Attainment gaps between pupils in the most deprived and advantaged schools

Introduction – attainment of pupils receiving free school meals

The research reported here, funded by the Sutton Trust, develops analyses presented in a report published by the Department for Education and Skills (DfES) (DfES, 2006) which examined 'gaps' between the attainment of disadvantaged pupils and their more advantaged counterparts. While differences between the attainment of pupils from different social groups are well known, with those from poorer backgrounds in general performing at lower levels, some very interesting findings relating to pupils receiving Free School Meals (FSM) were reported. In short, pupils receiving FSM were more likely to achieve 5 or more A* to C grade GCSEs if they attended the most deprived schools than if they attended more advantaged schools.

This clearly raises the question as to whether, as far as academic results go, schools with deprived intakes are best for poor pupils. In this paper, we examine whether this phenomenon may alternatively be explained by the prior attainment of pupils, the ethnic composition of schools and also schools' examination entry policies. To address this question, we present our analysis of GCSE examination results for 2006. The 2006 GCSE cohort is the first year group for whom it is possible to identify not only pupils receiving FSM when they were in Year 11 (when they took their GCSEs) but also whether they received FSM at any stage of their secondary school career. We therefore also take the opportunity to consider whether receiving FSM in any of the years of secondary schooling may contribute to statistical models of GCSE examination results.

As we see in Table 1, the proportion of FSM pupils achieving five or more A*-C grade GCSEs and equivalents in 2005 was just over 30% while the proportion of non-FSM pupils achieving this threshold was almost 60%. The same gap between FSM and non-FSM pupils was also evident using the government's preferred threshold measure which includes A* to C grade GCSEs in English and maths.

Table 1. Proportion of pupils achieving 5 or more A*-C grade GCSEs and equivalents in 2005

FSM status	% achieving 5 or more A*-C grade GCSEs and equivalents	% achieving 5 or more A*-C grade GCSEs and equivalents including English and maths GCSEs
FSM pupils	31.1	19.8
Non-FSM pupils	59.3	48.1

More interesting findings reported by the DfES however related to differences in the attainment of FSM pupils according to the level of deprivation at the school they attended – that is, according to the proportion of fellow pupils at the school who were also eligible for FSM.

Figure 1 shows the proportion of FSM and non-FSM pupils achieving the 5 or more A*-C grade GCSEs and equivalents threshold in 2005. We see that a larger proportion of FSM pupils in the highest FSM schools (with more than 50% of pupils on FSM) achieved this threshold than in any of the other FSM school bands. We see that the columns representing the proportion of FSM pupils achieving this threshold trace the shape of a dish because the proportion achieving 5 or more A*-C grades is similar in the lowest and highest school FSM bands.

Figure 2 shows the corresponding proportions achieving the 5 A* to C threshold *including English and maths*. We see that, for FSM pupils, the proportion achieving this threshold traces what we might imagine to be the shape of a ski jump. That is, the proportion achieving the threshold is highest among

pupils in the least deprived schools, declining but then rising again among pupils in the last two school FSM bands. A larger proportion of pupils who attended schools in the highest FSM band achieved the threshold than among the next three bands (35-50%, 21%-35% and 13-21% eligible for FSM). In contrast, among non-FSM pupils the proportion achieving the threshold shown in both Figure 1 and Figure 2 declines from left to right (though with a flattening of the slope in the highest school FSM bands).

Figure 1. Percentage of non-FSM and FSM pupils achieving 5+A*-C grade GCSEs and equivalent (Source DfES, 2006)
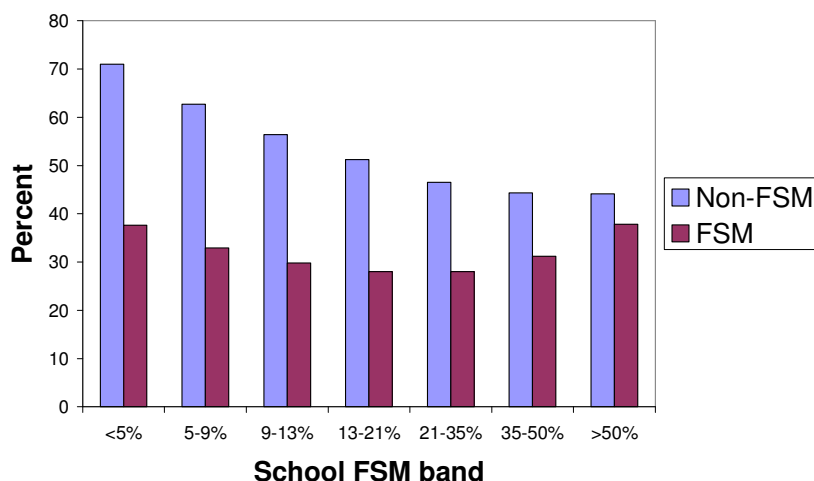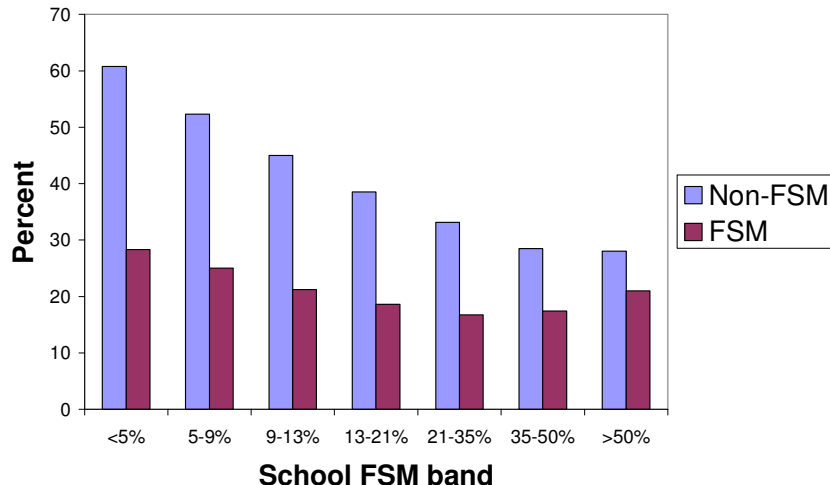

Figure 2. Percentage of non-FSM and FSM pupils achieving 5+A*-C grade GCSEs and equivalent including English and maths (Source DfES, 2006)

In this report we use data from the National Pupil Database for the 2006 GCSE cohort to examine whether these results indicate that FSM pupils achieve better test results if they attend high FSM schools or whether this phenomenon may reflect some of the characteristics of the pupils. In particular we examine the importance of receiving FSM at any time during secondary schooling (rather than in Year 11) and the importance of pupils' ethnicity, and if these differences in attainment may be related to the types of examinations entered.

For the purposes of this paper we have used different school FSM bands from the DfES analysis referred to above, grouping pupils into decile groups according to the level of FSM at the school they attended. We refer to these as 'deciles of school deprivation'. Thus we have not used the school FSM bands shown in Figures 1 and 2. This is because the number of schools in each band used in the DfES

publication varied from 871 in the lowest FSM band to just 78 in the highest.[1] In addition, we have in the first instance used the 'best eight GCSE and equivalents point score' as the Key Stage 4 outcome measure as this enables a more fine grained analysis than using a threshold measure such as whether a pupil achieves 5 A* to C grades.[2]

On this basis, the mean point score for non-FSM pupils attending the least deprived schools was 352 points, which might be understood as roughly five grade B and three grade C GCSEs.[3] The mean score declined across the deciles of school deprivation, falling to 270 points for non-FSM pupils attending the most deprived schools. In terms of GCSE grades, this might be understood as equating to eight grade Ds.

Among pupils receiving FSM when in Year 11, those attending the most advantaged schools achieved a mean score of 284 points, which may be represented as two grade Cs and six grade Ds. The mean scores of FSM pupils however once again traced the 'ski jump' shape noted earlier. A trough of 220 points was the mean point score for pupils in the eighth decile of school deprivation (seven grade Es and one grade F), recovering to a mean score of 236 points for FSM pupils attending the most deprived schools (representing two grade Ds and six grade Es). (These results are illustrated in Appendix 2, Appendix Figure A1.)

The most obvious potential explanation for differences in best eight GCSE and equivalents point scores would of course be corresponding differences in prior attainment although this is not reflected in the data (illustrated in Appendix Figure A2) – that is, there is a decline in mean prior attainment scores from the least deprived to the most deprived school bands with no 'ski jump' shape.

Looking across the deciles of school deprivation - pupils' FSM over time

The 2006 GCSE cohort was the first year group for whom pupil level data on FSM status was available for each of the five years covering Key Stage 3 and Key Stage 4 (which, for most pupils, corresponds to their time in secondary school, i.e., ages 11 to 16). We were keen to examine whether FSM pupils attending schools with different proportions eligible for FSM also differed in terms of the duration of their eligibility.

The proportion of pupils on FSM in secondary schools is routinely reported in DCSF publications. We would expect this proportion to change in line with changes in the economic cycle and during the period from 2002 to 2006 this proportion fell from 14.9% to 13.6%. However, for the 2006 GCSE cohort – that is, for a single year group of pupils – the decline in FSM receipt was somewhat more marked from 2002, when these pupils were in Year 7, to 2006 when they were in Year 11. This decline, among the 2006 GCSE cohort, in the proportion of pupils on FSM as they got older is represented in Figure 3, along with the decline in the national figure for all pupils in secondary schools during those years (that is, for pupils in all year groups). We might speculate that there may be two possible contributory explanations to this phenomenon. First, the difference would be consistent with the parents of FSM pupils being more likely to take up employment as their children got older. Second, and more prosaically, it would be consistent with pupils being increasingly independent as they grew older and choosing not to take up the free meals available within school.

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[1] Cut points for the decile groups are shown in Appendix 1.
[2] The data represent those pupils for whom FSM records, taken from the 2006 Pupil Level Annual Schools Census (PLASC), could be matched to the 2006 GCSE cohort (N=561,448). We were then able to match Key Stage 2 results (undertaken in the main by pupils aged 11) to 557,461 cases (99.3% of cases for which GCSE results had been matched to PLASC data).
[3] A* grade GCSE = 58 points, A = 52, B = 46, C = 40, D = 34, E = 28, F = 22, G = 16.

While the proportion of the 2006 GCSE cohort on FSM declined from 16.1% in 2002 to 12.5% in 2006, this does not, of course, imply that recipients in 2006 were on FSM throughout this period. While this was the case for 8% of the cohort, a further 13.3% of the cohort was on FSM in at least one year (but not every year). Figure 5 also shows lines indicating the proportion of pupils eligible for FSM in every year from 2002 to 2006 and those eligible for at least one year from 2002 to 2006. This group is of course somewhat larger than the proportion in any one year.

Figure 3. Percentage of FSM pupils from 2002 to 2006
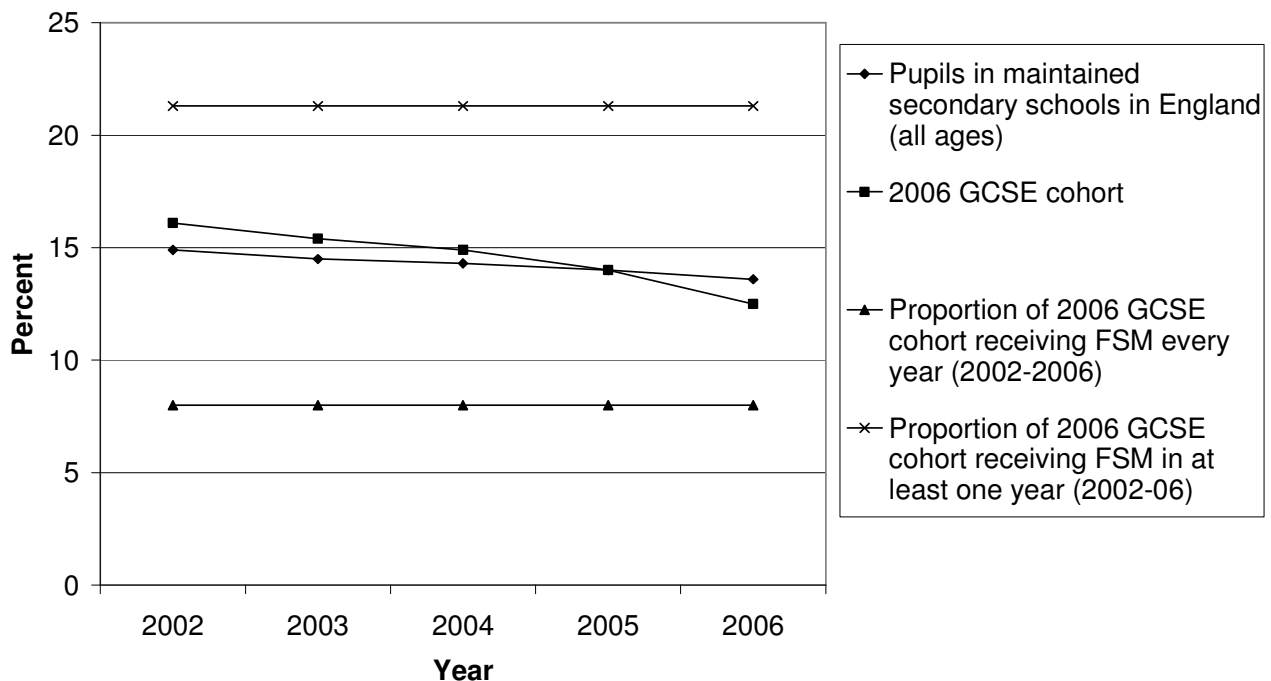
From the point of view of analysing pupil attainment, we might regard the difference between the 2006 GCSE cohort FSM figure (12.5%) and the proportion of pupils who had ever received FSM during their secondary school years (21.3%) as representing the '*hidden poor*'. [4]

The proportion of 'hidden poor' pupils increases across the deciles of school deprivation though not as dramatically as the increase in the proportion of pupils receiving FSM in 2006. In part, this reflects the fact that as the proportion of pupils on FSM grows, so the potential pool from which the 'hidden poor' may be drawn is reduced. (This is shown in Appendix Figure A3. Further information relating to the duration of FSM receipt is also presented in Appendix 3.)

As we see in Table 2, in terms of Key Stage 2 results and attainment in GCSEs (and equivalents), the hidden poor look rather more similar to FSM pupils (in 2006) than to 'never FSM' pupils. Indeed, while the mean Key Stage 2 average point score is slightly higher than that of the FSM in 2006 group, the mean GCSE score is slightly lower.

