How useful is household income as a factor in explaining attainment at school in England? Assessing the Parent Pupil Matched Data (PPMD)

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Contents Page No.

Summary

This is a report on the first use of the Pupil Parent Matched Dataset (PPMD) linking household income to the National Pupil Database. Having access to this is very valuable for research, and this report only makes a start in looking at what is possible. The report shows that none of the versions of income available in PPMD (benefits, earned, total and equivalised) is yet completely suitable for substantive analysis. In the linked files, pupils are missing, often in large numbers where adults' income are not linked, or family structures or second adult incomes are not known. An improved PMMD would be very helpful. It would make the substantive and comparative analyses in this report even clearer and safer. The various versions of income in PPMD are compared, and described in terms of available pupil characteristics. Earned income is deemed the most appropriate to use when considering low incomes and those on benefits. Once benefits, and other forms of unearned income, are added to the total household income, it is less clear who is on low or zero income before benefits (the target of the Pupil Premium policy).

Free school meal eligibility is a better predictor of attainment than raw income is, perhaps because the FSM records are more complete. This may also be due to limitations of the income data (see below). However, there is a strong linear (and visual) relationship between income, represented in 20 equal bands, and attainment at school (Key Stages 2 and 4). Thus, income bands appear to be the strongest single predictor of attainment.

Using a time series approach it is shown that, with these data, low income pupils have become less clustered in schools since the introduction of Pupil Premium funding in 2011. At KS4, low income pupils have also improved their attainment relative to high income pupils. Both of these outcomes might be the result of Pupil Premium policy, but re probably a little too early. At KS2, low income pupils improved their attainment, but not so clearly relative to high income pupils. To a great extent, the substantive results confirm our earlier analyses based on pupils with long-term disadvantage (but with clear differences between Key Stages).

It would be interesting to run these kinds of analysis again if a completer and more accurate version of PPMD could be developed. There is also further work to be done on variations by region and school type, and also further development of the number and type of income bands. Given pupils' long-term FSM status it would be useful to compare income with indicators of permanent disadvantage.

Introduction to PPMD

This work is based on analysis of the Pupil Parent Matched Dataset (PPMD) of household income in England, linked to the National Pupil Database (NPD), including the Pupil Level Annual School Census (PLASC), from 2008 to 2022. Data from children and young people aged 2 to 19 was transferred from DfE to DWP for matching via personal characteristics taken from the NPD/PLASC. This is the first time that such a dataset has been made available by the DfE for research, and so the project involved considerable preliminary consideration and cleaning. The use of the PPMD dataset is intended to help identify pupils in the education system from low- or modest-income households, perhaps not already captured by the Department's current measures of disadvantage such as free school meal (FSM) eligibility.

We were provided with PPMD files for the KS2 and KS4 cohorts for the years 2008 to 2022. The substantive focus of our study is on the changing relationship between income and attainment, Attainment in standardised tests, such as KS2 and KS4, were disrupted by the Covid lockdowns from 2020 onwards. Therefore, our analyses focus on PPMD up to 2019.

The report has a methods section that also describes some of the limitations of PPMD as encountered in the analysis. There are descriptive results and correlations looking at income for different kinds of pupils. The substantive sections concern the link between income/disadvantage and attainment, and the extent to which poorer pupils are clustered in, or segregated between, schools. In England in 2011, the Pupil Premium policy came into effect. This provided schools with "additional" funding in proportion to the number of disadvantaged pupils in the school. One aim of the policy was to increase the attractiveness of disadvantaged students during the allocation of school places, so providing an incentive that could reduce segregation of students between schools in term of poverty. The policy also intended that the additional money be used for programmes and interventions to improve the attainment of disadvantaged pupils. So, in addition to changes in segregation, our analyses also look at changes over time in the link between poverty and attainment, to see if it has reduced.

Access to PPMD is a privilege, because it is the first time that education researchers can work with full census household income data and consider its relationship to progression and attainment at school. Previous work in this area (in England) has had to rely on relatively small samples and cohort studies. These cohort studies, like Next Steps or the Millenium Cohort, suffer greatly in comparison to PPMD in two ways. They are much smaller (of the order of 12,000 cases in total, compared to 600,000 per age cohort for PPMD), and they lose cases over time with each successive wave. Losing cases does not just reduce the number further, it introduces a heavy bias. The missing cases tend to be disproportionately those with lower or no income at the outset (e.g. Siddiqui et al. 2019).

This matters because social scientists in education have long debated whether income (if available) would be a better predictor of attainment at school than indicators of disadvantage that are available, such as the binary threshold of eligibility for free school meals (Taylor 2018). The tentative conclusion is that, despite its obvious limitations, FSM-eligibility is more strongly related to attainment at school (Jerrim 2023), and to progression to higher education (Gorard et al. 2019) than income is. But the doubt remains. Is FSM preferrable simply because it is more complete than the income data in these cohort studies (usually linked to the complete National Pupil Database)? For the first time, it is possible to address this question using both measures with population data.

Using the PPMD

Cases

As shown in Table 1, there are around 600,000 cases in each cohort (for Key Stages 2 and 4) in the PPMD. This is approximately the same size as the annual cohorts of pupils in NPD/PLASC. The number of NPD cases linked to household income data is slightly less than the total, except for 2008 when the number of linked cases for KS4 is considerably less (390,000). We therefore ignore this year in subsequent analyses (so the main focus is on 2009 to 2019). In these years, there are about 30,000 NPD cases per year not linked to household income. There are also a few duplicate cases (with the same PMR) in each year at KS2, and rather more at KS4, especially in the earlier years.

Table 1 – Number of linked cases, KS2 and KS4 cohorts, 2008-2019

Year	Income total	Income duplicates	KS2 total	KS2 duplicates	KS2 linked cases	KS4 total	KS4 duplicates	KS4 linked cases
2008	11,699,792	469,892	597,181	11	575,079	671,608	2,040	391,977
2009	12,520,842	571,517	580,022	0	562,911	644,425	1,958	602,548
2010	13,164,763	654,053	571,326	12	557,374	649,859	1,449	611,839
2011	13,456,804	618,445	554,884	2	543,303	636,875	722	607,384
2012	13,523,478	573,052	544,219	1	533,468	631,045	628	604,559
2013	13,534,957	567,094	594,194	0	529,524	642,606	533	618,438
2014	13,482,921	521,606	561,540	1	550,406	628,125	534	606,421
2015	13,467,275	479,983	579,261	0	566,513	621,987	532	601,404
2016	13,425,872	441,540	592,270	0	578,668	609,151	486	588,134
2017	13,199,693	397,044	604,570	3	589,384	592,534	349	572,459
2018	12,663,160	347,759	624,148	3	607,432	588,493	406	567,758
2019	12,073,241	306,408	649,245	0	631,261	609,682	325	588,416

We deleted all cases that have an NPD/Census record but no matched income data in PPMD files, and the larger number of cases with any income data and no matched NPD/Census data. We removed the small number of duplicate cases. In each subsequent analysis we have tried to use all remaining cases, as far as possible. However, the totals in Table 1 represent the number of any records, and so the maximum number of cases possible for any measure of income. As soon as any restriction is placed on cases, such as that they have complete information about family structure, the number of cases drops.

Variables

Pupil background

As a measure of poverty, PPMD only has current eligibility for FSM, or eligibility at any time in the last 6 years (EverFSM6), which is the major criterion for Pupil Premium funding. Long-term data on individual FSM eligibility would be preferable to identify pupils who are permanently disadvantaged (Gorard et al. 2022). PPMD also has a flag variable representing whether a pupil has been living in care over the prior 12 months (or while in the current school in earlier years of data).

PPMD also has IDACI scores, which are area measures of deprivation and poverty and so not very suitable for individual analyses. Also available are other potential indicators of disadvantage such as English as an Additional Language (EAL), learning challenges such as Education, Health and Care (EHC) or special educational need (SEN), and ethnicity, as well as the sex of the pupil. All are considered in relation to income below.

Where variables have missing values, we have retained missing as an analytical category. For some variables, such as FSM, we have tried replacing missing values with not (known to be) eligible. The variable thus becomes - known to be FSM-eligible or not.

Attainment

The simplest measures of attainment are those based on overall point scores (and equivalents). At KS4, these have remained quite similar over time, expressed either as Attainment 8 scores, or Capped (at 8) total point scores. At KS2, the range of scores, and the way in which they are aggregated, has varied more over time. There was a change in scoring in 2013 and again in 2016. These will tend to confuse the analyses for KS2. Where necessary we have created overall KS2 point scores from separate literacy and numeracy scores. All attainment scores are converted to standardised z-scores, with a mean of 0, based on the range of scores for that cohort and year. This is to aid comparison over time.

Income

PPMD contains several variables relating to household income, but none of these is entirely satisfactory at present for our purposes. All income related variables have a relatively high percentage of missing values. The information about benefits only applies to a subset of cases, and the benefit amounts and policies have changed considerably over the period of interest (2009-2019). There is a total income figure for adult 1, and for an adult 2 if they exist and can be linked to the household of an adult 1. And there is also earned income from employment for adult 1, and again for adult 2 if they are linked. Total income is the sum of benefits, earned income, and any other known income. Finally, there is an equivalised income figure based on total income, which takes into account the family structure such as number of adults and number of children (by age), where known. Equivalised income is only available where the family structure is known, and if there is a second adult where the income for that adult is also known. The reason for these missing values is not known, but it would appear that more is portrayed in PPMD about households who have claimed benefits.

We linked adults 1 and 2 where possible, and created new variables representing the total household income, and the total earned income, for all pupils. Due to missing values, a substantial proportion of cases have no available value for income for adult 2 (and a few have no value for adult 1). So, we also created a version of each variable in which any missing income for adult 2 is treated as zero. This heuristic allows us to use income for all cases linked to NPD, in some analyses. This is likely to underestimate household incomes for some cases, but is addressed to some extent by how we handled cases (see below). Running some of the analyses with all available versions of income allows us to compare the results, with each other over time, and with attainment and pupil background variables.

Tables 2 and 3 show not only that a considerable number of cases have an unknown family structure and so do not have an equivalised income, but also that the proportion with an equivalised income drops considerably over time. It is not possible to explain why, using these data. In 2017, well over half of the KS4 cases had an unknown figure. Like the changes to assessment at KS2, this variation over time makes a time-series analysis with this version of income figures complicated. Any apparent substantive change in income over time (in relation to other variables such as background and attainment) might be due solely to the changing proportion of cases used in the analysis. This is because the missing values create a potential for bias (Gorard 2020).

Table 2 – Missing equivalised income KS2 2009-2019

	Cases with earned income (missing as zero)	Cases with equivalised income	% missing
2009	562.764	451,660	19.7
2010	557,202	446,540	19.9
2011	563,065	388,409	28.5
2012	533,029	327,358	38.6
2013	526,471	320,256	39.2
2014	547,512	327,552	40.2
2015	561,543	330,765	41.1
2016	573,380	330,556	42.3
2017	584,389	329,685	43.6

2018	602,650	328,223	45.4
2019	626,567	335,866	46.4

Table 3 – Missing equivalised income KS4 2009-2019

	Cases with earned income, missing as zero	Cases with equivalised income	% missing equivalised income
2009	601,842	453,373	24.7
2010	611,174	458,328	25.0
2011	606,467	407,256	32.8
2012	603,089	325,512	46.0
2013	614,038	330.515	46.2
2014	601,580	319,152	47.0
2015	594,001	310,758	47.7
2016	580,497	281,440	51.5
2017	565,318	269,919	52.3
2018	560,477	275,310	50.9
2019	585,734	322,419	45.0

Our analyses are not focused on the number of children in a family, since this does not directly influence whether any one child is eligible for FSM or Pupil Premium funding (although it might affect any threshold income, where applicable). However, we are concerned about whether a second adult is identified for each child, because if there is a second but unidentified adult then the household income could be underestimated. Therefore, in most analyses we also use a robust version including only those cases known to have a single adult in their household or for whom there is a record of a second adult with a known income (even if that was zero).

Table 4 summarises some of the advantages and disadvantages of the different available income measures (discussed further below). We do not propose using benefits payments because these only apply to a minority of cases, and permit no comparison with cases not on benefits. We do not propose using equivalised income (adjusted for family structure) because this is not really/directly relevant to whether a household receives benefits or not, and as noted above the proportion of cases available varies considerably by year.

Table 4 – A range of income measures

	Advantages	Disadvantages
Benefit payments	Probably most secure and complete data in PPMD	Allows no comparison with earned and other income
Earned income, household	Most relevant to benefits	Many family links missing
Earned income, household, missing as 0	Retains all cases, strongest link to attainment	Questionable assumption about missing values
Total income, household	-	Many family links missing
Total income, household, missing as 0	Retains all cases	Questionable assumption about missing values
Equivalised income, household	Secure, as only cases with known family structure	Many family links missing, not really relevant, weakest link to attainment

Total income has the greatest coverage. If missing or unknown income is treated as zero, then it has full coverage. It is therefore used in some analyses. Earned income is only available for some households, but is the most relevant to the allocation of benefits. If missing or unknown earned income is treated as zero, then it also has relatively full coverage. In order to combine total or earned incomes for

households, it is key to have information about family structure – most notably the link between adults 1 and 2. Some individuals are listed as coming from a known one-parent family. Some cases with adult 1 income not from a one-parent family also have an adult 2 income. Others appear to be not one-parent families but with only one adult with known income. Therefore, the main disadvantage of using all cases is that it involves assuming that where no adult 2 is linked then there is no adult 2 or that adult 2 has no income. And where adult 2 is linked but the income is not known then that is treated as zero income. Again, this is likely to underestimate the income for a subset of families.

The income data contains some extreme values, such as negative or positive tens of millions pounds per year. Our substantive analyses are concerned with comparing those eligible for free school meals (from families living in official poverty) to those not eligible, over time. So, we conducted some analyses with the full income range, but also tried out some more restricted ranges. For some descriptive analyses, we settled on a range of 0 to £200,000 annual earned income per household. Earned income is the most relevant version for the allocation of benefits (and so a link to Pupil Premium). The £200,000 figure is well above an income that would be likely to attract benefits, and so it allows a comparison between pupils from households on benefits and those with a relatively normal but wide range of earned income above the benefits threshold.

Analyses

The first stage of analysis is descriptive, using both total and earned incomes, for all cases, then those with incomes between 0 and £200,000, and finally those with incomes between 0 and £200,000 and a known family structure. We look at incomes over time, and in a comparison between groups in terms of pupil background (such as FSM eligibility, or ethnicity). In each result, we specify the type of income, and the range of cases used.

We ran correlations between income types, and between earned income, other numeric measures such as IDACI, the binary dummy variable of FSM or not, and attainment at KS2 and KS4. We ran simple regression models to predict/explain attainment using prior attainment, FSM-eligibility, and income. We also ran fuller regression models for 2019 to predict attainment at KS4 using prior attainment, income bands, raw income scores (earned, total, and equivalised), and FSM-eligibility, as predictors. The predictors were presented as one batch using forward entry, so that the strongest predictor was used first, followed by the second strongest after controlling for the first, and so on. This stage aims to assesses whether income is a better predictor of attainment than simple FSM-eligibility.

