

Applying the English Education FSS to the UK: method paper

Introduction

This paper describes the process for calculating Formula Spending Shares (FSS) for school education, and outlines how we applied the education FSS to local authorities across the UK. The education FSS was used to allocate education resources to local authorities in England between 2003/4 and 2006/7.

Education FSS

There are eight sub-blocks within the education service block. They are:

- Primary education
- Secondary education
- Under-5 education
- High cost pupils
- Schools damping
- Youth and community
- Local Education Authority (LEA) central functions
- LEA damping

The two damping sub-blocks, schools damping and LEA damping, are designed to ensure that each school/ LEA receives a minimum increase in funding, taking into account previous grant. Given that we are interested in estimating spending needs in total, these damping blocks are not relevant and are not estimated. The under-5 education sub-block is also not considered, as we are interested in comparing spending needs for school age pupils.

Primary education

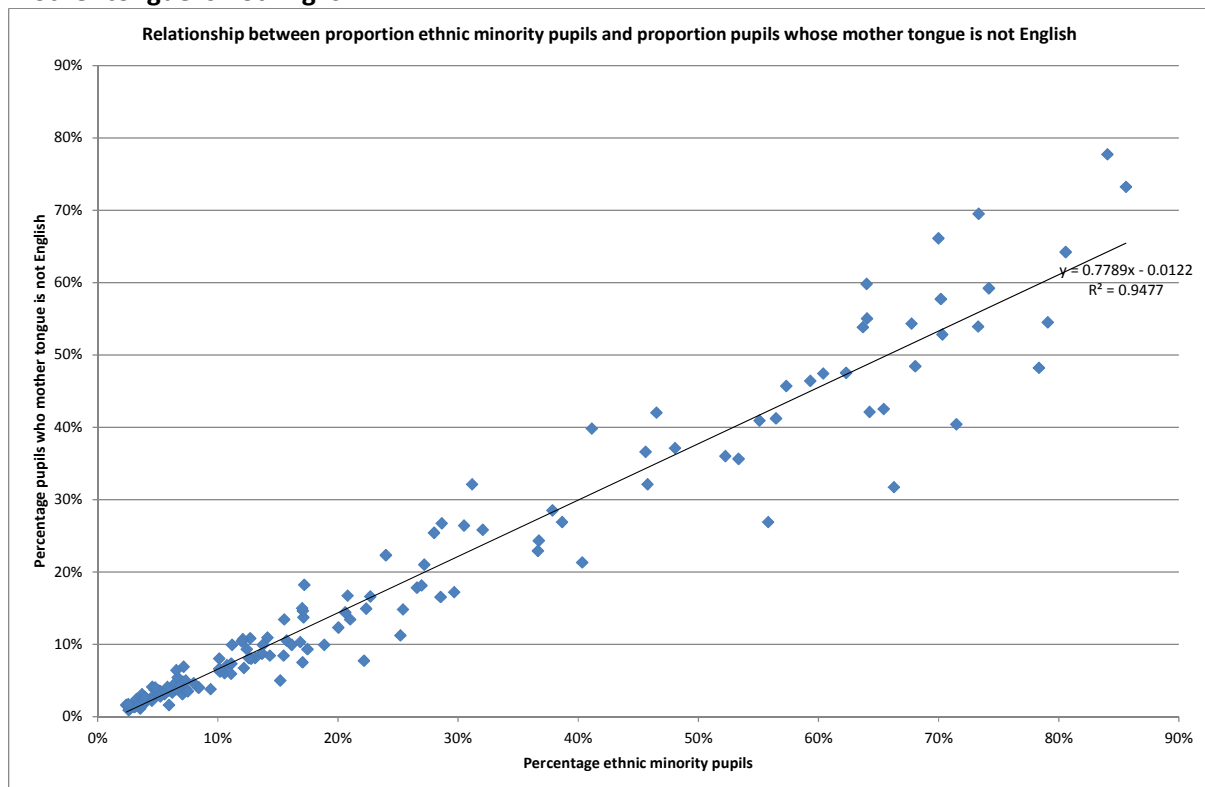
The primary education element consists of a basic amount per primary pupil (i.e. pupils aged 5-10 in maintained schools in the authority), with top-ups for additional educational needs, sparsity and area costs. The full equation is:

- Pupils aged 5-10 multiplied by the result of:
- Primary education basic amount (£2,265.83); plus
- Primary education AEN top-up multiplied by £1,450; plus
- Primary education sparsity top-up multiplied by £187;
- The result if then multiplied by the area cost adjustment for education.