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[4] The enlarged group of 'ever FSM' pupils received the benefit of free meals at some point during their secondary schooling, and pupils' FSM status would also have contributed to enhanced funding for the school on the basis of funding formulae. In these respects they were of course not 'hidden'.

Table 2. Mean Key Stage 2 and best eight GCSE and equivalent scores for 2006 cohort by FSM status

	N	Mean of average point score at Key Stage 2 (English, maths and science)	Mean point score in best eight GCSE and equivalent examinations
Never FSM	432211	61.4	314.8
FSM in 2006	66438	51.7	235.3
Hidden poor	47199	52.9	232.5

However the DCSF uses FSM status at the final year of compulsory education (GCSE year) as an indicator for lower income and disadvantaged backgrounds. That is, one of the DCSF's Public Service Agreement targets is to narrow the gap in achievement between children from lower income and disadvantaged backgrounds and their peers (PSA 11). Indicator 2 relates to the 'achievement gap between pupils eligible for free school meals and their peers' achieving the expected level at Key Stage 4 (that is, five or more A* to C grade GCSEs (and equivalents) including English and maths). Using FSM in the final year of compulsory education as the indicator of disadvantage, they identify a gap of 28 percentage points between FSM and non-FSM pupils in 2006. However, if we use the broader category of pupils who received FSM at any point during their secondary schooling then this achievement gap is slightly wider at 30 per cent. While 52% of 'never FSM' pupils reach this threshold this is only the case for 22% of 'ever FSM' pupils.

Similarly FSM status in Year 11 is used as a predictor variable in statistical modelling of pupils' attainment such as the DCSF's Contextual Value Added (CVA) analysis that is published in the performance tables. The 'hidden poor', or all those who were ever eligible for FSM during their secondary schooling but not in their final year, could be used to broaden the category of materially deprived pupils and may enhance the predictive power of statistical models.

The potential improvement to CVA models arising from including the 'hidden poor' is illustrated through the multivariate models (model 1 to model 7) shown in Appendix 4. In this series of statistical models, we begin with a parsimonious model of pupil attainment in their 'best eight' examinations (model 1). This model includes prior attainment at Key Stage 2, the pupil's sex, age and whether English is an additional language. The model is then extended to include pupil level variables relating to social background in order to investigate whether they improve the explanatory power of the model (reflected in the increase in the value of adjusted R square).

The first variable to be included (in model 2) is a measure of deprivation included in CVA modelling – the Income Deprivation Affecting Children Index (IDACI). More information on this score, which is based on a pupil's home postcode and reflects the proportion of local children living in poor households, is given in Appendix 5. Models 3 and 4 include the FSM status in 2006 and 'ever FSM' variables respectively. Of these models, marginally greater explanatory power (as reflected in the value of adjusted R square) is achieved by the inclusion of the 'ever FSM' variable. However, the greatest explanatory power is achieved by including the IDACI score, FSM in 2006 and 'hidden poor' (that is, FSM previously but not in 2006) as predictor variables (model 7).

We then extend this basic model to estimate the variations in attainment associated with each of the deciles of school deprivation. In effect, here we are examining whether a 'dish' or 'ski jump' shape is present across the deciles of deprivation even when the model controls for predictor variables including prior attainment, sex and the others listed earlier.

The coefficients relating to the deciles of school deprivation estimate the reduction in the number of points achieved in the best eight GCSE and equivalents point score that is associated with each of the deciles of school deprivation compared with the lowest decile (that is, compared with the most

advantaged schools). Interestingly, when prior attainment is taken into account, the 'ski jump' shape is discernible in the attainment of pupils across the deprivation deciles.

That is, taking into account prior attainment and the other factors included in the model, pupils tend to achieve better GCSE results in the less deprived schools, but those attending the *most* deprived schools achieve higher scores in their GCSE and equivalent examinations than pupils in the next three decile groups. Thus, for example, attending a school in the eighth decile of school deprivation is associated with achieving three grades fewer (reflected in the coefficient of -18.7) than the results achieved by pupils in the least deprived schools. However, the reduction in 'best eight' scores associated with the highest decile of school deprivation equates to only two GCSE grades (-11.6 points) compared to pupils in the lowest decile of school deprivation.[5] This reduction is substantially less than that associated with the fifth, sixth, seventh, eight and ninth deciles of school deprivation (this is shown in Appendix Figure A4).

For each of the deciles of school deprivation, the achievement of pupils is lower than that for the most advantaged decile. However, even controlling for prior attainment and various other factors the 'ski jump' shape is retained and merits further investigation. We therefore extend the model further to examine whether the reduction in test scores associated with each of the deciles of school deprivation differs for FSM and non-FSM pupils.

We do this in model 9 by estimating the size of the effect of attending schools in the different deciles of deprivation (relative to the least deprived) but doing so separately for pupils who never received FSM and those who did receive FSM during their secondary schooling. That is, we include interaction terms relating to FSM receipt and deciles of school deprivation.[6] The deciles of school deprivation coefficients in model 9 may be interpreted as the reduction for pupils who never received FSM during secondary school in best eight point scores associated with attending a school in each decile group. Thus pupils attending a school in the most deprived decile would be estimated to achieve 16.5 points fewer than they would achieve if they attended a school in the least deprived decile. (This represents something of a flattening of the angle of the 'ski jump launching ramp' for non-FSM pupils.)

The additional effect of school deprivation for FSM pupils is shown in the interaction effect. Thus for a FSM pupil attending the same school, the predicted best eight score would be adjusted not only by -16.5 (the reduction associated with the most deprived decile relative to the least deprived) but also by the value of the relevant interaction term (+13.0 for the 10th decile) and also the 'ever FSM' coefficient (-36.5).

Most of the values for the coefficients for the interaction between deciles of school deprivation and FSM receipt are close to zero so that the associations between 'best eight' scores and decile of school deprivation are similar for 'ever FSM' and 'never FSM' pupils. However, an additional 13.0 points are predicted for 'ever FSM' pupils from the highest decile of school deprivation and this is noteworthy. This suggests that the relative cost of attending the most deprived schools (relative to slightly less deprived schools) is smaller for FSM pupils than for non-FSM pupils – that is, the ski jump launching ramp is much steeper for 'ever FSM' than 'never FSM' pupils.

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[5] The dataset used for this analysis includes examination results for all 15 year old pupils taking GCSEs in 2006 (rather than a sample of pupils). We focus on reporting the unstandardised beta values which indicate the change in GCSE test scores associated with a one unit change in the predictor variable. For readers also interested in whether variables were statistically significant, this is shown in the models appearing in Appendix 4.

[6] For ease of understanding, the 'FSM 2006' and 'FSM previously but not in 2006' are replaced by a single 'ever FSM' term that is then interacted with the deciles of school deprivation.

Looking across the deciles of school deprivation – ethnic composition

Pupils classified as being in different ethnic groups make different degrees of progress during the years of secondary school and this may contribute to the relatively higher attainment of FSM pupils among those attending the most deprived schools. Thus, for example, according to the models used for the DCSF Contextual Value Added modelling, pupils from most minority ethnic groups make greater progress than White British pupils from KS2 to KS4 (that is, controlling for prior attainment and various other school and pupil characteristics). Minority ethnic groups are disproportionately represented among 'ever FSM' pupils compared with 'never FSM' pupils within the highest decile of school deprivation, and this explains some of the enhanced attainment achieved by pupils in the most deprived schools. (Appendix Figures A5 and A6 illustrate the proportions of pupils from different minority ethnic groups across the deciles of school deprivation for 'never FSM' pupils and 'ever FSM' pupils respectively.)

Interestingly, among 'never FSM' pupils from the larger ethnic groups, mean attainment declines across the deciles of deprivation (this is shown in Appendix Figure A7). In contrast, the attainment of pupils from the larger minority ethnic groups who had received FSM at some stage of their secondary schooling is relatively flat across the deciles (this is shown in Appendix Figure A8).

We may therefore extend our multivariate models shown in Appendix 4 to include 'dummy' variables for different ethnic groups (model 10) and, more importantly, again include interaction terms to differentiate between pupils who ever received FSM or never received FSM within those different ethnic groups. This is because the relevance of receiving FSM to educational outcomes may be markedly different for pupils from different ethnic groups – and this has previously been reflected in the DCSF's CVA modelling.

In model 10 we control for the ethnic background of individual pupils and see that this diminishes the steepness of the 'ski jump launch ramp' for non-FSM pupils although its size remains for pupils who received FSM during their secondary schooling. However, in model 11, where we also allow for a different size effect for FSM status for different ethnic groups (that is, FSM is interacted with the ethnic groups shown) the difference in the size of the 'ski jump launch ramp' for ever FSM and never FSM pupils diminishes substantially from a difference of two GCSE grades (12.0 points, shown in model 10) to two thirds of a GCSE grade (4.0 points shown in model 11 and represented in Appendix Figure A9).

Nevertheless, we see that the reduction in attainment associated with being a pupil from the highest decile of school deprivation (rather than just a FSM recipient from this group) persists in being less marked than for the next three decile groups. That is, the ski jump shape is retained in the coefficients relating to the deciles of school deprivation. Thus, compared with pupils attending schools in the most advantaged decile, pupils attending schools in deciles five to seven are estimated to achieve two fewer GCSE grades and pupils in deciles eight and nine to achieve three grades fewer. However, for pupils at the most deprived schools this falls to just over two and a half fewer grades (-15.9 points). The estimated impact of the decile of school deprivation on 'best eight' point scores for 'never FSM' and the additional impact for pupils who received FSM during their secondary schooling are illustrated in Appendix Figure A9. This model (model 11) comprises the 'best' model for 'best eight' point scores presented in this paper.

One possible mechanism through which the deciles of school deprivation have an impact on pupils' attainment may be the effect of the prior attainment profile of school intakes (often described as a peer effect or school composition effect). That is, the prior attainment and progress of other pupils may affect an individual pupil's progress. Model 12 therefore includes the mean prior attainment score at the school and a measure of the spread of ability at the school (that is, the standard deviation of the prior attainment scores at Key Stage 2).

We see that the coefficients relating to the deciles of school deprivation reduce markedly in size from around -18 points to about -7 points for the 7th, 8th and 9th deciles of deprivation. A difference of -18 points equates to three GCSE grades lower, controlling for other characteristics, than would be expected for a similar pupil from the lowest decile of school deprivation. Thus the reduction to -7 points (just over one aggregate GCSE grade) is substantial. This reduction is the effect of controlling for the average prior attainment at Key Stage 2 and the spread of prior attainment within the year group.

In addition, we see that the coefficient relating to FSM pupils attending the most deprived schools changes from a statistically significant +4.0 in model 11 to +1.3 points in model 12. Thus it appears that the benefit to FSM pupils of attending the most deprived schools may arise from a relatively higher mean level of prior attainment or narrow range in prior attainment at those schools.

For a parent it is important to note that model 11 would be somewhat more informative as it reflects the estimated impact on examination results of attending schools with different levels of deprivation. That is, model 11 addresses the question 'how do children perform if they attend schools with different levels of deprivation?' On the other hand model 12 addresses the question 'what is the effect of school deprivation on children's examination performance, over and above the effect of the school intake's prior attainment profile?'

This distinction draws attention to one of the features of the DCSF's CVA modelling. In CVA modelling, the results of which are published in school league tables, school level control variables relating to the level and spread of prior attainment among the school's intake are included in the modelling. That is, the primary purpose of CVA modelling is to assess *school performance* (that is, the performance of teachers, managers etc.) and therefore the model includes some school characteristics, such as the prior attainment of the cohort, that are beyond the control of the teaching staff. Thus the CVA modelling addresses the question 'how good is this school, considering the characteristics of its intake?' On the other hand, for parents the more pertinent question is 'how is my child likely to perform if she or he attends this school?' That is, CVA analysis provides good information for school inspectors but poor information for parents.

Looking across the deciles of school deprivation – examination entries

A further potential contributory factor explaining the relatively high performance of FSM pupils from the highest decile of school deprivation related to potential differences in examination entry policies across the deciles. We saw in Figure 1 that pupils on FSM in 2006 from schools in the highest of the DCSF's FSM bands were actually more likely to achieve the 5 A*-C grades benchmark than were FSM pupils in any of the other bands. However, Figure 2, which related to the threshold measure including English and maths, showed that the impressive results of pupils attending the most deprived schools were somewhat less marked. It may therefore be fruitful to explore differences in apparent examination entry policies across the deciles of school deprivation.

One way that we can investigate such differences is to compare examination results in the main academic qualifications only with examination results including all qualifications. That is, we may compare results in full GCSE examinations (the main academic qualification) with scores for all examinations that may contribute to the 'best eight' score (that is, including other qualifications such as vocational GCSEs, intermediate level GNVQs and short course GCSEs, as well as full GCSEs).

Before developing the multivariate modelling in this way we may consider the contribution of examinations other than full GCSEs to *raw* 'best eight' point scores. In short, the net contribution made by qualifications other than full GCSE examinations is greater among the higher deciles of school

deprivation.[7] Such examinations contribute an average of fewer than 10 points to the best eight point score (under 3% of the points score) of 'never FSM' pupils in the most advantaged schools. In the most deprived decile of school deprivation, they contribute more than 38 points (almost 16% of the total). (These net contributions are illustrated in Appendix Figure A10.) Interestingly, the difference in the number of points contributed for 'never FSM' pupils and 'ever FSM' pupils is greater in less deprived schools than in more deprived schools. This suggests that the degree of social differentiation relating to the types of examinations undertaken may also diminish from the least deprived deciles to the most deprived schools. Indeed, in the highest decile of school deprivation, qualifications other than full GCSE examinations make a greater net contribution to the best eight score of '*never FSM*' pupils than to the scores of 'ever FSM' pupils.

One reason why the mean 'best eight full GCSEs' raw score tends to diminish from the lowest deciles of school deprivation to the highest is that pupils in the higher deciles of school deprivation enter more vocational qualifications or half GCSE examinations and concomitantly enter fewer full GCSE examinations. That is, pupils in the highest deciles of school deprivation enter more examinations than those in many of the lower decile groups although the mean number of full GCSE entries diminishes across the deciles of deprivation. (This is illustrated in Appendix figures A11 and A12.)