The main substantive work examines changes in the link between income distribution and standardised attainment over time. For this next phase, we needed more precisely comparable data across years. Therefore, we used only cases with known earned income excluding negative values. We sorted cases by income, and reduced the number of cases in all years to the number in the smallest year, by removing cases at the high-income end. The incomes for 2009 were then converted into 20 equal size bands. Each band in KS2 has more than 16,000 cases, and the income bands start with a range of 0 to £1,961 (the second being £1,962 to £4,246). Each band in KS4 has near 19,000 cases, and the income bands start with a range of 0 to £2,559 (the second being £2,560 to £5,015).

We tried other types and numbers of bands, and this is the clearest, with lower bands with around the same income range across all years. Having created equal size income bands for all years, we used the first year (2009) as a base to set the maximum income for each band, and then adjusted the maximum for each band for years 2010 to 2019 using annual inflation figures from ONS (2024). This was done for each KS2 and KS4 cohort. This means that each of the lower bands in each year and cohort has as close to the same income range (adjusted for inflation) and the same number of cases as possible. We also created bands that were equal in numbers across all years, by allowing the income range for each band to vary.

We plotted the income for each band in each year. There is a good linear relationship, that has attainment ascending with income bands. In order to assess any impact from Pupil Premium funding we focus on

changes to the attainment/income relationship for the lower bands. The lower earned-income bands will be those disproportionately relevant to Pupil Premium (based on FSM-eligibility or otherwise). The higher bands form a kind of control group, presumably less affected by Pupil Premium.

This analysis of the impact of Pupil Premium cannot be a clean regression discontinuity analysis, comparing the linear relationship between income and attainment, for years before and after the introduction of Pupil Premium funding in 2011. FSM-eligibility is not only based on a specific income level, and so some households with low earned income may not claim or otherwise be eligible for FSM and *vice versa*. This would make any discontinuity fuzzy or dampened. Schools are also free to use the Pupil Premium funding for a wider range of pupils, as long as the focus is on those with disadvantage. Both of these factors will tend to dampen or reduce any effect size based on comparing results for FSM and non-FSM pupils. When looking at changes over time, we focus on the lower income bands. Band 4 goes up to £7,999 in 2009, which is similar to the amount of £7,400 (after tax, excluding benefits) which is the income threshold for FSM-eligibility for a single person (among other criteria). Band 6 goes up to £11,460 in 2009, which is well below the gross income figure for FSM eligibility of £16,190. If Pupil Premium funding made a difference to low attainers, it is in these lower income bands that the change should show up (compared to the higher income bands from 11 to 20).

The level of segregation by poverty between schools is assessed using three measures, Bands 1 to 2, Bands 1 to 4, and Bands 1 to 6. For each school, the segregation residual is the absolute difference between the national proportion of pupils in Bands 1 to 2 etc. for that year, minus the proportion of pupils in Bands 1 to 2 etc. in that school. The national segregation figure is the sum of the school residuals, divided by two. For more on this segregation index, see (Gorard 2018).

Descriptive analyses

Throughout the results sections, the findings are presented for the data that appears in the version of PPMD provided. As with any analyses, if the initial data are wrong then the results will be incorrect. Results can only be reported for the dataset provided.

Number of cases KS2

Tables 5 to 7 shows the number of cases in the KS2 cohort, and the mean and standard deviation for earned income in each year, and for total household income. In turn, these are for all cases (Table 5), those with incomes between 0 and £200,000 (Table 6), and Table 7 shows those with incomes between 0 and £200,000 and a known family structure (single parent or linked adult2). The restricted income range does not reduce the number of cases very much; it simply eliminates extreme incomes. But the number of households with a known family structure decreases markedly over time (Table 7). This is a problem limiting some kinds of analysis (see above).

Table 5 – Number of cases with mean household income, all cases, KS2, 2009-2019

	Earned income N	Earned income mean	Earned income standard deviation	Total income N	Total income mean	Total income standard deviation
2009	327,283	24,155	24,041	562,757	25,487	20,143
2010	339,353	24,459	25,874	557,202	27,328	21,288
2011	391,431	20,670	25,353	543,053	17,677	20,868
2012	373,071	17,591	17,987	533,029	22,961	16,377
2013	337,630	17,868	18,303	526,471	23,844	16,385
2014	358,926	18,560	19,413	547,512	24,921	17,727
2015	377,055	19,286	22,384	561,543	25,723	20,293
2016	390,011	19,713	27,163	573,380	26,037	23,720
2017	403,504	20,452	22,858	584,389	26,528	20,129
2018	421,468	21,532	25,474	602,650	27,233	22,250
2019	441,647	22,322	27,053	626,567	27,738	23,498

Table 6 – Number of cases with mean household income, 0 to £200,000, KS2, 2009-2019

	Earned income N	Earned income mean	Earned income standard deviation	Total income N	Total income mean	Total income standard deviation
2009	327,035	23,900	18,734	562,509	25,336	16,350
2010	339,155	24,265	19,065	557,004	27,209	16,332
2011	391,105	20,453	16,512	542,727	17,519	12,955
2012	372,831	17,427	15,076	532,789	22,847	14,191
2013	337,344	17,649	15,532	526,185	23,705	14,476
2014	358,574	18,273	16,083	547,160	24,735	15,441
2015	376,646	18,936	16,577	561,134	25,492	16,205
2016	389,540	19,326	16,959	572,909	25,778	16,103
2017	402,928	20,037	17,496	583,813	26,246	16,087
2018	420,718	20,983	18,377	601,900	26,856	16,769
2019	440,785	21,709	19,097	625,705	27,313	17,250

Table 7 – Number of cases with mean household income, 0 to £200,000 and known family structure, KS2, 2009-2019

	Earned income N	Earned income mean	Earned income standard deviation	Total income N	Total income mean	Total income standard deviation
2009	247,069	24,313	17,766	447,985	27,151	14,420
2010	254,585	24,611	18,050	442,041	29,174	14,186
2011	265,762	19,837	14,664	384,168	16,637	8,745
2012	205,689	15,172	11,424	323,330	25,712	9,920
2013	164,142	14,564	10,886	315,855	26,372	9,502
2014	172,716	14,751	10,928	323,241	27,428	10,079
2015	178,754	14,999	10,988	326,697	28,018	9,837
2016	180,280	14,932	10,746	326,290	28,106	11,268
2017	182,667	15,160	10,825	325,757	28,287	9,958
2018	183,920	15,514	11,088	325,399	28,591	10,122
2019	184,081	15,638	11,220	324,801	28,713	10,630

Correlations between income measures at KS2

When considered using all available cases, or only those with a restricted income between 0 and £200,000 and a known family structure, earned income is very strongly linked to earned income (with missing as zero) and total income for any household (Table 8). The correlation between earned and equivalised income is much lower, especially after 2011. This is presumably partly related to the reduced proportion of cases with equivalised incomes (see above).

Table 8 – Correlation between earned income and other income measures, KS2, all cases

	Earned income (missing as zero)	Total income	Equivalised income
2009	1.00	0.97	0.88
2010	1.00	0.97	0.93
2011	1.00	0.83	0.80
2012	0.93	0.90	0.66
2013	1.00	0.91	0.61
2014	1.00	0.90	0.57
2015	1.00	0.92	0.56
2016	1.00	0.95	0.54
2017	1.00	0.93	0.55
2018	1.00	0.94	0.58
2019	1.00	0.95	0.56

For families with incomes between 0 and £200,000 the link between earned income and total income is lower than it is for all cases, reducing over time to 0.67 (Table 9). This may be because, for the (relatively) lower earners, benefits historically start to make up more of the total.

Table 9 – Correlation between earned income and other income measures, KS2, 0-£200k, known family structure

	Earned income (missing as zero)	Total income	Equivalised income
2009	1.00	0.95	0.87
2010	1.00	0.93	0.86
2011	1.00	0.85	0.80
2012	1.00	0.77	0.66
2013	1.00	0.72	0.61
2014	1.00	0.85	0.56
2015	1.00	0.68	0.57
2016	1.00	0.66	0.55
2017	1.00	0.67	0.56
2018	1.00	0.68	0.57
2019	1.00	0.67	0.57

Number of cases KS4

Tables 10 to 12 shows the number of cases in the KS4 cohort, and the mean and standard deviation, for earned income in each year, and for total household income. These are for all cases (Table 10), those with incomes between 0 and £200,000 (Table 11), and Table 12 reports those with incomes between 0 and £200,000 and a known family structure (single parent or linked adult2). As with KS2, the income range does not reduce the number of cases very much; it simply eliminates extreme incomes. But the number of households with a known family structure decreases markedly over time.

Table 10 – Number of cases with mean household income, all cases, KS4, 2009-2019

	Earned income N	Earned income mean	Earned income standard deviation	Total income N	Total income mean	Total income standard deviation
2009	377,210	24,774	30,272	601,842	25,018	25,618
2010	447,812	24,715	49,576	611,174	26,690	42,859
2011	449,688	21,848	28,241	606,467	25,015	24,923.
2012	399,059	18,854	24,285	603,089	22,077	21,022.
2013	417,647	18,938	28,410	614,038	22,947	25,115
2014	413,331	19,412	33,674	601,680	23,707	31,013
2015	447,903	19,619	28,846	594,001	24,537	26,912
2016	437,740	20,075	38,741	580,497	24,826	34,853
2017	398,476	21,094	37,191	565,318	24,701	32,595
2018	396,353	22,069	39,830	560,477	26,104	35,601
2019	356,475	18,755	36,562	585,734	22,227	29,668

Table 11 – Number of cases with mean household income, 0 to £200,000, KS4, 2009-2019

	Earned income N	Earned income mean	Earned income standard deviation	Total income N	Total income mean	Total income standard deviation
2009	376,841	24,338	18,546	601,473	24,743	17,214
2010	447,404	24,316	18,505	610,766	26,398	16,932
2011	449,266	21,438	16,965	606,045	24,711	15,583
2012	398,556	18,415	15,706	602,586	21,787	14,668
2013	417,078	18,390	15,801	613,469	22,577	15,912
2014	412,656	18,703	16,057	601,005	23,223	19,050
2015	447,175	18,955	16,011	593,273	24,041	17,128
2016	436,993	19,338	16,401	579,750	24,272	16,856
2017	397,587	20,150	17,209	564,429	24,038	17,218
2018	395,371	21,026	18,010	559,495	25,361	17,452
2019	355,837	17,992	17,194	585,096	21,764	15,891

Table 12 – Number of cases with mean household income, 0 to £200,000 and known family structure, KS4, 2009-2019

	Earned income N	Earned income mean	Earned income standard deviation	Total income N	Total income mean	Total income standard deviation
2009	270,271	24,660	17,329	451,629	26,694	15,258
2010	331,757	24,419	17,275	456,175	28,536	14,475
2011	289,049	20,631	14,865	404,895	26,872	12,086
2012	172,981	14,574	10,227	323,123	23,975	9,712
2013	180,207	14,196	9,904	327,744	24,473	9,542
2014	172,009	14,410	10,008	307,632	25,325	15,473
2015	207,168	14,885	10,126	307,961	26,097	9,834
2016	197,034	14,888	9,931	294,494	26,181	9,925
2017	159,009	14,939	10,046	281,681	25,116	9,909
2018	153,521	15,362	10,358	272,879	26,950	10,092
2019	149,812	14,906	12,253	301,177	24,959	10,638

Correlations between income measures at KS4

Earned income, earned income (missing as zero), and total income measures are strongly related for most years (Tables 13, 14). However, the relationship between earned (and total) income and equivalised income varies considerably, but generally declines over time. This is largely due to a drop in the proportion of cases with the known family structure needed to compute equivalised income (see above). This is what the dataset shows, but the reason is unknown. Ideally, all cases would have a known family structure. There is considerable volatility in the link between earned and total income in later years that might repay further investigation.

Table 13 – Correlation between earned income and other income measures, KS4, all cases

	Earned income (missing as zero)	Total income	Equivalised income
2009	1.00	0.98	0.88
2010	0.99	0.99	0.92
2011	0.97	0.97	0.83
2012	1.00	0.96	0.70
2013	1.00	0.96	0.63
2014	1.00	0.96	0.53
2015	0.99	0.94	0.51
2016	0.99	0.97	0.56
2017	1.00	0.06	0.01
2018	1.00	0.96	0.58
2019	1.00	0.98	0.65

Table 14 – Correlation between earned income and other income measures, KS4, 0-£200k, known family structure

	Earned income (missing as zero)	Total income	Equivalised income
2009	1.00	0.95	0.88
2010	0.86	0.92	0.86
2011	0.86	0.87	0.83
2012	1.00	0.75	0.66
2013	1.00	0.70	0.62
2014	1.00	0.67	0.61
2015	0.77	0.64	0.59
2016	0.76	0.62	0.57
2017	1.00	0.01	0.01
2018	1.00	0.64	0.58
2019	1.00	0.79	0.71

Mean income by pupil characteristics at KS2

The report now turns to an examination of differences in mean income for pupils with varying background characteristics at KS2. As might be expected, there is no substantial difference between the household incomes of pupils in terms of their sex.

There is considerable variation in earned income by the ethnic origin of pupils over time. In general, White pupils have a slightly higher average income at KS2 (Table 15) but Mixed and Asian pupils have caught up considerably by 2019. Black, Chinese, and Other pupils have slightly lower incomes. Despite inflation, according to these data, the mean income for all groups except Mixed have declined somewhat since 2019.

Table 15 – Earned income mean by ethnic category, all cases, KS2, 2009-2019

	Any other	Asian	Black	Chinese	Mixed	White
2009	22,935	23,020	22,261	21,456	22,764	24,175
2010	24,144	23,894	22,154	20,506	22,977	24,558
2011	18,891	18,537	19,703	17,082	20,696	20,767
2012	17,785	16,654	18,108	16,275	18,902	17,453
2013	18,364	18,565	17,700	16,192	18,844	17,619
2014	17,978	19,048	17,374	17,584	19,396	18,407
2015	18,508	19,627	17,636	18,250	19,852	19,142
2016	18,702	20,036	17,902	17,383	20,233	19,633
2017	19,002	20,646	18,839	18,317	21,190	20,430
2018	19,543	21,466	19,745	19,115	22,457	21,564
2019	19,975	22,158	20,250	20,207	23,017	22,421

The situation for those earning 0 to £200,000 is similar, but the differences between ethnic groups are smaller (Table 16).

Table 16 – Earned income mean by ethnic category, incomes 0-£200k, KS2, 2009-2019

	Any other	Asian	Black	Chinese	Mixed	White
2009	22,849	22,793	22,219	21,456	22,637	24,014
2010	23,909	23,762	22,142	20,506	22,714	24,415
2011	18,616	18,523	19,692	16,764	20,431	20,623
2012	18,013	18,431	19,873	15,715	19,374	17,771
2013	17,779	18,478	17,692	15,952	18,728	17,415
2014	17,479	18,971	17,316	16,827	19,076	18,146
2015	18,375	19,393	17,631	17,643	19,518	18,861
2016	18,508	19,811	17,906	17,383	19,882	19,284
2017	18,743	20,416	18,789	17,962	20,789	20,006
2018	19,301	21,188	19,689	18,962	21,785	20,987
2019	19,485	21,804	20,198	20,016	22,501	21,764

There is little difference in income between the main EAL language groups (Table 17). Again, there is a general decline in income over time, based on these PPMD data. The lowest mean incomes are for the group whose first language is not English. This could include Chinese origin pupils, for example.

