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The Impact of the Specialist Schools Programme on Exam Results*

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Abstract

The Government and its agencies have seriously overestimated the impact of the specialist schools programme on educational attainment. The substantially higher exam scores achieved on average by schools with specialist status are due primarily to sample selection bias and not to any benefits flowing from subject specialisation itself. A fixed effects model is used on the panel of maintained secondary schools in England covering the period 1992-2005 to obtain this result. It is found, however, that the specialist schools programme has had beneficial distributional consequences. There is evidence that schools with the highest proportion of pupils eligible for free school meals have experienced by far the biggest improvement in exam results as a consequence of acquiring specialist status.

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The author alone is responsible for all errors and omissions.

The Impact of the Specialist Schools Programme on Exam Results

1. Introduction: the specialist schools programme

The specialist schools programme in England's secondary education sector began with the designation of 41 technology colleges in 1994 followed by the introduction of a language specialism one year later. After a somewhat tentative expansion of the programme through the remainder of the 1990s, the programme took off in a big way in 2001 and by 2006 over 80% of all maintained secondary schools in England had acquired specialist status (see Fig.1). Moreover, by 2004 the range of specialisms had been expanded to include arts, business studies/enterprise, engineering, languages, maths/computing, science, sport, humanities and music.

The aim of the programme is to increase the diversity of provision in secondary education in order to reap the benefits from greater subject specialisation. The creation of specialist schools lies "at the heart of the Government's drive to raise standards in secondary education and to move beyond the old one-size-fits-all-system [of comprehensive education]".[1] Schools are encouraged to specialise in what they do best so that the benefits of good practice will spread over to other subjects thereby raising levels of achievement across the curriculum. Furthermore, pupils will benefit by being allowed to specialise in subjects in which they are most interested. This at least is the theory if not exactly the practice since school choice is severely constrained by the number of specialisms on offer in any given catchment area and by the capacity of popular schools to meet the demand for places. In addition, all schools are subject to the requirements of the National Curriculum.[2]

Since the specialist schools programme is the Government's key policy strategy for improving educational attainment, it is important to ask whether and to what extent the programme is achieving its objectives.[3] The raw exam results in Table 1 clearly show that specialist schools obtain far better exam results than non-specialist schools at the end of compulsory education. On average, nearly 60% of pupils in specialist schools obtained 5 or more A*-C grades in the GCSE exams in 2005 compared to only 46% in non-specialist schools. The specialist/non-specialist exam gap is considerably wider, however, for some specialisms than for others, with schools specialising in sport, business studies and the arts, for example, achieving much lower exam grades than schools specialising in languages, maths, science, humanities and music. The long-run trends also indicate a persistent gap between specialist and non-specialist schools, which widened considerably following the rapid expansion of the programme after 2001 (see Fig. 2).

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[1] DfES Press Notice (2003/0018, 28 November 2002). See also DfES (2004a), chapter 4 on Independent Specialist Schools.

[2] Thirty percent of local authority districts have 5 or fewer secondary schools and 17% have 4 or fewer.

[3] Schools awarded specialist status receive a capital grant of £100,000 plus about £130 per pupil for a minimum of four years. This amounts to an increase in income per pupil of about 5%.

The Government's view, supported by the Specialist Schools and Academies Trust (SSAT), is that the specialist schools programme has been a great success. The DfES, for example, has claimed that "If your local school is a specialist school, it is more likely to be a good school – one which not only achieves more highly, but which offers greater choice to pupils within a broad and balanced curriculum."[4] It is the Government's view that "Specialist schools have been successful first and foremost because they have provided a means for inspirational head teachers to forge a distinctive mission and ethos which is right for their school". Moreover, they have used their specialist facilities "to develop excellence in their specialist subjects and to extend the insight it gives to best practice in teaching and learning to other areas of the curriculum" (DfES, 2003, p.11).

As in previous studies (Levacic and Jenkins 2004; Taylor 2007), the primary focus of this paper is to consider the extent to which the specialist schools programme has been associated with an improvement in the performance of pupils in national examinations.[5] The central question to be answered is: To what extent have specialist schools achieved exam results in excess of what they would otherwise have achieved if they had *not* acquired specialist status? In other words, we need to estimate the counterfactual. It is also important to discover whether some specialisms have been more successful than others in achieving higher levels of exam performance. A further issue to be investigated is whether there have been any significant distributional consequences of the programme such that different socio-economic groups have been differentially affected by the specialist schools programme.

The remainder of this paper is organised as follows. Section 2 summarises previous attempts to estimate the impact of the specialist schools programme on exam results. Section 3 explains how panel data methods have been used in this paper to estimate the specialist school effect on exam outcomes and section 4 presents the results of applying this method to maintained secondary schools in England. Section 5 concludes.