If we examine which non-full GCSE examinations are entered by pupils, we find that more than half of pupils overall (51%) entered a short GCSE course, with a mean of 0.7 GCSE equivalent entries per entrant. Vocational GCSEs were taken by 24% of the cohort with a mean of 2.2 GCSE equivalent entries per entrant. Intermediate GNVQ qualifications were entered by 15% of the cohort with an average of 4.3 GCSE equivalent entries per entrant.

The intermediate GNVQ qualification has of course provoked some controversy (and indeed has now been discontinued), contributing the equivalent of four GCSEs for the purposes of school performance tables. The proportion of pupils who entered an intermediate GNVQ is much higher for higher deprivation deciles. More than 30% of 'never FSM' pupils in the most deprived decile entered for an intermediate GNVQ in 2006 (as shown in Appendix Figure A13). It may of course be that this reflects the different preferences and values of pupils and parents across the deciles of schools. However, perhaps more importantly, if we restrict our consideration to the top 10% of pupils at Key Stage 2 – that is, to the highest attaining pupils – we see that a similar pattern emerges and this is shown below in Figure 4.

Here we see that among the top 10% of pupils in Key Stage 2 tests, while fewer than 3% of 'never FSM' (or indeed 'ever FSM') pupils from the lowest decile of school deprivation entered an intermediate GNVQ, the corresponding figures for the highest decile are greater than 30%. That is, a high attaining pupil attending a highly deprived school was ten times more likely to enter an intermediate GNVQ qualification than a similar pupil from the lowest school deprivation decile. (Later we consider the examination results achieved by these high attaining pupils.)

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[7] To understand why the contribution of qualifications other than full GCSEs is described as a net contribution, the following example may be instructive. Suppose a pupil achieves four grade C full GCSEs, four grade D full GCSEs and an intermediate GNVQ pass. For this pupil the DCSF's 'best eight' point score would be 320 points, comprising the GNVQ (160 points) and the four full GCSEs at grade C (40 points each). The score for the 'best eight full GCSEs' would however be 296 points, comprising four full GCSE passes at grade C (40 points each) and four at grade D (34 points each). Thus while the contribution of the GNVQ to the DCSF 'best eight' point score would be 160 points, the net contribution of qualifications other than full GCSEs is identified as 24 points (that is, the difference between 320 points and 296 points).

Figure 4. Highest attaining 10% of pupils at Key Stage 2 only - proportion of 'never FSM' and 'ever FSM' pupils entered for intermediate GNVQ qualifications across the deciles of school deprivation
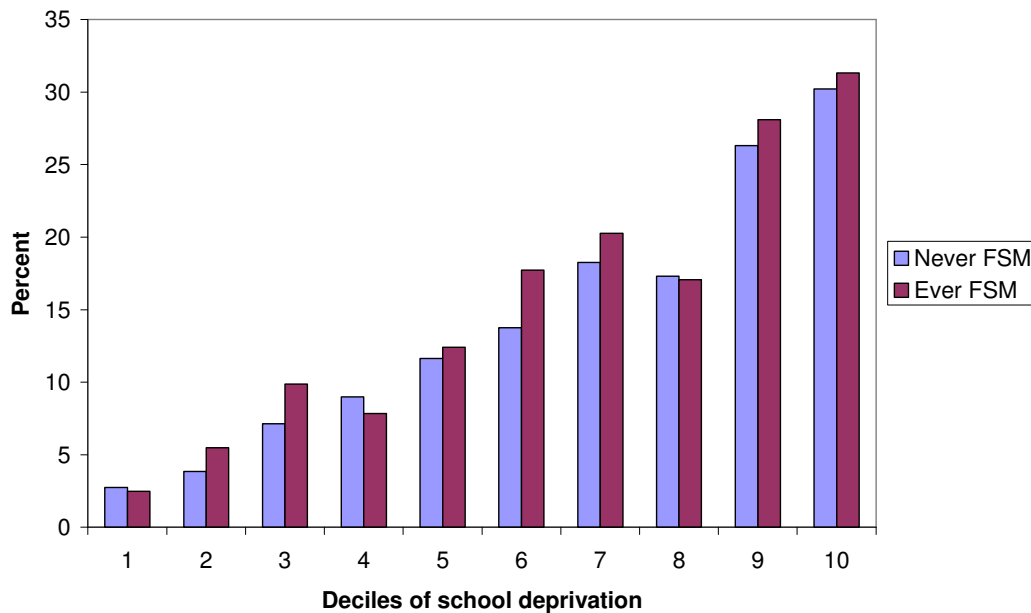
If we look more closely at the examination entries of high attaining pupils across the deciles of deprivation we find several other interesting differences and these are illustrated below in Figure 5. First, the average number of entries for single science examinations and modern foreign languages was higher in more advantaged schools than among high attaining pupils in the higher deciles of school deprivation. Conversely, those attending more disadvantaged schools were more likely to enter vocational GCSEs and, as we have seen, intermediate GNVQs (and especially the GNVQ in ICT).

Figure 5 – High attaining pupils only, mean number of entries per pupil (GCSE equivalences) in selected examinations across the deciles of school deprivation
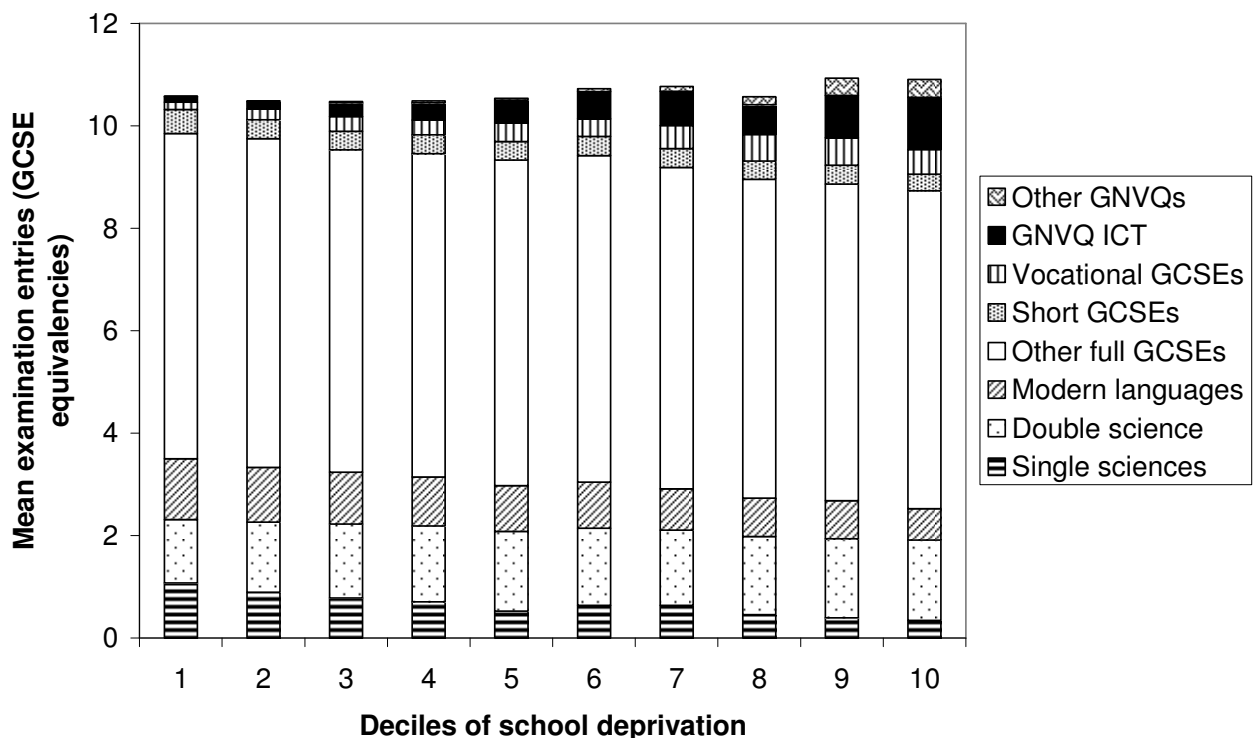
It is therefore important to consider the role played by qualifications other than full GCSE examinations to our emerging picture of variations in attainment across the deciles of school deprivation. Our approach here has been to change the outcome variable from the point score in the best eight GCSE (and equivalent) examinations to an outcome variable that focuses solely on attainment in *full GCSE examinations* (model 13). To calculate this outcome variable the point score per full GCSE examination was calculated (up to a maximum of eight full GCSE entries). As we have seen, some pupils entering other qualifications such as vocational GCSEs, GNVQs and short course GCSEs may enter fewer full GCSE examinations as a result. Therefore the outcome variable was divided by the number of GCSE examinations entered to obtain an average full GCSE point score *per entry*.

In model 13 we see that pupils from the most deprived four deciles of school deprivation are estimated to attain between 2.8 (decile 7) and 3.4 (decile 9) fewer points *per full GCSE entry* (equating to about half a grade less per entry) than similar pupils from the lowest decile of school deprivation. In order to make these figures more comparable to the examination outcomes including all qualifications we also calculated a points *per entry* score *including* GCSE, GNVQ and other qualifications (again capped at a maximum of eight entries). Model 14 shows how the inclusion of qualifications other than full GCSEs attenuates the disadvantage associated with attending more deprived schools (also represented in Appendix Figure A14 and Appendix Figure A15). Thus on this measure attending a school in the most deprived four deciles of deprivation was associated with a reduction of about one third of a GCSE grade per entry (for full GCSEs and other qualifications). Thus entries to examinations other than full GCSEs mask the extent of differences in attainment across the deciles of school deprivation.

Attainment of the top 10% of pupils across the deciles of school deprivation

It is interesting to consider how high attaining pupils fare across the deciles of school deprivation. In this section we therefore broadly repeat the analysis undertaken in earlier sections but including only high attaining pupils.

If we select the top 10% of pupils from those for whom we have Key Stage 2 results matched to Key Stage 4 results and, in addition, have complete records relating to FSM, this gives us a dataset comprising 54,038 pupils. Of these pupils, 51.4% were female and 86.4% categorised in the white British ethnic group. More than ninety per cent of the group had never received FSM during their secondary schooling (93.3%) compared with 6.7% who had received FSM.

Mean point scores for average performance in Key Stage 2 tests and 'best eight' point scores at GCSE and equivalent qualifications are shown in Table 2. Thus we see that despite similar mean scores in Key Stage 2 tests, in GCSE and equivalent examinations, never FSM pupils achieved a mean score roughly equivalent to seven grade A GCSEs and one grade B while the ever FSM group mean score is roughly equivalent to eight B grades.

Table 2 - Top 10% high attainers at Key Stage 2, mean Key Stage 2 and 'best eight' GCSE and equivalents scores or never FSM and ever FSM pupils

	Mean Key Stage 2 score	Mean 'best eight' GCSE and equivalents score
Never FSM (N=50,399)	81.0	409
Ever FSM (N=3639)	80.5	369

We then repeat the analysis that was carried out for the whole cohort and model 15 (shown in Appendix 4) shows a base model (similar to model eight for the whole cohort). In this model, which controls for prior attainment, female pupils, English as an Additional Language, age, IDACI score and FSM status

we see that the value for adjusted R square is much lower (with the model accounting for 17% of the variation rather than 53% as in model 8). Coefficients for the deciles of school deprivation (added in model 16), relative to the least deprived decile, fall from -0.4 to -22.1 points from the second to the tenth decile, which for the tenth decile may be understood as an aggregate reduction of between three and four GCSE grades in the best eight point score.

Extending the model first to differentiate between 'never FSM' and 'ever FSM' pupils within each of the deciles of school deprivation (model 17) does little to improve the explanatory power of the model and, in addition, coefficients for the interaction of FSM status and the deciles of school deprivation are difficult to interpret.

Consequently interaction terms for FSM status and the deciles of highest deprivation were not retained for models 18 and 19 which control for ethnic group and the interaction between FSM status and ethnicity. We see that the inclusion of ethnicity coefficients has little effect either on adjusted R square or on the size of the coefficients associated with the deciles of school deprivation. This is also the case when ethnic groups are interacted with FSM status (model 19). Thus the reduction in attainment associated with being in the highest decile of school deprivation, relative to the lowest, remains at between three and four GCSE grades. This compares with a difference of seven grades in the mean *raw* GCSE (and equivalents) results from the most advantaged decile of school deprivation to the most deprived decile.

If we then consider the point score per entry in up to eight full GCSE examinations (model 20), we see that pupils in the highest three deciles of school deprivation are estimated to achieve an average of half a grade less per full GCSE entry. Once again, if we compare this with the point score per entry included in the 'best eight' point score – that is, including half GCSEs, GNVQs etc. (model 21) - then the difference is slightly lessened although still equating to approximately half a GCSE grade per GCSE equivalent entry. Thus, taken in conjunction with the findings relating to the number of full GCSE examination entries we might conclude that high attaining pupils attending the most disadvantaged schools face a double penalty. They are likely to enter fewer full GCSE examinations and they are likely to achieve lower grades in those examinations.

Conclusion

This report has extended analyses presented by the Department for Education and Skills (DfES, 2006) which showed that pupils eligible for Free School Meals (FSM) who attended schools with the most deprived school intakes were more likely to achieve the 5 A* to C threshold than FSM pupils in less deprived schools. In contrast, the examination results of those not receiving FSM declined as the level of deprivation within schools increased. One possible interpretation of this finding would have been to conclude that FSM pupils were better off attending the most deprived schools. This report has shown that this would be an incorrect interpretation. The report has examined whether the phenomenon is explained by some of the characteristics of the pupils attending those schools and the examination entry policies at schools with different levels of deprivation.

Our analysis used data for the 2006 GCSE examination cohort. This is the first cohort for whom individual level FSM data was available for the whole period of their secondary schooling. Consequently it was possible to identify not only pupils on FSM in their GCSE year but also those on FSM earlier in their secondary school career. It was suggested that, from the point of view of modelling examination attainment, identification of the latter group may improve statistical models of attainment such as the DCSF's Contextual Value Added modelling.

We examined GCSE (and equivalents) attainment in pupils' 'best eight' examinations, progressively extending a parsimonious model of attainment. This model took into account pupils' prior attainment, sex, age, English as an additional language, FSM status and IDACI score. We found that the lower levels of attainment associated with attending schools with more deprived intakes were much less marked than was suggested by the raw figures. This was particularly clear when the statistical model took into account pupils' ethnic background and the different effects on attainment of FSM receipt within those different ethnic groups. In this way, for pupils who had never received FSM during their secondary schooling, the reduction in attainment associated with attending disadvantaged schools fell to two to three GCSE grades (from an original difference in raw grades of about 13 GCSE grades). For both pupils who had received FSM and for those who had not, higher levels of attainment were associated with attending a school with fewer disadvantaged pupils. However, in almost all of the models presented, the attainment associated with the deciles of school deprivation traced the shape of a 'ski jump' across the deprivation deciles – the level of attainment in the most disadvantaged decile of school deprivation tended to be higher than for the adjacent decile(s).