Table 17 – Earned income mean by EAL category, all cases, KS2, 2009-2019

	Not known, believed to be English	English	Not known, believed to be not English	Not English
2009	24,570	24,164	24,127	21,795
2010	24,803	24,574	23,079	22,080
2011	20,619	20,885	20,020	17,987
2012	18,677	17,635	17,240	16,410
2013	18,191	17,765	17,395	17,575
2014	19,129	18,541	19,177	17,737
2015	19,727	19,236	19,443	18,380
2016	21,030	19,725	18,563	18,733
2017	20,349	20,601	20,577	19,202
2018	22,651	21,743	21,302	20,078
2019	22,086	22,627	23,168	20,560

The relatively small “not known” categories are defined by DfE, and presumably represent the best guesses made when schools are asked to complete the Pupil Census.

The picture is very similar for those earning up to £200,000 (Table 18).

Table 18 – Earned income mean by EAL category, incomes 0-£200k, KS2, 2009-2019

	Not known, believed to be English	English	Not known, believed to be not English	Not English
2009	24,570	24,019	22,462	21,493
2010	24,803	24,438	23,079	21,867
2011	20,392	20,749	20,020	17,772
2012	18,460	17,516	17,263	16,277
2013	17,866	17,590	17,395	17,304
2014	18,614	18,300	18,567	17,470
2015	19,727	18,993	19,133	17,974
2016	21,030	19,429	18,563	18,292
2017	19,962	20,203	20,035	18,882
2018	22,651	21,206	21,302	19,639
2019	21,405	22,022	22,441	20,086

It is clear that Service families (with a parent or carer in the armed forces) have higher than average income, those with no SEN classification have approximately average income, and FSM-eligible children naturally tend to come from homes with very low incomes (Table 19). The classification for SEND changed considerably for the years 2016 onwards, so here we use the figures for those without any SEND classification in any year (the majority).

Table 19 – Earned income mean by pupil characteristics, all cases, KS2, 2009-2019

	Service child	FSM	No SEN classification	Overall
2009	32,961	6,435	24,779	24,155
2010	33,154	6,943	25,165	24,459
2011	24,539	7,543	21,167	20,670
2012	18,804	7,465	17,909	17,591
2013	17,233	6,815	18,178	17,868
2014	18,527	7,256	18,900	18,560
2015	19,630	7,687	19,543	19,286
2016	20,206	7,844	19,977	19,714
2017	20,606	8,502	20,799	20,452
2018	21,929	8,992	21,944	21,532
2019	23,295	9,851	22,733	22,322

There are between 5,000 and 12,000 cases missing per year

The same pattern appears for incomes restricted to 0 to £200,000 (Table 20).

Table 20 – Earned income mean by pupil characteristics, incomes 0-£200k, KS2, 2009-2019

	Service child	FSM	No SEN classification	Total
2009	32,961	6,361	24,598	23,900
2010	33,020	6,827	25,004	24,265
2011	24,539	7,466	21,005	20,453
2012	23,200	7,257	21,167	20,670
2013	17,169	6,581	17,968	17,649
2014	18,527	7,256	18,629	18,273
2015	19,630	7,391	19,253	18,936
2016	20,206	7,516	19,633	19,326
2017	20,557	8,133	20,389	20,037
2018	21,876	8,560	21,371	20,983
2019	23,200	8,344	22,132	21,709

Mean income by pupil characteristics at KS4

At KS4, mean incomes also appear to go down over time (Table 21). As at KS2, White students have the highest average income, and Chinese students the lowest.

Table 21 – Earned income mean by ethnic category, all cases, KS4, 2009-2019

	Any other	Asian	Black	Chinese	Mixed	White
2009	22,427	23,152	23,210	19,140	22,913	24,486
2010	21,354	20,865	22,711	17,940	23,142	24,635
2011	19,516	18,984	21,189	16,436	21,182	21,510
2012	18,168	18,609	19,911	15,715	19,518	17,889
2013	18,974	18,511	19,181	14,843	19,543	17,925
2014	18,251	18,638	19,042	16,613	19,545	18,337
2015	17,117	17,085	18,649	16,825	19,652	18,762
2016	16,975	17,498	18,721	15,650	20,184	19,199
2017	18,564	19,635	19,971	17,705	20,896	19,907
2018	18,773	20,347	20,721	18,038	21,965	20,800
2019	16,903	18,616	16,968	16,762	18,491	17,340

The same is true when restricted incomes are considered (Table 22).

Table 22 – Earned income mean by ethnic category, incomes 0-£200k, KS4, 2009-2019

	Any other	Asian	Black	Chinese	Mixed	White
2009	22,427	23,091	23,198	19,140	22,827	24,364
2010	21,219	20,840	22,689	17,940	23,020	24,541
2011	19,358	18,932	21,189	15,891	20,951	21,421
2012	18,013	18,431	19,873	15,715	19,372	17,771
2013	18,661	18,418	19,133	14,870	19,235	17,798
2014	17,991	18,520	19,018	16,444	19,284	18,139
2015	17,048	16,989	18,627	16,697	19,397	18,604
2016	16,896	17,395	18,692	15,650	19,911	19,011
2017	18,452	19,516	19,853	17,299	20,706	19,621
2018	18,617	20,114	20,373	17,525	21,516	20,519
2019	16,804	18,502	16,939	16,762	18,366	17,206

At KS4, those not having English as a first language come from households with lower incomes (Table 23).

Table 23 – Earned income mean by EAL category, all cases, KS4, 2009-2019

	Not known, believed to be English	English	Not known, believed to be not English	Not English
2009	22,283	24,494	20,786	21,586
2010	24,270	24,645	20,324	19,754
2011	21,282	21,607	17,927	18,309
2012	18,628	18,116	18,494	17,416
2013	19,011	18,136	18,452	17,382
2014	19,301	18,558	17,267	17,184
2015	19,400	18,959	16,459	16,388
2016	19,491	19,394	17,262	16,708
2017	21,245	20,148	18,402	18,253
2018	21,490	21,056	19,911	18,891
2019	18,343	17,634	16,359	16,384

This is similar when considering incomes restricted to 0 to £200,000 (Table 24).

Table 24 – Earned income mean by EAL category, incomes 0-£200k, KS4, 2009-2019

	Not known, believed to be English	English	Not known, believed to be not English	Not English
2009	22,023	24,378	20,810	21,455
2010	24,186	24,554	20,324	19,705
2011	21,145	21,507	17,927	18,219
2012	18,202	18,001	18,165	17,297
2013	19,011	18,014	18,451	17,148
2014	18,997	18,361	17,267	17,088
2015	19,255	18,803	16,323	16,238
2016	19,329	19,210	17,086	16,575
2017	20,693	19,876	18,146	18,063
2018	20,798	20,750	19,595	18,711
2019	18,343	17,500	16,001	16,244

The average income of Service children, as collected in the dataset, has apparently declined rapidly at KS4 (Table 25). It started way above the overall average, and is now actually below it. Pupils with no SEN classification have incomes in line with the national average, but again FSM-eligible have much lower incomes (as would be expected).

Table 25 – Earned income mean by pupil characteristics, all cases, KS4, 2009-2019

	Service child	FSM	No SEN classification	Overall
2009	31,835	8,241	25,108	24,774
2010	31,401	8,883	25,158	24,715
2011	22,870	8,530	21,989	21,848
2012	18,020	7,791	18,483	18,854
2013	18,233	7,816	18,452	18,938
2014	17,986	8,035	18,809	19,412
2015	19,138	8,896	18,951	19,619
2016	20,182	9,258	19,341	20,075
2017	20,485	9,465	20,196	21,094
2018	21,097	9,992	21,066	22,069
2019	18,402	8,666	17,722	18,755

The same pattern is seen for cases with a restricted income range.

Table 26 – Earned income mean by pupil characteristics, incomes 0-£200k, KS4, 2009-2019

	Service child	FSM	No SEN classification	Overall
2009	31,857	7,910	24,983	24,338
2010	31,424	8,568	25,055	24,316
2011	22,870	8,210	21,879	21,438
2012	18,020	7,175	18,350	18,415
2013	18,233	7,174	18,318	18,390
2014	17,986	7,557	18,610	18,703
2015	19,138	8,260	18,790	18,955
2016	20,087	8,696	19,150	19,338
2017	20,423	8,718	19,914	20,150
2018	21,097	9,249	20,755	21,026
2019	18,402	8,346	17,583	17,992

Income bands

This section looks at the 20 income bands we created to be as similar as possible over time, in terms of number of cases and highest income per band. We allowed the highest income per band to rise in line with inflation over time.

Number of cases per band

At KS2 and KS4, all of the bands are equal in numbers (as far as possible given ties in income levels) in 2009 (Tables 27, 28). Over time, keeping the same maximum income per band but adjusting upwards for inflation, the number of cases in the lower bands still grow. By 2019 the bands are still equivalent to those in 2009 in terms of income but are considerably more unbalanced in terms of numbers. We assessed the importance of this by also running analyses with bands of equal size by allowing the maximum income per band to drop. The substantive results were very similar (see below). Therefore, we believe that any outcomes reported are not solely due to changes in the banding over time, either by size or maximum income.

Table 27 - KS2 Counts per income band

Band	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
1	16,359	20,469	26,920	30,276	27,909	27,272	26,312	25,850	24,812	25,115	26,264
2	16,366	21,500	29,514	31,069	29,761	31,533	31,873	27,946	26,945	26,412	27,426
3	16,512	20,648	23,621	24,400	23,120	23,839	24,480	26,861	26,470	26,464	27,222
4	16,194	18,688	29,262	37,873	33,435	35,071	36,288	38,230	38,487	38,448	39,602
5	16,357	17,293	22,402	27,210	27,284	31,337	33,783	34,893	36,461	38,675	37,669
6	16,360	16,617	20,268	23,699	22,236	24,305	25,835	27,738	29,135	30,987	35,062
7	16,361	15,231	19,921	22,576	20,608	21,847	23,472	24,766	25,682	27,378	28,612
8	16,356	14,694	21,100	23,705	20,598	22,030	23,082	24,403	25,613	27,206	28,966
9	16,354	13,826	20,204	21,742	18,812	20,370	21,452	22,276	23,191	24,614	26,381
10	16,357	14,315	20,646	21,628	18,677	19,985	21,235	22,241	23,692	24,635	26,392
11	16,359	15,354	21,919	22,018	18,979	20,370	21,561	22,251	23,190	24,520	25,624
12	16,354	15,874	21,630	20,770	18,037	19,172	20,331	21,022	22,104	23,279	24,349
13	16,359	16,362	21,485	18,579	16,436	17,400	18,682	19,450	20,012	21,401	21,796
14	16,357	16,158	20,014	14,125	12,451	13,129	14,136	14,450	15,419	15,935	16,595
15	16,357	16,668	19,450	10,456	8,714	9,138	9,864	10,460	11,282	12,148	12,321
16	16,357	16,873	17,318	7,274	6,029	6,181	6,709	7,040	7,924	8,645	9,088
17	16,358	17,394	12,960	4,580	4,011	4,299	4,724	5,218	5,900	6,317	6,760
18	16,359	17,845	8,868	3,292	2,782	2,898	3,339	3,713	4,356	4,739	5,103
19	16,355	17,012	5,497	2,362	2,242	2,490	2,741	3,046	3,507	3,972	4,355
20	16,357	16,445	8,333	5,309	5,381	6,124	6,983	7,955	9,079	10,292	11,734

Table 28 - KS4 counts per income band

Band	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
1	18,851	21,629	24,171	24,643	27,248	25,126	26,250	24,424	21,130	20,393	22,235
2	18,858	23,886	28,127	28,618	30,957	31,267	32,480	26,915	23,084	22,028	27,900
3	18,843	25,212	23,760	23,617	25,130	25,204	25,912	26,649	23,347	22,091	23,588
4	18,860	22,014	31,999	36,708	38,983	38,886	43,479	42,700	36,350	34,796	38,707
5	18,844	21,755	25,340	30,063	33,683	36,259	40,077	39,021	35,003	35,460	36,696
6	18,859	22,046	24,973	28,666	30,182	30,848	32,857	32,498	31,035	30,977	30,353
7	18,842	21,895	24,910	27,444	29,345	29,266	32,043	31,830	28,941	28,790	30,198
8	18,852	22,379	27,008	28,531	29,598	29,062	31,915	32,344	29,367	29,960	28,936
9	18,848	22,762	25,660	26,010	27,147	27,030	29,673	29,426	26,705	26,918	26,279
10	18,848	23,154	25,962	24,829	25,791	24,648	28,159	27,813	25,362	25,177	24,670
11	18,855	23,791	26,288	23,950	24,746	24,201	27,461	26,648	23,812	23,894	22,983

12	18,847	23,792	25,905	21,591	22,687	21,589	23,616	23,282	20,973	21,181	21,028
13	18,848	23,397	24,791	19,484	19,636	19,498	20,847	20,360	18,999	18,904	17,593
14	18,850	22,015	23,185	15,095	14,989	14,414	15,471	15,038	14,399	14,396	13,112
15	18,851	22,053	21,811	11,728	10,691	10,145	10,595	10,571	10,568	10,802	9,328
16	18,850	22,104	20,001	8,041	7,583	7,170	7,470	7,494	7,667	7,672	6,104
17	18,850	21,970	15,599	5,378	4,955	4,869	5,171	5,320	5361	5576	4454
18	18,851	21,508	11,027	4,065	3,782	3,483	3,573	3,838	4035	4072	3405
19	18,852	20,259	7,761	3,113	2,878	2,797	2,959	2,994	3245	3493	2727
20	18,847	19,978	11,180	7,235	7,321	7,232	7,538	8,185	8637	9271	7724

Maximum income per band

Tables 29 and 30 show the maximum income per band at KS2 and KS4. The average income per band is shown in the Appendix. All maxima are rounded to the nearest £100, at the request of ONS. The highest income is constrained to be £300,000. Increasing this in line with inflation would not affect the number of cases in lower bands.

