Diversity, choice and the quasi-market: An empirical analysis of secondary education policy in England

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ABSTRACT

This paper investigates the extent to which exam performance at the end of compulsory education has been affected by three major education reforms: the introduction of a quasi-market following the Education Reform Act (1988); the specialist schools initiative introduced in 1994; and the Excellence in Cities programme introduced in 1999. We use data for all state-funded secondary schools in England over the period 1992-2006. The empirical analysis, which is based on the application of panel data methods, indicates that the government and its agencies have substantially overestimated the benefits flowing from these three major reforms. Only about one-third of the improvement in GCSE exam scores during 1992-2006 is directly attributable to the combined effect of the education reforms. The distributional consequences of the policy, however, are estimated to have been favourable, with the greatest gains being achieved by schools with the highest proportion of pupils from poor families. But there is evidence that resources have not been allocated efficiently.

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I INTRODUCTION

Over recent decades, and in countries as diverse as Australia, Chile, India, New Zealand, Sweden, the US and the UK, governments have decentralised the provision of compulsory education in the hope of stimulating improvements in the educational attainment of pupils (Fiske, 1996). The debate about the most appropriate method of providing education has a long history (Friedman, 1962) and has spurred a growing body of theoretical analyses (Bearse, Glomm and Ravikumar, 2000; Fernandez and Rogerson 1999; Hoxby, 1998, 1999; Nechyba, 2000; De Fraya, Oliveira and Zanchi, 2006). In addition, a large number of empirical analyses have been undertaken, particularly in the USA. In both the theoretical and empirical literature, the critical issue is the trade-off between efficiency and equity. Those who oppose a decentralised approach to education provision argue that it will lead to an increase in socio-economic segregation and ultimately greater income inequality (Levin, 1991a, 1991b). It is also argued that the wider social benefits generated by education - such as citizenship, a deeper sense of community and knowledge spillovers - can only be internalised through centralised provision. In contrast, proponents of a decentralised system argue that decentralisation is more likely to lead to an increase in allocative and productive efficiency (Hoxby, 1996).

In the UK, this reform agenda has manifested itself in a series of education reforms, beginning with the Educational Reform Act of 1988, which sought to stimulate the creation of a quasi-market in secondary education. At the heart of these reforms were measures to increase parental choice and increase competition between schools for pupils. These reforms have been bolstered by the *Specialist Schools Programme*, which aimed to increase the diversity of secondary education provision, thereby enhancing parental choice. In addition, the Labour Government recently introduced the *Excellence in Cities Initiative* (EiC), which sought to improve the educational performance of pupils in schools located in the most disadvantaged metropolitan areas. The key distinguishing feature of this policy initiative was to stimulate cooperation between schools, in the context of partnership agreements, by sharing good practice.

Several previous papers have investigated the effects of the quasi-market in secondary education in England on educational outcomes, school efficiency and equality of educational opportunity (Bradley and Taylor, 2002, 2004; Bradley, Johnes and Millington, 2004). More recently, Taylor (2007) has analysed the impact of the specialist schools initiative on examination outcomes. In the present paper, we draw these previous strands of our research together to measure the impact of the trinity of education reforms on the change in exam performance in secondary schools over the period 1992-2006. Our focus is on the proportion of pupils who obtain five or more 'good' grades in the General Certificate of Secondary Education (GCSE) exams, which are taken by all pupils in England at age 16.[1] The proportion of pupils in England obtaining 'good' exam grades has risen from 35.5% in 1992 to 58.3% in 2006, a dramatic improvement. Our aim is to answer three questions: First, what fraction of this improvement in exam performance can be attributed to the education reforms identified above? Second, which, if any, of the three major education reforms have had the greatest effect in raising exam performance in secondary schools? Third, have the reforms had any distributional consequences? For, instance, how do the effects of the education reforms vary by pupil background, such as ability, family income and ethnicity?

To answer these questions we use a panel of schools covering the period 1992-2006, which has the advantage that we can take a medium-term view of the effect of the quasi-market reforms and the specialist schools initiative. Moreover, by incorporating the EiC initiative into our analysis, we are able to get a better feel for the relative importance of each policy reform. From a technical point of view, using a panel of schools allows us to control for school level unobserved heterogeneity and so minimise the bias caused by endogeneous school choice.

The rest of the paper is structured as follows. In section II, we briefly describe the education reforms that have led to the creation of the quasi-market in secondary education, the specialist schools initiative and the EiC programme. A brief review of previous empirical studies is also provided. Section III introduces the data, identifies

[1] The GCSE exam is taken in approximately 8 to 10 subjects by pupils aged 15-16. Pupils undertake coursework and exams in most subjects and a 'good' grade is one in the range A*-C. The Government uses the proportion of pupils obtaining 5 or more A*-C grades in the GCSE exams as the benchmark for school success. The GCSE is a standard, norm-based, examination taken by almost all pupils, and the eight pass grades range from A* to G. Grades A* to C are considered acceptable for entry to university, together with passes in more advanced examinations (A and AS levels) two years later.

the determinants of school performance and presents our econometric methodology. Section IV discusses the results of a statistical analysis of changes in school performance over the period 1992-2006. Section V concludes.

II CHOICE AND COMPETITION IN SECONDARY EDUCATION

The introduction of a quasi-market in secondary education in England

Over the last twenty years, the provision of education in Britain has been radically transformed by a series of reforms, many of which stem from the Education Reform Act (1988). These reforms have led to the creation of a quasi-market in secondary education (Le Grand, 1991, 1993; Glennerster, 1991).[2] As a result, a centralised-state model of educational provision has been replaced by a more decentralised approach. The salient institutional features of the quasi-market in England's schools have been described in detail elsewhere (Bradley, Crouchley, Millington and Taylor 1998). The two main tenets of the decentralised approach are greater parental choice over the school attended by their child and an increase in competition between schools for pupils. Parents may be expected to take a school's exam performance into account, amongst other factors, in deciding on an appropriate school for their child, thus increasing *allocative* efficiency through greater choice.[3]

Schools have an incentive to recruit pupils because funding is linked directly to pupil numbers, and allowing schools to determine their own allocation of funding was expected to result in greater *productive* efficiency.[4] By allowing schools to compete for pupils, it was expected that educational performance would rise. Successful schools would thrive while unsuccessful schools would either close or decline in size, or improve their own performance in response to competition. It is expected that schools are most likely to respond positively to competition from rival schools in the local quasi-market. Similarly, the greater the amount of choice

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[2] Glennerster (1991) explains why the quasi-market is not a full market solution.