We also examined patterns of examination entries across the deciles of school deprivation. The mean number of full GCSE examinations entered by pupils was lower for pupils at schools with more disadvantaged intakes. These pupils were however more likely to enter examinations other than full GCSEs. This was also true for the highest attaining pupils (in Key Stage 2 tests). Results in examinations other than full GCSEs tended to reduce the gap in attainment between pupils attending more disadvantaged schools and less disadvantaged schools. Hence when analysis was restricted to results in full GCSE examinations only, attending schools with more deprived intakes was associated with achieving a lower grade per entry than was the case when all examinations (including GNVQs etc.) were included in the analysis. Hence high levels of entry for examinations other than full GCSEs tends to mask the lower levels of attainment in more disadvantaged schools. In the four most deprived deciles of school deprivation this equated to achieving about half a grade less per full GCSE entered.

References

Department for Education and Skills (2006) Statistics of Education: Trends in attainment gaps: 2005, London: HMSO.

Acknowledgements

Appendix 1 - Cut points for the deciles of school deprivation and descriptive statistics relating to variables used in statistical modelling

Descriptive statistics relating to deciles of school deprivation

Decile group (lowest FSM to highest)	Number of pupils	Number of pupils ever received FSM	Number of pupils in the top 10% at Key Stage 2	Number in top 10% 'ever FSM'	Range of school percentage of 2006 GCSE cohort receiving FSM
1	54,518	2,526	12,899	230	<2.3
2	54,924	4,132	7,948	278	2.3 - 3.8
3	55,164	5,483	6,163	275	3.8 - 5.1
4	54,960	6,714	5,423	290	5.1 - 6.5
5	54,839	8,179	4,945	321	6.5 - 8.4
6	54,823	9,923	4,536	329	8.4 - 10.6
7	54,854	12,170	3,910	384	10.6 – 14.0
8	54,734	15,613	3,285	451	14.0 – 18.8
9	54,096	19,625	2,904	526	18.8 – 29.1
10	52,936	29,272	2,025	623	>29.1

Descriptive statistics for variables used in statistical modelling

	N	Mean	Standard deviation
KS 2 average score (in English, maths and science) centred on mean	545848	0	14.7
Number of months since birthday at start of school year	545848	5.37	3.48
IDACI score	543844	0.21	0.17
School mean score for year group's KS2 average score centred on mean	545848	0	5.65
Standard deviation of year group's KS2 average score centred on mean	545844	0	1.97
	Per cent	N of cases	
Girl	50	270,658	
English as an additional language	7	40,578	
FSM 2006	12	66,438	
FSM previously but not in 2006	9	47,199	
Ever FSM	21	113,637	
Indian	2	11,947	
Pakistani	2	11,613	
Any other White	2	9,033	
Black Caribbean	1	7,310	
Black African	1	5,938	
Bangladeshi	1	4,857	
Mixed – White and Black Caribbean	<1	4,636	
Mixed – White and Asian	<1	2,243	
Chinese	<1	1,644	
Irish	<1	1,983	
Mixed – White and Black African	<1	992	
Gypsy / Romany	<1	197	
Traveller of Irish heritage	<1	98	
Any other mixed background	<1	4,059	
Any other Asian background	<1	2,719	
Any other Black background	<1	2,163	
Any other ethnic group	<1	3,306	
Ethnicity missing	2	11,980	