Table 29 - KS2 Maximum income per band

Band	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
1	2,000	2,600	2,700	2,800	2,900	3,000	3,000	3,000	3,000	3,100	3,200
2	4,200	5,100	5,300	5,500	5,700	5,800	5,900	5,900	6,000	6,100	6,300
3	5,700	6,500	6,700	7,000	7,200	7,400	7,500	7,500	7,600	7,800	8,000
4	6,900	8,200	8,400	8,800	9,100	9,300	9,400	9,400	9,500	9,800	10,000
5	8,500	9,900	10,300	10,700	11,000	11,300	11,500	11,500	11,600	11,900	12,200
6	10,200	11,700	12,100	12,600	13,000	13,300	13,500	13,500	13,600	14,000	14,300
7	12,000	13,600	14,000	14,700	15,100	15,500	15,700	15,700	15,800	16,200	16,700
8	14,200	15,700	16,200	16,900	17,400	17,900	18,100	18,100	18,300	18,800	19,200
9	16,700	17,900	18,500	19,400	19,900	20,400	20,700	20,700	20,900	21,400	22,000
10	19,600	20,500	21,200	22,100	22,800	23,300	23,700	23,700	23,900	24,500	25,100
11	22,800	23,500	24,300	25,300	26,100	26,700	27,100	27,100	27,300	28,100	28,800
12	26,200	26,700	27,600	28,800	29,600	30,400	30,800	30,800	31,100	31,900	32,700
13	29,600	30,100	31,100	32,500	33,400	34,300	34,800	34,800	35,000	36,000	36,900
14	33,000	33,400	34,500	36,100	37,100	38,000	38,600	38,600	38,900	39,900	40,900
15	36,400	36,800	38,100	39,800	40,900	41,900	42,600	42,600	42,900	44,000	45,100
16	40,000	40,500	41,900	43,800	45,000	46,200	46,800	46,800	47,200	48,400	49,700
17	44,200	44,800	46,300	48,300	49,700	51,000	51,800	51,800	52,100	53,500	54,900
18	49,100	50,000	51,600	53,900	55,500	56,900	57,800	57,800	58,200	59,700	61,200
19	55,900	57,000	58,900	61,500	63,200	64,900	65,900	65,900	66,300	68,100	69,800
20	299,900	297,500	298,000	299,900	300,000	299,900	299,300	299,800	300,000	299,800	300,000

Table 30 - KS4 Maximum income per band

Band	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
1	2,600	2,600	2,700	2,800	2,900	3,000	3,000	3,000	3,000	3,100	3,200
2	5,000	5,100	5,300	5,500	5,700	5,800	5,900	5,900	6,000	6,100	6,300
3	6,400	6,500	6,700	7,000	7,200	7,400	7,500	7,500	7,600	7,800	8,000
4	8,000	8,200	8,400	8,800	9,100	9,300	9,400	9,400	9,500	9,800	10,000
5	9,700	9,900	10,300	10,700	11,000	11,300	11,500	11,500	11,600	11,900	12,200
6	11,500	11,700	12,100	12,600	13,000	13,300	13,500	13,500	13,600	14,000	14,300
7	13,300	13,600	14,000	14,700	15,100	15,500	15,700	15,700	15,800	16,200	16,700
8	15,400	15,700	16,200	16,900	17,400	17,900	18,100	18,100	18,300	18,800	19,200
9	17,600	17,900	18,500	19,400	19,900	20,400	20,700	20,700	20,900	21,400	22,000
10	20,100	20,500	21,200	22,100	22,800	23,300	23,700	23,700	23,900	24,500	25,100
11	23,000	23,500	24,300	25,300	26,100	26,700	27,100	27,100	27,300	28,100	28,800
12	26,100	26,700	27,600	28,800	29,600	30,400	30,800	30,800	31,100	31,900	32,700

13	29,400	30,100	31,100	32,500	33,400	34,300	34,800	34,800	35,000	36,000	36,900
14	32,700	33,400	34,500	36,100	37,100	38,000	38,600	38,600	38,900	39,900	40,900
15	36,000	36,800	38,100	39,800	40,900	41,900	42,600	42,600	42,900	44,000	45,100
16	39,700	40,500	41,900	43,800	45,000	46,200	46,800	46,800	47,200	48,400	49,700
17	43,800	44,800	46,300	48,300	49,700	51,000	51,800	51,800	52,100	53,500	54,900
18	48,900	50,000	51,600	53,900	55,500	56,900	57,800	57,800	58,200	59,700	61,200
19	55,800	57,000	58,900	61,500	63,200	64,900	65,900	65,900	66,300	68,100	69,800
20	300,000	304,400	298,500	298,900	300,000	300,000	300,000	300,000	300,000	300,000	300,000

Free school meals

As would be expected, current FSM-eligible pupils are more likely to be found in low income bands, especially up to band 7, at KS2 and KS4 (Tables 31, 32). Most are in bands 1 and 2. Some otherwise eligible families may not have registered for FSM, despite encouragement by schools and policy-makers. Previous estimates are that there may have been as many as 50,000 cases unregistered (Gorard et al. 2022). The rollout of Universal Credit has probably reversed the situation, at least temporarily, and more families will be allocated FSM automatically. However, there are also a few FSM-eligible cases even up to band 20. Using PPMD data alone, it is not clear why this is. Since FSM is the major criterion for allocating Pupil Premium funding this again suggests that a clean regression discontinuity analysis is not possible. Instead, we will later look at changes in the lower bands relative to the upper bands. There is no clear pattern of change over time in terms of the percentage of FSM-eligible pupils in each band. Empty cells appear where the number of cases was less than 10.

Table 31 – Percentage of cases eligible for FSM, by KS2 income bands, 2009-2019

Income band	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
1	29.3	31.8	33.4	30.2	29.6	30.5	29.3	28.7	28.3	27.4	31.7
2	20.4	19.5	21.8	18.6	20.2	20.4	19.7	19.6	20.2	19.9	25.2
3	9.9	8.2	11.0	10.5	10.2	10.9	11.0	11.3	12.3	11.7	17.2
4	6.1	6.5	6.8	5.7	6.1	6.4	6.4	6.5	6.9	6.5	10.0
5	5.1	4.9	5.9	5.3	4.9	4.6	4.9	4.5	5.1	5.2	7.9
6	3.8	3.9	5.3	4.5	4.3	4.4	4.4	4.4	4.5	4.4	6.1
7	3.1	3.6	4.9	4.1	3.5	3.7	3.6	3.6	4.0	3.8	5.8
8	2.7	3.2	4.0	3.6	2.8	2.9	3.1	3.1	3.2	3.4	5.0
9	2.3	2.8	4.0	3.3	2.5	2.7	2.6	2.6	3.0	2.9	4.4
10	2.1	2.4	3.3	3.0	2.4	2.4	2.3	2.4	-	2.6	3.6
11	1.8	2.3	2.7	2.6	2.1	2.1	2.1	2.0	2.1	2.3	3.2
12	1.5	1.9	2.2	2.0	1.4	1.7	1.6	1.5	1.7	1.8	2.7
13	1.1	1.3	1.7	1.6	1.1	1.4	1.2	1.2	1.4	1.4	2.0
14	1.0	1.1	1.2	1.3	0.9	0.9	1.1	0.8	1.3	1.3	1.7
15	0.6	0.7	1.0	1.0	0.9	1.0	0.9	0.9	1.0	1.0	1.4
16	0.3	0.4	0.6	1.0	0.6	0.6	0.8	0.8	0.9	0.8	1.3
17	0.2	0.3	0.6	0.8	0.6	0.8	0.6	0.5	0.7	0.5	0.9
18	0.2	0.2	0.5	0.8	0.7	0.6	0.6	0.6	0.5	0.4	0.6
19	0.2	0.2	0.5	0.8	-	0.5	0.4	-	0.4	0.4	0.4
20	0.1	0.2	0.3	-	0.3	-	0.2	-	0.2	0.2	0.3

Table 32 - Percentage of cases eligible for FSM, by KS4 income bands, 2009-2019

Income band	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
1	20.9	23.6	24.1	21.2	22.6	24.5	24.0	23.4	21.5	22.6	21.5
2	13.6	15.9	16.5	13.6	15.7	16.3	17.0	16.8	16.4	16.4	15.2
3	6.7	7.2	8.8	7.1	8.3	8.9	10.0	10.6	10.6	10.8	9.6
4	5.2	6.3	5.2	3.9	4.8	5.4	6.3	6.2	5.7	6.1	5.2
5	3.7	4.6	-	3.2	3.8	4.0	4.6	4.5	4.2	4.6	4.0
6	3.2	3.9	4.4	2.6	3.0	3.3	4.2	4.1	3.7	4.0	3.7
6	3.2	3.9	3.9	2.6	3.0	3.3	4.2	4.1	3.7	4.0	3.0
7	2.9	3.5	3.4	2.3	2.5	3.0	3.7	3.4	3.2	3.3	2.7
8	2.5	3.4	3.0	1.9	2.3	2.3	3.2	3.3	2.8	2.8	2.3
9	2.3	2.8	2.7	1.7	1.8	1.9	2.7	2.6	2.4	2.4	2.1
10	1.7	2.2	2.3	1.5	1.6	2.0	2.6	2.6	2.3	2.4	1.7
11	1.6	2.2	2.1	1.3	1.6	1.8	2.1	2.1	1.7	2.1	1.5
12	1.2	1.8	1.6	1.4	1.5	1.4	1.7	1.7	1.7	1.7	1.3
13	1.1	1.5	1.4	1.1	1.2	1.1	1.3	1.6	1.4	1.4	1.1
14	0.7	1.0	1.0	0.9	1.1	1.0	1.1	1.2	1.2	1.2	0.9
15	0.6	0.7	0.8	0.8	0.7	0.8	0.9	1.1	1.1	1.1	0.9
16	0.6	0.6	0.6	0.7	0.8	0.9	0.7	0.7	0.8	1.0	0.7
17	0.3	0.4	0.5	0.7	0.6	0.5	0.7	0.5	0.9	0.7	0.4
18	0.4	0.3	0.4	0.6	0.4	0.6	0.5	0.5	0.3	0.4	-
19	0.3	0.4	0.4	-	-	-	0.4	0.6	0.5	0.6	-
20	0.2	0.3	0.3	0.2	0.2	-	-	0.2	-	0.2	-

Living in care

Although much smaller in number than FSM-eligible pupils, those pupils living in care are also allocated Pupil Premium funding. As with FSM, pupils living in care are disproportionately from low-income "households", especially in bands 1 and 2, at both KS2 and KS4 (Table 33, 34). Especially in the later years, none appear in the higher income bands.

Table 33 - Percentage in care, by KS2 income bands, 2009-2019

Income band	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
1	0.3	0.5	0.3	0.4	0.4	0.7	0.7	0.8	0.9	0.9	0.9
2	0.2	0.3	0.2	0.2	0.2	0.3	0.3	0.4	0.4	0.4	0.5
3	0.2	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.3	0.2
4	0.1	0.2	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.2
5	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.2
6	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.2
7	0.1	0.2	0.1	0.1	0.2	0.1	0.2	0.3	0.2	0.2	0.2
8	0.1	0.2	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.2
9	0.1	0.2	0.1	0.1	0	0.1	0.1	0.1	0.2	0.2	0.2
10	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.1
11	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
12	0.2	0.2		0.1	0.1		0.1		0.1	0.1	0.1
13	0.1	0.1		0.1				0.1		0.1	0.1
14	0.1	0.1	0.1			0.1			0.1	0.1	0.1
15	0.1	0.1		0.1					0.1		
16	0.1	0.1									
17	0.1	0.1									
18	0.1	0.1									

19	0.1	0.1		0.3	0.1		0.1				
20	0.1	0.1									

Table 34 - Percentage in care, by KS4 income bands, 2009-2019

Income band	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
1	0.4	0.5	0.7	0.6	0.6	0.8	0.9	1.1	1.2	1.3	1.2
2	0.3	0.4	0.4	0.3	0.4	0.5	0.5	0.7	0.7	0.9	0.7
3	0.2	0.3	0.2	0.2	0.3	0.4	0.4	0.5	0.5	0.5	0.5
4	0.2	0.3	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.4	0.3
5	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.3
6	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.4	0.3	0.4	0.3
7	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.4	0.5	0.4
8	0.2	0.3	0.2	0.2	0.3	0.2	0.3	0.4	0.4	0.4	0.4
9	0.1	0.2	0.2	0.2	0.2	0.2	0.3	0.4	0.4	0.4	0.3
10	0.2	0.2	0.1	0.2	0.2	0.1	0.2	0.3	0.3	0.3	0.3
11	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2		0.3	0.3
12	0.1	0.2	0.1	0.2	0.2	0.2	0.2	0.2		0.3	0.2
13	0.1	0.2	0.1	0.1	0.1	0.2	0.2	0.2		0.2	0.2
14	0.2	0.1	0.1	0.1	0.2	0.1	0.1	0.2		0.1	0.1
15	0.1	0.1	0.1	0.1	0.2	0.1	0.2	0.2		0.1	0.2
16	0.1	0.1	0.1		0.2		0.3	0.2			
17	0.1	0.1	0.1								
18	0.1	0.1	0.1								
19	0.1	0.1									
20	0.1	0.1	0.1								

Lone parents

Similarly, pupils from families with lone parents (and a known family structure, rather than simply where a second adult is not known) are heavily represented in low income bands, especially bands 1 and 2, where nearly half are lone parents in some years (Tables 35, 36). This is both for KS2 and KS4. High income families are rarely lone parents. This may be partly due to differences in knowledge about family structure and income for adult2.

Table 35 - Percentage lone parents, by KS2 income bands, 2009-2019

Income band	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
1	48.4	48.4	39.5	36.3	41.6	43.0	43.6	43.9	43.9	43.9	44.0
2	42.7	46.6	38.8	38.9	45.5	47.7	48.6	44.6	44.6	44.1	44.0
3	43.9	41.3	38.8	37.8	42.6	44.9	46.9	51.8	53.8	54.8	54.1
4	41,0	44.3	31.0	24.4	29.1	30.2	30.6	31.3	32.8	33.9	33.7
5	42.9	43.2	34.1	28.2	29.7	28.5	28.3	28.8	29.4	28.4	30.7
6	42.2	38.2	30.9	26.3	27.2	28.0	28.0	28.5	29.2	29.1	27.0
7	36.8	36.1	27.3	23.6	26.0	25.8	26.4	26.3	26.9	26.9	26.8
8	36.4	35.0	23.8	20.0	22.6	22.1	22.5	23.2	23.3	23.9	23.8
9	33.1	31.9	21.2	18.1	21.0	19.6	20.0	20.1	20.7	21.3	20.9
10	29.3	28.3	17.5	15.7	18.6	17.5	17.1	17.5	17.5	17.5	17.7
11	24.4	23.6	15.6	13.6	15.6	14.5	14.8	14.3	14.3	14.1	13.9
12	20.1	19.6	13.4	10.5	11.2	10.6	10.0	9.8	9.8	9.4	8.8
13	15.6	15.0	10.7	7.7	7.3	6.7	6.6	6.2	6.4	5.9	5.4
14	11.5	11.0	8.6	5.2	4.7	4.0	3.7	3.3	3.5	3.3	3.0
15	8.4	8.7	6.7	3.3	2.7	2.4	2.2	1.8	1.7	2.0	1.9
16	6.0	6.2	4.6	2.3	2.0	1.2	1.3	1.3	1.1	1.0	1.2

17	4.7	4.4	3.1	1.4	1.3	1.0	0.8	0.7	0.6	0.7	0.7
18	3.0	3.0	2.3	0.9	0.6	0.5	0.6	0.6	0.5	0.2	0.4
19	2.0	2.0	1.7	0.7	0.6	0.3	0.5	0.1	0.2	0.3	0.2
20	1.4	1.3	1.2	0.4	0.1	0.1	0.2	0.1	0.1	0.2	0.1

Table 36 - Percentage lone parents, by KS4 income bands, 2009-2019

Income band	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
1	46.6	40.7	39.7	40.8	45.8	41.7	36.9	36.6	40.1	39.9	40.0
2	44.8	40.9	40.2	42.6	45.8	45.5	42.6	38.4	40.4	39.4	44.3
3	39.6	34.8	40.8	41.2	42.9	43.6	42.3	46.2	50.5	51.6	46.0
4	43.7	41.1	33.3	29.7	29.9	30.3	26.9	27.2	31.3	31.4	29.7
5	42.7	40.7	32.5	32.4	32.4	30.3	27.3	27.6	29.1	28.5	28.9
6	39.9	37.9	37.5	30.9	31.0	31.1	28.7	28.3	29.8	29.5	29.7
7	39.9	37.9	35.3	30.9	31.0	31.1	28.7	28.3	29.8	29.5	29.7
8	39.0	36.5	32.5	29.2	29.2	29.7	27.3	27.5	29.3	29.5	28.6
9	38.6	34.9	29.6	26.8	27.2	26.1	24.4	24.4	26.8	26.8	26.2
10	36.6	31.9	27.3	25.8	24.8	24.2	22.1	22.1	24.6	24.5	23.5
11	33.1	27.9	24.2	23.2	22.4	22.1	19.4	19.2	22.0	21.0	20.4
12	29.1	24.3	20.9	19.6	18.3	18.0	15.1	15.4	17.3	15.9	14.8
13	23.8	19.6	17.8	13.6	11.7	11.4	9.7	9.0	9.9	9.4	8.2
14	19.6	16.0	15.1	8.6	7.3	6.6	6.0	5.7	6.3	5.6	4.5
15	15.2	12.9	12.3	5.0	4.1	3.3	3.2	2.5	2.8	2.5	2.3
16	12.0	10.1	9.7	2.8	2.1	2.1	1.7	1.4	1.8	1.7	1.3
17	9.4	7.9	7.5	1.7	1.2	1.0	1.0	0.8	1.0	1.0	0.7
18	6.7	5.8	5.0	1.6	0.6	0.7	0.6	0.4	0.6	0.5	0.4
19	4.5	4.0	3.5	0.6	0.5	0.4	0.4	0.4	0.3	0.4	0.0
20	3.1	2.7	2.6	0.6	0.4	0.0	0.0	0.0	0.0	0.3	0.0

SEN

In most years, SEN pupils are disproportionately in low income bands, as with FSM but less so (Tables 37, 38). But for KS2 in 2016, perhaps when the classifications changed, there are a larger number of SEN pupils in higher income bands.