[3] Data from the Longitudinal Study of Young People in England (LSYPE) indicate that choice of secondary school is influenced primarily by family and friends (66%), a school's location (63%) and a school's exam performance (38%). Other less important factors are religious considerations (8%) and other characteristics of the school (7%). It is worth noting that 86% of parents indicated that their child went to their first-choice school.

[4] Information about each school's exam performance is provided by the annual publication of the *School Performance Tables*.

available to parents in an educational marketplace, the stronger the effect of competition should be.

The sorting of pupils between schools and cream-skimming by 'good' schools could, however, have distributional consequences. Pupils from poorer families may increasingly become concentrated in the 'poor' (i.e. worst performing) schools whereas pupils from wealthier families become increasingly concentrated in the 'good' schools (i.e. best performing). Cream skimming by schools reinforces this process of segregation, insofar as schools which face an excess demand for places will 'select' those pupils with the best chance of being successful in national exams, thereby making the school more popular with potential entrants. In contrast, failing schools have little option but to accept less able pupils.

For the US, there is a growing body of evidence that examines the effect of competition between state-funded schools (Borland and Howsen, 1992) and competition between school districts (Blair and Staley, 1995; Marlow, 1997, 2000; Zanzig, 1997) on school performance. Gibbons, Machin and Silva (2006) review this evidence and conclude that it is at best 'mixed'. Furthermore, there is still very little empirical evidence for the UK (Levacic and Hardman, 1998). Bradley *et al* (1998) tested to see if a quasi-market in the secondary education sector had been created, whereas Bradley, Johnes and Millington (2001) investigated the determinants of school efficiency. Both studies showed that the greater the competition among schools, the larger the improvement in exam performance and efficiency. Moreover, 'good' schools grew more rapidly and expanded their pupil capacity to accommodate the excess demand for places. However, both studies focused on a fairly brief time period (1992-98), and it is possible that the quasi-market has become more effective as schools have adapted their behaviour.

More recently, Gibbons, Machin and Silva (2006) have analysed the effect of choice and competition in the primary school sector within a 45km radius of Central London using pupil level data from the National Pupil Database. Choice and competition are measured by the number of schools in a district and the average distance between home and schools in the district. They find little evidence that choice and competition improve exam performance amongst English primary schools. Church schools do respond positively to competition, however, especially where their competitors are also church schools in more competitive markets. Moreover, the benefits of this competition are highest for pupils in church schools with a greater proportion of

children from low-income families. The authors conclude that the effects of choice and competition in raising exam performance of pupils in the primary school sector have not been substantial or widespread. These results also imply that choice and competition only have beneficial effects where there is heterogeneity amongst primary schools, in this case in terms of their religious background.

The specialist schools programme – increasing diversity and choice

The second major education reform in the secondary school sector in England since the early 1990s has been the implementation of the specialist schools programme. Specialist schools are state-maintained secondary schools with a designated subject specialism. Schools have an incentive to acquire specialist status because they receive a capital grant of £100,000 and extra funding per pupil for four subsequent years. The policy began with the designation of technology colleges in 1994. The Government's aim is that all secondary schools in England will ultimately have specialist status (Levavic and Jenkins 2004), the intention being to improve exam performance through greater subject specialisation and greater choice. Moreover, since 2004, schools have been allowed to have two specialisms in any combination of subjects.[5]

There is contrasting evidence on the success of the specialist schools programme. Evidence in support of a positive effect of specialist schools on exam performance is provided by Gorard (2002), Jesson (2002), Jesson and Crossley (2004) and OFSTED (2005). This has led the Government to argue that the programme has been extremely successful. This view has been challenged by the Education and Skills Committee of the House of Commons (House of Commons, 2003, p.4). Furthermore, Schagen and Goldstein (2002) have highlighted the methodological weaknesses of analyses that do not use multi-level modelling techniques, such as those cited above, and are especially critical of the school level analyses conducted by the Specialist Schools Trust. Taylor (2007) argues that all previous work suffers from a serious weakness: no attempt has been made to investigate whether the switch to specialist status has been associated with a *subsequent change* in a school's performance.

Excellence in cities (*EiC*)

[5] In 2006/7, 10% of all maintained secondary schools had two specialisms. See the Standards Site at the Department of Children, Schools and Families (standards.dfes.gov.uk/specialistschools).

The EiC is a major government policy which aimed to raise the standard of education for young people from disadvantaged backgrounds in urban schools. The policy was launched in 1999 and was targeted at all secondary schools in 25 local education authorities in the major cities of England. The programme was extended in 2000 (phase 2) and again in 2001 (phase 3), covering approximately one third of all secondary schools which have been organised into 57 partnerships (CITE).[6] The EiC aimed to diversify provision in secondary schools so that the needs of all pupils ('gifted and talented' as well as 'disadvantaged') were met in the context of cooperation between schools, organised through partnerships.[7] The objectives of the programme were to improve educational performance by raising the motivation and expectations of pupils, improving the quality of teaching and changing the ethos of schools through partnerships.[8]

A DfES funded evaluation of the EiC, based on both qualitative and quantitative methods, concludes that the programme created a positive ethos towards learning in the recipient schools, resulting in improved pupil motivation and behaviour, and also better attendance (Kendall *et al*., 2005). These changes are regarded as important for subsequent improvements in exam performance. Kendall *et al.* show that there was an almost immediate impact of the EiC programme but this was confined to attainment in maths at the end of Key Stage 3 for pupils in the most disadvantaged schools. In a quantitative analysis, Machin, McNally and Meghir (2004) estimate that the short-run impact of the EiC programme was to increase the proportion of pupils moving up one grade by 3%, though much weaker effects were found for English than for maths. Insofar as the positive effects of the EiC programme disseminate throughout the school over time, we might expect an improvement in the GCSE performance of pupils in participating schools. This effect should be stronger for phase 1 schools because there has been more time for good practice to disseminate.

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[6] Expenditure on the EiC programme rose from £24 million in 1999/2000 to £139 million in 2000/2001 and then to £386 million in 2005/2006. This represented approximately 4.3% of total local authority current expenditure on secondary schools, which was £9,000 million in 2000/2001. Total funding during 1999-2006 has been around £1.7bn and the funding per pupil has been around £140 per pupil.

