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Changing School Autonomy:

Academy Schools and their Introduction

to England's Education

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Abstract

In this paper, we study a high profile case – the introduction of academy schools into the English secondary school sector - that has allowed schools to gain more autonomy and flexible governance by changing their school structure. We consider the impact of an academy school conversion on their pupil intake and pupil performance and possible external effects working through changes in the pupil intake and pupil performance of neighbouring schools. These lines of enquiry are considered over the school years 2001/02 to 2008/09. We bypass the selection bias inherent in previous evaluations of academy schools by comparing the outcomes of interest in academy schools to a specific group of comparison schools, namely those state-maintained schools that go on to become academies after our sample period ends. This approach allows us to produce a well balanced treatment and control group.

Our results suggest that moving to a more autonomous school structure through academy conversion generates a significant improvement in the quality of their pupil intake and a significant improvement in pupil performance. We also find significant external effects on the pupil intake and the pupil performance of neighbouring schools. All of these results are strongest for the schools that have been academies for longer and for those who experienced the largest increase in their school autonomy. In essence, the results paint a (relatively) positive picture of the academy schools that were introduced by the Labour government of 1997-2010. The caveat is that such benefits have, at least for the schools we consider, taken a while to materialise.

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1. Introduction

Around the world, many countries recognise that a highly educated and skilled workforce is one of the key drivers of a country's future progress and prosperity. There is therefore a keen interest in what types of educational institutions deliver better outcomes for their students. The case of schools, and the policies they pursue, has attracted a large amount of attention. For example, a policy focus in many countries has been placed on whether innovative schooling strategies can offset the problems that have been connected to low pupil achievement in state/public schools. Some examples of this kind include learning lessons from the private sector (see Chakrabarti and Peterson, 2008), giving more autonomy to schools (Clark, 2009), increased school accountability (Hanushek and Raymond, 2004), more flexible (and extended) teaching times and curriculum innovation (e.g. Abdulkadiroglu et al, 2009).

A growing economics of education literature has presented empirical estimates on the impact of various school types on pupil achievement. For example, US work on charter schools (publicly funded schools with autonomy levels more like private schools) finds some evidence of achievement gains.[1] In England, successive governments have aimed to improve pupil performance by increasing the amount of school choice and competition by introducing a number of school types to the English education system.[2] Many parents have also recognised the link between their children's educational outcomes and their future prosperity. This has led to there being strong connections between house valuations and proximity to

[1] This literature is not without controversy. Recent, typically small scale, experimental evaluations of charters in particular US cities (Boston and New York) find positive impacts on educational achievement (see Abdulkadiroglu et al, 2009, Dobbie and Fryer, 2009, and Hoxby and Murarka, 2009). Wider coverage non-experimental evaluations produce more mixed results (CREDO, 2009).

[2] See, for example, Gibbons, Machin and Silva (2008) find that in English community schools there is little scope for choice/competition to enhance performance, whilst such a possibility exists in faith schools where more autonomy in decision making is present.

what parents view as better schools for their children in a number of countries (Black and Machin, 2010). This all points to a heightened focus – by both governments and individuals - in the kind of schools deliver better outcomes for their children.

Some nations are innovative in their quest for the optimal school structure, while others pursue policies with little deviation from the orthodox model of the local or community school. The charter school movement in the US – a movement that allows the managing body of the charter schools to gain increased autonomy and that has spread across many states – offers one example of an innovative policy regarding school structures. Another example is in Sweden where a new type of private school has started operating (self-titled 'free schools') that compete for students with public schools on an equal financial basis. These free-schools are privately managed, but they receive full public funding that is calculated based on the number of students that they enrol who live in their local area. One further example is in England where a variety of different types of school has been introduced: academy schools – the subject of this paper – are probably the most well-known example of a new generation of school type.

The gradual introduction of academy schools has proven to be a controversial area of schools policy ever since the first clutch of academies opened in September 2002. Academies are independent, non-selective, state-funded schools that fall outside the control of local authorities. These schools are managed by a private team of independent co-sponsors. The sponsors of the academy school delegate the management of the school to a largely self-appointed board of governors[3] that has responsibility for employing all academy staff, agreeing levels of pay and conditions of service with its employees and deciding on the policies for staffing structure, career development, discipline and performance management.

[3] An academy usually has around thirteen governors, with seven typically appointed by the sponsor.

Supporters of academies argue that combining independence to pursue innovative school policies with the experience of the sponsor will allow academies to drive up the educational attainment of their pupils.

In this paper, we carefully appraise the academy school model. We study the impact of academy school conversion on their pupil intake and pupil performance and possible external effects working through changes in the pupil intake and pupil performance of neighbouring schools. These lines of enquiry are considered over the school years 2001/02 to 2008/09. We bypass (at least some of) the selection bias inherent in previous evaluations of academy schools by comparing the outcomes of interest in academy schools to a specific group of comparison schools, namely those state-maintained schools that go on to become academies after our sample period ends. This approach enables us to produce a well balanced treatment and control group.

Our results suggest that moving to a more autonomous school structure through academy conversion generates a significant improvement in the quality of pupil intake, a significant improvement in pupil performance and small significant improvements in the performance of pupils enrolled in neighbouring schools. These results are strongest for the schools that have been academies for longer and for those who experienced the largest increase in their school autonomy. These findings matter from an economic perspective, in that they suggest the increased autonomy and flexible governance enabled by academy conversion may have had the scope to sharpen incentives to improve performance. They also matter from a public policy standpoint because recent years have seen the increased prevalence of an education system that is being allowed to become more and more autonomous. In essence, the results paint a (relatively) positive picture of the academy

schools that were introduced by the Labour government of 1997-2010. The caveat is that such benefits have, at least for the schools we consider, taken a while to materialise.

In the next section of the paper, we discuss the nature of secondary schooling in England and document the rise of academies. We also describe how schools become academies and present a brief summary of related studies. Section 3 describes the data, the estimation framework that we adopt and uses this discussion to formulate key hypotheses to be tested in the empirical work. Section 4 presents the results on academies. Section 5 reports the robustness tests on academies. Section 6 presents the results on neighbouring schools. We offer conclusions to the paper in section 7.

2. The Introduction of Academy Schools

Academies are a relatively new type of secondary school first introduced into the English education system in the early 2000s. In this section, we consider their introduction. We discuss how academies relate to the other secondary school types that are in operation in England and we document the scale of the rise in the number of academy schools.

School Types in England

The English education system has always been characterised by a strong voluntary movement that has been actively involved in the delivery of education. Historically these voluntary organisations were typically religious and, in the early times of education delivery, were the sole providers in England. Over time, the state sector gradually took up a more active involvement in providing resources to the education system by first helping to fund these early schools. The state then went on to create new schools that had no affiliation with the voluntary sector (now known as community schools). However, despite the increased

involvement of the state sector, the commitment of the voluntary movement to education has never waned: even today, a significant percentage of the schools in the English education system are run as a partnership between the voluntary sector and the state sector (these are voluntary aided schools, voluntary controlled schools or foundation schools).

The private sector also has an involvement in England's education system. This has typically taken the form of privately funded independent schools that run alongside state funded schools with little private sector involvement in the state funded schools (Machin and Wilson, 2008). However, the passing of 1988 Education Act changed this. This act allowed the government to form partnerships with the private sector to deliver education. The UK government then actively encouraged schools that are public-private ventures as a medium for delivering education (for more details, see Machin and Wilson, 2008). The first batch of this new type of school were city technology colleges (or CTCs). In more recent years, the academy school programme has been introduced and, in some important dimensions, this can be thought of as a continuation and development of the CTC scheme.

Taken together, there are currently seven different school types that make up the English secondary education system: independent schools, academy schools, city technology colleges, voluntary aided schools, foundation schools, voluntary controlled schools and community schools. Each school type is characterised by a unique set of features regarding their school autonomy and governance. This is shown in Table 1. In this Table, we order the different school types by the amount of autonomy that their governing body/management body has to make the schooling decisions.

At the top of the autonomy list is the registered independent school. Such schools are able to charge fees. They also possess a management body that determines all staffing

decisions; the curriculum for the school; the structure and length of the school day; the admissions and pupil selection process; the school budget and all the other policies that the school follows. Collectively, the registered independent schools have the most autonomy.

Academy schools share some of the characteristics of independent schools: for example, an academy school will have a management that determines all staffing decisions; the majority of the curriculum for the school (except some core subjects: English, Maths, Science and IT); the structure and length of the school day; selecting up to 10% of their intake who demonstrate sufficient aptitude and enthusiasm in the specialism that the academy has decided to follow; the school budget and all the other policies that the school follows. However, academy schools cannot charge fees. They are also all-ability schools (except for [at most] 10% of their intake): the management/governing body therefore has less scope to decide on their admissions compared to independent schools.

The third type of school on the list is the CTC. We mentioned earlier that the CTCs are similar to academy schools. However, the crucial difference is that – unlike an academy school - a CTC is obliged to follow the national curriculum in all subjects (Whitty et al., 1993). The curriculum is also characterised by a strong technological, scientific and practical bias, which is not always the case in academy schools. A CTC has less scope to decide the curriculum for the school compared to an academy.

Next on the list is the voluntary-aided school, the foundation school and the voluntary-controlled school. All of these types of school are run as a partnership between the state sector and the voluntary sector. In a voluntary aided school (unlike an academy or a CTC), the governing/management body is not responsible for all staffing decisions; the structure and length of the school day; or the school budget or any other school policy. The voluntary aided

school is obliged to follow the national curriculum in all subjects. However, the managing/governing body is responsible for the admissions of the school (in a non-selective way) and it is also responsible for all staffing decisions. A foundation school is similar to a voluntary aided school, except that the sponsor is not able to appoint the majority of the governing body. A voluntary controlled school is similar to a foundation school, except that the LEA is responsible for the admissions of the school (in a non-selective way).

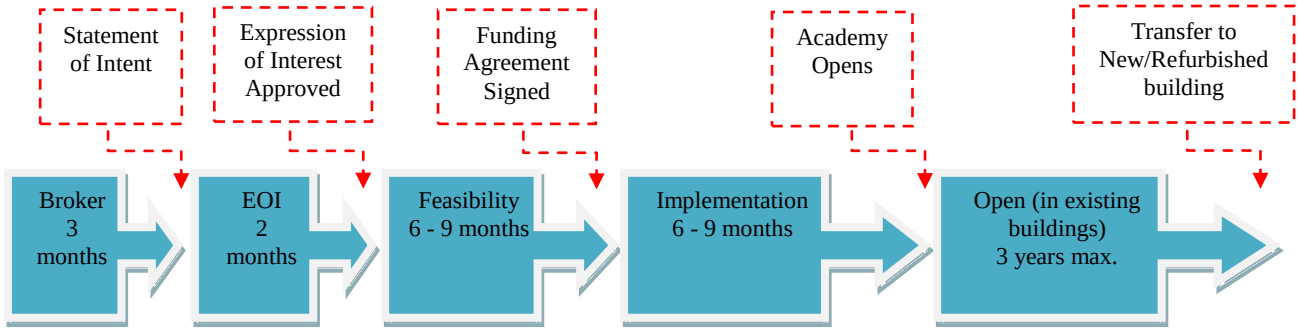
Finally, there is the traditional local community school. These schools are centrally organized through the local education authority and have rigid governance structures. In addition, such schools do not have responsibility for any staffing decisions. These schools possess little autonomy, certainly when compared to the other school types in the Table.

Academy Schools

Academy schools are (typically) set up due to any of the following reasons: to replace existing schools (that are often failing); to become an additional school in a particular area; or as a means for fee-charging successful schools to broaden their intake of pupils by becoming academies (Academies and Independent Schools: Prospectus).

