

What is the evidence on the impact of Pupil Premium funding on school intakes and attainment by age 16 in England?

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Abstract

The use of targeted additional funding for school-age education, intended to improve student attainment, is a widespread phenomenon internationally. It is slightly rarer that the funding is used to improve attainment **specifically** for the most disadvantaged students – often via trying to attract teachers to poorer areas, or encouraging families to send their children to school. It is even rarer that funding is used to try and reduce the attainment gap between economically disadvantaged students and their peers, and almost unheard of that the funding is intended to change the nature of school intakes by making disadvantaged students more attractive. These last two were the objectives set for Pupil Premium funding to schools in England. The funding started **in 2011**, for all state-funded schools at the same time, so there is no easy counterfactual to help assess how effective it has been. The funding is a considerable investment every year and it is therefore important to know whether it works as intended. This paper presents a time series analysis of all students at secondary school in England from 2006, well before the funding started, until 2019, the most recent year for which there are attainment figures. It overcomes concerns that the official attainment gap between students labelled disadvantaged and the rest is sensitive to demographic, economic, legal, and other concurrent policy changes. **It does this** by looking at a stable group of long-term disadvantaged students. It is argued that this group would have attracted Pupil Premium funding, if it existed, in any year and under any economic conditions. After 2010, these long-term disadvantaged pupils became substantially less clustered in specific schools in their first year, and throughout their remaining school life. This improvement cannot be explained by economic or other factors **used in this paper**, and so it looks as though the Pupil Premium has been effective here. The picture for the attainment gap at age 16 is more mixed. It is partly confused by changes in the grading of assessments in 2014 and again from 2016. The reasons why the improvements are less clear than at primary school are discussed, and they involve the nature of evidence available to secondary schools to help them improve the attainment of their most disadvantaged students

Key insights

This paper assesses the clustering of long-term disadvantaged pupils within secondary schools in England, and the attainment gap between them and their peers. It finds that the socio-economic segregation of the poorest pupil has declined unexpectedly 2011-2019, and that this is weakly linked to a decline in the attainment gap.

Introduction

Pupil Premium funding was introduced in England in 2011 for all state-funded schools, in proportion to their intake of disadvantaged pupils. It was given to provide assistance and interventions to decrease the unattractiveness (during the allocation of school places) of disadvantaged students who might need more resources to achieve expected levels of attainment, to improve the attainment of poorer pupils, and so reduce the poverty attainment gap (Freedman and Horner 2008, Gov.UK 2010). This paper provides an overview of some existing evidence on policies that have been employed worldwide to increase funding intended to improve educational outcomes, and how this is best implemented. The key concern for our new evaluation is how to identify, and so label, those students who are disadvantaged, and therefore eligible for additional targeted funding. The paper outlines the practical difficulties in this evaluation,

describes the datasets, design and methods used, and then presents the findings and some implications for policy.

Pupil Premium policy in England

Since 2011, all state-funded schools in England have received additional annual funding linked to the number of their pupils known to be eligible for free school meals (FSM), and so officially registered as from low-income families. This figure was originally £430 per secondary pupil in 2011, rising to £955 currently. Adjusted for inflation, in current figures the premium value rose to a peak of £1,050 for 2014-15, and has declined slightly to its current value ever since. The figure is greater for pupils living in state care (£2,345), and less for pupils with parents in the armed forces (£300), or whose parent(s) had died while in the armed forces (Foster and Long 2020). In total, these figures **can** make a substantial difference to the funding of large secondary schools.

The funding was agreed with two major purposes. One was to create a kind of incentive for schools, when allocating places, to prioritise disadvantaged pupils in some way (Freedman and Horner 2008, Gov.UK 2010). On average (and only on average), disadvantaged pupils can present schools with greater challenges to successful teaching. On average, socio-economically less advantaged students have lower attainment outcomes at school, and poorer opportunities once they have left school (Lessof et al. 2018, Gorard and Siddiqui 2019, Hanushek et al. 2019). However **it** happens, poorer children are disproportionately clustered in schools with others like them in England and elsewhere (Jenkins et al. 2008, Gorard 2015, Roew and Lubienski 2017). This can be damaging in many ways (Horgan 2007), most especially for the lowest attainers (Dickerson et al. 2018), **apparently** lowering aspiration and participation for individuals, and reducing social and ethnic cohesion (Danhier 2018, Hewstone et al. 2018). So, the extra Pupil Premium funding was proposed to encourage schools to take a fairer share of the local poorer children in each area, and **thereby reduce the level of** socioeconomic segregation between secondary schools.

The other aim also emerged from the fact that disadvantaged pupils are more likely to be struggling, and have challenges or other priorities while at school, making it harder for them to access the much wider secondary curriculum (Rolle et al. 2008). Pupil Premium provides schools with the funds to support low-income low attaining pupils with additional resources and interventions (Copeland 2019). Pupil Premium is a kind of catch up or even remedial policy for disadvantaged pupils, to reduce the poverty attainment gap, and schools are increasingly judged in terms of the results for their Pupil Premium pupils compared to the rest (DfE 2019).

At the same time as the Pupil Premium was announced, the Coalition government also set up the Education Endowment Foundation (EEF) as a charity initially funded by DfE, in order to create and accumulate robust evidence on how the Pupil Premium money could best be used to reduce the attainment gap. EEF has so far commissioned hundreds of evaluations, mostly randomised control trials, many reviews of best practice, identified what they term “promising approaches”, and published a teacher Toolkit summarising the strengths and weaknesses of many common ideas used in the classroom. The idea is that schools and teachers should this evidence, and more like it from other key sources, to select valid approaches for their chosen purposes. Valid approaches would be those that had been demonstrated to have worked in reducing the attainment gap, and which could be considered “best bets” to do so again. Many schools now report using these resources or something like them (Higgins 2020).

Is money for schools the best model for additional funding?

Internationally, **our search** found no prior studies looking at the effectiveness of additional funding, in itself, for reducing socioeconomic segregation between schools. However, using funding to try and improve the attainment of poorer pupils is a more common policy approach. It has been used by

governments and other agencies worldwide for many years (Children's World Report 2020). There are many variations on the theme, with money given to the school system to deploy, or to areas with high levels of disadvantage (as in Opportunity Areas, DfE 2018a), to families either for them to deploy or as an incentive (so that parents encourage school attendance, for example), to teachers, or to the disadvantaged students themselves (Toukoushian and Michael 2007). There is little robust evidence so far on which of these avenues is best.

Evaluations suggest that giving the funding to students, to improve their performance directly or through enhanced extrinsic motivation, does not work **well** in most subject areas (Bettinger et al. 2010, Fryer 2010). Students also need to know *how* to improve their attainment. Therefore, paying them for the building blocks of improvement, such as for classroom behaviour where students are more likely to know what to do, is more promising. One large experimental study found improved attainment in maths, compared to a control, for groups wherein students were paid if they increased their scores, and a group wherein students, teachers, *and* school leaders received the incentive (Behrman et al. 2015). There was little or no improvement for a group wherein only teachers were paid extra if students improved. So, directing the funding to pay for more or better teachers is not very effective (**as also shown by de Ree et al. 2018**). Incentives can encourage teachers to take posts in disadvantaged areas and schools (Clotfelter et al. 2005, Feng, 2014), but does not keep them there, especially if the funding ceases or reduces (See et al. 2020).

The evidence on the benefits of paying parents **while their children are at school** is not much stronger. There is a long-established *association* between parental engagement in their children's learning and the children's attainment (e.g. EEF 2021). However, intervening to enhance parental engagement in children's learning and school life has not **yet** been demonstrated to be a clear *causal* factor in equalising the academic outcomes of disadvantaged children. Therefore, funding programmes to support parental involvement for disadvantaged children are not a promising use of money if student attainment is the main objective (Gorard and See 2013).

Although the international evidence on providing extra money to schools for them to improve is mixed (Mbiti et al. 2019), some large studies have suggested that providing extra resources for schools can lead to greater gains than **providing** incentives for teachers (Lavy 2002). The Pupil Premium is perhaps most like the additional funding that schools in England have long received for individual pupils with statements of special educational needs or a disability. Both funds are intended to assist those pupils facing long-term challenges in accessing the curriculum. **The money from Pupil Premium may not actually have been additional, rather than replacing some prior funding routes, but is perhaps more flexible and more precisely targeted at disadvantaged pupils (Ofsted 2012).**

The evidence on the impact of such funding for poorer pupils is mixed (**Witte 2017**), but reasonably promising overall (Henry et al. 2010, Holmlund et al. 2010, **Jenkins et al. 2006**). The funding is not tied to compliance standards or other criteria. It is simply based on pupil intakes to schools. This reduces the chances of failure of implementation, as has happened previously with more complex schemes elsewhere (Bastagli 2010).

