0.572
± 50%	1563	0.87	10.00	0.565
± 40%	1455	0.81	9.58	0.575
± 30%	1317	0.68	9.60	0.573
± 20%	1128	0.61	9.84	0.553
± 10%	737	0.48	9.79	0.513

French

Change in number of entrants (%)	Number of centres	Mean centre variability (% A*-C)	Std.dev.	Correlation
All Centres	2074	1.47	15.72	0.674
± 90%	2025	1.69	15.58	0.677
± 80%	2012	1.75	15.53	0.678
± 70%	1989	1.67	15.46	0.682
± 60%	1947	1.66	15.43	0.683
± 50%	1876	1.71	15.26	0.686
± 40%	1736	1.55	15.10	0.690
± 30%	1482	1.37	14.99	0.694
± 20%	1093	1.24	14.78	0.704
± 10%	636	0.68	14.91	0.705

Geography

Change in number of entrants (%)	Number of centres	Mean centre variability (% A*-C)	Std.dev.	Correlation
All Centres	2874	0.80	13.22	0.762
± 90%	2797	0.86	13.07	0.767
± 80%	2777	0.89	13.05	0.767
± 70%	2729	0.96	13.02	0.768
± 60%	2657	0.99	13.02	0.768
± 50%	2564	1.00	12.92	0.772
± 40%	2376	0.77	12.70	0.774
± 30%	2063	0.70	12.43	0.780
± 20%	1570	0.60	12.34	0.784
± 10%	866	0.59	12.42	0.784

German

Change in number of entrants (%)	Number of centres	Mean centre variability (% A*-C)	Std.dev.	Correlation
All Centres	707	0.83	15.8	0.653
± 90%	694	0.92	15.85	0.653
± 80%	687	0.9	15.8	0.652
± 70%	678	0.92	15.81	0.651
± 60%	665	0.65	15.52	0.657
± 50%	644	0.67	15.55	0.653
± 40%	588	0.56	15.6	0.645
± 30%	506	0.43	15.67	0.629
± 20%	394	0.85	15.97	0.620
± 10%	209	1.09	16.88	0.617

History

Change in number of entrants (%)	Number of centres	Mean centre variability (% A*-C)	Std.dev.	Correlation
All Centres	3056	1.35	12.76	0.759
± 90%	2982	1.45	12.63	0.763
± 80%	2965	1.49	12.61	0.763
± 70%	2934	1.55	12.58	0.763
± 60%	2895	1.53	12.51	0.764
± 50%	2802	1.56	12.41	0.767
± 40%	2607	1.43	12.13	0.775
± 30%	2312	1.18	11.97	0.780
± 20%	1799	1.03	11.48	0.792
± 10%	994	0.97	11.55	0.787

Physics

Change in number of entrants (%)	Number of centres	Mean centre variability (% A*-C)	Std.dev.	Correlation
All Centres	1746	0.67	10.05	0.549
± 90%	1708	0.83	9.89	0.557
± 80%	1687	0.87	9.91	0.558
± 70%	1667	0.91	9.77	0.565
± 60%	1643	0.95	9.73	0.569
± 50%	1596	0.9	9.63	0.559
± 40%	1502	0.81	9.48	0.572
± 30%	1358	0.75	9.33	0.573
± 20%	1151	0.67	9.05	0.569
± 10%	759	0.67	9.1	0.473

Science

Change in number of entrants (%)	Number of centres	Mean centre variability (% A*-C)	Std.dev.	Correlation
All Centres	3045	-2.41	18.85	0.605
± 90%	2615	-2.79	17.75	0.650
± 80%	2543	-2.79	17.6	0.655
± 70%	2414	-2.61	17.25	0.664
± 60%	2285	-2.55	16.98	0.674
± 50%	2106	-2.25	16.44	0.692
± 40%	1905	-2.15	16.03	0.704
± 30%	1606	-1.91	15.51	0.722
± 20%	1203	-1.51	15.17	0.739
± 10%	657	-2.26	15.24	0.744

