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The Result of 11 Plus Selection: An Investigation into Opportunities and Outcomes for Pupils in Selective LEAs

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Abstract
This paper assesses the impact of academic selection at age 11 on children in the minority of areas that still operate such a system. The answers are very clear. Overall there is little or no impact on attainment, but those educated in grammar schools do substantially better (around four grade points more than pupils with the same Key Stage 2 (KS2) points in similar, but non-selective, areas). This is equivalent to raising four GCSEs from a grade ‘C’ to a ‘B’. Other children within selective areas who do not gain a place in a grammar school are disadvantaged by a little under one grade point. In part these effects stem from the substantive under representation of poorer and special needs children in grammar schools. Only 32% of high ability children eligible for free school meals (FSM) attend grammar schools compared with 60% of non-FSM pupils. So whilst the net effect of selection is not substantive it does result in gains for those attending the grammar schools and a slight disadvantage for the rest. The paradox is that grammar schools bestow greater advantages to poor children than more affluent children, but very few make the cut.

Keywords: grammar schools, selective education

JEL Classification: I20

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1. Introduction

There has been a great deal of discussion about the remaining grammar schools in England and the justification for keeping any form of academic selection in a mainly "comprehensive" education system. On 20 January 2003 the then Labour education secretary Charles Clarke called for a debate on the impact of grammar schools on standards, less than two weeks after being quoted in the Time Education Supplement (TES 10/1/03) as saying that selection at 11 "inhibited educational opportunities". The current Education Bill before Parliament has explicitly ruled out selection by ability as a means of allocating pupils to schools in the proposed Trust Schools. It is our intention to inform the selection debate using data from the English national pupil database (PLASC) constructed by the Department for Education and Skills (DfES). We explore whether overall performance is higher or lower in selective local education authorities (LEAs) and ask who is advantaged and who is disadvantaged by this education selection mechanism.

The PLASC database gives detailed information about all pupils in the English state school system, including national test results and personal data, such as ethnicity and eligibility for free school meals. National test results from PLASC are employed in this research as measures of prior ability and output. Pupils in English schools are educated in four key stages and take national tests at set the end of each key stage. The tests at the end of key stage 2 (KS2) generally coincide with the end of primary schooling at age 11 and provide a useful indication of academic ability on entry to secondary school. Key stage 3 (KS3) tests are taken at age 14, and formal qualifications, GCSE and GNVQ exams, are taken at the end of key stage 4 (KS4), when the pupils are 16.

Selection is present in the English education system in various forms. Church schools, admissions policies for over-subscribed schools, exclusion practices and specialist status all offer opportunities for state schools to make choices about the pupils they educate and those they turn away. Whilst most independent schools select their pupils based on ability to pay and/or academic achievement, only a minority of state educated pupils sit a formal test (the 11 plus[1]) to ascertain the type of schooling they should receive. In a few LEAs those with the highest scores in the test are offered a place in a grammar school, whilst the remaining pupils attend other schools in the area (nominally "secondary modern schools" or "comprehensive schools"). It is this form of *academic* selection that is the focus of our analysis. It has been noted that most comprehensive schools also engage in selective teaching by setting pupils once in the school. This is different from selective education since it allows pupils to be in different sets for different subjects and to change sets if they progress more or less than their classmates; reassessment is possible at any age.

The debate surrounding academic selection at age 11 is more than simply a discussion about raw attainment. The current drive to raise achievement in secondary schools across England means there is substantial interest in knowing what type of education system adds the most value to all pupils. In addition, recent evidence that social mobility has declined over the last twenty years has been linked by some to the decline of grammar schools. Grammar schools have historically been considered to offer a route for advancement by bright children from deprived backgrounds (see The Economist, 2004, for example). We therefore compare the outcomes of all secondary school pupils in LEAs with grammar schools, with pupils in *similar* non-selective areas. We examine the relative progress in these similar areas across the ability distribution and in particular we consider the outcomes of `borderline' pupils in grammar and non-grammar schools. We pay particular attention to the value added by different selective and non-selective systems to the test scores of children from low income families. We also discuss the additional impact of being educated in single sex or religious schools.

Further, we explore the critical issue of differential access to grammar schools at age 11 across pupil characteristics including children eligible for free school meals. Hence, we investigate whether selection is more or less socially divisive than comprehensive education. If academic selection improves the chances of children in poverty to get into the best schools we might expect to see less socio-economic

[1] The 11 plus test is a grammar school entrance exam taken at roughly the same time as KS2 SATS. It is not a national attainment test, and can be set by the school or the local education authority. Pupils

segregation in selective areas than in similar LEAs without overt selection but with high demand for good schools.

Getting into a grammar school is clearly not random – it depends on a range of characteristics and circumstances, including both ability and geographical location. Furthermore, areas with academic selection are on average more affluent than other areas. This makes comparing these LEAs with the rest of the country potentially misleading. We address these selection issues in three ways: First, we compare selective LEAs with a group of non-selective LEAs that have similar characteristics (identified using propensity matching); secondly, we compare pupils relative improvements in grades over time (value-added) rather than raw attainment, and finally, we undertake an instrumental variables (IV) approach, which explores the variation in pupil attainment from attending a grammar school that is derived from age within the school year rather than ability. It should be noted that we also check whether primary school pupils achieve more in selective LEAs than our matched LEAs.

Several features stand out from the initial exploratory work on the PLASC data- girls are more likely to attend grammar schools than boys, as are children born in the first four months of the school year (September to December). More striking, however, is the large under representation of those eligible for free school meals (FSM). This is still markedly so even when we condition on pupil attainment at age 11. Bright, poor children rarely secure a grammar school place.

The results of our analysis indicate that selective LEAs overall do not achieve substantially improved performance compared with similar non-selective LEAs. Grammar school pupils do demonstrate significantly higher levels of attainment, but those children not attending grammar schools in selective areas do slightly less well than their peers in non-selective areas. In part this appears to stem from the crowding of poor pupils into the non-grammar schools.

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who do not want to apply for a place in the grammar school do not have to sit the test. See http://www.nfer.ac.uk/infoservices/sst/asp for further information on selection tests.

The minority of able poor children who do attend grammar schools do exceptionally well. Hence there are two countervailing factors around grammar schools and social mobility: Bright children eligible for FSM do exceptionally well in grammar schools *but* very few achieve a place, even given attainment levels at age 11. It is likely that this reflects greater efforts by affluent parents to coach their children to pass the selection exam (often referred to as the 11+). It may also be that schools are selecting pupils using criteria other than ability, as there is a grey area where high attainment in the 11+ exam doesn't automatically secure admission if there is competition for places even after setting the pass-mark.

The remainder of this paper is laid out as follows: Section 2 lays out existing evidence and some issues about the impact of academic selection on attainment. The data employed is discussed Section 3. Section 4 identifies who is most likely to gain a grammar school place within selective LEAs. Section 5 addresses the problem of identifying which non-selective LEAs make up a reasonable comparison group for the selective areas on the basis of observed characteristics of their resident populations. Section 6 looks at the two key issues 1) differences in attainment between selective and non-selective areas and 2) differences in attainment between those making it into a grammar school and those not within selective LEAs. Section 7 concludes.

2. Literature Review

Studies of selection using early cohorts (pre 1987) are limited because the examination system in England had two types of final exams dependent on ability (high ability pupils took GCE exams at age 16 whilst lower ability pupils took CSE). Sullivan and Heath (2002) use the National Child Development Survey data (NCDS) to compare state and private schools and find a benefit to getting a place in a grammar school as opposed to a comprehensive school for pupils who were in the top third of the ability distribution at age 11 in 1969, but this says nothing about the system as a whole. As Schagen and Schagen (2001) point out, to determine which system is most effective it is necessary to compare performance of all pupils in each type of system. Most researchers therefore compare the remaining selective systems with fully comprehensive systems across England. Jesson (2000), for example, uses matched KS3-GCSE data to analyse value added performance of different areas and finds that comprehensive systems perform at least as well as those retaining selective schools.

However, the selection into grammar schools occurs three years before the KS3 tests at age 14. Research by the DfES (2002) indicates that pupils across the ability distribution who were 16 in 2000/2001 made as much or more progress between KS2 and KS3 in "designated selective"[2] LEAs as in non selective LEAs.

The recent release of the PLASC data and associated tables has led to a resurgence of interest in evaluating school output since the data allows researchers to follow pupils throughout their school career. Using this data, Hutchison and Scott (2003) find that grammar schools add value on average but that high achieving 11 year olds do not benefit at GCSE level from grammar school education.

There is a lack of consensus about the extent to which grammar schooling benefits poorer children in our communities and whether selection is more or less socially divisive than a comprehensive system with competition for places. This is partly due to the difficulty of obtaining pupil level socio-economic data, and possibly also due to a lack of recognition of the scale of economic change in England since academic selection was the norm (Edwards and Tomlinson 2002).

Researchers have attempted to compare schools with similar socio-economic intakes by using free school meals (FSM) as an indicator of poverty. Families with very low incomes and in receipt of state benefits are eligible for free school meals[3]. Recent Government statistics verify a negative correlation between school levels of poverty and exam results (DfES Bulletin, 2002). Raw results are lower in most schools with large numbers of pupils eligible for free school meals. The DfES also analyses performance of high ability pupils in schools with similar proportions of FSM eligible children (less than 5%). Results indicate more progression in grammar schools between KS2 and KS3, but no significant difference in the progression of children in different types of school during KS4.

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[2] Designated selective refers to LEAs where a ballot would be needed to change the status quo. They are identified as areas where 25% of pupils in state secondary mainstream schools attend a grammar school.

[3] It is in a schools interest to collect FSM data as both school funding and school assessment are based on the percentage of pupils eligible. This does not guarantee that the FSM data includes all pupils living in poverty; there are various reasons why a family may not reveal their eligibility. See Gorard et al (2002 p7) for a discussion on the collection of FSM data.

In 2004 the Education Select Committee of MPs suggested that “All forms of selection at one set of schools have, as a matter of arithmetic, consequences for other schools.”[4] Peter Robinson[5] notes in the TES (11/10/02) “If your child goes to a school surrounded by a lot of disadvantaged kids, your child is likely to do less well”. When talking about the results of the 2000 PISA study he says “they suggested that the peer group affect was a more powerful predictor than some of the individual factors about background and class.” One conclusion that could be drawn from these observations is that it is in the interest of a bright child from a poor household to be educated away from other children living in poverty. It appears that this is not happening; Gorard et al (2002) note that between 1997 and 2001 segregation by income was rising across schools in England. The Education Network[6] note that the proportion of schools at the extremes of the FSM distribution are growing. They also point out that three quarters of the schools with only 1% of pupils eligible for free school meals are grammar schools.

