

Social Class, Pupil Progress and School Performance: An Analysis in English Primary Schools

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Abstract

This paper raises fundamental questions about educational policy with respect to three key issues: the factors that create school success and failure, the related ways in which school performance is judged in terms of league table rankings and the role of social class, and in particular income, in pupil progress at primary (elementary) school. As a point of entry to these issues the paper investigates the effects of pupil composition in primary schools, finding that while there are small but significant compositional effects on pupil progress the inclusion of composition variables has a profound effect on rankings of school performance. These findings suggest that most value added analyses of schools are misleading. Underlying this problem is a systematic failure by policymakers to consider the way that social class affects pupil progress. However, it is also suggested that policies for increasing the incomes for those close to official poverty levels may have a beneficial effect on pupils' progress.

Key Words: Social Class, Pupil Progress, Accountability, Value Added

Introduction

This paper raises questions about educational policy with respect to three key issues: the factors that create school success and failure, the related ways in which school performance is judged and the role of social class and in particular income, on pupil progress at primary school. As a point of entry to these issues it investigates the effects of pupil composition in primary schools. It does this by studying factors affecting pupil progress in a sample of English Primary schools and contextualises findings within the current educational policies of the New Labour Government in England. The general issues, however, are more broadly relevant to educational systems elsewhere that involve elements of public accountability through judgements made about the performance of school students.

There has been considerable debate about the nature and effects of pupil composition, by which we mean the effects the student body may have on school outcomes independent of individual pupil characteristics such as their social class, gender, and ethnicity backgrounds and whether they have learning difficulties. The debate has been 'alive' since the publication of Coleman et al's (1966) celebrated report because it is central to two related concerns: the nature of school effectiveness and appropriate policies to raise school effectiveness. With respect to the former, Thrupp and Hirsch (2006) have argued that we can identify two apparently opposed positions. The first claims that school effectiveness is a function of school management and teacher performance, while the latter claims that social factors (e.g., social class) determine pupil outcomes in schools. In this respect, pupil composition can be seen as one social factor that may be significant in determining pupil outcomes. However, they note that we can consider these two positions as at the ends of a spectrum and that much of the debate centres on the relative contributions of schools and teachers and social factors.

In policy terms, the debate is crucial because if indeed it were the case that school management and teacher performance are key factors determining school effectiveness, then the focus would be on the policies that would best raise school performance. It can be argued that policy makers have focussed, over the past twenty years, on these factors by enlisting the support of some school effectiveness and improvement studies (Goldstein, 2001). Some policy makers have even claimed that reference to social factors, is no more than an excuse for poor performance made by educators (Thrupp, 1998).

In England and to some extent the United States this has led to two specific sets of policy: a) what may be called the state theory of learning (Lauder, Brown, Dillabough and Halsey, 2006) and b) the introduction of market mechanisms. The state theory of learning has been a primary focus of developments in England, but also underpinned by a bipartisan government commitment to the use of market mechanisms. It is based on the idea that a combination of the repeated high stakes testing of pupils, a national curriculum with mandated pedagogy, and the publication of school rankings or

'league tables' will raise 'standards'. High stakes testing with publication of results is meant to hold schools and increasingly teachers to account while it is also intended to provide feedback for students and parents. Students and schools are set targets related to the tests and their progress is monitored in relation to them. These policies presuppose a theory of motivation in which children are stimulated to achieve the test results while teachers similarly have the spur of achieving high test results since their school will be judged against others in the published league tables.

Of particular relevance to the findings presented below, schools have usually been judged only in terms of their overall test results and more recently 'value added' measures have been accepted by policy makers since they are more closely related to pupil progress. In our study, we discuss value added measures which include social class, deprivation and prior achievement. Official studies have used only limited contextual measures of value added (CVA), and there remain major issues as to how they can be used (Goldstein, 2008). The CVA measures adopted by the DCFS are derived from data collected by the Pupil Annual School Census database (PLASC) maintained by the Department of Children, Schools and Families (DCFS) where the only compositional variable that even approximates social class composition is the proportion eligible for free schools meals.¹ In a separate paper (Kounali, Robinson, Goldstein and Lauder, 2008) we have explored the problems associated with using that variable, and especially its low reliability. We note that the inclusion of compositional or indeed any variables measured at the school level, may be relevant to judging schools for the purposes of accountability, for example when carrying out local or national inspections. For the purposes of school choice, however, it is not appropriate to include such variables since interest lies only in comparing school 'effects' and not in 'explaining' how such effects may be caused (Goldstein and Leckie, 2008). It is clear, however, that the way in which school performance is judged is important because where schools do not achieve targeted test results, a

¹ For further details see the SCFS website:
<http://www.standards.dfes.gov.uk/performance/1316367/CVAinPAT2005/>

battery of measures can be externally imposed on a school to secure better test results (Lauder, Brown, Lupton, Hempel-Jorgensen and Castle, 2006), raising questions about teacher's professional autonomy and morale.

The market mechanism of parental choice is also seen as a way of raising 'standards', in that schools which do not attract pupils to fill their allocated rolls may be penalised financially and ultimately threatened with closure. This latter policy is particularly germane to the question of the nature of the pupil body since studies have shown that parental choice has an impact on the flows of students to schools, according to social class, gender and ethnicity (Lauder, Hughes, et al, 1999).

In summary, the question of whether pupil composition has a significant impact on school performance assumes a central position within the debate over school effectiveness for two reasons: in so far as aspects of pupil composition do not enter into official judgements about school performance, it may be that schools and teachers may be wrongly held responsible for their school's performance. Official government statistics in England take into account various contextual measures in assessing school performance but they do not take into account as to whether, for example, a disadvantaged pupil in a predominantly high social class school will perform better than one in a predominantly low social class school. Moreover, if parental choice significantly alters the pupil composition of schools such that, for example, they become more polarised in terms of social class intake and this is found to have a bearing on pupil outcomes, then fundamental questions will be raised about this policy.