It is crucial for any funding scheme intended to improve education for disadvantaged groups that the funding reaches its correct "target", and that it is then used effectively. Good intentions and extra money are not enough in themselves. The funding allocation must be fair, which depends on high quality administrative data (Baker et al. 2014), otherwise the intended recipients can miss out on the benefits (Minorini and Sugarman 1999).

The prior evidence on Pupil Premium impact

The widespread and expensive Pupil Premium policy was implemented in England without prior testing of its impact. And because the policy applies to all schools it is no longer possible to design an evaluation with a clear counterfactual. Instead we have to rely on before-and-after time series analyses,

coupled with attempts to factor out other changes to the law, to the economy and to assessment, that have taken place over the same period.

All prior attempts at evaluating the impact of Pupil Premium funding have been found wanting in several crucial respects (Gorard et al. 2019). There **had** been no evaluations of the impact on socio-economic segregation between schools, until a study of primary schools by Gorard et al. (2021). There have been some studies of the attainment gap which only looked at the picture since 2011, when Pupil Premium started, so they cannot genuinely say that any trend was not already in existence beforehand (e.g. DfE 2018b). None of the prior studies of the attainment gap have taken into account confounding factors such as economic changes, new definitions of disadvantage, non-educational policies such as the introduction of Universal Credit, and changes in the nature and scoring of assessments. Economic and policy changes matter because they will change the proportion and nature of the group officially labelled as disadvantaged in any year. And this will then alter the apparent attainment gap between pupils labelled disadvantaged and the rest in a way that is unrelated to the impact of the Pupil Premium, or the work of schools.

Since 1989, the proportion of pupils registered as eligible for (or taking) FSM has varied with extremes from just above 10% of the school population to just above 20%. Assessing the impact of the Pupil Premium involves comparing the attainment gap for years before 2011 when there was no Pupil Premium with later years when there was. If FSM is used as the long-term criterion (pupils living in care and Service children were not officially or consistently recorded until relatively recently), then in some years the disadvantaged group would be much larger than in others. Average attainment at KS4 (and every other KS) is linked to the duration of pupils' disadvantage. Pupils who have been FSM-eligible for more years by KS4 have lower attainment than those who have been more temporarily FSM-eligible. In fact, the temporary FSM-eligible pupils are closer in average attainment to the majority never eligible pupils than to the permanently eligible (Gorard 2018).

This means that in years when the economy is poor, and there are more FSM-eligible pupils, then the newly eligible ones will have higher average attainment than the other longer-term FSM-eligible pupils, and so the official attainment gap will appear to decline. The opposite will happen when the economy improves, and the attainment gap will appear to increase. This is not, however, anything to do with Pupil Premium impact. So, analyses like those of Exley (2015,) National Audit Office (2015), Public Accounts Committee (2015), EEF (2017). Education Policy Institute (2017), and Social Mobility Commission (2019), are misleading because what they are portraying as changes in the attainment gap are at least partly just changes in the economy (plus other changes in policies and assessment). The same thing happens when a new law such as Universal Credit changes the proportion of pupils labelled as disadvantaged. For fuller discussion and illustration of these problems, see Gorard et al. (2019).

Similar things happen when economic or educational changes lead to more or fewer families in England using the (6.5%) minority of private schools. Private pupils are not generally included in official estimates of the attainment gap based on the National Pupil Database, and are not often FSM-eligible. If the pupils on the cusp of using private schools are, on average, slightly higher attaining than the remaining pupils in the state-funded system then in years when they are in the state-funded system they will be included in the calculations, and so the attainment gap will appear larger. The official gap will appear smaller in years when such pupils are in private schools and omitted from the gap calculation. Again this is nothing, directly, to do with the impact of Pupil Premium funding. It will just confuse the conclusions drawn from a simple time series analysis (such as those cited above).

Another, perhaps relatively minor, factor is that the existence of the Pupil Premium policy itself will have provided a further incentive for schools to register all potential target pupils as FSM-eligible. It **was** estimated that perhaps 50,000 or more pupils are legally entitled to FSM but not registered, or their status is otherwise unclear (Gorard et al. 2019). Registering more of these will reduce the amount of missing data, and so increase the apparent prevalence of disadvantage. As shown in the next section, there have also been changes to **the** nature and difficulty of assessments recognised at KS4.

A substantial part of the apparent change in the official attainment gap in any year, area or school is therefore linked to factors such as changes in private school attendance, the economy, in the definition of poverty, and the duration of poverty (none of which are strictly anything to do with attainment levels, but which become confounding variables unless accounted for). These problems arise whether the gap is based on current FSM-eligible pupils and the rest, or pupils who have ever been FSM-eligible and the rest. If anything, EverFSM is more sensitive to such concurrent changes than simple eligibility is.

In order to assess the impact of Pupil Premium funding as accurately as possible, a way of defining disadvantage is needed that applies equally to pupil cohorts from long before the policy was introduced. And a dataset is needed that includes relevant variables in the same format from well before 2011 until well after. In this way, we can identify and assess the segregation and attainment of pupils who would have attracted Pupil Premium funding, had it been available, in any year, and regardless of the legal and economic circumstances.

Changes to KS4 assessment

At KS4, unlike KS2, there is a wide range of qualification types and subjects taken. To cope with this, and provide a summary value, the National Pupil Database records a KS4 points score which converts all grades, subjects and types of qualification into a common aggregated total. The majority of qualifications are based on the GCSE, and as well as a total the points scores are also computed in terms of the best 8 GCSE grades or their equivalent. There have been other summary measures, but only the total and this best 8 equivalent are available in the same format for all years 2006 to 2019. The results in this paper have been evaluated both in terms of total points scores, and the capped points scores (best 8).

From 2014 to 2016 some qualifications began to be ignored in the official points scores – including where a pupil sat more than one qualification with considerable overlap, perhaps by entering through more than one awarding body. Such qualifications were no longer double-counted (DfE 2016).

Until 2016, GCSEs (and so the points scores based on them) were graded from G (the lowest pass grade) to A* (the highest). From 2017 onwards the grades were reversed in order and presented as numbers (from 1 as the lowest to 9 as the highest). These numeric grades do not map neatly onto exact letter grades, but the DfE has created a conversion so that the new grades can also be summarised in points scores. In 2017 the results included these new grades for English and maths, and the other subjects used new grades in 2018 and 2019. There was a deliberate attempt by policy-makers to stop what they saw as annual grade inflation and so, although equivalents were stated, the KS4 scores after 2016, perhaps even after 2014, are on a very different scale.

In an attempt to overcome discrepancies in time series created by these changes in scores from 2014 onwards, DfE (2014) started using the mean rank difference between the scores of disadvantaged (FSM-eligible) pupils and the rest. Note that they did not address the economic and legal changes discussed in the last section. DfE (2014) claimed their new approach was intended to be resilient to changes in grading systems, such as the addition of new top grades, and resilient to changes to assessments and curricula, because it is only about order and not the metric used to create the order. They say in summary - “While there is still a possibility of reform effects which do not reflect changes in underlying ability, and regular robustness assessments of the Index would be needed, the risk of substantial non-comparability due to changes to GCSEs appears to be small”. In this new paper, we try out this approach as well as a range of others.

Methods

The new analyses in this paper look at the more stably disadvantaged group of pupils, who were known to be FSM-eligible for every year while at their secondary school. This group are less affected by

changes in the economy than the temporarily or ever disadvantaged (see below). Their segregation and attainment is compared with those of all other pupils in their cohort. This yields a reasonably robust method for assessing Pupil Premium impact, independently of concurrent legal and economic factors.

The datasets used

The records used in this paper are provided by the National Pupil Database (NPD), as held by the DfE. The records, containing some sensitive data, were accessed via a secure area set up the ONS. They represent the Key Stage 4 (KS4) cohorts 2005/6 to 2018/19, and include all pupils of the correct age for that school year, in state-maintained schools including special schools and Pupil Referral Units (PRUs).

The later NPD datasets include variables representing pupils living in state care, those with parents in the armed forces. These could be used to define pupils with Pupil Premium status, but are not available for all cohorts. Therefore, disadvantage in this paper is defined in terms of FSM-eligibility (which represents the overwhelming majority of cases anyway).