Table 37 - Percentage SEN pupils, by KS2 income bands, 2009-2019

Income band	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
1	15.0	28.4	28.3	26.4	24.3	23.9	18.7	20.0	19.9	20.4	20.8
2	14.1	26.4	26.8	25.1	23.2	22.5	17.5	18.8	18.4	19.5	19.8
3	13.2	23.1	24.7	22.9	20.8	20.0	15.6	16.8	17.2	18.0	18.2
4	12.6	22.9	21.5	20.2	18.3	18.0	13.8	14.5	14.8	14.7	15.3
5	12.3	21.9	22.1	19.9	18.3	17.1	12.5	14.0	14.2	14.5	15.1
6	12.2	20.7	21.5	19.8	18.0	17.4	13.1	14.0	14.0	14.2	14.6
7	12.2	20.3	21.4	20.5	17.8	17.3	13.0	13.9	14.2	14.2	14.9
8	11.6	20.4	21.8	20.4	17.7	16.6	12.7	13.3	14.0	13.9	14.9
9	11.9	20.9	22.6	20.9	17.7	16.8	12.5	13.3	13.5	14.0	14.0
10	11.0	20.2	21.7	21.1	17.4	16.4	13.0	13.2	13.7	13.5	13.7
11	11.1	20.3	21.8	20.8	17.6	16.4	12.4	13.7	12.8	13.6	13.9
12	11.2	20.3	21.4	19.9	18.1	16.1	12.2	13.1	13.6	13.5	13.9
13	11.1	20.5	20.6	19.2	16.9	16.0	12.1	13.5	12.8	13.4	13.3
14	11.0	19.7	19.5	18.6	16.1	15.6	11.0	12.5	12.5	12.9	12.5
15	10.2	18.0	18.7	18.4	16.4	15.5	11.2	12.0	12.7	11.9	12.5
16	9.9	17.9	17.4	16.4	15.3	14.3	10.6	11.2	11.6	11.6	12.7

17	9.3	16.9	17.2	16.1	14.3	13.2	10.1	11.2	10.7	10.7	10.9
18	8.6	15.9	15.8	14.6	12.7	13.0	9.1	10.1	9.3	10.2	10.8
19	8.2	15.-	14.3	14.2	12.3	10.8	8.8	9.9	9.2	9.5	10.1
20	6.8	12.7	12.7	11.0	10.8	10.2	7.7	8.1	8.3	8.5	9.2

Table 38 - Percentage SEN pupils, by KS4 income bands, 2009-2019

Income band	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
1	24.7	22.6	26.0	21.9	22.8	21.5	18.0	25.5	16.5	15.8	16.5
2	23.1	21.6	24.4	21.6	20.3	20.2	16.9	23.4	15.2	15.1	14.6
3	20.0	18.3	22.1	19.0	17.9	18.0	15.2	21.0	13.5	13.5	13.3
4	20.2	19.6	19.0	16.9	15.4	15.2	13.3	21.9	11.2	11.2	11.1
5	19.3	18.8	20.1	17.5	16.1	15.4	12.6	18.7	11.3	11.3	11.3
6	19.3	18.2	19.2	17.1	15.8	15.8	13.2	17.9	11.7	11.0	11.7
7	19.8	18.2	19.8	17.0	15.5	15.3	13.5	17.5	11.3	11.7	11.3
8	18.9	18.8	19.3	16.1	15.4	15.2	13.1	17.5	11.1	11.8	11.0
9	18.5	18.0	19.1	16.1	15.3	14.5	12.8	16.9	10.6	11.5	10.6
10	18.8	18.1	19.1	15.6	15.1	14.4	12.8	17.2	10.7	11.3	10.5
11	18.7	17.5	18.9	16.2	15.1	14.5	12.6	17.4	10.6	11.0	10.8
12	17.4	17.2	18.5	16.1	14.8	14.3	12.8	17.5	10.9	11.2	10.9
13	17.4	16.3	18.2	16.3	14.2	14.3	12.2	17.1	10.7	11.0	10.9
14	16.6	15.5	17.3	14.7	13.8	13.6	11.6	17.6	10.7	10.7	9.9
15	16.5	14.8	16.8	13.5	13.1	12.7	11.3	18.9	9.4	10.4	9.4
16	15.2	14.1	15.7	12.8	12.4	12.1	10.9	19.3	9.6	9.8	9.1
17	14.2	13.4	14.7	12.9	12.0	11.9	9.0	21.2	8.4	9.3	8.3
18	14.0	13.0	13.1	11.6	11.2	11.1	8.2	21.2	8.5	9.6	8.3
19	12.6	12.6	12.6	10.1	10.3	9.2	7.6	23.8	7.7	7.6	7.8
20	10.5	9.8	9.6	7.1	7.1	7.1	6.4	38.2	5.8	5.8	5.6

Note: the figures for 2016 are out of kilter. They should probably be ignored.
These are the equal income bands (and their characteristics) used later to look at changes in the relationship between income and attainment.

Correlations between income and other variables

Fuller inter-correlations appear in the Appendix. These show that earned income is a substantially better predictor of attainment at KS1, KS2, and KS4 than equivalised income (and this is a further reason why we do not proceed with equivalised income here). These also make it clear that FSM eligibility is a better predictor of KS2 attainment in any year, for all cases and the restricted set of cases, than income is. We discuss the possible reasons later. However, income is a better predictor of KS2 and KS4 attainment than the area-based IDACI measure. At KS2, income remains a relatively static predictor of attainment, after 2011, using all cases (Table 39). However, there is a decline after 2011 using the restricted case set (Table 40).

Table 39 – Correlation between earned income, IDACI, FSM and KS2 scores, KS2, all cases

	IDACI	FSM	KS2 scores
2009	-0.13	-0.16	0.11
2010	-0.12	-0.16	0.04
2011	-0.10	-0.14	0.08
2012	-0.10	-0.16	0.09
2013	-0.10	-0.17	0.12
2014	-0.12	-0.16	0.12
2015	-0.11	-0.14	0.12
2016	-0.10	-0.12	0.11
2017	-0.14	-0.14	0.12
2018	-0.13	-0.13	0.11
2019	-0.14	-0.14	0.13

Table 40 – Correlation between earned income, IDACI, FSM and KS2 scores, KS2, 0-£200k, known family structure

	IDACI	FSM	KS2 scores
2009	-0.23	-0.25	0.17
2010	-0.23	-0.37	0.06
2011	-0.21	-0.28	0.13
2012	-0.13	-0.26	0.07
2013	-0.12	-0.30	0.09
2014	-0.13	-0.19	0.14
2015	-0.12	-0.28	0.08
2016	-0.11	-0.27	0.08
2017	-0.11	-0.26	0.08
2018	-0.09	-0.25	0.07
2019	-0.10	-0.26	0.08

The link between income and KS4 attainment declines suddenly after 2011, settling to a surprisingly low level from 2014 onwards (Tables 41, 42). Earned income has consistently the highest correlation with KS4 scores, compared to equivalised or total income. Even so, the correlation is low – generally less than or around 0.1. This could be because, although the mean KS4 scores for each income band are strongly linearly related (see below), there is a wide range of attainment scores for each actual income. For example, children from some households with zero earned income can have very high attainment, and households with zero earned incomes can be asset rich. If the findings are valid, the drop after 2011 could be partly due to the Pupil Premium policy.

Table 41 – Correlation between earned income, IDACI, FSM and KS4 scores, KS4, all cases

	IDACI	FSM	KS4 points
2009	-0.09	-0.10	0.10
2010	-0.06	-0.07	0.07
2011	-0.07	-0.11	0.10
2012	-0.06	-0.10	0.10
2013	-0.05	-0.09	0.09
2014	-0.06	-0.08	0.06
2015	-0.07	-0.09	0.07
2016	-0.05	-0.07	0.06
2017	-0.06	-0.07	0.07
2018	-0.08	-0.21	0.09
2019	-0.14	-0.07	0.06

Table 42 – Correlation between earned income, IDACI, FSM and KS4 scores, KS4, 0-£200k, known family structure

	IDACI	FSM	KS4 points
2009	-0.22	-0.22	0.21
2010	-0.23	-0.22	0.20
2011	-0.18	-0.23	0.16
2012	-0.10	-0.23	0.11
2013	-0.10	-0.25	0.11
2014	-0.11	-0.25	0.12
2015	-0.12	-0.23	0.10
2016	-0.10	-0.23	0.09
2017	-0.08	-0.22	0.10
2018	-0.14	-0.07	0.08
2019	-0.16	-0.18	0.16

Comparing income and FSM-eligibility as predictors of attainment

Using cases with known earned income between 0 and £200,000, the following regression models have two steps. The outcome variable is attainment (KS2 or KS4 point scores). In the first step we use earned income, and in the second step we use FSM-eligibility. Then we reverse the order, entering FSM before income. In this way we can assess which is the better predictor of attainment, and how much more the second predictor adds once the first is controlled for.

Tables 43 and 44 show that in every year the binary variable FSM (currently eligible, or not) is a better predictor of attainment scores at KS2 than the income data from PPMD. There is no obvious trend over time.

Table 43 - Models predicting attainment, with income first, KS2 2009-2019

	R for Earned income	Coefficient	R for FSM	Coefficient
2009	0.16	0.11	0.24	-0.19
2010	0.07	0.04	0.11	-0.09
2011	0.12	0.07	0.22	-0.19
2012	0.14	0.10	0.22	-0.18
2013	0.16	0.11	0.24	-0.18
2014	0.16	0.11	0.24	-0.19
2015	0.15	0.11	0.23	-0.18
2016	0.13	0.09	0.22	-0.18
2017	0.16	0.11	0.23	-0.18
2018	0.15	0.11	0.22	-0.17
2019	0.15	0.11	0.23	-0.18

Table 44 - Models predicting attainment, with FSM first, KS2 2009-2019

	R for FSM	Coefficient	R for Earned income	Coefficient
2009	0.21	-0.19	0.24	0.11
2010	0.10	-0.09	0.11	0.04
2011	0.21	-0.19	0.22	0.07
2012	0.20	-0.18	0.22	0.10
2013	0.22	-0.18	0.24	0.11
2014	0.21	-0.18	0.24	0.11
2015	0.20	-0.18	0.23	0.11
2016	0.20	-0.18	0.22	0.09
2017	0.20	-0.18	0.23	0.11
2018	0.20	-0.17	0.22	0.11
2019	0.20	-0.18	0.23	0.11

Tables 45 and 46 similarly show that in every year the binary variable FSM (currently eligible or not) is a better predictor of attainment scores at KS4 than the income data from PPMD, and there is no obvious trend over time.

Table 45 – Models predicting attainment, with income first, KS4 2009-2019

	R Earned income	Coefficient	R FSM	Coefficient
2009	0.141	0.109	0.219	-0.171
2010	0.091	0.070	0.192	-0.170
2011	0.135	0.107	0.200	-0.150
2012	0.138	0.110	0.197	-0.144
2013	0.124	0.099	0.191	-0.148
2014	0.102	0.071	0.227	-0.205
2015	0.115	0.081	0.229	-0.201
2016	0.096	0.069	0.225	-0.206
2017	0.100	0.073	0.215	-0.193
2018	0.091	0.065	0.212	-0.193
2019	0.093	0.069	0.216	-0.196

Table 46 – Models predicting attainment, with FSM first, KS4 2009-2019

	R FSM	Coefficient	R Earned income	Coefficient
2009	0.191	-0.171	0.219	0.109
2010	0.179	-0.170	0.192	0.070
2011	0.170	-0.150	0.200	0.107
2012	0.165	-0.144	0.197	0.110
2013	0.165	-0.148	0.191	0.099
2014	0.215	-0.205	0.227	0.071
2015	0.215	-0.021	0.229	0.081
2016	0.215	-0.206	0.225	0.069
2017	0.203	-0.193	0.215	0.073
2018	0.202	-0.193	0.212	0.065
2019	0.205	-0.196	0.216	0.069

Despite being a threshold measure only, FSM may be stronger as it is validated and more complete than income. It may have less measurement error. Six further regression models appear in the Appendix, including four where FSM and income are used as predictors with stepwise entry. In each example, FSM is preferred to income as a predictor. However, in a fuller regression using prior attainment, and income bands as well as raw income scores, FSM-eligibility is a weaker predictor than income bands. Raw income scores do not correlate well with attainment scores are the relationship is not linear. The

relationship between income bands and attainment is linear (see below). And income band is the best single predictor of attainment, other than prior attainment.

Plotting income bands and attainment

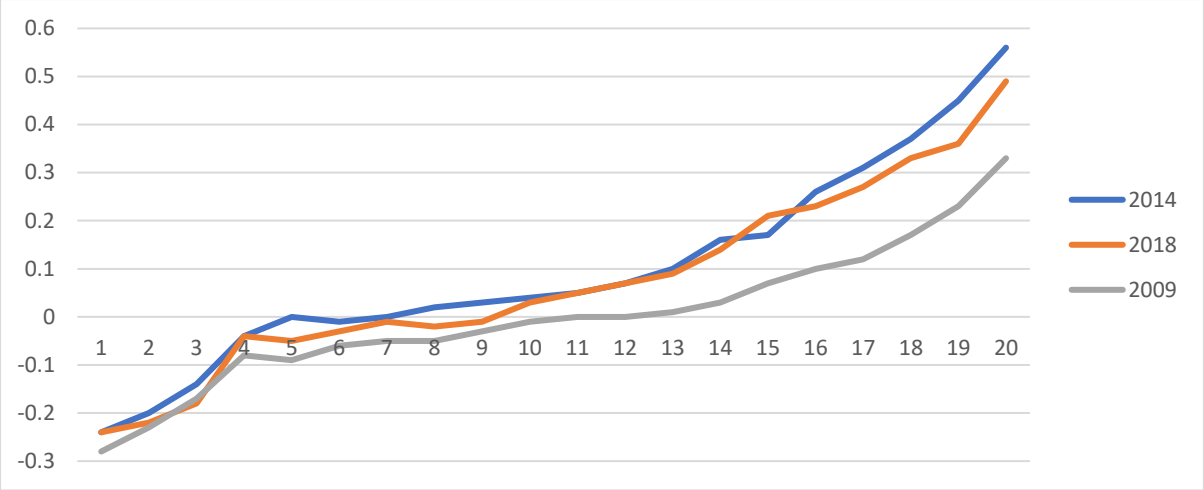
Consideration now turns to attainment scores by the income bands defined and described above. Table 47 shows the average KS2 attainment for each band from 2009 to 2019. It is clear that the lower income bands have lower average attainment. If the Pupil Premium policy, directed at disadvantaged pupils, were effective then the attainment of the lower income bands would be expected to rise in a way that was not also true for higher income bands. Every band except for band 3 has a higher relative score in 2019 than in 2009. Pupil Premium came into effect in 2011. While there might have been an immediate impact on that year's school place allocation, so affecting segregation by poverty, it is less likely that the extra funding would improve the attainment of lower income pupils immediately Evidence-led programmes and interventions had to be sought and implemented, and this takes time and would have involved errors and wrong choices. So perhaps it is better to look for impact nearer 2016 when a complete cohort of pupils had been through primary or secondary phases while the policy was in effect, and then sat for statutory assessments at KS2 or KS4. The proportion of households with income below the minimum standard peaked in 2014, according to the Joseph Rowntree Foundation (2023).