Prior to the Academies Act 2010, the path to establish an academy school in a local authority involved a number of steps, as set out in Figure 1:

Figure 1: The Path to Establish an Academy School



The path to establishing an academy school begins with the Office of the School Commissioner (OSC). They first identify and then explore with local authorities[4] (LAs) the opportunities for developing a new academy school to improve standards in the lowest attaining school(s) or to increase school diversity, parental choice or fair access for parents within the local authority. The process enters the brokering phase if the LA consents to the academy school creation and an academy is seen as the right solution to the needs of the LA. In this phase, the OSC matches the LA to a sponsor(s). The phase is completed when both the LA and the sponsor(s) sign the Statement of Intent. This states that the LA and the sponsor(s) will work together to complete a full Expression of Interest (EOI).

In the EOI phase, the LA and the sponsor work together to complete a formal document that is known as the Expression of Interest. This shows the need for a new academy in the proposed area and should provide more details about the proposed academy such as: the age range of the pupils and the number of pupils that are expected to enrol into the school. The phase is completed when the LA and sponsor send the expression of interest to the Secretary of State for Education for his or her approval. If the EOI is approved, then the process moves on to the feasibility stage.

During the feasibility stage, a project manager – funded by the Department for Education - is appointed to work with the sponsor(s) to develop the project and conduct a local consultation with key stakeholders. In this stage, the sponsor(s) will also state a specific vision for the academy. In addition, the sponsor(s) will also state their vision for the

[4] Prior to the Academies Act 2010, the establishment of any academy school in an area required the permission of the local authority (National Audit Office 2010). However, following the election in May 2010, the new UK government introduced legislation into the Academies Act 2010 which removes the requirement for the local authority to approve any plans to create an academy school in its area. For the purposes of this paper, we therefore consider only those academy schools that were approved prior to the Academies Act 2010 and we drop from our sample any academies that have been approved after this date.

curriculum and structure/length of the school day for the academy. At this stage, there is also a requirement for the sponsor(s) to produce a series of documents that show how the proposed academy will meet the requirement of raising the educational standards and aspirations in the local area. This stage is completed when the sponsor(s) submit these documents to the Secretary of State for Education for his or her approval. If approved, the Department for Education will enter into a legally binding funding agreement with the sponsor(s). The funding agreement formally states the size, the subject specialism, the location as well as other characteristics of the academy, and leads to the creation of a new academy.

As soon as the funding agreement is signed, the process enters the implementation phase. In this phase, new buildings for the academy (if needed) will begin to be built. This will also be the time when the assets of the existing school – that are replaced by the academy - are transferred from the local authority to the academy trust. The academy will then open as soon as possible and will receive state funding – at a level comparable to other local schools – according to the number of students that attend the school (Academies and Independent Schools: Prospectus). If the academy replaces a school, then the academy will operate in the existing buildings for a maximum of three years before moving to new/refurbished buildings.

In Table 2, we show the number of state-maintained English secondary schools – of each school type – in operation over an eight year period beginning in 2002. The definition of the different school types are the same as Table 1. The Table shows a marked change in the structure of English secondary schools. First, there is the decline of the traditional ('bog standard') community school, second, there is the marked rise in schools with non-traditional structures. The marked rise in the number of schools with non-traditional structures is driven by large increases in the number of foundation schools and, most importantly for our analysis,

academy schools. By 2008/9, there were 130 academies, comprising 4.3 percent of secondary schools, and there is a commitment to there being many more in future (see Machin and Vernoit, 2010, and the Schools White Paper, 2010).

In Table 3, we look at the type of English secondary school that converts to an academy. The Table shows that the vast majority of academy schools are actually academy conversions from predecessor schools. The Table also shows that (at least) one school from every secondary school type has converted to an academy. However, the majority of academy conversions occur in community schools. There is also a marked increase in the number of foundation schools that convert to academies as the program has matured.

In Table 4, we compare the average pre-treatment school characteristics of academy schools with the other types of English secondary schools that make up the state maintained sector. We also look at these school characteristics across different cohorts of academies (based on the first academic year that the academy started operating). We believe that there are a few points worth highlighting. The Table shows that the pre-treatment academies (schools prior to academy conversion) – compared to other types of maintained English secondary school - contain a higher proportion of pupils who are eligible for free school meals. This is also true for the proportion of pupils taking free school meals. A logical conclusion to draw from this Table is that an academies pupil intake contains higher proportions of poor pupils. The Table also shows that the pupils at pre-treatment academies - compared to other types of English secondary schools - miss a higher percentage of half days due to unauthorised absences.

We have also looked at a measure of school performance. The Table shows that the pre-treatment academy schools – compared to other types of maintained English secondary

schools – contain lower proportions of pupils who achieve the equivalent of five or more good (A*-C) GCSEs including English and Maths. We also looked at the key stage 2 performance of the pupils (a series of exams that they take at the end of primary school prior to going to secondary school). In terms of secondary school attendance, this can be seen as a measure of pupil-intake quality. The Table makes the clear point that the pre-treatment academies – compared to other types of maintained English secondary schools - enrol a pupil intake that has performed less well at key stage 2.

A cohort-by-cohort comparison shows some variation in the pre-treatment school characteristics of the academies. However, despite this variation, all cohorts of academies (if analysed individually and compared to the other types of maintained secondary school) contain higher proportions of poor pupils; experience higher absentee rates; contain lower proportions of pupils who achieve the equivalent of at least five good GCSEs including English and Maths; enrol a pupil intake that has performed less well at key stage 2.

Tables 1 through to 4 display some highly relevant points. There is now a significantly larger share of schools that are operating in the English education system that are allowed more autonomy and flexibility compared to any other type of maintained secondary schools. The academy schools look like a flagship model. Compared to other school types, these schools in their pre-treatment form are both disadvantaged and poorly performing. This means that any evaluation of the impact of academies on outcomes will also be an assessment of whether they are a means of reducing the rich/poor achievement gap.

Related Studies

To date, only a small body of work has explicitly evaluated the impact of academies on educational outcomes. The most notable is a study by Machin and Wilson (2008).

However, there is also a five year evaluation that has been conducted by PriceWaterhouseCoopers (PwC Report, 2008) and there is a report by the National Audit Office (2010). Machin and Wilson (2008) look at the improvement in the GCSE performance of academy schools compared to the performance of a matched group of schools over the same time period. They find only modest insignificant improvements. The PwC Report (2008) finds higher percentage point increases in the GCSE results of academies compared to the national average. However, Machin and Wilson note a number of problems with a comparison of academies with the national average. This, they believe, invalidates the results of the PwC Report. It is noteworthy that both Machin and Wilson (2008) and the PwC Report (2008) admit that drawing any strong conclusions from their results is precipitous.

More recently, a NAO report has looked at the performance of academies compared to a selected group of maintained schools. Their comparison group is composed of schools with similar pupil intakes and performance to the pre-treatment academies. The NAO also exclude some academies from their sample: they require all academies to have been open for at least two years at the time of writing.[5] They also exclude from their sample any academy that was either a former city technology college or a former independent school.They find that there has been a significant improvement in the proportion of pupils achieving the equivalent of five or more GCSEs at A*-C grade in the academies compared to the comparison group. This result is driven by the relatively more advantaged pupils[6] attending the academy as compared to the predecessor school. The report also finds significant improvements in pupil attendance at academies compared to comparable schools.

[5] This means that they look at the first six cohorts of academy schools.
[6] These pupils are not eligible for free school meals.

A related study is by Clark (2009). He looks at grant-maintained (GM) schools[7] in England in the late 1980s, using a regression-discontinuity design to look at performance and competition effects. More specifically, his regression-discontinuity design exploits the fact that schools wishing to become GM schools are required to win the support[8] of the parents with children who are currently enrolled at the school. This approach allows Clark to look at the performance of narrow GM vote winners compared to the performance of narrow GM vote losers. He finds that the narrow GM vote winners experience a significant improvement in the proportion of pupils achieving the equivalent of five or more GCSEs at A*-C grade – increasing by roughly 0.25 standard deviations for each additional year the narrow GM vote winner is open - compared to the narrow GM vote losers. Clark also finds significant improvements in pupil attendance at narrow GM vote winners compared to narrow GM vote losers. He also finds improvements in student quality at the narrow GM vote winners compared to the narrow GM vote losers. However, he finds that a narrow GM vote win has no impact on the neighbouring schools.

Across the Atlantic, there is more evidence on charter schools. In some regards, this is a type of school in the US that is similar to an academy. Some of the more convincing studies in this literature exploit the fact that some charter schools use lotteries to allocate places when the school is oversubscribed. Examples of this kind include: Abdulkadiroglu et al. (2009), who estimate the impact of charter attendance on student achievement using Boston data, Hoxby and Murarka (2009), which evaluates the effect of the majority of charter schools in New York City on their students' test scores, and Angrist et al. (2010), who evaluate the impact of a specific Charter School (in Lynn, Massachusetts) that is run by the Knowledge is

[7] GM schools were renamed as foundation schools (see Table 1) in the Schools Act 1998.
[8] This is achieved by winning the majority of a formal vote.

Power Program (KIPP) – this is a program that is targeted at low income students that qualify for free school meals and was set-up by Teach for America veterans.

Abdulkadiroglu et al. find that the lotteried in pupils experience significant improvements in their English language scores at both middle and high schools – increasing by 0.19 and 0.2 standard deviations respectively for each year that they spend at the charter school – compared to the lotteried out pupils. They find even larger effects for the lotteried in pupils in their math scores at both middle and high schools – increasing by 0.43 and 0.32 standard deviations respectively for each year that they spend at the charter school – compared to the lotteried out pupils. They also find some evidence that the highest achievement gains were achieved by students who were performing particularly poorly before they attended the charter school.

Hoxby and Muraka (2009) find that lotteried in pupils experience significant improvements in both their maths scores and reading scores between the third and eighth grade – increasing by 0.09 standard deviations and 0.04 standard deviations respectively for each year they spend at the charter school – compared to the lotteried out pupils who remain in traditional public schools. They also look at the link between certain school polices and the above effects on achievement. They find that a longer school year/day is associated with positive achievement effects. However, the authors are keen to stress that this does not imply causation. This is because separating the observable policies from unobservable policies is an extremely difficult task (and the procedure is further complicated due to the multicollinearity between the observable policies).

Angrist et al. (2010) find that lotteried in students who attend KIPP Academy Lynn, a school that serves students in grades five through to eight, experience significant

improvements in their maths scores and reading scores - increasing by 0.35 standard deviations and 0.12 standard deviations respectively for each year they spend enrolled at KIPP Lynn – compared to lotteried out pupils. They also find that students with limited English proficiency, special educational needs or lower baseline scores experience the highest achievement gains in both maths scores and reading scores. In a separate study, Dobbie and Fryer (2009) look at schools in Harlem in New York, with results being broadly similar results to those of Angrist et al. (2010).

However, sometimes lottery based estimates are not possible. Some studies adopt non-experimental methods as an alternative, but they tend to produce more mixed results on charter schools. For example, CREDO (2009) uses propensity score matching methods. They find that a charter schools performance are no better (or worse) than neighbouring traditional public schools. One problem with non-experimental methods is that there are concerns about how well they deal with selection bias compared to the lottery based estimates. An informative study that addresses this issue is by Hoxby and Murarka (2007). They estimate treatment effects for charter schools using both non-experimental methods and lottery based estimates. They find that their non-experimental estimates replicate their lottery-based estimates.

The question of whether a charter schools has an impact on the performance of their neighbouring schools has only been addressed by a few studies. Examples of this kind include: Bettinger (2005), which looks at the impact of charter schools in Michigan on neighbouring public schools, Hoxby (2002), which evaluates the impact of charter schools in Michigan and Arizona on their neighbouring regular public schools, and Booker et al. (2007), which looks at the impact of a high concentration of charter schools in Texas on the student

achievement in traditional public schools. All three studies find improvements in the traditional public schools that can be attributed to the introduction of charter schools.

