

FFT Index methodology note

Background

When we want to look at how the attainment or progress of pupils varies by a range of characteristics it is often useful to be able to compare data over a number of years. This is particularly important when the number of pupils in a group is small within a single year.

Changes in assessment methodology such as different Foundation Stage Profiles, a move from Levels to Scaled Scores, and (in 2017) reformed GCSEs, make it impossible, without further work, to compare attainment before and after the change.

It might be possible, if data linked to other assessments were available, to undertake some form of 'conversion' between old and new scales. This would enable absolute comparison of changes over time but it is complex to undertake even if linked data were available, which is not always the case.

If, however, we are interested in the attainment of different groups, for example:

- how does the performance of Pupil Premium pupils compare with other pupils?
- do pupils with English as an additional language make better progress?

then it is possible to look at relative attainment within each year i.e. what is the performance of the group in which we are interested compared to the performance of other groups?

This leads us to develop what we will call the *FFT Index*.

Methodology

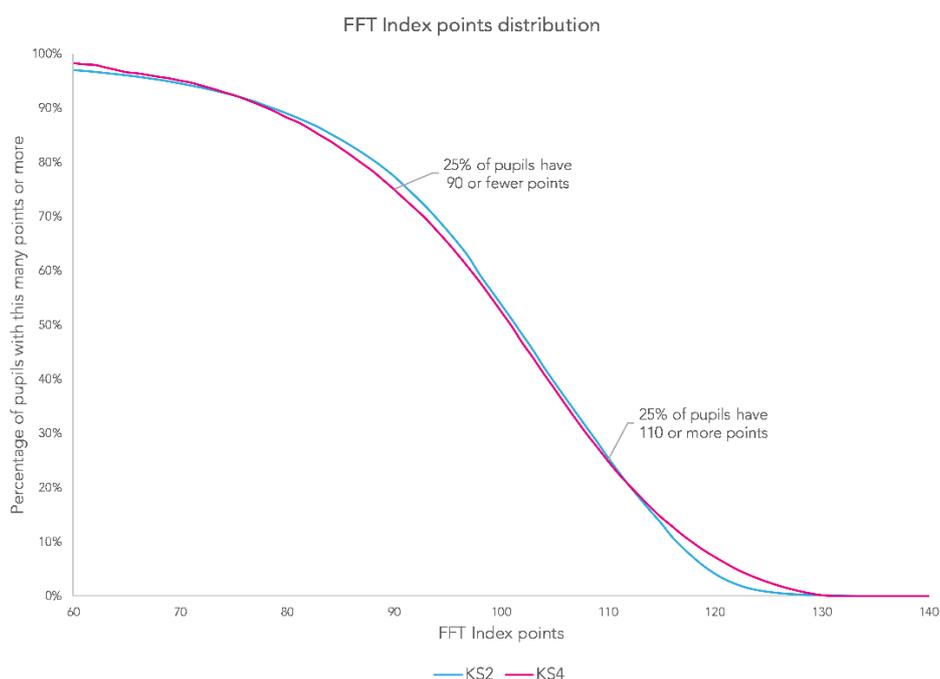
Within each year we convert a score (attainment or value added) to a standardised scale. This is done by calculating the z-score. For each pupil we calculate their z-score as:

$$z = (\text{pupil score} - \text{national average score}) / (\text{standard deviation of national scores})$$

This calculation provides a series of z scores which, overall, have a mean of zero and a standard deviation of 1. We then scale these scores as follows:

$$S = 100 + 15 * z$$

This means that the scaled scores have a national mean of 100 and a standard deviation of 15. The overall scale is from 60 to 140 – any scores below 60 are set to 60 and any above 140 to 140. This ensures that very low or very high scores (outliers) are unlikely to distort the outcomes. Distribution of FFT Index scores for KS2 and KS4 are:



The methodology used here is *not* the same as that used by the Department for Education to generate its Scaled Scores at KS1 and KS2 from 2016 onwards. Also, our calculation gives the same national mean (100) in

every year. The national means for KS1 and KS2 Scaled Scores are not 100 and they are likely to change each year.

Indicators

This methodology can be applied to indicators where the outcome is on a numerical scale, such as:

- Foundation Stage Profile total scores
- National Curriculum Levels and Scaled Scores at KS1
- National Curriculum Level Fine Grades, Scaled Scores and Test Marks at KS2
- GCSE grades, Points Scores, Attainment 8 at KS4

It is not appropriate to apply the methodology to threshold measures such as Level 4+ and 5A*-C GCSEs. We do not consider this to be a disadvantage because threshold measures tend to highlight differences for pupils who have attainment just below or above the threshold whereas average grade or mark measures assess the attainment and progress of all pupils.

Coverage

When calculating FFT Index scores we use data from pupils in maintained schools to calculate the national mean and standard deviation values. This means that we exclude pupils from special schools, pupil referral units and independent schools.

Comparing different Key Stages

The conversion of scores means that, for each Key Stage, the national mean is 100. When comparing gaps between different Key Stages we need to take account of the relationship between scaled scores and actual attainment. The following example, which compares gaps at KS1 and KS2, illustrates the issue:

- using the FFT Index the Pupil Premium gap at KS2 in 2016 was 7.0 points and the KS1 gap for the same cohort (in 2011) was 8.0 points;
- this looks as if the gap has reduced;
- however, the gap in progress (value-added) from KS1 to KS2 is 1.5 points which would indicate a slight widening of the gap between KS1 and KS2.

If we look at the relationship between scaled scores and attainment we find that:

- at KS1, 10 FFT Index Points are equivalent to around 0.34 of a National Curriculum Level;
- at KS2, 10 FFT Index Points are equivalent to around 0.50 of a Level;
- applying this would give a KS1 gap of 0.27 of a Level and a KS2 gap of 0.35 of a Level. This is a widening of the gap by 0.08 of a Level which is similar to the value added gap converted to Level (0.05).

Converting to Levels is fine for KS1 and KS2 but it cannot be applied to other stages. In order to make comparisons of gaps across Key Stages we can convert the FFT Index to an equivalent in months. The calculation is based upon the following methodology:

- we take mean age of pupils when assessed, for example 135 months at KS2;
- at each stage the national mean FFT Index is 100 (this applies to all stages and to all years);
- this gives, for KS2, for example, 1.35 months per index point (135 divided by 100);
- the table below shows the conversions for each stage.

Stage	Age when assessed (months)	Mean Scaled Score	Months per point
FS	63	100	0.63
KS1	87	100	0.87
KS2	135	100	1.35
KS4	195	100	1.95

Applying this conversion to the KS1/KS2 example illustrated above we find:

- KS1 gap (2011 cohort) of 6.9 months;
- KS2 gap (2015 cohort) of 9.5 months;
- value added gap of 2.1 months

The value added gap (2.1 months) is similar to, but lower than, the difference between the KS1 and KS2 gaps (2.6). This is likely to be caused by a number of factors including:

- the Pupil Premium cohort changing over time – there are around 6% of pupils who are Pupil Premium at KS2 but not at KS1;
- the underlying distribution of attainment scores varying slightly between stages. This could be addressed (to some extent) by normalising the underlying data but this would be complex and would cause other issues such as the attainment interval between each index point varying across the range of scores.

Conversion to months provides, therefore, a simple methodology which enables gaps to be compared across Key Stages and, in particular, the changes in the gap as each cohort moves through each stage.

Summary

The FFT Index provides a way in which outcomes (attainment and value added scores) can be compared across Key Stages and changes in the outcomes for subgroups of pupils can be evaluated.