Table 47 - KS2 Attainment z-scores by income bands

Income band	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
1	-0.28	-0.08	-0.22	-0.18	-0.21	-0.24	-0.23	-0.21	-0.22	-0.24	-0.24
2	-0.23	-0.07	-0.19	-0.15	-0.19	-0.20	-0.21	-0.20	-0.20	-0.22	-0.22
3	-0.17	-0.02	-0.13	-0.08	-0.13	-0.14	-0.15	-0.18	-0.17	-0.18	-0.22
4	-0.08	-0.03	0.01	-0.01	-0.02	-0.04	-0.06	-0.06	-0.07	-0.04	-0.06
5	-0.09	-0.02	-0.02	0	-0.01	0	0	-0.02	-0.03	-0.05	-0.08
6	-0.06	-0.01	-0.01	0.01	-0.01	-0.01	-0.02	-0.04	-0.03	-0.03	-0.03
7	-0.05	0.01	-0.01	-0.01	0	0	-0.02	-0.04	-0.04	-0.01	-0.05
8	-0.05	-0.03	-0.01	-0.01	0.01	0.02	0.01	-0.01	-0.03	-0.02	-0.04
9	-0.03	-0.01	-0.03	-0.01	0.02	0.03	0.03	0	0.01	-0.01	-0.01
10	-0.01	-0.02	0	0	0.04	0.04	0.03	0.04	0.03	0.03	0.04
11	0	-0.01	-0.01	0.01	0.04	0.05	0.05	0.03	0.06	0.05	0.05
12	0	-0.01	0.01	0.03	0.05	0.07	0.07	0.07	0.07	0.07	0.08
13	0.01	0.01	0.05	0.08	0.09	0.10	0.10	0.10	0.10	0.09	0.12
14	0.03	-0.02	0.07	0.12	0.15	0.16	0.16	0.15	0.15	0.14	0.17
15	0.07	0.02	0.10	0.15	0.18	0.17	0.20	0.22	0.18	0.21	0.23
16	0.10	0.02	0.13	0.21	0.24	0.26	0.26	0.29	0.24	0.23	0.26
17	0.12	0.03	0.17	0.27	0.29	0.31	0.30	0.33	0.30	0.27	0.31
18	0.17	0.06	0.21	0.34	0.36	0.37	0.38	0.39	0.35	0.33	0.36
19	0.23	0.07	0.28	0.37	0.41	0.45	0.44	0.45	0.43	0.36	0.42
20	0.33	0.15	0.41	0.52	0.56	0.56	0.56	0.61	0.51	0.49	0.53

Another way of looking at these changes is presented in Figure 1 which shows the changes from 2009 to 2014, and from 2014 to 2018. In the later years, the attainment of lower attainers has lifted, compared to 2009. However, the biggest gains are for the higher income bands. This pattern does not look suitable for an impact from Pupil Premium disproportionately affecting low income pupils.

Figure 1 – KS2 attainment by income bands, 2009, 2014, 2018



As a check, we also present the same kind of analysis but using equal size (not equal income) bands. Ideally, we would like equal-sized (number of cases) bands for each year, and for those bands to have exactly the same range of incomes (adjusted for inflation). Our trend data would then be precisely comparable, and we could be sure that changes over time in average attainment per band were not somehow created by a change in the nature of the bands. In reality, we can have equal income bands over time with an increasing number of cases in the lowest bands (as above), or we can have equal sized bands with decreasing maximum income in the lower bands (below). So, we have tried both, and the results are commensurable (which is reassuring), but not identical.

The picture using equal-sized bands is more volatile, but does not now show a large gain for higher income bands (up to band 16). In fact, the higher bands now have marginally lower attainment (Figure 2). The large gain for the equal income bands (above) therefore could have been created by the reduced number of cases in those bands (a distillation). There is a clear gain for very low income bands, and a suggestion of differential improvement for bands 1 and 2, and 5 to 10. This differential gain could be due to Pupil Premium.

Figure 2 – KS2 attainment by equal size income bands, 2009, 2014, 2018

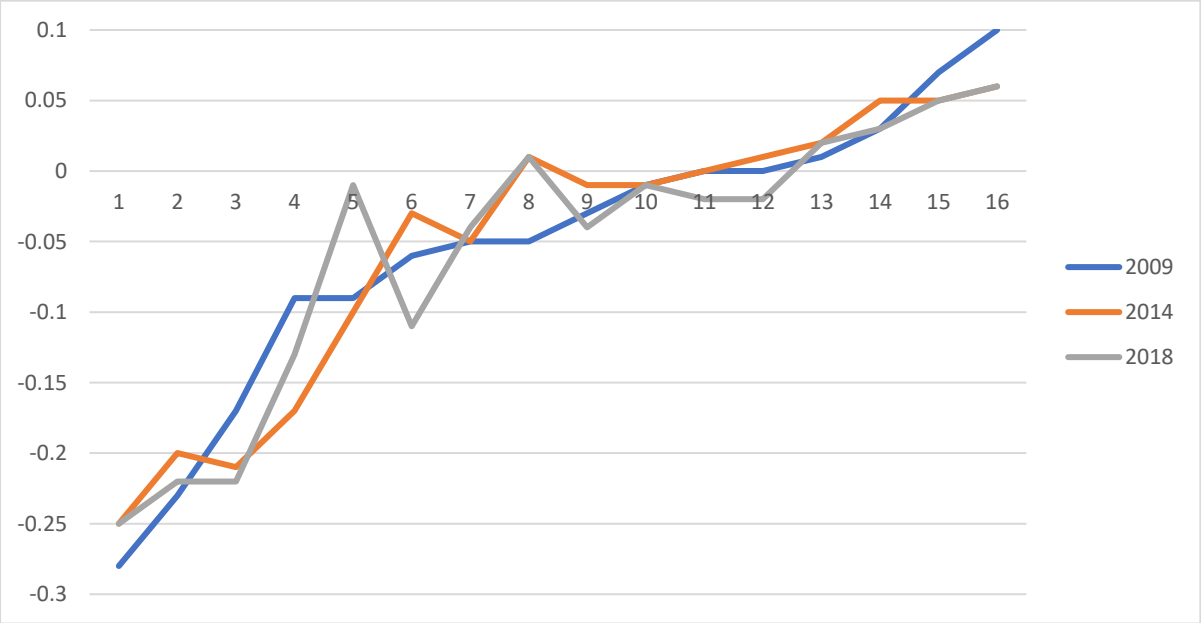


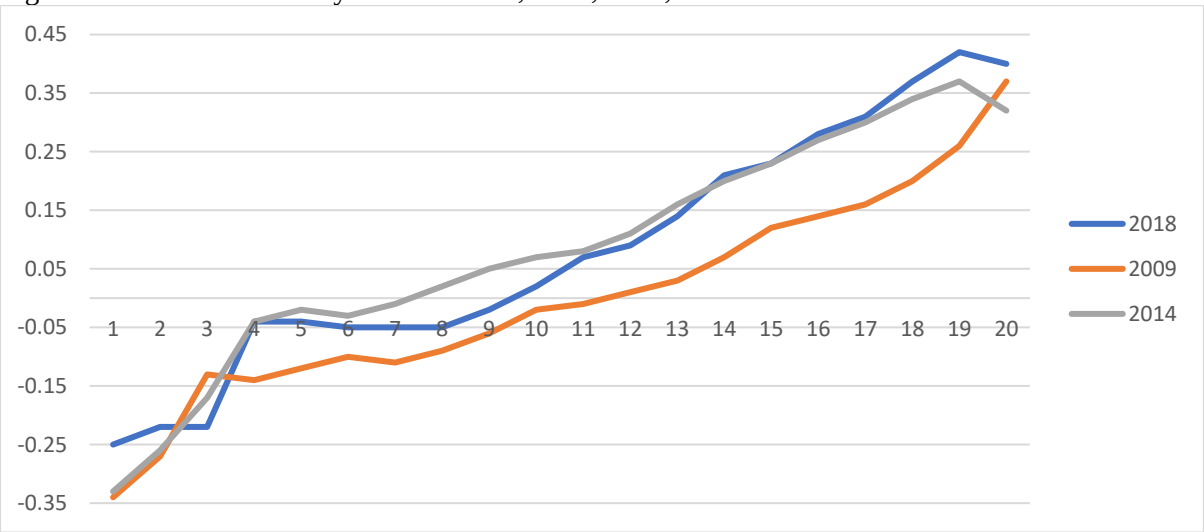
Table 48 shows the average attainment for each equal-income band at KS4. Again, low income bands have low average attainment and *vice versa*.

Table 48 - KS4 Attainment z-scores by income band

Income band	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
1	-0.34	-0.33	-0.31	-0.24	-0.28	-0.33	-0.31	-0.26	-0.23	-0.25	-0.27
2	-0.27	-0.28	-0.29	-0.19	-0.28	-0.26	-0.25	-0.21	-0.2	-0.22	-0.22
3	-0.13	-0.09	-0.17	-0.12	-0.18	-0.17	-0.16	-0.19	-0.2	-0.22	-0.17
4	-0.14	-0.16	-0.01	-0.03	-0.02	-0.04	-0.04	-0.05	-0.06	-0.04	-0.05
5	-0.12	-0.12	-0.08	-0.02	-0.06	-0.02	0	-0.02	-0.04	-0.04	-0.02
6	-0.10	-0.09	-0.06	-0.01	-0.06	-0.03	-0.02	-0.04	-0.05	-0.05	-0.04
7	-0.11	-0.08	-0.06	0	-0.05	-0.01	-0.03	-0.05	-0.06	-0.05	-0.05
8	-0.09	-0.09	-0.03	0.03	-0.02	0.02	0	-0.04	-0.05	-0.05	-0.02
9	-0.06	-0.07	-0.03	0.03	0.01	0.05	0.02	-0.01	-0.01	-0.02	0.01
10	-0.02	-0.04	-0.01	0.04	0.03	0.07	0.04	0.03	0.01	0.02	0.04
11	-0.01	-0.02	0.02	0.05	0.06	0.08	0.06	0.05	0.06	0.07	0.07
12	0.01	0.01	0.03	0.04	0.09	0.11	0.08	0.1	0.08	0.09	0.09
13	0.03	0.05	0.06	0.08	0.15	0.16	0.16	0.16	0.14	0.14	0.17
14	0.07	0.08	0.10	0.13	0.21	0.20	0.21	0.23	0.21	0.21	0.22
15	0.12	0.13	0.14	0.16	0.28	0.23	0.24	0.26	0.25	0.23	0.26
16	0.14	0.16	0.18	0.18	0.35	0.27	0.27	0.30	0.29	0.28	0.29
17	0.16	0.18	0.20	0.18	0.40	0.30	0.34	0.33	0.36	0.31	0.36
18	0.20	0.21	0.27	0.22	0.47	0.34	0.34	0.40	0.37	0.37	0.37
19	0.26	0.27	0.35	0.25	0.53	0.37	0.38	0.45	0.41	0.42	0.4
20	0.37	0.38	0.59	0.29	0.69	0.32	0.35	0.42	0.43	0.40	0.44

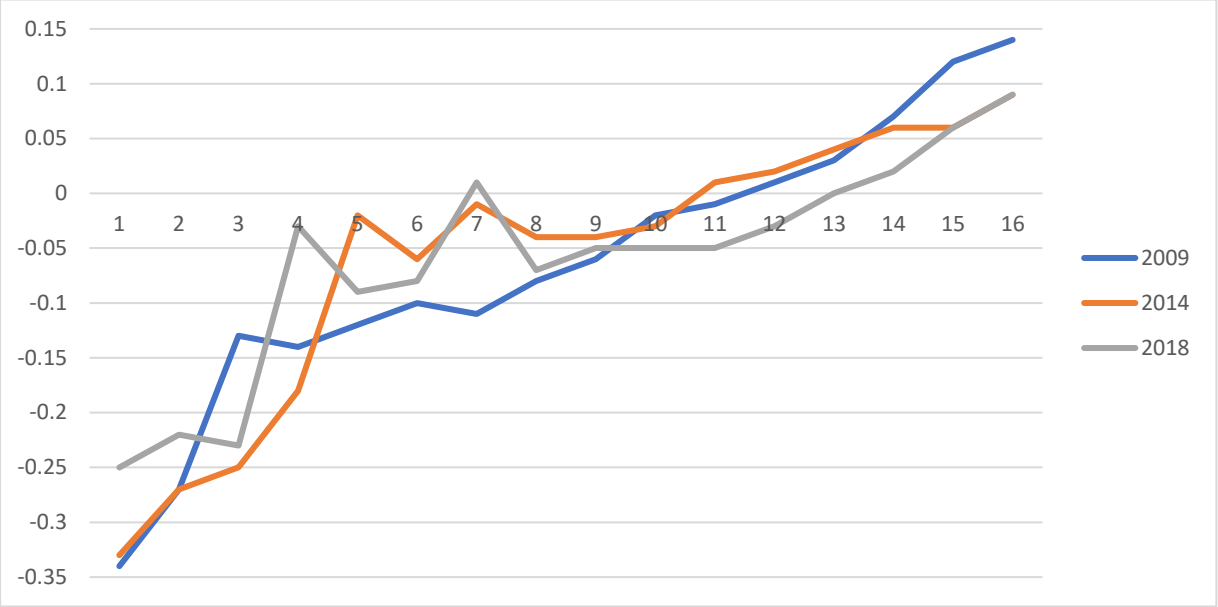
Another way of looking at these changes is presented in Figure 3. Focusing on the lower equal-income bands, the obvious change from 2009 (before Pupil Premium) to 2014 (mid-way in this dataset) and 2018 is for bands 4 to 6. These lower income pupils are doing better. This is less clear for the very lowest earned income bands (1 to 3). By 2018, bands 1 and 2 have improved their position (although band 3 is again an anomaly).