2. Previous studies of the impact of the specialist schools programme

Different approaches have been used to evaluate the success of the specialist schools programme. First, a qualitative study of eighteen specialist schools commissioned by the DfES concluded that the acquisition of specialist status had been "a powerful vehicle of school improvement and means of raising attainment" (D*f*ES 2004b). Conclusions based on such a small sample, however, are unlikely to produce reliable conclusions about the system as a whole. Furthermore, one of the criteria used to select the sample of schools in this study was that a school had to be performing 'above average' (in

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[4] DfES Press Notice (2003/0018, 28 November 2002).
[5] These are the GCSE exams taken at the end of compulsory schooling, usually at age15/16.

terms of its exam performance), which means that any conclusions drawn from this survey cannot be generalised.

Second, OFSTED has now undertaken two surveys of specialist schools based upon data collected through visits by school inspectors to 52 specialist schools. Both surveys have assessed specialist schools across a range of indicators (such as leadership and management, teaching quality, community involvement, the provision of vocational opportunities, pupil participation in extra-curricular opportunities) and concludes that "Compared to other schools, specialist schools do well against a range of indicators" (OFSTED 2005:3). No attempt is made by OFSTED, however, to assess whether the acquisition of specialist status has led to an improvement in the exam performance of specialist schools compared to non-specialist schools. The report simply refers to the raw exam results and notes that "pupils aged 16 in specialist schools have performed significantly better in national examinations than those in other schools, and the rate of improvement in these results continues to be faster in specialist schools than in other schools" (OFSTED 2005:6).

Third, the Specialist Schools and Academies Trust (SSAT) has taken a more direct route to estimating 'the specialist school effect'. For several years, SSAT has attempted to estimate the effect of specialist status on exam results by using regression methods on school-level data. Using the data for 2005, for example, Jesson and Crossley (2005) first predict each school's exam results using a measure of prior attainment (i.e. the exam results obtained by pupils in their final year at primary school).[6] This *predicted* value is then subtracted from the school's *actual* exam result to obtain an estimate of the school's exam performance. For 2005, they find that after controlling for prior attainment, the exam results achieved by pupils in specialist schools were 4.6 percentage points higher than those achieved by pupils in non-specialist schools.[7] Similar estimates are obtained for earlier years using the same estimation technique (Jesson and Crossley 2004)[8].

Fourth, there has been considerable debate over the value of school-level analyses of educational attainment. Schagen and Goldstein (2002), for example, identify a number of methodological weaknesses in school-level analyses (such as those undertaken by Jesson and Crossley) and argue that pupil level and not school level data should be used for identifying the potential determinants of

[6] The proportion of pupils who are boys is also included but this additional control has virtually no effect on the results obtained. In fact, this variable is simply a proxy for girls-only schools and is insignificant when a girls-only dummy is included as a control.
[7] The mean difference between the actual and predicted exam result is 58.0% - 56.4% = +1.6% for specialist schools and 46.7% - 49.7% = -3.0% for non-specialist schools. Thus, 6.7 percentage points of the difference (of 11.3 percentage points) is 'explained' by the higher levels of prior attainment of pupils in specialist schools. The remaining 'unexplained' component (of 4.6 percentage points) is *attributed* to the specialist schools factor. See Jesson and Crossley (2005:4).
[8] In earlier reports, the proportion of pupils eligible for free school meals is used to control for differences in the family background of pupils between schools (Jesson 2001, 2002).

educational attainment. They argue that multi-level modelling techniques should be used in order to take into account the hierarchical nature of the data.[9] A further advantage of pupil-level analyses is that more controls can be included in the model than is the case for school level analyses. Adding a rich set of controls reduces the likelihood of missing variable bias, which is a potentially serious problem with the school level analyses undertaken by Jesson and Crossley for the Specialist Schools and Academies Trust.

Missing variable bias is likely to be a particularly severe problem in estimating the determinants of educational attainment. This is because of the presence of sample selection bias in the distribution of pupils between schools (Levacic and Jenkins 2004; Noden and Schagen 2006; Castle and Evans 2006). Specialist schools, for example, may attract pupils with more educationally aware parents than is the case for non-specialist schools, thus raising the exam performance of pupils in specialist schools. It is therefore essential to control for the sorting of students between schools if a school's *own* influence on the educational attainment of its students is to be accurately estimated.

Essentially, we need to disentangle the effect of specialist school status from the wide range of other influences on a school's exam results. A wide range of variables is therefore included in these pupil level models in order to control for the sorting of pupils between schools.[10] When this is done using pupil level data, the estimated 'specialist school effect' is far smaller than the estimates obtained by Jesson and Crossley. Levacic and Jenkins (2004), for example, estimate that pupils attending a specialist school are 2.3 percentage points (2.9 for boys and 1.6 for girls) more likely to obtain 5 or more A*-C grades than pupils with the same characteristics attending non-specialist schools. This estimate is similar to that obtained by Noden and Schagen (2006) but far below the 4.6 percentage points obtained by Jesson and Crossley (2005).

