Structure and Performance of Post-Primary Schools in Northern Ireland

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Chapter 5
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5.1. Introduction

This chapter evaluates post-primary school performance in Northern Ireland against a number of factors which popular wisdom would regard as important determinants of educational performance. Within the context of educational policy, a post-primary school's educational performance is conventionally measured by the proportion of its pupils obtaining five or more GCSEs at grades A*-C (including English and Mathematics), hereafter referred to as 5+A*-C (E&M) or, equivalently, as 'good GCSEs'. The minimum performance standard for post-primary schools in England is at least 40% of a school's Year 12 students obtaining 5+A*-C (E&M).[1] When students obtain grades A*-C in five or more subjects, irrespective of what these subjects are, their level of performance is referred to as 5+A*-C with pupils with 5+A*-C (E&M) being a subset of those with 5+A*-C. However, in this book we focus on the 5+A*-C (E&M) measure because, as Greaves *et. al.* (2014) observe: it represents the culmination of compulsory schooling and is often a condition for being accepted for A-level (Key Stage 5) studies which follow the end of compulsory schooling; it is also an important benchmark for employers, is frequently focused on by commentators, and is a major of performance in school league tables.

One of the factors which it is thought has a favourable impact on a school's performance in terms of the proportion of its pupils getting good GCSEs is *school size*. An important assumption underlying the Northern Ireland government's education policy is based on the assumption that creating larger schools, by closing smaller ones, will result in better schools. Another assumption often made in respect of education policy in Northern Ireland is that schools which are in financial difficulty are also schools which perform relatively badly: consequently it is hypothesised that there will a strong association between *financial viability* and educational performance. Another hypothesis is that school performance is affected by the *type of management* which operates the school. In particular that the differing levels of performance in Catholic (Maintained), Protestant (Controlled), and Integrated schools are, in part, due to the fact that they embody different approaches to educating children.

The presence of pupils who are *disadvantaged* – either by virtue of *economic deprivation* or because they have *special educational needs* (hereafter, SEN pupils) is also thought to affect school performance adversely. This book follows convention by identifying economically deprived pupils as those who, by virtue of low parental income, are eligible for *free school meals* (hereafter, FSM pupils).[2] FSM pupils are, of course, a surrogate for pupils from disadvantaged backgrounds and, although one may think of other surrogates, it remains the most commonly used indicator of pupils' economic deprivation.

These hypotheses are subjected to testing, first in a bivariate framework and then in a multivariate framework. The advantage of the latter over the former is that it allows the values of the other variables to be held constant (or, in the statistical jargon, 'controls to be imposed' on associated variables) while the relationship between the two variables of interest is being examined. The instrument for testing these hypotheses was a consistent dataset for Northern Ireland's post-primary schools - containing information on *inter alia* schools' education performance, enrolment trends and

[1] Torney (2014).

[2] Pupils are eligible for free school meals if their parents are in receipt of any of the following benefits: (i) Income Support; (ii) Income-based Job Seekers allowance; (iii) Income-related Employment and Support Allowance; (iv) Support under Part VI of the Immigration and Asylum Act 1999; (v) Guaranteed element of the State Pension Credit; (vi) Child Tax Credit with an annual income not exceeding £16,190.

financial standing – which we constructed using information from: (i) the 'viability audits', which each school had to provide the Education and Library Boards; (ii) data provided to researchers by DENI on its website and (iii) additional information obtained by Torney (2014, 2013) from DENI, under the Freedom of Information Act. These data provided an opportunity to: construct an index of schools based on the variables deemed to be important by Northern Ireland's Department of Education for future sustainable schools (quality of education, enrolments and finance); consider issues of access and performance inequality; and, highlight those factors associated with better educational performance. The chapter concludes with a discussion on how this empirical analysis might inform the ongoing public policy debate on the future of the education system in Northern Ireland.

5.2 Salient Features of Post-Primary Schools in Northern Ireland

Table 5.1 shows the main features of post-primary schools in Northern Ireland in 2013. There were a total of 210 post-primary schools in Northern Ireland in 2013 out of which examination results (for the 2013 GCSE and A level examinations) were available for 205 schools. This chapter's focus is on these 205 schools which collectively, encompassed a total of 142,960 pupils of whom 19% were FSM pupils and 20% were SEN pupils. These 205 schools (for which examination results were available) were subdivided into 68 grammar schools (which admitted pupils on the basis of an entry test at age 11) and 137 secondary schools (which were non-selective in their admissions). Northern Ireland's 68 grammar schools contained 62,599 pupils (44% of total enrolment) with 80,361 pupils (56% of total enrolment) in secondary schools. Thus, the average enrolments of grammar schools and secondary schools were, respectively, and 921 and 587 pupils.

Northern Ireland's grammar schools could be subdivided into 'Catholic' grammars (30 in number, with 44% of all grammar school pupils) and 'Protestant' grammars (38 in number, with 56% of all grammar school pupils). Similarly, secondary schools could be subdivided into: Catholic (Maintained) schools (67 in number, with 50% of all secondary school pupils); Protestant (Controlled) schools (49 in number, with 34% of all secondary school pupils); and 'Other' schools (21 in number, of which 20 were Integrated schools, with 16% of all secondary school pupils).[3] Hereafter, the 'Other' schools are referred to as 'integrated' schools.

The schools were managed by five separate 'Education Boards', the Western (40 schools, with 18% of total pupils), the Southern (47 schools, with 21% of total pupils), Belfast (34 schools, with 21% of total pupils), North-East (48 schools, with 22% of total pupils), and South-East (36 schools, with 18% of total pupils). On the basis of an audit conducted in 2010, the 205 schools were placed in four categories of financial stress (defined more specifically below) ranging from 'no stress' (level 4) to 'high stress' (level 1). Most of the schools (138/205) were financially unstressed (that is, level 4); 48 of the 138 schools experienced only a moderate level of financial stress (level 3); and only 18 schools were financially stressed (that is, level 1 or 2).

[3] The exception was *Colaiste Feirste* in Belfast which was an Irish language school.

Table 5.1: Salient Features of Northern Ireland's Post-Primary Schooling System, 2013

	Number of Schools	Total Enrolment	Year 12 enrolment	Year 14 enrolment	FSM pupils	SEN pupils	5+A*-C	5+A*-C (E&M)	2+A*-E	3+A*-C
Total Schools	205	142,960	24,147	13,743	19.0	19.8	78.8	59.5	98.0	65.3
Grammar Schools:	68	62,599	9,403	8,303	7.4	7.9	97.3	93.9	99.6	77.1
Catholic Grammars	*30*	*27,661*	*4,017*	*3,741*	*10.2*	*8.9*	*98.4*	*94.9*	*99.5*	*80.1*
Protestant Grammars	*38*	*34,938*	*5,386*	*4,562*	*5.1*	*7.1*	*96.4*	*93.1*	*99.6*	*74.7*
Secondary Schools:	137	80,361	14,744	5,440	28.0	28.9	67.0	37.5	95.5	46.6
Maintained	*67*	*40,015*	*6,990*	*3,136*	*32.1*	*29.2*	*73.8*	*41.0*	*95.6*	*49.9*
Controlled	*49*	*27,692*	*5,562*	*1,472*	*23.1*	*27.3*	*58.9*	*33.2*	*95.8*	*41.0*
Other	*21*	*12,654*	*2,192*	*832*	*25.8*	*31.8*	*66.3*	*37.3*	*94.7*	*43.5*
Western Board	40	25,642	4,133	2,526	24.1	23.5	80.8	58.9	98.3	63.8
Southern Board	47	30,656	5,516	2,961	18.4	14.9	80.2	61.6	98.2	70.0
Belfast Board	34	29,417	4,625	3,230	22.0	25.6	83.4	63.0	96.2	63.0
North-East Board	48	32,019	5,502	2,843	15.0	15.3	77.1	57.3	99.1	65.3
South-East Board	36	25,226	4,371	2,183	15.8	20.7	72.3	56.2	98.6	64.3
Financial Stress=1	10	2,758	593	143	40.0	41.3	57.5	25.7	90.0	47.9
Financial Stress=2	8	3,140	804	174	32.8	33.4	63.1	28.8	85.6	35.6
Financial Stress=3	48	36,153	6,367	3,152	23.2	20.5	76.2	51.6	96.9	59.8
Financial Stress=4	138	100,103	16,251	10,206	16.5	18.5	81.3	65.3	98.6	67.8

Small versus Large Schools

We divided schools into two groups: those that had at least 500 pupils in years 8-12 and were, therefore, on DENI's criterion, *size viable* and those that had less than 500 pupils in years 8-12 and were, therefore, on DENI's criterion, *size unviable.* Of the 205 post-primary schools in Northern Ireland, 130 were 'size viable' and 75 were 'size unviable'. At first blush, there appeared to be a strong association between size and performance: the mean values of 5+A*-C GCSE passes for size viable and unviable schools were, respectively, 84% and 68% and the mean values of 5+A*-C (E&M) GCSE passes for size viable and unviable schools were, respectively, 68% and 41%. Both pairs of differences were statistically significant at the 5% level (hereafter, 'significant').[4]

However, this comparison is misleading because the group of 130 'size viable' schools contained 63 (of the total of 68) grammar schools while the group of 75 size unviable schools contained only 5 grammar schools. Since, compared to secondary schools, grammar schools had a much higher level of performance, in respect of both 5+A*-C and 5+A*-C (E&M) GCSE passes, the observed relationship between size and performance is very possibly more of a 'grammar school' effect" rather than a 'size effect' *per se*.

A fairer comparison would be to compare size viable *secondary* schools with size unviable *secondary* schools and to compare size viable and size unviable *grammar* schools. Of the 137 post-primary secondary schools in Northern Ireland, 67 were 'size viable' and 70 were 'size unviable'. The mean values of 5+A*-C GCSE passes for size viable and unviable secondary schools were, respectively, 70% and 65% and the mean values of 5+A*-C (E&M) GCSE passes for size viable and unviable secondary schools were, respectively, 40% and 35%. Neither pair of differences was

[4] t(1)=6.0 and t(1)=7.1, respectively.

statistically significant at the 5% level, but both were significant at the 10% level. The results suggest that that, as far as secondary schools were concerned, size and GCSE performance were (weakly) *positively* related.

Of the 68 grammar schools in Northern Ireland, 63 were 'size viable' and 5 were 'size unviable'.[5] The mean values of 5+A*-C GCSE passes for size viable and unviable grammar schools were, respectively, 97% and 99% and the mean values of 5+A*-C (E&M) GCSE passes for size viable and unviable grammar schools were, respectively, 94% and 96%. The first difference (with respect to 5+A*-C GCSE passes) was significant suggesting that, as far as grammar schools were concerned, size and GCSE performance (not taking account of English and Mathematics) were *inversely* related.

Schools and Financial Stress

Table 5.1 also shows that of the 204 post-primary schools for which the relevant data existed: 138 (68%) had a financial stress level of 4 (budget deficit is within Local Management of Schools (LMS) limits); 48 (24%) had a financial stress level of '3' (budget deficit greater than 5% or £75,000 and less than 25% of LMS limits); 8 (4%) had a financial stress level of '2' (budget deficit 25% or more but less than 50% of LMS limits); and 10 (5%) had a financial stress level of '1' (budget deficit 50% or higher than LMS limits). So, 68% of schools did not have any budgetary problems and 92% of schools were either not in any budgetary difficulty or not in any serious budgetary difficulty. Putting it differently, only 18 of Northern Ireland's 204 post-primary schools (8%) could be said to be in financial difficulty and, furthermore, all of these 18 financially stressed schools were secondary schools; none of Northern Ireland's 68 grammar schools were in financial difficulty.

Furthermore the 18 (secondary) schools which were financially stressed were smaller than the 118 secondary schools which were unstressed (the average size of the 18 stress level 1 or 2 schools was 327 pupils compared to 624 pupils for the 118 stress level 3 or 4 secondary schools) and they also carried a larger proportion of FSM and SEN pupils: the proportions of FSM and SEN pupils in level 1/2 schools were, respectively, 36% and 37% compared to, respectively, 18% and 19% for level 3/4 schools. It is also noteworthy that that schools which were financially stressed performed worse educationally than schools which were unstressed (the proportions of 5+A*-C and of 5+A*-C (E&M) GCSE passes were, respectively, 61% and 27% in stress level 1/2 schools compared to, respectively, 80% and 61% in stress level 3/4 schools).

Schools and Education Boards

The smallest schools in 2012-13 were in the Western Education and Library Board (ELB), with an average size of 641 pupils, and the largest schools were in the Belfast ELB with an average size of 865 pupils. The proportion of FSM pupils (in the total number of pupils in a school) was highest in the Western ELB (24%) and lowest in the North-Eastern ELB and the South-Eastern ELB (15%). The proportion of SEN pupils (in the total number of pupils in a school) was highest in the Belfast ELB (26%) and lowest in the North-Eastern ELB (15%).

The Belfast Board and South Eastern Boards had, respectively, the highest and the lowest proportion of 5+A*-C GCSE passes (respectively, 83% and 72%) while the Belfast Board and South Eastern Boards also had, respectively, the highest and the lowest proportion of 5+A*-C (E&M) GCSE passes (respectively, 63% and 56%).