The primary education AEN top-up is in turn a function of three variables: pupils in maintained primary schools whose mother tongue is not English; children of income support/ income based Jobseeker's allowance claimants; and children of working families tax credit claimants.

Data on pupils whose mother tongue is not English was not available for Wales or NI. To estimate figures for Wales and NI, analysis was undertaken for England to examine the relationship between the proportion of pupils from ethnic minorities and the proportion of pupils whose mother tongue is not English. The estimated equation (Figure 1) shows that the proportion of ethnic minorities explains a large part of the variation in the proportion of pupils whose mother tongue is not English. The coefficients from this equation were used, together with actual data on ethnic minority pupils, was used to estimate the proportion of pupils in Wales, Scotland and NI whose mother tongue is not English.

Figure 1: Relationship between proportion ethnic minority pupils and proportion pupils whose mother tongue is not English



Data on children of income support and income based JSA was available from NOMIS for England, Wales and Scotland, and from NINIS for NI. Data on children of working families tax credits by LA area was available from HMRC for England, Wales and NI. Data for NI was not available; it was therefore assumed that the five education authorities in NI had the same value for this indicator as the average for Wales and Scotland.

The area cost adjustment is a factor to reflect differences in the cost of providing education services across the country. The ACA uses data from the New Earnings Survey to calculate (after controlling for the effects of occupational structure), a geographical cost index. This is expressed as an index with a mean of 1 (so an authority with an ACA of 1.1 faces costs 10% higher than average). The ACA scores are lower truncated at the mean, such that areas with a lower than average wage index are given an ACA of 1.

The sparsity top-up is calculated using data on population data at ward level. The population of the LA living in wards with a population density of less than 0.5 persons per hectare (multiplied by 3.5)

and the population living in wards with a population density of 0.5 – 4 persons per hectare, is expressed as a proportion of the total population of the LA. The indicator was relatively straightforward to calculate for the UK territories. Information on the size of wards (in hectares) was available from ONS, and was combined with data on population to calculate population density. The ward level information (for some 9,500 wards) was aggregated to LEA level.

Within English LEAs, the effect of the ACA is to adjust resources to London and the south – no LEA in the midlands or north of England has an ACA above 1. It was not possible to completely replicate the ACA, as to do so would require collation of extensive data on wages and occupational structure by UK area. Instead, wage data was collated from NES for each UK LEA, and used to estimate a wage index for each LEA (without having controlled for occupational structure). By this analysis, the only LEAs in the devolved territories with an ACA above one were the Edinburgh and Lothian authorities. Given that no English LA in the midlands or north scores above one, this analysis seems intuitively reasonable. The accuracy with which our approach measures the ACAs of the other LAs in the UK territories does not matter, as they are given scores at the mean (1).