The 11+ exam is intended to identify the brightest pupils, and inevitably creates a group of borderline pupils with similar ability but marginally different test scores, who are then separated into different types of school. Qualitative studies have found that pupils can feel failures if they are not chosen to be in the top group or best school. For example Boaler (2000) notes that when pupils were placed into ability sets within a school “students in low groups felt disaffected on account of low expectations of their capacity…and a continuous diet of low-level work….”. NFER research in 2001 looking at the impact of the structure of secondary education in Slough found that “selection mainly affects children of `borderline’ ability.” They found that Slough’s borderline pupils who were not in grammar schools were less successful than similar pupils educated elsewhere in comprehensive schools. These findings are also confirmed by Schagen and Schagen (2001) at GCSE level; they find that middle ability pupils in grammar schools have an advantage at GCSE over their peers in other types of schools.

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4 Reported on BBC Online 22/07/04 at http://news.bbc.co.uk/1/hi/education/3914257.stm

5 Peter Robinson is head of research at the Institute for Public Policy Research

6 see: http://www.ednet.org.uk/artsearch1.taf?function=detail&article_uid1=3437&_UserReference=DBF1ECBA4CCFD7DBC311A3AD&head=3

Low attainment of borderline pupils in secondary modern schools could indicate that these pupils have unobservable characteristics, which make them less likely to succeed. An interesting hypothesis put forward by Critchlow (2003) to explain why value added between KS2 and KS3 appears to be higher in grammar schools is that the selection process allows greater discrimination than the key stage tests can identify. In effect, pupils with the same key stage test results are subdivided with the weaker pupils sent to secondary modern schools, and the stronger educated in grammar schools. This might explain some, if not all, the difference in value added for borderline pupils. Without access to the 11 + results or cognitive ability test (CAT) scores, which attempt to identify potential rather than measure academic learning and might be expected to better predict future outcomes, there is a danger of inflating the effects of attending a grammar school (and penalties for not), especially for borderline pupils.

Furthermore, most of the existing literature compares pupils between the selective LEAs and all non-selective areas. The minority of LEAs which use selection at 11 widely are, however, not typical of the country as a whole. They are more politically Conservative and affluent. Comparing performance in these LEAs with all other areas will mix up differences in attainment stemming from selection with those due to differences in family circumstances of the children. Controls for pupil characteristics (FSM eligibility, ethnicity etc.) are unlikely to be sufficiently detailed to rule out bias due to unobserved family factors differing across areas. We compare areas with similar populations to address the issue of unobserved heterogeneity.

Many selective schools are also single sex, and it is important to ascertain which type of selection, if any, is most responsible for any variations in results. Both Bone (1983) and Smithers and Robinson (1997) (as quoted in Elwood and Gipps (1999)), conclude that the performance of girls in single sex schools is higher than in co-educational schools for reasons other than the separation of the genders. For example, the academic tradition of such schools and the selective bias towards particular types of families are all indicators of high outcomes. Smithers and Robinson also report the difficulty of separating the single sex effect from the school type, noting that more single sex schools are grammar schools and therefore have higher ability intakes.

Within this study we therefore take great care to compare similar areas with and without selection and to identify the true effects of attending a grammar school versus failing to make the cut. We also discuss issues around the overlap between single-sex schools and grammar schools.

3. Data employed

The data employed in this research are the DfES pupil level annual census data (PLASC) and associated examination and school tables. Pupil level data are available for all school age pupils in 2002, including, for the first time, pupil level indicators such as FSM, special educational needs and ethnicity. In order to analyse the effects of selection we use a subset of the census, using only data for those pupils in mainstream state secondary schools in 2002 for whom we have GCSE results. These 2002 pupil records have been matched to prior attainment records for KS3 (2000) and KS2 (1997) thus allowing for measures of added value throughout their secondary school careers.

Supplementary area information has been added to this dataset, including indices of deprivation, to address issues such as the heterogeneity of areas when creating our matched samples. For the purpose of this analysis we define an LEA as selective if at least 10% of pupils are educated in grammar schools.[7] There are 19 such LEAs. Schools have been identified as selective based on the school level information collected as part of PLASC. The area level data includes information about admissions policy, which identifies schools as being comprehensive, secondary modern or grammar. (It is not possible to simply identify schools with the word grammar school in their name as this includes several schools who have selected pupils based on ability in the past, but no longer do so.)

We use two outcome variables for GCSEs at age 16. The first is the total GCSE (or equivalent) score where each grade achieved for each exam sat is one point. A 'G' is therefore equivalent to one point whilst an 'A*' is 8 points. The second is a capped

[7] We have also tried identifying LEAs with 10% of pupils in either a grammar or secondary modern school and with 20% in grammar school. Our results appear to be consistent across the alternative measures.

score for the best eight GCSEs which takes some account for the fact that pupils take differing numbers of GCSEs and certain high performing schools put pupils forward for more exams.

We use attainment at KS2 as an explanatory variable in certain regressions, in order to capture a measure of value added which allows greater flexibility than the calculation preferred by the DfES.

4. Achieving a place in a grammar school

In this section we begin by considering access to grammar schools within selective LEAs. We ask whether all pupils of a particular ability have an equal opportunity to achieve a grammar school place. Table 1 shows that on average just under a quarter of pupils in the areas that we have defined as selective LEAs attend grammar schools. The other three quarters attend schools which nominally either secondary modern or comprehensive (within some areas both names are used and admission policies may reflect the differences). Those attending grammar schools have higher KS2 scores, as would be expected as selection is undertaken on academic ability at age 11. They also have higher attainment scores at KS3 and KS4. More interesting are the variations across pupil characteristics. Some 12% of pupils in non-grammar schools in these areas are entitled to free school meals (FSM), whereas in the grammar schools only 2% have FSM entitlement. Among FSM eligible children in selective LEAs just 5.8% attend grammar schools as opposed to 26.4% of other children. Special educational needs (SEN) children are also massively under represented in grammar schools. Whilst those with English as a second language are fairly evenly split and there are diverse patterns across ethnic groups, with Black pupils being less likely to make it to a grammar school but Asian and other ethnic groups showing a higher than average propensity to attend grammar schools. Finally grammar school children are slightly older within their year (by 0.3 of a month) and are less likely to be boys.

The selection decision is undertaken on attainment at age 11. If attainment was the sole criteria for entry into a grammar school then attainment would be sufficient information to predict who attends a grammar school. However, the system may seek to adjust the raw attainment score to allow for age within year or gender differences in attainment. Further, parental influence and school discretion may lead to other criteria other than ability influence who gains entry into Grammar schools. To investigate this we thus employ logistic equations to allow us to consider the possible range of factors influencing a pupil's likelihood of getting into grammar school.

Table 2 reports the results from a series of logistic regression models. LEA fixed effects are included in all regressions in the table to account for any variations in the mix of characteristics across LEAs. A result of 1 indicates no deviation from the average propensity and scores below (above) 1 indicate under (over) representation. Standard errors are reported in parentheses and asterisks indicate statistical significance. Column 1 covers all students in selective LEAs and includes the child's KS2 test score (as a series of 0-1 controls for each attainment level) prior to entry into secondary school.

The regression results lead to rather more complex conclusions than the simple descriptive statistics shown in Table 1. Firstly, younger pupils within a school year are disproportionately allowed into grammar schools given their lower attainment, yet note that in Table 1 this group is still under represented in grammar schools. It is clear that younger children within the school year have lower KS2 scores, but that the over-recruitment of this group into grammar schools for the same KS2 attainment only partially offsets this.

Columns 2-4 of Table 2 focus in on parts of the attainment distribution. They indicate that black children are no less likely to attend grammar schools given KS2 attainment but Asian and other ethnic groups are still more likely to attend. But the most striking result is that FSM children are still massively under represented in grammar schools given their academic attainment. Also special-needs children or those speaking English as a second language are under represented in grammar schools. The disadvantage to FSM, special-needs or English as a second language students applies to even the highest ability children (column 2), so that taking FSM children in the top three KS2 groups (groups 9-11[8]) just 32% are attending grammar schools as opposed to 60% of non-FSM children.

Access to grammar schools is clearly not only based on the 11+ exam result. We have shown that the results are adjusted so as too equalise the mix for age within the year. The regression results indicate, however, that this adjustment is incomplete. It is still the case the younger children are less likely to attend a grammar school even though there is partial adjustment for their lower test scores. So, for age, a positive bias is created to offset lower attainment.

Similar allowances are not applied to boys, FSM or special-needs children or those who have English as a second language. Rather the reverse, these groups are under-represented given their attainment; the system creates a negative bias for these children.

The negative bias probably stems in part from the differences between the 11+ exam results and the KS2 tests. Parents in selective LEAs will almost certainly recognise that it is the 11+ exam which is the decisive test for school admissions, whereas we can only observe the national KS2 tests. There are at least three potential differences between the two. Firstly, the tests may identify different competences. Secondly, the 11+ may identify smaller differences across pupils in order to provide a finer 'ranking' of ability or aptitude. Finally, affluent parents have an incentive to provide coaching to help their children to pass the 11+ as this could potentially provide free education in an area where these parents consider the only alternative to be private schooling. Hence it is inevitable that some groups of parents are working the system to secure a grammar school place for their child. Whichever factor is in play, the 11+ system appears to have design features which (perhaps through parental actions) systematically exclude bright children from poor backgrounds, those that have special needs and those with English as a second language from attending grammar schools whilst partially equalising representation across month of birth.

5. Identification and Matching

Where the brightest pupils within an LEA are taught in grammar schools we might expect some impact on attainment across all pupils in the LEA. In particular we

[8] The KS2 groups referred to are based on the categories used by the DfES to calculated school level

might assume that the rather different peer groups in the various schools would influence attainment. It is important that we control for this in our analysis.

Attainment may also be affected in other ways. Whilst the selection process changes the mix of characteristics of the pupils, non-grammar schools may also have lower quality facilities or teachers. Grammar schools may also benefit from more support from parents and the wider community.

We assume in our analysis that pupils live and study in the same LEA and that it is therefore appropriate to look at the impact of academic election at LEA level. It has been argued that by focusing on LEA effects, the extent to which pupils cross LEA boundaries to go to school has been overlooked (for example see Independent 2/11/99). Schagen and Schagen (2001 (2)) claim that in 1998 40% of year 7 pupils in Slough grammar schools came from outside Slough. However, research in 2002 by the DfES[9] shows that 94.7% of the pupils live and go to school in the same authority, and that outside London, the extent of inter-authority movement is very small.

Selection only remains in a minority of LEAs and our prior is that selective LEAs have characteristics that set them apart from most other areas in England. We anticipate that some of those dimensions that differentiate selective LEAs from most other LEAS (such as family income) are also correlated with pupil achievement. For example, the LEAs that retained selection are those that resisted the move towards comprehensives in the late 1960s and early 1970s. The majority of these areas were Conservative led LEAs and these areas are also likely to be more affluent.