Spanish

Change in number of entrants (%)	Number of centres	Mean centre variability (% A*-C)	Std.dev.	Correlation
All Centres	1143	1.08	15.67	0.705
± 90%	1112	1.22	15.35	0.713
± 80%	1102	1.22	15.35	0.713
± 70%	1085	1.28	15.31	0.713
± 60%	1056	1.39	15.26	0.714
± 50%	1009	1.47	15.33	0.708
± 40%	923	1.74	15.26	0.706
± 30%	797	2	15.3	0.704
± 20%	602	1.63	14.64	0.733
± 10%	324	1.11	15.81	0.695

Appendix B

Centre type classification

Centre type	Description	
1	Secondary Comprehensive	Community, Voluntary Aided Controlled
2	Secondary Selective	
3	Secondary Modern	
4	Secondary Comprehensive	Foundation
5	Secondary Selective	
6	Secondary Modern	
7	Independent	
8	Further Education Establishment	
9	Sixth Form College	
10	Tertiary College	
11	Other	
13	City Academy	
14	Free School	

The "Other" category corresponds to all centres that are entered into any of the remaining classifications. In order to report statistics on all available centres, if a centre has been misclassified or has no classification it is entered into the "Other" category.

Appendix C

Centre type statistics

Mathematics

Centre type	Number of centres	Mean centre variability (% A*-C)	Std. dev	n_{2015}	σ_{2015}	n_{2014}	σ_{2014}
All centres	3686	1.79	10.25	183	82	178	81
1	1286	1.88	9.80	182	69	183	75
2	48	-0.43	2.35	139	32	127	38
3	93	-0.03	10.55	156	67	153	66
4	148	3.92	10.12	210	77	211	94
5	19	0.40	2.45	133	27	141	27
6	23	2.05	8.80	180	55	189	64
7	171	0.14	7.58	95	44	93	41
8	215	-6.13	12.75	223	143	152	100
9	77	-0.96	12.59	150	74	127	56
10	39	-1.74	12.52	295	185	199	138
11	65	-1.07	11.16	158	136	123	90
13	1498	3.39	9.84	190	68	191	76
14	4	-3.04	6.68	123	64	117	65

English

Centre type	Number of centres	Mean centre variability (% A*-C)	Std. dev	n_{2015}	σ_{2015}	n_{2014}	σ_{2014}
All centres	2620	6.37	15.68	172	91	159	81
1	955	7.2	15.41	165	66	161	68
2	93	-0.01	2.09	136	34	136	35
3	79	6.04	12.13	121	48	115	47
4	104	12.10	17.03	184	72	179	76
5	16	1.03	5.83	143	30	140	32
6	5	4.13	11.50	147	42	125	39
7	132	1.07	7.28	96	50	93	44
8	175	-4.84	16.64	255	174	169	131
9	53	5.48	16.66	155	103	144	87
10	27	-4.16	17.81	350	208	279	234
11	37	-2.08	14.42	188	173	142	114
13	940	9.02	16.14	177	73	167	74
14	4	3.71	6.95	121	67	114	67

English literature

Centre type	Number of centres	Mean centre variability (% A*-C)	Std. dev	n_{2015}	σ_{2015}	n_{2014}	σ_{2014}
All centres	2581	-0.53	14.28	155	67	158	74
1	1028	-0.99	14.16	153	64	158	76
2	100	0.57	14.63	131	35	134	36
3	42	2.08	15.73	124	47	125	68
4	122	2.48	16.19	167	63	176	81
5	19	1.04	3.95	136	32	137	32
6	11	7.31	24.53	125	33	133	33
7	122	1.31	10.36	98	46	98	45
8	1	-12.72	NA	87	NA	93	NA
9	1	4.88	NA	113	NA	108	NA
11	14	0.33	9.77	153	63.55	171	85
	1118	-0.95	14.44	167	71.51	166	74
14	3	4.60	5.98	119	74.57	114	84