The Debate

The literature on the effects of pupil composition has been extensive and while it is probably fair to say that the balance of evidence favours the existence of such effects, there is no consensus (Thrupp, 1997, Nash, 2004). After three decades of studies reporting either the presence or absence of composition effects attention has turned to the basis for disagreement and

these have turned on both theoretical and methodological issues. Theoretically, the question of how pupil composition might affect school and individual pupil outcomes, was not given sustained theoretical consideration until the advent of Thrupp's work (1999), although earlier empirical analyses had included, more sophisticated compositional variables (Nuttall, Goldstein, Prosser, and Rasbash, (1989) Thrupp outlined three ways in which pupil composition might affect school and pupil outcomes: through peer subcultures, instruction and the curriculum and school policies and illuminated his theory with an ethnographic study of working and middle class schools. He hypothesised that peer subcultures might either support school aims and processes or resist them. In schools with a high proportion of working class youth there was a greater possibility of classroom disruption. In turn instruction and the curriculum were changed to arrest pupils' interest. However, at a policy level more time was spent on issues of discipline and ways of funding non core activities. At these three different but related levels, Thrupp (1999) argues that pupil composition has a significant impact on school and individual performance.

However, Thrupp's theoretical work arose out of the study of secondary schools and it is not immediately obvious that the pupil level aspect of his theory has application in primary schools largely because while we might expect to see issues of discipline and social control as of significance in some schools (Hempel-Jorgensen, 2007), these are unlikely to coalesce around sub-cultures of resistance in the sense, described for example, by Willis (1977).

The contrary view has been most consistently advanced by Nash (see, e.g., 2003, 2006), who makes two points. The first, which reflects a position he has developed over twenty years, is that the experiences of the early childhood years develop a cognitive *habitus* which largely determines future school careers, hence;

Discussion of the school composition effect and its relevance to school effectiveness should be located more securely in the larger debate

about the relationships between social class, early childhood socialisation, the development of cognitive and no cognitive habitus and the responsibility of the school for the learning outcomes of its students. (2003. p.453).

Added to this theoretical position is a methodological critique in which he argues that the causes of what we observe in schools may lie outside the school and composition effects may be one example. He cites Bourdieu (1999) who argues that:

[t]he perfectly commendable wish to see things in person, close up, sometimes leads people to search for the explanatory principles of observed realities where they are not to be found (not all of them, in any case), namely, at the site of observation itself (p.181).

Nash's critique is directed at ethnographic studies such as Thrupp's and not at quantitative studies which he sees as the essential precursor to qualitative studies which seek to explain observed quantitative effects.²

There are three points to make in thinking about studies investigating compositional effects to emerge from this debate. Firstly, causes that can be attributed to school effects as opposed to wider societal effects are always a matter of theoretical contest, especially in relation to those processes which appear to cross the border between school and society (Lauder, Jamieson and Wikeley, 1998). This is one reason why studies of school effectiveness should be theoretically driven. Secondly, Nash's view seems reasonable, since quantitative studies can identify effects, if not necessarily the causes. Finally, and most importantly for this study we need to unpack the notion of social class that is being used because it is germane to the two positions outlined above and more directly to present government policies: in particular, whether we can distinguish between four components that are often associated with social class: occupation, education, income and wealth. In this study we use home ownership as a proxy for wealth. The latter has been largely unexplored in the sociology of education but it may be that as (and

² Although, Thrupp (1999) is well aware of this problem noting that there may be factors that are *school based* but not *school caused* (p.5).

when house prices rise) this gives home owning parents a stake in society which then translates into aspirations and educational hopes for their children.³

Social Class, Income and Education

Typically in class analyses the underlying variable that links these factors is that of power. Power in this respect has three dimensions, power over others, the degree of autonomy that it confers at work and the power that accrues at home through disposable income. In this context education can be seen as related to the technical demands of work and also to the authority and status that it confers. Here Kohn's (1977) research is significant where he argues that it is professional middle class parents' sense of power over their destiny which is given to them by autonomy in their paid work and which they communicate to their children that enables them to perform relatively well at school.

In relation to this study we are interested in distinguishing, where possible, between social class as reflected in occupation and its attendant relations of power, income and wealth. This is for two reasons. The first concerns the theoretical position outlined by Nash (see especially his 2006 paper). For Nash, it is family cultural resources, in particular reading, that are germane to future educational performance. Here social class is translated into a particular cultural orientation. The material basis in terms of income, although not dismissed, is downplayed. Mayer (1997) has perhaps the clearest argument that it is the culture of parents in poverty and the nature of their parenting rather than income which explains the relationship between class and school performance.

The early 21st century (New Labour) government's strategy for reducing child poverty is largely focussed on raising the income of those in poorly paid work

³ A discussion about the effects of wealth on education has been initiated by Conley (2001) but it is limited to its effects on a college education in the United States.

through amongst other policies, working tax credits. These are given to families where one adult is in low paid work. In 2005, when the data on our families were collected, a couple or lone parent with one dependent child under 11 and a gross annual income of up to about £13,500 would have been eligible for WTC, although those with higher incomes would also be eligible if they were paying for childcare, or were disabled, or working more than 30 hours per week, or if they had more children.

If Mayer (1997) is correct then we should not expect this policy to have any effect on schooling, indeed it could be argued that with respect to schooling at least this policy merely 'throws good money after bad'.

In this paper we have attempted to distinguish various measures of economic and social deprivation from the more omnibus measure of social class. In particular our data enable us to identify those that are either unemployed, in rented accommodation and/or in receipt of WTCs. The distinction between rented accommodation and home ownership may be considered important since home ownership presupposes a degree of wealth accumulation which is absent for those that are renting.

It will be apparent that there is considerable overlap between concepts of social class and income, most clearly seen perhaps in relation to the unemployed where paid work confers no sense of status and reduces choices outside work due to low income. However, it may be that raising income to a certain minimum level reduces stress within the home and confers a note of hope, both of which may translate into school performance. In this paper we have categorised social class according to the Goldthorpe-Hope (1974) scale (see Appendix 1) because it allows for changes in the social class structure to include routine non-manual workers such as those in personal and protective services. Our classes are termed respectively: professional; middle and working class, with a further category of those not working. It has typically been the case in the sociology of education to refer to professionals as 'the middle class' but this excludes potentially significant groups of non-routine

workers, such as semi-professionals, lower level managers and administrators.

