Matched panel data estimates of the impact of academy status on the 2002-2009 Sponsored Academies

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I hereby declare that, except where explicit attribution is made, the work presented in this thesis is entirely my own.

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Abstract

The UK Academy School programme was introduced by the UK Government in 2002 through its Education Act. The aim of establishing these schools was to improve pupil performance and break the cycle of low expectations. Sponsored Academy Schools were established as public-private partnerships between the government and successful sponsors.

This thesis focused on the achievement of the Sponsored Academies in comparison with the achievement of pupils of the predecessor schools of these treated schools. This is with an assumption that sudden change in achievement of the pupils of these treated schools could be attributed to increases in autonomy granted these schools compared to their predecessor schools. Such differences are referred to here as the "treatment effect". To establish if the schools are achieving the set target of improving achievement, student key achievements measures in GCSE with and without necessarily including Maths, English and Science were queried. Changes in the quality of students admitted into year 7 in these schools was done using the KS2 SAT aggregate scores in key subject areas of Maths, English language and Science.

The data is an extract of school-level record from the NPD dataset for every 16 year old student at a state-maintained school for the years 2002 through 2009. The difference between this work and others is however in the assumptions made. Key assumptions include exclusion of some schools and data due to gaps between opening and closing dates or locations, allowing time for "Academy Effect" to take place, looking only at the first two years of establishment of the school and allowing for the comparison schools.

The conclusions are impaired by inefficiently matched group of treated and comparison. This was because of the comparison schools despite all efforts did not fulfil the necessary similarity in outcome before the date of conversion to Academies.

Impact Statement

This work did seek to contribute to further contribute to the existing conclusions of earlier publications that there are some or no impact of the Sponsored Academy status on students' outcomes. Neither do the evidence presented here support or refute the findings of these earlier publications on the impact of Academy schools policy on the quality of pupil intake by the Sponsored Academy schools. These schools were established between 2002 and 2009 by the then UK Labour Government. This research question was investigated with the expectation that an impact on the quality of pupil intake would result from improvements in pupil outcomes.

This work has however not been able to estimate increases in student outcomes because of an increase in the schools' administrative autonomy as a result of a grant of academy school status. The lack of support or dispute of the outcomes of the existing research by other authors is because of the inconsistency in trends of the Sponsored Academies after data cleaning. The work however shows upward trends in outcomes consistent with outcomes of non-Sponsored Academy schools for the same period. The work also shows significant difference in the trends of the characteristics of pupils admitted by the Sponsored Academy schools during policy implementation periods. The indicators of pupil characteristics explored here (Free School Meal, pupil ethnicity, IDACI scores, SEN) are in themselves indicators of changes within the schools.

Further work needs to be done in identifying, isolating and possibly correcting for the reasons for the lack of consistency in trends of these group of academy schools. This is very important in the implementation of a difference-in-difference method to determine policy impact. A qualitative study of individual academy schools could provide more insight into opinions of administrators, teachers, parents and pupils of these schools. This is with an aim of evaluating the effects of the policy change on individual schools. "Academy impact" of these group of schools in itself is type of study is made of the policy impact of individual schools.

Acknowledgement

It has been a privilege working with many academics within the Institute of Education over the course of writing this thesis. Each of these supervisors and academics have greatly added to my discussions and understanding.

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Chapter 1

1. Introduction

..., reforms to school structures - and their autonomy and governance – have been a feature of recent education policies in countries like England, Sweden and the United States. But does autonomy work? And does it offer scope to improve the lot of disadvantaged students in the lower tail of the education distribution?