3. Data, Modelling Approach and Key Hypotheses

In this section, we discuss the data sources used in this paper. We also discuss the approach that we adopt to construct our dataset. In the remaining parts of the section, we predesignate the outcomes of interest and outline our definition of a neighbouring school. We also describe the modelling approach that we adopt to estimate the impact of academy status on the outcomes of interest.

Data

In this paper, we use the school level characteristics from the Edubase, School Performance Tables (SPT) and Annual School Census (ASC) data sources. All three are collected by the Department for Education (DfE). Edubase contains annual data on a number of school characteristics – such as the number of pupils who attend the school, the school type (e.g. academy, CTC, foundation, etc.) and on the admissions policy of the school (e.g. comprehensive, selective, etc.) – for all schools in England and Wales from the 1999/00 academic year. The School Performance Tables contain annual data on several performance measures – such as the proportion of pupils achieving the equivalent of five or more GCSEs at A*-C grade, and the proportion of half days missed due to unauthorised absences – for all schools in England from the 1993/1994 academic year.

In England, all state maintained schools complete an Annual School Census. This is a requirement of the Education Act 1996 (Elias and Jones, 2006). Examples of information included in the Annual School Census are the following: the total number of pupils enrolled,

the percentage of pupils eligible for free school meals, the total number of qualified teachers, the percentage of pupils with special educational needs (either with or without a statement), the pupil-teacher ratio and the percentages of pupils from different ethnic groups.

In addition to the above, we also use data from the National Pupil Database (NPD). The NPD is a centrally collected data source that contains the pupil and school characteristics (school census) combined with the annual National Curriculum key stage attainment data at the pupil level. The school census data contains information on pupil-level background characteristics– such as whether the pupil has special educational needs (SEN); whether the pupil is eligible for free school meals (FSME); the first language of the pupil; the gender of the pupil; the school year group of the pupil; the school code for the school that the pupil attends; the local education authority (LEA) for the school that the pupil attends; and the ethnicity of the pupil – for all pupils in the English maintained sector. This data has been collected three times per year (January, May and September) from the 2001/2002 academic year. For this paper, we only use the year-on-year January collection because this collection is the most available and consistent through time.

We use the key stage[9] data at KS2 (aged 10/11) and KS4 (aged 15/16) to look at the pupil intake and pupil performance of the academies. We also use this key stage data to look at the pupil intake and pupil performance of the schools that we designate neighbouring schools. The KS2 data is available from the 1995/96 academic year. The KS4 data is available from the 2001/02 academic year.

Dataset Construction

[9] In England, compulsory education is organised around four key stages for eleven years of compulsory schooling from ages 5 to 16. These are key stage 1 (in years 1 and 2) and key stage 2 (years 3 to 6) in primary school; and key stage 3 (years 7 to 9) and key stage 4 (years (10 and 11) in secondary school.

In this paper, we analyse the secondary school performance of academies (and their neighbours) using their KS4 pupil performance data. However, a nice feature of the KS data is that it is possible to match the KS4 results of each pupil to their KS3 results (taken two years before) and KS2 results (taken five years before) provided that the pupil remains in a state-maintained school in England during this time. That is, for each pupil we match their KS4 results over the 2001/02 to 2008/09 academic years to their KS3 results over the 1999/00 to 2006/07 academic years to their KS2 results over the 1996/97 to 2003/04 academic years. We then match each pupil's school census data at KS4 to our matched KS4-KS3-KS2 dataset. However, one slight drawback is that we are not able to match pupils who are enrolled at independent schools because the NPD does not collect data from these schools. We have therefore taken the decision, in this paper, to only keep the pupils who have been matched at all three key stages.[10]

We are able to analyse the pupil-intake of the secondary schools by using the pupil year and the school identifier that is contained the pupil's school census data. This allows us to identify – for each year - the pupils that enter year 7 of secondary school. We are then able to look at the 'intake quality' of each secondary school – for each year - by matching their year 7 pupils to their KS2 results. That is, we match each pupil entering year 7 of a secondary school over the 2001/02 to 2008/09 academic years to their KS2 results over the 2000/01 to 2007/08 academic years.

However, the academy school treatment is at the school level rather than the pupil level. We therefore perform our analysis at the school-level for the main results of this paper.

[10] This means that pupils who transfer into, or out of, the state maintained sector from KS2 to KS4 are removed from our sample. The results are therefore of a localised nature, but given that we successfully match about 91 per cent of students across datasets and years the results are still likely to be representative to the majority of the population, and so extrapolation of the results to non-academy school pupils still seems reasonable.

In order to undertake the analysis at the level of the school, we use the school code information to collapse both the 'pupil-intake' dataset and the KS4-KS3-KS2 dataset to the level of each individual school. That is, the pupil-level data is collapsed to an average for each individual school. We then match both of these collapsed datasets to the school-level characteristics from the Edubase, School Performance Tables (SPT) and Annual School Census data sources using the school identifier. This produces a school-level KS4-KS3-KS2 dataset over the 2001/02 to 2008/09 academic years and a school-level pupil intake dataset over the 2001/02 to 2008/09 academic years. We keep only the yearly observations - for each school - that are matched to every source. We understand that that there are no differences in the calculation of any of these data sources across school types, and therefore a comparison across school types using the same data sources is appropriate in this instance.

One further issue concerns the schools that convert to academies. There are some examples where a number of schools combine to create one academy school. Where this occurs, we create one hypothetical pre-academy school. This adopts hypothetical characteristics that are a weighted-average – based on their student population at the time of the merge - of the characteristics of the merged schools.

Outcomes of Interest

The main focus of this paper is the impact of academy school conversion on their pupil intake and pupil performance. In addition to this, we also examine its impact on the pupil intake and pupil performance of neighbouring schools. In order to isolate the impact of an academy conversion on these outcomes, we define the academic year that the academy status is awarded as the first academic year that the academy school starts operating ('opens

for business'). We then use the academic year that the academy status is awarded (and the years after) as the base that we need to calculate the policy effect.

We investigate the impact of academy school conversion on their pupil intake and the pupil intake of neighbouring schools by looking at the KS2 performance of their pupils. This is calculated based on the average standardised KS2 total points score (with a population mean of zero and a standard deviation of one) of the pupils who enrol into year 7 of the academy/neighbouring school (the first year of secondary school).

We investigate the impact of an academy school conversion on its pupil performance and the pupil performance of neighbouring schools by looking at the KS4 performance of these pupils. The main measure of KS4 performance that we use in this paper is the average standardised proportion of pupils enrolled into the school who achieve the equivalent of five or more GCSEs at A*-C grade including English and Maths (with a population mean of zero and a standard deviation of one).

We define a 'neighbouring school' as any maintained secondary school that is within a 3-mile radius of a school that has been granted academy status over the 2001/02 to 2008/09 academic years. This classification of a 'neighbouring school' is somewhat arbitrary. However, this classification ensures that the distance between a neighbouring school and the relevant academy is both large enough to include a sufficiently large number of schools. The classification also ensures that the distance is small enough to include the schools that are the most likely to experience an academy effect. In order to isolate the impact of academy status on the performance of their neighbouring schools, we assume a discrete academy effect characterised by a single jump. We also define the year that a school first became a 'neighbouring school' as the first academic year that the relevant academy school opens. We

then use this year (and the years after) as the base that we need to calculate the policy effect on the neighbouring schools.

Modelling Approach

We use a school-level difference-in-difference method to estimate the impact of an academy school conversion on its pupil intake and its pupil performance. We use the same approach to identify its impact on the pupil intake and pupil performance of neighbouring schools. That is, we estimate the impact of the academy school conversion on its pupil intake and performance by comparing the average change in these outcomes, before and after conversion, relative to a set of control schools. Similarly, we estimate the impact of academy school conversion on the pupil intake and pupil performance of its neighbouring schools by comparing the average change in the performance of the neighbouring schools, before and after conversion, relative to a set of control schools. Using this method, we can exploit the variation in the degree of school autonomy – due to the award of academy school status – to isolate the impact on its pupil intake, its performance, the pupil intake of neighbouring schools and the pupil performance of neighbouring schools. In this approach, we assume a 'one-time effect' on the outcomes of interest. That is, we do not allow the estimated academy effect to be a function of time. The key parameter of interest is the difference in difference coefficient δ in the following equation:

$$y_{st} = \alpha_s + \alpha_t + \delta A_s * \text{PolicyOn}_{st} + \sum_{j=0}^{J} \lambda_{1j} X_{jst} + u_{1st} \quad (1)$$

where y denotes the outcome of interest for school s in year t, A is a dummy variable that is equal to 1 for every school in our treatment group and it is equal to 0 for every school in our control group; PolicyOn is a dummy variable equal to 1 for each school s in year t for the year, and the years after, the academy status has been awarded and it is otherwise equal to

zero, X denotes a set of control variables, α_s denotes school fixed effects, α_t denotes year fixed effects (included to take account of the year-by-year effects that common to all schools) and u is an error term.

In the second difference-in-difference method, we allow for cohort specific variations in the academy impact, δ_c, where c denotes the academy cohort.[11] This is shown in the following equation:

$$y_{st} = \alpha_s + \alpha_t + \sum_{c=1}^{7} \delta_c A_{sc} * PolicyOn_{st} + \sum_{j=0}^{J} \lambda_{2j} X_{jst} + u_{2st} \quad (2)$$

In the third difference-in-difference method, we allow for time of academy effects by placing schools awarded earlier and later academy status into different groups. We then estimate a separate δ coefficient for each group, δ_g, where g denotes the academy cohort group. The label 1 represents the earlier academy cohort group. The label 2 represents the later academy cohort group.[12] This is shown in the following equation:

$$y_{st} = \alpha_s + \alpha_t + \sum_{g=1}^{2} \delta_g A_{sg} * PolicyOn_{st} + \sum_{j=0}^{J} \lambda_{3j} X_{jst} + u_{3st} \quad (3)$$

Definition of Comparison Schools

In order to identify the causal impact of the academy conversion (school autonomy increase) on the outcomes of interest – in any of the above methods – we need to assume that the evolution of the outcomes of interest for the treatment group (in the absence of treatment) will behave in an identical manner as the control group. As already described in the discussion around Table 4, this is a problem in the case of academies because academy status has been awarded to many poorly performing problem schools. This means that a naive

[11] In doing so, we place every academy school (both before and after conversion) into a group according to the opening year of the academy. There are a total of seven academy cohorts in the treatment group.

[12] We have placed the first five cohorts of academies (both before and after conversion) into the earlier academy cohort group. We have placed the last two cohorts of academies (both before and after conversion) in the later academy cohort group.

comparison between academy schools and all other state-maintained schools is likely to suffer from significant selection bias. A related problem is that schools that go on to become academies may all share particular unobservable characteristics (e.g. they have a type of school ethos that is more in line with the academy model).

We believe that is possible to bypass both of these problems by comparing the outcomes of interest in academy schools to a specific, selected group of control schools. This group consists of state-maintained schools in our sample periods that go on to become academies after the sample periods end. That is, we define the treatment group as all academies (both before and after conversion) that gained academy status over the 2001/02 to 2008/09 academic years. We define the control group as all state maintained schools that were approved, prior to the Academies Act 2010, to become academies after the 2008/09 academic year.

To obtain an unbiased estimate of the impact of academy status on the outcomes of interest, we need two crucial assumptions to hold. Firstly, we need there to be no effect of the treatment group on the control group. In other words, we need to be able to rule out the possibility of any academy having an impact on any school that is in the control group. This is known as the no spillovers assumption. Secondly, we need the evolution of the outcomes of interest for the treatment group (in the absence of treatment) to behave in an identical manner as the control group.