By using a matching process we aim to identify LEAs that are most similar in terms of several measurable characteristics. This allows us to compare the results of pupils in selective LEAs with others in comparable non-selective areas in a way that reduces unobserved LEA heterogeneity in the populations considered. We anticipate, for example, that the greater affluence of Conservative areas will not be fully captured by the percentage of FSM pupils, but as income is correlated with school outcomes,

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value added scores.

[9] DfES research relates to PLASC data. See:
http://www.dfes.gov.uk/datacollection/asc/2003/Docs/IMS%20Final%20Show%2018.10.021.ppt

pupils in selective LEAs may outperform other children through these *unobserved* characteristics rather than as a result of the alternative education system. Thus, finding very similar areas among non-selective LEAs provides more appropriate comparison data by reducing these differences.

We make use of propensity matching to identify suitable matches for our data. Creating a dummy to identify LEAs with at least 10% of pupils in grammar schools, we run a logit estimation on all English LEAs and generate a prediction of the propensity of being selective for each LEA. The logit estimation uses the model presented in Table 3.

Our hypothesis is that local areas under Conservative control with a relatively wealthy population are more likely to have kept grammar schools despite widespread switching to a comprehensive system. Not all strongly Conservative areas resisted the switch to ending selection, and so we include a variable to identify Conservative LEAs in the logit estimation. We also include controls for whether or not the authority is a county, and for population density in the area - which may affect travel distances to a grammar school.

The results of the logit show that the significant predictors of remaining selective are being a largely Conservative LEA, having a low FSM proportion, a high population density and not being a county authority (Table 3). By ranking all LEAs according to their predicted propensity to be selective we can identify non-selective LEAs with similar characteristics to the selective LEAs under observation. Thus we create a matched sample of non-selective LEAS (where no pupil attends grammar school) using the predicted propensity to be selective from the above logit. There are 19 selective LEAs with at least 10% of pupils in grammar schools, to which we have matched non-selective LEAs in two alternative ways as discussed below.[10]

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[10] It is possible that middle class parents who are worried about negative peer effects from poor neighbours might increase the propensity to keep grammar schools. So those in LEAs where there is less social stratification by area will prefer a selective system, whereas those with tightly defined affluent areas would get predominantly pupils from affluent homes via a catchment area allocation system and be quite happy moving away from the Grammar system. In order to check this we included a term capturing the dispersion measure of ward level child poverty (from the Index of Multiple Deprivation 2000 to the equation reported in Table 3 but this was not significant.

There are a number of alternative ways a matched sample could be created. The first method used employs a nearest neighbour technique without replacement. That is, it identifies the matched sample by taking the nearest neighbour on the predicted propensity score, and using each non-selective LEA no more than once. The disadvantage with this method is that it is possible for matches to be made with authorities which are very dissimilar if there is a cluster of selective LEAs with high predicted scores. One way to limit this effect is to drop the selective LEAs with no similarly ranked non-selective LEA (that is, when an area has 'no common support'). The second matching technique employed is calliper matching - for each selective LEA (except the one with the highest prediction) two matches are identified with propensity scores either side of that of the selective LEA. This method allows for replacement - the same non-selective LEA can be matched to more than one selective area. Here each LEA in the matched sample has been drawn between one and six times[11] in order to identify suitable matches for all 19 selective LEAs. In the analysis that follows we report results from 'one-up, one-down' calliper matching using only LEAs that are entirely comprehensive as suitable matches for selective LEAs, but we show later that the main thrust of the results are representative of alternative specifications.

Table 4 indicates the differences between selective areas, matched areas and all non-selective LEAs (standard deviations in parentheses) for the characteristics used in the matching equation. The most powerful predictor is the proportion of LEA council seats that are Conservative and on this dimension our matched areas are much closer to the selective LEAs than the typical non-selective area. One check on the quality of the matching is to look at progress between KS1 and KS2 in the selective LEAs and our matched sample. That is, to look at primary school attainment for the same LEAs. If our matching is working, progress in this pre-selection period should be closer in the matched sample than for all LEAs. The results are reported in Appendix Table A.2 and suggest that pupils in selective LEAs are performing slightly better in value added terms in the primary years than all other LEAs, probably because their populations are

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[11] To test for the acceptability of repeat matches we have run key analyses with and without frequency weights and there are no significant differences.

more affluent. Our matched sample eliminates this gap entirely and once population characteristics are also conditioned on the gap is almost zero. Hence our matching appears to be correcting for underlying unobserved population differences.

Selective LEAs also differ from non-selective LEAs in terms of school organisation. Single-sex schools are common in selective LEAs, some 30% of schools being single-sex, whereas in non-selective areas this type of school is rare. Even in the matched areas just 6% of schools are single-sex (see Table 5). The bulk of single-sex schools in selective areas are grammar schools. Conversely, religious schools are not widely used in selective areas and grammar schools have notably fewer religious ties. As discussed above, academic selection also changes the mix of pupils *within* schools. As shown in Table 1, FSM children are under represented in grammar schools; hence FSM children are systematically concentrated into non-grammar schools. This means that we should expect a large variation in the percentage FSM between schools within a selective LEA. Indeed, Table 5 shows that selective LEAs have similar proportions of children eligible for FSM or having Special Needs to our matched areas but far higher standard deviations in these measures.

Gibbons and Machin (2004) have shown that affluent parents will pay substantially over the odds for a house in the catchment area of a good school. Academic selection may be expected to reduce any such affect since the grammar schools draw from a larger geographical area, and so may result in a reduction the concentration of poor children in certain areas. Whether this is true or not is unclear from our data but the vast under-representation of poor children in grammar schools dominates any potential effect it could have. We see clearly that the selective areas partition children not only on grounds of ability, but also of poverty and special needs.

6. The relationship between attainment and selection

After investigating which pupils are most likely to get into grammar schools, we consider the impact of academic selection on pupil attainment? As discussed above, the answer must include all pupils in the LEA, not just those in the grammar schools, as separating out the highest achieving (and possibly motivated) quarter of students may well affect attainment among other pupils.

To give a broad picture and to assess the importance of matching we start with the whole population. As discussed earlier this may be inappropriate if non-selective LEA pupils differ from those in selective LEAs in ways we do not observe with the limited range of individual pupil characteristics available. Hence we also compare with students from matched, non selective areas.

Three measures of attainment are used. The first two are measures of output in terms of GCSE results. This is arguably the most relevant measure to the pupils, since good GCSE results provide the necessary foundations to go onto further or higher education. Either of these two measures will allow us to consider differences in output across school and areas. First, we use the total GCSE points score. This is the sum of an individual's points from all GCSEs and equivalent exams. Second, we use a capped GCSE score, by considering only the sum of points from the best 8 GCSE and equivalent exam results. The capped measure is used to counter the differences in the number of exams sat in different schools. Certain schools may well enter pupils for 10 or more GCSEs, thus raising the pupils total score by sheer volume of exams sat, rather than with better performance. Our third attainment measure controls for prior attainment: we create a measure of value added which reflects the pupils score in the KS2 tests prior to entry into secondary school. This is perhaps the most appropriate measure of the impact of attending a school in selective LEA for policy makers and educationalists, as it provides a measure of the productivity of the education authority.

Table 6 therefore shows OLS regressions for all pupils for whom we have KS2 and GCSE results. Column 1 reports the results of a simple regression model that conditions on basic pupil demographics (gender, age) and school size. The key variable of interest is the "selective LEA" identifier which takes the value of 1 if the pupil attended any school within a selective LEA, or 0 if not.

The first point estimate of this model is that selective LEAs raise attainment by 3.6 grade points, slightly less than equivalent to raising four GCSE grades from a 'C' to a 'B'. Alternatively, it can be viewed as an 8% increase in the mean total GCSE point result. This is substantial, but it should be remembered that we have not yet conditioned on many pupil characteristics or on previous attainment and that we have not used the matched sample. The regression is simply comparing pupils in selective areas with those in all other areas without adjusting for any population differences.

The model used in Column 2 introduces those pupil characteristics that are observable within the data. These cover FSM eligibility, special-needs, English as a second language and ethnicity. The estimated attainment gap is reduced to 3 grade points.

Column 3 shows the result of the regression once we add school controls for single-sex and religious schools. The selective LEA premium is now cut to just 1.5 grade points. As mentioned above selective LEAs use far more single-sex schools and these appear to raise attainment by around 7 grade points.

Finally we explore the impact of school mix in terms of the ethnic mix and the proportion of: FSM children, children with special-needs and children with English as a second language. The only factor that has a significant impact is FSM. A large proportion of FSM children in the school reduces overall attainment (i.e. even for non-FSM children). It may be that the overall proportion of children eligible for FSM reflects the household income of all the pupils in the school and acts as a good proxy for overall poverty amongst children in the school. Alternatively it could suggest that a larger proportion of poor children in a school reduces the attainment of pupils in the school through peer group effects. Either way, once school mix characteristics are included in the analysis, we see that selective LEAs are not significantly outperforming other LEAs.

As noted before the modestly higher achievement in selective LEAs may simply come from entering pupils for more GCSEs rather than raising attainment *per se*. We therefore also report the results of the capped GCSE score. The results (in Table 7) indicate a slightly smaller attainment gap in selective LEAs once we take into account the variation in number of GCSEs entered. Using this output measure, the second model (with all pupil characteristics included but no school type or composition controls included) suggests a modest 2.4 GCSE grade point gain.

Conditioning on KS2 creates a value-added measure for secondary schools between the ages of 11 and 16. This will condition out heterogeneity in attainment prior to the selection regime being applied. The results of the value-added regression models are reported in Table 8a. Even with only basic controls the estimated impact of being in a selective LEA, conditional on attainment at age 11, is much reduced; to less than 1.5 additional points at GCSE. That is less than the difference between a B and a C in one full GCSE and one half GCSE.

Conditioning on more pupil characteristics makes no difference to the results as these same characteristics are captured by the conditioning on KS2 implicit in the value-added measure. However, introducing controls for school characteristics (single-sex and religious schools) reduces the estimates further, to just 1 grade point. The apparent benefits of these school types are greatly reduced in value-added estimation. It is clear that single-sex schools must be drawing in above-average ability pupils even in non-selective areas. The effects of pupil mix are also less important once we control for prior attainment and the results suggest a very small, positive benefit of attending a school in a selective LEA. (These results are not sensitive to estimating a single equation rather than separate equations for the selective and other LEAs, although the separate equation models are statistically preferred.)