Despite these attempts to control for the sorting of pupils between schools (by including a wide array of contextual variables), both Levacic and Jenkins (2004) and Noden and Schagen (2006) warn that estimates obtained from static cross-sectional analyses of the specialist schools effect suffer from serious problems of interpretation. As Noden and Schagen (2006) clearly point out, it is still not possible to discern whether specialist schools 'do well' as a result of becoming specialist or whether schools that 'do well' are more likely to become specialist. This is because the very process of

[9] Multilevel modeling techniques provide more reliable estimates of the standard errors of the coefficients on the explanatory variables, for example, by taking into account the correlated errors of pupils within schools and of schools within local education authorities. See Goldstein and Spiegelhalter (1996), Goldstein and Thomas (1996), Schagen *et* al. (2002), Schagen and Schagen (2005).

[10] These include personal and family background variables (e.g. prior attainment at the end of primary schooling, gender, age, ethnicity, eligibility for free school meals) and an array of variables relating to the pupil's school such as admissions policy (comprehensive, grammar, boys or girls only), school governance (voluntary-aided, foundation), pupil/teacher ratio, school specialism, % pupils eligible for free school meals, % pupils girls, & pupils white, highest age of pupils and school size.

acquiring specialist status is biased towards schools which are likely to achieve 'good' examination results. A striking distinction between specialist and non-specialist schools, however, is indicated by pupils eligible for free school meals (see Table 2). Non-specialist schools have around twice the proportion of pupils eligible for free school meals compared to schools specialising in languages, maths/computing, science, humanities and music. Schools with a high proportion of pupils from poor families are therefore far less likely to have acquired specialist status than schools with a low proportion of pupils from poor families. Moreover, the poverty gap between non-specialist and specialist schools has expanded sharply since 2001 as the proportion of schools switching to specialist status has increased. Attempts to estimate the impact of specialist status on a school's exam results need to take such sources of bias into account if the specialist school effect is to be accurately estimated.

3. Methodology: panel data analysis

A more stringent test of the impact of specialist schools on exam outcomes is to investigate how the exam performance of pupils has *changed over time* following the switch to specialist status (compared to non-specialist schools). This can be done by using data for all publicly-funded secondary schools in England over the years 1992-2005. Specifically, the existence of time-series data from 1992 onwards allows us to use panel data methods to investigate the effect of attaining specialist status on the exam performance of each school. Since the panel of schools contains schools that have *not* acquired specialist status as well as schools that have, the differences-in-differences method can be used for estimating the impact of a school's change in status from non-specialist to specialist. Those schools acquiring specialist status are the 'treated' group while those schools that remain non-specialist are used as the 'control' group. The aim is to estimate the extent to which a *change in a school's status* is associated with a *change in its exam outcome* for the treated group of schools compared to the non-treated group of schools.[11]

The primary advantage of panel data methods is that they allow the investigator to control for *unobservable* differences between schools. One such approach is the fixed effects model, which controls for (time-invariant) unobservable differences between schools that are fixed over time while simultaneously controlling for observable differences. The crucial feature of the fixed effects model is that it focuses on the variation in exam results *within* schools so that the effect of each school's change in status on exam results can be estimated by including a binary variable to indicate the timing of the switch from non-specialist to specialist status. Moreover, a binary variable indicating the timing of the switch to specialist status can be included for each distinct specialism. This procedure should lead to a

[11] The differences-in-differences estimator in this case is the difference between the treated group and the control group in exam performance between the pre-policy and the post-policy periods. A positive difference implies that the policy has had a positive impact on exam outcomes.

considerable improvement in the reliability of the estimated impact of the policy change on examination outcomes.

The model to be estimated is as follows:

$$Y_{st} = \alpha_s + \mathbf{Z}_{st}\boldsymbol{\eta} + \mathbf{X}_{st}\boldsymbol{\beta} + \mathbf{T}_t\boldsymbol{\lambda} + \varepsilon_{st}$$

where Y is the exam outcome; **Z** is a set of ten specialist school dummies (one for each type of specialism) which identify the years when each school had specialist status; **X** are time-varying controls; **T** are year dummies; α_s are school intercept dummies; $\boldsymbol{\eta}$, $\boldsymbol{\beta}$ and $\boldsymbol{\lambda}$ are parameters to be estimated; ε is the error term; s and t refer to school and year respectively.[12] The parameters $\boldsymbol{\eta}$ are the estimated differences-in-differences estimates of the policy effect for each of the ten specialisms. These estimated coefficients measure the within-school change in the exam performance of specialist schools (following conversion to specialist status) relative to the within-school change in the exam performance of non-specialist schools. The variables used as controls, **X**, include the pupil / teacher ratio, the part-time / full-time staff ratio, the number of pupils in the school (and its square), and the percentage of pupils eligible for free school meals. These are commonly used in analyses of school performance (Bradley and Taylor 2004; Taylor and Nguyen 2006). Note that all fixed school effects (such as admissions policy and type of school governance) are excluded from the model by construction. These time-constant factors are captured by the school intercept dummies. Ten separate school specialisms (**Z**) are identified for the empirical analysis (arts, business/enterprise, engineering, languages, maths/computing, science, sport, technology, humanities and music).