Additional science

Centre type	Number of centres	Mean centre variability (% A*-C)	Std. dev	n_{2015}	σ_{2015}	n_{2014}	σ_{2014}
All centres							
	2954	-0.77	17.53	101	51	92	48
1	1193	-0.24	17.66	99	48	92	47
2	19	1.61	8.92	72	41	66	39
3	60	-0.14	17.08	84	43	75	36
4	143	-0.78	20.24	111	52	102	52
5	8	4.01	7.37	64	29	66	27
6	20	4.49	25.26	93	53	83	49
7	127	4.06	10.93	52	31	52	29
8	4	-12.29	13.04	50	27	50	25
9	5	3.01	16.36	59	51	63	46
11	17	-2.81	15.83	91	52	77	50
13	1355	-1.78	17.58	108	52	98	49
14	3	-13.19	11.87	79	43	67	62

Biology

Centre type	Number of centres	Mean centre variability (% A*-C)	Std. dev	n_{2015}	σ_{2015}	n_{2014}	σ_{2014}
All centres	1729	0.85	10.05	65	33	65	35
1	601	1.29	11.15	59	28	59	30
2	75	0.22	3.48	98	38	96	40
3	20	4.23	9.64	53	23	48	22
4	73	1.94	10.22	57	26	60	32
5	15	0.95	3.84	107	41	108	36
6	7	1.41	7.76	69	40	55	29
7	127	0.59	5.69	60	29	59	27
8	21	-5.69	16.41	62	34	66	64
9	6	9.87	22.28	35	8	40	6
10	5	-5.11	4.38	50	15	49	20
11	10	-1.15	6.60	61	29	72	32
13	767	0.55	9.85	68	35	69	36
14	2	1.51	21.43	40	3	34	5

Chemistry

Centre type	Number of centres	Mean centre variability (% A*-C)	Std. dev	n_{2015}	σ_{2015}	n_{2014}	σ_{2014}
All centres							
	1721	0.68	10.50	64	34	64	34
1	624	1.17	12.29	57	28	58	28
2	72	0.36	3.73	93	39	91	40
3	18	-2.85	16.75	50	19	49	24
4	76	2.75	10.82	57	26	59	31
5	14	0.82	3.11	110	46	110	40
6	6	-2.69	11.84	73	45	63	34
7	123	0.48	4.89	61	33	60	30
8	8	5.61	16.53	56	24	66	43
9	1	11.33	NA	30	NA	25	NA
10	2	-4.87	10.12	57	25	54	37
11	6	-0.24	4.73	71	43	67	32
13	769	0.23	9.79	67	35	68	36
14	2	-3.10	14.90	41	2	34	5

French

Centre type	Number of centres	Mean centre variability (% A*-C)	Std. dev	n_{2015}	σ_{2015}	n_{2014}	σ_{2014}
All centres							
	2074	1.47	15.72	61	31	64	32
1	722	2.19	16.79	59	29	61	30
2	96	-0.41	7.22	66	28	67	28
3	25	-1.62	15.07	45	20	51	21
4	92	1.82	17.85	60	28	63	25
5	18	1.31	9.29	58	20	56	19
6	7	12.88	17.26	33	5	54	18
7	165	-0.43	8.77	49	19	52	20
9	1	17.74	NA	55	NA	74	NA
11	8	0.85	10.84	54	15	62	17
13	938	1.43	16.31	65	33	68	36
14	2	-14.61	13.54	45	15	41	13

Geography

Centre type	Number of centres	Mean centre variability (% A*-C)	Std. dev	n_{2015}	σ_{2015}	n_{2014}	σ_{2014}
All centres							
	2874	0.80	13.22	70	31	69	31
1	1042	0.66	14.39	69	29	68	29
2	106	-0.05	5.76	66	24	67	24
3	49	0.78	13.07	60	24	59	22
4	120	0.09	13.64	71	35	69	30
5	19	1.32	5.12	78	21	69	19
6	14	1.04	17.46	58	17	61	16
7	258	0.87	7.46	55	25	55	23
8	1	-6.17	NA	29	NA	33	NA
9	1	23.91	NA	62	NA	113	NA
11	10	2.58	14.68	90	39	83	32
13	1249	1.03	13.59	75	34	74	33
14	5	-1.88	16.38	54	27	57	46