“Our conclusion is probably not or at least not in England and in the case of Labour's Sponsored Academies. Whilst there is a paucity of robust and coherent evidence to draw upon, it does not seem unreasonable to say that, on balance, the evidence that does exist at best shows only small beneficial effects on overall pupil performance and very little consistent evidence of improvements for tail students”

(Machin and Silva, 2013, pg.11)

This thesis is concerned with the question of whether or not the UK government’s Academy School policy on secondary education is achieving the UK government’s set goals of improving educational standard in underperforming UK schools. It also looks at the changes in the quality of pupils admitted into these schools at the point of entry as a result of the assignment of Academy School status to the schools. The Academy School system of secondary education in England is set-up in response to the falling standards of education in some schools in the UK. The policy is designed to give parents a choice over where their children are educated. This quasi-market system introduced by the government over 20 years ago is central to the government’s aim to improve secondary education. Initially announced in a speech by David Blunkett in 2000, the Secretary State for Education and Skills at the time said that the government’s aim was "to improve pupil performance and break the cycle of low expectations" (Carvel, 2000). These schools were known as City Academies until the term was amended by the Education Act of 2002. Through this policy, the government has granted more autonomy to existing and newly

created schools as a catalyst for such freedoms to spur schools into achieving higher student outcomes.

These schools are semi-independent state funded schools that receive their funding directly from the Central Government and not through the Local Education Authorities (LEA). The daily administration of these schools is as done in other secondary school systems under the jurisdiction of the principal or headteacher. The principals or headteachers are responsible to the Academy Trusts and may be part of an Academy Chain. The Trusts have replaced the LEAs in the chain of funding and administration. These Trusts provide advice and expertise. More autonomy is granted these schools as a result of assignment of 'Academy School status'. Some of the freedoms granted these schools over other state schools also include freedom over curriculum and teacher pay and conditions.

Opinions have been polarised on these UK Government Academy Schools and on whether these schools could achieved the desired goals. An article by the BBC on the 27th of January 2014, quoting from a report by the Education Select Committee on England's school system, the article stated that the report showed 'no clear evidence that Academies raise standards overall'. This is despite the Education Secretary Nicky Morgan's assertion that Academies were 'central to delivering the best schools'. Several publications on the outcomes of Academies have either shown moderate improvements or no improvements in outcomes resulting from the increases in autonomy brought about by an assignment of Academy School status. Machin and Silva in (2013) concluded that there was probably none or at least not in England and in the case of Labour's Sponsored Academies some improvement in student outcomes due to such Academy School conversion.

Some critics of the UK Academy School policy argued that the Academy Schools are differentially effective in their outcomes. Some of these critics argue that higher-income families benefit at the expense of the poor because they are advantaged in their ability to exercise choice or because schools that control their admissions `cream-skim' easier to teach pupils (Allen, 2008). In a BBC News article (2015) the Education Select Committee chairman Graham Stuart was quoted to have stated that "current evidence did not prove that Academies raise standards overall or for

disadvantaged children," thus disputing the speculations of a positive benefits of Academy Schools on students from lesser-income families. Machin and Silva in 2013 summarised that 'the paucity of robust and coherent evidence did not find it unreasonable to say that on balance, the evidence that does exist at best showed only small beneficial effects on overall pupil performance and very little consistent evidence of improvements for tail students'. This work will add to ongoing debate on the evidence of the effectiveness of the UK government's Sponsored Academy Schools.

In subsequent sections of chapter 1, the key questions addressed in this work will be outlined. The motivation behind the adoption of a quantitative approach in addressing these questions will also be discussed. These sections will be followed by a section to explain the major policy events that led to the current English of school governance and administrative structures. This is followed by a section explaining the school types currently within secondary education in England and how they differ from each other. Chapter 2 reviews the Academy School Model and several key publications on Academy impact evaluation or evaluation of the impact of an increase in autonomy on the educational achievements of students of Foundation Schools. Chapter 3 deals with the data source, data manipulations and school outcome measures of achievement and pupil quality and school characteristics. Chapter 4 discusses the methodology and strategy for impact estimation. It also shows the empirical results. Chapter 5 is a short conclusion of the work.