Pupils who reached the end of KS4 at age 16 in 2006 would generally have joined secondary schooling at the age of 11 in 2002. This would be the earliest cohort that has a full trajectory, including all relevant data about their time in secondary school. Due to COVID lockdown, KS4 assessments were disrupted in 2020 and 2021. Therefore, this paper reports results for the cohorts 2006 to 2019, and compares all pupils known to be FSM-eligible for their entire secondary schooling with all other pupils. Table 1 shows the total number of all pupils in each cohort with complete records.

Table 1 – Number of pupils in each cohort

Cohort	Total in cohort (valid NPD records)
End of KS4 in 2006	56,1257
End of KS4 in 2007	55,5097
End of KS4 in 2008	56,6604
End of KS4 in 2009	55,2397
End of KS4 in 2010	53,5453
End of KS4 in 2011	53,1924
End of KS4 in 2012	51,9179
End of KS4 in 2013	51,5745
End of KS4 in 2014	55,2848
End of KS4 in 2015	57,0562
End of KS4 in 2016	58,3981
End of KS4 in 2017	59,7466
End of KS4 in 2018	61,7272
End of KS4 in 2019	64,2189

New indicators

New indicators were created registering how many years each pupil had been FSM-eligible for, and the number of years that knowledge of FSM-eligibility was missing, as an indication of that stable subset of pupils living in long-term poverty. We ranked each pupil by their KS4 Capped Points scores, and also assessed whether each pupil had higher than national average attainment, or not.

The attainment measures used were the KS4 Capped and KS4 Total points scores. These were also converted to z-scores, and the analyses were conducted with both these and the raw scores. In addition, a value-added measure was created, through a regression model with individual KS2 points as predictor and KS4 points the outcome. This is an estimate of the progress made by each pupil at secondary school.

The model for each cohort predicted the outcome with R value of around 0.7. The difference between the actual and predicted scores for each pupil (the residual) was stored as a new variable.

In order to assess the extent to which each long-term disadvantaged pupil attended a school with others who are also long-term disadvantaged, a value of between-school segregation was computed (Gorard 2015). This was calculated for each school, as the difference between:

- The number of long-term FSM-eligible pupils in that school, divided by the number of long-term FSM pupils in all schools
- and
- The number of pupils in that school divided by the number of pupils in all schools

This difference was then linked to the record of every pupil in that school. This segregation residual shows how clustered each school is in terms of FSM-eligible pupils, or not.

Based on figures from ONS (2020), a variable representing annual growth in GDP is used to represent economic change 2006-2019. Similarly, figures from DfE (2020) are used to represent the annual percentage of pupils attending private schools in England. Both sets of figures are compared to the primary results in this paper, and are used as predictors in later regression models. All analyses in this paper are at the national level, so the use of national figures for GDP and private school use is acceptable.

Analysis

For some analyses, the data for all 14 cohorts was combined into one dataset representing 7,895,115 pupils. This large dataset was used to create summaries of the characteristics of long-term disadvantaged pupils. The characteristics that were cross-tabulated with long-term disadvantage included sex, age in year, language, ethnicity, and special educational need status.

Where pupil records had some missing data, they were flagged as such. This flag was either a new category, for categorical variables, or a new flag variable for real number variables. This approach means that no cases were lost to analysis, and so the N in each table is the same as reported in Table 1. It also means that the missing data can be used in any analysis to assess if its “missingness” affects the substantive findings (Gorard 2020). The amount of data was so small relative to the dataset that it made no discernible difference.

“Effect” sizes were calculated by subtracting mean scores for long-term disadvantaged pupils from mean scores for all other pupils, and then dividing the result by the standard deviation for all scores. Effect sizes are presented for KS4 total points, KS4 capped points, and the residual scores for value-added and segregation (above).

We ranked all pupils in each year by their KS4 points, and computed the difference between the average rank for long-term disadvantaged pupils and the rest. This is the approach used by the DfE from 2014 onwards, which is claimed to overcome abrupt changes in metrics. For each year we also computed the percentage of long-term disadvantaged pupils who were at or above the average national score for KS4 points.

To help readers see the trends, many of the results such as the effect sizes, GDP change over time, the percentage of pupils in private schools, and the number of long-term disadvantaged pupils, are presented over time as line graphs. Line graphs are used, even though the data mostly consists of 14 data points representing the years 2006-2019, because the trends over time are easier to see. Similarly, in order to present the changes clearly, the origin of each graph is not always zero. And finally, all effect sizes are all converted into a positive format, to aid comparison between them. Readers are reminded of these issues, where relevant, in the text.

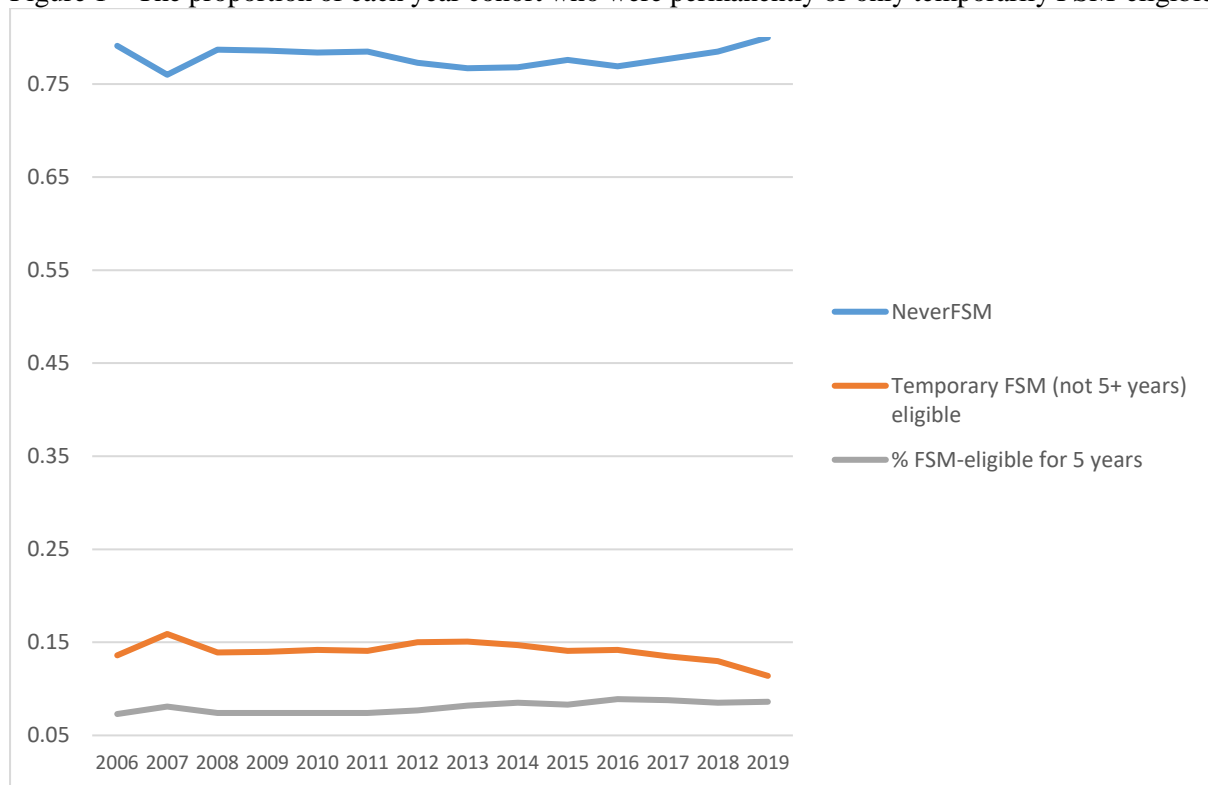
In order to assess the impact of the Pupil Premium policy more formally, two multivariate regression models were created – with outcomes represented by the annual attainment gap, and average segregation of long-term disadvantage pupils. The predictor variables were entered in two blocks. The first block consisted of GDP change, the percentage of pupil FSM-eligible for five years awhile at secondary school, and the percentage of pupils in private schooling. The second block was one variable, representing whether any year was before (up to 2010) or after (2011 onwards) the introduction of Pupil Premium.¹

Findings

The relative stability of long-term disadvantage

The proportion of pupils only temporarily FSM-eligible during their five years of secondary schools varies annually from 11.4% to 15.9% from 2006 to 2019. This is quite volatile (the middle line in Figure 1). The proportion of pupils who are permanently FSM-eligible (the lower line) varies from 7.3% to 8.9%. This change is slightly greater than the equivalent figures for KS2 pupils (Gorard et al. 2021), but considerably less than for temporarily disadvantaged pupils at KS4. As would be expected the proportion never eligible for FSM while at secondary school is a near mirror image of those temporarily eligible. Combining these groups creates a relatively stable group with which to compare the long-term disadvantaged.

