

Another attempt at a qualification-neutral Progress 8 measure – detailed methodology

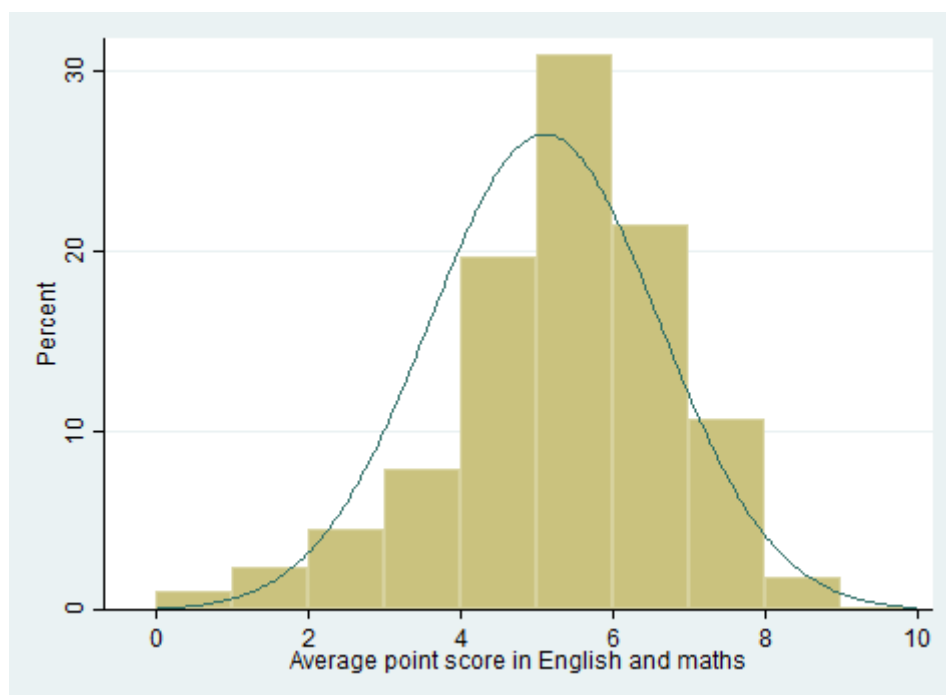
Dave Thomson

There are endless ways in which pupils' results could be scored to adjust for severity of grading.

The method described here would not necessarily be the best way of going about it if there were no planned changes to qualifications. But in 2017 we will begin to see the results of a once-in-a-generation reform of GCSEs, with new 1-9 grades awarded. What we propose could help score legacy A*-G grades more effectively than the interim points scores shown in the [Progress 8 technical guidance](#).

Over 99% of pupils included in the 2016 Progress 8 calculation were entered for a GCSE in English language (including combined language and literature) or maths, and 98.5% were entered for both. As there is almost complete coverage in these two subjects, we use pupils' results in them as the basis for scoring the other qualifications they enter.

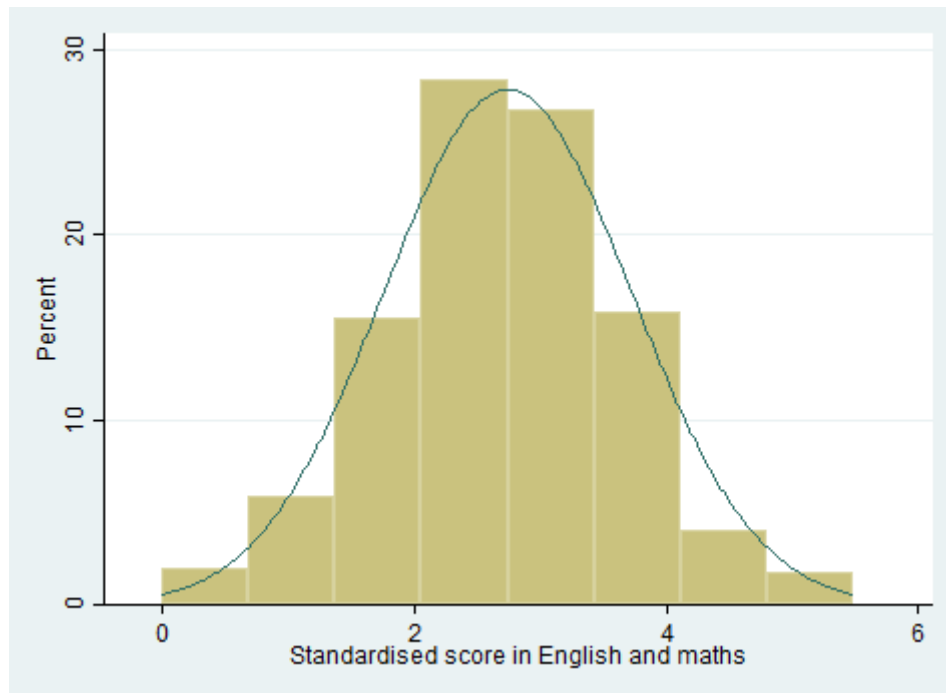
The chart below shows the distribution of pupils' average point scores (APS) in English and maths. It is slightly skewed and peaked compared to a normal distribution.