Secondary education

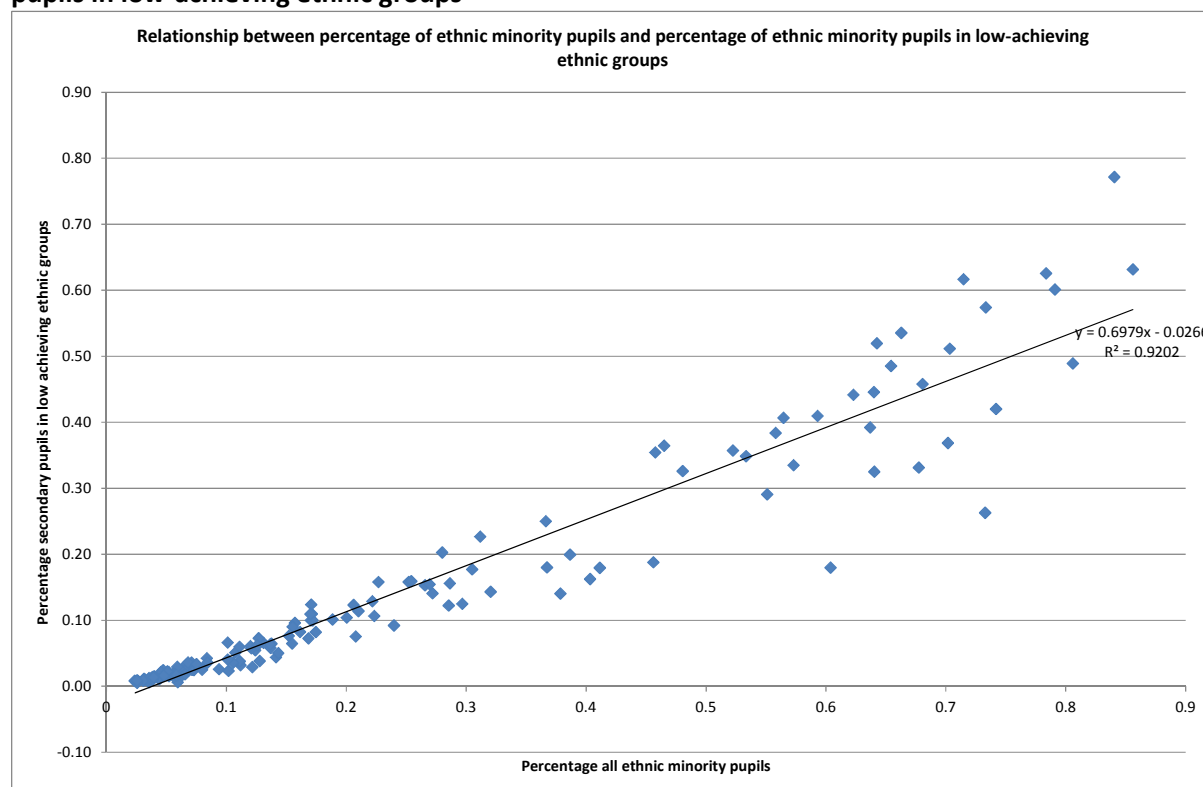
The main client group for the secondary education sub-block is the number of pupils aged 11-15. The full equation is:

- Pupils aged 11-15 multiplied by the result of:
- Secondary education basic amount (£2,967.80); plus
- Secondary education AEN top-up multiplied by £1,450; plus
- The result if then multiplied by the area cost adjustment for education.

The secondary education AEN top-up is a function of three variables: pupils of secondary school age in low-achieving ethnic groups; children of income support/ income based Jobseeker's allowance claimants; and children of working families tax credit claimants. The latter two variables (income support dependents and working families tax credit claimant dependents) are defined in the same way as for the primary education sub-block.

Low-achieving ethnic groups are defined as including Pakistani, Bangladeshi, African and Caribbean, other black, and gypsy/ Roma ethnic groups (but not for example Chinese or Indian ethnic groups). For the devolved territories, data on pupils of ethnic origin was available, but this data was not generally broken down into all necessary categories. The Welsh data for example classified pupils as 'Asian' but did not distinguish Indian from Pakistani or Bangladeshi Asians. The Scottish and NI data did not distinguish between different ethnic categories at all. It was therefore assumed that the proportion of ethnic pupils who were from low-achieving ethnic groups was the same in the devolved territories as in England (see figure 2). (An alternative, and possibly more reliable approach, would be to use census information on the breakdown of Scotland's total population of ethnic groups as a proxy for the likely breakdown of pupils by ethnic group).

Figure 2: Relationship between proportion ethnic minority pupils and proportion ethnic minority pupils in low-achieving ethnic groups



There is no sparsity top-up for secondary education (this is the same as in the Scottish education formula, which has a sparsity top-up for primary but not secondary education). The same ACA is used as was used for the primary education sub-block.

High-cost pupils

The number of high-cost pupils is estimated for each LA based on a function of the proportion of births that are low birthweight, the proportion of children in households of income support/ income based jobseekers allowance, and the population aged 3-15.

Data on low-weight births in each LA was available from the respective national health service databases; data was collated and averaged over a five-year period to remove the effect of annual fluctuations. For NI however, data was not available at LA-level (data was available for NI as a whole) and it was therefore assumed that the five LEAs in NI record the same proportion of low-weight births as for NI as a whole.

Data on children in households of IS/JSA claimants had already been collated for the primary and secondary education indicators, whilst data on the population aged 3-15 was available from ONS.