[7] Specifically, the EiC established *learning mentors*, to provide support for students with educational and/or behavioural difficulties; *learning support units*, to provide short-term support for 'difficult' pupils; and the *gifted and talented* programme. The latter focused on the most able 5-10% of pupils.

[8] See *Excellence in Cities: The National Evaluation of a Policy to Raise Standards in Urban Schools 2000-2003* by Kendall *et al*. (2005) for a fuller discussion of the EiC programme.

III. DATA AND METHODS

The data

The two main data sources used in the present study are the *School Performance Tables*, published annually by the DCSF (formerly DfES) and the unpublished annual *Schools' Census*. The *School Performance Tables* contain, amongst other things, information about the exam performance of pupils (at school level) in all maintained secondary schools in England. The *Schools' Census* provides information on, for example, admissions policy, gender mix, the number of teaching staff and support staff, the pupil-teacher ratio, and the proportion of pupils eligible for free school meals. Data from these two data sets are available from 1992 through 2006. Additional information about specialist schools and schools involved in the EiC programme was obtained from the DCSF. Table 1 shows the mean value of some of these variables over the study period and Table 2 shows the number of schools in each specialism in 2006.

As suggested earlier, school performance is measured by the proportion of pupils obtaining five or more GCSEs at grades A* to C, which are defined as 'good' exam grades.[9] As suggested above, this measure provides schools, parents and the government with a simple and readily understandable measure of the exam performance of each school. Table 1 shows that there has been a sustained increase in the proportion of pupils obtaining good exam grades. There has, however, been some variation in this measure of exam performance. For instance, Figures 1 and 2 show how exam performance varies between specialist and non-specialist schools and between schools located in metropolitan and non-metropolitan areas. It is clear from Figure 1 that specialist schools have out-performed non-specialist schools throughout the period. The gap, however, began to widen after 2001, doubling from around 7 percentage points to 14 percentage points by 2005. In contrast, the gap in exam performance between schools in metropolitan and non-metropolitan areas has narrowed substantially over time, indicating a steady catching-up process in operation throughout the period. This catching-up process has been especially strong during 2004/6 (see Figure 2), possibly as a consequence of the EiC programme.

[9] The correlation between the proportion of pupils obtaining 5 or more GCSEs at grades A* to C and exam performance measured by the average number of points obtained per pupil (first made available in 1999) is 0.97.

Econometric methodology

Following Hanushek (1979, 1986) we estimate an education production function, which in its simplest form can be written as follows:

$$Y_{st} = f(PUP_{st}, FAM_{st}, NEIGH_{st}, SCH_{st}) + error_{st} \quad (1)$$

where Y refers to an educational outcome (e.g. exam results) of school *s* at time *t*, PUP indexes observed pupil characteristics, such as gender, FAM refers to family background variables, NEIGH indicates neighbourhood influences and SCH represents a set of school inputs, such as the pupil-teacher ratio. Given our focus on the effects of education policy on educational outcomes, Equation 1 can be extended to include policy variables:

$$Y_{st} = f(PUP_{st}, FAM_{st}, NEIGH_{st}, SCH_{st}, COMP_{st-1}, SPEC_{st}, EiC_{st}) + error_{st} \quad (2)$$

Three policies are identified in this analysis: first, the competition for pupils between schools, COMP, due to the introduction of quasi-market forces; second, the specialist schools programme, SPEC; and third, the extra funding provided for schools in urban locations in the form of the Excellence in Cities programme, EiC. The competition variable is measured by the average exam performance of all schools in the local authority district, lagged one year, excluding the school in question.[10] As suggested above, it is expected that the change in a school's exam performance will be positively related to the exam performance of competitor schools in the same district. Failure to improve exam performance when other schools in the district are improving theirs would imply falling pupil numbers and hence a decrease in funding.

The potential impact of competition for pupils on a school's exam performance can also be investigated in other ways. First, an important feature of the quasi-market is parental choice of school. We address this by stratifying our data according to the number of schools in a district, which allows us to examine the effect of competition between schools, holding the level of parental choice constant. Second, we construct a measure of concentration to examine the effect of competition holding

the degree of concentration constant. The Herfindahl index is used to measure the degree to which pupils obtaining 'good' exam results are concentrated in schools within each district.[11]

SPEC is a dummy variable which is unity for those years during which a school has specialist status and zero otherwise; and similarly for the EiC programme. Therefore, for both SPEC and EiC we observe when the policy was ''switched on'. As suggested earlier, the existence of specialist schools adds to the diversity of educational provision in a district and hence allows pupils to choose schools that better match their preferences and aptitudes. To the extent that this choice improves allocative efficiency, we expect SPEC to have a positive effect on educational outcomes. However, there may be variation in exam performance between schools with respect to the subject in which they choose to specialise. This could occur, for example, if there are variations between subjects in the availability of suitably qualified teachers, such as in science and maths, or perhaps because the extra funding has a greater impact per student in some subjects than in others. Ten subject specialisms are identified in our statistical analysis (see Table 2).

As suggested earlier, the extra funding provided under the EiC programme was also made available to schools in an attempt to improve diversity of secondary education for pupils from disadvantaged backgrounds in urban areas. The funding was provided to stimulate cooperation between schools so that best practice could be diffused and the exam performance of 'poor' schools improved. It is therefore expected that EiC will have a positive effect on the exam performance of schools, and these effects will be larger the longer the school has been receiving such funding.

Estimation of equation (2) using OLS will, however, produce biased results arising from the endogeneity of certain variables and the existence of unobserved heterogeneity (Mayston, 2007; De Fraya, Oliveira and Zanchi, 2006). The error term in Equation (2) will include the effects of unmeasured features of both the school (e.g. teacher quality and school ethos) and the pupil (e.g. motivation and innate ability).

[1]1 A two-year lag was also tried but the results did not differ substantively from using a one-year lag.

11 The Herfindahl index is the sum over all schools in a district of $(s_i - S_i)^2$, where s is the proportion of pupils obtaining five or more A*-C grades in each school and S is the district mean.