We then use rank standardisation to convert APSs into normal scores. This creates a scale with mean zero and standard deviation one. We are assuming here that pupil attainment in English and maths is correlated with an underlying normally-distributed scale of ability.

To avoid using negative scores in subsequent calculations we shunt the distribution by subtracting the minimum value (that awarded to pupils with an APS of zero). The resulting distribution (which has mean 2.75 and standard deviation 1) is more normally distributed.

This is confirmed by the table of moments below it. Skewness has been eliminated and kurtosis (peakedness) is closer to the ideal value of 3.



Moments of the normal distribution for APS and standardised score

	APS	Std score
Mean	5.1	2.8
Std dev	1.5	1.0
Skewness	-0.7	0.0
Kurtosis	3.7	2.8

The standardised scores are subsequently used to assign points scores to grades in different qualifications. For each Key Stage 4 subject we calculate:

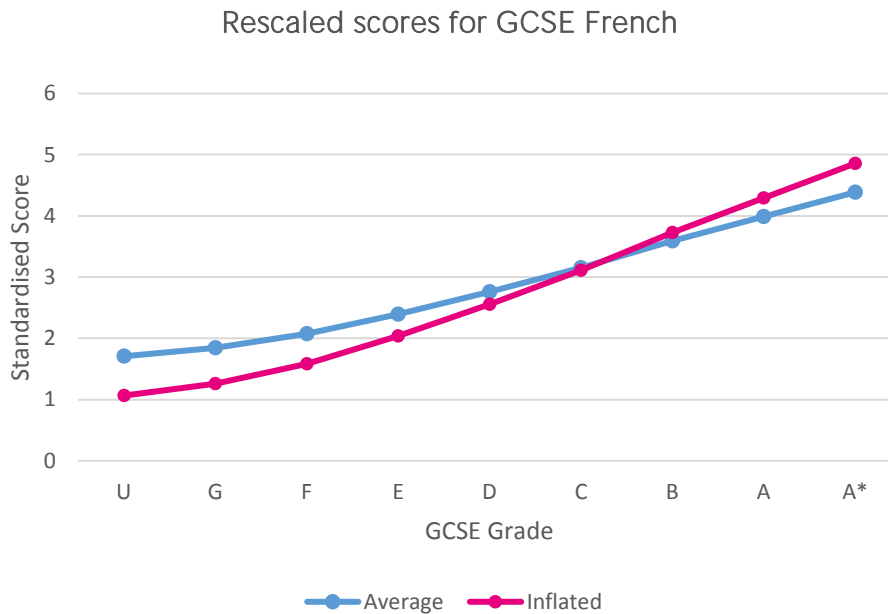
- The average standardised score for all pupils entered
- The variance in standardised scores for all pupils entered
- The average standardised score for all pupils achieving each grade

Subjects which tend to be entered by more able pupils, such as triple sciences, will have higher average standardised scores than other subjects.

The average standardised scores for each grade in each subject form the basis of the scores used in our subsequent Progress 8 calculations. However, these scores tend towards the average. We therefore inflate them so that they have the same variance as the standardised scores.

An example is shown in the chart below. The blue line shows the average standardised scores for all pupils achieving each grade. The purple line shows the effects of inflating the

variance. The mean remains unchanged but higher grades are scored more highly at the expense of lower grades.



We use this method to create a standardised score for each grade in each qualification counted in 2016 Performance Tables, which we then use in subsequent steps to calculate Attainment 8 and Progress 8.

For the purposes of this blogpost, subjects which overlap in content (such as core science and physics) are scored separately. However, there an argument can be made for grouping them together.

Another advantage

The main post gives details of some of the ways in which results would differ if this qualification neutral approach were adopted.

Another advantage, not mentioned in the main post, is that it results in a flatter variance profile than the current Progress 8 methodology.

That is more desirable as, for reasons [discussed in more detail in a previous post](#).

Results under the qualification neutral approach are still far from ideal though, with more variable scores among pupils with lower levels of prior attainment and less variable scores among those with higher levels of prior attainment.

(As the two sets of Progress 8 scores are on different scales we have deflated the DfE Progress 8 scores so that they have the same overall variance as the standardised scores. This is so we can show both on the same chart).

Variance in Progress 8 scores