Having estimated the proportion of high-cost pupils in each LA, the Education FSS allocates £8,168.15 for each of these pupils. The resulting total amount is then multiplied by the ACA, as previously described.

Youth and community

The client group for the youth and community sub-block is the population aged 13-19. A sum of £80.40 is allocated for each individual in this age group. The full equation is:

- Pupils aged 13-19 multiplied by the result of:
- Youth and community basic amount (£80.40); plus
- Youth and community deprivation top-up multiplied by £301.87; plus
- Youth and community ethnicity top-up multiplied by £96.30;
- The result is then multiplied by the area cost adjustment for education (defined as previously).

The youth and community deprivation top-up is a function of the children of IS/JSA claimants. However a threshold is applied so that any LAs who score below the threshold (9.2%) are not allocated any additional resources (whereas pupils above this threshold attract an additional £302 per pupil).

The ethnicity top-up is a function of the proportion of secondary-school pupils in low-achieving ethnic groups (defined as before), but again a threshold is applied. LAs with fewer than 0.55% of their secondary pupils in low-achieving ethnic groups are not allocated any additional resources (whereas pupils above this threshold attract an additional £96 per pupil).

LEA Central Functions

The client groups for the LEA central functions sub-block are pupils aged 3-18 (including those in sixth forms and academies) and resident pupils aged 3-18. For LEA pupils the formula is:

- Pupils aged 3-18 multiplied by
- Pupils basic amount (£114.62) plus
- Deprivation top-up multiplied by £194.37

The deprivation top-up is defined as a function of children in IS/JSA households above threshold, as described before.

For resident pupils the formula is:

- Resident pupils aged 3-18 multiplied by
- Resident pupils basic amount (£114.05) plus
- Deprivation top-up multiplied by £194.37; plus
- Sparsity top-up multiplied by £145.63.

The deprivation top-up is defined as a function of children in IS/JSA households above threshold, as described before. The sparsity top-up is defined as under the Primary Education sub-block.

The combined sum of the LEA pupil and resident pupil amount is then multiplied by the ACA. An LEA fixed amount of £425,000 per LEA is then added to the resulting sum to give the total amount for LEA central functions¹.

¹ An amount for 'residual college lecturers pensions' is also added, which we ignore for the purposes of our work.

Results

The results of applying the Primary education FSS are shown in Table 1; Table 2 shows the same information expressed as an index relative to need in England.

Primary education

England has much higher additional educational needs per pupil than the devolved territories. Scotland has the lowest AEN, 30% below England. England's relatively high needs are due to it having a much higher proportion of pupils whose mother tongue is not English – 15% of pupils in England, compared to 3% in Wales, 4% in Scotland and less than 1% in NI. The other indicators used to assess AEN show much less variation across the territories. In terms of the indicator 'children of families receiving IS or income-based JSA' the respective scores for England, Wales, Scotland and NI are 19%, 22%, 19% and 21%. The respective scores for 'children in families receiving working families tax credit' are 20%, 23%, 21% and 22%.

On the sparsity indicator all three devolved territories have significantly higher per pupils needs than England. Wales' sparsity score is 2.6 times England's; Scotland and NI score over four times higher than England.

Combining the AEN and sparsity scores results in a per pupil amount (before ACA). Before ACA, Wales' per pupil need is around 3% higher than England's, while Scotland's and NI's per pupil need is around 6% higher than England's. The effect of the ACA however is to reduce the extent of these differentials. After ACA, Wales per pupil need for primary education is around 1% less than England's; Scotland's is 2.3% higher; and NI's is 1.9% higher.

Table 1: Primary education per capita needs

	Pupils	AEN amount	Sparsity amount	Per pupil (before ACA)	Per pupil (after ACA)
England	3,229,510	£198	£63	£2,527	£2,622
Wales	194,189	£167	£168	£2,600	£2,600
Scotland	314,367	£138	£262	£2,666	£2,683
NI	133,925	£140	£267	£2,672	£2,672

Table 2: Primary education per capita indices

	AEN amount	Sparsity amount	Per pupil (before ACA)	Per pupil (after ACA)
England	1.000	1.000	1.000	1.000
Wales	0.843	2.657	1.029	0.992
Scotland	0.697	4.155	1.055	1.023
NI	0.706	4.232	1.058	1.019

Secondary education

The results of applying the Secondary education FSS are shown in Table 3; Table 4 shows the same information expressed as an index relative to need in England.