Although panel data for schools allows us to investigate whether the timing of changes in exam performance are associated with the timing of schools changing to specialist status, it is still not possible to deduce the underlying cause of any changes that can be attributed to the change in status. This is because the change in status itself involves changes not only in the school's teaching strategy but also changes in the school's funding. Do specialist schools 'do well' because of the benefits resulting from specialisation or do they 'do well' because of the extra resources they obtain as a result of acquiring specialist status (Levacic and Jenkins (2004)? This question cannot be answered in the present paper. The next section presents some estimates of the specialist school effect.

4. Estimates of the impact of specialist status using panel data methods

Using panel data methods, a statistically significant specialist school effect could be detected only for four of the ten subject specialisms (see Table 3). The largest effect is obtained for business and

[12] See Taylor (2007) for a more detailed explanation of the empirical model used here.

enterprise studies (2.9 percentage points), followed by technology colleges (1.9 percentage points). Schools specialising in arts and in science are the only other significant effects (at around 1 percentage point in both cases). On average over all specialist schools, the acquisition of specialist status is associated with a one percentage point increase in the percentage of pupils obtaining 5 or more A*-C grades. This compares with an estimated impact of 4.6 percentage points obtained by Jessons and Crossley (2005).

A further result of interest is the fall in the estimated specialist schools effect over time. When the panel data model is run for truncated periods, we find that the estimated effect is fairly constant (at around 1.5 percentage points) from 1992-97 through to 1992-03 and then falls sharply when the remaining two years of the study period are added (see Table 4). When the analysis is run for individual specialisms (see Table 5), we find that the sharp decline in the overall specialist schools effect is accounted for by the decline in the estimated effect for schools specialising in languages and science.

Distributional consequences

Although the specialist schools effect is small when estimated over all specialisms, there is still the possibility that the specialist schools programme has been more effective for some groups of pupils than for others. We therefore investigate whether the programme has had a differential impact on two distinctly different categories of schools. First, schools are distinguished according to the family background of their pupils, as defined by the proportion of pupils eligible for free school meals. The results are quite startling. The estimated impact of the specialist schools programme is negligible for schools with a low proportion of pupils from poor families, whereas exactly the opposite is found for schools with a high proportion of pupils from poor families (see Table 6). For schools in the highest quintile of pupils eligible for free school meals, the estimated specialist schools effect is 3.5 percentage points. The estimated effect varies considerably, however, between specialisms, with the greatest impact being in business studies, languages and technology (see Table 7). It is particularly noteworthy that the specialist schools effect is large (6.6 percentage points) even for schools specialising in languages – but only for those schools with a high proportion of pupils from poor family backgrounds.

There is a contradiction between the apparent effectiveness of the specialist schools programme and the types of schools that have had the greatest probability of acquiring specialist status. Schools in the lowest quintile of pupils eligible for free school meals, for example, accounted for 30% of all specialist schools in 2005, whereas schools in the highest quintile of pupils eligible for free school meals accounted for only 11% of all specialist schools. The bulk of the funding therefore went to schools likely to gain the least from the programme, at least in terms of GCSE exam results.

A further distributional consequence of the specialist schools programme is that it is the specialist schools with the lowest proportion of pupils with 5 or more A*-C grades (averaged over the entire period) that have experienced the largest increase in exam results. The estimates in Table 8 indicate a specialist school effect of 2 percentage points for schools in the lowest quintile of initial exam results, falling to 0.7 percentage points for schools in the highest quintile. This result is probably explained by the fact that it becomes increasingly difficult to improve exam performance as a school's exam results reach higher levels. This suggests that alternative educational outcomes to exam results also need to be used if the impact of the specialist schools programme is to be accurately estimated.