Figure 3 – KS4 attainment by income bands, 2009, 2014, 2018



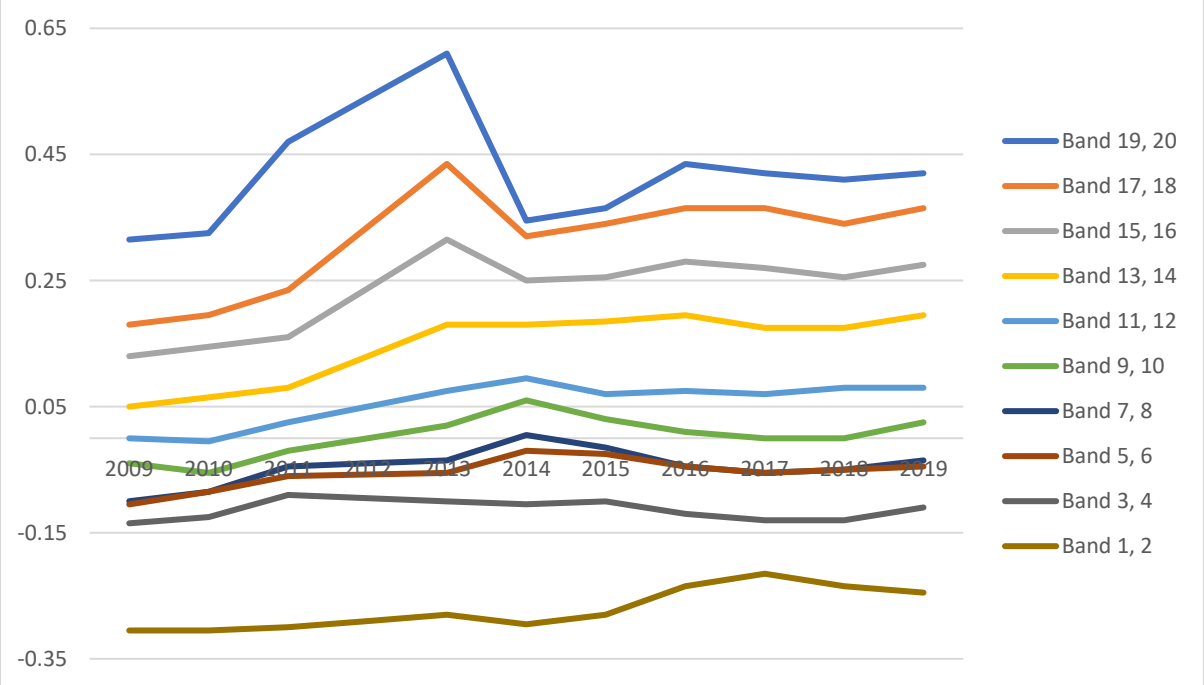
Again, as a check, we also analysed equal sized income bands (not equal income). The picture at KS4 is similar to that with equal-income bands, but a bit more confused (Figure 4). The biggest differential gain is for bands 3 to 9, with less evidence of success for the two lowest bands in 2014, but there was movement by 2018. There is no gain for the higher income bands. This all suggests that the Pupil Premium could have been effective in improving outcomes for low income pupils, but not so clearly or quickly affecting pupils from families with zero or near zero earned income.

Figure 4 – KS4 attainment by equal size income bands, 2009, 2014, 2018



A further way of looking at the pattern is in Figure 5, where all bands (equal income again) are shown grouped in pairs. There is volatility, but all of the lower income bands end up in a better position compared to where they started, and are closing the gap on higher income bands. For most low income bands, the big change happened in 2014.

Figure 5 – Changes in attainment KS4 z scores over time by grouped income bands



Put together, these data suggest that attainment for low income pupils has improved relative to high income pupils at both KS2 and KS4 between 2011 and 2018.

Poverty segregation between schools

The next section looks at how much low income pupils are clustered in schools with others like them, and how this has changed over time. Segregation was assessed by computing the national (Gorard) segregation index for all schools, based on the lowest two, four and six bands in each year.

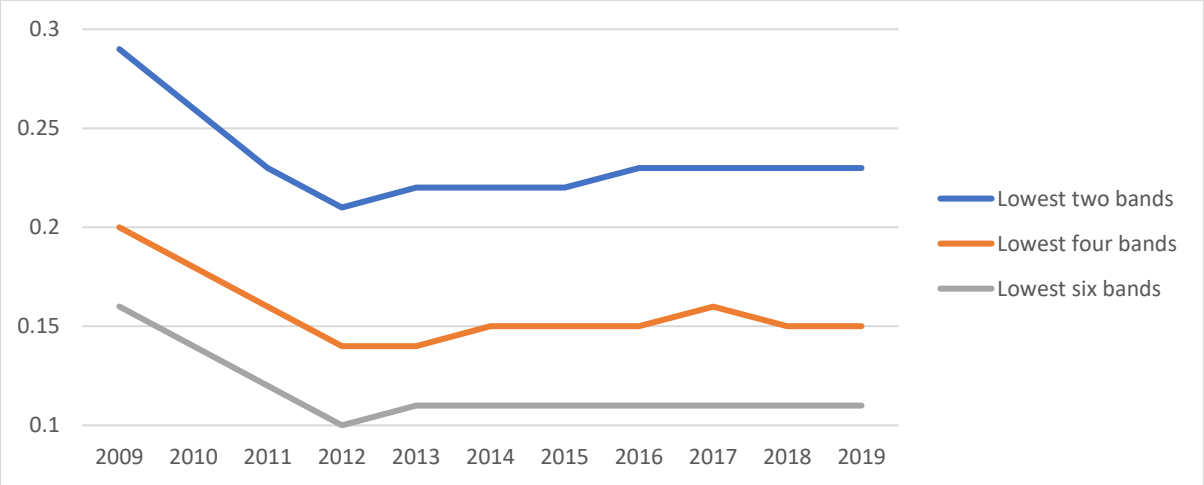
Segregation at KS2

The extent to which the poorest children were clustered within schools at KS2 dropped dramatically from 2009 to 2012, and then remained low until at least 2019. The figures appears in Table 49, but the pattern is clearer in Figure 4. This could have been due to Pupil Premium funding making disadvantaged pupils more attractive to schools after 2010, but the drop seems to predate that. This is not like the drop in segregation noted for long-term disadvantaged pupils which occurred from 2011 onwards but not before (Gorard et al. 2022).

Table 49 – National segregation by poverty, KS2, 2009-2019

	Lowest two bands	Lowest four bands	Lowest six bands
2009	0.29	0.20	0.16
2010	0.26	0.18	0.14
2011	0.23	0.16	0.12
2012	0.21	0.14	0.10
2013	0.22	0.14	0.11
2014	0.22	0.15	0.11
2015	0.22	0.15	0.11
2016	0.23	0.15	0.11
2017	0.23	0.16	0.11
2018	0.23	0.15	0.11
2019	0.23	0.15	0.11

Figure 4 - National segregation by poverty, KS2, 2009-2019



Segregation at KS4

The highest recorded level of segregation (the extent to which poorer children in KS4 are clustered in the same schools) was in 2010 for all three analyses (Table 50). There was sharp decline to 2012 (the year after Pupil Premium policy came into play, and two years after it was legislated). There was then a plateau, with some changes, with segregation ending at about the same level in 2019 as in 2012.

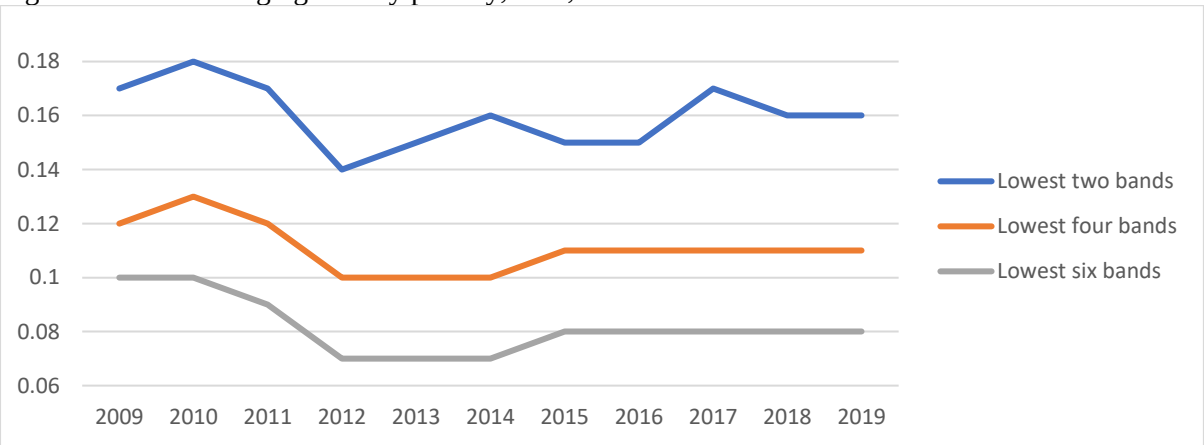
Table 50 – National segregation by poverty, KS4, 2009-2019

	Lowest two bands	Lowest four bands	Lowest six bands

2009	0.17	0.12	0.10
2010	0.18	0.13	0.10
2011	0.17	0.12	0.09
2012	0.14	0.10	0.07
2013	0.15	0.10	0.07
2014	0.16	0.10	0.07
2015	0.15	0.11	0.08
2016	0.15	0.11	0.08
2017	0.17	0.11	0.08
2018	0.16	0.11	0.08
2019	0.16	0.11	0.08

This pattern is perhaps clearer in Figure 5. The sharp drop in 2011 and 2012 could be linked to Pupil Premium funding which might have taken effect immediately. The incentive to take more disadvantaged pupils, or to be less concerned about the financial consequence of taking disadvantaged pupils, would have applied to in-year and between-year admissions in 2012. A similar picture appeared in our previous analysis looking at the segregation of long-term FSM-eligible pupils (Gorard et al. 2022).

Figure 5 - National segregation by poverty, KS4, 2009-2019



Discussion

Value of PPMD

Having access to household income data linked to school and pupil information is very valuable for researchers. Our work here has only just started to look at what is possible. We have not so far looked at regional or school-type analyses, for example.

However, it is already clear that PPMD could be improved in terms of households and income data. Much is incomplete or unclear. The decline over time in the number of cases with known family structure is a concern. PPMD may over-represent, or have fuller information about, lower income families for whom benefits are payable. Income data here also has a worryingly low correlation with attainment at school (until converted into bands). This might suggest a problem in the income data. There are also some very extreme negative incomes, which might be valid but are hard to explain. These cases do not fit the pattern of disadvantage from low (zero or small positive) income. We removed these for many analyses.

There are several kinds of income data, with different coverage and advantages. They are clearly correlated with each other. For our substantive analyses we focus most on earned income, which is relatively complete, and suitable when considering disadvantage (and who might be eligible for benefits

like free school meals). It is important to keep these limitations of the PPMD in mind when looking at the substantive findings.

Specifically, for safer substantive analyses and comparisons, it would be important to have as few missing or unlinked (with NPD) cases as possible, a known family structure for more cases, and fewer missing income values where there is a known adult2. Overall, and most crucially, there needs to be a more consistent number of cases in each year with equivalent information for an trend analyses. At present, the focus is understandably more on families eligible for benefits, but knowledge of the wider population is crucial for comparative and trend analyses.

Income and attainment

Using the data available, with its limitations, and with a focus on earned income, low-income pupils are much more likely to be from single-parent families, to live in an area of deprivation, to be FSM-eligible, and have a SEN classification.

The raw correlation between income and attainment is low (mostly around R=0.1 or less), which is surprising. The correlation tends to decline over time, both at KS2 and KS4. This is apparently good news, and could be due to Pupil Premium funding from 2011 onwards, but could also be due to changes in the number of cases per year, or other factors. Despite inflation, the average income declined notably from 2009 to 2019 in this dataset. This could be a valid result, but could also be due to issues with the dataset over time.

In each year, and at both KS2 and KS4, FSM-eligibility is a stronger predictor of attainment scores than PPMD raw-income is. This may be because such a threshold measure of poverty is intrinsically more powerful, but is perhaps more likely to be because FSM reporting is legally required from schools, based on a complex but audited measure.

We created 20 income bands, in two ways – equal income and equal numbers - using only cases with incomes between 0 and £300,000. We found the year with the smallest number of cases, and made each year have that number of cases, by eliminating the highest incomes. This means that all years had the same number of total cases, and so may help overcome issues of differential coverage. We then divided the cases into bands of equal size (equal size bands). We also used the maximum income per band in 2009, adjusted for annual inflation, to create bands that had the same real income every year, but allowed the number of cases per band to vary as needed.

There is a strong linear relationship between both sets of bands and attainment scores at KS2 and KS4. This pattern is much stronger than the raw correlation between income and attainment (where the pattern is not linear). Using z-scores, the low income bands have clearly negative average attainment scores, and the high income bands have clearly positive attainment scores. In fact, income band is the best single income-related predictor of attainment, better even than FSM-eligibility. It would be interesting to compare income bands with persistence of poverty (number of years FSM) as predictors of attainment. We selected 20 bands after trying 50 and 100, as a compromise between fit and discrimination. In future work it would be interesting to investigate further, and decide on the optimum number of bands for predicting attainment.

Over time, using our best estimates, most low income bands improve attainment scores relative to high income bands, so that 2014 tends to be better than 2009, and 2018 a bit better than 2014. Viewed in this way, the poverty attainment gap appears to be declining (as suggested by the correlation analysis). And this could be due, at least in part, to Pupil Premium funding. The changes mostly happened disproportionately to the lower incomes. However, the pattern is messy, there are still concerns about the income data, at KS2 the assessment regime changed twice in this period, and the timing my be inappropriate for Pupil Premium impact.

Looking at segregation by low income the picture is clearer. Segregation, using these figures, has declined 2009 to 2019, in fact from 2009 to 2013. This is also a good thing, because the poverty attainment gap has been shown to be lower in areas or years where segregation is lower. At KS4 the timing of the drop in segregation might match the impact of Pupil Premium funding on admissions to schools from 2011 onwards, but is a little early. We explained in Gorard et al. (2022) how such a change is possible, based on the proportion of pupils changing schools in every year. However, at KS2 the drop also happened from 2009 to 2010 which is clearly too early for a policy coming into force in 2011. The drop is good, whatever caused it, and despite the cautions about the data here the findings confirm those using long-term disadvantage based on the NPD alone. Policy should continue to work towards this de-clustering by poverty by whatever means.

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Appendix

The correlations between equivalised income, earned income and attainment scores at KS1, KS2 and KS4 in 2019 (as an example).

	KS1 reading	KS1 writing	KS1 maths
Equivalised income	0.026	0.016	0.015
Earned income	0.140	0.136	0.136

	KS2 reading	KS1 GPS	KS1 maths
Equivalised income	0.046	0.024	0.022
Earned income	0.135	0.142	0.128

	KS4 capped points
Equivalised income	0.091
Earned income	0.093

The correlations between earned income, and IDACI, FSM and KS2 scores.