Testing the Pupil Composition Thesis in Primary Schools

There are several reasons as to why a study of primary schools might be considered a particularly stringent test of the different elements of the pupil composition thesis. Firstly, given the view that it might well be the creation of pupil sub-cultures of resistance that are the source of a composition effect, for the reasons given above, they may well be absent from primary schools. Secondly, one of the reasons why this might be the case is that primary schools tend to be small and pupils are unlikely to avert the 'gaze' of teachers. Hence, even if sub-cultures of resistance were nascent within the primary school they are less likely to develop. Thirdly, pupils in primary school may not have generated the identities necessary to create groups which challenge the teachers' and school's goals. However, at the organisational level, because primary schools are smaller schools the compositional effects on the organisation may be larger, and by the same token, the issues raised by composition may be easier to handle. In the event, there have been few large scale studies of school effectiveness in primary schools that have taken composition into account and where they have the analysis using social class has been relatively crude (e.g. Mortimore, Sammons, Stoll, Lewis and Ecob, 1989).

These considerations provide a theoretical framework for this study. However, in addition to the theoretical debate, there has been a related debate about methods. This latter debate is concerned with the extent to which conflicting methods and especially measurement error could give rise to dubious claims over compositional effects. It is these methodological differences, we argue, that have led to disagreement over the presence and nature of compositional effects.

The Methodological Debate

There are two major issues with respect to methodology that can explain the unresolved nature of the debate over compositional effects. These relate to the techniques and sampling used in order to identify compositional effects and which have sometimes been termed phantom effects (Harker and Tymms, 2004). Thrupp, Lauder and Robinson (2002) have noted that there are few studies that conform to what they argue would approximate to the ideal with respect to techniques and sampling. As a consequence, it may well be that whether composition effects are identified will be a function of differences in the sample and techniques used. In outlining what they consider to be a desirable model with respect to sampling they argue for the following criteria:

First, the sample should include schools from both ends of the socio-economic spectrum. School compositional effects are unlikely to appear in reasonably well-mixed schools because there may be countervailing factors involved: the effects of school composition could be cancelled out by student sub-cultures in which those of high prior achievement excelled, while those of lower prior achievement generated a culture of resistance and school failure.

Second, a full set of entry-level variables, including prior achievement variables, need to be included. Entry level variables should include measures of social class for the school population, this has rarely been the case in England and Wales where a measure of eligibility for Free School Meals (FSM) typically has been used. We noted above that we have shown this measure to be unreliable in identifying disadvantaged pupils and as a predictor of subsequent performance (Kounali, Robinson, Goldstein and Lauder, 2007; Goldstein, Kounali and Robinson (2008).

Third, there should be measures that can capture the possible correlations between the theoretical dimensions of the school composition model (such as peer group processes, instructional, and school organisational and management processes). It is noteworthy that many school effectiveness studies are not whole school studies in the sense that not all pupils are measured. Typically, it is particular years that are used. This then raises a

question about how representative a year can be of a school and whether it is the characteristics of a year group and/or the whole school that are relevant. For analytical purposes then we can distinguish between the notion of a school as reflecting the current characteristics of the pupils in the school and the notion of a school as having characteristics independent of these. These points will be germane to the discussion below.

Fourth, a combination of compositional variables (e.g., prior achievement or social class composition) should be used in order to measure the various dimensions of pupil composition.

Fifth, different techniques for measuring composition should be used. The typical measure employed is the mean, for example, of the social class composition. Additionally, ratios of high to low social class proportions could be used or other measures of 'spread'. In this study we use ratios because they better capture the distribution of pupils within schools. For example, from our qualitative study of a sub-sample of 12 of the schools in this sample, it is clear that some school compositions comprise a significant proportion of pupils from professional backgrounds and working class backgrounds. These tend to be on the rural fringes of the urban centre which is the focus of this study (see below).

However, social class composition is not the only composition variable that can be considered. In this paper we also develop a measure for prior achievement composition effects. While we show that there is a strong correlation between social class and baseline measures at age 5, thereafter there are differences between social class and prior achievement. Our outcomes measures are reading and mental arithmetic and these differences are more marked for the latter. Here the hypothesis is that it is not only factors associated with social class, such as cultural capital but also the composition of prior achievement that needs to be considered since the context created by prior achievement composition may influence pupils' orientation to learning.

Sixth, where possible, a mix of school types would be included in the sample including denominational schools. This is because for example, catholic schools have been identified as performing a little better than state schools (Bryk, Lee and Smith, 1990). Sixth, it is essential that any study should be longitudinal. Finally, we assume that studies should conduct their analyses using appropriate statistical methods which respect the dependence structure characterizing such data i.e. multilevel modelling.

In addition to these criteria, there are several other factors that need to be taken into account: these include seeking to capture elements of the dynamics of the markets in primary schools and the question of pupil turbulence. By turbulence we mean 'A child joining or leaving school at a point other than the normal age in which children start or finish their education at that school, whether or not this involves a move of home' (Dobson and Henthorne, (1999:5). The question of turbulence is of significance because some 43 per cent of pupils move primary school at least once between the ages of 7 and 11: in some areas and schools the turbulence is far higher. The issue of turbulence has not been widely considered in the school effectiveness and improvement literatures but it was part of the remit for this project. Indeed, it is only since the inception of this project that a detailed analysis has been undertaken, (Goldstein, Burgess and McConnell, 2007). Finally, within our sample there are schools with high proportions of students that had been categorised as having special educational needs. How such pupils are categorised is problematic because there is variability between local authorities and between schools with respect to how the 'school action' and 'school action +' categories of SEN are determined and especially with respect to the latter because of the resource implications involved.

It is also important to be aware that, if a statistical model is mis-specified, for example by omitting relevant predictors, or by failing properly to take account of the multilevel data structure, spurious estimates for compositional effects can be obtained.

Given these considerations we move to a description of the sample.

Study design: The HARPS project

The HARPS project is an acronym for ‘Hampshire Research with Primary Schools’ and looks at the impact of school composition upon student academic progress. The main aim of the study is to estimate and better understand *compositional effects* at the primary school level. Compositional variables included in this study will be; social class (, Appendix 2)⁴, ethnicity, gender, prior achievement, special educational needs (SEN) and age,

The research design is both quantitative and qualitative. The project design is of 3 nested parts:

1. A large scale analysis of over 300 primary schools
2. A study of a subsample of 46 schools in one urban school area.
3. Detailed case studies of 12 schools.