Maintained, Controlled and Integrated Secondary Schools

[5] These were: Collegiate Grammar (Enniskillen), Dominican College (Portstewart), Lugan College (Craigavan), Portora Royal School (Enniskillen), St. Michael's Grammar (Craigavon).

In 2013, there were 49 'controlled', 67 'maintained', and 21 'integrated' secondary schools in Northern Ireland. The average number of pupils in maintained, controlled and integrated secondary schools was, respectively: 594, 565, and 603 pupils. FSM pupils in controlled secondary schools comprised 23% of total enrolment compared to 32% in maintained secondary schools, and 26% in integrated schools; the corresponding figures for SEN pupils were 27% for controlled secondary schools, 29% for maintained secondary schools, and 32% in integrated schools. So, compared to their controlled and integrated counterparts, maintained secondary schools had a *significantly* larger proportion of FSM pupils.[6] These proportions are set out in Figure 5.1, below.

[6] A test of differences in mean FSM proportions between maintained and controlled secondary schools was significant at the 5% level with t(1)=4.6; however, a test of differences in mean SEN proportions between the two types of schools was *not* significant at the 5% level with t(1)=0.85. A test of differences in mean FSM proportions between maintained and integrated secondary schools was significant at the 5% level with t(1)=2.1; however, a test of differences in mean SEN proportions between the two types of schools was *not* significant at the 5% level with t(1)=0.89.

Figure 5.1: Proportions of FSM and SEN pupils in Northern Ireland Secondary Schools, 2012-13

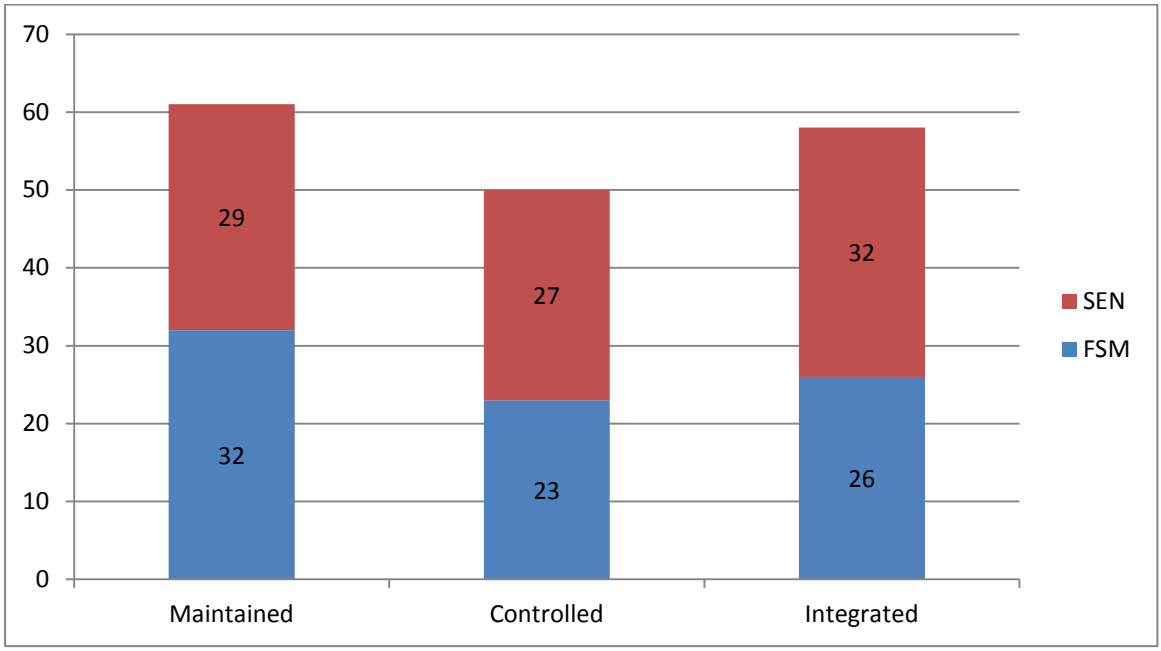
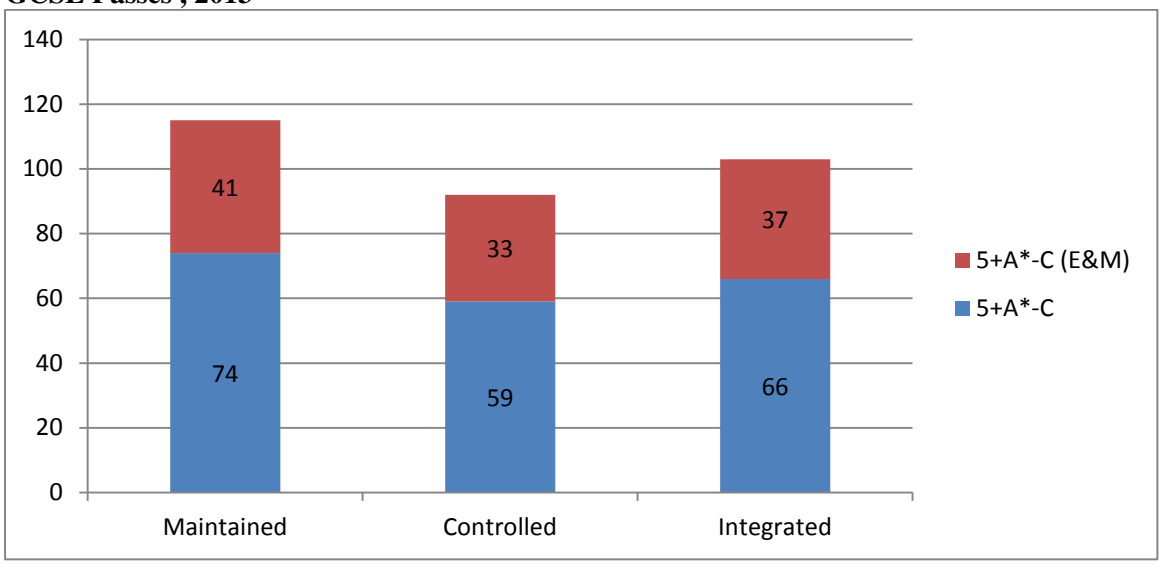


Figure 5.2: Proportions of pupils in Northern Ireland Secondary Schools obtaining 'good' GCSE Passes , 2013

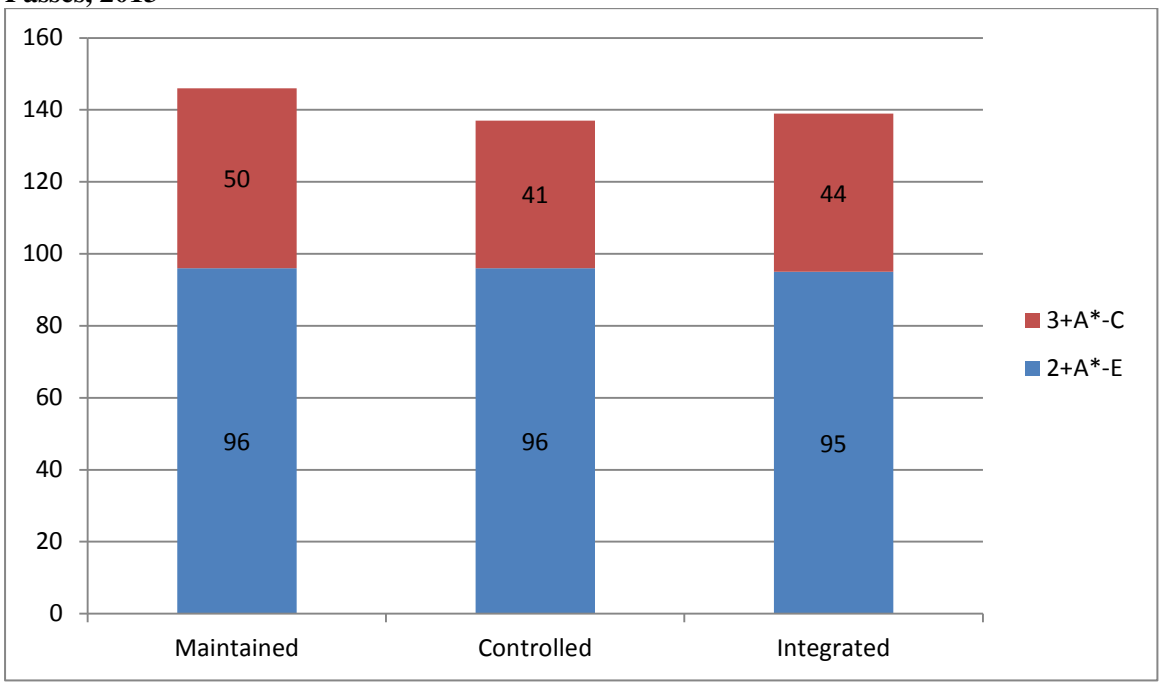


In view of the greater propensity of maintained secondary schools to meet the educational needs of Northern Ireland's less privileged (that is, FSM and SEN) post-primary pupils, it is commendable that they also recorded a significantly better educational performance than controlled secondary schools. As Figure 5.2 shows, of the average Year 12 class of 104 pupils in maintained secondary schools, 73% obtained 5+A*-C GCSE passes in 2013, compared to 59% of the average Year 12 class of 103 pupils in controlled secondary schools. Moreover, 41% of year 12 pupils in maintained secondary schools obtained 5+A*-C (E&M) GCSE passes in 2013 compared to 33% in

controlled secondary schools. The difference between maintained and controlled secondary schools in respect of both sets of educational achievements was significantly different from zero.[7]

Figure 5.2 shows that maintained schools also did better than integrated schools. In 2013, of the average Year 12 class of 104 pupils in integrated schools, 66% (compared to 73% for maintained secondary schools) achieved 5+A*-C GCSE passes and 37% obtained 5+A*-C (E&M) GCSE passes (compared to 41% for maintained secondary schools). However, of these two differences, the first (5+A*-C GCSE passes) was significantly different from zero[8] but the second (5+A*-C (E&M) GCSE passes) was not. Lastly, integrated schools did better than controlled secondary schools: 66% of 5+A*-C and 37% 5+A*-C (E&M) GCSE passes compared to 58% and 33% for controlled secondary schools. The first difference, in respect of 5+A*-C GCSE passes, was significantly different from zero,[9] but the second difference, 5+A*-C (E&M) GCSE passes was not.

Figure 5.3: Proportions of Year 14 pupils in Northern Ireland's Secondary Schools with A-level Passes, 2013



It is also possible to compare maintained and controlled secondary schools in terms of the A-level achievements of their Year 14 pupils. For A-level passes, we adopted two standards of achievement: (i) the percentage of pupils achieving 2 or more A level passes at grades A*-E, including equivalents (hereafter, 2+A*-E) and (ii) the percentage of pupils achieving 3 or more A level passes at grades A*-C, including equivalents (hereafter, 3+A*-C or 'good' A-levels). As Figure 5.3 shows of the average Year 14 class of 47 pupils in maintained secondary schools, 96% achieved 2+A*-E A-level passes and 50% achieved 3+A*-C A- level passes in 2013. This compares to controlled secondary schools, with an average Year 14 class of 30 pupils, in which also 96% achieved 2+A*-E A-level passes but 41% achieved 3+A*-C A-level passes in 2013 and integrated schools, with an average Year 14 class of 40 pupils, in which 95% achieved 2+A*-E A-level passes and 44% achieved 3+A*-C A-level passes in 2013. A statistical analysis of differences between the three types of schools

[7] With t(1) values of, respectively, 4.7 and 2.9
[8] t(1)=1.92, making it significant at the 10% level.
[9] t(1)=1.98.

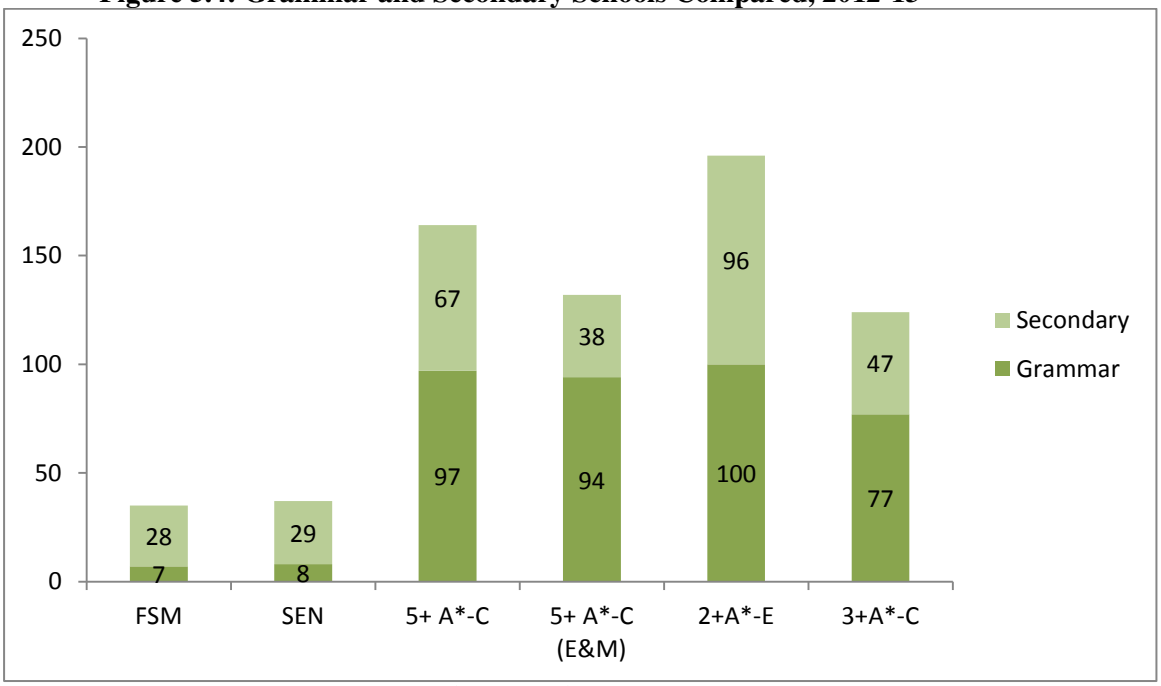
in respect of good A-levels suggests that the proportion of good A-levels in 2013 was significantly higher in maintained, compared to controlled, secondary schools but that all the other differences between the three types of schools in respect of A-level results (noted above) were not statistically significant.