5. Conclusion

This paper has argued that the specialist schools programme is not the great success story that the government and its agencies have claimed it to be. The evidence from a panel data analysis based on maintained (publicly-funded) secondary schools in England since before the school specialist programme began in 1992 through until 2005 indicates that the programme has been mildly successful, but only in four specialist areas. Schools specialising in business and enterprise, technology, science and arts are estimated to have achieved between one and three percentage points higher exam scores (as measured by the proportion of pupils with 5 or more A*-C grades) than they would have done if they had not converted to specialist status. On average over all specialist schools, the estimated effect of the programme is an increase of just one percentage point greater than would have been achieved if specialist status had not been acquired. This estimated effect is therefore substantially smaller than that obtained in previous studies, some of which suggest that the specialist schools programme has led to an increase in the proportion of pupils obtaining 5 or more A*-C grades by between 4 and 5 percentage points (Jesson and Crossley 2004, 2005).

The reason for this substantial disparity in the estimated effect of the specialist schools programme, compared to previous studies, is that the method used to estimate the specialist school effect in the present paper is based on the fixed effects model, which controls for unobservables in the school choice decision. In short, the fixed effects approach controls for the sorting of pupils between schools, which means that factors affecting school exam results such as parental influences are not attributed to the acquisition of specialist status, as is the case in analyses based on single-year cross-sectional studies. We argue in this paper that time-series data are an essential pre-requisite to estimating the impact of policy changes and that analyses based on single-year cross-sectional data are likely to produce substantially biased estimates of the specialist school effect.

Perhaps the most interesting results obtained in this paper relate to the distributional consequences of the specialist schools programme. There is evidence that schools with a high proportion of pupils on free school meals benefited from the programme by far more than schools with the opposite characteristics. Specialist schools in the top quintile of the proportion of pupils eligible for free school meals, for example, increased their exam scores by 3.5 percentage points whereas the estimated impact of specialist status for schools in the bottom quintile was not significantly different from zero. While this result indicates that the distributional consequences of the specialist schools programme have been in the desired direction, it also suggests that scarce educational resources have not been used efficiently, at least as indicated by the impact of specialist status on exam results. The schools with the greatest likelihood of improvement as a consequence of acquiring specialist status (i.e. those with a high proportion of pupils eligible for free school meals) have been the least likely to have become specialist schools. Conversely, the schools with the least likelihood of improvement (i.e. those with a low proportion of pupils eligible for free school meals) have been the most likely to have acquired specialist status.

We need to be wary about drawing conclusions relating to the causal relationship between specialist status and the improvement in exam results. Although panel data for schools allows us to investigate whether the timing of changes in exam performance are associated with the timing of schools changing to specialist status, it is still not possible to deduce the underlying cause of any changes that can be attributed to the change in status. This is because the change in status itself involves changes not only in the school's teaching strategy but also changes in the school's funding. The crucial question still to be answered is whether specialist schools do well because of the extra funding they receive or as a result of some other factor such as an improvement in the quality of teaching or a better match between the interests of the pupils and the courses on offer.

Future research directed at estimating the impact of specialist school status on educational outcomes could be extended beyond the limited focus on exam results in the present paper by investigating the consequences on post-16 outcomes. This can be done by combining individual level data from the bi-annual Youth Cohort Study with school level data (obtained from the annual Schools' Census and the School Achievement Tables). It would be useful to know, for example, whether attending a specialist school has had any effect on an individual's destination at age 19 and whether the effect varies between different types of specialism. A further development would be to estimate school level effects using a panel dataset consisting of several pupil cohorts based on data extracted from the National Pupil Database.

References

Bradley, S. and Taylor, J. (2004) The economics of secondary schools, *Handbook of Education Economics*, Johnes, G. and Johnes, J. (eds), Edward Elgar, 2004.

Castle, F. and Evans, J. (2006) *Specialist schools – what do we know?* London: Research and Information on State Education (RISE).

DfES (2003) A New Specialist System: Transforming Secondary Education, Department of Education and Skills, London.

DfES (2004a) *Department for Education and Skills: Five Year Strategy for Children and Learners*, Cm 6272, July.

DfES (2004b) *A Study of the Specialist Schools Programme*, Institute of Education, University of Warwick, Research Report 587: Department for Education and Skills.

D*f*ES (2006) Specialist schools directory (www.standards.dfes.gov.uk/specialistschools)

Goldstein, H. and Spiegelhalter, D. J. (1996) league tables and their limitations: statistical issues in comparisons of institutional performance, Journal of the Royal Statistical Society, A, Vol. 158, 385-443.

Goldstein, H. and Thomas, S. (1996) Using examination results as indicators of school and college performance, Journal of the Royal Statistical Society, A, Vol. 159: 149-163.

Jesson, D. with Taylor, C. (2001) *Educational Outcomes and Value Added Analysis of Specialist Schools for the Year 2000*, Technology Colleges Trust, London.

Jesson, D. with Taylor, C. (2002) *Educational Outcomes and Value Added by Specialist Schools*, Specialist Schools Trust, London.

Jesson, D. and Crossley, D. (2004) *Educational Outcomes and Value Added by Specialist Schools*, Specialist Schools Trust, London.