The feasibility of the zero spillover assumption could depend on the distance between the academies in the treatment group and the schools that make up the control group. In this paper, the median distance between the academies (treatment group) and the future academies (control group) is one-hundred and seventy-one kilometres. We believe that the median

distance between the treatment group and the control group is sufficiently large to mean that any academy effect (if any) on the future academies is likely to be small. However, this is difficult to formally test. To take account of the possibility that there may be a spillover effect influencing the reported results, we perform a robustness check in section 5 below that reduces the sample of control schools by excluding the schools that are located particularly close to an academy school in the treatment group. More specifically, we reduce the sample of control schools by excluding any school from the control group that is within three kilometres of an academy school in the treatment group. This has the effect of reducing the sample of control schools by ten per cent. We then use the reduced sample of control schools as a robustness check. This robustness check will allow us to get a feel for the potential size of any spillover effect. That is, if we find that this robustness check has little effect upon the estimated academy effect then this suggests that the impact of (any) spillover effects – between the treatment and control group - is minimal.

To assess the likelihood of the 'identical evolution', or common trends, assumption holding, we first look at the pre-treatment mean characteristics of the schools in the treatment group compared to the schools in the control group. These balancing tests offer an important check of our research design. In Table 5 (Panel A), we show the mean pre-treatment school-level characteristics of the current academies compared to the same mean school-level characteristics of the future academies over the 2001/02 to 2007/08 period. We also report the results of a difference in means test with clustered standard errors at the school level. They show that, prior to treatment, the average school level characteristics of the current academies are very similar to the average school level characteristics of the future academies. For example, out of the eleven estimated differences in these school-level characteristics, we find

that there is only one significance difference (at the 5% level of significance) between the current academies compared to the future academies. The one significant difference between the current academies compared to the future academies is that the pre-treatment current academies seem to enrol a significantly higher proportion of non-white pupils compared to the future academies.

The results from Table 5 (Panel A) are encouraging. However, we believe that it is possible to do better. This can be achieved by performing two balancing procedures that will increase the similarity of the schools in the treatment group and the schools in the control group. Firstly, we exclude any school from either the treatment group or the control group that has missing observations or gaps in our dataset over the 2001/02 to 2008/09 period. In practice, this means that we have complete data for every school in either our treatment group or our control group for every academic year in the 2001/02 to 2008/09 period. It also means that there must be a predecessor school with full data for all of the schools in either the treatment group or the control group.[13] This procedure prevents our results from being distorted by missing observations or gaps. Secondly, we adopt a propensity score matching strategy on the balanced panel of schools in the treatment group and the control group. That is, we estimate the propensity score[14] for being a current academy for both the treatment schools and the control schools using the pre-treatment characteristics. We then use the propensity score for each school in each year to calculate kernel weights for each school using

[13] This has the effect of excluding any academy school that was previously an independent school because we have no pre-academy data for such schools. We also exclude any new academy for similar reasons.

[14] This uses relevant pre-treatment observable characteristics – such as the proportion of pupils eligible for free school meals (we report the result in Appendix Table A1) - to estimate the propensity score (or likelihood) of each school becoming an academy in our sample period. This is estimated using a logit specification.

a kernel matching method.[15] The aim of this approach is to balance the distribution of the pre-treatment X characteristics for the treatment and control schools.

In Table 5 (Panel B), we report the same mean pre-treatment school-level characteristics for the matched current academies compared to the matched future academies (using their kernel weights) over the 2001/02 to 2007/08 period. The Table shows that, prior to treatment, our matching strategy appears to achieve the aim of balancing the distribution of the pre-treatment X characteristics in the treatment and control schools. That is, there are no significant differences in the reported pre-treatment characteristics of the matched treatment group compared to the matched control group. Given this result, we believe that the 'identical evolution' assumption is more likely to hold if we use the matched treatment group and the matched control group. We do, however, show results based on the unmatched comparison in the robustness tests we consider after the main results.

To further assess the likelihood of the 'identical evolution' assumption holding, we look at whether the matched current academies and the matched future academies experience different pre-reform time trends in either the mean KS2 total points score of their year 7 intake or the proportion of their pupils who achieve the equivalent of five or more GCSEs at A*-C grade including English and Maths. We also look at whether there are any (systematic) differences in either the mean KS2 total points score of their year 7 intake or the proportion of pupils who achieve the equivalent of five or more GCSEs at A*-C grade including English and Maths for the matched current academies compared to the matched future academies in any of the pre-treatment periods.

The results from both of these methods are reported in Table 6. Panel A presents the results from a linear trend model. The estimated coefficient on the interaction of the time

[15] This uses an Epanechnikov function with a constant bandwidth.

trend with the current academy indicator indicates whether there is a significant difference in the pre-treatment time trend in the KS2 test scores of the matched current academies compared to the matched future academies. The column (1) estimate shows an insignificant trend difference in the KS2 test scores of the year 7 intake in the pre-treatment years.

If we look at the pre-treatment KS4 performance of the matched current academies compared to the matched future academies (in column (2)), we also see no significance difference in the time-trend in the KS4 performance for the matched current academies compared to the matched future academies.

Panel B of Table 5 presents the results of a model that compares the level of our outcomes of interest through time. It shows that there is no significant difference between the matched current academies and the matched future academies in the pre-treatment levels (in any pre-treatment period) for either KS2 test scores of their year 7 intake or the KS4 performance of their pupils. In Panel B, we also report the results of an F-Test that looks at whether the interaction terms in Panel B are jointly equal to zero. The results of the F-Test (for both outcomes of interest) show that we cannot reject the hypothesis that the interaction terms are jointly equal to zero – this further supports the conclusion that there is no significant pre-treatment difference between our matched current academies and our matched future academies.

We believe these results to be convincing and strongly validate our comparison group of schools. The results show that the pre-treatment matched current academies and matched future academies have very similar observable characteristics. They are also very similar in both their pre-treatment trends and their pre-treatment levels in the outcomes of interest. This suggests that the matched future academies are a suitable control group for the matched

current academies. To estimate the difference in difference models described above in equations (1)-(3) we use the kernel weights to obtain estimates of the impact of an academy school conversion on its pupil intake and its pupil performance.[16] We also adopt a similar procedure to estimate the impact of an academy school conversion on the pupil intake and pupil performance of neighbouring schools.

4. Empirical Results

In this section, we report estimates of the impact of the academy school conversion on its pupil intake and its pupil performance using the approach that we outlined in section 3.

Academies and Pupil Intake

In Table 7, we investigate whether an academy school conversion has an impact on the pupil-intake of the school. We track the pupil-intake quality of each school over the 2001/02 to 2008/09 period by using the average standardised KS2 total points score of their year 7 pupils. This Table uses four different specifications to report estimates of the impact of academy status on its pupil intake. We begin with the raw difference-in-difference in column (1). We add time-varying controls in column (2). In column (3), we estimate heterogeneous effects for different cohorts of academies, and in column (4), we place the first five academy cohorts from the treatment group into an early group and we place the remaining two academy cohorts of academy school into a late group. We then estimate a separate academy effect for each group.

The estimated coefficients in the Table show that there has been a significant increase in the KS2 test scores for the year 7 pupils who have enrolled into an academy. This suggests

[16] We estimate the academy effects using a sample that consists of 102 current academies and 97 future academies. This is all the current academies and future academies that are left after the dataset has been constructed in the way we have outlined and the balancing procedures have been completed.

that (on average) the schools that convert to academies experience a sharp and significant increase in the 'quality' of their pupil intake at year 7. Column (1) shows the key stage 2 total points score of the year 7 pupils enrolled into an academy is 0.224 standard deviations higher due to the academy conversion. The intake quality (on average) significantly increases by 0.202 standard deviations when we add the controls in column (2). The estimates in columns (3) and (4) show that the quality of intake measured by primary school test scores seems to have increased by more in the earlier academy conversions. In column (4), the 'early' cohort conversions (cohorts 1 to 5, in school years 2002/3 to 2006/7) saw an increase in the KS2 performance of their year 7 intake by 0.311 standard deviations, as compared to an increase of less than one-third of that (0.103 of a s.d.) in the 'later' conversions (cohorts 6 to 7, in school years 2007/8 to 2008/9).

These results suggest that (on average) there has been a step-change in the pupil intake of schools when they convert to academy status. Such schools are attracting and admitting higher ability pupils once they convert to academy status. One interpretation of these results is that higher ability pupils may be substituting away from other schools to the academy schools. If this is the case, then we believe that this substitution will generate a more pronounced impact on the neighbouring schools (given the closeness in proximity). This highlights the importance of checking for any external effects from the academies to their neighbouring schools.

Academies and Pupil Achievement

We next consider whether an academy school conversion has an impact on the KS4 performance of its pupils. This is considered in Table 8. The Table is set-up in the same way as Table 7 except that is has an additional column. Column (1) shows that an academy school

conversion increases the proportion of their pupils who achieve the equivalent of five or more GCSEs at A*-C grade including English and Maths by an insignificant 0.095 standard deviations. This (average) performance effect changes to an insignificant 0.071 standard deviations with the addition of the controls in column (2). The estimates in column (3) and (4) reveal a striking finding. They show that the performance improvements due to the academy conversion are substantially higher in the earlier academy conversions. In column (4), the 'early' cohort conversions saw an increase in their KS4 performance by a statistically significant 0.181 standard deviations, as compared to the 'later' cohort conversions that saw a decrease in their KS4 performance by an insignificant of 0.029 standard deviations. In column (5), we check whether these performance improvements can be (at least partially) explained by the academies admitting a pupil intake with higher ability. That is, we make use of the KS2 test scores of the pupils who are now taking their KS4 exams by including their average KS2 standardised total points score as an additional control. We see that the performance improvements for the early cohort conversions remain after we take account of the KS2 test scores of these pupils. That is, the performance improvements cannot be explained by the increased prevalence of higher ability pupils in the academies.

The results of Table 8 suggest that KS4 performance has significantly improved for the earlier cohorts that convert to an academy school. On average, there seems to be an increase the proportion of pupils who achieve the equivalent of five or more GCSEs at A*-C grade including English and Maths by 0.181 standard deviations for the 'early' cohort conversions. These performance improvements are not trivial. It reflects a performance improvement of approximately 16% in the average pre-treatment baseline for the early cohort

academy conversion. They are also broadly consistent with the Hoxby and Muraka (2009) results on charter schools.[17]

Variation by Pre-Academy School Type (Autonomy Distance)

In this section, we exploit the fact that five different types of secondary school in the state-maintained sector have converted to an academy school. The managing/governing body in each of these five different school types (prior to the academy conversion) possess different degrees of autonomy (see Table 1). This means that that the amount of autonomy that each type of school gains by converting to an academy will vary. In Table 9, we show the type of English secondary school that converts to an academy. However, unlike Table 3, this is only shown for the current academies (cohort 1 to cohort 7) and future academies (cohort 8 to cohort 10) that remain after the balancing processes have been completed.

To consider differences by 'autonomy distance' we amend the earlier difference-in-difference method, allowing the different types of school that convert to academies to have different δ coefficients. That is, we place the different school types that convert to academies (see Table 3) into separate groups. We then use these pre-academy type groups to estimate a separate δ coefficient for each group, where δ_d denotes the 'autonomy distance' associated with an academy conversion from the five different predecessor school types.[18] This is shown in the following equation:

$$y_{st} = \alpha_s + \alpha_t + \sum_{d=1}^{5} \delta_d A_{sd} * \text{PolicyOn}_{st} + \sum_{j=0}^{J} \lambda_{4j} X_{jst} + u_{4st} \qquad (4)$$

[17] Once you take account of the fact that the Hoxby and Muraka estimates are per year spent at the charter school.