Figure 1 – The proportion of each year cohort who were permanently or only temporarily FSM-eligible



¹ A reviewer for this paper, with apparently no understanding of statistics, demanded that we report standard errors with the analytical results. For their benefit (and the benefit of any similarly confused readers), this paper deals with population data from the NPD, as clearly stated in this methods section. Even if standard errors (significance tests or confidence intervals) were useful (which they are not, e.g. Colquhoun 2014), they would be meaningless here since the cases have not been randomised (e.g. Berk and Freedman 2001). They would be meaningless but potentially very misleading.

This is the empirical basis for the argument that long-term disadvantage is a better definition for use in assessing changes in segregation and the attainment gap over time. The size of this long-term group is substantially less affected by legal, economic and other changes over time, than the temporary or never eligible groups. If segregation and/or the attainment gap has improved for this long-term disadvantaged group in the Pupil Premium era specifically then that would be an indication of impact that could not be so easily explained by changes in the proportion (and so the average characteristics) of pupils labelled FSM-eligible in any year.

Characteristics of long-term FSM-eligible pupils

Table 2 illustrates why the focus on length of disadvantage in this paper is important. There is a clear difference, of course, between the average attainment scores for the never FSM-eligible pupil group (zero years at secondary school spent as FSM-eligible) and the rest. But there is also a clear gradient of scores linked to the number of years a student has been known to be FSM-eligible by the end of KS4. The students facing the longest-term disadvantage tend to have the worst attainment scores, by some margin. They have lower total and capped points scores, and they even have worse value-added progress scores (which are meant to be independent of raw-score attainment). They also attend schools with the highest clustering of long-term disadvantaged students like them (higher segregation residuals). So, in years when pupils become temporarily FSM-eligible, the apparent attainment gap between FSM-eligible and the rest (the official gap) will tend to reduce, because these short-term disadvantaged pupils have higher average attainment than the core group of long-term disadvantaged pupils. If this is not taken into account, changes in the apparent attainment gap due to economic events or changes in the law will be mistakenly attributed to the work of schools. This problem appears in all previous analyses (above), including official figures.

Table 2 – Outcome measures by length of FSM-eligibility, all years 2006-2019 combined

Years FSM-eligible by KS4	KS4 Total points z-score	KS4 Capped points z-score	KS4 VA Residual	KS4 Segregation
0 years	0.146	0.158	0.097	-0.022
1 years	-0.404	-0.432	-0.288	0.039
2 years	-0.497	-0.536	-0.366	0.050
3 years	-0.573	-0.625	-0.434	0.063
4+ years	-0.639	-0.700	-0.477	0.085

N=7,895,115

These long-term disadvantaged pupils are less likely to report a white ethnic origin, and somewhat more likely to be of Asian, black or mixed origin, than the remaining pupils (even including the short-term disadvantaged). They are also slightly less likely to have English as their first language. The strongest pattern relates to Special Educational Needs (SEN). Long-term disadvantaged pupils are far more likely to have any SEN recorded, and over twice as likely to have a statement of SEN, than the majority of students (Table 3). The challenges faced by pupils with additional needs or disability, and their preponderance in the **most** economically disadvantaged group, could **partly** help explain why the “poverty” attainment gap exists, and why it is worse for long-term disadvantaged pupils.

Table 3 – Percentage of pupils, SEN status and long-term FSM-eligibility

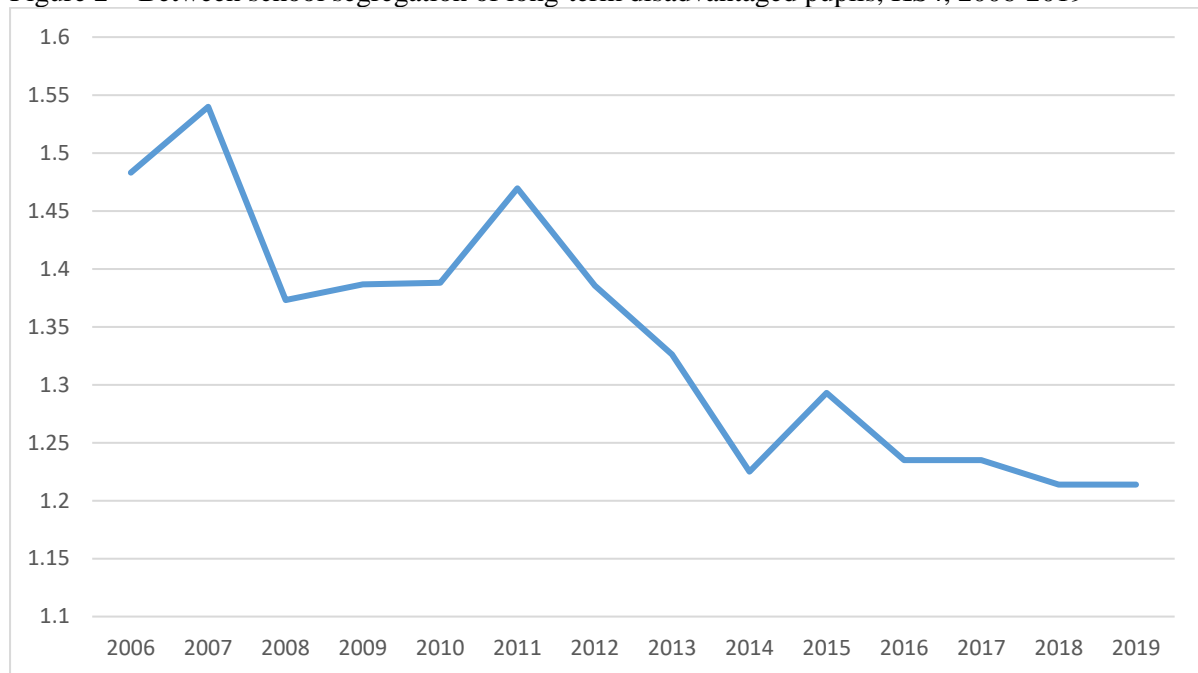
	None	SEN no statement	SEN statement
Majority (not long-term FSM) pupils	83	15	3
Long-term FSM-eligible pupils	63	30	7

Changes in the segregation gap over time

The gap in segregation between long-term disadvantaged pupils and the rest dropped from 2006 to 2007 before rising again slightly until 2011. Since then it has declined somewhat erratically and is at a

historically low level (Figure 2). Given that these figures are for the cohorts at the end of KS4, this decline might be considered too soon to be a reaction to a 2010/11 policy that **might be** assumed would primarily influence the intake at or around Year 7.

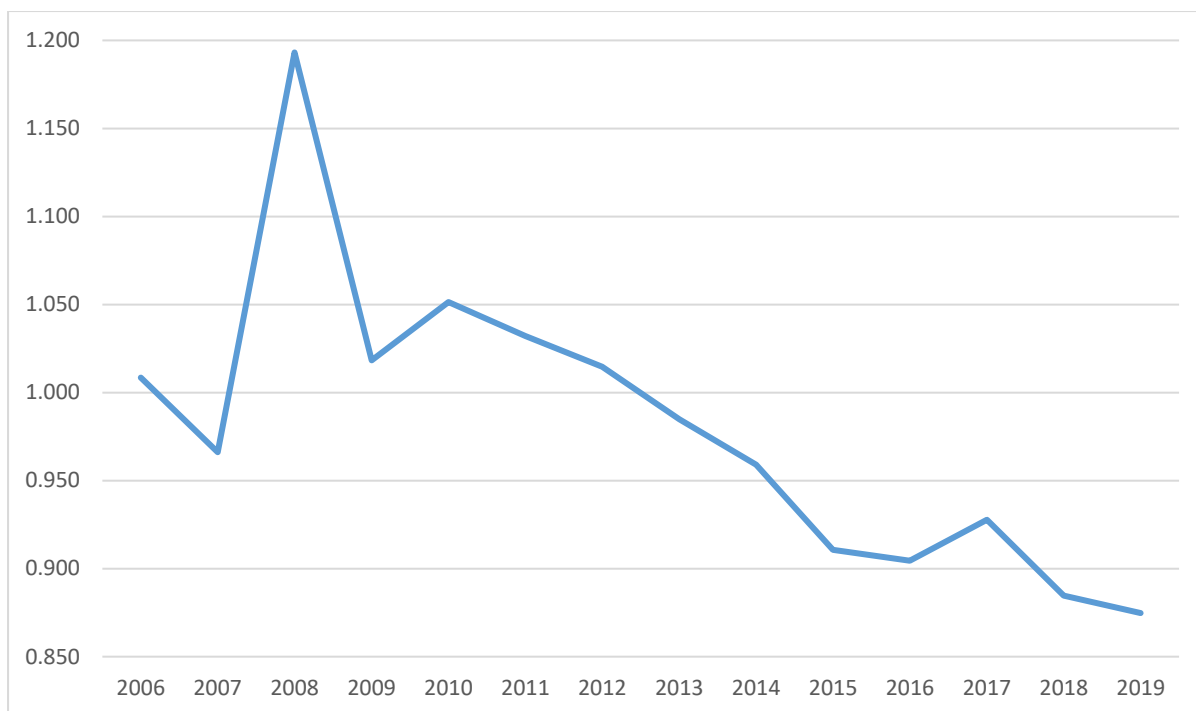
Figure 2 – Between school segregation of long-term disadvantaged pupils, KS4, 2006-2019



Note: In order to make the trends clear, the origin of this graph is not zero.