These unobserved variables are likely to be correlated with observed covariates, and in particular with SPEC and EiC. Ignoring unobserved heterogeneity is therefore likely to generate an upward bias in both of these covariates. There is also likely to be a correlation between some of the family background and school covariates. For instance, schools with a high proportion of pupils from 'favourable' family backgrounds (e.g. parents with a keen interest in their child's education) are likely to find it easier to recruit 'good' teachers, leading to better educational performance. If schools with good exam results attract 'good' teachers, some of the school covariates will be endogenous. Ignoring these problems may lead to a serious downward bias on school quality variables, such as the pupil / teacher ratio (Mayston, 2007).

An alternative estimation strategy that may reduce these biases is to exploit the panel nature of our data and estimate a fixed effects model, as follows:

$$Y_{st} = \alpha_s + \lambda COMP_{st-1} + \eta SPEC_{st} + \delta EiC_{st} + \mathbf{X_{st}\beta} + \mathbf{T_t\mu} + \varepsilon_{st} \qquad (3)$$

The vector **T** refers to a set of time dummies and $\mathbf{X_{st}}$ is a vector of time varying family, neighbourhood and school covariates. The α_s refer to school level fixed effects, which capture the effect of unobserved, time-invariant, school and pupil variables referred to earlier. The α_s also include time-constant family, neighbourhood and school variables, and the correlations between them.[12] Thus, the fixed effects model provides more precise estimates insofar as the policy variables explain differences between schools in the *within school* variation in Y_s over time.

IV. RESULTS

This section reports the estimated impact of the education reforms on exam performance. We first estimate the individual effect of the three education reforms. This is followed by estimates of the distributional consequences of the reforms. We do this by sub-dividing schools into groups according to pupil achievement, the proportion eligible for free school meals, the proportion from ethnic minorities and

[12] The results change very little when we estimate a random effects model (which assumes independence between the observed covariates and the unobserved heterogeneity) to check the robustness of our results.

the gender of a school's pupils. Finally, we investigate whether the reforms have had differential effects according to school choice (measured by the number of schools in each district) and also according to the potential competition between schools (as measured by the concentration of exam 'successes' within each school district).

The effect of the education reforms on exam performance

In order to investigate the overall impact of the education reforms, we begin by regressing exam performance on a set of year dummies in Model 1 (Table 3). This shows that the mean exam performance of all schools increased by 19 percentage points between 1993 and 2006. This serves as a benchmark for estimating the impact of the full range of variables specified in the previous section (see Eq. 3 above).

All of the specified variables are included in Model 2. The non-policy variables with significant coefficients are the pupil / teacher ratio, school size (as indicated by the number of pupils in the school) and the proportion of pupils eligible for free school meals (both within the school and within the local authority district). The pupil / teacher ratio and the proportion of pupils eligible for free school meals are both negatively related to exam performance as expected. As in previous studies (Bradley and Taylor 1998), school size is found to be positively related to exam performance.

The three policy variables are all positively related to exam performance and are highly statistically significant. The estimated coefficients suggest that a one percentage point increase in the exam performance of other schools in the same district is associated with a 0.2 percentage point increase in the school's own exam performance. The coefficient on the EiC variable indicates that the programme has been associated with a 2.1 percentage point improvement in the exam performance of those schools participating in the programme. The estimated impact of the specialist schools programme, however, appears to have been quite small, with the acquisition of specialist status being associated with an improvement in exam performance of less than 1 percentage point. The overall impact of all of the explanatory variables on exam performance is indicated by the reduction in the estimated coefficient on the year dummy for 2006, which falls from 19 to 11 percentage points (comparing Models 1 and 2).

Our regression results suggest that competition between schools was associated with an improvement of around 4 percentage points in the overall exam

score during 1993-2006.[13] Adding the impact of the EiC and specialist schools programmes, we estimate that the education reforms improved exam performance by around 6 percentage points in total. The regression results also indicate that the increase in school size of around 200 pupils per school during the period was associated with a two percentage point improvement in exam results. This leaves an improvement of 11 percentage points in exam performance unaccounted for. Model 2 therefore indicates that around one-third of the improvement in exam results during 1993-2006 can be directly attributed to the three major education reforms.

The impact of two of the policy variables is investigated in more detail in Model 3. The EiC programme was phased in over three years and hence those in the first phase have received extra funding for longer. Those schools included in the earlier phasing are expected to have experienced the greatest improvement in performance. This is exactly what we observe. On average, schools included in phase 1 (in the 1999/2000 school year) witnessed a 2.1 percentage point improvement in exam performance, whereas those schools in phase 3 (in year 2002 and beyond) exhibit a 1.6 percentage point improvement. The specialist schools programme can similarly be split into different specialisms in order to estimate the impact for each type of specialist school. When this is done, we find that the specialist schools programme is significantly positively related to exam performance for only three of the ten specialisms (which accounted for 40% of all specialist schools in 2006). The impact on exam performance for schools specialising in arts, technology and business studies is estimated to be 1.0, 1.6 and 2.3 percentage points respectively.

The distributional effects of the education reforms

In this section we analyse whether the education reforms have benefited some groups of pupils more than others. Specifically, we test for the effect of the reforms according to *ability, parental income, ethnicity* and *gender*.

To investigate the differential impact of the reforms on different ability groups, we sub-divide schools into quintiles according to the mean value of 'exam successes' over the study period. Equation 3 is then estimated for each group separately. Table 4 shows the results for each of the policy variables for different

[13] This estimate is obtained by multiplying the estimated coefficient on the lagged exam performance of all other schools in the district (0.21) by the change in the exam performance of all other schools in the district over the period 1992-2005 (20 percentage points).

ability groups. For almost all ability groups the policy variables are positive and statistically significant. The estimated impact of each policy, however, varies across the five ability groups. For example, the effect of competition between schools is stronger at the bottom end of the ability distribution than at the top, which could reflect the fact that schools with lower exam performance have simply had to improve their exam performance in order to maintain their position in the local market for pupils. It should be noted, however, that there is less scope for schools at the top end of the ability range to improve their exam performance (because the dependent variable is censored at 100%).[14]

Interestingly, the effect of the EiC programme is weakest at the bottom end of the ability range, probably because schools with a high proportion of the least able pupils are from very disadvantaged backgrounds and the extra funding provided by the policy is insufficient to compensate for this. The greater success of the policy for higher ability groups also implies that the programme has been directed at the most able pupils even in areas of severe deprivation. The opposite result is found for the specialist schools programme, which had its greatest impact at the bottom end of the ability range. Specialist schools with the lowest exam scores have witnessed a 1.6 percentage point improvement over the period 1993-2005, compared to an estimated effect not significantly different from zero in the top two quintiles of the ability range.