[18] We have placed the academies (both before and after conversion) into five pre-academy type groups: a CTC group, a voluntary aided school group, a foundation school group, a voluntary controlled school group and a community school group. We are not able to calculate a separate δ coefficient for the independent schools that convert to academies because we have no pre-conversion data on independent schools.

Finally, we allow for heterogeneity by both autonomy distance and early/late academy conversion.[19] This is shown in the following equation:

$$y_{st} = \alpha_s + \alpha_t + \sum_{dg=1}^{10} \delta_{dg} A_{sdg} * \text{PolicyOn}_{st} + \sum_{j=0}^{J} \lambda_{5j} X_{jst} + u_{5st} \quad (5)$$

where dg denotes a group that reflects both the pre-academy type group and the early/late academy cohort group.

In Table 10, we show coefficient estimates from equations (4) and (5). In column (1) and column (2), we look at the impact of an academy conversion on the quality of the pupil-intake of the school. In column (3), column (4), column (5) and column (6) we look at the impact of an academy school conversion on the KS4 performance of their pupils.

The Table shows there to be considerable variation in the estimated academy effect for the different types of schools that convert to academies. In column (1), we see that (on average) there are sharp significant increases in intake quality for the voluntary aided schools, voluntary controlled schools and the community schools that convert to an academy school. However, there is also (on average) a significant reduction in the intake quality for the CTCs that convert to an academy school. In column (2), we also see that there is considerable variation in the estimated effects for the early cohort conversions compared to the later cohort conversions within each school type that has converted to an academy. However, it is important to bear in mind that many more community schools convert to an academy school compared to the numbers from other types of academy school conversions. This means that it will (largely be) the community school conversions that are driving both the overall increase

[19] We have placed the academies (both before and after conversion) into ten groups that reflect both the pre-academy type group and the academy cohort group: an earlier CTC group; a later CTC group; an earlier voluntary aided school group; a later voluntary aided school group; an earlier foundation school group; a later foundation school group; an earlier voluntary controlled school group; a later voluntary controlled school group; an earlier community school group and a later community school group.

in the KS2 test scores of the pupil intake and the more pronounced increase in the pupil-intake quality for the earlier cohort conversions.

In column (3), we see that (on average) the community schools that convert to academies have experienced a significant increase in the KS4 performance due to the academy conversion. There are no significant performance improvements (on average) in any of the other types of schools that convert to an academy. It is of interest that these effects remain after we control for the KS2 results for these pupils (as shown in column (4)).

Column (5) shows that (on average) it is only the early voluntary controlled schools and the early community schools that have experienced a significant improvement in the performance of their pupils due to the academy conversion. However, it is again important to bear in mind the numbers of early community schools that have converted to an academy school compared to the other types of schools that convert to an academy. This again means that it will (largely be) the early community school conversions that are driving the overall performance improvements for the early cohort academy conversions. In column (6), we see that these effects remain after we control for the KS2 results of these pupils.

The results of Table 10 reveal an important finding in terms of the overall interpretation of our results. They suggest that the schools that experience the largest increase in the amount of their school autonomy due to the academy conversion (see Table 1) – voluntary controlled schools and community schools – experience the greatest performance improvements due to the academy conversion. Such schools gain responsibility for the majority of the curriculum of the school (except the core subjects: English, Maths, Science and IT); the structure and length of the school day; selection of up to 10% of their pupil-intake; the school budget and all staffing decisions (in the case of community schools that

convert to academies). In addition to this, we also find a similar relationship between the size of the school autonomy increase (due to the academy conversion) and its impact on the quality of its pupil intake in year 7. We are reluctant to draw strong conclusions from the results from column (2) and column (5) because most of the estimates are based on only a relatively small number of schools. Nonetheless, we believe that the variation in the estimated academy effects across the different school types is interesting and they do suggest that the schools that gain the largest increase in autonomy experience the greatest increase in their pupil quality and the greatest increase in their pupil performance.

5. Robustness Checks

In this section, we appraise the sensitivity of our results on the impact of an academy conversion on their pupil intake and pupil performance. It is important to test the robustness of the estimated academy effects that we report in the previous section to see if they can be explained by other factors and that they are not necessarily due to an academy school conversion. Results from a barrage of tests of robustness are therefore reported in Table 11. In all cases, we compare the estimates to our original specification when we estimated equation (3), which produced the results that are reported in Tables 7 and 8, column (4). For convenience, we re-report these results in column (1) of Table 11. In Panel A, we report the robustness tests when the dependent variable is the KS2 standardised total points score for the pupil who enrol into year 7 of each school in each year. In Panel B, we report the robustness tests when the dependent variable is the standardised proportion of pupils who achieve the equivalent of five or more GCSEs at A*-C grade including English and Maths for each school in each year.

The first robustness test, which is displayed in column (2) of table 11, considers the definition of treatment and control schools. Throughout the analysis to date, we have used a treatment group that consists of all seven cohorts of academies that have actually become academies before our sample period ends. Similarly, we have used a control group that consists of state-maintained schools in our sample periods that have been given final approval (prior to the Academies Act 2010) to become academies after our sample period end. It is therefore important to check the sensitivity of our results to a definition of the treatment and control schools that is based on the end year of our sample period, which in this case is the 2008/09 academic year. That is, we reduce the sample period year end by one year and this has the effect of switching the cohort 7 academies from the treatment group to the control group.[20] This is an indirect test of the sensitivity of the results to a definition of the treatment group and a control group that is determined by the end of our sample period that may not be representative of other years that could have been the end of our sample period. When we adopt this approach, the effect is to reduce the δ coefficients for the early cohort conversions in both Panel A and Panel B. In both cases, however, the estimated δ coefficients remain significantly different from zero. This is reversed when we look at the δ coefficients for the later cohort conversions. That is, they increase but remain insignificant.

In column (3), we present the estimates of the δ coefficients where we reduce our sample of control schools (future academies) by 10%. This has the effect of removing all schools in our control group that are within 3km of the treatment group. The procedure is an indirect way of looking at the potential size of any spillover effects from the treatment group to the control group. The Table shows that this has little impact on either the size or the significance of the estimated δ coefficients.

[20] All other cohorts of academies remain in the same treatment/control group and early/late cohort group.

We conduct a falsification test in column (4) and column (5). This is a test of whether the estimated δ coefficients reflect unaccounted pre-existing differences in the outcomes of interest for our treatment group compared to our control group. To do this falsification exercise, we alter the year in which each cohort of academy school became an academy to that of an earlier time period. We then re-estimate equation (3) but calculate the δ coefficients based on the 'fake' year in which the schools convert to academies. If the δ coefficients in this falsification exercise give similar results to that of our original specification then the implied results of our original specification can largely be accounted for by unaccounted pre-existing differences in the outcomes of interest. To avoid any contamination when schools actually convert to academies and when their 'fake' conversion occurred it is necessary (for each school) for there to be no overlap between their fake post-academy years and their actual post-academy years. This means that we have to shorten the post-treatment fake periods for the first two academy cohorts. It is also necessary for there to be observational points in at least one 'fake' pre-academy year. We have KS2 data from the 1995/96 academic year. This means we have year 7 intake data with matched KS2 results from the 1996/97 academic year. We therefore use the 1996/97 academic year as the first 'fake' pre-academy year. However, because the KS4 performance data that we use in our original specification only begins in the 2001/02 academic year, we use a comparable performance measure taken from the school performance tables for these falsification tests. This allows us to perform the falsification test over the same periods for both Panel A and Panel B. We conduct the falsification exercise over the eight year period between the 1996/97and 2003/04 academic years.

The actual structure of the falsification test in shown in the Appendix Table A2. It shows for each academy school cohort the years in which the 'fake' academy conversion

occurs compared to what actually happens. We then use this set-up to estimate δ coefficients using these fake policy years (as shown in Appendix Table A2) to re-estimate equation (3). In column (4) of Table 11, we see that the estimated δ coefficients are close to zero and become statistically insignificant. In column (5), we take account of the fact that the introduction of CTC schools during this fake-policy period may contaminate our results by dropping former CTC schools from both the treatment group and the control group. This has little impact on the significance of the estimated δcoefficients, which remain small and insignificant.

In column (6) and column (7) we revert back to our original sample period, however, we alter the modelling approach that we adopt to estimate equation (3). In column (6), we estimate equation (3) without any weighting and estimate the academy effect by comparing the unmatched current academies to the unmatched future academies. In column (7), we estimate the likelihood of being a current academy for our treatment group and control group using a non-linear probit model (as opposed to a logit model that is used in the original specification) using the same controls as our original specification. We then proceed with the same kernel matching method as the original specification. Both of these procedures have little impact on either the size or the significance of the estimated δcoefficients.

In column (8), we look at whether our estimated academy effects hold if we use similar dependent variables and are not specific to the dependent variables that we have chosen to use in our original specification. In Panel A, we change the dependent variable to the KS2 standardised mean points score for the pupils who enrol into year 7 of each school in each year. In Panel B, we investigate the idea that the performance improvements that we observe in our original specification are largely being drive by performance improvements in unconventional subjects. To investigate whether or not this is occurring we change the

dependent variable in Panel B to the standardised proportion of pupils who achieve five or more GCSEs at A*-C grade including English and Maths for each school in each year. That is, we drop the equivalent term that is used in the original specification and have a specific requirement that they are actually GCSEs. The column shows that changing the dependent variables that are used in Panel A and Panel B has little impact on either the size or the significance of our estimated δ coefficients.

Finally, in column (9), we compare the short-term academy effects for the early cohort conversions compared to the later cohort conversions. That is, we restrict the post-academy periods for each academy school so that there is a maximum of one post-academy period. For example, we estimate the academy effects for an academy school that opens in the 2005/06 academic year using all pre-treatment periods (in this case, 2001/02 to 2004/05) but only one post-treatment period (in this case, 2005/06 only). We then use this approach to compare the short-run academy effects for the early academy cohort conversions compared to the later academy cohort conversions. This can be thought of as an indirect test of whether the difference in the estimated effects for the early cohort conversions compared to the later cohort conversions is (largely) due to the early cohort academies operating (as academies) for a longer amount of time. That is, if we find that the estimated short term academy effects for the early academy cohort conversions are similar to the estimated short term academy effects for the later cohort conversions then this would suggest that the estimated academy effects are a function of time. In Panel A, we see that the estimated short term academy effects on their pupil intake are different for the early academy cohort conversions compared to the later academy cohort conversions. The sharp significant increase in the pupil-intake quality for the early academy cohort conversions occurs in the short term, where as there is no sharp

significant increase in the pupil-intake quality in the later academy cohort conversions in the short term. This suggests that the early academy cohort conversions experience a change in their pupil-intake quality in the short term that is different to the short term change in the pupil-intake quality of the later academy cohort conversions. In essence, this suggests that the reported changes to the pupil-intake quality in our original specification are not due to a function of time and we therefore cannot be confident that the later academy cohort conversions will experience (if given more time) a similar increase in their pupil-intake quality. In Panel B, we see that the estimated short term academy effects on their pupil performance for the early academy cohort conversions compared to the later academy cohort conversions are similar in both their size and their significance. This suggests that the early academy cohort conversions experience a change in their pupil performance in the short term that is similar to the short term change in the pupil performance of the later academy cohort conversions. In essence, this suggests that the reported changes to the pupil performance in our original specification are likely to be due to the increased operating time of the early academy cohort conversions. We are therefore (reasonably) confident that the later academy cohort conversions will experience (if given more time) a similar increase in their pupil performance.

To summarise, the results of Table 11 show our results to be highly robust to a number of checks. These include: altering the definition of the treatment and control schools by using a different period to end our sample; removing schools from the control group that are within 3km of a school in our treatment group (such schools are likely to be particularly susceptible to spillover effects from the treatment group to the control group); a falsification test; a

change in the modelling approach that we adopt and also to a change in the dependent variable. We are therefore confident that the results from our original specification are robust.