Figure 3 makes the position clearer. This compares the segregation by disadvantage of only those pupils eligible for FSM when they arrived at secondary school in Year 7 (with the remaining pupils). It again shows some volatility 2006 to 2010, and then an annual decline **during** the Pupil Premium era. The gap in segregation for Year 7 school intakes is at the lowest level ever recorded by 2019. It is feasible that school intakes desegregated almost as soon as disadvantaged pupils were known to bring additional funding to schools, so making them “less unattractive to schools” to use the official phrasing. **Most school leaders have reported that the new funding immediately affected their activities, although only a few felt that it had affected their admissions (Ofsted 2012). However,** Freedman and Horner (2008) envisaged a kind of unconscious bias in the process of allocating school places, even within the existing guidelines. And wanted to give “schools located in more disadvantaged communities the resources to attract middle-class parents” (p.9). In 2014, the government published a revised admissions code that permitted all admission authorities in England to prioritise disadvantaged children in their admission arrangements (Foster and Long 2020). The Pupil Premium funding may have provided the incentive for such prioritisation. These changes in segregation could therefore well be the result of **the Pupil Premium making poorer pupils seem “less unattractive” both consciously and unconsciously.**

Figure 3 - Between school segregation of Year 7 FSM-eligible pupils, KS4, 2006-2019

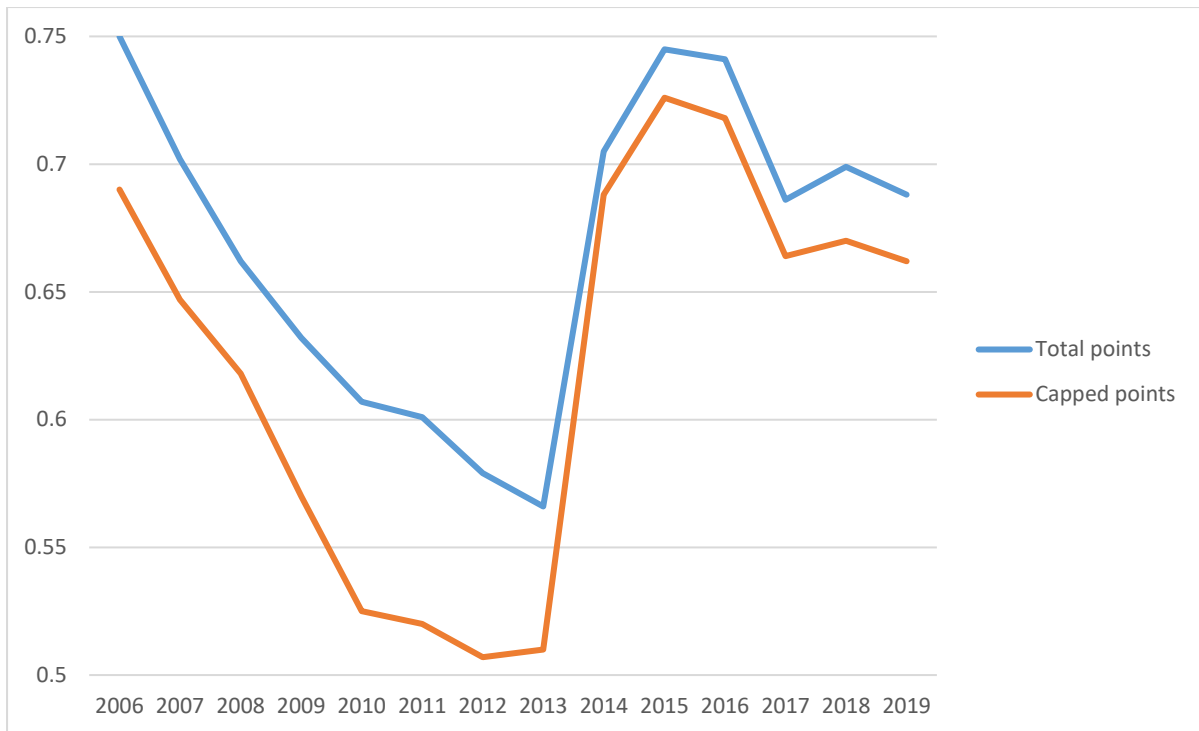


The Pupil Premium era is clearly linked with a national decline in economic segregation of pupils between schools at KS4, just as we have previously shown happening at KS2 (Gorard et al. 2021).

Changes in the attainment gap over time

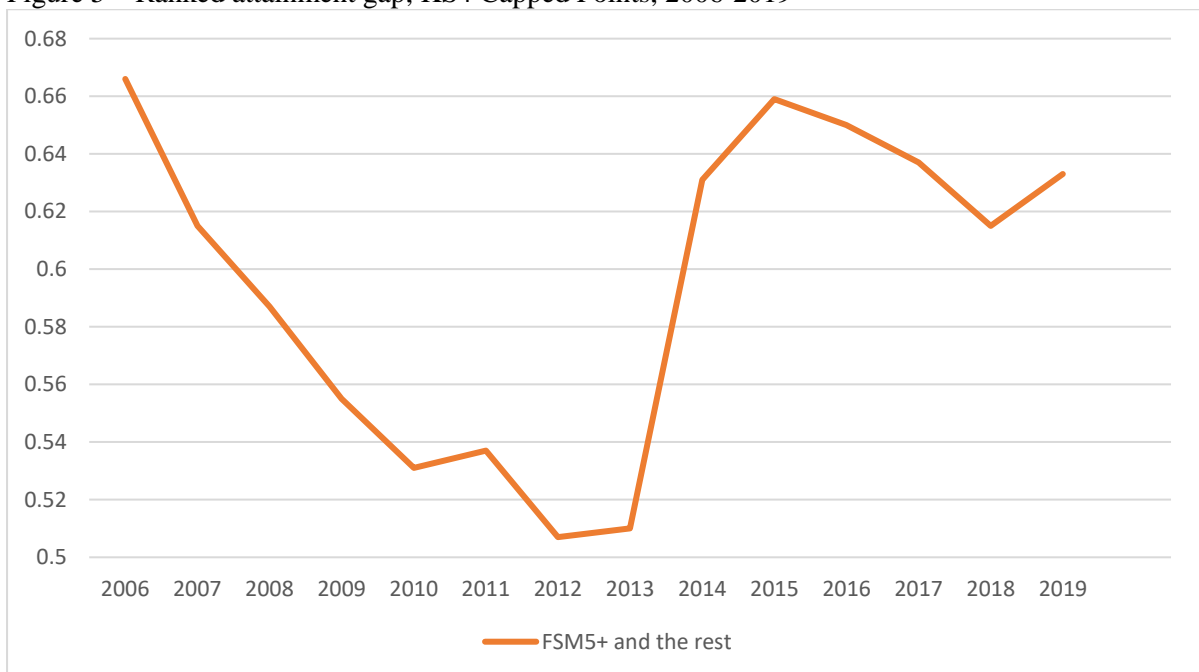
The link between the poverty attainment gap at KS4 and the Pupil Premium era is **in some ways** similar to, but more complex than, at KS2 (Gorard et al. 2021). The trend from 2006 to 2013 was downward both in terms of Total Points and Capped Points (best 8 GCSE scores or equivalent). The decline in the gap was historical, and predated Pupil Premium funding. The gap grew suddenly in 2014 at around the same time as new scores for KS4 were devised, grades were changed, and marking became harder (Figure 4). It dropped again after 2015 when the first PP era cohort **in secondary schools** reached the end of KS4.