Appendix 2 – Appendix Figures

Figure A1. Mean best eight GCSE and equivalents point score for non-FSM and FSM pupils by deciles of school deprivation (6 points equates to one GCSE grade, e.g. C = 40, B = 46 etc)
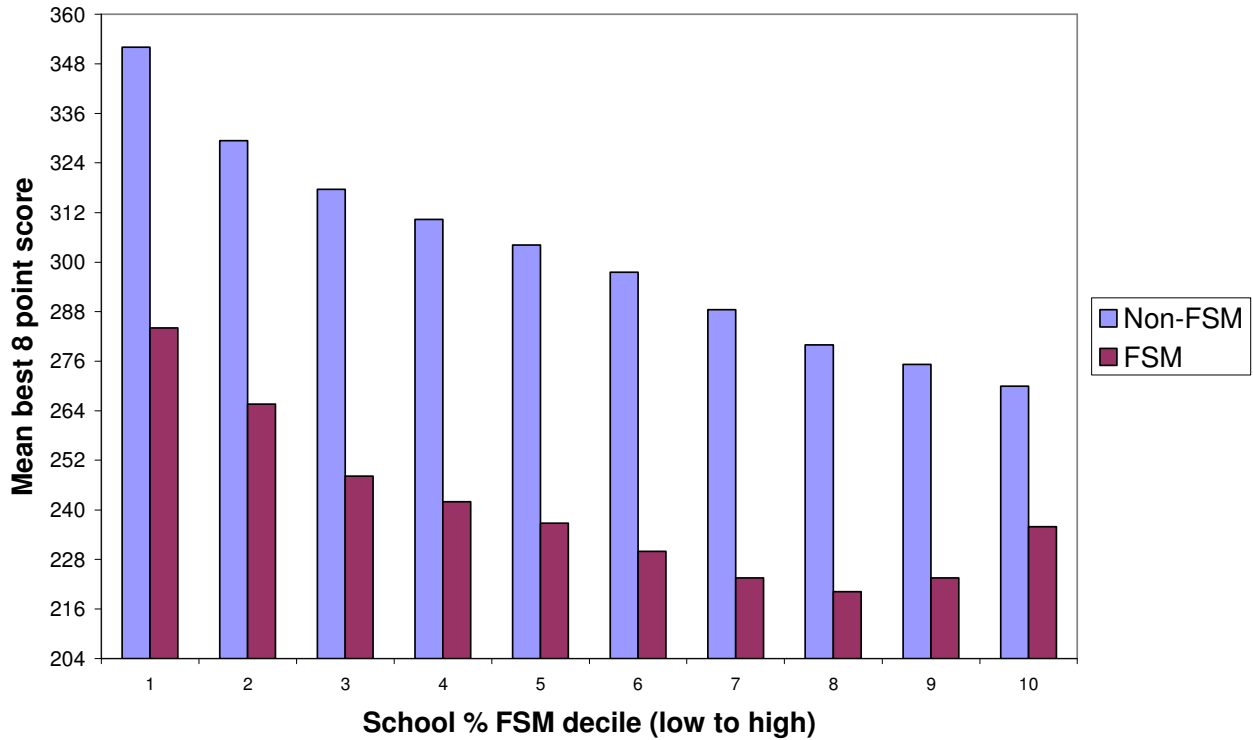
Figure A2. Mean of average KS2 prior attainment score (English, maths and science) for non-FSM and FSM pupils by secondary school FSM decile
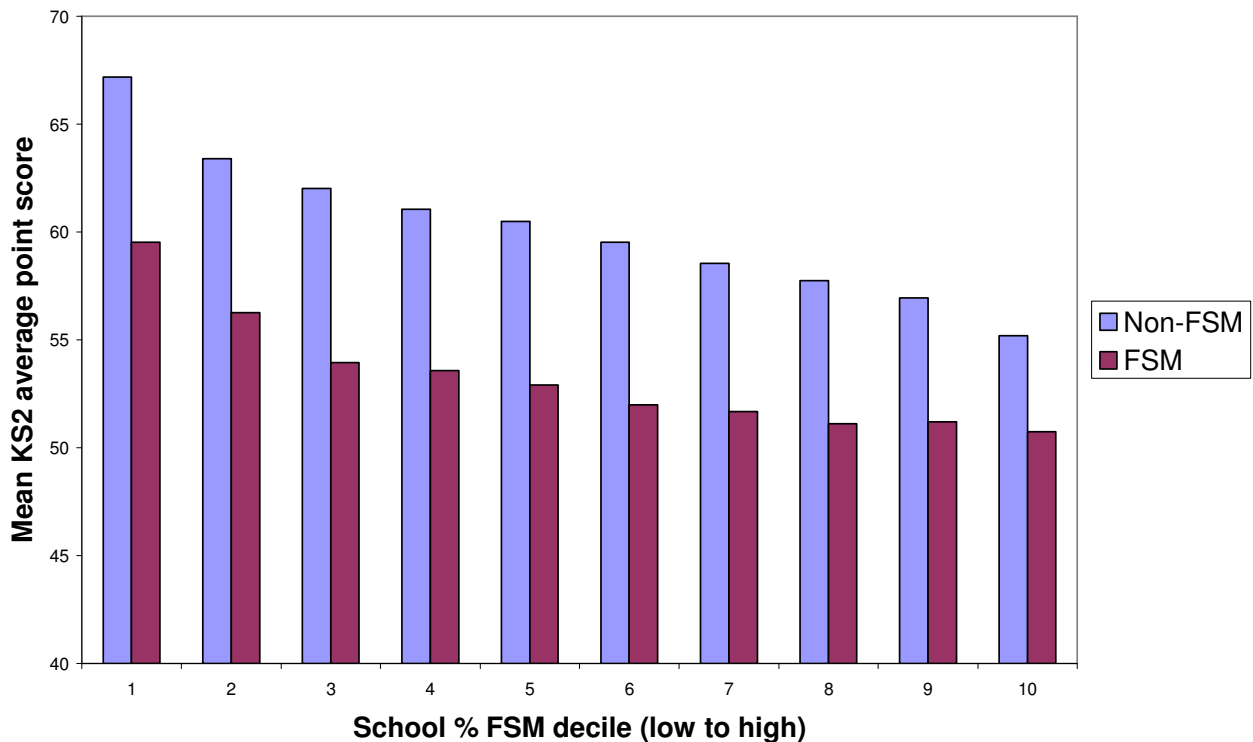
Figure A3. Proportion of FSM pupils in 2006 and 'hidden poor' pupils by school FSM deciles
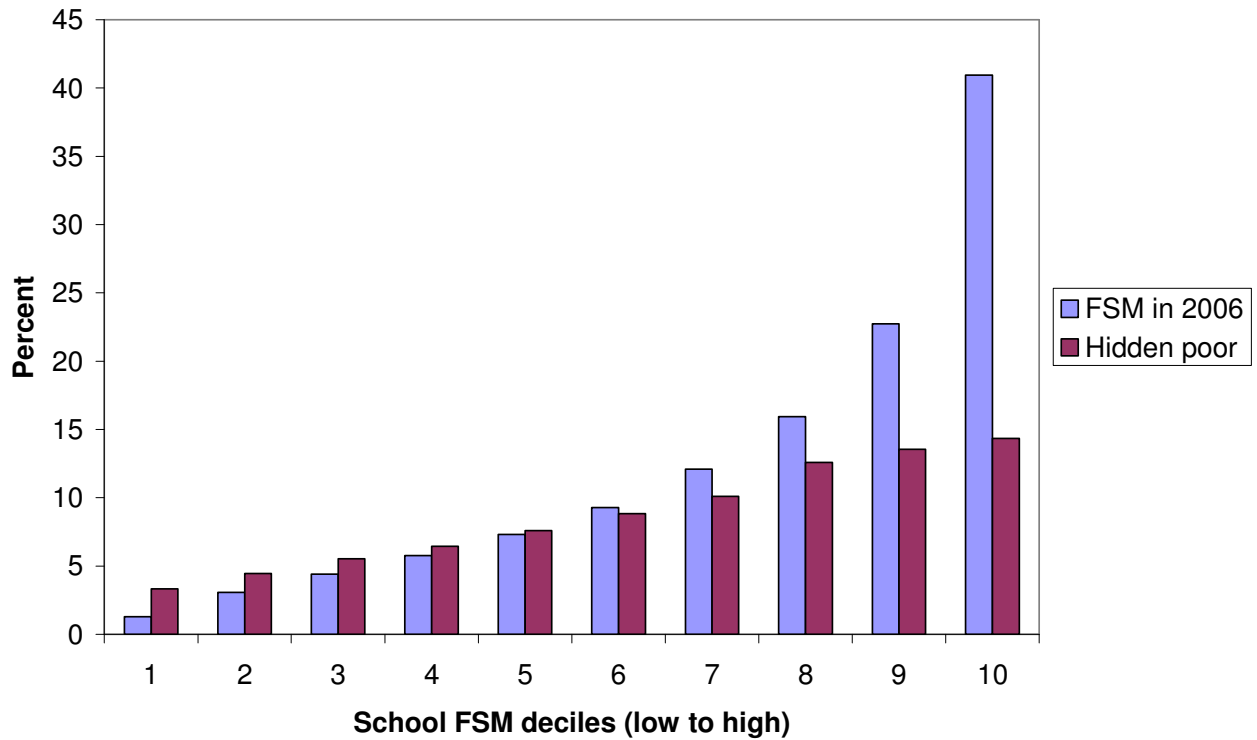
Figure A4 – Reduction 'best 8' point score associated with different deciles of school deprivation (compared with being from the least disadvantaged decile of school deprivation), controlling for other factors (figures relate to Model 8)
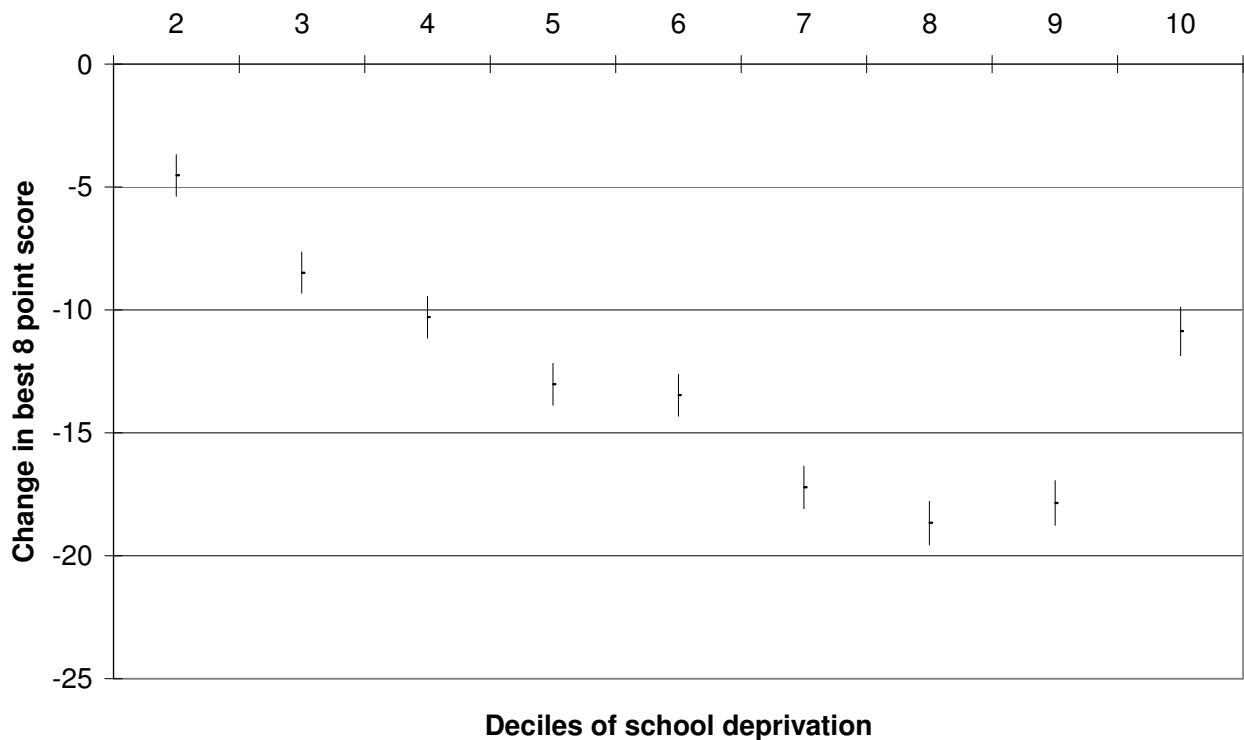
Figure A5. Proportion of 'never FSM' pupils within each decile of school deprivation drawn from different ethnic groups
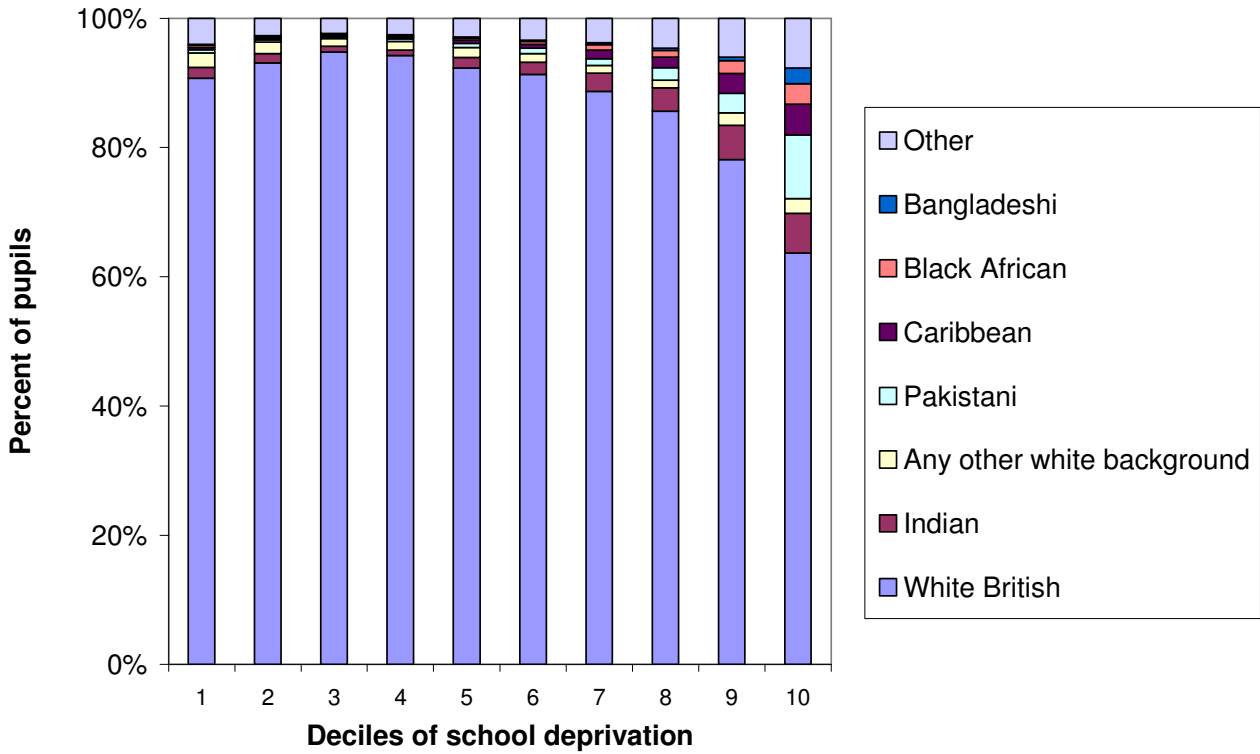
Figure A6. Proportion of 'ever FSM' pupils within each decile of school deprivation drawn from different ethnic groups
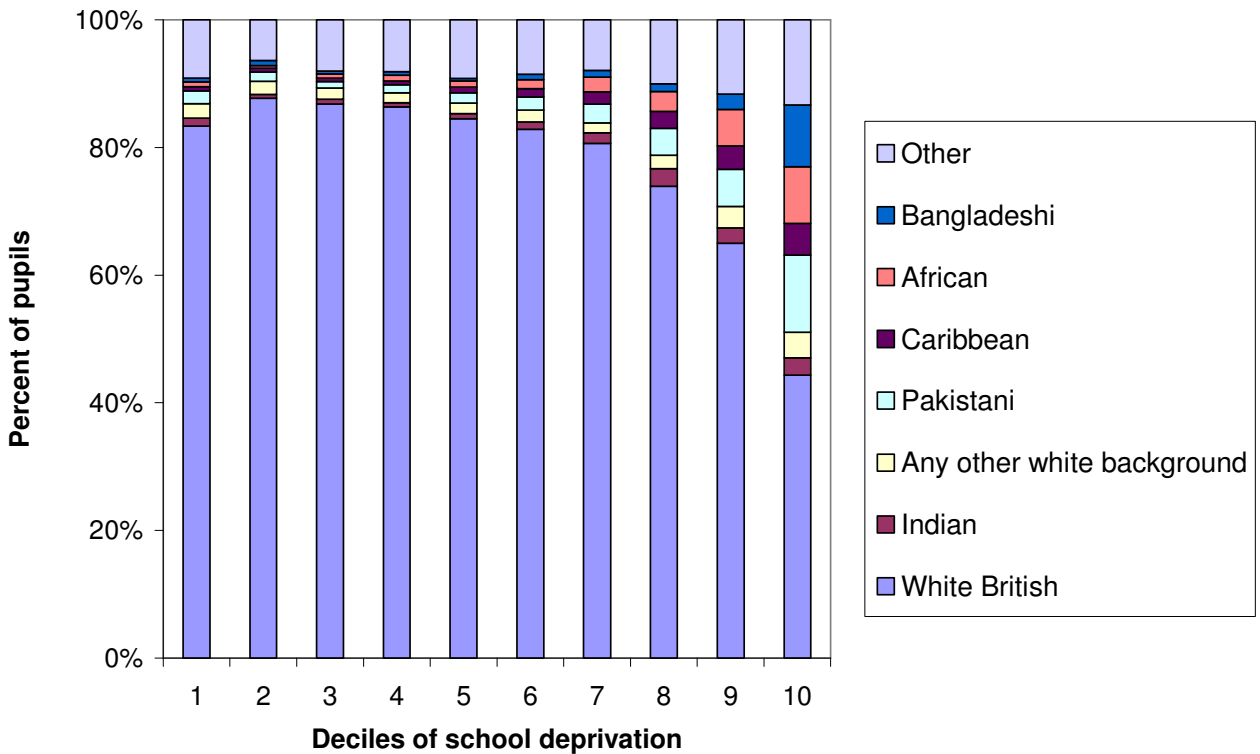
Figure A7. Mean best eight GCSEs and equivalent scores of never FSM pupils from different ethnic groups across the deciles of school deprivation
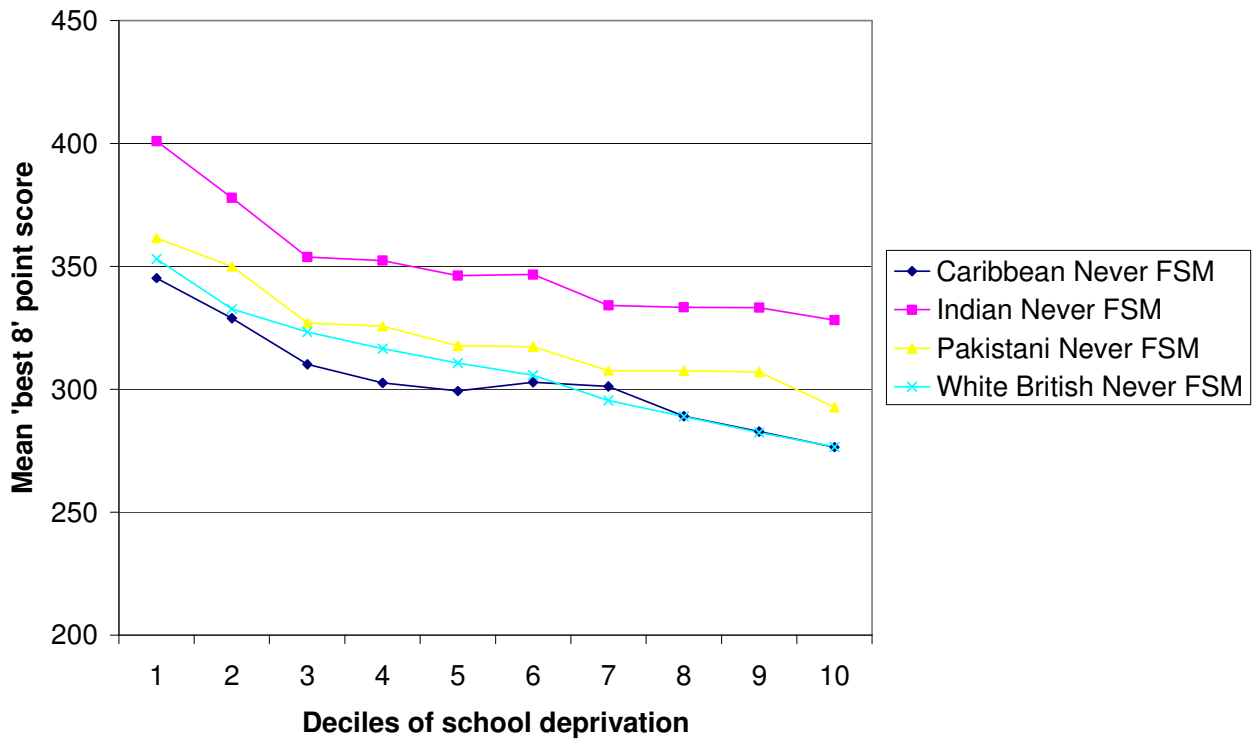
Figure A8. Mean best eight GCSEs and equivalent scores of 'ever FSM' pupils from different ethnic groups across the deciles of school deprivation
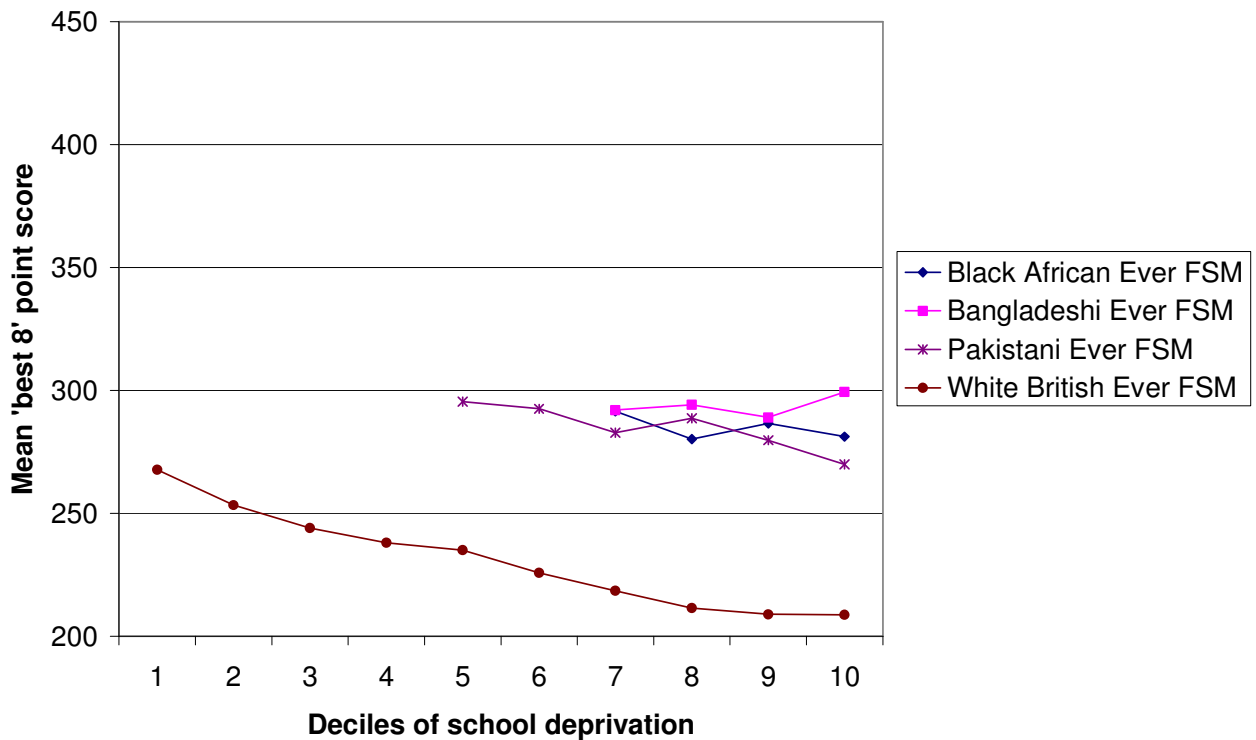
Figure A9 - Reduction in 'best 8' points score associated with different deciles of school deprivation (compared with being from the least disadvantaged decile of school deprivation), and additional effects for 'ever FSM pupils' (figures relate to Model 11) (dotted line represents reduction associated with being 'ever FSM')