Jesson, D. and Crossley, D. (2005) *Educational Outcomes and Value Added by Specialist Schools: 2005 Analysis*, Specialist Schools and Academies Trust, London.

Levacic, R. and Jenkins, A. (2004) Evaluating the Effectiveness of Specialist Schools, Centre for the Economics of Education, London School of Economics.

Noden, P. and Schagen, I. (2006) 'The specialist schools programme: golden goose or conjuring trick?', *Oxford Review of Education*, Vol. 32 , 431-448.

Office for Standards in Education (2005) Specialist schools: a second evaluation, February, Ref. HMI 2362.

Schagen, S., Davies, I., Rudd, P. and Schagen, I. (2002) *The Impact of Specialist and Faith Schools on Performance*, LGA Research Report 28, National Foundation for Educational Research.

Schagen, I. and Goldstein, H. (2002) Do specialist schools add value? Some methodological problems', *Research Intelligence,* Vol. 80, August, 12-15.

Schagen, I. and Schagen, S. (2005) Combining multilevel analysis with national value-added data sets – a case study to explore the effects of school diversity, *British Educational Research Journal*, Vol. 31, 309-328.

Taylor, J (2007) 'Estimating the impact of the specialist schools programme on secondary school exam results in England', *Oxford Bulletin of Economics and Statistics*, forthcoming. (Working paper available on request)

Taylor, J and Nguyen, A. N. (2006) An analysis of the value added by secondary schools in England: Is the value added indicator of any value? *Oxford Bulletin of Economics and Statistics*, Vol. 67.

Table 1 GCSE exam results in 2005 by school specialism

Specialism	Year specialism introduced	Number of schools in each specialism	% pupils with 5 or more A*-C grades
Technology	1994	563	59.1
Languages	1995	215	66.8
Arts	1997	371	56.2
Sport	1997	328	51.4
Business & enterprise	2002	195	55.0
Engineering	2002	42	55.1
Maths	2002	201	62.5
Science	2002	288	65.6
Humanities	2004	55	65.1
Music	2004	15	79.1
Specialist schools		2273	59.2
Non-specialist schools		855	45.8
All schools		3128	55.6

Note: The data in this table refer only to maintained secondary schools in England.
Source: Specialist Schools Database, 2006; School Achievement Tables, 2005. Both data sets were obtained from the Department for Education and Skills.

Table 2 Percent of pupils eligible for free school meals, 2005

	Number of schools	Mean
Non-specialist	855	21.0
Specialist	2273	13.2
Arts	371	15.3
Business/enterprise	195	16.0
Engineering	42	12.6
Languages	215	10.7
Maths/computing	201	11.4
Sport	328	15.4
Science	288	10.4
Technology	563	13.0
Humanities	55	11.3
Music	15	8.0

Source: Specialist Schools Database, 2006; School Achievement Tables, 2005. The two data sets were obtained from the Department for Education and Skills.

Table 3 Estimated impact of specialist status: panel data analysis (1992-2005)

	Number of schools (2005)	Actual difference between specialist and non-specialist schools in 2005	Estimated effect of specialist status on %5+A*-C grades
Arts	371	12.0	**1.2*****
Business studies & enterprise	195	10.5	**2.9*****
Engineering	42	10.5	-1.1
Languages	215	23.2	0.2
Maths & computing	201	17.3	0.1
Science	288	21.0	**0.9****
Sport	328	7.4	-0.2
Technology	563	15.3	**1.9*****
Humanities	55	19.5	-0.4
Music	15	26.9	0.7
All specialist schools	2273	14.9	**1.0*****

Notes: *, **, *** = significant at 0.05, 0.01 and 0.001 respectively. The estimates of the specialist school effect given in column 4 are obtained from the fixed effects model specified in section 3 using the panel of maintained secondary schools in England (1992-2005 inclusive). The variables used as controls include the pupil / teacher ratio, the part-time / full-time staff ratio, the number of pupils in the school (and its square), and the percentage of pupils eligible for free school meals. Year dummies are also included as regressors. The base group includes non-specialist schools. The full set of results is available on request to the author.

Table 4 Estimated impact of specialist status over different time periods

	Estimated coefficient on specialist schools variable
1992-96	2.2
1992-97	1.6
1992-98	1.5
1992-99	1.5
1992-00	1.4
1992-01	1.5
1992-02	1.4
1992-03	1.5
1992-04	1.2
1992-05	1.0

Notes: All estimated coefficients are statistically significant at 0.001.
See notes to Table 4 for details of the estimating equation.