The estimated policy effects over the family income range are reported in Table 5. Equation 3 is estimated separately for each quintile of the proportion of pupils eligible for free school meals, which is highly correlated with the corresponding distribution in family income levels. The clearest result is the difference in policy effects between pupils from the poorest and richest family backgrounds. Schools with the highest proportion of pupils from poor families have benefited the most from the three education reforms, whereas schools with the lowest proportion have not benefited at all. The specialist schools programme, for example, is associated with an improvement in exam performance of 2.8 percentage points for schools with a high proportion of pupils from poor families compared to no effect for schools with a low proportion of pupils from poor families. Taking all three policy instruments together, we estimate that the policy reforms raised exam performance by

[14] When we estimate a fixed effects tobit model (with an upper limit of 80%) to allow for the possible effects of censoring, our findings remain substantively unchanged.

8.8 percentage points for those schools with the highest proportion of pupils from poor families compared to no measurable effect for schools with the lowest proportion of pupils from poor families.

Although the impact of the specialist schools programme is estimated to have been small overall, there is evidence that some types of specialist school benefited substantially, but only those schools with a high proportion of pupils from poor families. Schools specialising in languages, for example, experienced a 4.7 percentage point gain in exam performance, but this substantial gain was confined to schools with a high proportion of pupils from poor families (see Table 6). The exam performance gains in business studies (5.5 pp) and technology schools (4.2 pp) were also substantial for schools with a high proportion of pupils from poor families. The results provided in Table 6 indicate that the benefits of the specialist schools programme have been highly concentrated in favour of the less well off.

The estimated impact of the policy reforms obtained for schools with different proportions of pupils from poor families corresponds with the results obtained when schools are grouped according to the proportion of ethnic minority pupils. The impact of competitive forces and the EiC programme is substantially higher for schools with a high proportion of pupils from ethnic minorities (see Table 7). The EiC and specialist schools programmes, for example, had a substantially greater impact on the exam performance of schools with more than 50 per cent of pupils from ethnic minorities than on the exam performance of schools with less than 10 per cent from ethnic minorities.

The final distributional aspect of the benefits of the education reforms relates to gender differences in exam performance.[15] Equation 3 is estimated for three different types of school according to their gender admissions policy: boys-only, girls-only and co-educational schools (see Table 8). The most interesting, and perhaps most surprising, result is that single-sex schools benefited far more from the EiC programme than did co-educational schools, which was directed specifically at urban areas with the severest problems of deprivation. This programme is estimated to have

[15] The factors underlying the evolution of the gender gap in exam results are investigated by Andrews *et al*. (2006), who argue that part of the explanation for the trend improvement in girls' exam results relative to boys was the switch to an examination system based more heavily on coursework from the late 1980s. There is evidence that girls prefer coursework and this could account for the increase in the gender gap as well as an improvement in results overall (Machin and McNally, 2005). Other explanations of the widening gap include the increasingly poor attitude of boys to performing well in school.

boosted exam performance by 3.4 and 5.6 percentage points in boys-only and girls-only schools respectively compared to only 1.7 percentage points in co-educational schools. This result is consistent with the earlier reported finding that schools with the highest ability pupils gained most from the EiC programme.[16] Neither boys-only nor girls-only schools, however, are estimated to have benefited from the specialist schools programme.

Spatial variations in the effect of the policy reforms

We observed earlier that the gap in exam performance between non-metropolitan and metropolitan areas has closed substantially in recent years (see Figure 2). To what extent can this be explained by the education reforms? One reason for the greater impact in metropolitan areas could be the greater competition for pupils in metropolitan areas since there are more schools to choose from. Schools in metropolitan areas may therefore have to be more aggressive to attract pupils and urban transport links will help to facilitate this choice. We should consequently expect the impact of competition to be greater in metropolitan than in non-metropolitan areas. The results reported in Table 9 suggest that this is the case. A one percentage point increase in the exam performance of competing schools is associated with an improvement of 0.38 percentage points in metropolitan schools compared to only 0.12 percentage points in non-metropolitan schools. There is also evidence that the specialist schools programme had a greater impact in metropolitan schools than in non-metropolitan schools.

Although the sharp decline in the performance gap between metropolitan and non-metropolitan schools is interesting and suggestive, a more fruitful approach to identifying the impact of choice and competition on exam performance is to investigate how the policy impact varies according to (a) the number of schools in a district and (b) the potential competition between schools within a district. A concentration ratio (i.e. the Herfindahl index) is used as an indicator of potential competitiveness in each school district.

The effect of the extent of school choice on the strength of the policy effects is indicated in Table 10. The impact of competition on exam performance increases as the number of schools in a district increases, as expected, since competitive forces are

[16] The percentage of pupils gaining five or more A*-C grades in the GCSE exams in 2006 was 75%, 70% and 56% in girls-only, boys-only and co-educational schools respectively.

likely to be more intense in markets where there are more schools. The opposite result is obtained for the EiC programme, which is estimated to have been less effective in districts with a large number of schools. Its greater success in districts with a small number of schools is possibly because the EiC programme depends on cooperation between schools and that cooperation may be easier to achieve in districts with only a small number of schools.

Finally, we investigate the extent to which the effect of competition varies according to the degree of concentration of pupils within schools in each district. The results in Table 11 indicate that the estimated coefficient on the competition variable falls as the degree of concentration increases, as expected. This confirms that competition between schools is likely to have a greater impact on exam performance in a more competitive environment, as measured in this case by the Herfindahl index. The converse result is obtained for the EiC programme, which is estimated to be most effective in districts with the lowest degree of concentration. We therefore conclude from the results in Tables 10 and 11 that competition works best where choice is greatest, and cooperation works best where there are fewer schools to coordinate in a partnership arrangement.

V. CONCLUSION

This paper has investigated the impact on exam performance of three major education policies that have been introduced into England's secondary schools during the past two decades. Following the Education Act (1988), a quasi-market was created in the early 1990s by providing schools with increasing control over their own resources and by linking each school's funding more directly to its intake of pupils. On the other side of the equation, parental choice of school has been considerably increased. Moreover, schools were increasingly differentiated by the specialist schools programme, which began in 1994 with the designation of technology colleges. In addition to expanding the choice set to ten different specialisms (and more recently to a combination of any two specialisms), policy has become more heavily focused on schools in areas of severe deprivation through the Excellence in Cities programme.