Grammar versus Secondary Schools

As shown in Table 5.1, there were 205 post-primary schools in Northern Ireland in 2013, of which 68 were grammar schools and 137 were secondary schools. FSM pupils in grammar schools comprised 7% of total enrolment compared to 28% in secondary schools; the corresponding figures for SEN pupils were 8% for grammar schools and 29% for secondary schools. So, compared to grammar schools, secondary schools had a *significantly* larger proportion of FSM pupils and SEN pupils. The average size of grammar schools was 921 pupils with 138 pupils in year 12 (the year in which pupils sat their GCSE examination). The corresponding numbers for secondary schools were 587 with 108 Year 12 pupils. In 2013, 97% of Year 12 pupils in grammar schools achieved 5+A*-C GCSE passes and 94% achieved 5+A*-C (E&M) GCSE passes. The corresponding figures for secondary schools were 67% for 5+A*-C GCSE passes and 35% for 5+A*-C (E&M) GCSE passes.[10]

It is also possible to compare grammar and secondary schools in terms of the A-level achievements of their Year 14 pupils. While all the 68 grammar schools in Northern Ireland had A-level (Year 14) pupils, only 102 of the 137 secondary schools had Year 14 pupils. The 2+A*-E achievement for Year 14 pupils was 100% in grammars school and 96% in secondary schools and the difference in proportions between the two types of schools was not significantly different from zero. The 3+A*-C achievement for Year 14 pupils was 77% in grammars schools and 47% in secondary schools and, on this occasion, the difference in proportions between the two types of schools was significantly different from zero.

Figure 5.4: Grammar and Secondary Schools Compared, 2012-13



Notes: FSM and SEN are proportions in total enrolment; 5+A*-C and 5+A*-C (E&M) are proportions of Year 12 enrolment; 2+A*E and 3+A*-C are a proportion of Year 14 enrolment.

[10] Both sets of differences were significantly different from zero with t(1)=18.0 on a 5+A*-C comparison and t(1)=37.0 on a 5+A*-C (E&M) comparison.

Catholic versus Protestant Grammar Schools

Most of Northern Ireland's grammar schools (51 out of 68) are classed under the management type 'Voluntary', a term which gives no indication of the religious predilections of those running the schools. However, under the veneer of this neutral label, there is a clear binary divide between the 68 grammar schools depending on whether they subscribed to a 'Protestant ethos' or to a 'Catholic ethos'. So, just as secondary schools in Northern Ireland can be distinguished by whether they are 'Protestant' (that is, 'controlled') or 'Catholic' (that is, 'maintained' schools), grammar schools can also be distinguished by whether they are of a 'Protestant' or a 'Catholic' ethos. As Table 5.1 shows, of the 68 grammar schools in Northern Ireland, 30 were 'Catholic' and 38 were 'Protestant' with average enrolments in 2013 of, respectively, 922 and 919 pupils. Of the 62,599 grammar school pupils in Northern Ireland in 2013, 27,661 (44%) attended Catholic grammars and 34,938 (56%) attended Protestant grammars.

Although only 7% and 8% of grammar school pupils were, respectively, FSM and SEN pupils, these proportions varied between Catholic and Protestant grammar schools: in Catholic grammars, 10% of pupils were FSM pupils and 9% were SEN pupils in contrast to 5% (FSM) and 7% (SEN) in Protestant grammars. The difference between Catholic and Protestant grammar schools in respect of the proportion of their pupils who were FSM was significantly different from zero[11] but the difference with respect to SEN pupils was not.

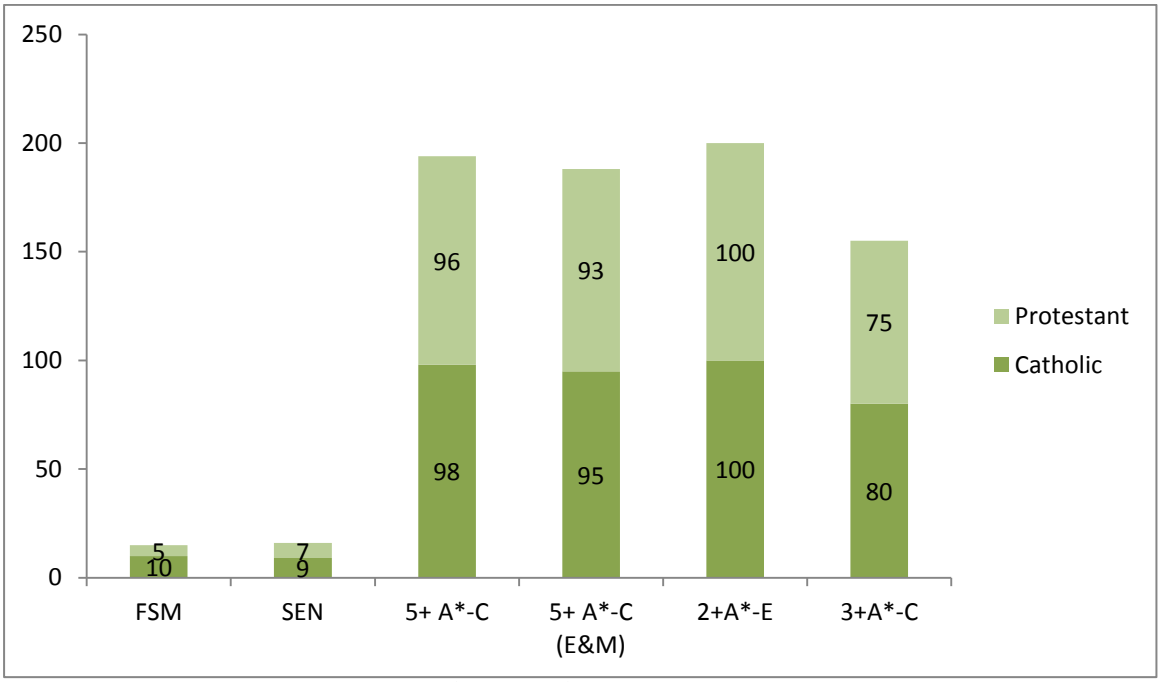
Of the 4,017 Year 12 pupils in Catholic grammar schools in 2013, 98% in 2013 achieved 5+A*-C GCSE passes and 95% achieved 5+A*-C (E&M) GCSE passes. The corresponding figures for the 5,386 Year 12 pupils in Protestant grammar schools in 2013 were 96% achieving 5+A*-C GCSE passes and 93% achieving 5+A*-C (E&M) GCSE passes in 2013. However, while on the face of it, Catholic grammar schools outperformed their Protestant counterparts with respect to their respective proportions of 5+A*-C and 5+A*-C (E&M) GCSE passes, these differences in performance were not large enough to be statistically significant.

One can also compare the difference between Catholic and Protestant grammar schools in respect of the A level performance of their year 14 pupils. For the 2+A*-E achievement level, there was no difference between the two types of grammar schools: nearly all year 14 pupils in Catholic and Protestant grammar schools obtained this qualification. However, for the 3+A*-C qualification - which was obtained by 80% and 75% of Year 14 pupils in, respectively, Catholic and Protestant grammar schools - the difference in performance between the two types of grammars was significantly different from zero.[12]

[11] t(1)=4.5

[12] The null hypothesis that there was no difference could not be accepted for t(1)=2.2.

Figure 5.5: Catholic and Protestant Grammar Schools Compared, 2012-13



Notes: FSM and SEN are proportions in total enrolment; 5+A*-C and 5+A*-C (E&M) are proportions of Year 12 enrolment; 2+A*E and 3+A*-C are a proportion of Year 14 enrolment.

Pupil Absenteeism

A good summary indicator of discipline within a school is absenteeism. On the basis of data provided by DENI, absenteeism is measured in terms of 'half-days'. There are 190 statutory school days in a school year and, therefore, 380 half-days (morning and afternoon). A pupil with a 100% attendance record would have attended on each of those 380 half-days and pupil with a 85% attendance record would have failed to attend 57 of the 380 half-days. In the DENI data, absenteeism using two measures: (i) the average attendance rate in the school over the school year (that is, 380 half-days) and (ii) the proportion of pupils in a school whose attendance is less than 85% or, in other words, missed more than 57 of the 380 half-days in the school year. Figure 5.6 shows absenteeism across the different types of school by the first measure and Figure 5.7 does the same using the second measure.

Figure 5.6: Overall Attendance in Northern Ireland Post-Primary Schools, 2011-12 (%)

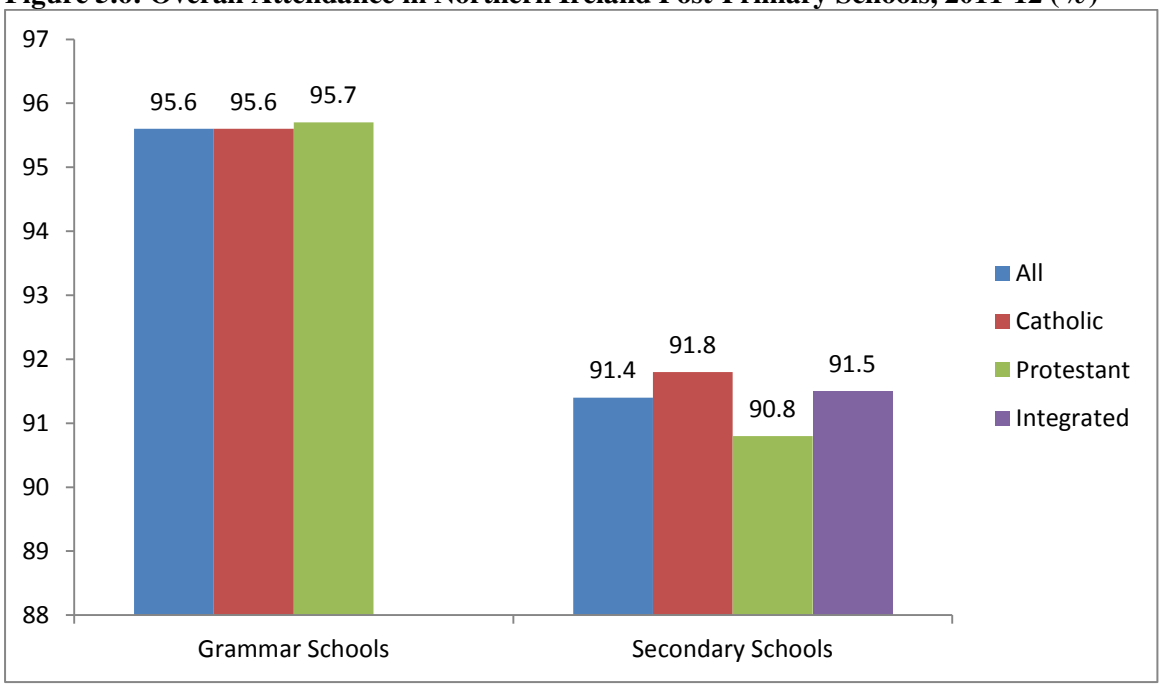
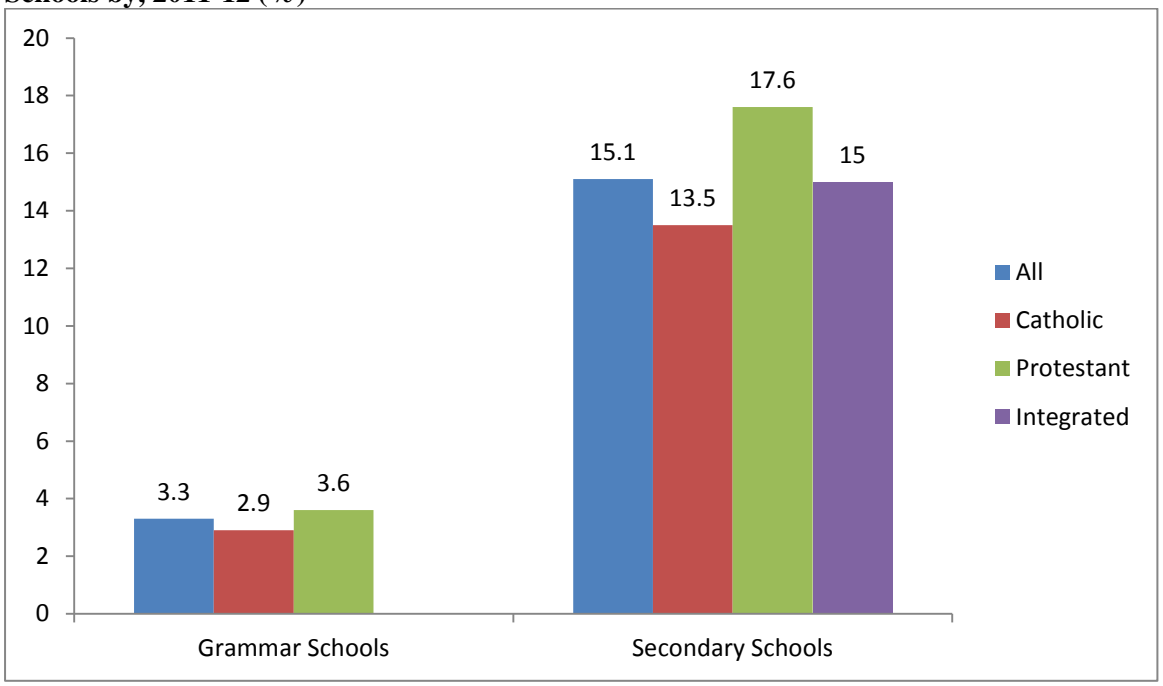


Figure 5.7: Proportion of Pupils with Poor Attendance in Northern Ireland Post-Primary Schools by, 2011-12 (%)



Pupils who were absent for more than 15% of the 380 half-days in the school year

The average attendance rates in grammar and secondary schools were 96% and 91%, respectively, and this difference was statistically significant. Similarly, the proportion of pupils with 'poor' attendance was 15% in secondary schools but only 3% in grammar schools and, once again,

this difference was statistically significant.[13] The average attendance rate was uniform across Catholic and Protestant grammar schools (96%) and though the proportion of poor attenders was slightly higher in Protestant grammars (4%) compared to Catholic grammars (3%), this difference was not significantly different from zero.