6. External Effects on Neighbouring Schools

In this section, we report estimates of the impact of academy school conversion on the pupil intake and the pupil performance of neighbouring schools using the approach that we outlined in section 3. There are no strong *a priori* predictions from economic theory regarding the likely impact of academies on the pupil intake and the pupil performance of their neighbouring schools. On the one hand, there may be beneficial pupil intake effects, which stem from neighbourhood compositional changes due to the introduction of an academy school into a specific area, and there may be beneficial performance effects, which stem from increased choice/competition and also from the sharing of academy school facilities (and expertise) with the wider community (Curtis, 2008). On the other hand, there may be detrimental pupil intake effects, which stem from a changing pupil-intake in academy schools that are experiencing significant increases in their intake quality (see Table 7), and there may also be detrimental performance effects, which stem (again) from the changing pupil-intake quality in academy schools and also from a teacher recruitment policy in academies that targets some of the most talented teachers in their neighbouring schools.[21] It therefore becomes an empirical question as to which of these effects dominate, and we formulate our tests in this light.

[21] It is thought that teachers will be drawn in the academy schools due to the higher remuneration packages on offer (National Audit Office 2007). We find results that (on average) teachers in academies get paid 13% more than teachers in other state-maintained secondary schools.

Neighbouring Schools and Pupil Intake

In Table 12 we investigate whether or not an academy school conversion has an impact on the pupil-intake of neighbouring schools. The results in the Table use six different specifications to report estimates of the impact of an academy school conversion on the pupil intake of neighbouring schools. We begin with the raw difference-in-difference in column (1). We add time-varying controls in column (2). In column (3), we take account of the fact that different cohorts of academies experience different treatment doses. That is, we calculate a separate estimate for each of the seven cohorts of neighbouring school in our treatment group. In column (4), we place the first five cohorts of neighbouring school into an early group and we place the remaining two cohorts of neighbouring school into a late group. In column (5), we place each neighbouring school into a group that reflects the pre-academy type of the academy school that originally made them a neighbouring school. Finally, in column (6), we place each neighbouring school into a group that reflects both the pre-academy type of the academy that originally made them a neighbouring school and the early/late group that they belong.

The estimated coefficients in the Table show that (on average) there has been a significant decrease in the KS2 test scores for the year 7 pupils who have enrolled into the neighbouring schools. This suggests that (on average) the schools that are neighbours to schools that convert to an academy school experience a sharp and significant decrease in the 'quality' of their pupil intake at year 7. More specifically, the estimates suggest that higher ability pupils are substituting away from the neighbouring schools to the academy school. Column (1) shows that the key stage 2 total points score of the year 7 pupils enrolled into a neighbouring school is (on average) a significant 0.037 standard deviations lower due to the

academy conversion. The intake quality (on average) significantly reduces by 0.038 standard deviations when we add the controls in column (2). The estimates in column (3) show that the quality of intake measured by primary school test scores seems to have behaved in a (broadly) similar way across the different cohorts of neighbouring school. In column (4), the 'early' neighbouring schools (cohorts 1 to 5, in school years 2002/3 to 2006/7) saw a reduction in the KS2 performance of their year 7 intake by a marginally significant 0.033 standard deviations, as compared to a significant reduction of 0.050 standard deviations in the 'later' neighbouring schools (cohorts 6 to 7, in school years 2007/08 to 2008/09). Column (5) shows there is some variation in the estimated academy effects. We see that there has been a significant decrease in the intake quality in the schools that are neighbours to either foundation schools that convert to an academy or community schools that convert to an academy. In column (6), we also see that there is some variation in the estimated academy effects for the early cohort conversions compared to the later cohort conversions within each school type that converts to an academy school. The column shows the overall significant decrease on quality of the intake in neighbouring schools is largely being driven by early cohort academy conversions that were previously community schools; later cohort academy conversions that were previously foundation schools; later cohort academy conversions that were previously voluntary aided schools and later cohort academy conversions that were previously a CTC school.

Neighbouring Schools and Pupil Performance

Finally, we look at whether an academy school conversion has an impact on the KS4 pupil performance of neighbouring schools. This is considered in Table 13, which is set-up in the same as way as Table 12. Column (1) shows that an academy school conversion (on

average) has an insignificant impact on the performance of neighbouring schools. This is largely unchanged with the addition of the controls in column (2). The estimates in column (3) shows that pupil performance measured by the proportion of pupils achieving the equivalent of five or more GCSEs including English and Maths is substantially higher in the neighbouring schools due to the early cohort academy conversions compared to the pupil performance in the neighbouring schools due to the later cohort academy conversions. In column (4), the 'early' neighbouring schools (cohorts 1 to 5, in school years 2002/03 to 2006/07) saw an increase in the KS4 performance of their pupils by a significant 0.054 standard deviations, as compared to a significant reduction of 0.091 standard deviations in the KS4 performance of 'later' neighbouring schools (cohorts 6 to 7, in school years 2007/08 to 2008/09). In column (5) and column (6), we see that there is some variation in the estimated academy effects both across and within academy schools depending on their pre-academy type. We see that there have been significant improvements in the KS4 pupil performance in the schools that are neighbours to either early academy cohort conversions that were previously community schools or early academy cohort conversions that were previously voluntary aided schools. However, there have been significant reductions in the KS4 pupil performance in the schools that are neighbours to later academy cohort conversion that were previously community schools; later academy cohort conversions that were previously voluntary controlled schools; later academy cohort conversions that were previously foundation schools or later academy cohort conversions that were previously a CTC.

Table 13 shows that it is possible for neighbouring schools to experience significant improvements in their KS4 performance despite the reduction in the 'quality' of their pupil intake. That is, the beneficial performance effects, which stem from increased

choice/competition and also from the sharing of the academy school facilities (and expertise) with the wider community (Curtis 2008), seem to outweigh the detrimental effects, which stem from the increased pupil intake quality in academy schools (and the corresponding reduction in the pupil-intake quality in the neighbouring schools) and also from a teacher recruitment policy in academies that targets some of the most talented teachers in their neighbouring schools.

A logical question to ask (given this result) is why is it occurring? There is a strong relationship between the KS4 performance improvements in the academy schools and the KS4 performance improvements in the neighbouring schools. We do not believe that this is a coincidence: it suggests that it is possible for performance improvements in an academy to generate beneficial effects on their neighbouring schools. This seems likely to have come via the increased choice/competition mechanism that has scope to deliver significant positive external effects from academy conversion.

6. Conclusions

In this paper, we study a high profile case – the introduction of academy schools into the English secondary school sector – that has allowed schools to gain more autonomy and flexible governance by changing their school structure. We consider the impact of academy school conversion on their pupil intake and pupil performance. In addition to this, we also examine a possible external effect operating through an impact on the pupil intake and pupil performance of neighbouring schools.

The gradual introduction of academy schools has been a controversial area of schools policy ever since the first clutch of academies opened in September 2002. On one side of the

debate on academies – and more generally on the policy of granting schools more autonomy – you will find fierce supporters who passionately believe that academies (increased autonomy) will sharpen economic incentives for all staff to do better. In addition to this, it will also allow the school to pursue innovative schooling policies that drive up the educational attainment of their pupils. On the other side of the debate on academies – and more generally on the policy of granting schools more autonomy – you will find fierce critics who campaign against the policy of academies because they believe that it will not work and that they are a way of (implicitly) privatising the education system in England – leading to increased social segregation. In this paper, we have attempted to offer some robust evidence that can be informative for resolving this dispute.

We bypass the selection bias that is inherent in the previous evaluations of academy schools by comparing the outcomes of interest in academy schools to a selected group of comparison schools. This group consists of a matched sample of state-maintained schools that go on to become academies after our sample period ends. This approach allows us to produce a well-balanced treatment and control group. We then estimate the impact of an academy conversion on our four outcomes of interest – the pupil intake in academy schools; the pupil performance in academy schools; the pupil intake in neighbouring schools; and the pupil performance in neighbouring schools – by comparing the average change in these outcomes (before and after the academy conversion) relative to our selected group of comparison schools. Using this method, we can exploit the variation in the degree of school autonomy – due to the academy conversion – to isolate the impact on our four outcome of interest.

Our results suggest that (on average) schools respond to being granted increased autonomy (through the academy conversion) by sharply increasing the 'quality' of their pupil-

intake at year 7. However, this result is (largely) driven by the early cohorts of schools that converted to an academy school. In addition to this, we also find results showing that only the early cohorts of schools that convert to academies experience significant performance improvements. However, we believe that the performance improvements are a function of time and have scope to be replicated in later cohorts of schools that convert to an academy if they are given more time. Both of these results have been subject to a number of robustness checks and are strongest for the schools that experience the largest increase in the degree of their school autonomy (resulting from the academy conversion).

When we look at external effects on neighbouring schools, our results suggest that (on average) neighbouring schools experience a sharp and significant decrease in the 'quality' of their pupil intake at year 7. This estimated academy effects on the pupil intake 'quality' in neighbouring schools is (broadly) consistent across different cohorts of neighbouring school. In addition to this, we also find that it is possible for neighbouring schools to experience significant improvements in their pupil performance despite the reduction in the 'quality' of their pupil intake. This seems to occur (mainly) in the neighbours of academy schools that experience large significant improvements in their pupil performance. We do not believe that this is a coincidence: it suggests that it is possible for performance improvements in an academy to generate significant beneficial external effects on their neighbouring schools.

In essence, these results paint a (relatively) positive picture of the academy schools that were introduced by the Labour government of 1997-2010. In further work, we plan to carefully appraise whether the benefits of an academy school conversion outweigh the costs.

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Table 1 - Typology of English Secondary Schools

	Characteristics of School Governance				
	Non-LEA Admissions Authority	Majority Sponsor Appointed Governing Body	Maintained by Non-LEA	Governing Body responsible for most School policies	Fee-Charging
Registered independent school[a]	✓	✓	✓	✓	✓
Academy school[b]	✓	✓	✓	✓	×
City Technology College[c]	✓	✓	✓	×	×
Voluntary aided school[d]	✓	✓	×	×	×
Foundation school[e]	✓	×	×	×	×
Voluntary controlled school[f]	×	×	×	×	×
Community school[g]	×	×	×	×	×

Notes:

a - Registered independent schools are independent of the Local Education Authority (LEA), and are fee-charging.

b - Academy schools are all ability independent specialist schools, which do not charge fees, and are not maintained by the Local Education Authority (LEA). Academies only follow the national curriculum in English, Maths, Science and ICT [DfES, 2007]. They are established by Sponsors from business, faith or voluntary groups, who work in partnership with central government. Sponsors and the DfE provide the capital costs for the Academy. Running costs are met by the DfE in accordance with the number of pupils, at a similar level to that provided by LEAs for maintained schools serving similar catchment areas.

c - City Technology Colleges are all ability independent schools, which do not charge fees, and are not maintained by the Local Education Authority (LEA). Their curriculum has a strong technological, scientific and practical bias (in addition to following the national curriculum) [see Whitty et al., 1993]. They are established by Sponsors from business, faith or voluntary groups, who work in partnership with central government. Sponsors and the DfE provide the capital costs for the CTC. Running costs are met by the DfE in accordance with the number of pupils, at a similar level to that provided by LEAs for maintained schools serving similar catchment areas.

d - Voluntary aided schools are maintained by the Local Education Authority (LEA). The foundation (generally religious) appoints most of the governing body. The governing body is then responsible for admissions, employing the school staff, and the foundation will normally own the school's land and buildings (apart from the playing fields which are normally owned by the LEA).

e - Foundation schools are maintained by the Local Education Authority (LEA). The foundation (generally religious) appoints some – but not most – of the governing body. The governing body is then responsible for admissions, employing the school staff, and either the foundation or the governing body will own the school's land and buildings.

f - Voluntary controlled schools are maintained by the Local Education Authority (LEA). The foundation (generally religious) appoints some – but not most – of the governing body. The LA continues to be the admissions authority. The governing body will employ school staff, and the foundation will normally own the school's land and buildings (apart from the playing fields which are normally owned by the LEA).

g - Community schools are maintained by the Local Education Authority (LEA). The LEA is responsible for admissions, employing the school staff, and it also owns the school's land and buildings.