The approach adopted so far restricts the background factors to having the same impact in selective and other LEAs. We remove this restriction by estimating models for separate samples. Column 1 and 2 of Table 8b show an illustrative model where all factors are considered. Whilst an F-test rejects the single equation model (see lower panel to the Table), most coefficients are fairly similar. The one very large exception is the proportion of pupils on the special-needs register - this is far more damaging in selective LEAs. These separate models can be estimated for all specifications reported in columns 1 to 4 and an assessment of the predicted impact of attending a school in a selective LEA can be assessed. This will now differ if the assessment considers what would happen if the population currently in selective LEAs were switched to the non-selective regime; or, if the non-selective LEAs became selective (these are Blinder-Oaxaca calculations). The results can differ both because the mix of characteristics differs across the two types of LEA and because the regimes have different effects for different characteristics. The simulations are reported in the lower panel of Table 8a. They suggest that under model 1, with only basic controls, pupils in selective LEAs are achieving around 1.5 GCSE additional grade points, whilst for those in non-selective LEAs the gains to becoming selective would be slightly smaller. For the more comprehensive model, model 3 (which includes pupil and school characteristics), the results shown in Columns 1 and 2 of Table 8b suggest the modest gains for children in the selective areas would be even smaller if non-selective LEAs were to switch to the selective model. Hence, there is some rationale for the current situation of a mix of selective and non-selective areas. The small benefits of a selective system are not fully transferable to those areas that are not currently selective. This appears to be largely due to the greater proportions of special-needs children in non-selective areas who would do very badly under an academic selection policy.

The results reported up to this point have compared selective LEAs to all other LEAs. We know that the LEAs retaining selection are generally wealthier and Conservative voting and that our range of pupil indicators is limited, and so we expect there to be unobserved differences across the populations of pupils in selective and non-selective areas. To correct for this we compare selective LEAs with those non-selective areas with similar population characteristics as discussed above. Following the same procedures for analysis as before, we now compare selective LEAs to those matched LEAs.

Table 9 report the results of the analysis using this matched sample for the value-added estimate between KS2 and KS4. In general the coefficients reported are fairly similar to the first, full sample estimates. The main focus however is on the selective LEA indicator, and we see that the results are considerably smaller in Columns 1 and 2 and become insignificant when school type indicators are included.

The key conclusion from this section is clear; once we condition on pupil characteristics, crucially including prior (KS2) attainment, then the effect of being in a selective LEA to a similar non-selective LEA is not substantial. Further, the small degree of overall higher attainment in selective LEAs is associated entirely with greater use of single-sex and religious schools. However, if these school types are also engaged in a form of selection it may be appropriate to focus more attention on the results in column 2 rather than column 3. At most, selective LEAs raise attainment for all their students by less than 1 GCSE grade. The lower bound estimate is that they have no effect at all; the difference depends on how we treat the fact that so many grammar schools are also single-sex schools. This conclusion is not sensitive to alternative matching rules (results of which are presented in Appendix Table A.3).

So, selective LEAs are not substantially more successful in raising attainment for their pupils than non-selective areas, on average. We now focus on whether attending a grammar over a non-grammar in a selective area makes any difference to outcome. As this selection into grammar is undertaken on ability (and we therefore expect differences in raw output as a characteristic of the selection process) we only use models based on value-added from now on. We have shown above that it is important to use a matching technique to reduce unobserved population differences and therefore we now report only comparisons between selective and matched LEAs.

Does getting into a grammar make a difference to attainment?

Table 10 is similar to Table 9 except that now the selective LEA dummy is split into two groups; those attending grammar schools and those attending non-grammar schools. As this split is based on ability at age 11 we only report value-added measures. The results show that (the 1/4 of) pupils attending grammar schools are achieving substantially better value-added results than pupils of similar ability in non-selective areas with similar population characteristics. The students attending non-grammar schools in selective areas are now doing slightly worse than their equivalent in the matched areas, although these estimates are statistically borderline. As the estimates presented are for the whole population of pupils in one year (rather than a sample) the point estimates are differences in conditional means between the populations. The impression formed is that getting into a grammar school is beneficial to pupils by a substantial margin; those not achieving a place do slightly less well. The final column, Column 4, suggests this is partly due to the crowding of FSM pupils into these schools, because once the proportion of the school eligible for FSM is taken into account the underachievement of pupils in non-grammar schools disappears and the positive grammar school effect is reduced by a quarter.

Table 11 repeats this analysis but shows a number of alternative matching rules. Column 1 is equivalent to the results reported in column 3 of Table 11. This is the main matching rule we use in the paper and matches each selective LEA to its nearest neighbour above and below on the matching propensity score. Column 2 reports the impact repeating the analysis without the authority that has no non-selective authority with a higher propensity score (no common support). This has little impact on the grammar school effect but makes the estimated results for those not attending grammar schools slightly more negative. This pattern is further reinforced if matches are allowed with LEAs with some selection, but where there are fewer than 10% of pupils in grammar schools (with an average of just 2%) (column 3).

Columns 4-6 repeat the exercise described above, but with a single match, with no replacement among the non-selective LEAs. So here, one non-selective authority is matched to only one selective one. The disadvantage with this approach is that some of the matches may be some distance away. The pattern is consistent, with large positive effects for the minority of pupils attending grammar schools and small negative effects for those not attending grammar schools in selective LEAs.

To confirm the importance of attaining a grammar school place we now focus on 'borderline' pupils - those with KS2 grades putting them in group 7 or 8, where most pupils do not attend grammar school, and group 9 where typically, they do (if in selective areas). This focus on the borderline provides a local treatment effect. Those who make it to grammar schools are on average only a fraction more able than those who do not and if, when compared to those in non-grammar areas, falling either side of the line is important we can ascertain that it is the grammar school place that is making the difference. Table 12 shows that for borderline pupils the effect of making it into a grammar school is even more marked than it is for all those attending grammars. By inference very highly able children benefit less. The small penalty for not getting into a grammar school is very similar to previous estimates. So within selective LEAs, making it to a grammar school appears to be extremely beneficial, whilst failing to make it results in pupils only marginally underachieving compared with those with similar ability in the matched non-selective areas. This high achievement is focused especially on borderline students who make it into grammar schools.

Free School Meals and selection

As noted in Section 4, children eligible for FSM are substantially under represented in grammar schools and this applies even when we control for ability as measured by the KS2 test scores. Thus, as shown in Table 2, even highly able poor children are not attending grammar schools and the question remains whether the selective system is beneficial or harmful to these poorer children. We start then by repeating earlier analysis but report results for FSM children separately from non-FSM pupils. We can thus assess whether entry to grammar schools is especially beneficial to poorer children and what happens to those from poorer families attending other schools in selective areas. Tables 13 and 14 are similar to Table 12 but report information on non-FSM (Table 13) and FSM children (Table 14) separately. For the larger non-FSM sample these results look very similar to those reported earlier. grammar schools achieve a mark-up in attainment whilst others are achieving about the same as non-FSM children elsewhere in the country. FSM pupils (Table 14) who make it to grammar schools (a small minority) are benefiting even more substantially from making it into these elite schools. For FSM pupils the gains to attending a grammar school are more substantive (around 7 to 8 grade points) without extra penalties for those not making it. Hence the overall picture is that the minority of high ability pupils who are eligible for FSM achieve high attainment in grammars. Finally, turning our attention to high ability children not attending grammar schools, Table 15 focuses on FSM pupils in KS2 groups 9-11 (the high ability range), with the matched LEAs as the comparison group. This confirms relatively high attainment of the minority of high ability pupils in grammar schools, who (using column 3) are achieving 6 grade points more than pupils in the matched areas. Conversely, the majority of poor high ability pupils who are in non-grammar schools are disadvantaged by 1.3 grade points.

Potential biases in our estimates of grammar school effect

Our data contains KS2 test results rather than the 11+ results used to determine entry to grammar schools. If the 11+ results contain superior information that allows grammars to distinguish more finely between pupils, or if grammars supplement the test results with additional information (interviews, pupil reports etc.), then our parameter estimates of the effects of attending a grammar school will be upwardly biased.

Our main model of focus is:

$$GCSE_i = \beta_1 GRAMMAR_i + \beta_2 ability_i + X_i'\beta_3 + \varepsilon_i$$

where X is a vector containing other personal and school characteristics. There is no perfect measure of ability; grammar schools are proxying for it with 11+ and in our data we observe an alternative proxy - KS2 scores. Our concern is that the difference between these two ability proxies is not merely noise, but contains information on the pupil's ability that may be used to determine grammar school admission. This extra information is denoted as z_i below :

$$11plus_i = KS2_i + z_i$$

with $Corr(GRAMMAR_i, z_i) > 0$ and $Corr(ability_i, z_i) > 0$

In this case, our regression specification can be re-written as:

$$GCSE_i = \beta_1 GRAMMAR_i + \beta_2 KS2_i + X_i'\beta_3 + \eta_i$$

where $\eta_i = z_i + \xi_i$ and ξ_i is a random error. In this case β_1 is both (upwardly) biased and inconsistent.

In order to estimate the true effect that selective education has on performance, we implement an IV approach. As shown in Table 2, grammar schools take account of the lower attainment of younger pupils when setting entry requirements. However, these age-adjustments are incomplete and older pupils are still more likely to gain entrance than their younger counterparts. 26.5% of those born in the first four months of the academic year (September-December) attend a grammar school within selective LEAs, compared to only 22.4% of those born in the last four months of the year (May-August). This differential exposure to selective education by within-year age forms the basis of our identification strategy. So long as within-year age is orthogonal to true ability, we can use it as an exogenous source of variation in exposure to grammar treatment.

The remaining analysis focuses on a subset of borderline ability pupils within a window of interest related to the attendance differential between the old and young sub-groups. In this section of analysis, we omit those pupils born in the middle four months of the academic year. For every selective LEA we run a separate logit regression of the probability of attending a grammar:

$$\Pr(grammar_i) = f(gender_i, FSM_i, SEN_i, \text{English not mother tongue}_i, ethnicity_i, KS2_i)$$

From this we obtain the propensity to attend a grammar school (and predict the propensity for each selective LEAs' respective matched counterparts). Old and young pupils are then ranked (in a descending order) separately on their propensity, which we then convert to a percentage. At this point, we restrict the sample to those pupils with propensity ranking percentages lying in-between the LEA's percentage of young and old pupils within grammar schools[12]. As noted above, this window of interest has a mean width of 4%[13]. It is within this window that within-year age will be the strongest in terms of predicting exposure to grammar school. Given that the propensity score is non-continuous, in some LEAs pupils who are equally likely to attend a grammar straddle the window, thus yielding a different sub-sample with each run. Thus we run the analysis 100 times, and weight pupils by the frequency with which they are observed in the window.