The attendance rates between different secondary school types – controlled, maintained, integrated – were similar with maintained schools having a higher attendance rate than either controlled or integrated schools. The difference in attendance rates between maintained and controlled secondary schools was significantly different from zero[14], but attendance rate differences between maintained and integrated schools, and between integrated and controlled schools, were not significantly different from zero.

There were, however, marked differences between the three types of secondary schools in their respective proportion of pupils with poor attendance records: 18%, 15%, and 13% for, respectively, controlled, integrated, and maintained secondary schools. The difference between maintained and controlled secondary schools in their proportion of pupils who were poor attenders (18% and 13%, respectively) was significantly different from zero[15] but the difference between maintained and integrated schools and between integrated and controlled schools was not.

One can also compare attendance between schools with differing proportions of FSM pupils. As discussed in chapter 3, for funding purposes, DENI places post-primary schools in Northern Ireland in one three 'FSM bands' depending on the proportion of FSM pupils in the school. For the 2012-13 schools budget, these were: band 1 (up to 18.5%); band 2 (between 18.5 and 29.4%); and band 3 (above 29.4%). Since 66 of the 68 grammar schools in NI in 2013 were in FSM band 1 (that is, less than 18.5% of pupils in these schools were FSM pupils), we confine our analysis of absenteeism to secondary schools.

Of the 137 secondary schools in Northern Ireland analysed in this chapter: 31 were in FSM band 1, 50 were in FSM band 2, and 56 were in FSM band 3. As Figure 5.8 and Figure 5.9 show, their attendance rates were, respectively, 92.6%, 91.6%, and 90.4% and their proportions of pupils with poor attendance (that is, those who were absent for more than 15% of the 380 half-days in the school year) were, respectively, 11.5%, 14.9%, and 17.6%. Statistical testing of these differences, on the basis of pairwise comparisons between schools in the three FSM bands, yielded the following results:

1. The difference in attendance rates, and in the proportion of pupils with poor attendance, between FSM band 3 and FSM band 1 schools were both significantly different from zero.[16]
2. The difference in attendance rates, and in the proportion of pupils with poor attendance, between FSM band 3 and FSM band 2 schools were both significantly different from zero.[17]
3. The difference in attendance rates, and in the proportion of pupils with poor attendance, between FSM band 2 and FSM band 1 schools were significantly different from zero.[18]

[13] Respectively, t(1)=19.4 and t(1)=18.7.
[14] t(1)=2.3.
[15] t(1)=2.3.
[16] Respectively, t(1)=4.7 and t(1)=4.2.
[17] Respectively, t(1)=2.7 and t(1)=2.0.
[18] Respectively, t(1)=2.4 and t(1)=2.5.

Figure 5.8: Overall Attendance in Northern Ireland Post-Primary Secondary Schools by FSM band, 2011-12 (%)

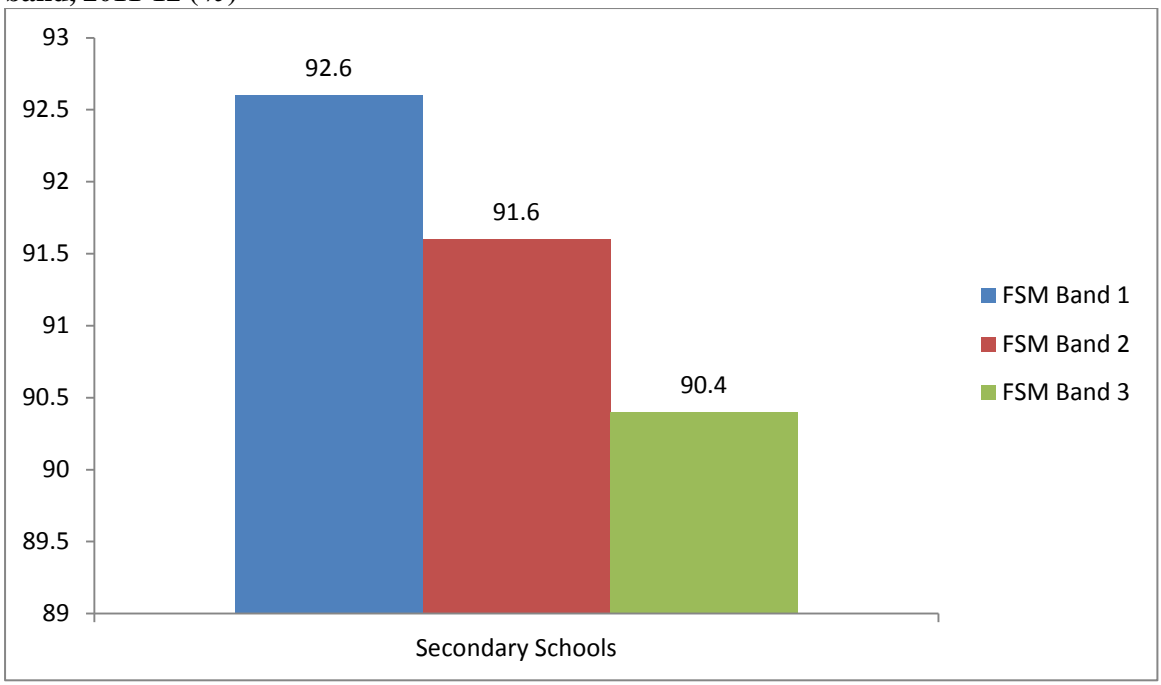
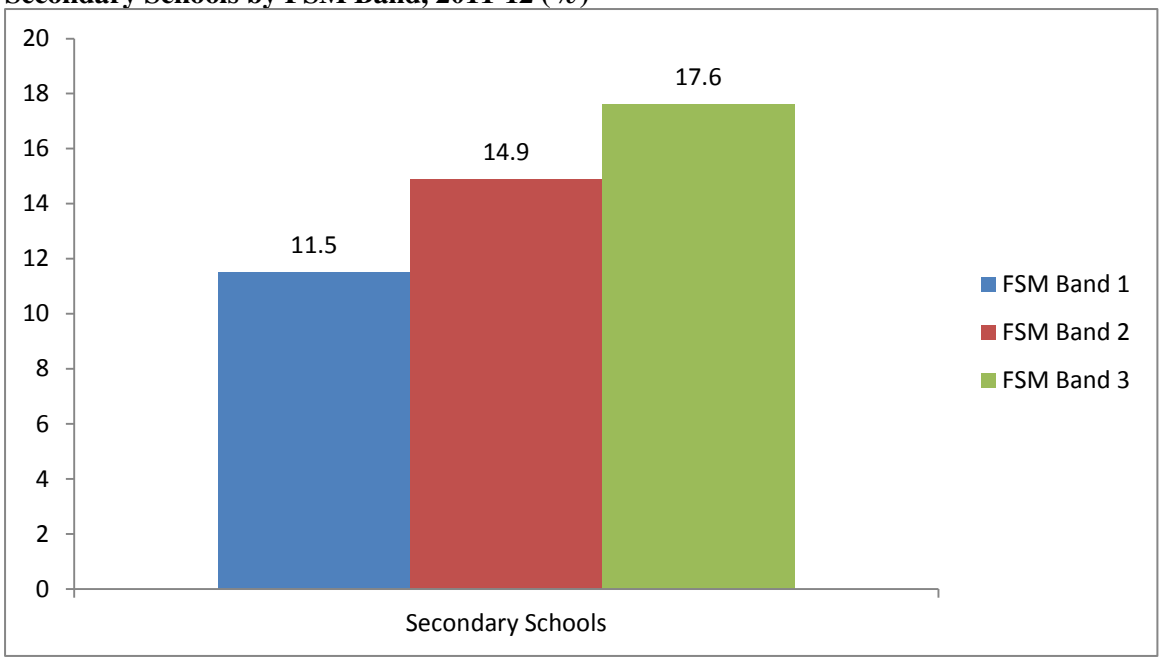


Figure 5.9: Proportion of Pupils with Poor Attendance in Northern Ireland Post-Primary Secondary Schools by FSM Band, 2011-12 (%)



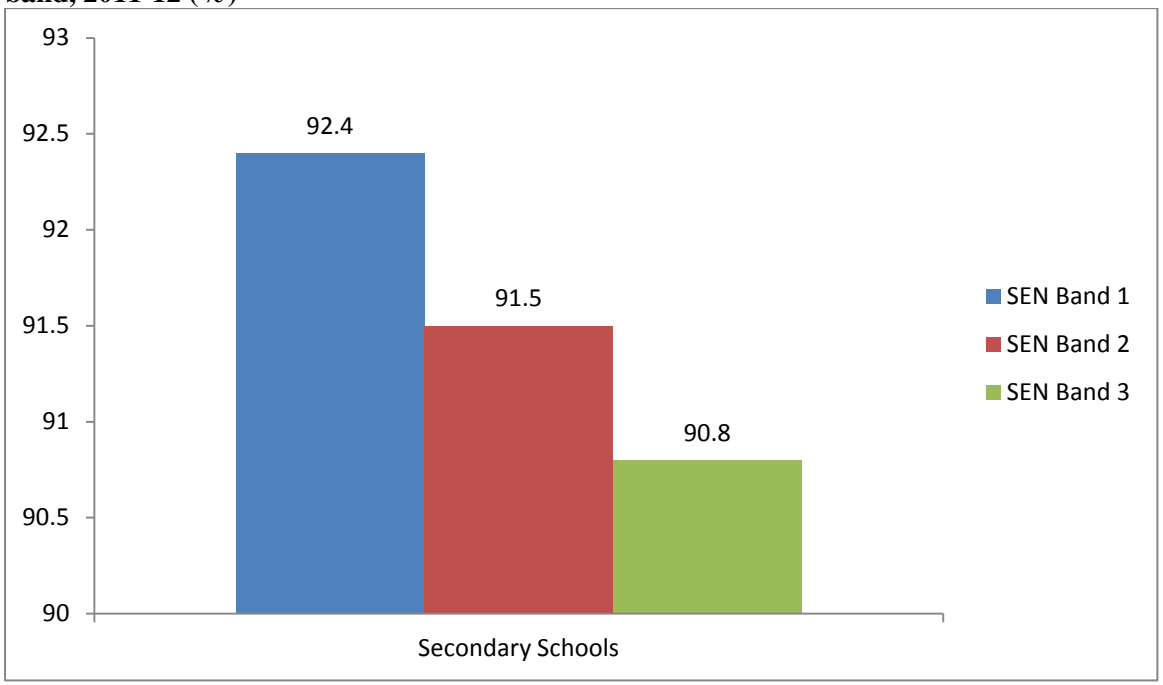
Pupils who were absent for more than 15% of the 380 half-days in the school year

We carried out an identical exercise for SEN pupils by categorising schools into three 'SEN bands' using the cut-off points that DENI used for its FSM bands. Of the 137 secondary schools in Northern Ireland, 22 were in SEN band 1, 56 were in SEN band 2, and 59 were in SEN band 3. As

Figures 5.10 and 5.11 show, the attendance rates of schools in these three SEN bands were, respectively, 92%, 92%, and 91% and their proportions of pupils with poor attendance (that is, those who were absent for more than 15% of the 380 half-days in the school year) were, respectively, 12%, 15%, and 17%. Statistical testing of these differences, on the basis of pairwise comparisons between schools in the three SEN bands, yielded the following results:

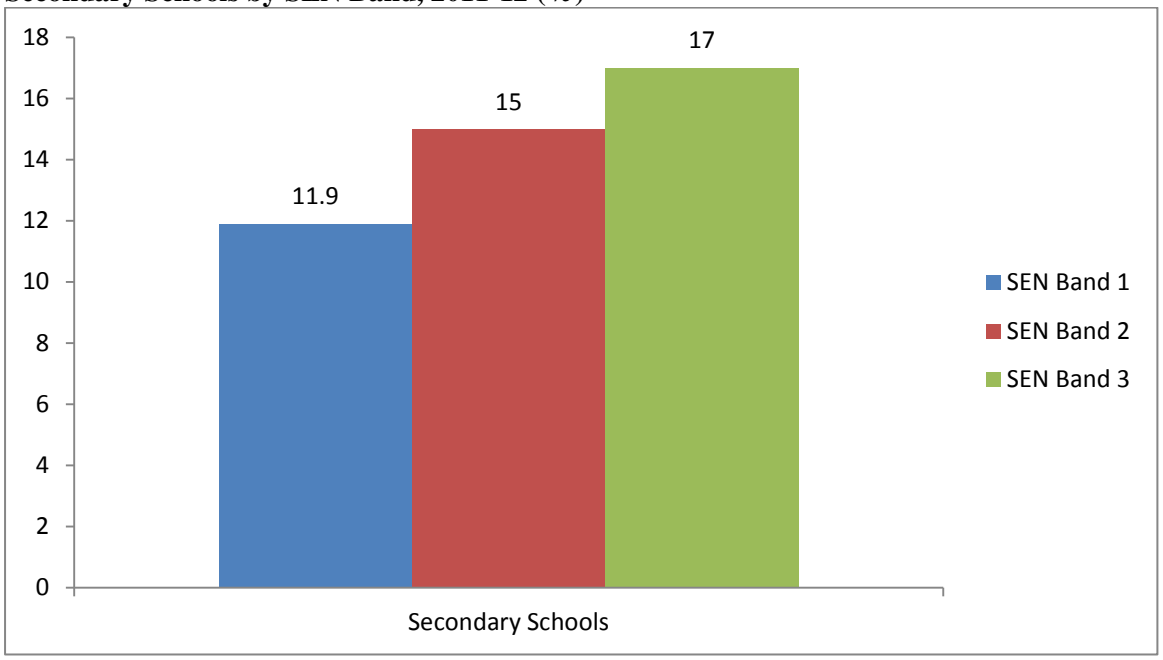
1. The difference in attendance rates, and in the proportion of pupils with poor attendance, between SEN band 3 and SEN band 1 schools were both significantly different from zero.[19]
2. The difference in attendance rates, and in the proportion of pupils with poor attendance, between SEN band 3 and SEN band 2 schools were *not* significantly different from zero.
3. The difference in attendance rates, and in the proportion of pupils with poor attendance, between FSM band 2 and FSM band 1 schools were significantly different from zero. [20]

Figure 5.8: Overall Attendance in Northern Ireland Post-Primary Secondary Schools by SEN band, 2011-12 (%)



[19] Respectively, t(1)=3.3 and t(1)=3.2.
[20] Respectively, t(1)=2.0 and t(1)=2.2.

Figure 5.9: Proportion of Pupils with Poor Attendance in Northern Ireland Post-Primary Secondary Schools by SEN Band, 2011-12 (%)



Pupils who were absent for more than 15% of the 380 half-days in the school year

5.3 Explaining Educational Performance: Multivariate Analysis

Although the previous section established an association between the schools' educational performance and variables like school size and schools' financial stress level, it would be a mistake to make causal inferences from this. The focus in the preceding section was on just two variables (*bivariate analysis*) with the other factors being ignored. The mistake arises from the fact that the two variables being analysed, say X and Y, might be related to a third variable, Z and it is this common relationship of X and Y to Z which creates the association between X and Y. For example, schools which are highly stressed may have a disproportionate number of FSM pupils; at the same time, FSM pupils may impact negatively on a school's performance. So, by not taking account of the presence of FSM pupils, there is the danger of imputing causality to the observed association between stress levels and performance. So, in taking account of the association between X and Y, after controlling for the effects of Z, we do not mean to suggest that there is necessarily a causal relationship between X and Y, only that the probability of correlation implying causation is greater when the effect of Z has been controlled for than when it is not.

In order to correct for this, the analysis has to move from considering only two variables at a time to taking account of several variables simultaneously. So, rather than considering the two relationships separately - that is, (i) performance depends upon size and (ii) performance depends upon stress level - we consider a relationship in which performance depends upon size *and* stress level. We can also add other variables to this, like the number of FSM and SEN pupils and the schools' management type and, thereby, conduct a *multivariate analysis* of the relationship between performance and several explanatory factors.

Table 5.2: Regression Estimates to Explain GCSE Examination Performance Performance*

	Secondary Schools								Grammar Schools							
	5+A*-C [$\bar{R}^2 = 0.388$]				**5+A*-C (E&M) [($\bar{R}^2 = 0.511$]**				**5+A*-C [$\bar{R}^2 = 0.443$]**				**5+A*-C (E&M) [$\bar{R}^2 = 0.582$]**			
	Coeff	SE	T value	P value	Coeff	SE	T value	P value	Coeff	SE	T value	P value	Coeff	SE	T value	P value
Enrolment Year 14	0.12	0.03	4.46	0.00	0.10	0.03	3.28	0.00	0.02	0.01	2.28	0.03	0.03	0.01	2.51	0.02
Enrolment Years 8-12					-0.01	0.00	-1.35	0.18								
Catholic Grammar									3.63	1.15	3.16	0.00	4.07	1.58	2.58	0.01
Catholic Maintained§	6.70	2.74	2.45	0.02	6.35	2.30	2.76	0.01								
Integrated	4.76	3.61	1.32	0.19	4.04	2.65	1.53	0.13								
Absenteeism**	-0.73	0.18	-3.98	0.00	-0.41	0.16	-2.59	0.01	-0.48	0.29	-1.66	0.10	-1.36	0.40	-3.38	0.00
Proportion of FSM pupils					-0.49	0.10	-5.13	0.00	-0.44	0.12	-3.53	0.00	-0.78	0.18	-4.28	0.00
Proportion of SEN pupils	-0.12	0.09	-1.32	0.19												
Boys only school									-2.04	1.19	-1.72	0.09	-3.58	1.63	-2.19	0.03
Girls only school									2.50	1.15	2.17	0.03	2.20	1.59	1.39	0.17
Southern Board§§	4.64	2.83	1.64	0.10	6.75	2.14	3.15	0.00	1.43	1.07	1.35	0.18	2.81	1.54	1.82	0.07
Western Board	4.10	3.22	1.27	0.21	3.44	2.45	1.41	0.16					3.87	1.73	2.24	0.03
Financial stress level 4§§§					3.56	3.15	1.13	0.26								
Financial stress level 3					4.72	3.24	1.46	0.15								
Intercept	66.44	4.49	14.78	0.00	46.92	4.86	9.66	0.00	97.26	1.71	56.86	0.00	97.04	2.35	41.32	0.00

* The dependent variable is the proportion of Year 12 pupils receiving 5+ GCSE passes at A*-C grades in 2013; (E&M) means these passes included English and Mathematics.

** Absenteeism refers to the proportion of pupils who were absent for more than 15% of the statutory 380 half-days in the school year (2011-12 figures).

§ Reference category: Controlled schools; §§ Reference category: Belfast Board; §§§ Reference Category: Financial Stress level 1

Table 5.3: Regression Estimates to Explain A-Level Examination Performance Performance*

	Proportion Obtaining 3+A*-C A-level Passes							
	Secondary Schools [$\overline{R}^2 = 0.383$]				**Grammar Schools** [($\overline{R}^2 = 0.359$]			
	Coeff	**SE**	**T value**	**P value**	**Coeff**	**SE**	**T value**	**P value**
Enrolment Year 14	0.10	0.03	3.16	0.00				
Catholic Grammar					7.48	2.13	3.51	0.00
Catholic Maintained§	9.30	3.53	2.64	0.01				
Integrated§	8.89	4.34	2.05	0.04				
Absenteeism**					-1.36	0.58	-2.33	0.02
Boys only school	-0.65	0.17	-3.87	0.00				
Intercept	11.52	6.52	1.77	0.08	-10.69	2.69	-3.97	0.00

* The dependent variable is the proportion of Year 14 pupils receiving 3+ A-level passes at A*-C grades in 2013;

** Absenteeism refers to the proportion of pupils who were absent for more than 15% of the statutory 380 half-days in the school year (2011-12 figures).

§ Reference category: Controlled schools; §§ Reference category: Belfast Board.

We estimated separate equations for secondary and grammar schools to explain their GCSE and A-level performance on the basis of the 2013 examination results. As explained earlier, we used two indicators of GCSE performance: the proportion of Year 12 students obtaining 5+A*-C and 5+A*-C (E&M) GCSE passes. The performance indicator used For A-level results was the proportion of pupils who obtained 3+A*-C passes.[21] These formed the *dependent* variables of the analysis and inter-school variation in their values was explained by differences between schools in their values of the relevant *explanatory* variables. The estimation results from estimating these equations separately, for secondary and for grammar schools, are shown in Table 5.2 for GCSE results and in Table 5.3 for A-level results.[22]

The coefficients associated with each variable are to be interpreted as the *estimated change* in the dependent variable for a *small change* in the explanatory variable.[23] For explanatory variables which take categorical values, the coefficient represents the change in the dependent variable for a change from the *reference category* (level 1 for financial stress or BELB for Boards) to the category in question. There were three such categorical variables: school management type (reference category, 'controlled'); school board (reference category, 'Belfast'); and school financial stress level (reference category, '1').

The estimates shown in Tables 5.2 and 5.3 represent the most *parsimonious* version of the estimated equations obtained by dropping from the full specification all variables whose associated t-values were less than 1. As is well known, this practice maximises the explanatory power of the equation, as measured by the adjusted R^2 (denoted $\overline{R}^2$ in Table 5.3). The $\overline{R}^2$ values, shown at the head of Table 5.2, imply that the secondary school equations explained 38.8% and 51.1% of inter-

[21] There was not sufficient inter-school variation in the 2+A*-E indicator to merit estimation.

[22] The observations for each school were weighted by its proportionate size in terms of the number of its Year 12 pupils.

[23] Consequently, if the coefficient estimate is *positive*, the value of the dependent variable will *rise* for a small *increase* in the value of the explanatory variable while if the coefficient estimate is negative, the value of the dependent variable will *fall* for a small *increase* in the value of the explanatory variable.

school variations in the proportion of students obtaining, respectively, 5+A*-C and 5+A*-C (E&M) GCSE passes while the grammar school equations explained 44.3% and 58.1% of inter-school variation in these two proportions. Similarly, the $\bar{R}^2$ values, shown at the head of Table 5.3, imply that the secondary school and the grammar school equations explained, respectively, 38.3% and 35.9% of inter-school variations in the proportion of students obtaining 3+A*-C A-level passes. The detailed results are discussed under the following headings.

School Size, Financial Stress, and Area Boards

The *only* size variable that mattered for GCSE and for A-level performance (in respect of proportions obtaining 5+A*-C and 5+A*-C (E&M) GCSE passes and 3+A*-C A-level passes) in secondary and in grammar schools in 2013 was the size of the Year 14 (sixth form) class. School size, as measured by either the number of pupils in Years 8-12 or by numbers in Year 12 enrolment, did not have a significant effect on GCSE performance and this was true of secondary and of grammar schools. The results shown in Table 5.2 suggest that: (i) for secondary schools, an *additional ten* pupils in Year 14 was associated with a rise of 1.2 percentage points (pp) and 0.8pp, respectively, in the proportions obtaining 5+A*-C and 5+A*-C (E&M) GCSE passes; (ii) for grammar schools, an *additional ten* pupils in Year 14 was associated with a rise of 0.2pp and a 0.3pp , respectively, in the proportions obtaining 5+A*-C and 5+A*-C (E&M) GCSE passes. The results shown in Table 5.3 that for secondary schools an *additional ten* pupils in Year 14 was associated with a rise of 1 percentage points (pp) rise in the proportions obtaining 3+A*-C A-level passes but that grammar school A-level performance was unaffected by Year14 size.[24]

Why should sixth form size matter for GCSE performance? The answer probably is that a large and thriving sixth form allows for teacher specialism which has a favourable impact on GCSE teaching. This is analogous to a university department with a large postgraduate intake being able to provide better undergraduate teaching than a department without (or with only weak) postgraduate provision. It should not be inferred from this that large sixth forms are the *cause* of good performance. The fact is that both good performance and large sixth-forms are related to a *third factor* which is good teaching. Large sixth forms are simply one way (and not necessarily the most efficient way) of attracting good teachers.

The general lesson to be drawn from this result is that educational performance would improve if one could devise ways of attracting good teachers to schools, in particular to 'challenging' schools. The Training and Development Agency (TDA) in England has shown how this might be done by launching a recruitment campaign directed specifically at filling posts in schools with a poor performance record. The Office for Standards in Education (Ofsted) also has a *Teach First* scheme, which works in London, the North-West, and the Midlands, which recruits high-flying graduates to teach in tough secondary schools (Lipsett, 2008: 5). However, how long good teachers stay on in such schools depends on the support they receive from management (Tickle, 2011: 4).