Figure 4 – Attainment gap, KS4 Points, long-term disadvantaged pupils, 2006-2019



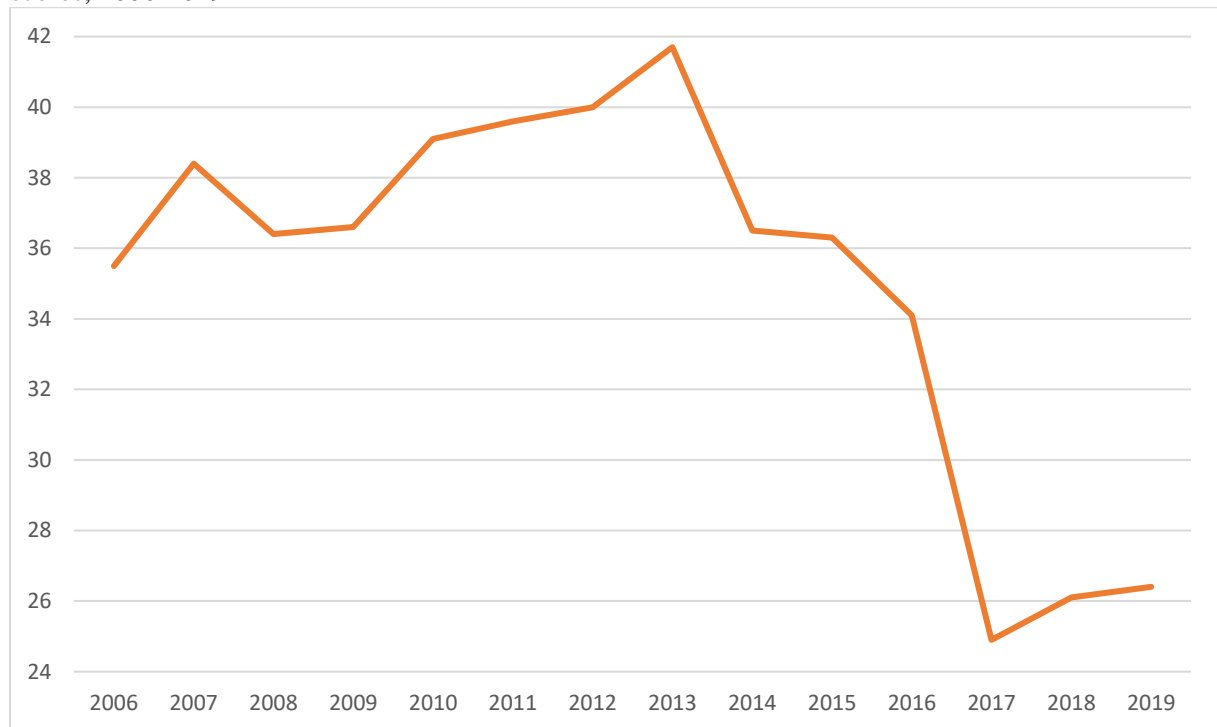
Why does the attainment gap at KS4 have this abrupt rise in 2014, that does not appear in KS1, for example (see Gorard et al. 2021)? One explanation lies in the changes to assessment at KS4 at that time. To explore this issue further we did several additional analyses. The first used the DfE (2014) approach of expressing the attainment gap as the difference in the mean rank of the KS4 scores for disadvantaged and other pupils, **for each year**. Here we used long-term disadvantaged pupils and others so that the results would be less affected by economic and legal changes over time than the DfE model (Figure 7). The result shows that the attainment gap is stubborn, and that whatever this ranking approach does it does not overcome the changes in KS4 assessment from 2014 onwards. The pattern in Figure 5 is **effectively** the same as in Figure 4.

Figure 5 – Ranked attainment gap, KS4 Capped Points, 2006-2019



The next attempt to look at the attainment gap net of changes in assessment and scoring involved the percentage of long-term disadvantaged pupils who scored above the national mean for all pupils. In a sense, this is the inverse of the figures above. If disadvantage were unrelated to attainment then around 50% of long-term disadvantaged pupils would be above (and below) the national mean score at KS4. By 2012 it had grown from 36% to 42% (Figure 6). This is a reasonably impressive figure for equity. But again from 2014 this figure plummeted to only 25% before rising again annually after 2017. Something very serious seems to have happened in and after 2014 that undid all of the previous progress and more, making the system far more polarised by disadvantage than it had ever been.

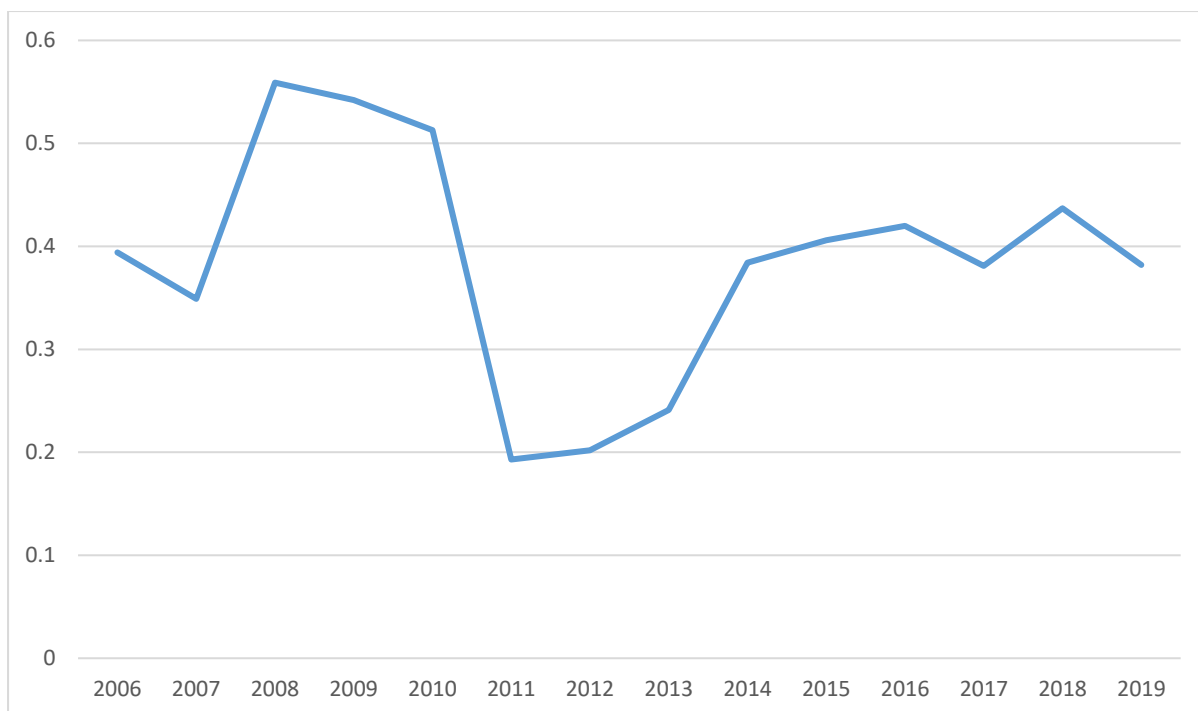
Figure 6 - Percentage of long-term FSM-eligible pupils scoring above national mean Capped Points scores, 2006-2019



However, over and above the confusion created by the 2014-2016 changes, there are now signs that the attainment gap, as assessed in this way, is reducing for cohorts completing their secondary education.

The final consideration here is the progress made by pupils between KS2 and KS4 (Figure 7). Value-added residuals are supposedly independent of raw-score attainment, and so the gap would be zero if KS4 attainment was solely attributable to KS2 attainment or noise, and unrelated to poverty. In fact, the gap shows a sudden drop after 2011, too early to be strongly associated with Pupil Premium funding we feel, and then a sharp increase in 2014. Whatever happened in 2014 it seems to have made assessment markedly harder for poorer pupils and so led to a larger attainment gap, even as assessed by value-added scores supposedly independent of raw-score levels. Two or more government policies are in tension. The Pupil Premium is intended to reduce the attainment gap. But the pressure to make assessment harder, prevent grade inflation, and have greater differentiation among higher attainers, is linked to a sudden large increase in the gap. All of our analyses for the attainment gap, however computed, show the same thing.