Hampshire-wide data: Our original population cohort consists of 11793 (51% boys) of all Hampshire pupils who took a baseline (school entry) test during 2001-2002 at age 5 and their Key Stage 1 test at age 7 (hereinafter KS1 test) during 2003-2004. We have test results for approximately 84% of this cohort based on data from the National Pupil database (NPD) and maintained by the CFDS. The NPD is a pupil level database which matches pupil and school characteristic data to pupil level attainment. PLASC is the key source of data for individual pupil characteristics which include ethnicity, FSM, information on Special Education Needs (SEN), and a history of schools attended.

The Hampshire-wide size of the cohort of Reception year pupils (grade 1) from PLASC/NPD 2001/02 is 14329 and the size of the year 2 pupils (grade 3) from PLASC/NPD 2003/04 is 14308. The pattern of longitudinal losses in terms of test results is typical for Hampshire for this phase, judging by the historical cohort data provided by the Hampshire LA. Examination of these historical cohorts showed that around 2000 pupils are systematically lost over

⁴ Social class has been classified according to the Goldthorpe-Hope (1974) scale, this operationalises a theory of class, rather than socio-economic status, however as an abbreviation we have used the term SES in the following tables.

time because they are leaving the schools and another group of 2000 new pupils are coming into these schools.

Because of data-inconsistencies related to correctly identifying and recording school changes (school merges) we finally included 11702 pupils with, baseline and KS1 data. These pupils come from 318 (Infant, Junior and Primary Schools) at baseline and 302 schools at KS1.

In addition to the above tests Hampshire schools also use tests designed by the Qualifications and Curriculum Authority in Year 3 (grade 4). Our cohort was followed-up to the administration of the Qualification and Curriculum Authority⁵ (QCA3) tests: Hampshire managed to obtain QCA3 from 200 schools contributing data for 8730 pupils. However, this sample comprised only a 61% follow-up for our cohort from baseline to QCA3. More specifically, only 7092 pupils from our cohort also had QCA3 and 4610 did not. Also another 1638 pupils were added to our cohort for whom baseline and KS1 test results were not available. The KS1 test results for these 1638 pupils were then traced through the National Pupil database. It was not possible however to trace their baseline scores since these tests are not standard across LAs – the baseline score we used for our cohort is in fact specific to Hampshire.

We have chosen the subsample of 46 schools as the focus for this paper because it enables us to approximate closely the sample specification outlined above, and we have collected and analysed detailed family background information from the year 3 children in these schools. The subsample contains family background data on 1653 year 3 pupils from a total of 2012 students attending 46 out of all 50 schools in the Basingstoke and Deane area during the second semester of the academic year 2004 - 2005. Relevant to economic status these data include: occupational group (Goldthorpe and Hope 1974) , working status; home ownership; whether in receipt of Working Tax Credit; whether in receipt of FSM, level of education of

⁵ This is the body in England charged with the management of the national curriculum and student assessment.

the parents, and house movements during the child's lifetime⁶. The deprivation geography of Hampshire according to the multiple deprivation index (Noble et. al., 2004) suggests that the children attending the selected Basingstoke schools are not among the most deprived in Hampshire, but this area nevertheless includes pockets of particularly deprived areas, thus in principle, covering the deprivation spectrum.

The majority of the responders were the mothers of the children (87%) or the mother and the father (1.3%) and less than 1% was not the child's parent. Female responders accounted for 90% of the returned questionnaires. This is also a sample that is predominantly white with 92.7% of the responders being white-British or Irish, another 3.4% being white-mixed and another 3.3% all other ethnic backgrounds.

In addition to data on these factors we also had data supplied by Hampshire LA on pupils' baseline and KS1 scores, turbulence within schools in terms of pupils entering and leaving schools, and absences and various levels of special needs.

Quantitatively, we can look at value added models up to years 3 and 4 because we administered QCA tests in both years. In this paper we have used valued added analyses from baseline and KS1 to QCA 3 in reading and mental arithmetic. Reading competence, it can be argued, is essential for all forms of education although it is also related to social class and cultural capital (Nash, 2006). In contrast, learning in maths is typically seen to be more subject to the influence of the school and less of the home. For reasons we give in Appendix 1 we have only be able to use the mental arithmetic element of the QCA3 maths test.

The reading test has a range of 0 - 36 with a standard deviation of 8.0, and the mental arithmetic test has a range of 0 – 15 with a standard deviation of 3.6.

⁶ Details of how these data were collected are in Brown and Thrupp (2005).

Statistical methods - Modelling Achievement and Progress

We have fitted a multilevel model with the QCA reading and mental arithmetic test scores as joint responses and the set of variables as predictors given in Tables 1-3.

A formal statement of the model is as follows:

$$\begin{aligned}
 y_{ij}^{(1)} &= \beta_0^{(1)} + \beta_1^{(1)} x_{1,ij} + \sum_{k=2}^p \beta_k^{(1)} x_{k,ij} + u_{0j}^{(1)} + u_{1j}^{(1)} x_{1,ij} + e_{ij}^{(1)} \\
 y_{ij}^{(2)} &= \beta_0^{(2)} + \beta_1^{(2)} x_{1,ij} + \sum_{k=2}^p \beta_k^{(2)} x_{k,ij} + u_{0j}^{(2)} + u_{1j}^{(2)} x_{1,ij} + e_{ij}^{(2)} \\
 \begin{pmatrix} u_{0j}^{(1)} \\ u_{1j}^{(1)} \\ u_{0j}^{(2)} \\ u_{1j}^{(2)} \end{pmatrix} &\sim MVN(0, \Omega_u) \quad \begin{pmatrix} e_{ij}^{(1)} \\ e_{ij}^{(2)} \end{pmatrix} \sim MVN(0, \Omega_e)
 \end{aligned} \tag{1}$$

where i indexes individual pupils and j indexes schools and the superscript indexes whether reading or mathematics. There are p fixed predictors (x) in this model of which the first is the KS1 score, which also has a random coefficient at the school level and is the baseline reading or maths score as appropriate. Model (1) is fitted as a bivariate model. This is efficient since it fully utilises all the data, including where a pupil only has one QCA3 score (3.8%). The results are presented separately for maths and reading scores.