Table 5 Estimated impact of specialist status over different time periods by specialism

	Tech	Lang	Arts	Sport	Bus	Eng	Maths	Science
1992-95	2.2***							
1992-96	1.6***	1.9#						
1992-97	1.9***	1.5*						
1992-98	1.4***	1.5*	1.9	1.6#				
1992-99	1.6***	1.2*	1.6#	0.8				
1992-00	1.8***	1.2**	0.7	0.2				
1992-01	1.8***	1.2***	1.4**	0.5				
1992-02	1.8***	1.1***	1.3***	0.2				
1992-03	2.0***	1.0***	1.3***	0.2	2.6***	0.0	0.9	2.6***
1992-04	2.0***	0.6*	1.1***	-0.3	3.1***	-0.5	0.4	1.8***
1992-05	1.9***	0.2	1.2***	-0.2	2.9***	-1.1	0.1	0.9**

Notes: #, *, **, *** = significant at 0.05, 0.01 and 0.001 respectively. See notes to Table 4 for details of the estimating equation.

Table 6 Estimated impact of specialist status for each quintile of % eligible for free school meals

% eligible for free school meals (quintiles)	Estimated coefficient on specialist school dummy variable	Number of specialist schools
Lowest quintile	0.3	693
2nd quintile	1.0***	553
3rd quintile	1.3***	460
4th quintile	1.5***	355
Highest quintile	3.5***	261

Notes: *** = significant at 0.001 respectively. See notes to Table 4 for details of the estimating equation.

Table 7 Estimated impact of specialist status v. % eligible for free school meals

	% eligible for free school meals (average 1992-2005)		
	Lowest quartile	Middle two quartiles	Highest quartile
Arts	0.1	1.4***	2.7***
Business studies	1.3*	2.5***	6.9***
Engineering	-2.6**	1.8*	-4.0*
Languages	-0.6	0.3	6.6***
Mathematics	-0.7	1.1*	2.8*
Science	0.1	1.6***	3.8***
Sport	-0.3	0.0	0.1
Technology	1.5***	1.7***	4.9***
Controls included?	Yes	Yes	Yes
R-squared (within)	0.47	0.42	0.50
n	8741	26004	8715

Notes: See notes to Table 4 for details of the estimating equation. *, **, *** = significant at 0.05, 0.01 and 0.001 respectively.

Table 8 Estimated impact of specialist status for each quintile of % 5+A*-C grades

% 5+A*-C grades (quintiles)	Estimated coefficient on specialist status dummy variable
Lowest quintile	2.0***
2nd quintile	1.7***
3rd quintile	1.6***
4th quintile	0.2
Highest quintile	0.7**

Notes: **, *** = significant at 0.01 and 0.001 respectively. See notes to Table 3 for details of the estimating equation.

Appendix

Table A Trends in number and type of specialist schools: 1994-2006

	Technology	Languages	Arts	Sport	Business	Engineering	Maths	Science	Humanities	Music	Total
1994	41										41
1995	34	6									40
1996	43	24									67
1997	41	15	6	11							73
1998	45	11	11	15							82
1999	36	13	8	11							68
2000	45	23	24	25							117
2001	58	27	32	33							150
2002	78	31	78	59	18	4	12	24			304
2003	63	32	60	68	66	16	64	97			466
2004	56	19	92	61	69	25	80	111	18	7	538
2005	38	15	83	55	58	6	53	56	42	15	421
2006	7	5	27	12	18	6	16	15	12	5	123
Total	585	221	421	350	229	57	225	303	72	27	2490

Source: Specialist Schools Database (2006), Department for Education and Skills website.

Table B Estimated fixed effects model, 1992-2005

Explanatory variables	Dependent variable = pupil obtained 5 or more A*-C grades in the GCSE exams 2003
School specialism	
Arts	0.012***
	(0.002)
Business studies & enterprise	0.029***
	(0.004)
Engineering	-0.011
	(0.007)
Languages	0.002
	(0.003)
Mathematics & computing	0.001
	(0.003)
Science	0.009**
	(0.003)
Sport	-0.002
	(0.002)
Technology	0.019***
	(0.002)
Humanities	-0.005
	(0.008)
Music	0.007
	(0.013)
School and family background variables	
Pupil/teacher ratio	-0.002***
	(0.000)
Part-time/full-time teachers	0.005
	(0.004)
Pupils/100	0.011***
	(0.001)
Pupils/100 squared	0.000**
	(0.000)
% pupils eligible for free school meals	-0.278***
	(0.010)
Constant	0.361
	(0.007)
Pseudo R-squared (within schools)	0.44
F-test (prob > F)	53.8 (0.000)
n	43576

Notes: *, **, *** = significant at 0.05, 0.01 and 0.001 respectively. The estimates of the specialist school effect given in this table are obtained from the fixed effects model specified in section 3 using the panel of maintained secondary schools in England (1992-2005 inclusive). Year dummies were also included in the model. The base group includes non-specialist schools.