Never FSM pupils   **Deciles of school deprivation**   Ever FSM pupils
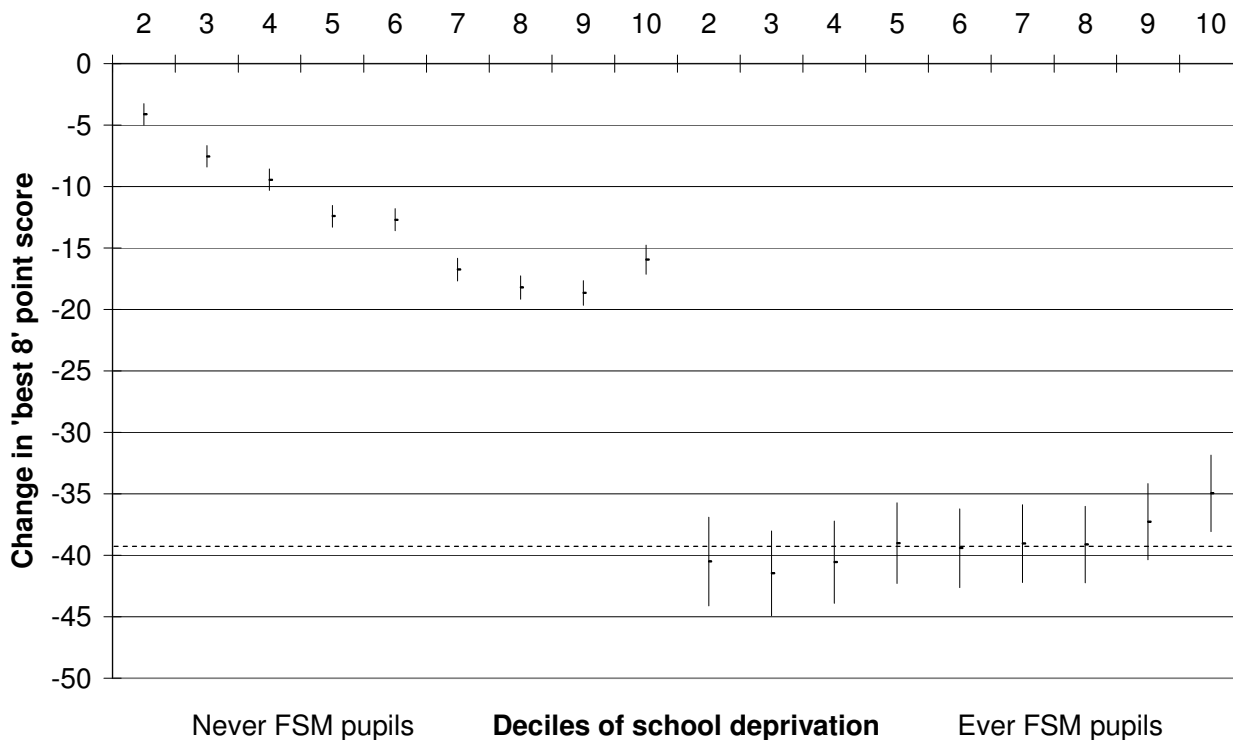
**Figure A10. Mean attainment in best eight GCSEs and equivalent of ever FSM and never FSM pupils across deciles of school deprivation – shading of bars identify the net contribution to the mean score made by examinations other than full GCSEs**

Legend:
- Ever FSM pupils, net contribution of non-full GCSE examinations to best 8 score
- Ever FSM pupils, best 8 full GCSE score
- Never FSM pupils, net contribution of non-full GCSE examinations to best 8 score
- Never FSM, average score in best 8 qualifications

Deciles of school deprivation
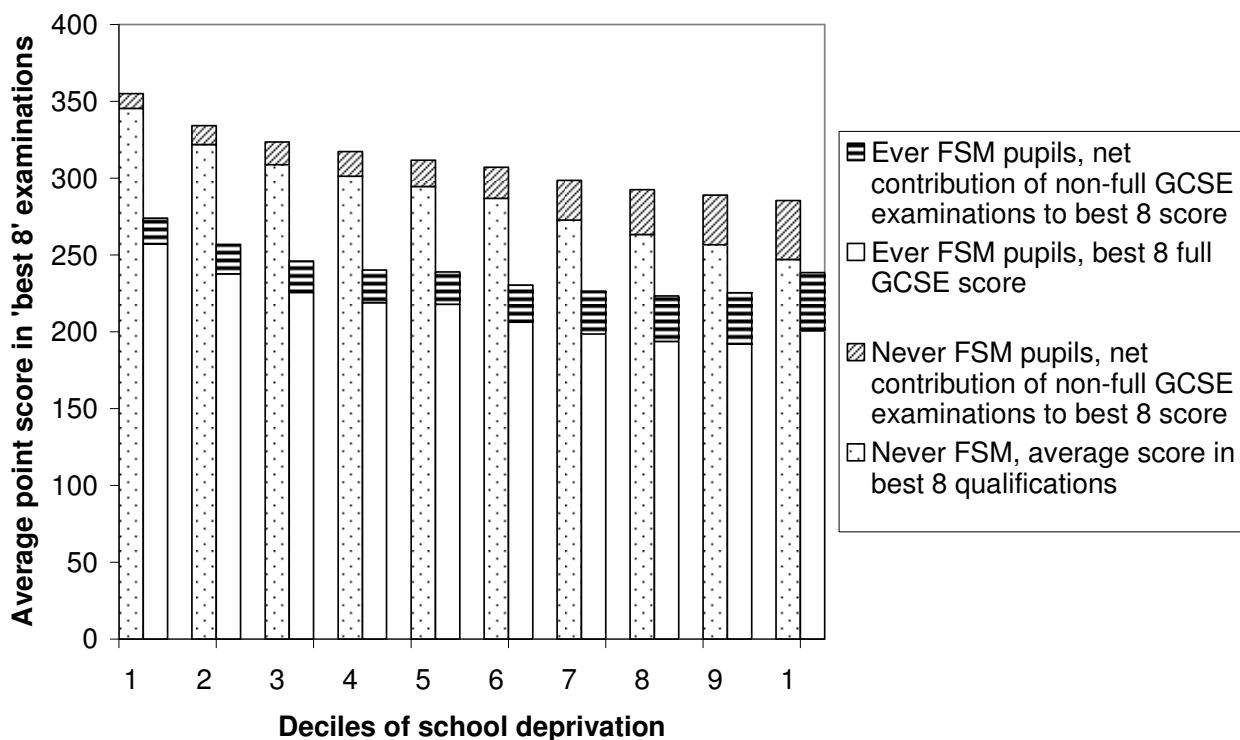
Figure A11. Mean number of examination entries (GCSE equivalencies) of 'never FSM' and 'ever FSM' pupils across the deciles of school deprivation
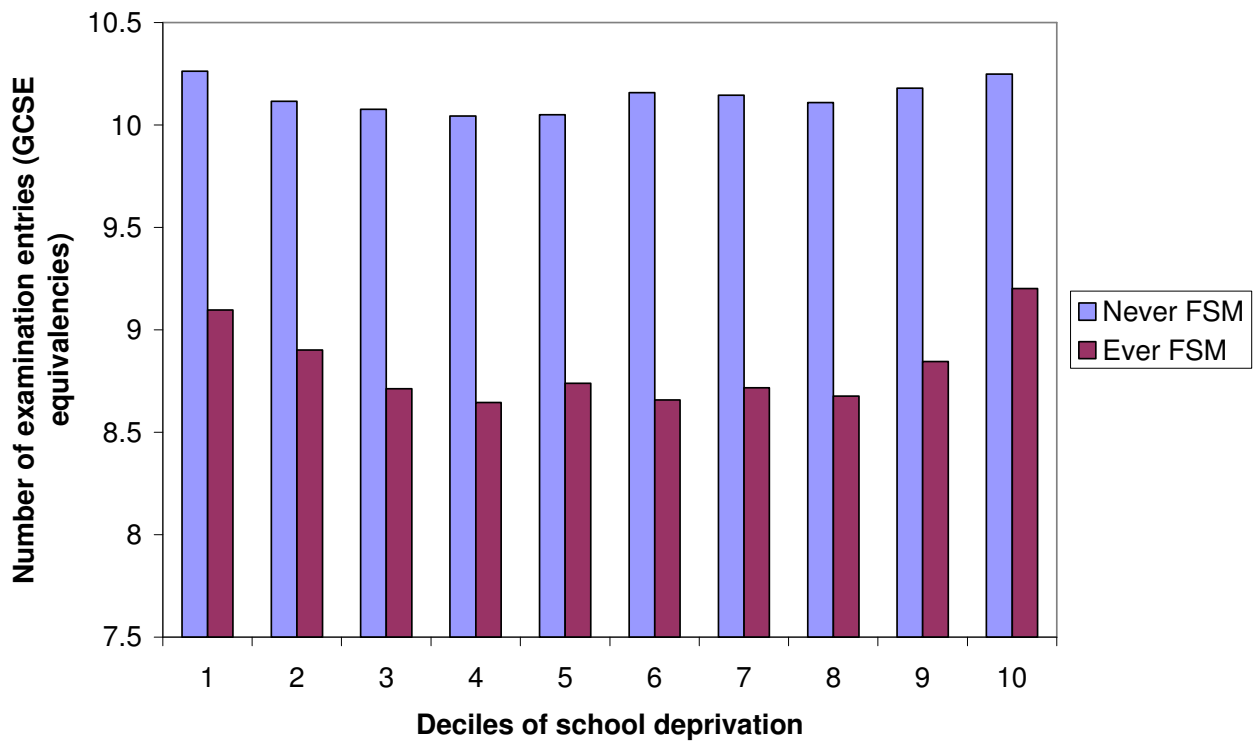
Figure A12. Mean number of full GCSE examination entries of 'never FSM' and 'ever FSM' pupils across the deciles of school deprivation
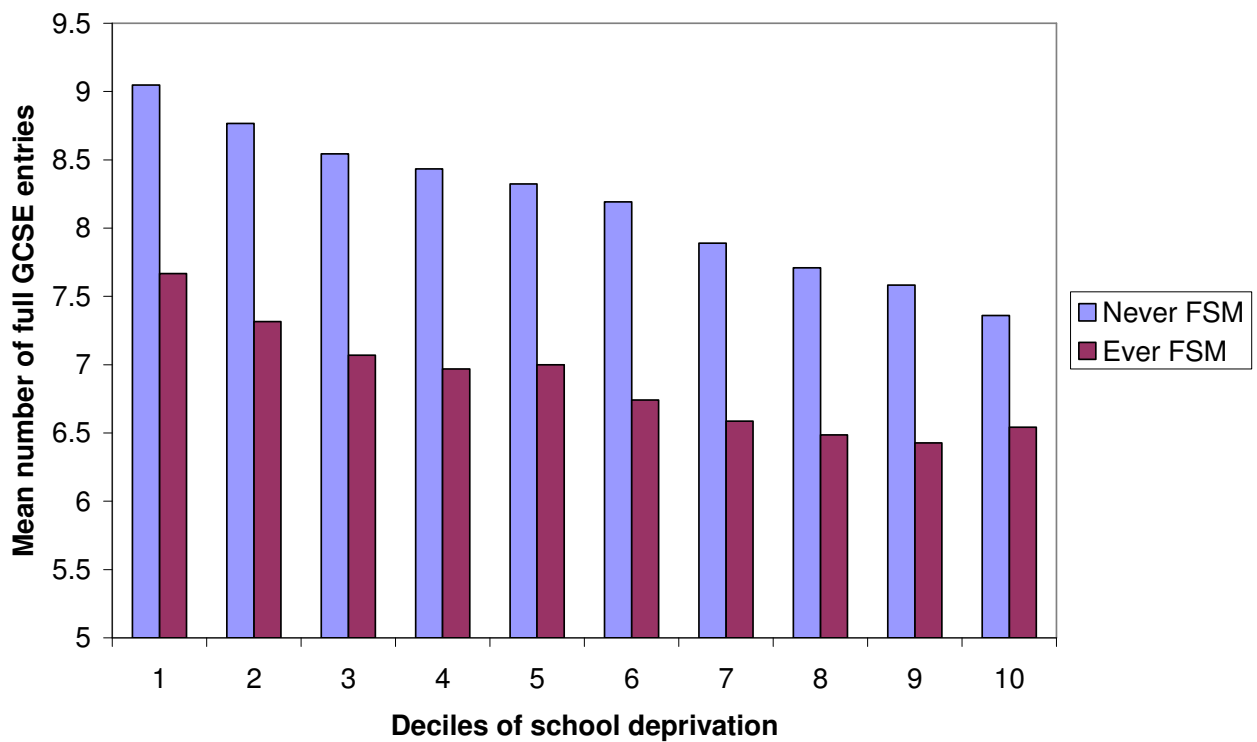
Figure A13. Proportion of 'never FSM' and 'ever FSM' pupils entered for intermediate GNVQ qualifications across the deciles of school deprivation
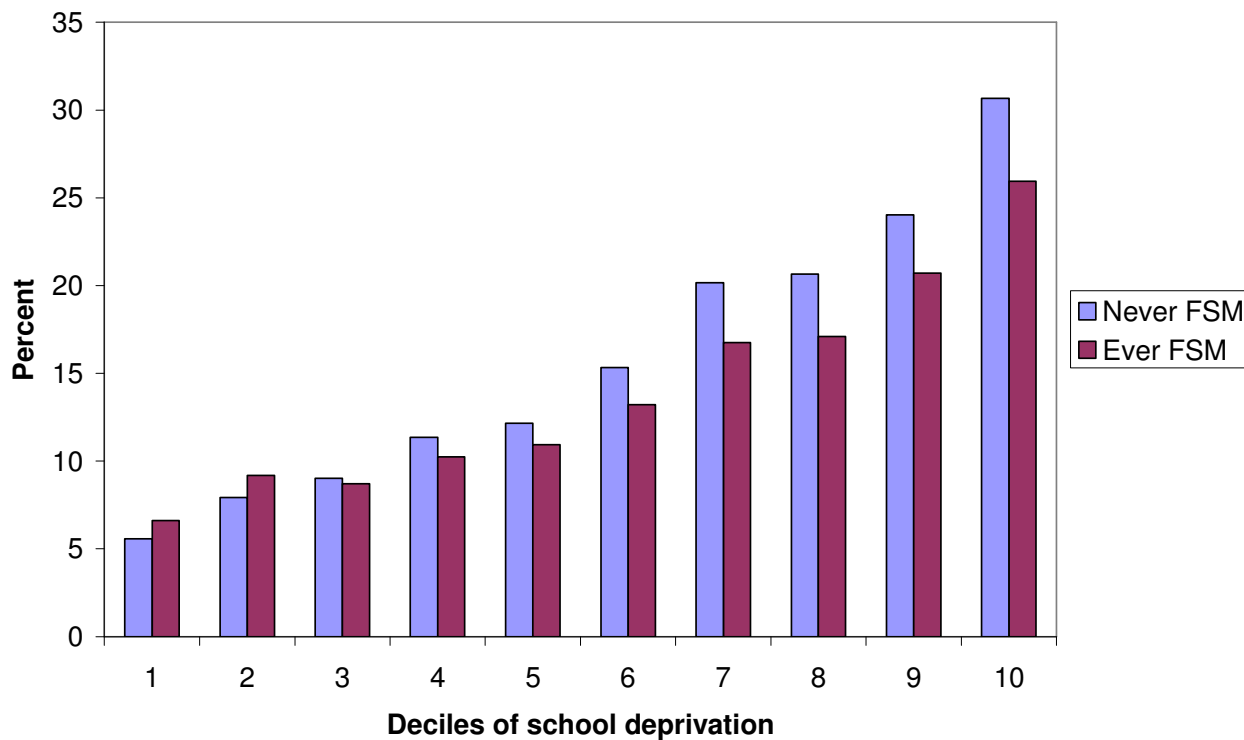
Figure A14 - Reduction in *points per full GCSE examination entry* associated with different deciles of school deprivation (relative to the least disadvantaged decile of school deprivation), controlling for other factors (figures relate to Model 13)
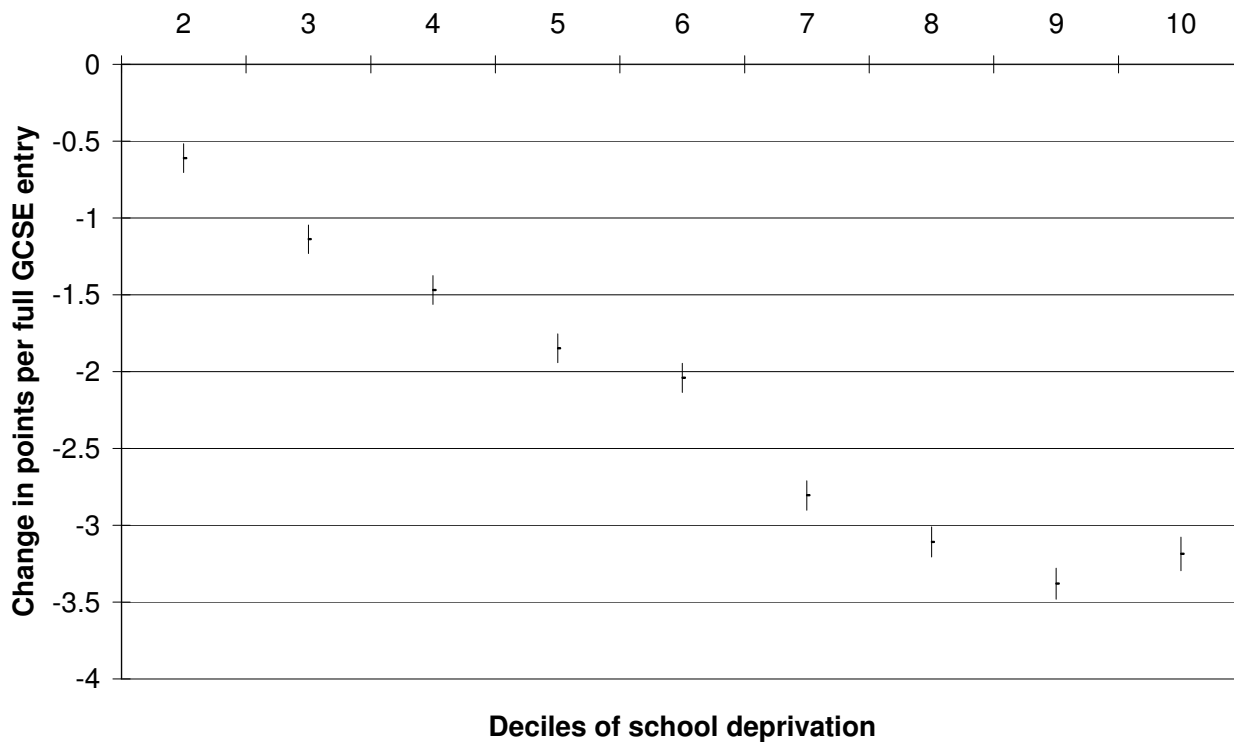
Figure A15 – Reduction in *average points per entry (including GNVQ, half GCSEs etc)* **associated with belonging to different deciles of school deprivation (compared with being from the least disadvantaged decile of school deprivation), controlling for other factors (figures relate to Model 14)**
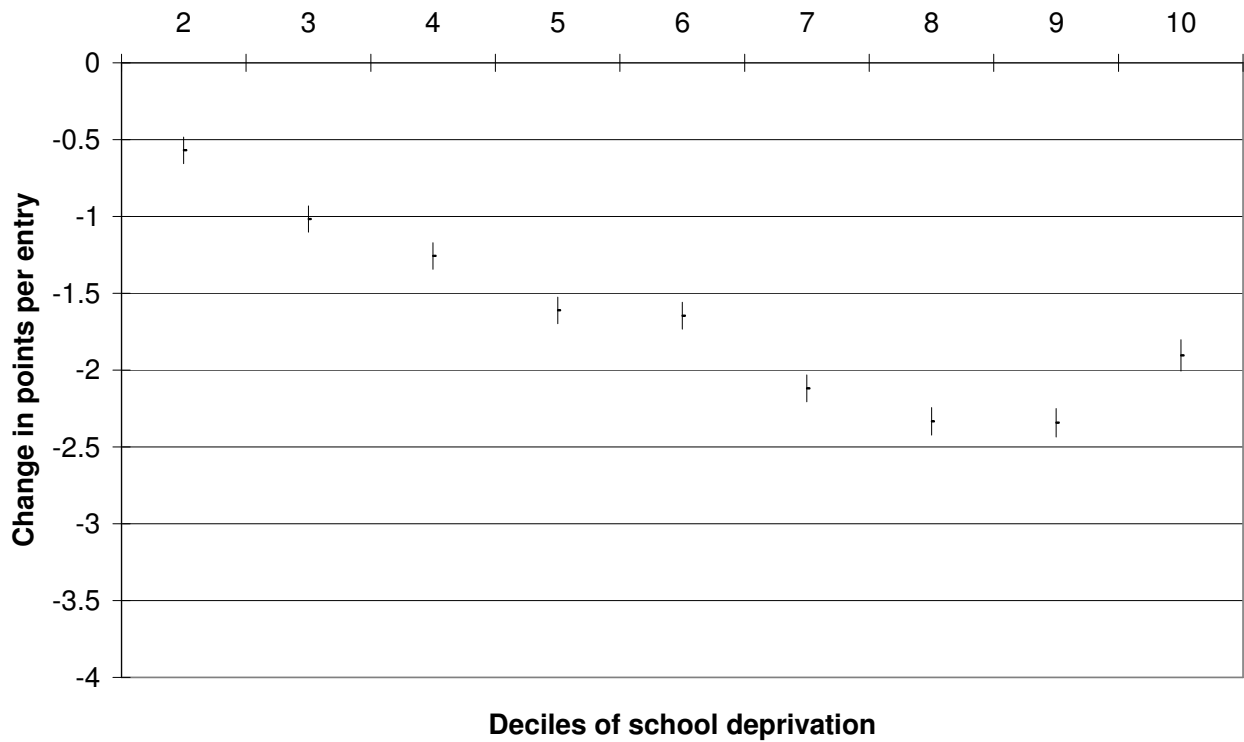
Appendix 3 – Pupils' FSM receipt over time