Table 2 - Introduction of Academy Schools, 2001/2-2008-9

	Number (Percent) of Schools by Type							
	2001/2	2002/3	2003/4	2004/5	2005/6	2006/7	2007/8	2008/9
Academy school	0 (0.0)	3 (0.1)	12 (0.4)	17 (0.5)	27 (0.9)	46 (1.5)	83 (2.7)	130 (4.3)
City Technology College	15 (0.5)	15 (0.5)	14 (0.5)	14 (0.5)	11 (0.4)	10 (0.3)	5 (0.2)	3 (0.1)
Voluntary aided school	510 (16.2)	514 (16.5)	517 (16.7)	523 (16.8)	519 (16.8)	512 (16.7)	517 (16.6)	508 (16.7)
Foundation school	499 (15.8)	499 (16.1)	501 (16.2)	502 (16.1)	546 (17.7)	548 (17.9)	657 (21.1)	726 (23.9)
Voluntary controlled school	97 (3.1)	96 (3.1)	95 (3.1)	95 (3.1)	89 (2.2)	87 (2.8)	85 (2.7)	82 (2.7)
Community school	2030 (64.4)	1982 (63.8)	1959 (63.2)	1958 (63.0)	1891 (61.3)	1857 (60.7)	1764 (56.7)	1594 (52.4)
Total	3151	3109	3098	3109	3083	3060	3111	3043

Notes: Source – School Performance Tables.

Table 3 – Typology of Academy Conversions

	Pre-Academy Type						
	New Academy Schools	Independent School	City Technology College	Voluntary Aided School	Foundation School	Voluntary Controlled School	Community School
All Academies (Cohorts 1- Cohorts 10)	12	5	12	17	35	3	158
Cohort 1 Academies	0	0	0	1	0	0	2
Cohort 2 Academies	1	0	1	0	0	0	7
Cohort 3 Academies	2	0	0	0	0	0	3
Cohort 4 Academies	0	0	3	2	0	1	4
Cohort 5 Academies	1	0	1	2	0	0	15
Cohort 6 Academies	5	2	5	4	5	0	16
Cohort 7 Academies	3	3	2	0	10	1	28
Cohort 8 Academies	0	0	0	2	11	1	44
Cohort 9 Academies	0	0	0	6	8	0	39
Cohort 10 Academies	0	0	0	0	1	0	0

Notes: Source – School Performance Tables.

Table 4 – Pre-Treatment Characteristics

	Proportion eligible FSM	Proportion taking FSM	Proportion non-white	% half days missed due to unauthorised absences	Proportion getting 5 or more A*-C GCSEs, including English and Maths	Key stage 2 points score	Full-time Equivalent Pupils	Full-time Equivalent Qualified Teachers	% SEN, with statement	% SEN, no statement	% half days missed due to authorised absences	Sample Size
All Academies (Cohorts 1 – Cohorts 10)	0.278	0.214	0.168	2.400	0.253	76.329	725.017	55.576	3.000	24.526	8.067	224
Cohort 1 Academies	0.440	0.278	0.286	3.033	0.127	70.347	710.667	42.500	2.638	31.933	7.100	3 (3)
Cohort 2 Academies	0.455	0.356	0.444	2.265	0.150	70.356	758.294	48.571	3.922	27.318	9.524	8 (7)
Cohort 3 Academies	0.359	0.241	0.268	3.261	0.141	75.130	805.000	49.200	3.477	24.622	8.972	3 (3)
Cohort 4 Academies	0.294	0.222	0.243	1.731	0.340	78.850	875.838	54.948	2.792	20.613	7.608	10 (10)
Cohort 5 Academies	0.411	0.284	0.327	3.155	0.198	73.600	905.315	53.136	3.407	26.024	8.524	18 (13)
Cohort 6 Academies	0.280	0.224	0.192	2.155	0.277	76.180	720.318	52.494	3.261	25.213	7.985	30 (27)
Cohort 7 Academies	0.232	0.191	0.142	2.456	0.276	77.301	684.620	55.981	2.908	23.011	8.109	41 (39)
Cohort 8 Academies	0.283	0.209	0.138	2.611	0.250	76.419	775.322	61.642	2.564	24.667	8.196	57 (50)
Cohort 9 Academies	0.264	0.208	0.152	2.145	0.244	76.294	652.781	51.880	3.279	24.888	7.813	53 (47)
Cohort 10 Academies	0.236	0.193	0.031	1.783	0.186	76.908	528.417	39.717	2.195	29.967	8.833	1 (0)
All Other types of School	0.175	0.141	0.147	1.235	0.474	82.273	783.481	62.651	2.349	15.953	6.730	2819
City Technology College	0.112	0.105	0.031	0.150	0.855	90.235	1031.75	86.007	0.577	5.536	4.223	2
Voluntary Aided School	0.162	0.134	0.189	0.891	0.557	84.460	716.033	58.102	1.918	12.990	6.280	517
Foundation School	0.133	0.108	0.142	1.021	0.552	84.230	823.116	67.331	2.016	13.763	6.370	705
Voluntary Controlled School	0.125	0.093	0.099	1.024	0.557	84.328	857.353	67.579	2.332	13.027	6.331	88
Community School	0.194	0.156	0.138	1.405	0.420	80.840	787.565	62.292	2.580	17.674	6.994	1758

Notes: Same sample of schools as Table 2 and Table 3, except the number of academies in each cohort is reduced we have no pre-treatment data for the 17 academies that are either new academies or former-independent conversions. In parentheses we show the number of matched academies in each cohort.

Table 5 – Balancing Tests

	Number	Proportion eligible for FSM	Proportion taking FSM	Proportion non-white	% half days missed due to unauthorised absences	Proportion getting 5 or more A*-C GCSEs, including English and Maths	Key stage 2 points score	Full-time Equivalent Pupils	Full-time Equivalent Qualified Teachers	% SEN, with statement	% SEN, no statement	% half days missed due to authorised absences
Panel A: Before balancing procedures												
Current academies (treatment group)	113	0.285	0.222	0.201	2.442	0.263	76.285	743.046	54.118	3.109	24.118	8.153
Future academies (control group)	111	0.273	0.209	0.144	2.371	0.246	76.360	712.293	56.605	2.919	24.814	8.008
Difference (Standard Error)	-	0.012 (0.018)	0.013 (0.013)	0.057 (0.024)*	0.071 (0.195)	0.016 (0.018)	-0.075 (0.631)	30.753 (34.368)	-2.487 (2.700)	0.190 (0.236)	-0.695 (1.336)	0.145 (0.208)
Panel B: After balancing procedures												
Current academies (treatment group)	102	0.277	0.220	0.208	2.353	0.273	76.673	761.512	55.550	3.000	23.532	8.047
Future academies (control group)	97	0.306	0.230	0.264	2.403	0.244	75.871	713.565	57.965	2.816	25.553	7.963
Difference (Standard Error)		-0.029 (0.021)	-0.010 (0.017)	-0.056 (0.033)	-0.050 (0.210)	0.028 (0.019)	0.803 (0.677)	47.947 (37.475)	-2.415 (2.920)	0.184 (0.242)	-2.021 (1.447)	0.084 (0.215)

Notes: * Denotes significance at five percent. Robust standard errors (clustered at the school level) are reported in parentheses. Same sample of schools as Table 2 and Table 3, except the number of academies in each cohort is reduced we have no pre-treatment data for the 17 academies that are either new academies or former-independent conversions.

Table 6 – Pre-Treatment Trends

	Key Stage 2 Test Scores	Key Stage 4 Performance
	(1)	(2)
A. Time-trends		
Time Trend	0.434 (0.054)*	0.011 (0.001)*
Academy X Time Trend	0.137 (0.084)	0.001 (0.003)
School Fixed Effects	Yes	Yes
R-Squared	0.888	0.855
Sample Size	1242	1242
B. Levels		
Academy X 2003	-0.386 (0.471)	0.008 (0.011)
Academy X 2004	-0.163 (0.473)	0.009 (0.011)
Academy X 2005	0.457 (0.507)	0.013 (0.013)
Academy X 2006	-0.178 (0.506)	0.011 (0.014)
Academy X 2007	0.749 (0.529)	0.007 (0.017)
Academy X 2008	0.602 (0.596)	-0.001 (0.031)
Year dummies	Yes	Yes
School Fixed Effects	Yes	Yes
R-Squared	0.890	0.858
Sample Size	1242	1242
	F (6, 198) = 1.99 Prob>F = 0.068	F (6, 198) = 0.24 Prob>F = 0.946

Notes: * Denotes significance at five percent. Robust standard errors (clustered at the school level) are reported in parentheses.

Table 7 - Academy Schools and Pupil Intake
(Key Stage 2 Standardised Total Points Score)

	Key Stage 2 Test Scores			
	(1)	(2)	(3)	(4)
Academy	0.224 (0.077)	0.202 (0.074)		
Academy, Cohort 1			0.572 (0.111)	
Academy, Cohort 2			0.674 (0.233)	
Academy, Cohort 3			0.233 (0.351)	
Academy, Cohort 4			0.096 (0.256)	
Academy, Cohort 5			0.364 (0.153)	
Academy, Cohort 6			0.144 (0.108)	
Academy, Cohort 7			0.044 (0.106)	
Academy, Early				0.311 (0.123)
Academy, Late				0.103 (0.081)
School Fixed Effects	Yes	Yes	Yes	Yes
Control Variables	No	Yes	Yes	Yes
Year Dummies	Yes	Yes	Yes	Yes
R-Squared	0.853	0.857	0.859	0.858
Sample Size	1497	1497	1497	1497

Notes: Robust standard errors (clustered at the school level) are reported in parentheses. Control variables are: % of pupils eligible for Free-School-Meals (FSM), % of pupils who are White-Ethnic, Ratio of total pupils to qualified teachers, % of pupils with Special Educational Needs (SEN) with a statement, % of pupils with Special Educational Needs(SEN) without a statement. Early comprises cohorts 1-5. Late comprises cohorts 6-7.

Table 8 - Academy Schools and GCSE Performance
(standardised proportion of pupils enrolled into the school who achieve the equivalent of five or more GCSEs at A*-C grade including English and Maths)

	Key Stage 4 Test Scores				
	(1)	(2)	(3)	(4)	(5)
Academy	0.095 (0.055)	0.071 (0.055)			
Academy, Cohort 1			0.179 (0.270)		
Academy, Cohort 2			0.122 (0.133)		
Academy, Cohort 3			0.399 (0.075)		
Academy, Cohort 4			0.271 (0.112)		
Academy, Cohort 5			0.079 (0.135)		
Academy, Cohort 6			-0.012 (0.114)		
Academy, Cohort 7			-0.063 (0.074)		
Academy, Early				0.181 (0.075)	0.184 (0.072)
Academy, Late				-0.029 (0.076)	-0.019 (0.074)
School Fixed Effects	Yes	Yes	Yes	Yes	Yes
Control Variables	No	Yes	Yes	Yes	Yes
Year Dummies	Yes	Yes	Yes	Yes	Yes
KS2 Control	No	No	No	No	Yes
R-Squared	0.850	0.854	0.856	0.856	0.865
Sample Size	1497	1497	1497	1497	1497

Notes: As for Table 7.

Table 9 - Typology of Academy Conversions (After Balancing Process).