German

Centre type	Number of centres	Mean centre variability (% A*-C)	Std. dev	n_{2015}	σ_{2015}	n_{2014}	σ_{2014}
All centres							
	707	0.83	15.80	53	23	55	25
1	211	1.31	16.43	51	22	54	24
2	36	-0.21	7.20	49	22	50	21
3	4	5.96	14.52	46	21	52	13
4	27	0.12	14.01	59	24	54	28
5	10	-1.90	6.02	48	15	54	26
6	1	13.23	NA	42	NA	43	NA
7	24	1.16	5.57	41	13	44	14
11	2	-9.52	1.92	38	16	34	11
13	392	0.73	16.79	55	24	57	26

History

Centre type	Number of centres	Mean centre variability (% A*-C)	Std. dev	n_{2015}	σ_{2015}	n_{2014}	σ_{2014}
All centres							
	3056	1.35	12.76	74	34	76	34
1	1126	1.37	13.49	73	32	75	33
2	109	0.10	6.42	69	24	70	25
3	71	-0.12	12.74	60	27	58	24
4	129	0.10	12.93	80	38	82	34
5	21	1.22	4.92	79	28	78	27
6	11	2.37	15.45	61	27	66	23
7	236	2.67	9.91	54	26	56	26
9	1	5.58	NA	104	NA	71	NA
10	1	13.08	NA	26	NA	30	NA
11	15	-2.13	10.93	66	27	65	31
13	1333	1.42	12.99	80	35	81	35
14	3	2.68	26.63	39	12	33	8

Physics

Centre type	Number of centres	Mean centre variability (% A*-C)	Std. dev	n_{2015}	σ_{2015}	n_{2014}	σ_{2014}
All centres							
	1746	0.67	10.05	63	33	64	33
1	635	1.21	11.49	57	28	58	28
2	73	0.27	3.76	88	38	85	36
3	20	-2.89	7.51	48	19	48	23
4	81	2.18	10.83	56	27	60	30
5	16	1.27	3.13	110	42	111	37
6	8	3.14	13.81	68	48	55	28
7	115	0.38	4.74	58	31	57	28
8	8	1.32	11.27	46	18	58	39
9	1	-1.72	NA	29	NA	26	NA
10	2	-6.27	3.83	56	25	57	32
11	7	-0.97	9.25	68	40	65	30
13	778	0.25	9.78	67	35	68	35
14	2	-2.87	10.95	41	2	34	5

Science

Centre type	Number of centres	Mean centre variability (% A*-C)	Std. dev	n_{2015}	σ_{2015}	n_{2014}	σ_{2014}
All centres							
	3045	-2.41	18.85	118	67	110	67
1	1164	-2.05	19.32	121	63	113	63
2	20	-1.40	7.57	73	47	76	49
3	115	-0.78	16.08	88	51	86	53
4	135	-0.45	21.82	137	76	128	72
5	7	6.03	11.65	57	29	62	41
6	20	0.66	21.17	120	80	123	62
7	164	-0.19	10.34	54	36	55	40
8	49	-2.16	17.18	58	35	58	29
9	24	-3.36	18.65	55	33	65	40
10	8	7.83	20.84	58	21	47	20
11	44	-0.92	14.93	71	59	67	56
13	1292	-3.59	19.39	130	66	121	69
14	3	-4.39	2.26	79	72	53	28

Spanish

Centre type	Number of centres	Mean centre variability (% A*-C)	Std. dev	n_{2015}	σ_{2015}	n_{2014}	σ_{2014}
All centres							
	1143	1.08	15.67	55	26	55	26
1	364	1.09	15.86	55	28	54	25
2	77	2.33	6.92	58	23	57	22
3	10	11.85	24.76	60	37	56	31
4	48	-2.98	21.46	53	22	57	20
5	13	0.61	10.54	57	16	59	16
6	2	13.80	52.38	75	42	48	0
7	105	0.01	14.87	43	15	42	13
9	1	1.46	NA	26	NA	29	NA
10	6	17.24	23.38	66	16	69	16
11	1	-3.64	NA	176	NA	200	NA
13	515	1.05	15.56	57	26	57	27
14	1	6.85	NA	77	NA	48	NA