Figure 7 – KS4 Value-added residual gap, long-term disadvantaged pupils, 2006-2019

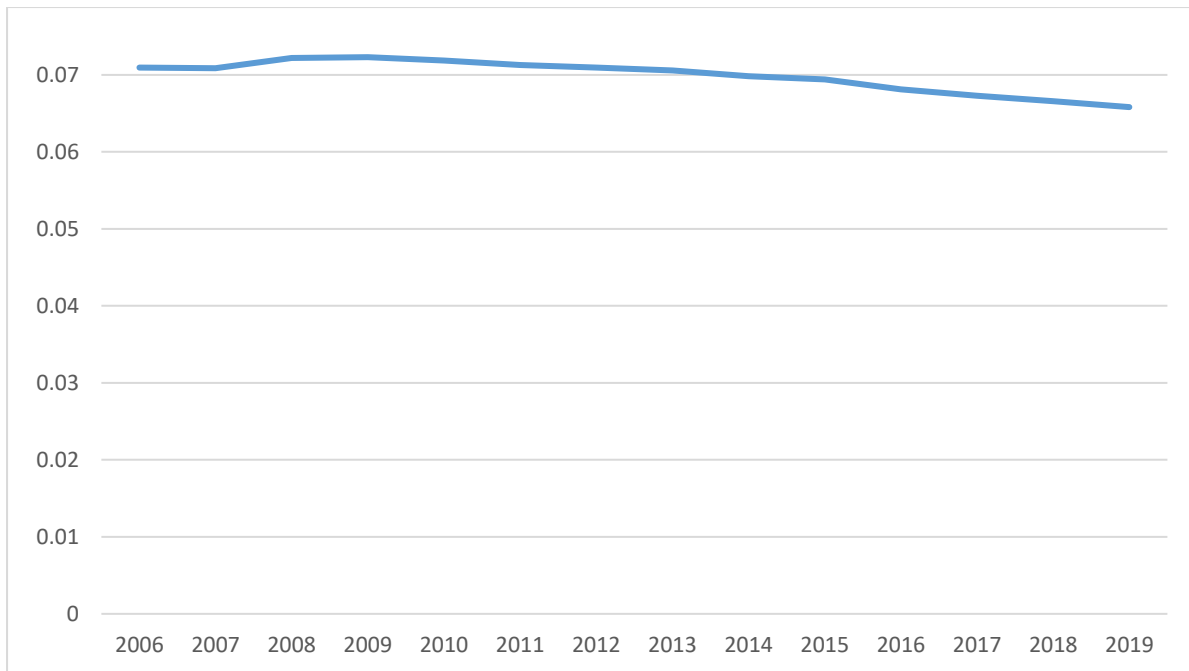


Economic considerations

The focus on long-term disadvantage here means that the results are less sensitive than prior studies to confounding economic and policy changes over time. The proportion of long-term disadvantaged pupils is less volatile than the proportion of temporary or ever disadvantaged pupils (above), protecting the results to some extent from the changes unrelated to attainment that could mislead in previous and official accounts of the attainment gap (and so of the impact of Pupil Premium funding). However, it is still worth considering if there are links to the economy that are not captured by the analysis so far.

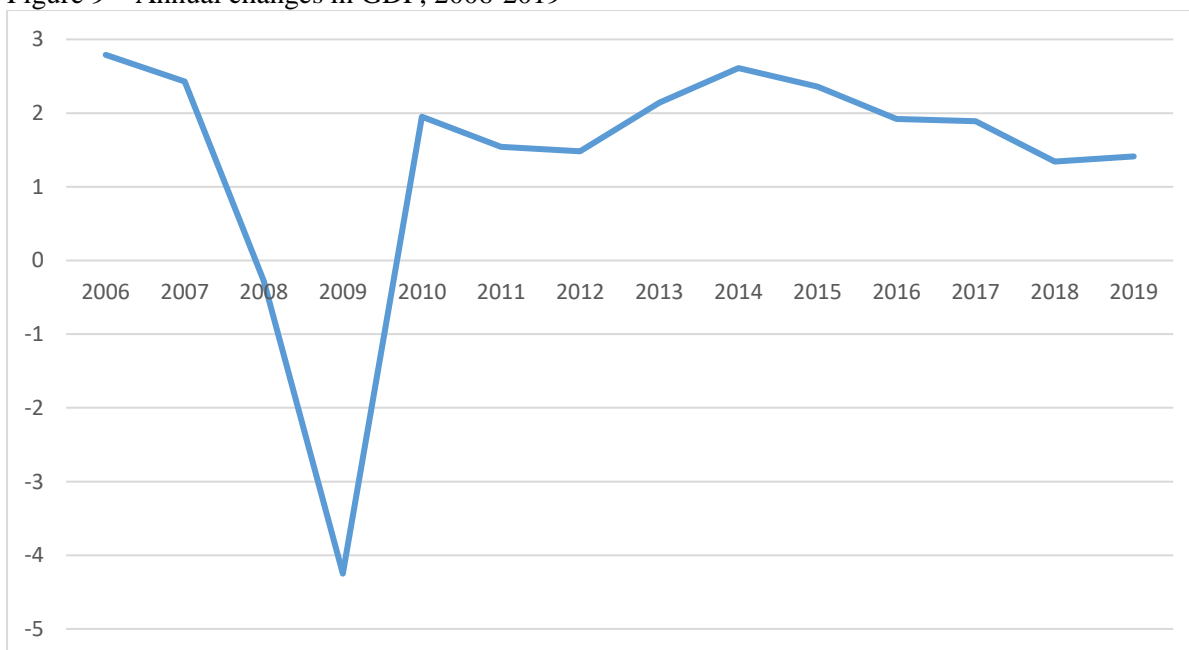
The use of private schools is likely to increase slightly when the economy is stronger. Pupils in private schools do not generally appear in the NPD (meaning that the data for them is weak or non-existent), and are not included in official versions of the poverty attainment gap. This could take somewhat higher attaining scores out of the calculation, so making the gap look smaller (Gorard et al. 2019). The inverse could apply when the economy is weaker. Because marginal attendees at private school could have slightly higher average attainment (above) they will also make the attainment gap appear smaller. But these changes would be nothing to do with the impact of Pupil Premium funding, or the focus of schools on reducing the gap. However, figures from the DfE (2020) suggest that private school use has actually declined since 2011, meaning that any reduction in the attainment gap since 2011 cannot be explained by this factor (Figure 8).

Figure 8 – Percentage of pupils attending private schools, 2006-2019



Similarly, reductions in the attainment and segregation gaps over time cannot be explained by an overall improvement in GDP since 2011 (Figure 9). Historically, socio-economic segregation between schools in England has been largely the inverse of GDP. But from 2011 onwards segregation no longer inversely tracked GDP in a way that had never happened before (see Gorard et al. 2019). If the reason for reduced segregation is not economic, some other reason such as the Pupil Premium policy may be behind it. We investigate this further in the next section, using regression models.

Figure 9 – Annual changes in GDP, 2006-2019



All of the economic indicators have been converted to z-scores here for comparability.

To summarise, GDP change is only very weakly related to the segregation gap (of long term disadvantaged pupils and their peers), with R-squared of less 0.004 (Table 4). The other three possible **confounding** variables are much more strongly related (R-squared between 0.44 and 0.59). When there are more disadvantaged pupils, the level of SES segregation in state-funded schools declines markedly. This shows that even the results for the more stable long-term disadvantaged group are susceptible to

economic and related changes. The segregation gap is noticeably lower during the Pupil Premium era (as identified by the flag variable marking a year as being after 2010 or not).

Table 4 – Correlations (R) between the long-term disadvantaged segregation gap, and economic indicators and the Pupil Premium

	GDP change	annual	% pupils in private schools	% long-term disadvantaged pupils	Pupil Premium era flag
Long-term FSM Segregation gap		-0.06	0.71	-0.77	-0.66

GDP change is weakly related to the KS4 attainment gap, with R-squared of less 0.07 (R of 0.26 in Table 5). As expected, when the economy improves, the attainment gap is larger. When there are more pupils in private schools (and so not part of the gap metric), the attainment gap declines, again as expected. This is presumably because the marginal private school pupils have somewhat higher attainment, and so taking them out of the gap calculation makes the remaining state-funded pupils appear closer on average. The Pupil Premium era is associated with a slightly lower attainment gap, but the difference is negligible (as suggested by the figures above).