	Pre-Academy Type						
	New Academy Schools	Independent School	City Technology College	Voluntary Aided School	Foundation School	Voluntary Controlled School	Community School
All Academies (Cohorts 1- Cohorts 10)	0	0	12	16	31	2	138
Cohort 1 Academies	0	0	0	1	0	0	2
Cohort 2 Academies	0	0	1	0	0	0	6
Cohort 3 Academies	0	0	0	0	0	0	3
Cohort 4 Academies	0	0	3	2	0	1	4
Cohort 5 Academies	0	0	1	1	0	0	11
Cohort 6 Academies	0	0	5	4	4	0	14
Cohort 7 Academies	0	0	2	0	10	1	26
Cohort 8 Academies	0	0	0	2	10	0	38
Cohort 9 Academies	0	0	0	6	7	0	34
Cohort 10 Academies	0	0	0	0	0	0	0

Notes: Source – School Performance Tables.

Table 10 – Heterogeneity by Autonomy Distance and Early/Late Conversion

	Key Stage 2 Test Scores		Key Stage 4 Test Scores			
	(1)	(2)	(3)	(4)	(5)	(6)
Academy, CTC	-0.301 (0.135)		-0.081 (0.090)	-0.074 (0.092)		
Academy, CTC, Early		-0.490 (0.202)			0.003 (0.140)	0.003 (0.137)
Academy, CTC, Late		-0.135 (0.131)			-0.172 (0.112)	-0.159 (0.122)
Academy, Voluntary Aided	0.420 (0.258)		0.076 (0.150)	0.108 (0.147)		
Academy, Voluntary Aided, Early		0.067 (0.356)			0.254 (0.234)	0.287 (0.218)
Academy, Voluntary Aided, Late		0.801 (0.213)			-0.113 (0.100)	-0.082 (0.121)
Academy, Foundation	-0.162 (0.174)		-0.275 (0.243)	-0.227 (0.226)		
Academy, Foundation, Early		-			-	-
Academy, Foundation, Late		-0.174 (0.176)			-0.285 (0.244)	-0.237 (0.227)
Academy, Voluntary Controlled	0.462 (0.090)		0.245 (0.190)	0.263 (0.194)		
Academy, Voluntary Controlled, Early		0.547 (0.049)			0.434 (0.040)	0.453 (0.043)
Academy, Voluntary Controlled, Late		0.287 (0.061)			-0.128 (0.048)	-0.116 (0.048)
Academy, Community School	0.335 (0.083)		0.152 (0.061)	0.149 (0.059)		
Academy, Community School, Early		0.534 (0.126)			0.200 (0.089)	0.200 (0.085)
Academy, Community School, Late		0.138 (0.356)			0.098 (0.081)	0.092 (0.081)
School Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Control Variables	Yes	Yes	Yes	Yes	Yes	Yes
Year Dummies	Yes	Yes	Yes	Yes	Yes	Yes
KS2 Control	No	No	No	Yes	No	Yes
R-Squared	0.863	0.868	0.857	0.866	0.858	0.867
Sample Size	1497	1497	1497	1497	1497	1497

Notes: As for Table 7.

Table 11 - Robustness Checks – Pupil Intake and GCSE Performance

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Panel A: KS2 Test Scores	Original Specification	Sample period end in 2007/08	Dropping 10% of control academies based on distance.	Fake Policy, T-5	Fake Policy, T-5, CTCs removed	No Matching	Kernel Matching, Original Specification, Probit	Original Specification, KS2 mean test score in English, Maths and Science (standardised)	Limit all cohorts of academies to a max of 1 year post treatment
Academy, Early	0.311	0.290	0.287	-0.013	-0.011	0.309	0.287	0.302	0.307
	(0.123)	(0.117)	(0.122)	(0.065)	(0.071)	(0.124)	(0.121)	(0.117)	(0.122)
Academy, Late	0.103	0.165	0.129	-0.081	-0.061	0.079	0.101	0.116	0.120
	(0.081)	(0.124)	(0.108)	(0.060)	(0.066)	(0.078)	(0.081)	(0.082)	(0.085)
School Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Control Variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R-Squared	0.858	0.876	0.862	0.907	0.879	0.857	0.859	0.867	0.870
Sample Size	1497	1315	1441	1210	1137	1501	1496	1497	1354
Panel B: KS4 performance	Original Specification	Sample period end in 2007/08	Dropping 10% of control academies based on distance.	Fake Policy, T-5	Fake Policy, T-5, CTCs removed	No Matching	Kernel Matching, Original Specification, Probit	Original Specification, 5 + GCSEs at A*-C grade including English and Maths (standardised)	Limit all cohorts of academies to a max of 1 year post treatment
Academy, Early	0.181	0.173	0.185	0.038	0.001	0.176	0.169	0.175	0.058
	(0.075)	(0.069)	(0.075)	(0.064)	(0.054)	(0.074)	(0.075)	(0.073)	(0.068)
Academy, Late	-0.029	0.078	-0.007	0.014	-0.037	-0.020	-0.033	-0.029	0.029
	(0.076)	(0.124)	(0.113)	(0.072)	(0.071)	(0.076)	(0.076)	(0.072)	(0.072)
School Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Control Variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R-Squared	0.856	0.881	0.856	0.890	0.800	0.856	0.856	0.864	0.861
Sample Size	1497	1315	1441	1225	1153	1501	1496	1497	1354

Notes: As for Table 7.

Table 12 - Neighbouring Schools (Within 3 Miles) and Pupil Intake (Key Stage 2 Standardised Total Points Score)

	Key Stage 2 Test Scores					
	(1)	(2)	(3)	(4)	(5)	(6)
Nr_Academy	-0.037 (0.016)	-0.038 (0.015)				
Nr_Academy, Cohort 1			-0.096 (0.063)			
Nr_Academy, Cohort 2			-0.038 (0.035)			
Nr_Academy, Cohort 3			-0.099 (0.063)			
Nr_Academy, Cohort 4			0.016 (0.032)			
Nr_Academy, Cohort 5			-0.023 (0.030)			
Nr_Academy, Cohort 6			-0.043 (0.032)			
Nr_Academy, Cohort 7			-0.059 (0.031)			
Nr_Academy, Early				-0.033 (0.019)		
Nr_Academy, Late				-0.050 (0.024)		
Nr_Academy, CTC					-0.035 (0.040)	
Nr_Academy, CTC, Early						-0.005 (0.049)
Nr_Academy, CTC, Late						-0.133 (0.051)
Nr_Academy, Voluntary Aided					-0.005 (0.038)	
Nr_Academy, Voluntary Aided, Early						0.011 (0.040)
Nr_Academy, Voluntary Aided, Late						-0.205 (0.074)
Nr_Academy, Foundation					-0.199 (0.060)	
Nr_Academy, Foundation, Early						-
Nr_Academy, Foundation, Late						-0.199 (0.060)
Nr_Academy, Voluntary Controlled					0.018 (0.076)	
Nr_Academy, Voluntary Controlled, Early						0.065 (0.083)
Nr_Academy, Voluntary Controlled, Late						-0.210 (0.129)
Nr_Academy, Community School					-0.041 (0.018)	
Nr_Academy, Community School, Early						-0.055 (0.022)
Nr_Academy, Community School, Late						-0.013 (0.029)
School Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Control Variables	No	Yes	Yes	Yes	Yes	Yes
Year Dummies	Yes	Yes	Yes	Yes	Yes	Yes
R-Squared	0.936	0.937	0.937	0.937	0.937	0.937
Sample Size	7937	7937	7937	7937	7937	7937

Notes: As for Table 7.

Table 13 - Neighbouring Schools (Within 3 Miles) and GCSE Performance (standardised proportion of pupils enrolled into the school who achieve the equivalent of five or more GCSEs at A*-C grade including English and Maths)

	Key Stage 4 Test Scores					
	(1)	(2)	(3)	(4)	(5)	(6)
Nr_Academy	0.012 (0.015)	0.010 (0.015)				
Nr_Academy, Cohort 1			0.067 (0.049)			
Nr_Academy, Cohort 2			0.144 (0.032)			
Nr_Academy, Cohort 3			0.098 (0.042)			
Nr_Academy, Cohort 4			0.014 (0.033)			
Nr_Academy, Cohort 5			-0.010 (0.032)			
Nr_Academy, Cohort 6			-0.096 (0.027)			
Nr_Academy, Cohort 7			-0.089 (0.038)			
Nr_Academy, Early				0.054 (0.018)		
Nr_Academy, Late				-0.091 (0.023)		
Nr_Academy, CTC					-0.003 (0.031)	
Nr_Academy, CTC, Early						0.029 (0.037)
Nr_Academy, CTC, Late						-0.108 (0.040)
Nr_Academy, Voluntary Aided					0.094 (0.036)	
Nr_Academy, Voluntary Aided, Early						0.096 (0.038)
Nr_Academy, Voluntary Aided, Late						0.066 (0.088)
Nr_Academy, Foundation					-0.196 (0.080)	
Nr_Academy, Foundation, Early						-
Nr_Academy, Foundation, Late						-0.202 (0.080)
Nr_Academy, Voluntary Controlled					0.025 (0.082)	
Nr_Academy, Voluntary Controlled, Early						0.080 (0.092)
Nr_Academy, Voluntary Controlled, Late						-0.249 (0.104)
Nr_Academy, Community School					0.015 (0.018)	
Nr_Academy, Community School, Early						0.048 (0.022)
Nr_Academy, Community School, Late						-0.058 (0.026)
School Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Control Variables	No	Yes	Yes	Yes	Yes	Yes
Year Dummies	Yes	Yes	Yes	Yes	Yes	Yes
R-Squared	0.942	0.942	0.942	0.942	0.942	0.942
Sample Size	7937	7937	7937	7937	7937	7937

Notes: As for Table 7.

Appendix, Table A1 - Pre-Treatment Logit Specification

Explanatory Variables	Dependent Variable: Academy indicator (This is equal to 0 for future academies; It is equal to 1 for current academies)
	0.976
Proportion Non-White	(0.246)
% half days missed due to unauthorised	0.001
absences	(0.032)
	-0.549
Proportion eligible for FSM	(0.414)
% half days missed due to authorised	-0.044
absences	(0.018)
	0.000
Full-time Equivalent Pupils	(0.000)
Sample Size	1408

Appendix, Table A2 – The Structure of the Falsification Exercise as a Robustness Check

	Policy Case	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Cohort 1	Actual	P	P	P	P	P	P	A	A	A	A	A	A	A
	Fake	P	A	A	A	A	A							
Cohort 2	Actual	P	P	P	P	P	P	P	A	A	A	A	A	A
	Fake	P	P	A	A	A	A	A						
Cohort 3	Actual	P	P	P	P	P	P	P	P	A	A	A	A	A
	Fake	P	P	P	A	A	A	A	A					
Cohort 4	Actual	P	P	P	P	P	P	P	P	P	A	A	A	A
	Fake	P	P	P	P	A	A	A	A					
Cohort 5	Actual	P	P	P	P	P	P	P	P	P	P	A	A	A
	Fake	P	P	P	P	P	A	A	A					
Cohort 6	Actual	P	P	P	P	P	P	P	P	P	P	P	A	A
	Fake	P	P	P	P	P	P	A	A					
Cohort 7	Actual	P	P	P	P	P	P	P	P	P	P	P	P	A
	Fake	P	P	P	P	P	P	P	A					

Appendix, Table A3 - Pre-Treatment Logit Specification

Explanatory Variables	Dependent Variable: Neighbouring School indicator (This is equal to 0 for future neighbouring schools; It is equal to 1 for current neighbouring schools)
Proportion eligible for FSM	-0.482 (0.157)
Proportion Non-white	0.587 (0.108)
% half days missed due to unauthorised absences	-0.086 (0.021)
Sample Size	5953