For AEN, the three devolved territories score less per capita than England, although their gap to England is not as large as it is for Primary education AEN. The magnitude of the gap between the

devolved territories primary and secondary AEN scores is surprising (for example, NI's AEN score increases from 0.706 for primary to 0.879 for secondary), given that the way the AEN is calculated – it is essentially calculated the same way for primary and secondary education, but the AEN for secondary education includes the proportion of ethnic minorities in low achieving groups in place of the indicator pupils whose mother tongue is not English.

The difference in primary and secondary AEN scores is actually in large part due to issues around English pupil numbers. Specifically, the most deprived LEAs share of primary pupils is larger than those LEAs share of secondary pupil numbers. This means that England's per pupil AEN score declines between primary and secondary ages, but not because there is any difference in the indicators used. Instead, the relatively better off LEAs are weighted more heavily in calculating England's overall AEN for secondary education than they are for primary education, hence the increase in relative need observed for the devolved territories.

After application of AEN (but before ACA), the relative per pupil spending needs of Wales, Scotland and NI are 0.2%, 1.4% and 0.7% lower than England's. England has higher per pupil needs essentially because it has higher numbers of pupils in low-achieving ethnic groups, whilst this effect is compensated for somewhat by the fact that the devolved territories tend to score more highly on the other AEN indicators (children in working families tax credit households and children in IS/ JSA households).

Following application of ACA, the gap between England's per capita needs and the needs of the devolved territories widens slightly, although the three devolved territories have very similar relative needs themselves. Wales' per pupil spending need for secondary education is 3.5% below England's; Scotland's is 3.9% below; and NI's is also 3.9% below.

Table 3: Secondary education per capita needs

	Pupils	AEN	Per pupil (before ACA)	Per pupil (after ACA)
England	2,825,930	£176	£3,144	£3,249
Wales	171,142	£169	£3,137	£3,137
Scotland	284,769	£133	£3,100	£3,121
NI	120,210	£155	£3,123	£3,123

Table 4: Secondary education per capita indices

	AEN	Per pupil (before ACA)	Per pupil (after ACA)
England	1.000	1.000	1.000
Wales	0.959	0.998	0.965
Scotland	0.752	0.986	0.961
NI	0.879	0.993	0.961

Youth and community

Table 5 shows the results of applying the youth and community sub-block of the English FSS. All three devolved territories score higher than England on deprivation, and Wales and NI score significantly above England. This deprivation score is based on one indicator only – the proportion of

children of IS/ JSA parents above threshold. The actual amounts of funding associated with this sub-block are however relatively small, with NI for example being allocated an additional £9 per pupil compared to England.

In terms of the ethnicity indicator, the position is reversed, with England having a much higher proportion of low achieving ethnic groups above threshold. Again, the actual levels of funding per pupil are small.

Combining the two elements, Wales' per pupil need is 3.4% below England's, Scotland's is 5.6% below England's, and NI's is 1.8% below England's.

Table 5: Youth and community

	Per pupil amount			Per pupil indices		
	Deprivation	Ethnic	Total	Deprivation	Ethnic	Total
England	£30	£11	£121.07	1.000	1.000	1.000
Wales	£38	£2	£120.56	1.271	0.176	0.996
Scotland	£32	£2	£114.29	1.053	0.204	0.944
NI	£39	£0	£118.95	1.279	0.000	0.982

High-cost pupils

Table 6 shows the results of applying the high-cost pupils sub-block. The number of high-cost pupils is defined as a function of the proportion of low-weight births, and the proportion of children in IS/ JSA households. Estimated in this way, Wales is estimated to have the highest per capita need for high cost pupils, 3% per capita higher than England. Scotland and NI both have per capita need below England. NI's high-cost needs are estimated to be low because it has a relatively low proportion of babies born low-birthweight.

After applying ACA, Wales' total per capita need for this block is 1% below England's; Scotland's is 4.3% below England's and NI's is 7.6% below England's.