If we split the 21.3% of pupils who were ever on FSM according to the number of years in which they received FSM, we see in Table 3 that the most common *duration* of FSM receipt was the full five years followed by being on FSM in one year only.

Table A1. Number of years (out of 5) in which 2006 GCSE cohort pupils received FSM (rounded to nearest whole percentage)

Number of Years	1	2	3	4	5
Percent of pupils	4	3	3	4	8

The duration of FSM receipt varies across the school FSM deciles as is shown in Figure A16. We see that within the highest decile of school deprivation, more pupils were on FSM *every year* from 2002-2006, that is, throughout their secondary schooling, than were on FSM between one and four years. The reverse was however the case within every other decile group, with those eligible for FSM every year comprising only 14% of those who were on FSM in the lowest school FSM decile.

We might speculate as to two possible interpretations consistent with this picture. First, this may reflect the location of the higher FSM deciles schools within urban areas where there may be higher rates of longer term unemployment or inactivity. Second, we might suggest that FSM pupils in schools with higher rates of FSM may feel less stigmatised by their FSM status and may consequently be more willing to take up FSM for a longer period.

Figure A16. Number of years of in which pupils received FSM by school FSM deciles (percentages)
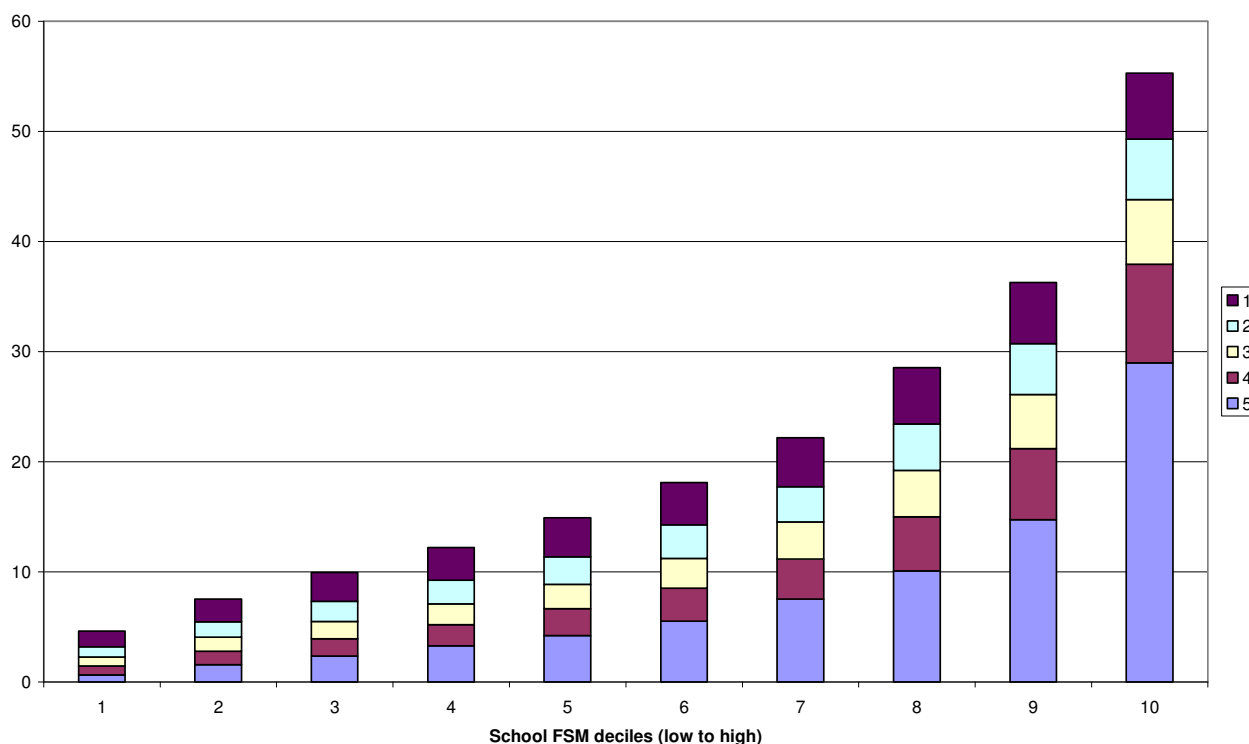
If we examine the ethnic background of pupils on FSM during their secondary schooling we find that White British pupils, who comprise 84% of the 2006 GCSE cohort overall, account for at least two thirds of those on FSM for each duration, ranging from 80% of those receiving on FSM in one year only to 68% of those on FSM in all five years.

However, the duration of FSM receipt varies markedly between ethnic groups and this is represented in Figure 8 for selected ethnic groups (those ethnic groups in which more than 4500 pupils were categorised). What is most striking is the large proportion of Bangladeshi pupils on FSM for all five years of their secondary schooling.