Within-year age has a direct effect on attainment at 16: in both selective and non-selective LEAs, older pupils achieve higher GCSE scores. Before we can use being old within-year as an instrument for grammar school exposure, it is first necessary to remove this direct age effect. We do this by regressing GSCE score on a dummy for being old within-year in the matched LEAs. As there are no grammar schools in these LEAs, this relationship should only pick up the direct age effect[14]. We then subtract

[12] We construct the equivalent window in each selective LEAs matched counterparts, thus enabling us to compare equivalent pupils.

[13] The width of the window varies considerably across the LEAs, with a range of 1.3%-11.5%. 2 of the 19 Selective LEAs in our data had admission systems that more than offset for the lower 11+ attainment of younger pupils – the proportion of young pupils attending grammar schools exceed the proportion of old pupils. We omit these 2 LEAs from this section of analysis.

[14] Within our borderline selective LEA sample, there are more older males than females. In order that we do not conflate being old with being male, we also remove the effect of gender on attainment,

this age coefficient from the GCSE scores of those pupils in the selective LEAs, leaving us with an excess GCSE score, net of a direct age effect:

$$Excess_i = GCSE_i - \hat{\beta}_{MATCH} OLD_i$$

The only way in which being old within-year should now affect attainment for those in selective LEAs is indirectly, via exogenously raising the likelihood of attending a grammar school.

We first run a series of OLS regressions on the subset of pupils within the window of interest to ascertain the magnitude of the potential bias. These results are found in Table 16. As we are considering a similar pool of borderline pupils, it is not surprising that the coefficient on attending a grammar (relative to not attending a grammar within the selective LEAs) is similar to the difference between the point estimates of attending a grammar and not attending one reported in Table 12.

We then repeat the analyses using IV estimation, reporting the results in table 17. The 1^{st} stage regressions are reported in table A.4 in the appendix. The instrument performs well and is fairly strong, with F statistics ranging from 23 to just under 28 for the three different specifications.

The IV point estimates for attending a grammar are smaller than the OLS equivalents, highlighting an upward bias to the OLS coefficients. Controlling for pupil characteristics and school type variables, we estimate the effect of attending a grammar school as 5.8 age-adjusted GCSE points, 24% smaller than the OLS estimate. Hence we believe that the estimates of the attainment gap between those getting into grammar schools over those that don't, reported in Tables 12-15 are upwardly biased by a factor of 1.25). Taking model 3 of Table 10, the quarter of pupils attending a grammar in selective LEAs have higher attainment by 3.5 GCSE grades and the three-quarters who do not are disadvantaged by around half a grade.

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allowing this coefficient to differ across the age groups. Thus:
$Excess_i = GCSE_i - \hat{\beta}_{MATCH} old_i + \hat{\delta}_{MATCH} male_i + \hat{\alpha}_{MATCH} male_i * old_i$

This selection issue is likely to be more acute for poor pupils as so few attend grammar schools even when they are highly able.

8. Conclusions

This research has investigated the impact of retaining academic selection at age 11. The answers are very clear. Overall there is little or no impact on attainment, but the quarter of children educated in grammar schools do substantially (around 3.5 grade points) better than their peers in similar non-selective areas. This is equivalent to raising 3½ GCSEs from a grade 'C' to a 'B'. The other three-quarters of children not making it into grammar schools are disadvantaged by ½ a grade point. In part these effects stem from the substantive under-representation of poorer and special-needs children in grammar schools. Of high ability children (KS2 groups 9-11) only 32% of those who are FSM eligible attend grammar schools as opposed to 60% of non-FSM children. The change in the social mix of schools raises attainment in the grammar schools but has moderately adverse effects for the rest. The paradox is that for the minority of poor children who do gain a place in a grammar school the advantage this bestows appears to be greater than for more affluent children. If access could be widened then the case for keeping selective education would be greatly enhanced.

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Table 1 Descriptive Statistics of the populations of grammar schools and non grammar schools within selective areas.

Selective LEAs	Proportion of pupils	KS2 mean	KS3 mean	Total GCSE points mean	Best 8 GCSe grades mean	Free School Meals	English as a Second Language	Special Educational Needs	White	Black	Asian	Other ethnic groups	Average age within school year (months)	Boys
Non grammar schools	75.67%	25.00 (3.83)	32.11 (5.72)	37.90 (17.55)	33.32 (13.59)	0.12 (0.33)	0.05 (0.23)	0.20 (0.40)	0.88 (0.32)	0.02 (0.13)	0.04 (0.18)	0.02 (0.13)	6.34 (3.48)	0.51 (0.50)
Grammar schools	24.23%	30.33 (2.38)	42.29 (3.59)	62.68 (11.69)	51.99 (7.43)	0.02 (0.15)	0.04 (0.21)	0.04 (0.19)	0.88 (0.32)	0.01 (0.09)	0.04 (0.20)	0.03 (0.16)	6.66 (3.47)	0.48 (0.50)
Total	100%	26.30 (4.21)	34.61 (6.86)	43.92 (19.47)	37.86 (14.73)	0.10 (0.30)	0.05 (0.22)	0.16 (0.37)	0.88 (0.32)	0.01 (0.12)	0.04 (0.19)	0.02 (0.14)	6.42 (3.48)	0.50 (0.50)

Table 2 Logistic regression of Probability of Attending a Grammar School, LEA fixed effects.

Model	(1)	(2)	(3)	(4)
	All pupils	**Highest 20% of KS2 ability KS2 score 10-11**	**Borderline KS2 score 8-9**	**Sub – borderline KS2 score 6-7**
Within-year age: Old	0.863	0.952	0.806	0.761
	(4.77)**	(0.94)	(5.30)**	(1.55)
Within-year age: Young	1.218	1.083	1.269	1.401
	(6.26)**	(1.40)	(6.06)**	(2.34)*
Male	0.919	0.946	0.878	1.222
	(3.31)**	(1.25)	(3.97)**	(1.59)
Pupil eligible for FSM	0.335	0.328	0.352	0.170
	(16.29)**	(8.96)**	(12.52)**	(4.54)**
Pupil on special needs register	0.627	0.984	0.601	0.377
	(7.77)**	(0.13)	(6.72)**	(3.81)**
Pupil mother tongue not English	0.775	0.587	0.927	0.780
	(2.98)**	(3.52)**	(0.70)	(0.85)
Black	1.149	0.962	1.282	1.948
	(1.07)	(0.16)	(1.51)	(1.27)
Asian, not including Chinese	3.489	3.031	3.251	9.600
	(13.31)**	(6.11)**	(9.96)**	(7.60)**
Other	2.437	2.571	2.111	7.045
	(9.48)**	(5.48)**	(6.11)**	(6.84)**
KS2 controls	**Y**	**Y**	**Y**	**Y**
Observations	***60870***	***12110***	***23972***	***13680***

Notes: Absolute value of z statistics in parentheses
* significant at 5%; ** significant at 1%
LEA fixed effects included

Table 3 Logit estimation of the likelihood of being a Selective LEA

Cell percentages

Log likelihood -42.196 Pseudo R2 0.256	**Selective (10% in Grammar)**
Quartile 1 % Conservative seats	-1.871
	(2.01)*
Quartile 2 % Conservative seats	-2.788
	(2.43)*
Quartile 3 % Conservative seats	-1.154
	(1.70)
County LEA	-1.464
	(2.01)*
Pop density. ≥75th Percentile	1.807
	(2.28)*
LEA percentage FSM	-14.355
	(2.66)**
Constant	1.080
	(1.40)
Observations	***148***

Notes: Absolute value of z statistics in parentheses
* significant at 5%; ** significant at 1%

Table 4 Characteristics of Selective LEAs with matched and non-matched non-selective LEAs.

	% Conservative seats	**County LEAs**	**Population density**	**LEA % FSM**
Match	0.48	0.28	2451.52	0.11
	(0.18)	(0.46)	(3658.38)	(0.07)
All non selective	0.28	0.23	2460.02	0.16
	(0.20)	(0.42)	(2851.59)	(0.1)
Selective	0.47	0.21	2383.11	0.11
	(0.2)	(0.42)	(1533.67)	(0.05)
Total	***0.30***	***0.23***	***2450.14***	***0.16***
	(0.21)	***(0.42)***	***(2714.63)***	***(0.10)***

Table 5 School Characteristics and Populations across Selective and Matched Areas

Selective LEAs	Single sex schools	Religious schools	School % SEN	School % FSM	School % ESOL
Non grammar schools	0.16	0.15	0.21	0.13	0.06
			(0.11)	(0.10)	(0.14)
Grammar schools	0.74	0.08	0.05	0.02	0.05
			(0.04)	(0.02)	(0.08)
Selective LEA Total	0.30	0.14	0.17	0.10	0.06
			(0.12)	(0.10)	(0.13)
Schools in Matched Areas	0.06	0.12	0.18	0.08	0.07
			(0.10)	(0.07)	(0.16)
Schools in Unmatched areas	0.09	0.16	0.17	0.15	0.09
			(0.10)	(0.13)	(0.18)

Table 6 OLS regressions for GCSE Results – All Pupils

Model	(1)	(2)	(3)	(4)
Selective LEA	3.617	3.063	1.621	0.719
	(5.00)**	(5.22)**	(2.18)*	(1.06)
Male	-5.018	-3.354	-3.174	-3.163
	(56.16)**	(36.08)**	(38.64)**	(38.22)**
Within-year age: Young	-0.885	-0.567	-0.569	-0.578
	(13.36)**	(10.19)**	(10.28)**	(10.86)**
Within-year age: Old	1.006	0.683	0.666	0.675
	(16.83)**	(12.63)**	(12.18)**	(12.53)**
School size quintile 2	3.162	2.114	2.149	1.301
	(5.48)**	(4.47)**	(4.71)**	(3.40)**
School size quintile 3	3.717	2.348	2.685	1.374
	(6.61)**	(5.01)**	(6.06)**	(3.57)**
School size quintile 4	5.372	3.650	4.310	2.431
	(9.57)**	(7.59)**	(9.59)**	(6.84)**
School size quintile 5	4.998	3.131	4.216	1.988
	(8.17)**	(6.03)**	(8.24)**	(4.61)**
Pupil FSM		-11.465	-11.310	-8.123
		(44.24)**	(41.84)**	(39.45)**
Pupil on special needs register		-19.740	-19.483	-19.022
		(105.27)**	(111.56)**	(104.03)**
Pupil mother tongue not English		1.684	1.365	3.142
		(3.20)**	(2.91)**	(11.60)**
Black		-1.171	-2.915	-0.583
		(2.87)**	(6.87)**	(2.18)*
Asian, not including Chinese		1.977	1.706	1.949
		(3.35)**	(3.45)**	(6.98)**
Other		3.946	2.854	2.682
		(8.12)**	(6.08)**	(8.13)**
Religious school dummy			3.411	2.966
			(8.81)**	(8.45)**
Single sex BOYS			7.361	6.104
			(5.96)**	(6.27)**
Single sex GIRLS			6.680	6.268
			(7.99)**	(11.13)**
School % SEN				1.238
				(0.51)
School % FSM				-34.480
				(12.10)**
School % ESOL				-2.252
				(1.14)
School % Black				0.480
				(0.17)
School % Asian				9.020
				(3.26)**
School % Other ethnic				16.698
				(3.25)**
Constant	39.774	44.652	43.107	47.571
	(78.45)**	(107.46)**	(94.85)**	(80.32)**
Observations	***491436***	***491106***	***491106***	***491106***
R-squared	***0.03***	***0.24***	***0.26***	***0.29***