Figure 1 Number of specialist and non-specialist secondary schools

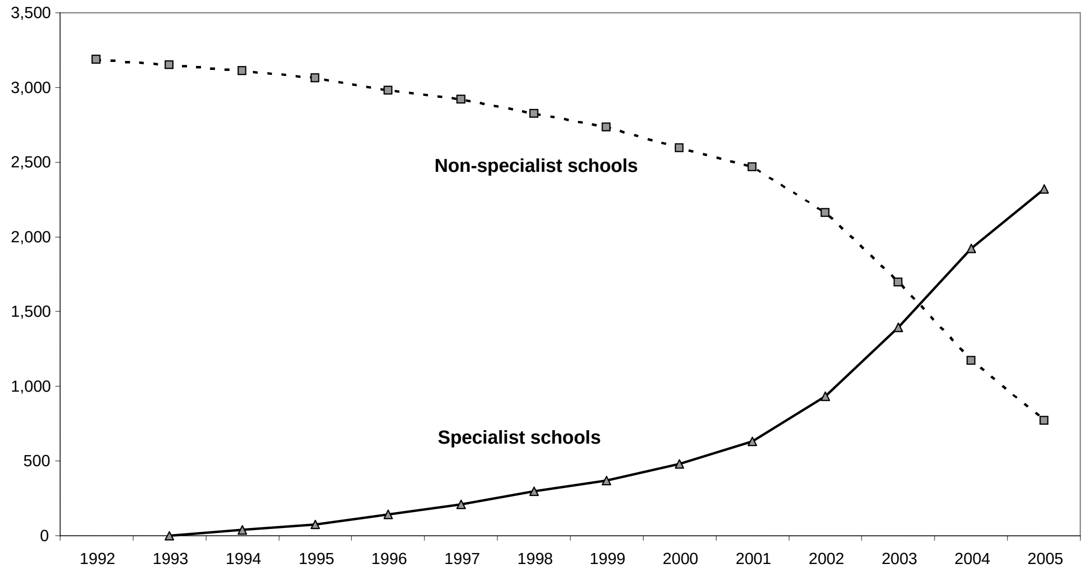

Figure 2 Proportion of pupils with 5 or more A*-C grades

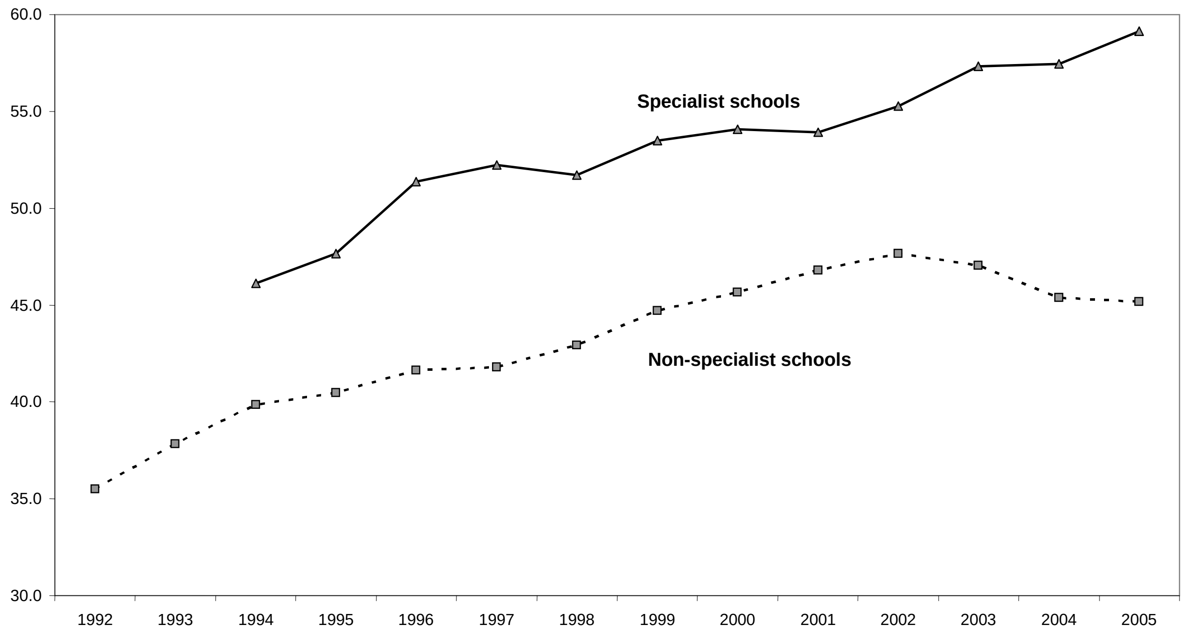

Figure 3 % pupils eligible for free school meals