This paper has attempted to estimate the effect of these three education policies on the exam performance of pupils at the end of compulsory education. Our main findings, which are based on a panel of all secondary schools in England (1992-

2006), are as follows. First, the introduction of a quasi-market sought to increase competition between schools for pupils and, in so doing, improve their exam performance. Our estimates suggest, however, that only around 20% of the overall improvement in exam performance over the period 1992-2006 can be attributed specifically to the quasi-market reforms. This policy had a far bigger impact, however, in metropolitan areas where competition is likely to be more intense and where parental choice is likely to be greater. We estimate that the quasi-market accounted for over 35% of the overall improvement in exam results in metropolitan areas compared to around 10% of the improvement in non-metropolitan areas. This finding is supported by the further result that the impact of competition was found to be substantially greater in districts which had the most schools and in districts with the lowest concentration of pupils in just a few schools (as measured by the Herfindahl index).

Second, the impact of the specialist schools programme on exam performance is estimated to have been modest, improving exam performance by less than one percentage point overall. Some specialisms, however, had a bigger impact on exam performance than others, with the largest effects being for schools specialising in business and enterprise (2.3 percentage points) and in technology (1.6 percentage points). No discernible effect could be detected for the majority of specialist schools, suggesting that a large proportion of the funding yielded no significant improvement in exam performance. This suggests a substantial misallocation of public funds since the schools with the greatest proportion of pupils from poor families were least likely to acquire specialist status throughout the study period.

Third, the Excellence in Cities programme is estimated to have had some success, insofar as it accounted for a 2 percentage point improvement in GCSE results during 2000-06 (when exam results improved by 11 percentage points overall). The overall effect on exam performance has been small, however, since it has been mainly restricted to schools in metropolitan areas.

Although the education reforms are estimated to have had only a small impact on exam performance in aggregate, there is convincing evidence that the impacts that did occur have been distributionally beneficial. Our estimates suggest that the increased competition had the greatest impact on exam performance in those schools with the most disadvantaged pupils. The same result was obtained for the specialist schools programme, which also had its biggest impact in schools with the most

disadvantaged pupils. Specifically, these two policies benefited those schools with the highest proportion of pupils from poor families and with the highest proportion of ethnic minority pupils. The distributional effects of the EiC programme are less clear cut. There is evidence, for example, that those schools with the highest ability pupils gained more from this programme than schools with the lowest ability pupils. This was not the intention of the programme. All three policies, however, are estimated to have had a greater impact on schools with a high proportion of ethnic minority pupils.

The impact of the education reforms taken as a whole has therefore been relatively small, with only about one-third of the total improvement in exam performance being directly attributable to these three education reforms. This seems to be a rather meagre return on a substantial investment in education resources. One possible explanation for the gap between the impact of the policies and the overall change in exam results is simply that the GCSE exams have become easier or that assessment methods have become less stringent. In other words, there may have been grade inflation. There is still no convincing evidence, however, that grade inflation has been substantially responsible for the steady improvement in exam results since the early 1990s. We cannot rule out the possibility that the effects of the education reforms have not been accurately estimated by the methods used in this paper.

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Table 1 Mean characteristics of schools, 1992-2006

	% 5+ A*-C grades	Pupils per teacher	Part-time / full-time staff	School size (pupils)	% pupils eligible for free school meals	Concentration of pupils in schools within districts (Herfindahl index)	% schools specialist	% of schools partners in EiC programme
1992	35.5	15.3	19.2	819	17.1	0.168	0.0	0.0
1993	37.8	15.7	18.7	846	17.2	0.161	0.0	0.0
1994	39.9	15.8	19.4	868	18.5	0.163	1.2	0.0
1995	40.7	15.9	19.2	892	19.1	0.158	2.5	0.0
1996	42.1	16.2	19.7	901	19.4	0.150	4.6	0.0
1997	42.5	16.3	16.8	912	19.5	0.153	6.8	0.0
1998	43.8	16.5	20.0	922	18.8	0.157	9.5	0.0
1999	45.7	16.6	19.4	942	18.1	0.158	11.9	0.0
2000	47.0	17.0	15.1	968	17.5	0.156	15.7	13.5
2001	48.3	17.0	17.4	989	16.9	0.148	20.4	23.1
2002	49.9	16.9	17.8	1004	16.0	0.146	30.2	28.0
2003	51.7	17.0	14.5	1022	15.6	0.145	45.0	28.1
2004	52.9	17.0	16.5	1033	15.5	0.152	61.7	27.8
2005	55.6	16.7	16.6	1032	15.3	0.143	74.3	28.1
2006	58.3	16.6	16.6	1035	14.7	0.136	78.2	27.5

Note: The Herfindahl index is the sum of $(s_i - S_i)^2$, where s is the proportion of pupils obtaining five or more A*-C grades in each school and S is the corresponding proportion for the district as a whole.

TABLE 2 Number of schools in each specialism in 2006

Specialism	Year specialism introduced	Total in 2006	%
Technology	1994	585	19
Languages	1995	221	7
Arts	1997	421	14
Sport	1997	350	11
Business	2002	229	7
Engineering	2002	57	2
Maths	2002	225	7
Science	2002	303	10
Humanities	2004	72	2
Music	2004	27	1
None	-	588	19
Total	-	3078	100