As the earlier discussion on financial stress showed, financial stress was experienced uniquely by secondary schools: 59 out of the 68 grammar schools were entirely stress-free with the remainder experiencing only mild (level 3) financial stress. Among secondary schools, only 18 of the 137 schools experienced levels of stress that could be deemed 'serious' (level 1 or 2). Consequently, it was no surprise that the educational performance of both secondary and grammar schools was unaffected by their levels of financial stress.

[24] This is probably because the average size of grammar schools' Year 14 was 122 pupils leaving little scope for 'economies of scale. By contrast, the average size of secondary schools' Year 14 was only 40 pupils.

The area management of the schools had some effect on their educational performance. Compared to the "reference Board", Belfast, *secondary schools* in the Southern and the Western Boards had significantly better 5+A*-C and 5+A*-C (E&M) performances (by 4.6pp and 6.8pp, respectively, for the Southern Board and by, respectively, 4.1pp and 3.4pp for the Western Board) and *grammar schools* in the Southern and the Western Boards had a significantly better 5+A*-C (E&M) performance (by, respectively, 2.8pp and 3.9pp). However, there no significant area effects with respect of A-level results,

Single Sex versus Co-educational Schools

Although most of Northern Ireland's schools were co-educational schools, 22 of the 137 secondary schools, and 27 of the 68 grammar schools, were single sex schools. Of the 22 schools single sex schools in the secondary school sector, 12 were girls only and, of the 27 schools single sex schools in the grammar school sector, 14 were girls only. Single sex schools were largely a feature of the "Catholic" schools. Among grammar schools, 17 of the 30 Catholic grammars (57%) and 10 of the 38 Protestant grammars (26%), were single sex. Among secondary schools, 18 of the 68 Catholic maintained schools (26%), 4 of the 49 controlled schools (8%), and none of the integrated schools were single sex schools.

The evidence is while there was no significant difference, in terms of GCSE performance, between the co-educational and the single sex secondary schools (whether boys or girls only). In the grammar school sector, however, compared to coeducational schools, girls only schools did significantly *better* in terms of proportions obtaining 5+A*-C GCSE passes (by 2.5pp) and boys only schools did significantly *worse* in terms of proportions obtaining 5+A*-C (E&M) GCSE passes (by 3.6pp).

FSM and SEN pupils

There was no evidence that the presence of SEN pupils had any effect on GCSE performance either for secondary schools or for grammar schools.[25] The findings with respect to FSM pupils were entirely different. A percentage point *increase* in the proportion of FSM pupils in secondary schools would *reduce* the proportion of pupils obtaining 5+A*-C (E&M) GCSE passes by 0.5pp though the proportion of pupils obtaining 5+A*-C GCSE passes would be unaffected. However, in grammar schools, percentage point *increase* in the proportion of FSM pupils in secondary schools would *reduce* the proportion of pupils obtaining *both* 5+A*-C and 5+A*-C (E&M) GCSE passes by, respectively, 0.4pp and 0.8pp.[26] However, A-level results were unaffected by the presence of FSM pupils.

It should not be inferred from this that FSM pupils were the *cause* of poor GCSE results. There is the very real possibility of reverse causation. It may be that under-resourced schools - which, by that fact alone, would produce poor results - are disproportionately located in areas of greatest deprivation and which serve as the school catchment areas for FSM pupils.

Catholic versus Protestant Schools

The results reported in Table 5.2 provide clear evidence that the educational performance of Catholic schools in Northern Ireland was better than that of Protestant schools. In the grammar school sector, *ceteris paribus* Catholic grammars outperformed Protestant grammars in the proportion of

[25] The reported coefficient in Table 5.2 had a t-value of 1.32 but, because it was greater than one, the inclusion of the SEN variable in the equation boosted its explanatory power.

[26] This would suggest that the range of GCSE subjects offered by grammar schools would be different from those offered by secondary schools: the former would offer fewer subjects like woodwork or car repair.

pupils obtaining 5+A*-C GCSE passes by 3.6pp and in the proportion of pupils obtaining 5+A*-C (E&M) GCSE passes by 4.1pp. *Ceteris paribus* Catholic grammar schools also outperformed their Protestant counterparts by 7.5pp in the proportion of pupils obtaining 3+A*-C A-level passes.

In the secondary school sector, Catholic maintained schools outperformed controlled schools in the proportion of pupils obtaining 5+A*-C GCSE passes by 6.7pp and in the proportion of pupils obtaining 5+A*-C (E&M) GCSE passes by 6.4pp. Although it is tempting to suggest that this might be the consequence of a superior educational ethos in Catholic schools, the fact that integrated schools also significantly outperformed controlled schools (by 4.8pp in the proportion of pupils obtaining 5+A*-C GCSE passes and by 4.0pp in the proportion of pupils obtaining 5+A*-C (E&M) GCSE passes) offers grounds for resisting this temptation.[27] Rather, the reason for the disparities in GCSE performance within the secondary school sector, noted above, raises as many questions about what is 'wrong' with controlled schools as it does about what is 'right' with maintained schools. This point is reinforced by the fact that both maintained and integrated schools outperformed Protestant secondary schools (by, respectively, 9.3pp and 8.9pp) in terms of the proportions of their pupils obtaining 3+A*-C A-level passes.

5.4. Explaining Absenteeism

An important feature of the results shown in Table 5.2 relating to GCSE results is the importance of absenteeism in explaining educational performance. *Ceteris paribus* the proportion of pupils with poor attendance in a school (whether secondary or grammar) was *inversely* associated with the proportion of pupils in the school obtaining 5+A*-C and 5+A*-C (E&M) GCSE passes. For example, as Table 5.2 shows, a 1pp rise in the proportion of pupils with poor attendance in a secondary was associated with fall of, respectively, 0.7pp and 0.4pp in their proportion of 5+A*-C and 5+A*-C (E&M) GCSE passes. This fact makes it important to gain an appreciation of the factors which affect absenteeism in schools. In order to identify these factors, we adopted two definitions of absenteeism (Figures 5.8 and 5.9): (i) the 'Poor Attendance Rate' (PAR), which is the proportion of pupils in a school who missed more than 15% of the statutory 380 half-days in the school year; (ii) the 'Overall Attendance Rate' (OAR), which is the average proportion (for the school year) of enrolled pupils attending school on any given half-day. Since absenteeism in grammar schools was very low (see Figures 5.8 and 5.9), the equations with PAR and OAR as dependent variables were estimated only on data for secondary schools and these estimates are shown in Table 5.4. The $\bar{R}^2$ values, shown at the head of Table 5.4, imply that the equations explained 44.6% and 46.7% of inter-school variation in, respectively, secondary schools' PAR and OAR.

[27] It should be noted that the difference in performance between Catholic secondary and integrated schools was not significantly different from zero.

Table 5.4: Regression Estimates to Explain Absenteeism in Northern Ireland Secondary Schools*

	Poor Attendance Rate [$\bar{R}^2 = 0.446$]				Overall Attendance Rate [$\bar{R}^2 = 0.467$]			
	Coeff	SE	T value	P value	Coeff	SE	T value	P value
Total Enrolment	-0.01	0.00	-2.50	0.01	0.002	0.00	1.58	0.12
Enrolment Year 14	-0.03	0.02	-1.62	0.11	0.01	0.01	2.47	0.02
Enrolment Year 12	0.07	0.02	3.56	0.00	-0.02	0.01	-2.97	0.00
Proportion of FSM pupils	0.30	0.04	7.55	0.00	-0.11	0.01	-8.78	0.00
South East Board	2.38	1.12	2.12	0.04	-0.79	0.35	-2.26	0.03
Catholic Maintained	-4.77	1.08	-4.41	0.00	1.26	0.34	3.77	0.00
Integrated	-1.90	1.34	-1.42	0.16	0.52	0.41	1.26	0.21
Intercept	9.37	1.68	5.58	0.00	93.89	0.52	180.60	0.00

* The 'Poor Attendance Rate' is the proportion of pupils in a school who missed more than 15% of the statutory 380 half-days in the school year; the 'Overall Attendance Rate' is the average proportion (for the school year) of pupils attending school on any given half-day.

The results in Table 5.4 show a complex relation between school size and absenteeism. First, the larger the total number of pupils in the school (that is, in Years 8-14), the smaller the PAR and OAR: every additional 10 pupils reduce PAR by 0.1pp and raises OAR by 0.02pp. However, underlying the overall size effect are two more specific size effects. First, *ceteris paribus* the size of a school's year 14 class (sixth form) is inversely related to its absenteeism rate, both in terms of PAR (this *falls* by 0.3pp for an additional 10 Year 14 pupils) and OAR (this *rises* by 0.1pp for an additional 10 Year 14 pupils). Our hypothesis is that the size of the Year 14 class is a measure of the degree of a school's 'academic seriousness' and this affects attendance (and, perhaps, general discipline) in the school. Second, *ceteris paribus* the size of a school's year 12 class (GCSE) is positively related to its absenteeism rate, both in terms of PAR (this *rises* by 0.7pp for an additional 10 Year 14 pupils) and OAR (this *falls* by 0.1pp for an additional 10 Year 14 pupils). Our hypothesis is that absenteeism is more of a problem among older pupils and the size of the Year 12 class reflects this.

Table 5.4 also shows that there was a strong positive association between absenteeism and the proportion of FSM pupils in a school. Every 1pp increase in this proportion would raise the PAR by 0.3pp and would reduce the OAR by 0.11pp. (It should be noted that there was no such association between schools' absenteeism and their proportion of SEN pupils).

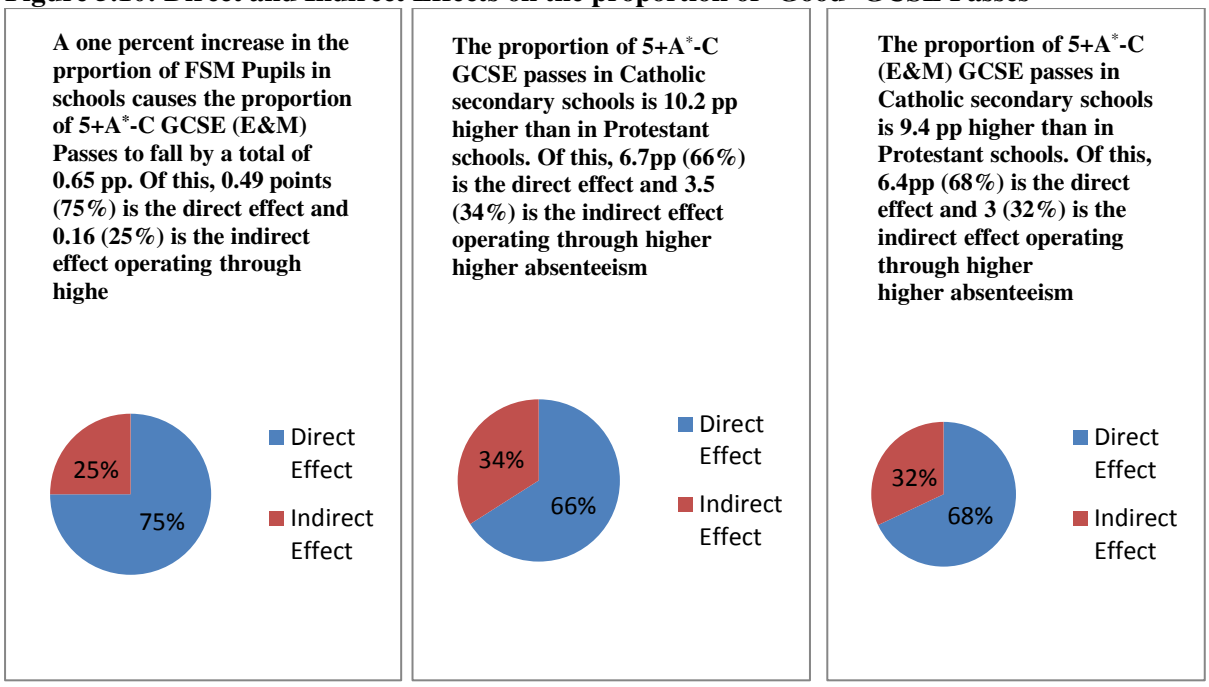
Table 5.4 also shows that absenteeism was significantly less of a problem in catholic maintained schools than it was in controlled or integrated schools. Compared to controlled schools, the PAR in Catholic schools was 4.8pp lower and the OAR was 1.3 pp higher; compared to integrated schools, the PAR in Catholic schools was 2.9pp lower and the OAR was 0.7 pp higher. Lastly, compared to all the other Boards, the problem of absenteeism was significantly greater in schools under the South-Eastern Board: the PAR in schools under the South-Eastern Board was 2.4pp higher and the OAR was 0.8 pp lower than they were for schools in the other Boards.

Putting together the results in Tables 5.2 and 5.4, it is evident that FSM pupils affect their schools' GCSE performance in two ways. Firstly, there is a direct effect (as shown in Table 5.2) when, *while at school*, they do not perform as well as non-FSM pupils. Second, there is an indirect

effect whereby the proportion of FSM pupils in a school and its absenteeism rate are positively related (Table 5.4) and the higher absenteeism rate then leads to a lower level of GCSE performance (Table 5.2).[28] A similar argument can be made about Catholic secondary schools. Compared to controlled schools, their superior GCSE performance emanates from two sources. Firstly, their pupils, while at school, learn more effectively than pupils in controlled schools (Table 5.2). Secondly, pupils in Catholic maintained schools are more likely to be in school, compared to their counterparts in controlled schools (Table 5.4) and lower rates of absenteeism in maintained schools then results in better GCSE results (Table 5.2).