Correlations Earned income, IDACI, FSM, KS2 points, 2009, all cases

	IDACI	FSM	KS2 total points
Earned income	-0.13	-0.16	0.11
IDACI		0.37	-0.20
FSM			-0.21

Correlations Earned income, IDACI, FSM, KS2 points, 2010, all cases

	IDACI	FSM	KS2 total points
Earned income	-0.12	-0.16	0.14
IDACI		0.36	-0.15
FSM			-0.10

Correlations Earned income, IDACI, FSM, KS2 points, 2011, all cases

	IDACI	FSM	KS2 total points
Earned income	-0.10	-0.14	0.08
IDACI		0.36	-0.18
FSM			-0.21

Correlations Earned income, IDACI, FSM, KS2 points, 2012, all cases

	IDACI	FSM	KS2 total points
Earned income	-0.10	-0.16	0.09
IDACI		0.35	-0.17
FSM			-0.20

Correlations Earned income, IDACI, FSM, KS2 points, 2013, all cases

	IDACI	FSM	KS2 total points
Earned income	-0.10	-0.17	0.12
IDACI		0.34	-0.17
FSM			-0.22

Correlations Earned income, IDACI, FSM, KS2 points, 2014, all cases

	IDACI	FSM	KS2 total points
Earned income	-0.12	-0.16	0.12
IDACI		0.32	-0.17
FSM			-0.22

Correlations Earned income, IDACI, FSM, KS2 points, 2015, all cases

	IDACI	FSM	KS2 total points
Earned income	-0.11	-0.14	0.12
IDACI		0.30	-0.15
FSM			-0.21

Correlations Earned income, IDACI, FSM, KS2 points, 2016, all cases

	IDACI	FSM	KS2 total points
Earned income	-0.10	-0.12	0.11
IDACI		0.29	-0.17
FSM			-0.19

Correlations Earned income, IDACI, FSM, KS2 points, 2017, all cases

	IDACI	FSM	KS2 total points
Earned income	-0.14	-0.14	0.12
IDACI		0.29	-0.17
FSM			-0.20

Correlations Earned income, IDACI, FSM, KS2 points, 2018, all cases

	IDACI	FSM	KS2 total points
Earned income	-0.13	-0.13	0.11
IDACI		0.28	-0.15
FSM			-0.20

Correlations Earned income, IDACI, FSM, KS2 points, 2019, all cases

	IDACI	FSM	KS2 total points
Earned income	-0.14	-0.14	0.13
IDACI		0.28	-0.15
FSM			-0.19

Correlations 2009, 0-£200k, known family structure

	IDACI	FSM	KS2 total points
Earned income	-0.23	-0.25	0.17
IDACI		0.35	-0.16
FSM			-0.19

Correlations 2010, 0-£200k, known family structure

	IDACI	FSM	KS2 total points
Earned income	-0.23	-0.37	0.06
IDACI		0.36	-0.15
FSM			-0.10

Correlations 2011, 0-£200k, known family structure

	IDACI	FSM	KS2 total points
Earned income	-0.21	-0.28	0.13
IDACI		0.31	-0.11
FSM			-0.17

Correlations 2012, 0-£200k, known family structure

	IDACI	FSM	KS2 total points
Earned income	-0.13	-0.26	0.07

IDACI		0.27	-0.08
FSM			-0.14

Correlations 2013, 0-£200k, known family structure

	IDACI	FSM	KS2 total points
Earned income	-0.12	-0.30	0.09
IDACI		0.26	-0.07
FSM			-0.15

Correlations 2014, 0-£200k, known family structure

	IDACI	FSM	KS2 total points
Earned income	-0.13	-0.19	0.14
IDACI		0.32	-0.17
FSM			-0.22

Correlations 2015, 0-£200k, known family structure

	IDACI	FSM	KS2 total points
Earned income	-0.12	-0.28	0.08
IDACI		0.21	-0.05
FSM			-0.15

Correlations 2016, 0-£200k, known family structure

	IDACI	FSM	KS2 total points
Earned income	-0.11	-0.27	0.08
IDACI		0.21	-0.07
FSM			-0.13

Correlations 2017, 0-£200k, known family structure

	IDACI	FSM	KS2 total points
Earned income	-0.11	-0.26	0.08
IDACI		0.20	-0.06
FSM			-0.14

Correlations 2018, 0-£200k, known family structure

	IDACI	FSM	KS2 total points
Earned income	-0.09	-0.25	0.07
IDACI		0.19	-0.05
FSM			-0.14

Correlations 2019, 0-£200k, known family structure

	IDACI	FSM	KS2 total points
Earned income	-0.10	-0.26	0.08
IDACI		0.19	-0.04
FSM			-0.13

The correlations between earned income, and IDACI, FSM and KS4 scores.

Correlations Earned income, IDACI, FSM, KS4 points, 2009, all cases

	IDACI	FSM	KS4 points
Earned income	-0.09	-0.10	0.10
IDACI		0.35	-0.22
FSM			-0.19

Correlations Earned income, IDACI, FSM, KS4 points, 2010, all cases

	IDACI	FSM	KS4 points
Earned income	-0.06	-0.07	0.07
IDACI		0.34	-0.20
FSM			-0.18

Correlations Earned income, IDACI, FSM, KS4 points, 2011, all cases

	IDACI	FSM	KS4 points
Earned income	-0.07	-0.11	0.10
IDACI		0.34	-0.17
FSM			-0.17

Correlations Earned income, IDACI, FSM, KS4 points, 2012, all cases

	IDACI	FSM	KS4 points
Earned income	-0.06	-0.10	0.10
IDACI		0.33	-0.16
FSM			-0.17

Correlations Earned income, IDACI, FSM, KS4 points, 2013, all cases

	IDACI	FSM	KS4 points
Earned income	-0.05	-0.09	0.09
IDACI		0.33	-0.15
FSM			-0.17

Correlations Earned income, IDACI, FSM, KS4 points, 2014, all cases

	IDACI	FSM	KS4 points
Earned income	-0.06	-0.08	0.06
IDACI		0.33	-0.20
FSM			-0.22

Correlations Earned income, IDACI, FSM, KS4 points, 2015, all cases

	IDACI	FSM	KS4 points
Earned income	-0.07	-0.09	0.07
IDACI		0.30	-0.21
FSM			-0.22

Correlations Earned income, IDACI, FSM, KS4 points, 2016, all cases

	IDACI	FSM	KS4 points
Earned income	-0.05	-0.07	0.06
IDACI		0.29	-0.22
FSM			-0.22

Correlations Earned income, IDACI, FSM, KS4 points, 2017, all cases

	IDACI	FSM	KS4 points
Earned income	-0.06	-0.07	0.07
IDACI		0.28	-0.23
FSM			-0.20

Correlations Earned income, IDACI, FSM, KS4 points, 2018, all cases

	IDACI	FSM	KS4 points
Earned income	-0.08	-0.21	0.09
IDACI		0.27	-0.23
FSM			-0.20

Correlations Earned income, IDACI, FSM, KS4 points, 2019, all cases

	IDACI	FSM	KS4 points
Earned income	-0.14	-0.07	0.06
IDACI		0.28	-0.25
FSM			-0.21

Correlations Earned income, IDACI, FSM, KS4 points, 2009, 0-£200k, known family structure

	IDACI	FSM	KS4 points
Earned income	-0.22	-0.22	0.21
IDACI		0.33	-0.18
FSM			-0.17

Correlations Earned income, IDACI, FSM, KS4 points, 2010, 0-£200k, known family structure

	IDACI	FSM	KS4 points
Earned income	-0.23	-0.22	0.20
IDACI		0.33	-0.16
FSM			-0.15

Correlations Earned income, IDACI, FSM, KS4 points, 2011, 0-£200k, known family structure

	IDACI	FSM	KS4 points
Earned income	-0.18	-0.23	0.16
IDACI		0.31	-0.11
FSM			-0.12

Correlations Earned income, IDACI, FSM, KS4 points, 2012, 0-£200k, known family structure

	IDACI	FSM	KS4 points
Earned income	-0.10	-0.23	0.11
IDACI		0.28	-0.05
FSM			-0.08

Correlations Earned income, IDACI, FSM, KS4 points, 2013, 0-£200k, known family structure

	IDACI	FSM	KS4 points
Earned income	-0.10	-0.25	0.11
IDACI		0.27	-0.04
FSM			-0.08

Correlations Earned income, IDACI, FSM, KS4 points, 2014, 0-£200k, known family structure

	IDACI	FSM	KS4 points
Earned income	-0.11	-0.25	0.12
IDACI		0.26	-0.09
FSM			-0.15

Correlations Earned income, IDACI, FSM, KS4 points, 2015, 0-£200k, known family structure

	IDACI	FSM	KS4 points
Earned income	-0.12	-0.23	0.10
IDACI		0.24	-0.09
FSM			-0.15

Correlations Earned income, IDACI, FSM, KS4 points, 2016, 0-£200k, known family structure

	IDACI	FSM	KS4 points
Earned income	-0.10	-0.23	0.09
IDACI		0.23	-0.12
FSM			-0.15

Correlations Earned income, IDACI, FSM, KS4 points, 2017, 0-£200k, known family structure

	IDACI	FSM	KS4 points
Earned income	-0.08	-0.22	0.10
IDACI		0.21	-0.11
FSM			-0.14

Correlations Earned income, IDACI, FSM, KS4 points, 2018, 0-£200k, known family structure

	IDACI	FSM	KS4 points
Earned income	-0.14	-0.07	0.08
IDACI		0.20	-0.10
FSM			-0.15

Correlations Earned income, IDACI, FSM, KS4 points, 2019, 0-£200k, known family structure

	IDACI	FSM	KS4 points
Earned income	-0.16	-0.18	0.16
IDACI		0.22	-0.14
FSM			-0.16

Stepwise regression models, confirming that FSM is a better predictor of attainment than income.

Regression predicting KS2 total points (stepwise) 2009-2019

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
FSM	0.213	0.103	0.209	0.204	0.217	0.215	0.206	0.185	0.203	0.198	0.191
Income	0.215	0.104	0.211	0.205	0.217	0.215	0.206	0.186	0.203	0.199	0.196

Regression predicting KS2 total points (stepwise) 2009-2019, 0-200k, known family structure

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
FSM	0.192	0.090	0.170	0.141	0.153	0.215	0.146	0.128	0.144	0.139	0.131
Income	0.210	0.102	0.170	0.142	0.154	0.215	0.147	0.128	0.146	0.143	0.131

Regression predicting KS4 total points (stepwise)

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
FSM	0.191	0.179	0.170	0.165	0.165	0.215	0.215	0.215	0.203	0.202	0.205
Income	0.199	0.182	0.173	0.166	0.166	0.216	0.215	0.215	0.203	0.202	0.205

Regression predicting KS4 total points (stepwise) 2009, 0-200k, known family structure

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
FSM	0.175	0.199	0.145	0.084	0.083	0.151	0.150	0.146	0.142	0.146	0.161
Income	0.224	0.228	0.174	0.095	0.094	0.154	0.154	0.148	0.142	0.147	0.175

Multiple regression model predicting KS4 attainment in 2019, using stepwise entry of predictors including all measures of income, FSM and prior attainment (as an example). The next strongest predictor would be simple earned income. No other income/poverty indicators are relevant.

Predictor	R		Coefficient
KS2 maths	0.573		0.378
KS2 English	0.619		0.300

Income band	0.622		0.067
FSM	0.623		-0.042

The average income in each of 20 equal income bands.

KS2 Mean income per band

Income band	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
1	922	1,250	1,276	1,300	1,307	1,428	1,453	1,454	1,456	1,469	1,494
2	3,088	4,029	4,217	4,352	4,480	4,605	4,690	4,619	4,631	4,764	4,871
3	5,048	5,827	6,002	6,286	6,467	6,638	6,724	6,691	6,739	6,944	7,134
4	6,263	7,331	7,514	7,857	8,080	8,294	8,419	8,459	8,528	8,726	8,955
5	7,691	9,033	9,342	9,749	10,004	10,250	10,442	10,481	10,575	10,819	11,062
6	9,318	10,815	11,174	11,666	11,977	12,291	12,470	12,463	12,539	12,876	13,170
7	11,099	12,618	13,072	13,634	14,018	14,385	14,599	14,601	14,706	15,102	15,473
8	13,065	14,633	15,096	15,769	16,196	16,618	16,885	16,884	17,003	17,456	17,902
9	15,432	16,800	17,356	18,135	18,627	19,131	19,406	19,409	19,547	20,069	20,566
10	18,139	19,201	19,845	20,715	21,287	21,852	22,167	22,165	22,334	22,945	23,520
11	21,164	21,967	22,692	23,709	24,382	25,011	25,383	25,376	25,556	26,247	26,899
12	24,476	25,082	25,892	27,033	27,813	28,537	28,955	28,964	29,165	29,959	30,691
13	27,885	28,409	29,315	30,594	31,430	32,274	32,750	32,755	33,010	33,868	34,736
14	31,278	31,757	32,793	34,179	35,125	36,068	36,580	36,593	36,867	37,888	38,822
15	34,648	35,111	36,271	37,772	38,845	39,875	40,465	40,461	40,775	41,878	42,916
16	38,186	38,670	39,890	41,607	42,757	43,850	44,474	44,547	44,856	46,081	47,237
17	42,064	42,608	43,863	45,830	47,150	48,401	49,115	49,113	49,457	50,782	52,045
18	46,584	47,268	48,701	50,921	52,311	53,710	54,523	54,467	54,872	56,392	57,826
19	52,290	53,170	54,811	57,363	59,119	60,562	61,462	61,465	61,933	63,556	65,193
20	70,917	72,713	83,463	92,216	94,923	98,304	98,928	99,345	100,178	104,423	106,185

KS4 Mean income per band

Income band	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
1	1,201	1,239	1,275	1,299	1,283	1,411	1,439	1,451	1,446	1,469	1,529
2	3,931	4,059	4,221	4,374	4,507	4,621	4,692	4,621	4,639	4,758	5,019
3	5,715	5,826	6,010	6,289	6,477	6,638	6,748	6,699	6,741	6,942	7,165
4	7,168	7,339	7,512	7,869	8,079	8,294	8,408	8,479	8,505	8,711	8,899
5	8,850	9,052	9,356	9,770	10,017	10,263	10,446	10,495	10,583	10,847	11,127
6	10,590	10,829	11,173	11,668	11,989	12,307	12,477	12,479	12,550	12,881	13,231
7	12,370	12,627	13,072	13,638	14,020	14,398	14,605	14,615	14,721	15,105	15,494
8	14,326	14,637	15,099	15,772	16,214	16,633	16,888	16,882	16,999	17,459	17,907
9	16,432	16,803	17,358	18,123	18,619	19,116	19,408	19,407	19,537	20,059	20,564
10	18,788	19,194	19,832	20,699	21,269	21,826	22,162	22,164	22,326	22,924	23,497
11	21,475	21,965	22,686	23,704	24,379	24,994	25,361	25,355	25,531	26,224	26,868
12	24,537	25,068	25,900	27,026	27,775	28,516	28,949	28,948	29,153	29,929	30,703
13	27,757	28,376	29,316	30,591	31,435	32,275	32,745	32,749	32,985	33,890	34,682
14	31,058	31,747	32,803	34,187	35,141	36,085	36,572	36,607	36,892	37,877	38,744
15	34,348	35,098	36,268	37,760	38,831	39,908	40,474	40,491	40,790	41,863	42,891
16	37,809	38,649	39,884	41,646	42,745	43,850	44,477	44,491	44,855	46,047	47,218
17	41,687	42,598	43,874	45,863	47,120	48,405	49,125	49,129	49,474	50,774	52,040
18	46,278	47,258	48,712	50,869	52,241	53,680	54,500	54,491	54,919	56,350	57,830
19	52,073	53,168	54,766	57,344	59,059	60,449	61,458	61,462	61,909	63,509	65,114
20	72,258	74,685	84,625	96,006	97,868	102,009	103,429	102,663	104,027	107,058	108,284