Notes: Absolute value of z statistics in parentheses
* significant at 5%; ** significant at 1%

Table 7 OLS regression results for Capped GCSE – All Pupils

Model	(1)	(2)	(3)	(4)
Selective LEA	2.831	2.396	1.327	0.613
	(5.42)**	(5.74)**	(2.52)*	(1.30)
Male	-3.829	-2.510	-2.309	-2.300
	(60.37)**	(38.16)**	(37.64)**	(37.02)**
Within-year age: Young	-0.685	-0.434	-0.435	-0.441
	(13.30)**	(9.83)**	(9.93)**	(10.65)**
Within-year age: Old	0.778	0.522	0.510	0.517
	(17.24)**	(12.82)**	(12.34)**	(12.79)**
School size quintile 2	2.379	1.552	1.566	0.889
	(5.37)**	(4.34)**	(4.54)**	(3.22)**
School size quintile 3	2.839	1.757	1.977	0.930
	(6.37)**	(4.83)**	(5.72)**	(3.23)**
School size quintile 4	3.979	2.621	3.075	1.573
	(9.18)**	(7.10)**	(8.80)**	(5.78)**
School size quintile 5	3.716	2.242	2.996	1.208
	(7.96)**	(5.76)**	(7.77)**	(3.87)**
Pupil FSM		-9.072	-8.965	-6.407
		(44.81)**	(42.78)**	(38.34)**
Pupil on special needs register		-15.631	-15.457	-15.112
		(105.15)**	(111.06)**	(114.53)**
Pupil mother tongue not English		1.397	1.148	2.258
		(4.07)**	(3.69)**	(10.89)**
Black		-0.697	-1.962	-0.213
		(2.25)*	(6.00)**	(1.04)
Asian, not including Chinese		1.461	1.237	1.551
		(3.80)**	(3.70)**	(7.28)**
Other		2.879	2.084	1.997
		(8.29)**	(6.03)**	(8.38)**
Religious school dummy			2.222	1.871
			(8.03)**	(7.87)**
Single sex BOYS			5.087	4.069
			(5.46)**	(5.66)**
Single sex GIRLS			5.223	4.872
			(8.01)**	(11.08)**
School % SEN				1.256
				(0.70)
School % FSM				-27.968
				(12.91)**
School % ESOL				-0.449
				(0.30)
School % Black				0.571
				(0.27)
School % Asian				6.345
				(3.12)**
School % Other ethnic				12.233
				(3.40)**
Constant	34.670	38.528	37.424	40.977
	(86.17)**	(119.87)**	(104.58)**	(89.48)**
Observations	***491436***	***491106***	***491106***	***491106***
R-squared	***0.03***	***0.25***	***0.27***	***0.30***

Notes: Absolute value of z statistics in parentheses
* significant at 5%; ** significant at 1%

Table 8a OLS regression results for Value-added (KS4-KS2) – All Pupils

Model	(1)	(2)	(3)	(4)
Selective LEA	1.464	1.500	1.042	0.666
	(5.73)**	(6.76)**	(3.92)**	(2.74)**
Male	-3.112	-2.680	-2.547	-2.535
	(62.07)**	(52.37)**	(58.93)**	(59.19)**
Within-year age: Young	0.647	0.612	0.600	0.566
	(19.49)**	(19.52)**	(18.88)**	(18.23)**
Within-year age: Old	-0.731	-0.687	-0.678	-0.640
	(19.56)**	(19.76)**	(19.74)**	(18.84)**
School size quintile 2	0.758	0.561	0.577	0.240
	(3.49)**	(2.75)**	(2.81)**	(1.43)
School size quintile 3	1.035	0.784	0.879	0.348
	(4.36)**	(3.57)**	(3.96)**	(1.84)
School size quintile 4	1.679	1.321	1.523	0.761
	(6.82)**	(5.91)**	(6.84)**	(3.99)**
School size quintile 5	1.487	1.102	1.431	0.516
	(5.44)**	(4.25)**	(5.29)**	(2.23)*
Pupil FSM		-5.281	-5.278	-3.994
		(40.32)**	(38.94)**	(37.77)**
Pupil on special needs register		-6.389	-6.412	-6.468
		(51.49)**	(51.45)**	(63.49)**
Pupil mother tongue not English		3.130	2.994	3.843
		(9.14)**	(9.33)**	(19.76)**
Black		0.908	0.332	1.285
		(3.70)**	(1.41)	(9.26)**
Asian, not including Chinese		2.871	2.751	2.717
		(8.69)**	(8.81)**	(13.38)**
Other		2.149	1.811	1.848
		(8.24)**	(6.99)**	(10.30)**
Religious school dummy			0.903	0.749
			(5.09)**	(5.02)**
Single sex BOYS			2.019	1.599
			(4.69)**	(4.70)**
Single sex GIRLS			2.485	2.421
			(9.44)**	(12.82)**
School % SEN				0.613
				(0.74)
School % FSM				-15.056
				(12.05)**
School % ESOL				-1.544
				(1.33)
School % Black				1.002
				(0.69)
School % Asian				4.632
				(3.33)**
School % Other ethnic				4.757
				(2.04)*
Constant	39.078	39.697	39.225	41.136
	(160.72)**	(178.11)**	(156.73)**	(147.99)**
Observations	***491436***	***491106***	***491106***	***491106***
R-squared	***0.52***	***0.57***	***0.57***	***0.58***

Model	(1)	(2)	(3)	(4)
F tests	9.40	11.67	8.18	13.40
Blinder-Oaxaca - Selective	1.485	1.515	1.156	0.727
Blinder-Oaxaca - Non-Selective	-1.321	-1.379	-0.808	-0.527

Table 8b OLS regression results for Value-added (KS4-KS2) – All Pupils

Model	(1) As model (4) Selective only	(2) As model (4) Non-selective only
Male	-2.371	-2.550
	(17.43)**	(57.24)**
Within-year age: Young	0.385	0.590
	(5.17)**	(17.55)**
Within-year age: Old	-0.765	-0.618
	(10.04)**	(17.16)**
School size quintile 2	0.776	0.057
	(2.08)	(0.34)
School size quintile 3	0.976	0.209
	(3.64)**	(0.98)
School size quintile 4	1.153	0.634
	(2.84)*	(3.12)**
School size quintile 5	0.174	0.482
	(0.35)	(1.94)
Pupil FSM	-3.743	-4.028
	(15.45)**	(35.57)**
Pupil on special needs register	-6.070	-6.543
	(15.50)**	(61.70)**
Pupil mother tongue not English	2.654	3.993
	(7.92)**	(19.24)**
Black	1.513	1.262
	(3.91)**	(8.68)**
Asian, not including Chinese	2.619	2.686
	(7.88)**	(11.92)**
Other	1.887	1.846
	(6.07)**	(9.18)**
Religious school dummy	0.698	0.792
	(2.82)*	(4.77)**
Single sex BOYS	2.056	1.093
	(3.35)**	(2.98)**
Single sex GIRLS	2.030	2.370
	(6.09)**	(10.13)**
School % SEN	-8.074	2.137
	(4.22)**	(3.12)**
School % FSM	-14.911	-15.223
	(3.79)**	(11.96)**
School % ESOL	0.529	-1.548
	(0.20)	(1.14)
School % Black	-6.595	1.109
	(1.81)	(0.73)
School % Asian	2.688	4.631
	(1.03)	(2.96)**
School % Other ethnic	3.889	4.695
	(0.90)	(1.62)
Constant	43.158	41.002
	(75.06)**	(143.51)**
Observations	***60816***	***430290***
R-squared	***0.63***	***0.57***

Table 9 OLS regressions for Value-added (KS4-KS2): Selective and Matched Areas Only

Model	(1)	(2)	(3)	(4)
Selective LEA	0.820	0.858	0.145	0.492
	(3.18)**	(3.39)**	(0.41)	(1.55)
Male	-3.096	-2.617	-2.466	-2.492
	(37.02)**	(27.12)**	(29.27)**	(31.15)**
Within-year age: Young	0.659	0.589	0.560	0.525
	(10.22)**	(9.97)**	(9.24)**	(8.65)**
Within-year age: Old	-0.712	-0.655	-0.637	-0.604
	(10.72)**	(10.01)**	(10.32)**	(9.50)**
School size quintile 2	1.530	1.333	1.312	0.389
	(5.19)**	(4.29)**	(3.84)**	(1.25)
School size quintile 3	1.950	1.759	1.782	0.931
	(6.23)**	(6.16)**	(5.99)**	(3.35)**
School size quintile 4	1.959	1.757	2.111	1.026
	(5.97)**	(5.64)**	(6.65)**	(3.20)**
School size quintile 5	1.529	1.379	1.841	0.816
	(3.27)**	(2.97)**	(3.96)**	(1.94)
Pupil FSM		-4.977	-4.859	-3.799
		(26.33)**	(24.58)**	(19.39)**
Pupil on special needs register		-6.618	-6.612	-6.393
		(27.70)**	(28.10)**	(32.07)**
Pupil mother tongue not English		1.669	1.630	2.959
		(2.97)**	(2.97)**	(9.62)**
Black		0.866	0.166	1.486
		(2.87)**	(0.45)	(6.19)**
Asian, not including Chinese		4.099	3.856	3.076
		(8.76)**	(8.85)**	(8.68)**
Other		2.478	2.061	1.970
		(6.19)**	(5.18)**	(7.77)**
Religious school dummy			0.956	0.804
			(3.97)**	(3.08)**
Single sex BOYS			2.887	1.997
			(4.85)**	(3.61)**
Single sex GIRLS			3.201	2.320
			(9.55)**	(7.88)**
School % SEN				-3.090
				(1.81)
School % FSM				-16.830
				(5.26)**
School % ESOL				-2.544
				(3.05)**
School % Black				-2.219
				(0.87)
School % Asian				5.878
				(3.32)**
School % Other ethnic				4.245
				(1.71)
Constant	39.229	39.737	39.270	41.835
	(140.67)**	(139.91)**	(112.59)**	(80.54)**
Observations	***145764***	***145629***	***145629***	***145629***
R-squared	***0.54***	***0.58***	***0.59***	***0.60***