For the variable ‘special needs’ we carried out preliminary analyses relating the categories to the QCA3 test scores. There are only small mean differences among the special needs groups so that we have used a binary split ‘special needs/no special needs’ for this predictor. We have carried out similar analyses for social class and find an approximate linear relationship with simple category scores 1,...4. Likewise for main carer’s education a linear relationship for maths requires scores 1,2,2,3 and for reading scores 1,2,3,6. Thus for these latter variables we have a single covariate which are these category scores. For the year grouping variable we have formed a

composite variable: No mixed ages at either year 2 or year 3; not mixed year 2 and mixed year 3; not mixed year 3 and mixed year 2; mixed both years. Additional exploration of year grouping effects is the subject of further research.

Results

In this section we discuss the factors that we found to have an effect on QCA3 test scores of reading and mental arithmetic. These include both individually measured characteristics as well as compositional variables at school and class-level and are detailed in Tables 1-3. These tables explore these effects, fitting model (1), where each table presents a subset of the variables fitted. We look in detail at the extent of between-school variation in Table 4.

<Insert Table 1 about here >

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Prior Achievement and Social Class

We start by analysing the effects of social class at the individual pupil level before looking at the school level compositional effects.

Table 5 below shows that there is a strong relationship between social class and pupils' baseline scores for both literacy and maths.

<Insert Table 5 about here >

Those from professional and non-professional middle class families perform far better than those from working class families. The effects of social class can be documented from children taking baseline tests at about age 5. Table 5 accords with an important body of research that suggests that social class disadvantage is already present by the age of 5 (Feinstein, 2006; Nash, 2006). It therefore, supports the existing literature which must now be considered a robust finding. However, as we shall see below, this does not mean an absence of a school effect for working class students and those whose families are not in paid employment.

Moreover, while individual pupil prior achievement typically has proved to be the strongest predictor of performance, there is an additional social class effect over and above that measured by prior achievement. Pupils who had attained Level 3 at KS1 scored at QCA3 one standard deviation higher than those who had attained Level 1 or below at KS1 in both reading and mental arithmetic; pupils drawn from the professional and middle classes scored 0.6 and 0.8 standard deviations higher in the QCA3 reading test compared with working class pupils and those from non-working families respectively. This is also a significant finding. While cohort studies such as Feinstein's (2006) show that there is a social class effect throughout a child's school career and beyond, this has not been so clearly established in contextual value added school effectiveness studies and especially in primary schools. However, as we note below, in contrast to cohort study analyses such as Feinstein's there is also a compositional effect for those with lower baseline achievement scores.

The Effects of Social Class, Income and Wealth on Pupils' Performance

The family's social class and income were found to have a significant impact on both QCA3 test performances after adjusting for prior achievement and other factors. All economic indicators: home renting, receipt of working tax credit, as well as social class were found to have a significant impact on the reading test – but not on the maths test. The penalty for working class students when compared to those from professional backgrounds equates to almost a 0.6 standard deviation penalty in the QCA3 reading test once all other factors had been taken into account. Pupils whose parents rent their homes experience a 0.3 standard deviation penalty on average when compared to those whose parents own their homes. There are also significant interactions among these indicators.

Of those with no capital assets (e.g., home ownership) we found that the negative effect of home renting on the child's QCA3 reading test performance will reduce significantly if the parent is receiving working tax credits when compared to the majority of home renters who are not in paid work (86 per cent of FSM families were renting: Table 2). This suggests that income makes a difference to children's school performance where parents do not own their homes. In Table 6 below we present descriptive statistics concerning the number of families renting their home and receiving working tax credit according to social class. This shows that a high proportion of those renting are from working class or non paid working backgrounds and that this is especially true of those in receipt of working tax credits.

Insert Table 6 about here: Number of families renting their home and receiving working tax credit according to social class.

There was a difference on the QCA3 attained scores in both reading and mental arithmetic tests in favour of those pupils whose parents were university graduates or post-graduates compared with those whose parents left school at 16 years (0.23 and 0.18 standard deviations difference in reading and maths respectively, Table 2).

Prior Achievement and Performance in QCA3 Reading and Maths

We have noted that social class has an impact on pupil progress, especially for reading, even when prior achievement has been taken into account. Here we look at the effects of prior achievement on individual pupil progress.

Attainment at KS1 is an important predictor for test performance at year 3 (grade 4) for both reading and maths. For QCA3 reading, this translates into a penalty of 1 SD units for a pupil at the lowest 7% quantile (Level 1 or less at KS1) compared to one at the 67% quantile (Level 3) of the KS1 scale. In KS1 maths assessment there are two written tests (one covering levels 2B–3B and the other covering levels 3C–4C) and a mental mathematics test. Pupils take one written paper and the mental mathematics test. The type of test that schools selected for mathematics was found to be a significant predictor for QCA3 attainment for both English and maths (leading to differences of 0.2 and 0.5 standard deviations between the two test-groups for reading and mental arithmetic respectively). In our analysis we include a binary indicator for the written test taken but include only the mental maths test for our measure of prior maths attainment.

The level of prior attainment at the end of the reception year was also found to affect progress in addition to the KS1 score, especially for maths. Pupils with higher scores at baseline progress significantly more in maths with different effects across the KS1 scale (one standard deviation of higher baseline score increases the KS1 related differences (from the lowest KS1 level) in QCA3 attainment in the mental arithmetic by 0.3 to 0.4 standard deviations).

Having looked at the effects of social class and prior achievement at the individual level we now move to examining school factors. We start by looking at those that may determine the social class composition of schools such as demographic changes and parental choice.

Rolls and Registration Rates

Earlier, we suggested that the question of parental choice should be taken into account when considering school effectiveness, especially within the context of pupil composition. This is because while the social class of pupils, may be reconfigured by groupings within schools, parental choice may in principle, have that effect of determining the overall social class composition of schools. While we had not direct data tracking pupil flows into schools on the basis of parental choice we did have a proxy for modelling such decisions and their effects by looking at school rolls and registration rates. Here we were particularly interested in whether schools were subject to declining rolls, either due to demographic factors or to parental choice. The effect of rolls on school performance is not clearly understood but we note that in New Zealand Nash and Harker (2005) have shown that students in schools with declining rolls were more likely to underperform relative to their counterparts in rolls at official capacity.

Pupils attending schools with high registration rates, that is, at or close to the maximum numbers of pupils the school is allowed, were found to perform significantly better in the reading test. There is an average difference of 0.1 standard deviations in both reading and mental arithmetic scores between pupils going to a school with a registration rate at the 25th centile and a pupil going to a school at the 75th centile (of the distribution of registration rates among schools). Given the literature on educational markets and their relationship to rolls (Lauder, Hughes, et al, 1999), it is worth considering the relationship between lower registration rates (than the school's capacity) and social class composition.