Appendix D

SES boxplots
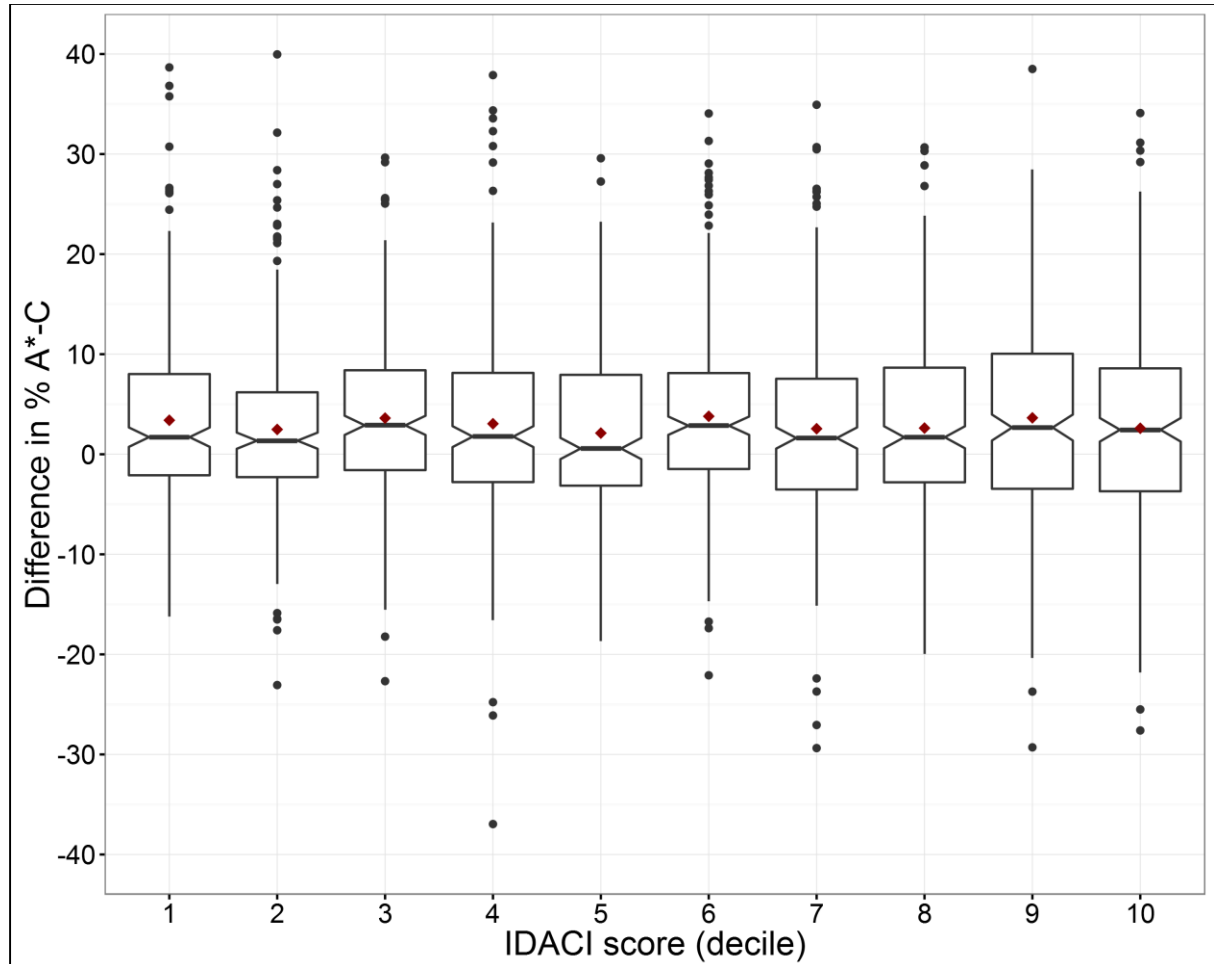
Figure D1. Boxplot of centre variation (mathematics) for IDACI deciles. The mean variation is denoted by the red diamond.