Table 6: High-cost pupils

	Individuals	High cost	High-cost inc ACA	High cost	High-cost inc ACA
England	7,774,100	£321	£334	1.000	1.000
Wales	447050	£330	£330	1.030	0.990
Scotland	737,600	£317	£319	0.989	0.957
NI	308,150	£308	£308	0.961	0.924

LEA Central Functions

Table 7 shows the results of applying the LEA central functions sub-block; Table 8 shows the same information expressed as an index, where England equals 1.

The non-resident pupil numbers are based on the number of registered pupils aged 5-15 rather than 3-18 including those in sixth forms. This is to enable a fair, like-for-like comparison to be made on spending needs for the compulsory age groups. Including 16-18 year olds would complicate analysis as it would be difficult to disentangle *need* from policy influences – in England for example, a smaller

proportion of pupils remain in sixth forms as there is a tendency to continue post-16 education in colleges. For similar reasons, it has been assumed that, in each LEA, 1% of all pupils are residential pupils.

The non-residential pupil amount is thus what each DA would be allocated for each non-residential pupil, based on DAs scores on the deprivation top-up. England and Scotland receive less per pupil than Wales and NI. The amount that each DA would be allocated for residential pupils depends not only on the deprivation top-up but also on the sparsity top-up, and this therefore favours Scotland and NI.

Including the ACA, the per pupil spending needs of Wales, Scotland and NI are 6%, 8% and 11% higher respectively than England's. Fixed costs (for each LEA) are then added. This adjustment favours Scotland and Wales in particular, because they have more LEAs per pupil than England or NI. England has 150 LEAs, giving it 40,000 pupils per LA; Wales has 17,000 pupils per LEA; Scotland has 19,000; and NI, with just five LEAs, has 51,000 pupils per LA and therefore does relatively badly from this allocation rule.

In total, including ACA and the fixed costs (but assuming all LEAs have the same proportion of 'resident pupils'), the results of applying the LEA Central Functions sub-block indicate that Wales and Scotland both have per pupil spending needs around 15% higher than England, while NI has spending needs 9% higher than England. NI has the highest levels of deprivation, but this is mitigated for to an extent by the relatively lower amount it receives for fixed costs.

Table 7: LEA Central Functions per pupil spending needs

	Non-resident pupils	Resident pupils	Non-resident amount per pupil	Resident amount per pupil	Total exc ACA	Total inc ACA	Total inc fixed costs
England	6,055,440	605,544	£134.09	£63.52	£127.68	£132.25	£141.76
Wales	365,331	36,533	£139.40	£147.67	£140.15	£140.15	£163.42
Scotland	599,136	59,914	£134.44	£219.99	£142.22	£143.08	£163.71
NI	254,135	25,414	£138.91	£220.90	£146.36	£146.36	£153.96

Table 8: LEA Central Functions per pupil needs indices

	Non-resident amount per pupil	Resident amount per pupil	Total exc ACA	Total inc ACA	Total inc fixed costs
England	1.000	1.000	1.000	1.000	1.000
Wales	1.040	2.325	1.098	1.060	1.153
Scotland	1.003	3.463	1.114	1.082	1.155
NI	1.036	3.478	1.146	1.107	1.086

Total assessed need

The total assessed need per pupil is derived by summing the amounts from the previous sub-blocks. England is assessed to have higher per pupil spending needs than all three devolved territories. Wales' and NI's per pupil needs are around 2% below England's, while Scotland's is slightly less at 1% below England's.

Table 9: Total assessed need per pupil

	Amount	Amount/ pupil	Index
England	21,756,843,333	£3,589	1.000
Wales	1,288,056,922	£3,526	0.981
Scotland	2,126,692,995	£3,549	0.988
NI	892,079,428	£3,510	0.977

The main reason for England's higher relative spending need than the devolved territories is because of the ACA. Without this (which adjusts resources towards the southeast of England rather than to any other regions), then the relative need scores of each of the devolved territories would be 1-2% higher per pupil than England.

Table 10: Total assessed need per pupil (excluding ACA)

	Amount	Pupils	Amount/ pupil	Index
England	20,999,084,227	6,055,440	£3,468	1.000
Wales	1,288,056,922	365,331	£3,526	1.017
Scotland	2,112,827,708	599,136	£3,526	1.017
NI	892,079,428	254,135	£3,510	1.012