Aggregating the results of Tables 5.2 and 5.4, a 1pp increase in the proportion of FSM pupils in a secondary school would cause the proportion of 5+A*-C (E&M) GCSE passes to fall by 0.5pp owing to the direct effect and by 0.15pp (=0.3×0.5) owing to the indirect effect making for a total reduction of 0.65pp. Similarly, compared to a controlled secondary school, the proportions of 5+A*-C and of 5+A*-C (E&M) GCSE passes in a Catholic maintained secondary school would be higher by, respectively, 6.7pp and 6.4pp owing to the direct effect and by, respectively, 3.5pp (=0.73×4.77) and 2.0pp (=0.41×4.77) owing to the indirect effect. This implies a total increase in the proportions of 5+A*-C and of 5+A*-C (E&M) GCSE passes due to the 'maintained effect' of, respectively, 10,2pp and 9.4pp. Figure 5.10 illustrates the magnitudes of the direct and indirect effects of FSM pupils and Catholic maintained secondary schools on GCSE performance.

Figure 5.10: Direct and Indirect Effects on the proportion of 'Good' GCSE Passes



[28] Note that we are not saying that it is the FSM pupils who are the truants. The presence of FSM pupils could lead to non-FSM pupils staying away.

5.5. Is there a Catholic Ethos in Northern Ireland's Post-PrimarySchools?

The preceding sections showed that the GCSE performance of maintained (Catholic) secondary schools – as measured by the proportion of Year 12 pupils obtaining 5+A*-C and 5+A*-C (E&M) GCSE passes - was significantly better than that of their controlled (Protestant) counterparts. Part of the reason for this might be that maintained schools were better *endowed* with the 'attributes' that lead to better performance. However, another part might be that maintained schools *used* these attributes better than Protestant schools. For example, both types of schools have FSM pupils but maintained schools are better at nurturing FSM pupils than are Protestant schools; or both types of schools face the problem of pupil absenteeism but maintained schools cope better than do controlled schools. In other words, on this latter argument, there is a 'Catholic ethos' in schools in the sense that if faced with the same set of educational circumstances as Protestant schools, they would produce better results. In this section we investigate how much of the *observed* superior performance of maintained vis-à-vis controlled secondary schools was due to better *attribute endowment* and how much was due to better *attribute usage* (where 'better attribute usage' is an euphemism for 'Catholic ethos').

The methodology employed is that of Oaxaca (1973) and Blinder (1973) method (hereafter, O-B) of decomposing differences between groups, in their respective mean values, into a "discrimination" and a "characteristics" component. The O-B decomposition is formulated for situations in which the sample is subdivided into two mutually exclusive groups, such as, for example, men and women. Then, as Oaxaca (1973) did in his seminal paper, one may decompose the difference in average wages between men and women into two parts, one due to gender differences in the coefficient vectors and one due to gender differences in the attribute (or variable) vectors. The attribute contribution is computed by asking what the average male-female difference in probabilities would have been if the difference in attributes between men and women had been evaluated using a common coefficient vector.

In the context of Northern Ireland's post-primary schools, the basic problem may be formulated as follows. Catholic and Protestant schools differ in terms of both *attribute endowments* (as represented by their enrolment numbers, FSM pupils, absenteeism rates) and in their *attribute usage* (as represented by their coefficients on these variables).[29] So the first step is to ask what the Catholic/Protestant difference in educational performance *would have been* if both sets of attributes were evaluated at a *common* coefficient vector. This difference could then be entirely ascribed to a difference in attribute endowment since coefficient (attribute usage) differences would have been neutralised. Call this the *explained difference*. Then the *observed* difference less the *explained difference* is the *residual* or *unexplained* difference. We identify this unexplained difference as due to 'attribute usage' or as the 'Catholic ethos'.

Note that in the regression estimates presented in Table 5.3 we could not identify attribute usage because, by construction, the coefficients on the variables (enrolment numbers, FSM pupils, absentee rates) were assumed to be the same regardless of whether the secondary schools were maintained, controlled, or integrated. In order to identify differences in usage we needed to estimate the GCSE performance equations *separately* for maintained and controlled secondary schools.

More formally, suppose there are two groups of schools, C (Catholic) and P (Protestant) with Y as an outcome variable (proportion of Year 12 pupils with 'good' GCSE passes) such that $E(Y_C)$and $E(Y_P)$are the *expected* values of the outcome variable for, respectively, groups C and P. Then:

$$\mathbf{Y_k} = \mathbf{X_k}'\boldsymbol{\beta}_\mathbf{k} + \boldsymbol{\varepsilon}_\mathbf{k},\ k = C, P \qquad (5.1)$$

[29] For example, Catholic schools might have a lower coefficient on the FSM variable implying that, in educational terms, they did more with FSM pupils than did Protestant schools.

Where $\mathbf{Y_k}$ is the vector of outcomes, $\mathbf{X_k}$ is the matrix of observations, and $\boldsymbol{\varepsilon_k}$ is the vector of error terms for persons in group k where, by assumption $E(\boldsymbol{\varepsilon_k})=0$. Suppose there is some coefficient vector, β^*, which should be used to evaluate the contribution of the difference in attributes. Then the difference in expected outcomes can be written as:

$$\begin{aligned} R &= E(Y_C) - E(Y_P) = E(X_C')\beta_C - E(X_P')\beta_P \\ &= E(X_C')\beta_C - E(X_P')\beta_P + E(X_C')\beta^* - E(X_C')\beta^* + E(X_P')\beta^* - E(X_P')\beta^* \\ &= E(X_C - X_P)'\beta^* + \left[E(X_C')(\beta_C - \beta^*) + E(X_P')(\beta^* - \beta_P) \right] \\ &= U + V \end{aligned} \tag{5.2}$$

Equation (5.6) yields a two-fold decomposition in which the term $U = E(X_W - X_B)'\beta^*$ is the part of the outcome difference that can be explained by the difference in attributes, and the term $V = E(X_W')(\beta_W - \beta^*) + E(X_B')(\beta^* - \beta_B)$ is the unexplained part. The latter is usually ascribed to a 'structural effect', here identified as a 'Catholic ethos'.

In general, the problem of defining β^*, the non-discriminatory coefficient vector, is an important issue in the decomposition literature. One possibility is to identify β^* with the coefficients of one of the groups. Another is to regard it as the average of the two group coefficients (Reimers, 1983): $\beta^* = 0.5 \times \beta_W + 0.5 \times \beta_B$. Yet another (Cotton, 1988) is to weight the coefficients by the size of the groups: $\beta^* = n_W \times \beta_W + n_B \times \beta_B$ where n_W and n_B are the proportions in groups *W* and *B*. In the results reported below, β^* is obtained by pooling the observations for Catholic and Protestant schools.

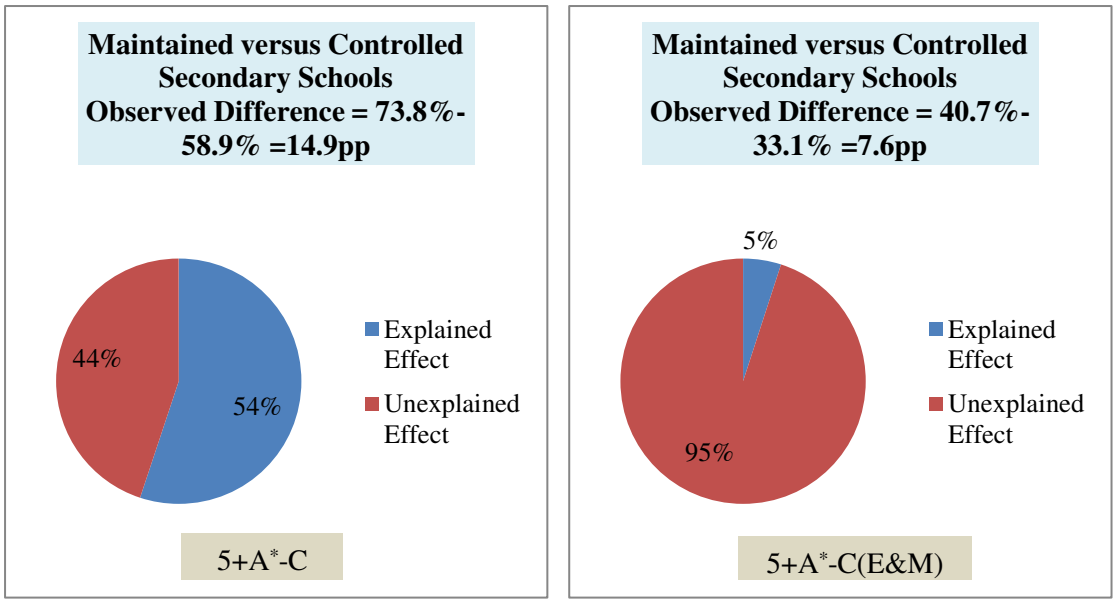
Figure 5.11 (left panel) shows that of the difference of 14.9pp between maintained (Catholic) and controlled (Protestant) secondary schools in the proportion of Year 12 pupils with 5+A*-C GCSE passes, 56% could be explained by differences in attribute endowments between the two groups of schools and 44% was 'unexplained' and could be ascribed to a difference in 'attribute usage' or to a 'Catholic ethos'. Figure 5.11 (right panel) shows that of the difference of 7.6 pp between maintained and controlled secondary schools in the proportion of Year 12 pupils with 5+A*-C (E&M) GCSE passes, 5% could be explained by differences in attribute endowments between the two groups of schools and 95% was 'unexplained' and could be ascribed to a difference in 'attribute usage' or to a 'Catholic ethos'.

This result stems from the fact that a higher proportion of FSM pupils in a school drags down its results with respect to 5+A*-C (E&M) GCSE passes (Table 5.2). Since maintained secondary schools had a higher proportion of FSM pupils compared to their controlled counterparts (Figure 5.1: 32% versus 23%) they were at a *disadvantage* in terms of attribute endowments. In partial compensation for this, the 'Poor Attendance Rate' – which also pulled down school results with respect to 5+A*-C (E&M) GCSE passes (Table 5.2) - was lower in maintained, compared to controlled, schools (Figure 5.6: 13.5% versus 17.6%). This meant that, in this respect, maintained secondary schools had an *advantage* in terms of attribute endowments. The *net* effect of FSM disadvantage and PAR advantage (along with maintained school advantage with respect to Area Boards[30]) meant that maintained schools were at a small (5%) advantage in terms of attribute endowments vis-à-vis controlled secondary schools. Consequently, the superior performance of

[30] Compared to controlled secondary schools, a larger proportion of maintained schools were in the 'better performing' Southern and Western Boards: 28% of the 68 maintained secondary schools were in the Western Board and 25% were in the Southern Board; in contrast, the Western and Southern Boards had, respectively,10% and 26% of the 49 controlled secondary schools.

maintained schools, with respect to 5+A*-C (E&M) GCSE passes, was almost entirely (95%) due to a difference in 'attribute usage' or to a 'Catholic ethos'.

Figure 5.11: The Decomposition of the Proportion of Pupils obtaining 5+A*-C GCSE Passes by Maintained and Controlled Secondary Schools



5.6 School Performance and Measuring Value-Added by Schools

The preceding sections analysed the educational performance of Northern Ireland's post-primary schools in the context of proportion of their pupils leaving school with 'good' GCSE passes. This section turns to addressing the (arguably, more neglected) issue of educational performance in primary schools and, from this, arriving at conclusions about the value-added by schools to the educational performances of its pupils. Although there is no formal well-established indicator of primary school educational performance in Northern Ireland – as there is for post-primary schools in terms of proportions obtaining good GCSEs – an informal indicator is provided by the results of Level 5 tests in Mathematics and English for Key Stage 2 pupils: that is, pupils between the ages of 8 and 11 years in Years 5, 6, and 7 of primary school. The starting point for evaluating primary schools' educational performance is a regression equation in which the dependent variable - the percentage of pupils achieving level 5 in Mathematics and English at Key Stage 2 – is "explained" by a number of variables which relate to the schools' characteristics. Variations in performance between schools are, therefore, due to difference in characteristics between schools.

The equation for Level 5 Maths explained 24% of the variation in results between schools and the equation for Level 5 English explained 22% of the variation in results between schools. In both equations, the most significant factors (at a 5% level of significance) explaining inter-school variations in results were the following:

1. **The proportion of free school meal (FSM) children in the school.** Every percentage point increase in this proportion would reduce the proportion of pupils receiving a level 5 in Maths by 0.33 percentage points and would reduce the proportion of pupils receiving a level 5 in English by 0.17 percentage points.
2. **The proportion of Special Educational Needs (SEN) children in the school.** Every percentage point increase in this proportion would reduce the proportion of pupils receiving a level 5 in Maths by 0.26 percentage points and would reduce the proportion of pupils receiving a level 5 in English by 0.25 percentage points.