TABLE 3 Estimated fixed effects model

Explanatory variables	Dependent variable = proportion of pupils obtaining five or more A*-C grades		
	Model 1	Model 2	Model 3
Competition between schools		0.213***	0.211***
		(0.011)	(0.011)
Excellence in Cities Partnership		0.021***	
		(0.001)	
Excellence in Cities: phase 1 (2000)			0.026***
			(0.002)
Excellence in Cities: phase 2 (2001)			0.017***
			(0.002)
Excellence in Cities: phase 3 (2002)			0.016***
			(0.003)
All specialisms		0.007***	
		(0.001)	
Arts			0.010***
			(0.002)
Business studies / enterprise			0.023***
			(0.003)
Engineering			-0.008
			(0.006)
Languages			-0.005*
			(0.003)
Maths			-0.001
			(0.003)
Science			0.002
			(0.003)
Sport			-0.002
			(0.002)
Technology			0.016***
			(0.002)
Humanities			-0.007
			(0.006)
Music			-0.005
			(0.011)
Pupil / teacher ratio		-0.001***	-0.001***
		(0.000)	(0.000)
Part-time / full-time teachers		0.005	0.006
		(0.004)	(0.004)
Pupils		0.010***	0.010***
		(0.001)	(0.001)
Pupils squared		0.000	0.000*
		(0.000)	(0.000)
Proportion of pupils eligible for free school meals		-0.285***	-0.281***
		(0.010)	(0.010)
Proportion of pupils eligible for free school meals in other schools in district		-0.353***	-0.350***
		(0.046)	(0.046)
1994	0.021	0.018	0.018
	(0.002)	(0.002)	(0.002)
1995	0.027	0.020	0.020
	(0.002)	(0.002)	(0.002)
1996	0.040	0.032	0.032
	(0.002)	(0.002)	(0.002)
1997	0.045	0.033	0.033
	(0.002)	(0.002)	(0.002)

TABLE 3 continued

1998	0.056	0.041	0.040
	(0.002)	(0.002)	(0.002)
1999	0.074	0.053	0.053
	(0.002)	(0.002)	(0.002)
2000	0.084	0.054	0.053
	(0.002)	(0.002)	(0.002)
2001	0.095	0.056	0.056
	(0.002)	(0.002)	(0.002)
2002	0.111	0.064	0.064
	(0.002	(0.002)	(0.002)
2003	0.127	0.074	0.074
	(0.002)	(0.002)	(0.002)
2004	0.139	0.080	0.080
	(0.002)	(0.003)	(0.003)
2005	0.166	0.103	0.104
	(0.002)	(0.003)	(0.003)
2006	0.191	0.112	0.112
	(0.002)	(0.003)	(0.003)
Constant	0.385	0.350	0.350
	(0.001)	(0.011)	(0.011)
R-squared (within)	0.42	0.45	0.45
n	43447	43304	43304

Note: ( ) = standard errors. *, **, *** = significant at 5%, 1% and 0.1% respectively.

TABLE 4 Estimated policy effects over the ability range

Average exam score of school (1992-2006): by quintile	Competition between schools	Excellence in Cities Partnership	Specialist schools programme
Schools with lowest exam scores	0.259*** (0.027)	0.009*** (0.003)	0.016*** (0.003)
Second quintile	0.279*** (0.025)	0.021*** (0.003)	0.014*** (0.003)
Third quintile	0.241*** ((0.023)	0.032*** (0.003)	0.008** (0.003)
Fourth quintile	0.215*** (0.023)	0.030*** (0.004)	0.001 (0.003)
Schools with highest exam scores	0.035 (0.019)	0.024*** (0.004)	0.003 (0.002)

Note: ( ) = standard errors. *, **, *** = significant at 5%, 1% and 0.1% respectively. The estimated coefficients for the controls and year dummies are not reported.

TABLE 5 Estimated policy effects by proportion of pupils eligible for free school meals

Average % eligible for free school meals (1992-2006): by quintile	Competition between schools	Excellence in Cities Partnership	Specialist schools programme
Lowest % eligible for free meals ('rich kids')	-0.011 (0.020)	-0.000 (0.005)	0.002 (0.002)
Second quintile	0.141*** (0.022)	0.010* (0.005)	0.007* (0.002)
Third quintile	0.246*** (0.023)	0.013*** (0.004)	0.008** (0.003)
Fourth quintile	0.241*** (0.027)	0.017*** (0.003)	0.010*** (0.003)
Highest % eligible for free meals ('poor kids')	0.235*** (0.027)	0.013*** (0.003)	0.028*** (0.003)

Note: ( ) = standard errors. *, **, *** = significant at 5%, 1% and 0.1% respectively. The estimated coefficients for the controls and year dummies are not reported.

TABLE 6 Estimated policy effects by proportion of pupils eligible for free school meals and by type of specialism

Explanatory variables	% eligible for free school meals (average 1992-2005)		
	Lowest quintile	Middle quintiles	Highest quintile
Competition between schools	-0.006	0.213***	0.232***
	(0.020)	(0.014)	(0.027)
Excellence in Cities Partnership	0.001	0.013***	0.013***
	(0.005)	(0.002)	(0.003)
Arts	0.004	0.010***	0.028***
	(0.004)	(0.003)	(0.006)
Business studies / enterprise	0.009	0.020***	0.055***
	(0.006)	(0.004)	(0.008)
Languages	-0.006	-0.004	0.047***
	(0.004)	(0.004)	(0.009)
Maths	-0.003	0.007	0.009
	(0.005)	(0.004)	(0.010)
Science	0.000	0.008*	0.028***
	(0.004)	(0.003)	(0.008)
Sport	0.001	-0.002	0.005
	(0.005)	(0.003)	(0.006)
Technology	0.015***	0.014***	0.042***
	(0.003)	(0.002)	(0.005)
Constant	0.491	0.238	0.347
	(0.135)	(0.016)	(0.030)
R-squared (within)	0.44	0.44	0.56
n	8526	26019	8759

Note: ( ) = standard errors. *, **, *** = significant at 5%, 1% and 0.1% respectively. The estimated coefficients for year dummies are not reported. Schools specialising in engineering, humanities and music were excluded due to small number of schools in these specialisms when split into quintiles.

TABLE 7 Estimated policy effects by proportion of pupils in ethnic minority

Average % of pupils in ethnic minority (1992-2006): by quintile	Number of schools (2006)	Competition between schools	Excellence in Cities Partnership	Specialist schools programme
Under 10% ethnic minority	2197	0.168***	0.011***	0.007***
pupils		(0.012)	(0.002)	(0.001)
10% to 50% ethnic minority	637	0.190***	0.021***	0.002

pupils		(0.027)	(0.003)	(0.003)
Over 50% ethnic minority	283	0.241***	0.031***	0.022***
pupils		(0.037)	(0.005)	(0.004)

Note: ( ) = standard errors. *, **, *** = significant at 5%, 1% and 0.1% respectively.
The estimated coefficients for the controls and year dummies are not reported.