Because of the small number of schools it is difficult to make strong inferences with regards to the association of social class and registration rates at the school level. However, what was of significance was the association between social class composition, school popularity and school turbulence.

Broadly speaking the schools operating at their official capacity drew their intakes from the professional and middle classes and were relatively stable in terms of student turbulence. Whereas the majority of schools that were below

their official capacity were more likely to have a significant proportion of working class students and were more likely to have student turbulence.

These findings are important because they suggest that the penalty attached to less popular schools is related to parental choice which in turn may be affected by judgements relating to the social class composition and stability of the school population. This prompts us to question the effect turbulence may have on pupil outcomes. While others have found a significant effect (Goldstein, Burgess, and McConnell, 2007) our findings suggest that those attending schools with a high proportion of new pupils seem to perform less well but this result is statistically weak (significance level 6%) and also had a very small effect (0.02 of a standard deviation) reduction in QCA3 reading test score between the extremes 75% and 25% of the distribution of the proportion of new pupils among schools). In part this may be because the schools in this study had relatively stable pupil populations when compared to other areas.

Social Class Composition Effects

The social class composition of a school class was found to have a significant impact on pupils' reading attainment only. Children going to schools with high proportions of pupils from working class and/or non paid work backgrounds perform significantly worse in the reading test. The social class composition is defined as the ratio of the number of working class pupils to the number of those from professional backgrounds. The point gap between pupils attending schools at the 25% lowest centile and the 75% upper centile of the school distribution of this social class ratio is almost one point that is 0.05 standard deviations.

Prior Achievement Composition Effects

With respect to prior achievement composition effects we need to take a developmental perspective. We have seen that pupils from working class and families not in paid work backgrounds start their school careers well behind those from professional social class backgrounds. Those lower achievers who

attend high baseline intake classes perform better in reading and maths than those who do not, while there is no advantage for higher achievers in the same class. From KS1 through to the QCA3 tests those who were initially lower achievers improve more rapidly than their peers. This is a significant finding for two reasons: firstly, it suggests that composition does matter at a particularly crucial stage in a child's education. The finding may open a window of optimism in relation to cohort studies such as Feinstein's (2003) which suggests that by the time low achieving low SES pupils start school there is no improvement in their relative position. The effect here is small and clearly requires further research since we have shown (Lauder, Brown, Hempel-Jorgensen and Lupton, 2008) that the mediating factors associated with grouping may be crucial in understanding this outcome. However, as it stands, the policy implication is that where possible low prior achievers should be in the same classroom as high prior achievers wherever this is possible. This is a point we return to in the conclusion. Secondly, there is a question as to whether these effects are taken into account when school performance is judged which is discussed below.

However, for those judged to be of higher ability (those who take the more demanding exam) there is a penalty in being mixed with those judged of lower prior achievement. This was also found by Robertson and Symons (2003). In Figure 1 we compare composition effects for students from professional and working class and those not in paid work backgrounds with different prior achievement profiles who have achieved level 3 at KS1 and those below level 3 in the context of schools with different forms of social class and prior achievement compositions.⁷

⁷ Working class pupils were included who are renting and pupils from professional families who own their homes. High prior attainers are those in the 75% centile of the baseline score distribution and level 3 at KS1 and low prior attainers are those in the 25% centile of the baseline distribution and Level 1 or below at KS1. For the school compositional prior achievement variables, those at the 1% and 99% centiles were included. A high prior attaining school had both high (above the 99th centile) baseline average, low proportion of KS1 Level 1 attainers and high registration rates with average for turbulent pupils. A low prior attaining school has low baseline average, high proportion of Level 1 attainers and low registration rates.

<Insert Figure 1 about here.> Expected Difference from the average pupil-profile in predicted Reading Scores according to different pupil profiles

Finally, the data on composition effects are almost certainly underestimates for two reasons. Our missing data appear to be biased towards those on low incomes (Goldstein, Kounali and Robinson, 2008) so our analysis is likely to reduce the composition effect sizes. We argued earlier that it is in schools at the extremes of the social class distribution that composition effects are most likely to be observed. In our sample, while there were schools with such compositions they were relatively few in number. Six schools had over 40% of pupils from professional backgrounds, two of which had 60%. In contrast, approximately 11 schools had predominantly working class populations. However, these included those not working, low skilled routine workers and skilled craftspeople. In turn this raises questions about how we understand the nature of the working class and its relationship to education, which requires further analysis. Of these only four schools had a predominance of those who are unemployed or low skilled routine workers.

A further hypothesis, worthy of consideration, concerns the way that composition is reconfigured by grouping strategies Roberston and Symons (2003). They found powerful grouping effects related to social class, although they did not place these effects within the wider context of a multi-level model. It may well be that composition effects are therefore mediated by grouping strategies. In our study there were effects which were suggestive of the influence of grouping strategies which we refer to below. In Lauder, Brown, Hempel-Jorgensen and Lupton (2008) an explanation, drawing on the qualitative data from this study, is given of these composition effects in the light of schools' setting and grouping strategies.

Class Organisation and Outcomes in Reading and Maths

Our data had information on one aspect of grouping: where a child was taught in a class with older or younger pupils. And here, as Table 1 shows, there are effects that under certain conditions can add close to two points to a pupil's progress. However, the series of grouping permutations between older and younger pupils that we identified produced mixed results which are hard to interpret. (See appendix 2 for a discussion which provides an interpretation of these results). We did not have the further necessary grouping data to enable the modelling of groupings within a hierarchical structure. Grouping strategies are highly fluid within primary schools and it is therefore hard to pin down what the effects might be (Lupton et al, 2006). However, we have noted these effects because they provide some initial support for the hypothesis articulated above, that the moderate composition effect on individual pupils may be explained by the mediating effect of groupings.