Table 10 OLS regressions for Value-added (KS2-4): Selective and Matched Areas Only

Model	(1)	(2)	(3)	(4)
Grammar in Selective LEA	5.585	5.293	4.464	3.608
	(19.60)**	(16.97)**	(9.47)**	(8.87)**
Non-Grammar in Selective LEA	-0.630	-0.493	-0.693	-0.178
	(1.67)	(1.34)	(1.67)	(0.44)
Male	-3.069	-2.590	-2.463	-2.473
	(34.58)**	(25.21)**	(28.64)**	(29.57)**
Within-year age: Young	0.615	0.549	0.537	0.513
	(9.21)**	(8.94)**	(8.59)**	(8.28)**
Within-year age: Old	-0.670	-0.617	-0.608	-0.589
	(10.59)**	(9.92)**	(10.04)**	(9.34)**
School size quintile 2	1.106	0.943	1.032	0.401
	(4.19)**	(3.44)**	(3.45)**	(1.32)
School size quintile 3	1.849	1.669	1.713	1.099
	(5.81)**	(6.12)**	(6.02)**	(3.94)**
School size quintile 4	2.108	1.901	2.090	1.268
	(7.16)**	(6.82)**	(6.67)**	(3.81)**
School size quintile 5	1.970	1.792	2.066	1.224
	(4.70)**	(4.22)**	(4.65)**	(2.95)**
Pupil FSM		-4.745	-4.709	-3.849
		(26.37)**	(24.62)**	(20.22)**
Pupil on special needs register		-6.603	-6.600	-6.542
		(28.88)**	(28.84)**	(31.02)**
Pupil mother tongue not English		1.764	1.701	2.935
		(2.80)**	(2.81)**	(9.42)**
Black		0.767	0.306	1.437
		(2.37)*	(0.87)	(5.89)**
Asian, not including Chinese		3.757	3.712	3.030
		(7.24)**	(7.82)**	(8.46)**
Other		2.239	2.004	1.955
		(5.28)**	(4.80)**	(7.76)**
Religious school dummy			1.340	1.175
			(4.56)**	(3.90)**
Single sex BOYS			1.166	0.945
			(2.06)*	(1.76)
Single sex GIRLS			1.695	1.502
			(3.82)**	(3.61)**
School % SEN				-0.820
				(0.61)
School % FSM				-14.690
				(4.58)**
School % ESOL				-2.449
				(2.76)**
School % Black				-2.197
				(0.96)
School % Asian				5.233
				(2.76)**
School % Other ethnic				3.117
				(1.27)
Constant	39.395	39.883	39.462	41.239
	(154.44)**	(154.34)**	(122.04)**	(81.40)**
Observations	***145764***	***145629***	***145629***	***145629***
R-squared	***0.56***	***0.59***	***0.60***	***0.60***

Table 11 Robustness to alternative matching rules

	(1)	(2)	(3)	(4)	(5)	(6)
	One up – one down matching with replacement	**As (1) but no common support LEA Dropped**	**As (2) but LEAs with <10% Grammar school pupils included**	**Nearest neighbour without replacement**	**As (4) but with no common support LEA dropped**	**As (5) but lEAs with <10% Grammar pupils included**
Grammar in Selective LEA	4.464 (9.47)**	4.528 (9.27)**	4.492 (10.18)**	4.710 (9.29)**	4.859 (8.67)**	4.801 (9.61)**
Non-Grammar in Selective LEA	-0.693 (1.67)	-0.803 (1.90)	-0.911 (2.20)*	-0.453 (1.09)	-0.491 (1.16)	-0.665 (1.55)
Grammar in Non-Selective LEA			5.424 (9.13)**			5.086 (7.76)**
Constant	39.462 (122.04)**	39.531 (118.79)**	39.659 (128.48)**	39.390 (96.13)**	39.447 (91.85)**	39.477 (95.76)**
Observations	***145629***	***138953***	***146072***	***117555***	***107517***	***108543***
R-squared	***0.60***	***0.60***	***0.60***	***0.60***	***0.60***	***0.60***

Table 12 OLS regressions for Value-added (KS2-4) – Border line KS2 Groups 7 to 9 only - Selective and Matched Areas

Model	(1)	(2)	(3)	(4)
Grammar in Selective LEA	7.170	6.686	5.896	4.756
	(26.74)**	(24.40)**	(14.14)**	(12.87)**
Non-Grammar in Selective LEA	-0.737	-0.582	-0.791	-0.232
	(1.90)	(1.59)	(1.88)	(0.58)
Male	-3.202	-2.714	-2.558	-2.579
	(29.13)**	(21.45)**	(21.26)**	(21.75)**
Within-year age: Young	0.751	0.675	0.654	0.627
	(8.68)**	(8.50)**	(8.00)**	(7.86)**
Within-year age: Old	-0.684	-0.634	-0.632	-0.609
	(6.81)**	(6.88)**	(6.84)**	(6.47)**
School size quintile 2	1.257	1.043	1.149	0.446
	(4.35)**	(3.43)**	(3.47)**	(1.32)
School size quintile 3	2.078	1.863	1.915	1.186
	(6.45)**	(6.75)**	(6.44)**	(3.84)**
School size quintile 4	2.329	2.041	2.247	1.344
	(7.13)**	(6.70)**	(6.49)**	(3.60)**
School size quintile 5	2.214	1.985	2.288	1.339
	(4.82)**	(4.46)**	(4.95)**	(3.05)**
Pupil FSM		-5.282	-5.238	-4.302
		(25.39)**	(24.39)**	(18.56)**
Pupil on special needs register		-7.759	-7.742	-7.517
		(24.56)**	(24.52)**	(26.09)**
Pupil mother tongue not English		1.573	1.509	2.641
		(2.84)**	(2.82)**	(7.79)**
Black		0.380	-0.106	1.199
		(0.84)	(0.23)	(2.95)**
Asian, not including Chinese		3.970	3.930	3.397
		(8.60)**	(9.44)**	(9.81)**
Other		2.126	1.887	1.982
		(4.36)**	(3.99)**	(5.22)**
Religious school dummy			1.400	1.228
			(4.84)**	(4.14)**
Single sex BOYS			0.976	0.824
			(1.60)	(1.45)
Single sex GIRLS			1.754	1.582
			(3.66)**	(3.49)**
School % SEN				-2.140
				(1.42)
School % FSM				-15.183
				(3.89)**
School % ESOL				-2.089
				(2.39)*
School % Black				-3.167
				(1.13)
School % Asian				5.551
				(2.24)*
School % Other ethnic				1.596
				(0.59)
Constant	39.181	39.863	39.417	41.542
	(133.59)**	(137.63)**	(111.93)**	(74.84)**
Observations	***78018***	***77946***	***77946***	***77946***
R-squared	***0.21***	***0.28***	***0.28***	***0.29***

Table 13 OLS regression results for Value-added (KS2-4) – Non-FSM Pupils in Selective and Matched Areas

Model	(1)	(2)	(3)	(4)
Grammar in Selective LEA	5.398	5.198	4.415	3.428
	(20.13)**	(17.16)**	(9.29)**	(8.71)**
Non-Grammar in Selective LEA	-0.475	-0.509	-0.710	-0.173
	(1.26)	(1.33)	(1.63)	(0.41)
Male	-3.127	-2.628	-2.525	-2.540
	(34.12)**	(25.52)**	(29.34)**	(30.65)**
Within-year age: Young	0.602	0.563	0.551	0.525
	(9.39)**	(9.44)**	(8.98)**	(8.73)**
Within-year age: Old	-0.640	-0.619	-0.611	-0.595
	(9.98)**	(9.53)**	(9.62)**	(8.87)**
School size quintile 2	0.931	0.912	0.996	0.348
	(3.34)**	(3.20)**	(3.21)**	(1.10)
School size quintile 3	1.772	1.704	1.746	1.064
	(6.06)**	(6.34)**	(6.14)**	(3.69)**
School size quintile 4	1.983	1.931	2.117	1.233
	(7.01)**	(7.09)**	(6.81)**	(3.62)**
School size quintile 5	1.840	1.849	2.121	1.226
	(4.58)**	(4.48)**	(4.86)**	(2.89)**
Pupil on special needs register		-6.539	-6.533	-6.435
		(28.16)**	(28.05)**	(30.06)**
Pupil mother tongue not English		1.265	1.202	2.370
		(2.42)*	(2.42)*	(9.04)**
Black		0.072	-0.390	0.997
		(0.21)	(1.07)	(3.66)**
Asian, not including Chinese		3.671	3.634	3.026
		(8.04)**	(8.67)**	(8.99)**
Other		2.048	1.826	1.839
		(5.03)**	(4.54)**	(8.25)**
Religious school dummy			1.333	1.168
			(4.38)**	(3.81)**
Single sex BOYS			1.160	0.960
			(1.98)	(1.76)
Single sex GIRLS			1.558	1.380
			(3.34)**	(3.20)**
School % SEN				-1.195
				(0.89)
School % FSM				-16.188
				(4.62)**
School % ESOL				-2.069
				(2.71)**
School % Black				-3.479
				(1.68)
School % Asian				5.427
				(2.72)**
School % Other ethnic				2.979
				(1.17)
Constant	39.889	39.986	39.586	41.587
	(149.53)**	(149.71)**	(119.36)**	(79.53)**
Observations	***132663***	***132663***	***132663***	***132663***
R-squared	***0.56***	***0.58***	***0.58***	***0.59***

Table 14 OLS regression results for Value-added (KS2-4) – FSM Pupils in Selective and Matched Areas