TABLE 8 Estimated policy effects by gender of admissions

Gender of pupils	Number of schools (2006)	Competition between schools	Excellence in Cities Partnership	Specialist schools programme
Boys only schools	180	0.200***	0.034***	0.000
		(0.044)	(0.006)	(0.005)
Girls only schools	227	0.135***	0.056***	0.004
		(0.038)	(0.005)	(0.004)
Co-educational schools	2710	0.225***	0.017***	0.007***
		(0.011)	(0.002)	(0.001)

Note: ( ) = standard errors. *, **, *** = significant at 5%, 1% and 0.1% respectively.
The estimated coefficients for the controls and year dummies are not reported.

TABLE 9 Estimated policy effects for schools in metropolitan and non-metropolitan areas

Explanatory variables	Dependent variable = proportion of pupils obtaining five or more A*-C grades			
	Non-metropolitan		Metropolitan	
Competition between schools	0.119***	0.121***	0.375***	0.374***
	(0.013)	(0.013)	(0.021)	(0.021)
Excellence in Cities Partnership	0.012**	0.013***	0.012***	0.012***
	(0.003)	(0.003)	(0.002)	(0.002)
All specialisms	0.004***		0.014***	
	(0.002)		(0.002)	
Arts		0.005		0.020***
		(0.003)		(0.004)
Business studies / enterprise		0.018***		0.035***
		(0.004)		(0.005)
Engineering		0.004		-0.020
		(0.006)		(0.014)
Languages		-0.008*		0.001
		(0.003)		(0.004)
Maths		0.003		-0.006
		(0.004)		(0.005)
Science		0.001		0.006
		(0.003)		(0.005)
Sport		-0.002		0.003
		(0.003)		(0.004)
Technology		0.012***		0.030***
		(0.002)		(0.003)
Humanities		-0.010		-0.003
		(0.007)		(0.010)
Music		-0.020		0.021
		(0.013)		(0.019)
Constant		0.373		0.304
		(0.014)		(0.022)
R-squared (within)	0.41	0.41	0.53	0.53
n	27404	27404	15140	15140

Note: ( ) = standard errors. *, **, *** = significant at 5%, 1% and 0.1% respectively. The estimated coefficients for the controls and year dummies are not reported.

TABLE 10 Estimated policy effects by number of schools in district

Number of schools in district (2006)	Number of schools (2006)	Number of EiC Partnership schools (2006)	Competition between schools	Excellence in Cities Partnership	Specialist schools programme
1 to 4	206	4	0.099**	-	-0.002
			(0.027)		(0.004)
5 to 9	1259	75	0.116***	0.043***	0.008***
			(0.016)	(0.004)	(0.002)
10 to 14	764	258	0.266***	0.018***	0.003*
			(0.025)	(0.003)	(0.003)
15 and over	888	520	0.332***	0.007**	0.008***
			(0.027)	(0.002)	(0.002)

Note: ( ) = standard errors. *, **, *** = significant at 5%, 1% and 0.1% respectively. The estimated coefficients for the controls and year dummies are not reported. There is no estimated coefficient for the EiC Partnership programme for districts with under five schools since there were only four districts in this category.

TABLE 11 Estimated policy effects by degree of concentration of pupils in schools within district

Herfindahl index: average for 1992-2006 by quintile	Competition between schools	Excellence in Cities Partnership	Specialist schools programme
Districts with lowest concentration of pupils	0.387***	0.009**	0.008**
	(0.031)	(0.003)	(0.003)
Second quintile	0.322***	0.011***	0.010**
	(0.027)	(0.003)	(0.003)
Third quintile	0.217***	0.031***	0.003
	(0.027)	(0.004)	(0.003)
Fourth quintile	0.164***	0.030***	0.013***
	(0.026)	(0.005)	(0.003)
Districts with highest concentration of pupils	0.081***	0.057***	0.001
	(0.017)	(0.011)	(0.003)

Note: ( ) = standard errors. *, **, *** = significant at 5%, 1% and 0.1% respectively. The estimated coefficients for the controls and year dummies are not reported. The Herfindahl index is the sum of $(s_i - S_i)^2$, where s is the proportion of pupils obtaining five or more A*-C grades in each school and S is the corresponding proportion for the district as a whole.

Figure 1 Proportion of pupils with 5 or more A*-C grades

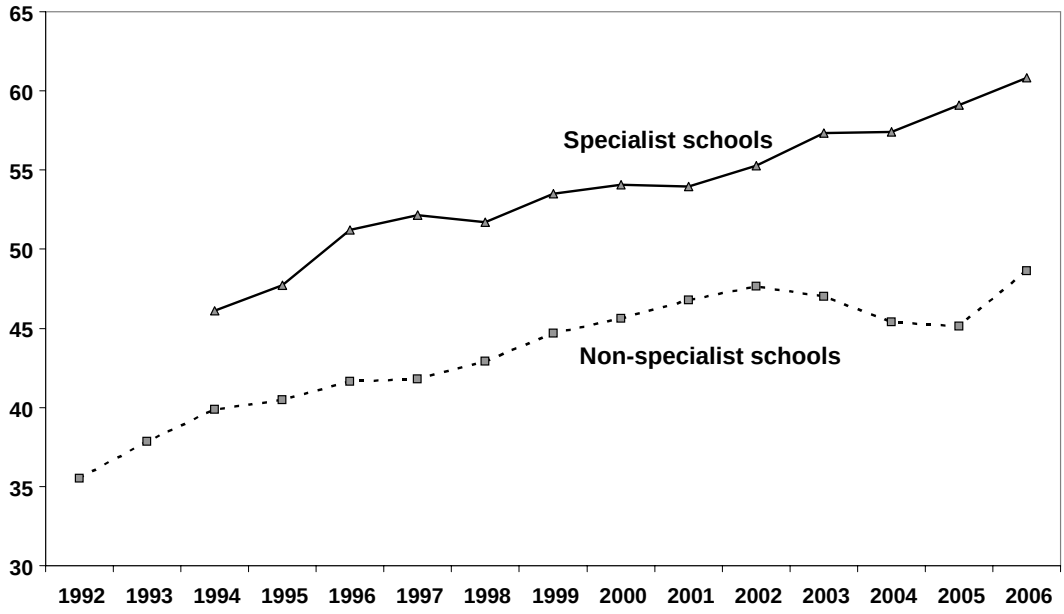

Figure 2 % 5 or more A*-C grades: metropolitan v non-metropolitan schools