Differential school effectiveness and Accountability

One of the key questions to be investigated in this study was that of the influence of composition measures on school rankings when compared to the standard contextual value added measures used in official statistics. In what follows we present data patterns on school performance according to our model, which includes compositional variables and compare it to the standard model typically used by the UK Department for Schools, Children and Families (DCFS). We are particularly interested in two aspects of this comparison. Firstly, with respect to school performance for students who have achieved Level 3 at KS1 and those who have achieved below this level.⁸ The policy assumption is that schools can be good schools for all pupils and if they are not, they should be. But league table rankings do not take into account the possibility that some schools are good for some pupils and perhaps not others. Our model takes into account compositional effects so that what we

⁸ We have allowed for differential school effectiveness by including a random coefficient for the (dummy) variable associated with the highest level category at KS1. This allows us to obtain two 'value added' effects for each school: one that applies to the pupils who are in the highest scoring category at KS1 and one for the remainder.

see in these data are school, year or teacher effects.⁹ Secondly, when we compare the school rankings according to our model and the DCFS contextual value added model it will be clear that school rankings are changed. This same point is made by Goldstein and Leckie (2008). When these two sets of data patterns are compared important questions are raised about the reliability of the basis for official judgements about school performance.

We begin by noting that there is a significant (residual) between-school variation in attainment in QCA3 reading (Table 4) - ranging between 7.8% & 8.3% (depending on the prior attainment (KS1) scale – below Level 3 and Level 3 respectively) and in mental arithmetic test scores ranging between 17.8% & 13% (below KS1 Level 3 and Level 3, respectively) - the actual amount of between-school variance depends on the child's KS1 attainment.

In order to read and compare the scatter plot and caterpillar figures below we have highlighted five schools as follows:

The characteristics of the marked schools:

Colour	SES composition	Prior attainment composition	Size	No

Red X	Lowest	High	63	3
Yellow rectangle	Low	Low	57	4
Lime triangle	Low	Average	84	30
Pink diamond	High	Average	53	33
Black circle	Highest	High	16	37

⁹ In terms of the data collected the best account to be given is that what we identify here are teacher year group effects. However as we argue in Lauder, Brown, Hempel-Jorgensen and Lupton (2008) this would be a reductionist interpretation because it fails to take into account the interrelationships between school, year and teacher effects.

In Figure 2 we show our analysis taking into account composition for high and low achievers at KS1.

<Insert Figures 2a& 2b >

In this figure quadrant 1 represents schools that do well for high achievers, quadrant 2 those who do well with all pupils, quadrant 3 those who do well with lower achievers and quadrant 4 those schools that underperform for both kinds of pupil. It can be seen, for example with respect to reading, that school 3 which is of low social class composition performs above the mean for high KS1 reading achievers, while school 4 of similar social composition but with low KS1 achievers performs well for all students. In contrast, school 37 performs well for both groups. However, when the same analysis is applied to the mental arithmetic effects then none of these schools performs so well. In contrast, school 30 which has a low social class composition and which did not perform so well for either type of pupil in reading is one of the best performing in mental arithmetic for both pupil types. The schools that did well for one or both of the pupil types for reading do less well for both types in mental arithmetic.

When we compare these results with those calculated according to the DCFS method, we see considerable differences in how schools perform.

<Insert Figures 3a-3b about here>

In reading, it will be seen, for example, that school 37 performs well for all pupils in the DCFS calculation while it performs poorly for all pupils in our model. In our model it also performs well. However if we look at schools 1 and 4, then on the DCFS analysis these schools do not perform well for either groups of student. However on our analysis both schools perform well for high

achievers. If we take school 31, this is considered a poor school on the DCFS analysis but it performs well for low achievers in our analysis.

When comparing the maths rankings it can be seen that school 2, for example, does well for all pupils in both analyses in contrast school 4 does not do well for either groups of pupils on either analysis. In contrast school 18 does poorly for both groups of students on the DCFS analysis but does well for both groups in our analysis. These results suggest that the processes in schools are complex and that the idea that often appears to be assumed in league table results that 'good' schools are good for all pupils needs to be reconsidered.

When we translate these data into rankings we can see the differences between our analysis and that of the DCFS. As regards reading, it will be seen that the DCFS ranking are quite different to ours. Consider school 3 (Red X). On the DCFS ranking it is low in the rankings, as it is on our analysis for low achievers but on our analysis the same school does very well for high achievers.

<Insert Figure 4a about here >

A similar point can be made for this school in maths. It seems as if it does very well with high achieving pupils but less well with low achieving pupils. This should be contrasted with the school 30 which does well with low achieving maths pupils.

<insert Figure 4b about here>

Four points arise from this analysis. Firstly, schools that perform well on reading do not necessarily perform well in mental arithmetic and vice-versa. Secondly, schools do perform differentially according to the pupils they are teaching. Thirdly, when the DCFS contextual value added ranking are

compared to our analysis then the rankings change when our additional measure of social class composition is taken into account and for the differential effects that schools have on particular groups of students we have analysed in terms of prior achievement. Finally, all value added estimates will have large confidence intervals attached to them that severely restricts their usefulness (Goldstein and Leckie, 2008).

Conclusion

In looking at our results when compared to the competing theories outlined in the introduction, several comments can be made. There is a strong social class influence on pupils' achievement and progress throughout that part of their school career that we have studied. The finding that there is a strong correlation between social class and baseline test scores provides additional evidence for the view that social class influences early educational development. This much accords with Nash's theory and the findings of Feinstein and others. In highlighting elements of social class related to income we found that for the group which has no capital assets (e.g., house ownership) government policy with respect to Working Tax Credit (WTC) increases pupil's progress, compared to those families where no one is in employment. Although, there is considerable debate about WTCs this finding does suggest that income matters when it comes to children's school performance, although how it matters remains a matter of conjecture.

It is clear that there are other aspects to social class for which our findings can inform further debate. It is also important, given the findings regarding social class and income to note that, in contrast to the often cited claim, that pupils from single parent families are at a disadvantage, we found no supportive evidence. This suggests that the often suggested deleterious effects of single parenthood are a function of income rather than family structure.

However, when social class is taken into account there are still further effects with respect to gender, age, English as a second language and special needs. Gender does not seem to make a difference for reading but was found to affect progress in maths with boys doing significantly better in the mental arithmetic test. Age at reception was also found to have a positive effect on QCA3 test performance but only for reading: having English as a second language bears a significant penalty for test performance at QCA3 in reading only.

In moving to the central focus of this study, it is clear that the effects of composition are varied. A school's popularity is important and raises questions about current policy. While the issue is not straightforward, it seems that parents may make judgements relative to the social class composition of the school and its level of turbulence, where there is some association between the latter and social class. However, we know from previous studies that school choice is highly contextualised (Ball, Bowe and Gewirtz, 1997) and it is for this reason that we can say little more about our results.