Model	(1)	(2)	(3)	(4)
Grammar in Selective LEA	8.498	8.391	7.120	6.906
	(12.10)**	(12.40)**	(9.38)**	(8.61)**
Non-Grammar in Selective LEA	-0.460	-0.098	-0.299	0.183
	(0.95)	(0.29)	(0.82)	(0.52)
Male	-2.779	-2.195	-1.858	-1.801
	(13.06)**	(10.57)**	(8.43)**	(8.22)**
Within-year age: Young	0.469	0.415	0.403	0.394
	(1.97)	(1.91)	(1.86)	(1.79)
Within-year age: Old	-0.590	-0.547	-0.511	-0.475
	(2.25)*	(2.28)*	(2.14)*	(2.03)*
School size quintile 2	1.196	1.248	1.363	0.868
	(2.70)**	(3.45)**	(3.75)**	(2.79)**
School size quintile 3	1.110	1.316	1.436	1.192
	(1.73)	(2.38)*	(2.83)**	(2.55)*
School size quintile 4	1.262	1.505	1.727	1.298
	(3.05)**	(3.28)**	(3.68)**	(2.84)**
School size quintile 5	0.892	1.006	1.268	0.723
	(1.44)	(1.63)	(2.05)*	(1.23)
Pupil on special needs register		-6.862	-6.892	-7.168
		(23.49)**	(24.02)**	(26.31)**
Pupil mother tongue not English		3.973	3.874	5.022
		(4.07)**	(4.07)**	(7.41)**
Black		3.122	2.581	2.877
		(6.40)**	(5.13)**	(4.76)**
Asian, not including Chinese		4.006	3.892	3.498
		(4.23)**	(4.40)**	(4.29)**
Other		3.663	3.322	3.202
		(4.12)**	(3.77)**	(4.08)**
Religious school dummy			1.518	1.456
			(3.36)**	(2.96)**
Single sex BOYS			1.254	0.627
			(1.77)	(0.99)
Single sex GIRLS			3.239	3.185
			(5.32)**	(5.91)**
School % SEN				3.090
				(1.74)
School % FSM				-9.530
				(5.04)**
School % ESOL				-3.489
				(1.73)
School % Black				2.261
				(0.81)
School % Asian				3.253
				(1.35)
School % Other ethnic				2.477
				(0.69)
Constant	34.350	33.795	33.178	34.075
	(75.69)**	(92.03)**	(81.34)**	(59.23)**
Observations	***12966***	***12966***	***12966***	***12966***
R-squared	***0.40***	***0.48***	***0.48***	***0.49***

Table 15 OLS regression results for Value-added (KS2-4) – High Ability FSM Pupils KS2 Groups 9-11 in Selective and Matched Areas Only

Model	(1)	(2)	(3)	(4)
Grammar in Selective LEA	6.861	7.205	5.723	4.821
	(9.30)**	(10.62)**	(7.13)**	(5.36)**
Non-Grammar in Selective LEA	-1.210	-1.072	-1.337	-0.681
	(1.53)	(1.36)	(1.66)	(0.84)
Male	-2.801	-2.457	-1.837	-1.708
	(5.23)**	(4.68)**	(2.83)**	(2.69)*
Within-year age: Young	-0.798	-0.858	-0.857	-0.777
	(0.99)	(1.14)	(1.16)	(1.07)
Within-year age: Old	-1.269	-1.179	-1.086	-1.006
	(1.94)	(1.89)	(1.72)	(1.60)
School size quintile 2	1.970	1.877	2.113	1.136
	(2.29)*	(2.29)*	(2.58)*	(1.43)
School size quintile 3	1.372	1.465	1.667	0.898
	(1.61)	(1.69)	(1.88)	(0.99)
School size quintile 4	2.117	1.930	2.348	1.245
	(2.52)*	(2.14)*	(2.54)*	(1.42)
School size quintile 5	2.237	2.067	2.490	1.422
	(2.05)*	(1.77)	(2.09)*	(1.21)
Pupil on special needs register		-8.020	-7.927	-7.780
		(5.85)**	(5.84)**	(5.58)**
Pupil mother tongue not English		2.826	2.814	4.239
		(1.90)	(1.91)	(3.24)**
Black		0.485	0.154	1.073
		(0.33)	(0.10)	(0.49)
Asian, not including Chinese		0.971	0.878	2.273
		(0.61)	(0.59)	(1.30)
Other		1.388	0.823	1.272
		(0.68)	(0.42)	(0.56)
Religious school dummy			1.296	0.886
			(1.35)	(0.96)
Single sex BOYS			1.322	1.030
			(1.30)	(1.05)
Single sex GIRLS			3.758	3.571
			(3.60)**	(3.31)**
School % SEN				-0.922
				(0.27)
School % FSM				-9.926
				(1.97)
School % ESOL				-2.122
				(0.62)
School % Black				1.047
				(0.19)
School % Asian				-5.034
				(1.00)
School % Other ethnic				2.618
				(0.55)
Constant	42.591	42.552	41.470	43.657
	(44.01)**	(42.46)**	(35.15)**	(33.44)**
Observations	***1718***	***1718***	***1718***	***1718***
R-squared	***0.15***	***0.20***	***0.21***	***0.22***

Table 16 OLS regression results for GCSE excess – Borderline Pupils in Selective Areas

Model	(1)	(2)	(3)
Grammar	8.187	8.252	7.670
	(12.01)**	(12.36)**	(11.04)**
MALE	1.971	2.354	2.145
	(2.80)*	(2.95)**	(2.38)*
school size quintile 2	1.445	1.380	1.353
	(2.53)*	(2.19)*	(1.98)
school size quintile 3	1.474	1.316	1.496
	(1.96)	(1.63)	(1.96)
school size quintile 4	1.835	1.815	2.240
	(2.22)*	(2.06)	(2.50)*
school size quintile 5	2.153	1.990	2.581
	(1.68)	(1.51)	(1.95)
pupil FSM		-1.639	-1.381
		(1.19)	(1.06)
pupil on special needs register		-5.370	-5.303
		(2.63)*	(2.59)*
pupil mothertongue not English		-0.067	0.154
		(0.06)	(0.14)
Black		1.914	2.099
		(1.36)	(1.53)
Asian, not including Chinese		0.664	0.909
		(0.35)	(0.49)
Other		0.669	0.625
		(0.51)	(0.53)
Religious school dummy			1.999
			(3.00)**
Single sex BOYS			1.915
			(2.16)*
Single sex GIRLS			1.594
			(2.40)*
Constant	-3.201	-3.119	-3.961
	(2.28)*	(2.10)	(2.50)*
Observations	***4202***	***4202***	***4202***
R-squared	***0.19***	***0.20***	***0.21***

Table 17 IV regression results for GCSE excess – Borderline Pupils in Selective Areas

Model	(1)	(2)	(3)
Grammar	7.866	6.786	5.825
	(2.52)*	(2.64)**	(2.03)*
MALE	1.981	2.396	2.140
	(2.88)**	(2.98)**	(2.40)*
school size quintile 2	1.487	1.573	1.588
	(2.54)*	(2.33)*	(2.28)*
school size quintile 3	1.498	1.425	1.580
	(1.85)	(1.55)	(1.92)
school size quintile 4	1.782	1.570	2.219
	(2.10)*	(1.82)	(2.58)**
school size quintile 5	2.021	1.391	2.147
	(1.25)	(0.99)	(1.53)
pupil FSM		-1.625	-1.294
		(1.16)	(0.94)
pupil on special needs register		-5.251	-5.157
		(2.58)**	(2.54)*
pupil mother tongue not English		-0.083	0.333
		(0.07)	(0.30)
Black		2.028	2.355
		(1.39)	(1.56)
Asian, not including Chinese		0.637	0.857
		(0.35)	(0.47)
Other		0.642	0.597
		(0.50)	(0.52)
Religious school dummy			1.608
			(1.85)
Single sex BOYS			2.860
			(1.99)*
Single sex GIRLS			2.498
			(2.06)*
Constant	-3.058	-2.468	-3.534
	(1.46)	(1.36)	(2.04)*
Observations	***4202***	***4202***	***4202***
F test for instrument in 1st stage regression	***23.33***	***24.31***	***27.88***

Appendix A.1 Local Education Authorities with more than 10 percent of children attending selective schools

LEA	**Frequency**	**Percentage of selective pupil sample**
Barnet	2842	4.65
Bexley	2568	4.20
Kingston-upon-Thames	1137	1.86
Sutton	1976	3.23
Wirral	3662	5.99
Trafford	2502	4.09
Calderdale	2201	3.6
Buckinghamshire	4613	7.54
Poole	1491	2.44
Bournemouth	1517	2.48
Reading	905	1.48
Slough	1124	1.84
Plymouth	2715	4.44
Torbay	1307	2.14
Southend-on-Sea	1773	2.90
Kent	13509	22.09
Medway	2914	4.76
Gloucestershire	5738	9.38
Lincolnshire	6669	10.9
Total	***61163***	***100***

Appendix A.2

OLS regression results for Value-added (KS1-2) – All Pupils

Model	(1)	(2)
Selective LEA	0.103 (1.28)	0.092 (1.10)
Observations	***529747***	***529747***
R-squared	***0.58***	***0.60***

OLS regression results for Value-added (KS1-2) – Selective and Matched Areas Only

Model	(1)	(2)
Selective LEA	-0.016 (0.18)	-0.012 (0.14)
Observations	***152052***	***152052***
R-squared	***0.58***	***0.61***

Appendix A.3 – Robustness to alternative matching rules

	One up – one down matching with replacement	As (1) but no common support LEA Dropped	As (2) but LEAs with <10% Grammar school pupils included	Nearest neighbour without replacement	As (4) but with no common support LEA dropped	As (5) but lEAs with <10% Grammar pupils included
Selective LEA	0.145	0.119	-0.000	0.439	0.486	0.353
	(0.41)	(0.33)	(0.00)	(1.30)	(1.39)	(1.01)
Constant	39.270	39.324	39.487	39.156	39.186	39.171
	(112.59)**	(107.69)**	(112.94)**	(88.02)**	(82.34)**	(84.64)**
Observations	***145629***	***138953***	***146072***	***117555***	***107517***	***108543***
R-squared	***0.59***	***0.59***	***0.59***	***0.59***	***0.59***	***0.59***

Appendix A.4 – First stage regressions for attending a Grammar school – Old and Young Borderline Pupils in Selective LEAs

	(1)	(2)	(3)
Within-year age: Old	0.172	0.182	0.145
	(4.83)**	(4.93)**	(5.28)**
MALE	0.016	0.003	-0.024
	(0.54)	(0.11)	(0.80)
School size quintile 2	0.148	0.153	0.144
	(1.18)	(1.21)	(1.51)
School size quintile 3	0.078	0.082	0.052
	(0.65)	(0.66)	(0.62)
School size quintile 4	-0.159	-0.156	-0.006
	(1.38)	(1.33)	(0.08)
School size quintile 5	-0.394	-0.386	-0.221
	(4.46)**	(4.24)**	(3.93)**
Pupil FSM		0.051	0.079
		(0.67)	(1.29)
Pupil on special needs register		0.135	0.122
		(2.82)*	(3.61)**
Pupil mother tongue not English		-0.008	0.097
		(0.12)	(1.50)
Black		0.166	0.208
		(1.67)	(2.13)*
Asian, not including Chinese		-0.008	-0.020
		(0.18)	(0.40)
Other		0.008	0.006
		(0.14)	(0.09)
Religious school dummy			-0.212
			(2.91)*
Single sex BOYS			0.504
			(6.21)**
Single sex GIRLS			0.476
			(6.17)**
Constant	0.359	0.347	0.161
	(6.18)**	(5.58)**	(4.14)**
Observations	***4202***	***4202***	***4202***
R-squared	***0.16***	***0.16***	***0.40***