Table 5 – Correlations (R) between the long-term disadvantaged KS4 attainment gap, and economic indicators and the Pupil Premium

	GDP change	annual	% pupils in private schools	% long-term disadvantaged pupils	Pupil Premium era flag
Long-term FSM attainment gap		0.26	-0.41	0.33	-0.03

However, there are some complications in these figures, and the possible predictors are themselves correlated with each others. So the next section uses them all in a multivariate analysis.

Regression models

Putting three potential predictor variables (GDP change, percentage in private schools, proportion of pupils listed as long-term disadvantaged) together in a multiple regression model, they can predict changes in the segregation gap between long-term disadvantaged pupils and the rest, explaining around 69% of the variation (row 1 in Table 6). This confirms that socio-economic segregation between schools is sensitive to economic and related changes over time, even for the long-term disadvantaged. Adding knowledge of whether any year was in the Pupil Premium era or not adds slightly to the accuracy, raising it by five percentage points to 74%. In general, and having taken economic factors into account, the segregation gap is lower in the Pupil Premium era than it was before. This is an important element of the findings. We have protected against being misled by economic and policy changes by focusing on long-term disadvantage (above), then double-protected by looking at changes in the Pupil Premium era after accounting for (as far as possible) three potentially confounding variables.

Table 6 – Strength of two step model predicting gap in segregation of long-term disadvantaged pupils and their peers

Step	R	R-squared
1. Economic indicators	0.83	0.69
2. Whether in Pupil Premium era	0.86	0.74

In the model, the more students there are in private schooling in any year, the lower the apparent segregation gap is (Table 7). Presumably, this is because pupils on the cusp of attending private school have higher average attainment than those facing long-term disadvantage. Removing these pupils from NPD, and so from the gap calculation, makes the gap appear smaller. And again, a higher proportion of

long-term disadvantaged students is linked to a lower segregation gap. Once these factors and GDP have been taken into account, the coefficient for years in the Pupil Premium era is -0.30. The gap is still lower after 2011, even after these economic factors have been taken into account.

Table 7 – Standardised coefficients for model predicting gap in segregation of long-term disadvantaged pupils and their peers

Coefficients	Standardised
GPD change	0.31
Percentage of pupils FSM-eligible for 5 years	-0.47
Percentage of pupils in private schools	0.27
Pupil Premium era flag	-0.30

The model for the attainment gap, using the same predictors, is weaker (lower R-squared at each step), and so adding any variable in step 2 has more variation to “soak up”. However, knowledge of whether the year was in the Pupil Premium era or not adds 16 percentage points to the R-squared (Table 8).

Table 8 – Strength of two step model predicting the KS4 attainment gap for long-term disadvantaged pupils and their peers

Step	R	R-squared
1. Economic indicators	0.43	0.19
2. Whether in Pupil Premium era	0.59	0.35

Table 9 is similar to Table 5 for the first three predictors (although the coefficients are understandably smaller than their simple correlations with the outcome). When there are more pupils in private schools, the attainment gap at KS4 goes down. The big difference lies in **the** variable for the Pupil Premium era which is now much larger (negative), suggesting that net of economic factors the Pupil Premium *is* linked to an improvement in the attainment gap.

Table 9 – Standardised coefficients for model predicting the KS4 attainment gap for long-term disadvantaged pupils and their peers

Coefficients	Standardised
GPD change	0.21
Percentage of pupils FSM-eligible for 5 years	0.27
Percentage of pupils in private schools	-0.46
Pupil Premium era flag	-0.57

For comparison, Tables 10 and 11 show the results for the same multiple regression model, but with the gap defined in terms of pupils ever being eligible for FSM (rather than always being eligible) during their five years in secondary school. This is important because this EverFSM is how the official attainment gap is computed.

The resulting model is much stronger (higher R-squared) than for the long-term disadvantaged gap (Table 10), but variation in the attainment gap is only explained by economic factors. The Pupil Premium is irrelevant here. This shows starkly one of the dangers of the official attainment gap. It is entirely associated with economic factors and is, according to this model, nothing to do with the actions of schools in response to their extra funding.

Table 10 – Strength of two step model predicting the KS4 attainment gap for ever disadvantaged pupils and their peers

Step	R	R-squared
1. Economic indicators	0.84	0.71
2. Whether in Pupil Premium era	0.84	0.71

This is then reflected in the coefficients (Table 11). The value for the Pupil Premium era is negligible, while the values for all other possible predictors are much higher, and more than double those in Table 8. There is a very real danger that the official attainment is based solely on non-educational changes over time, and that this is not realised by policy-makers and other bodies such as think tanks, Ofsted and research organisations.

Table 11 – Standardised coefficients for model predicting the KS4 attainment gap for ever disadvantaged pupils and their peers

Coefficients	Standardised
GPD change	0.46
Percentage of pupils FSM-eligible for 5 years	1.03
Percentage of pupils in private schools	1.21
Pupil Premium era flag	0.05

Discussion

This paper has demonstrated several problems with the official account of the attainment gap (there is no official figure for segregation) in England. On a minor note, the DfE (2014) approach of looking at differences in the ranking of student attainment does not overcome the changes in metrics from 2014 onwards. It appears to be little or no better than an “effect” size based on raw or standardised scores. More importantly, the official attainment gap, which we suggested was sensitive to changes in the economy and other non-educational factors (Gorard et al. 2019), appears to be made up *only* of such extraneous factors. This finding needs to be addressed urgently. Official accounts are not safe to base education policy and practice on.

More positively, the clustering of long-term disadvantaged pupils in secondary schools has certainly declined since 2011, in a consistent way that it did not before, and is most obvious in the intakes to schools in Year 7 which is where Pupil Premium would be initially expected to make a difference. The gap in school socio-economic segregation between long-term poor pupils and the rest is at a historic low, and apparently still falling. This cannot be explained by economic or legal changes leading to differences in the proportion of pupils labelled disadvantaged, as is shown in this paper, nor by a reduction in the diversity of schooling, substantial changes to admissions arrangements, or the abolition of selection by faith or ability, for example (Gorard 2018). Pupil Premium funding is currently the best explanation for the improvement, and that is reason enough for the policy to be continued in something like its current form for the time being. It is relatively easy to imagine how extra funding does make disadvantaged students less unattractive to schools. Because schools can now use disadvantage as a, positive, criterion for allocating contested school places, the funding could have had an almost immediate (and continuing) impact on school intakes, both directly and by reducing any unconscious bias against potentially harder-to-teach pupils.

There is also evidence of an underlying improvement in the attainment gap, but this is counter-acted to a great extent by other assessment policy changes. Why has the same clear improvement as seen in the segregation gap not also occurred with the attainment gap, as it did at KS1 in primary schools? It may be that the changes in primary and early schools need longer to feed through the system before manifesting themselves in improved KS4 outcomes. However, the changes to KS4 assessment, and recognition of qualifications, from 2014 onwards have not helped. This is not to say that the changes were wrong. But it is not clear that their clash with the Pupil Premium objectives was ever considered and accepted as a necessary cost by policy-makers. But another possible explanation is the relative lack of evidence on how to use Pupil Premium funding at KS4 level.

At time of writing, the EEF has reported complete evaluations of 120 distinct interventions, of which 17 are listed as “promising”. Promising here means that the evaluation succeeded, the results are deemed trustworthy, and that the intervention was reported as having benefits for pupil attainment. This 10% to

15% of positive outcomes for otherwise plausible (i.e. with equipoise) approaches is to be expected (Gorard et al. 2017). Of the 120 approaches trialled, 80 (67%) were for early years or primary phases. Of the 17 promising approaches, 12 were for the primary phase (71%). This means that schools and networks seeking evidence on how best they might use their Pupil Premium funding have a much greater number of promising interventions if they teach younger children. This may be part of the reason why the attainment gap has reduced more, in the Pupil Premium era, at KS1 than KS4.

There is some relationship between the attainment gap and the poverty segregation gap. The changes in each of the 14 years covered here correlate with R of 0.40. It is not clear if they are causally related at all, or in which direction, or whether they are mutually reinforcing. However, a likely link is that a less segregated school system will **tend to** have smaller poverty attainment gaps. Therefore, society should keep operating to reduce between school segregation by poverty, by all means, including Pupil Premium funding. Other means include reduction in residential segregation through national policies to assist more deprived areas, more open access to all schools, and reduction in the number of *types* of schools in England (Gorard 2018). This may then assist in reducing the attainment gap longer term but, as this paper shows, in the meantime more work is needed in schools to ensure that interventions and practices used are evidence-led, and by policy-makers to ensure that other policies for assessment do not interfere with the worthwhile drive towards a lower attainment gap.

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