With respect to social class composition our findings are ambivalent: for individual pupils the effects of social class composition are present, particularly at the extremes of social class composition but not large. However, we should note the progress that working class pupils of low prior achievement make when in classes with higher prior achieving pupils. The policy implications for the distribution of primary school pupils are complex. In schools where there are pupils with a range of prior achievement then the implication is that pupils who are low prior achievers do best in classes with high prior achievers. Where, however schools do not have such a range, the policy implications are more complex because it might mean allocating low achieving pupils to schools where there are a significant proportion of high achievers.

In order to explain the moderate effects of social class composition we raised the possibility, suggested by the effects of vertical grouping and aspects of our qualitative study (Hempel-Jorgensen, 2008; Brown, 2008), that composition

effects in primary schools are mediated by grouping strategies and that it is through these that we will see composition effects most clearly (See Lauder, Brown, Hempel-Jorgensen and Lupton, 2008).

The quality of predictors used in models that compare schools is important for value-added analysis. Correctly accounting for differences in their intakes and social class composition leads to large reductions in the differences between schools and fairer comparisons between schools. It is also noteworthy that it is less common practice in value-added analysis to examine differential school progress when considering variations in schooling. The lack of such practice will unfairly penalize schools with lower attaining pupils in particular. (See also Goldstein, 2008).

With these points in mind, when it came to comparing our measures of school ranking, including compositional variables with those used in English official contextual value added measures it is quite clear that the inclusion of compositional variables changes the rank order of schools. In turn this prompts fundamental questions about the fairness in judging schools according to official measures. When this finding is coupled with questions about the reliability of FSM measures, (Kounali, Robinson, Goldstein and Lauder, 2008) then we can be rightly sceptical about key elements in accountability policies operated by many educational administrations..

Finally, while we have stressed factors that schools may have little control over, the social class and social class composition of pupils, it should be pointed out that in the debate about the factors which influence school performance this is a question of the glass being roughly two thirds full. About 30% of the variability in QCA3 test results remains unexplained, meaning that important factors affecting pupils' test performance remain unexplained. These could well relate to unmeasured school characteristics since these appear to account for a significant amount of the unexplained variance. One finding which was expected and which suggests that schools might be more effective in specific areas, when compared to the contextual and compositional variables used in this study is that Maths can be seen as being

less affected by social class background than English. Hence, there is a greater school effect for Maths than Reading. However, boys perform better than girls in maths, which again raises the question of the influence of factors outside the school.

Given these findings the paper raises questions about the possibilities of systematic school improvement through within-school strategies. But in a tentative way it also points to income in the alleviation of poverty as one more certain strategy for improving student progress in schools.

Acknowledgements

This paper could not have been written without the critical comments and insights of our colleagues on the project Ruth Lupton, Martin Thrupp, Ceri Brown, Amelia Hempel-Jorgensen and Frances Castle. We should acknowledge the role of Ruth Lupton in providing critical insights through the writing of this paper and Ceri Brown in the development and administration of the questionnaire on family background and structure which was crucial to this paper. This study could not have been undertaken without the close cooperation of Hampshire LA and in particular Nigel Hill and Paula Guy.

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Appendix 1

categories. This suggests that the bread-winner has a male gender. If we look closer at the change of occupational status for the major bread winner we find that those with higher social class occupations suffer less in the job market (job-stability/ insecurity). A total of 365 families (22.1%) experienced a worsening of their occupational status. Among these families, 81% corresponds to female bread-winners. Among higher social class occupations 20.7 % experienced a worsening of their occupational status compared with 23.7% and 24.3% for the middle and low social class occupations. The gender of the bread-winner modifies this relationship and suggests that working mothers might experience a tougher deal in the job market. More specifically, we find that if we control for the gender of the major bread-winner then among females with occupations associated with high social class 27.4% experience worsening of their occupational status. This worsening of occupational status is 36.9% and 39.2% among women with middle and low social class occupations, respectively.

Appendix 2

Data were available for individual pupils at both years 2 and 3 indicating whether the pupil was taught in a class where pupils from older, younger or both older and younger year groups were included. This gave us data patterns related to those vertical groupings which are often employed in primary schools where schools are small or there are falling rolls and/or scarce resources and in which class size needs to be balanced with cost. Grouping strategies in primary schools are complex, varied and subject to change (Lupton et al, 2006) and therefore it was only in this limited sense that we were able to see if there are any grouping effects.

The picture we have identified is complex (Table 1). Mixed age classes at both year 2 and 3 appear to have a significant negative effect on QCA3 reading and no impact on the mental arithmetic score (pupils in mixed age classes in both years scored at QCA3 reading 0.24 standard deviations lower compared to those taught at classes with no age mixing). Age mixing at year 2 was found to have a positive effect on both reading and mental arithmetic (pupils in mixed age classes at year 2 had an advantage of 0.1 and 0.24 standard deviations on QCA3 test results for reading and mental arithmetic respectively against those taught at classes with no age mixing). Age mixing during the year of QCA3 tests was also found to have a positive effect for mathematics only (pupils in mixed age classes at year 3 had an of advantage 0.4 standard deviations against those taught at classes with no age mixing)

For year 3 pupils who were in mixed classes, we do not know the extent to which teachers exercise judgement on pupils' abilities in order to assign pupils into vertical groupings when the need arises. In schools where the proportion of low KS1 attainers is less than 10% only 1% of pupils are mixed with younger year groups whereas in schools where the proportion of low attainers is higher (more than 10%) significantly more of their pupils (19%) are grouped with younger year groups. Similarly, at KS1, the average baseline score in both reading and maths was almost one standard deviation above the average for those pupils who were taught in classes with older year groups (Table 1 – not available from this table).

Thus the above effects relating to vertical groupings could reflect differences in performance associated with the matching of pupils' ability to a class of similar ability, i.e. selection effects. If, for example, teachers group lower ability pupils with younger year groups then this could explain the benefit these pupils experience in QCA3 attainment. It should be noted that the majority (80%) of pupils attending mixed-age classes at year 2, consist of pupils actually mixing with older year groups. Similarly the positive impact on attainment that pupils taught in such classes experienced could also reflect pupils' ability (Table 1).