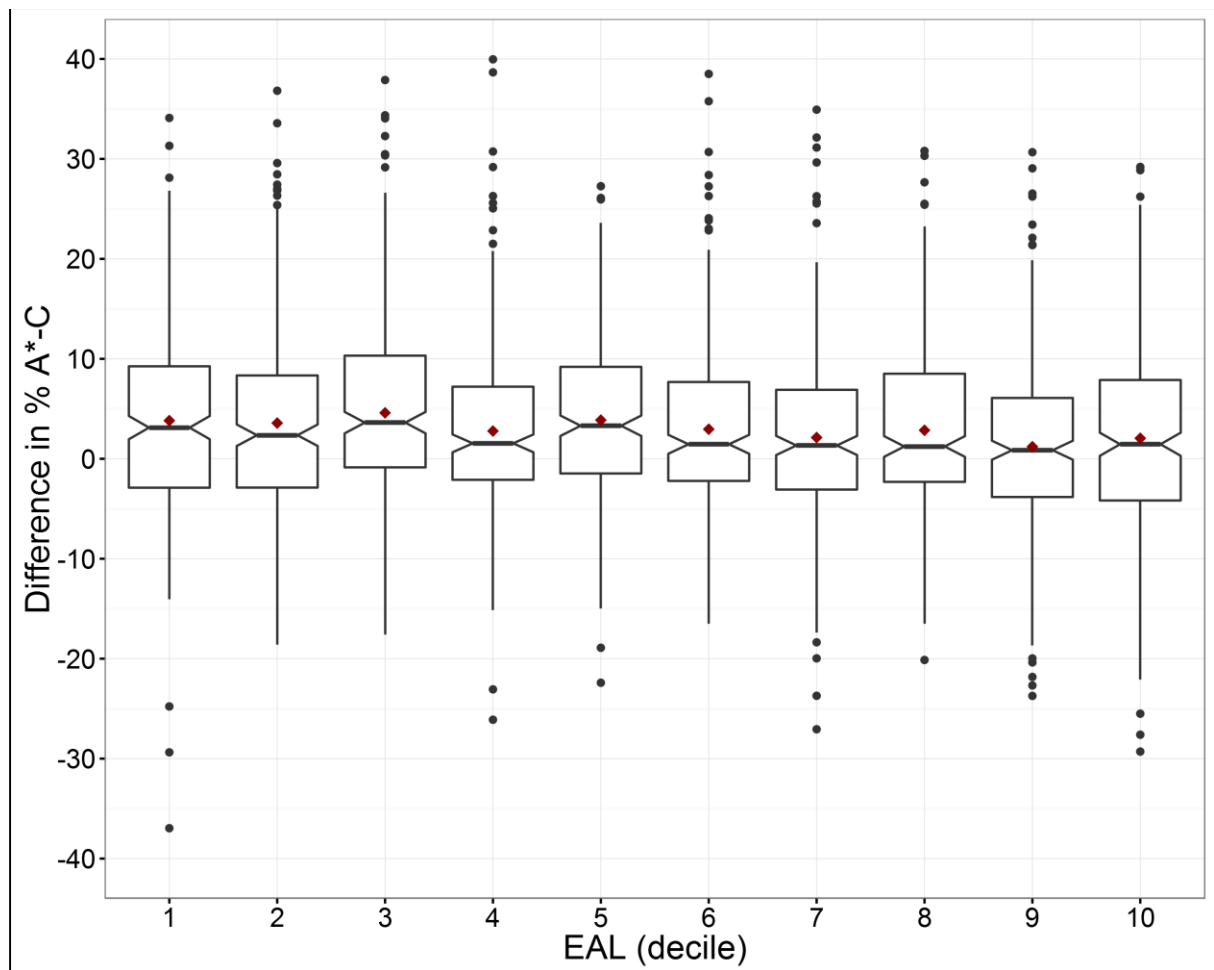
Figure D2. Boxplot of centre variation (mathematics) for EAL deciles. The mean variation is denoted by the red diamond.