Figure 8. Proportion of pupils from different ethnic groups receiving FSM for 0-5 years of their secondary schooling
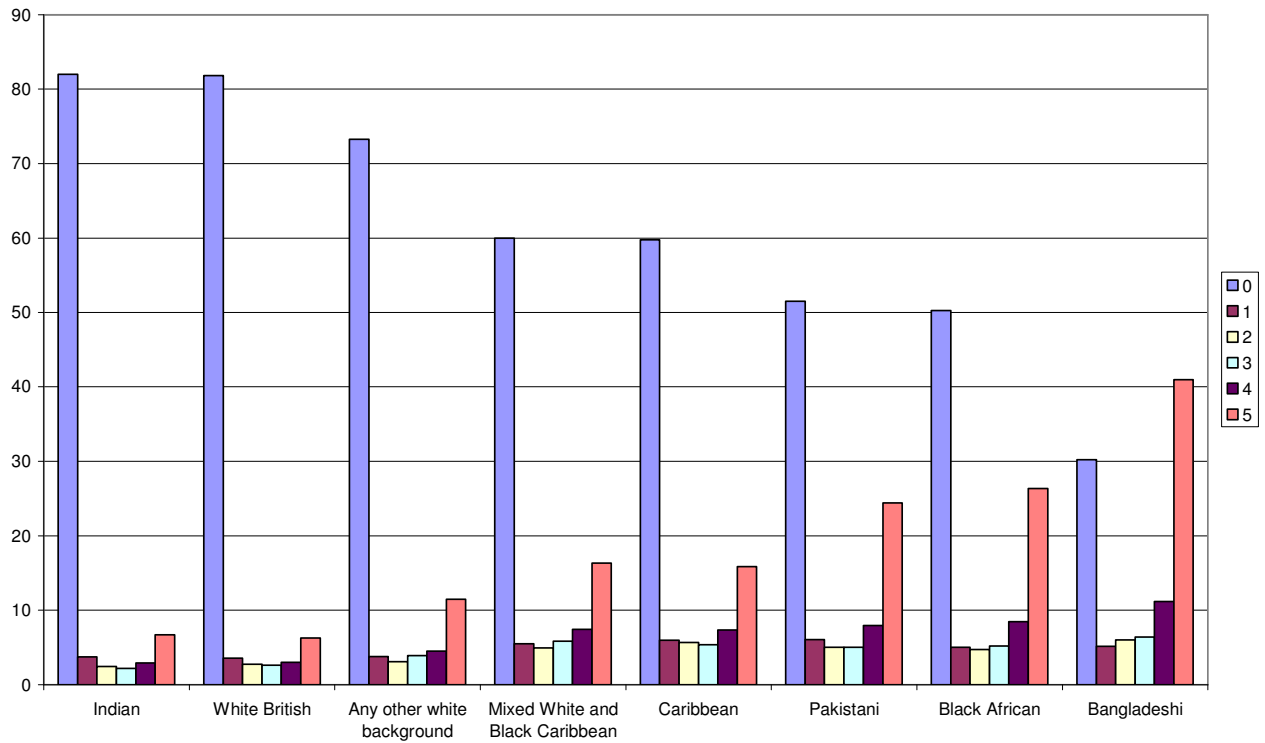
Appendix 4 - Multivariate models

Models 1-7

Dependent variable	DCSF 'best 8' point score for GCSEs (and equivalents)						
Model number	**1**	**2**	**3**	**4**	**5**	**6**	**7**
N	545848	543844	545848	545848	543844	543844	543844
Adjusted R square	0.475	0.499	0.487	0.503	0.503	0.513	0.514
Unstandardised Beta values							
Constant	292.2	309.6	295.5	299.5	309.3	310.0	310.1
KS2 average score	4.5	4.5	4.6	4.4	4.4	4.3	4.3
Girl	21.1	21.7	21.4	21.7	21.8	22.0	22.0
English as an Additional Language	35.2	45.9	41.8	44.3	48.7	49.6	49.2
Age	-1.4	-1.2	-1.3	-1.2	-1.2	-1.1	-1.1
IDACI 2006		-93.7			-80.3	-64.9	-65.6
FSM 2006			-36.1		-23.6		-31.0
FSM previously							-38.2
Ever FSM				-44.2		-34.1	

Models 8-11

Dependent variable	DCSF 'best 8' point score for GCSEs (and equivalents)							
Model number	**8**		**9**		**10**		**11**	
N	543844		543844		543844		543844	
Adjusted R square	0.516		0.516		0.52		0.521	
Unstandardised Beta values								
Constant	319.3		319.3		318.7		319.1	
KS2 average score	4.3		4.3		4.3		4.3	
Girl	22.0		22.0		22.0		22.0	
English as an Additional Language	49.5		49.4		21.9		18.9	
Age	-1.1		-1.1		-1.1		-1.1	
IDACI 2006	-55.3		-55.3		-58.1		-56.7	
FSM 2006	-30.5							
FSM previously	-37.6							
Ever FSM			-36.5		-36.4		-39.0	
School average prior attainment								
School spread of ability								
School FSM percent								
Deciles of school deprivation								
2	-4.5		-4.3		-4.0		-4.1	
3	-8.5		-8.0		-7.3		-7.5	
4	-10.3		-9.8		-9.2		-9.4	
5	-13.0		-12.8		-12.2		-12.4	
6	-13.5		-13.0		-12.6		-12.7	
7	-17.3		-16.9		-16.8		-16.8	
8	-18.7		-18.5		-18.5		-18.2	
9	-18.1		-18.8		-19.5		-18.7	
10	-11.6		-16.5		-18.3		-15.9	
Deciles of school deprivation interacted with FSM								
2			-1.9	ns	-2.0	ns	-1.5	ns
3			-3.5		-3.5		-2.5	ns
4			-2.4	ns	-2.4	ns	-1.6	ns
5			0.0	ns	-0.2	ns	0.0	ns
6			-0.4	ns	-0.5	ns	-0.4	ns
7			0.9	ns	0.6	ns	-0.1	ns
8			1.7	ns	1.5	ns	-0.1	ns
9			5.2		4.9		1.7	ns
10			13.0		12.0		4.0	
Ethnic groups								
Pakistani					32.0		22.4	
Indian					27.8		24.7	
Any other White					18.0		12.9	
Black African					43.6		33.7	
Black Caribbean					22.4		15.0	
Bangladeshi					41.9		27.5	
Mixed - White and Black Caribbean					3.1		-1.0	
Mixed - White and Asian					13.7		12.7	
Chinese					34.2		29.4	

Irish					5.9		8.9	
Mixed - White and Black African					13.7		11.3	
Gypsy/Romany					-55.7		-69.6	
Irish Travellers					-62.9		-31.6	
Any other mixed					8.3		7.3	
Any other Asian					34.8		27.3	
Any other Black					17.9		11.7	
Any other					34.2		22.0	
Ethnicity missing					-6.1		-6.7	
Interacted with ever FSM								
Pakistani							28.7	
Indian							29.5	
Any other White							25.1	ns
Black African							26.7	
Black Caribbean							21.2	
Bangladeshi							29.9	
Mixed - White and Black Caribbean							12.8	
Mixed - White and Asian							7.4	
Chinese							39.6	
Irish							-11.6	
Mixed - White and Black African							9.7	
Gypsy/Romany							25.0	
Irish Travellers							-49.0	
Any other mixed							6.4	
Any other Asian							34.5	
Any other Black							17.4	
Any other							33.0	
Ethnicity missing							4.0	

Models 12-14

Dependent variable	DCSF 'best 8' point score for GCSEs (and equivalents)		Average grade in up to 8 full GCSEs		Average grade in up to 8 qualifications (GCSE equivalencies)	
Model number	**12**		**13**		**14**	
N	543841		543844		543844	
Adjusted R square	0.523		0.560		0.536	
Unstandardised Beta values						
Constant	311.4		40.0		40.4	
KS2 average score	4.2		0.5		0.5	
Girl	21.9		2.4		2.5	
English as an Additional Language	19.0		2.4		2.1	
Age	-1.1		-0.1		-0.1	
IDACI 2006	-57.0		-7.0		-6.5	
FSM 2006						
FSM previously						
Ever FSM	-36.4		-4.1		-4.2	
School average prior attainment	0.8					
School spread of ability	-0.8					
School FSM percent						
Deciles of school deprivation						
2	0.2	ns	-0.6		-0.5	
3	-1.7		-1.1		-1.0	
4	-2.5		-1.5		-1.2	
5	-4.8		-1.8		-1.6	
6	-4.0		-2.0		-1.6	
7	-7.1		-2.8		-2.1	
8	-7.6		-3.1		-2.3	
9	-7.1		-3.4		-2.3	
10	-2.4		-3.2		-1.8	
Deciles of school deprivation interacted with FSM						
2	-3.8					
3	-5.2					
4	-4.4					
5	-2.9	ns				
6	-3.3					
7	-2.9	ns				
8	-3.0	ns				
9	-1.0	ns				
10	1.3	ns				
Ethnic groups						
Pakistani	22.0		2.4		2.4	
Indian	23.0		2.8		2.8	
Any other White	11.6		1.8		1.6	
Black African	31.9		4.2		3.8	
Black Caribbean	13.7		1.9		1.5	

Bangladeshi	26.5		3.1		3.0	
Mixed - White and Black Caribbean	-1.4	ns	0.1	ns	-0.1	ns
Mixed - White and Asian	11.1		1.7		1.6	
Chinese	26.8		3.4		3.5	
Irish	6.3		1.5		1.1	
Mixed - White and Black African	10.0		1.6		1.2	
Gypsy/Romany	-68.7		-7.6		-7.9	
Irish Travellers	-32.4		-4.5		-3.8	
Any other mixed	6.2		1.1		0.9	
Any other Asian	24.8		3.4		3.2	
Any other Black	10.5		1.4		1.2	
Any other	19.2		2.9		2.5	
Ethnicity missing	-6.9		-0.7		-0.8	
Interacted with ever FSM						
Pakistani	29.3		3.2		3.2	
Indian	30.7		3.1		3.2	
Any other White	25.3		2.9		2.8	
Black African	27.4		2.8		3.0	
Black Caribbean	21.7		2.5		2.5	
Bangladeshi	29.8		3.5		3.4	
Mixed - White and Black Caribbean	13.3		1.3		1.3	
Mixed - White and Asian	8.5		1.2		0.8	
Chinese	40.9		4.4		4.1	
Irish	-11.3		-1.0		-1.2	
Mixed - White and Black African	10.2		1.0		1.3	
Gypsy/Romany	24.2		3.3		3.3	
Irish Travellers	-49.4		-3.4		-4.1	
Any other mixed	7.0		0.8		0.8	
Any other Asian	36.2		3.6		3.8	
Any other Black	17.8		1.6		1.9	
Any other	34.3		3.4		3.8	
Ethnicity missing	4.0		0.2	ns	0.4	

Models 15-19

Dependent variable	DCSF 'best 8' point score for GCSEs (and equivalents)							
Model number	**15**	**16**	**17**		**18**		**19**	
N	53930	53930	53930		53929		53929	
R square	0.167	0.184	0.185		0.188		0.189	
Unstandardised Beta Values								
Constant	296.9	307.2	307.3		307.0		307.4	
KS2 average score	5.5	5.3	5.3		5.3		5.3	
Girl	10.7	10.8	10.8		10.8		10.8	
English as an Additional Language	24.3	25.4	25.0		10.4		9.7	
Age	-0.8	-0.8	-0.8		-0.7		-0.7	
IDACI 2006	-63.3	-42.4	-42.7		-44.5		-44.0	
FSM 2006								
FSM previously								
Ever FSM	-27.3	-24.9	-21.1		-25.1		-28.6	
School average prior Attainment								
School spread of ability								
School FSM percent								
Deciles of school Deprivation								
2		-4.3	-4.0		-4.0		-4.0	
3		-8.1	-7.7		-7.6		-7.6	
4		-11.1	-10.9		-10.6		-10.6	
5		-12.1	-11.8		-11.6		-11.5	
6		-13.4	-13.2		-13.0		-13.0	
7		-16.1	-15.6		-15.8		-15.7	
8		-22.2	-21.9		-21.8		-21.8	
9		-22.5	-23.7		-22.0		-22.0	
10		-22.1	-25.1		-22.0		-22.9	
Deciles of school deprivation interacted with FSM								
2			-10.5					
3			-12.1					
4			-6.5	ns				
5			-7.8	ns				
6			-5.5	ns				
7			-8.5					
8			-5.7	ns				
9			3.3	ns				
10			5.4	ns				
Ethnic groups								
Pakistani					18.6		13.5	
Indian					16.9		15.8	
Any other White					8.6		8.8	
Black African					20.0		17.4	
Black Caribbean					1.9	ns	-2.5	ns

Bangladeshi					21.0		14.5	
Mixed - White and Black Caribbean					-4.2	ns	-7.9	
Mixed - White and Asian					7.7		7.3	
Chinese					22.6		20.8	
Irish					6.6		8.7	
Mixed - White and Black African					6.0	ns	6.7	ns
Gypsy/Romany					34.6	ns	34.4	ns
Irish Travellers					4.7	ns	4.5	ns
Any other mixed					5.6		5.7	
Any other Asian					19.5		17.0	
Any other Black					-1.5	ns	-5.3	ns
Any other					12.8		11.1	
Ethnicity missing					0.0	ns	-1.2	ns
Interacted with ever FSM								
Pakistani							21.6	
Indian							21.4	
Any other White							1.7	ns
Black African							13.7	
Black Caribbean							21.3	
Bangladeshi							16.2	
Mixed - White and Black Caribbean							22.5	
Mixed - White and Asian							7.1	ns
Chinese							26.2	
Irish							-22.0	
Mixed - White and Black African							-1.6	ns
Gypsy/Romany								
Irish Travellers								
Any other mixed							1.9	ns
Any other Asian							25.9	
Any other Black							17.1	ns
Any other							12.1	ns
Ethnicity missing							19.0	

Models 20-21

Dependent variable	Average grade in up to 8 full GCSEs	Average grade in up to 8 qualifications (GCSE equivalencies)
Model number	**20**	**21**
N	53930	53930
R square	0.215	0.198
Unstandardised Beta values		
Constant	37.9	38.6
KS2 average score	0.7	0.7
Girl	1.4	1.4
English as an Additional Language	3.2	3.1
Age	-0.1	-0.1
IDACI 2006	-5.6	-5.2
FSM 2006		
FSM previously		
Ever FSM	-2.9	-2.8
School average prior attainment		
School spread of ability		
School FSM percent		
Deciles of school deprivation		
2	-0.5	-0.5
3	-1.0	-1.0
4	-1.4	-1.4
5	-1.6	-1.5
6	-1.9	-1.7
7	-2.3	-2.0
8	-3.1	-2.7
9	-3.5	-2.7
10	-3.4	-2.7

Appendix 5 - Note on the FSM and IDACI indicators

Receiving a Free School Meal is of course a crude indicator of deprivation as it identifies only a small group of deprived pupils and fails to differentiate between a very heterogeneous group of pupils who do not receive FSM. Nevertheless, it has been widely used in educational research as an indicator of social class because it is collected for all pupils and because it contributes to the explanatory power of statistical models that seek to explain pupil attainment (e.g. Contextual Value Added (CVA) modelling reference, EiC modelling). An alternative measure of pupil deprivation based on the pupil's home postcode has been developed, the Income Deprivation Affecting Children Index (IDACI), and this measures the proportion of children living in low income households in a given area. This indicator is however an aggregate score for the Super Output Area (SOA) in which a pupil lives and these areas may include a substantial number of children given that SOAs have a minimum population of 1000 (mean 1500)[8] and that more than 20% of the population of England is aged 0-15.[9] Therefore, despite the fact that FSM is a crude measure, it is still of value as it relates to individual pupils and indeed, is included as a predictor variable in the DCSF's CVA modelling along with an IDACI score for each pupil.

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[8] http://www.statistics.gov.uk/geography/soa.asp
[9] http://www.statistics.gov.uk/census2001/profiles/commentaries/people.asp