3. **The number of Full Time Equivalent Teachers in the school.** Every increase in this number would raise the proportion of pupils receiving a level 5 in Maths by 0.38 percentage points and would raise the proportion of pupils receiving a level 5 in English by 0.32 percentage points.
4. **The Pupil Teacher Ratio.** The pupil teacher ratio (PTR) was entered in non-linear form as $\alpha PTR + \gamma(PTR)^2$ which implies that:

$$\frac{\partial y_i}{\partial PRT_i} = \alpha + 2\gamma PTR_i$$

and if $\alpha > 0$ and $\gamma < 0$, this implies that y_i is maximised with respect to PRT_i when $\frac{\partial y_i}{\partial PRT_i} = 0 \Rightarrow PTR_i = -\frac{\alpha}{2\gamma}$ is the performance maximising pupil teacher ratio, PTR_i^* .

According to the estimates reported in Table 1, $PTR_i^* = \frac{4.791}{2 \times 0.116} = 21$ for optimal achievement.

An important issue with respect to school performance is measuring "value added" – what additional contribution does a school make over and above what we might reasonably expect from it? In this section we propose a way of measuring value-added by schools in the context of their educational performance. Using *predicted* values, $\hat{y}_i$, of educational performance in school *i*, obtained from the regression equation and comparing them with the corresponding *observed* values, y_i, the *value added* by the school (VA_i) is defined as the difference between the actual and predicted results, expressed as a percentage of the predicted results. More formally:

$$VA_i = \left(\frac{y_i - \hat{y}_i}{\hat{y}_i} \right) \times 100 \qquad (5.3)$$

From equation (5.3), $VA_i > 0$ /<0/=0 if a school's performance exceeds/falls short of/equals its predicted performance.

The Northern Ireland primary school with the largest value-added in Maths was St. Joseph's in Belfast: with 51.4% of its pupils eligible for FSM, only 26.4% of its relevant pupils were predicted to achieve a Level 5 in Maths at Key Stage 2. In fact, 83.3% of its relevant pupils achieved this result. Similarly, the Northern Ireland primary school with the largest value-added in English was Ballyhackett Primary School in Coleraine *with only 46 pupils in total*: with 21.7% of its pupils eligible for FSM, only 24.5% of its relevant pupils were predicted to achieve a Level 5 in English at Key Stage 2. In fact, 62.5% of its relevant pupils achieved this result.

At the other end of the spectrum, the Northern Ireland primary school with the lowest value-added in Maths was Whitehead Primary School in Carrickfergus: with only 9.4% of its pupils eligible for FSM, 53.5% of its relevant pupils were predicted to achieve a Level 5 in Maths at Key Stage 2. In fact, only 17.6% of its relevant pupils achieved this result. Similarly, the Northern Ireland school with the lowest value-added in English was Limavady Central Primary School in Limavady: with 27.8% of its pupils eligible for FSM, 36.8% of its relevant pupils were predicted to achieve a Level 5 in English at Key Stage 2. In fact, only 7.2% of its relevant pupils achieved this result.

In order to evaluate the educational performance of primary schools in Northern Ireland, DENI first places schools in an "FSM band". Suppose there are *K* FSM bands (in practice, schools in which FSM pupils, as a percentage of the total number of pupils, are: 0-10; 10-20; 20-30; 30-40; 40-50; 50-60; over 60), indexed *k=1…K*. Suppose that of the total of *N* schools, there are N_k schools in the k^{th} FSM band, $\sum_k N_k = N$. A school is then regarded as "underperforming" if, for three

successive years, it is in the *lowest quartile* of its FSM band. So, with N_k schools in FSM band k, there will, in any year, be $N_k/4$ schools in the lowest quartile for that band.

We can contrast DENI's approach to measuring educational underperformance with ours. Like us, DENI recognises that there is an inverse relation between the proportion of FSM pupils in a school and its educational performance. Consequently, to facilitate inter-school comparison, schools are grouped by DENI into seven FSM bands by percentage of FSM pupils in the school (0-10; 10-20; 20-30; 30-40; 40-50; 50-60; over 60). Unlike DENI, however, we make *explicit* the relationship between schools' educational performance and their proportion of FSM pupils and, in addition, moderate this relation by including other variables (*inter alia* the proportion of SEN pupils, the number of teachers, attendance rates).

Consequently, using our regression model, we are able to measure the absolute performance of a school (how a school is doing without reference to other schools) as well as its relative performance (how a school is doing with reference to other schools). The DENI construct is only able to identify schools in the lowest quartile. In consequence, DENI's comparison is purely relative: a school may be improving in absolute terms but the fact that is in the lowest quartile of educational achievement for three successive years is sufficient to label it as an "underperforming" school.

In order to appreciate this point, since there are N_k schools in FSM band k, there will always be $N_k/4$ schools in the lowest quartile. Suppose that while remaining in the lowest quartile for three successive years, a particular school was the worst performing school in the lowest quartile in year 1, a middle-performing school in the lowest quartile in year 2, and the best performing school in the lowest quartile in year 3. Then on DENI's construct, this school would simply be viewed as an "underperforming school". However, on the basis of our method, this school would be viewed as an improving school because the gap between its actual and predicted result would be narrowing (if this gap was negative, that is, it was "underperforming") or growing (if this gap was positive, that is, it was "underperforming"). To put it more succinctly, DENI's construct looks at the performance of a school relative to that of other schools in its FSM band; our method examines the gap between a school's actual and predicted performance where the prediction is based on a number of school characteristics including the proportion of its pupils who are eligible for FSM.

5.6. Conclusions

The policy debate about post-primary education in Northern Ireland – as manifested by the audit of post-primary schools conducted in 2012 by each of the responsible Education and Library Boards – has been preoccupied with three issues: enrolment numbers and their trends in the different schools; their financial performance, as evidenced by their budgetary deficits; and their educational performance, as evidenced by the proportion of their pupils obtaining 5+A*-C level GCSE passes (preferably including English and Mathematics). When schools have been found wanting, in one more of these respects, the panacea proposed is school amalgamations to form large schools. It is the *hope* of those who favour this solution that large schools will, at a stroke, slay the triple-headed monster of small numbers, poor financial management, and low educational outcomes that plague Northern Ireland's post-primary schools.

This hope is seriously misplaced. First, as chapter 3 showed, given that the Schools Funding Formula requires "money to follow the pupil", it is unlikely that the formation of large schools (with enrolments in excess of 500 pupils) would make more than a small dent in the Department of Education's budget. At the same time, school closures and amalgamations would significantly increase the travel time (and costs) of pupils who, because of the closure of their local schools, would now be required to travel further afield to a "large school". As we argued in the previous chapter, the

evidence is that the net financial gain from school closures is likely to be small and perhaps even negative.

In this chapter we question the prevailing belief in Northern Ireland's education circles that large schools make for better schools. There is little evidence that a large number of pupils in a school makes for a better GCSE performance. It is true that a large sixth form produces better GCSE results (in much the same way that a flourishing postgraduate program in a university department produces better undergraduate results) but (just as with a university's post graduate programme) it is not the sixth form *per se* but the sixth form as an instrument for attracting good teachers that does the trick. The policy point is that there are several, possibly cheaper and more effective, ways of attracting good teachers to a school than through a large sixth form.

Not only does schooling policy in Northern Ireland suffer from the defect of being unsupported by evidence it also suffers from the flaw that, through its blinkered focus on average performance, it misses several issues relating to inequality in Northern Ireland's schooling system:

1. There is a wide gulf between grammar and secondary schools in their educational performance with the consequence that pupils who attend the former type of school have considerably better life chances than those who attend the latter type.
2. FSM pupils are denied the proportionate access to grammar school education that their presence in the population of post-primary pupils would, on grounds of social justice, demand. However, this problem of access is considerably worse for Protestant, compared to Catholic, grammars.
3. There is also a considerable gap between the different secondary schools with some displaying grammar school levels of achievement while others are "sink schools".
4. There is also evidence that, in terms of GCSE results, FSM pupils in secondary schools do not perform as well as non-FSM pupils. However, it is not clear whether the roots of this underachievement of FSM pupils lies in the circumstances surrounding the pupils' lives or whether they lie in the nature of schools located in deprived areas.
5. Lastly, there is evidence that, on average, Catholic schools (secondary and grammar) outperformed their Protestant counterparts both in terms of GCSE and in terms of A-level results.

These issues - which, taken collectively, can be placed under the general rubric of "educational inequality" – point to the need for a *social justice* dimension to educational policy in Northern Ireland with a concomitant research agenda to facilitate this. Consistent with the above points, this research agenda should embrace the following areas:

a) The sharing of educational experience, in the broadest sense, between the Catholic and Protestant sectors. The current proposals for school amalgamation in Northern Ireland are almost exclusively *intra*-sectoral and serve to fossilise the existing system in which pupils from the two communities live in complete isolation from each other. Yet, the evidence is (see above) that Protestant schools could benefit by learning how Catholic schools are able to deliver superior educational outcomes. The critical point is what these lessons are and how they might best be delivered?

   However, in advance of answering this question, the general point is that the formation of larger schools within each sector is, in terms of delivering better educational outcomes, simply a distraction whose purpose is largely to allow Catholic and Protestant schools to remain within their separate educational ghettoes. The interests of Northern Ireland's school pupils would be better served by forming "learning communities" which embrace both sectors (Gallagher *et al*, 2010). This may not necessarily lead to *bigger* schools but it is more likely to lead to *better* schools.

b) The issue of access inequality is fundamental to Northern Ireland's post-primary educational problems. Although they are funded with public money, grammar schools *fail the community* by restricting admission in terms of the economic circumstances of its pupils. In effect, the tax payer pays grammar schools to transmit deprivation through generations.

In terms of how to improve access inequality to grammar schools, one could usefully look at the identical problem of Oxbridge admissions being disproportionately the preserve of pupils from independent schools. The *first* step in addressing the issue of access inequality is to be aware that it exists: Westminster is far more aware of the "Oxbridge problem" than Stormont is of its "grammar school problem". Indeed, it would not be an exaggeration to say that Oxbridge colleges are themselves aware that they have a problem while Northern Ireland's grammar schools remain cocooned in complacency.

The next step towards solving the problem of access inequality is for the government to place it (preferably high) on its policy agenda. Unfortunately, the issue is not even a blip on the Northern Ireland government's policy radar. The last step is the willingness to devise panoply of measures that will raise the numbers of FSM pupils in grammar schools: outreach programmes, compensatory marks in entrance tests, and perhaps, even – dare one say it - quotas.

References

Anand, S. and Sen, A. (1997) *Concepts of Human Development and Poverty: A Multidimensional Perspective*, Human Development Report 1997 Papers, New York, UNDP.

Bain Report (2006) *Schools for the Future: funding, strategy, and sharing*. Report of the Independent Strategic Review of Education.

Blinder, A. S., (1973), "Wage Discrimination: Reduced Form and Structural Estimates", *Journal of Human Resources* **8**: 436-455.

Borooah, V.K. (2001) "The Measurement of Employment Inequality Between Population Subgroups: Theory and Application", *Labour*, 15:169-89.

Borooah, V.K. and Knox, C. (2012) *The Economics of School Closures in Northern Ireland*, Belfast: Atlantic Philanthropy.

Bourguignon, F. (1979), "Decomposable Income Inequality Measures", *Econometrica*, 47: 901-20.

DENI(2009), *Schools for the Future: A Policy for Sustainable Schools*. Bangor: Department of Education, Northern Ireland.

DENI (2012a), *Northern Ireland School Statistics: 2011/2012* Bangor: Department of Education, Northern Ireland.

DENI (2012b), *Area Planning Guidance*. Bangor: Department of Education, Northern Ireland.

DENI (2012c) *Year 12 and Year 14 Examination Performance at Post Primary Schools in Northern Ireland: 2010/11 revised.* Bangor: Department of Education.

Gallagher, T., Stewart, A., Walker, R., Baker, M. and Lockhart, J. (2010) 'Sharing education through schools working together' *Shared Space*, Issue No. 10: 65-74. Belfast: Community Relations Council.

Greaves, E., Macmillan, L., and Sibieta, L. (2014), *Lessons from London schools for attainment gaps and social mobility*, London: Social Mobility and Child Poverty Commission.

Hughes, J. (2010) 'Are separate schools divisive? A Case Study from Northern Ireland'. *British Educational Research Journal* 37 (5): 829-850.

Lipsett, A. (2008) *Education Guardian*, 25th January, page 5.

Oaxaca, R. (1973), "Male-Female Wage Differentials in Urban Labor Markets", *International Economic Review*, **14**: 693-709.

O'Dowd, J. (2011) *Putting Pupils First: Shaping Our Future*. A statement the Minister for Education to the Northern Ireland Assembly. Bangor: Department of Education, Northern Ireland.

Purvis, D. (2011) *Educational Disadvantage and the Protestant working class: a call to action*. Belfast: Purvis Report.

Theil, H. (1967) *Economic and Information Theory*. Amsterdam: North-Holland.

Tickle, T. (2011) *The Guardian*, 4th May, page 4.

Torney, K. (2014), "2013 GCSE and A-level Results for all Schools", *The Detail*, 16 January.

United Nations Development Programme (2012) Human Development Index: accessible at: http://hdr.undp.org/en/statistics/hdi/

Wilson, S. (2011) *Budget 2011-15*, Statement to the Assembly: 4th March. Hansard: Official Record.