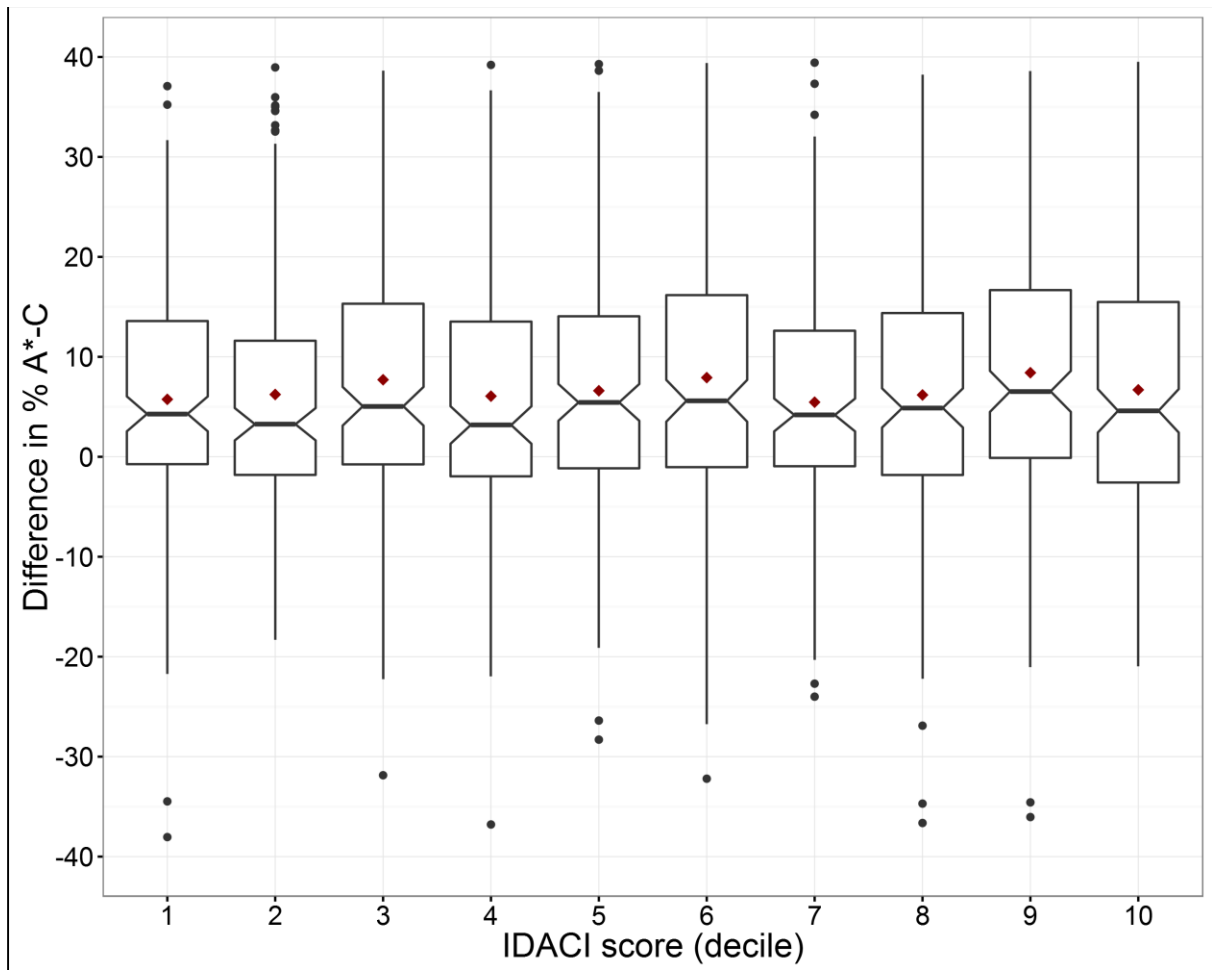
Figure D3. Boxplot of centre variation (English language) for IDACI deciles. The mean variation is denoted by the red diamond.
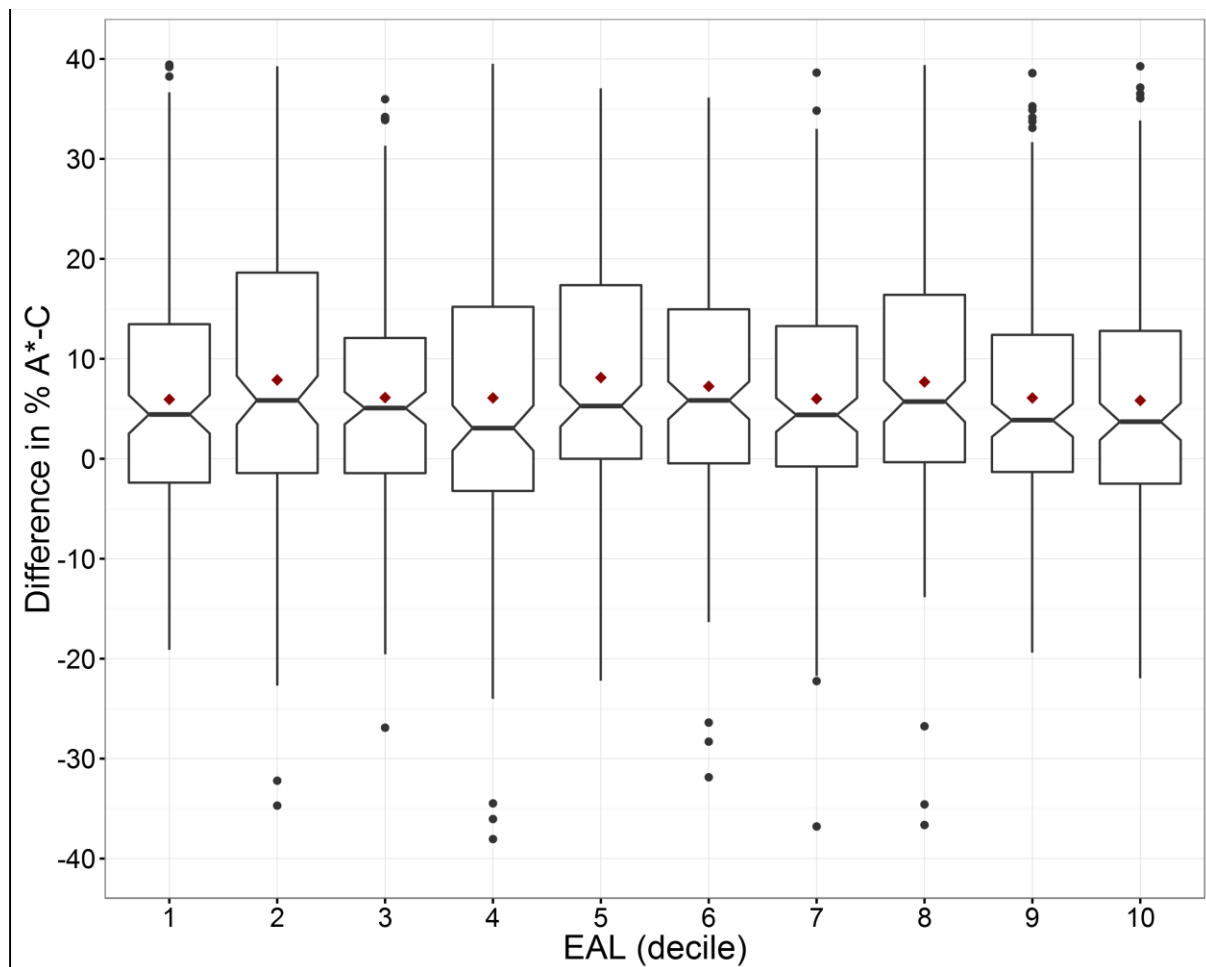
Figure D4. Boxplot of centre variation (English language) for IDACI deciles. The mean variation is denoted by the red diamond.

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