Using a nearest neighbour one-to-one matching, a group of control schools with similar characteristics as the treated schools are matched to the treated schools. A Difference-in-Difference method is used in estimating the impact of Academy School effect for the earliest two years of the group treated schools over a group of control schools. Measures of achievement used in this work include subject level GCSE outcomes at grade C and above for Mathematics and English language. Other measures are aggregate level GCSE outcomes at grade C and above in measures such as 5 GCSE and 5 GCSE with Maths and English included. The same analysis is done for the quality of pupils accepted into Academy Schools at grade 7 controlling for all forms of special education needs data. For the quality of

pupil intake, the measures of outcomes of interest used include the KS2 total point score, the Maths, English and Science z-scores. In both cases, the impact on school level outcomes was estimated as an aggregate for all Academy Schools irrespective of their year of opening for both of the two years in question.

1.1 Outline of Thesis

The thesis addresses two separate questions:

1. What is the impact of an increase in school autonomy arising from the Academies programme on pupil achievement? In particular, the focus is on the UK Sponsored Academies and not the Converter Academies.
2. Does an increase in administrative autonomy of Academies impact positively on the quality of pupils admitted by Sponsored Academy Schools?

Assessing whether or not gaining Academy School status improves pupil outcomes is a fundamental question, and one that policy makers are most interested in. This makes it necessary first to investigate a response of existing pupil outcome to a take-up of "Academy status" before investigating changes in the quality of pupils admitted into these schools in grade 7. It is also necessary to assume that "Academy School effect" should increase over time. This would be because if the key reference result is the final pupil achievement at the end of grade 11, students the first batch of graduates from the Academy School after conversion would have done so after only one year of the conversion to an Academy School. The fifth cohort of graduates would have done so after experiencing five years of studying under the new school and none in the pre-conversion school. Thus every cohort after the first will increasingly experience the Academy School effect longer than the first. If the Academy School if effective in achieving the aims of conversion, pupil outcome should increase over time.

This thesis seeks to contribute to available empirical evidence on the debate on whether or not granted increases in Academy School autonomy has resulted in improvements of Academy School pupils' outcomes when compared to similar non-Academy Schools. In particular, the average impact of autonomy on GCSE outcomes of schools that converted to Academy Schools was investigated. The aim is to ascertain if conversion to Academy Schools would academically be more

advantageous for underachieving schools and their students. Although it is not possible to directly attribute all observed changes strictly to increases in school autonomy, it is however possible to estimate the difference in outcomes between the pre-conversion school and the Academy Schools knowing that the difference between both periods is the treatment on the treated. Unlike Machin and Vernoit (2011) who worked on a pupil-level research, this work has queried school-level data for the same information.

This work has taken a slightly different approach compared to the earlier publications in estimating the effect of increased autonomy on Academy Schools. Several of the earlier publications have adopted the government's measure of 5 GCSE's at grades A*-C with and without English and Maths as the standard measures of outcomes. The same measure of 5 GCSE's at grades C and above with Maths and English included is used by the government in its League Table. This work goes beyond the measures of GCSE outcomes adopted by earlier publications by the query of student achievement measures of 8 GCSE with or without Maths as a robust check on the impact estimates on 5 GCSE with Maths and English included. Compared with earlier publications, there are more data available to this work than has been available to any of the earlier publications. Rather than take a snapshot 'one-time effect' approach at the start of the programme as the "Academy effect", a two-year study of theses Academy effects has been done. According to Ashenfelter (1978), outcomes from the before conversion would suffer a dip as a result of assignment. Thus a direct comparison of the results of the first year of the treated schools to that of a comparison group of schools should suffer a bias resulting from the fall in outcomes just prior to conversion.

This work seeks to estimate the impact of conversion to Academy Schools on GCSE groups at the end of compulsory education over time. This research work will not query the data for cohort performance but will focus on the aggregate performance of Academies within the earliest two concurrent years of establishment. The aggregate Academy effect is estimated for all of the treated schools for the earliest two concurrent years to investigate continuum of progression in trends over time. Some of the earlier publications assumed a one-

time effect in KS4 GCSE outcomes of the treated schools and did not study or estimate the impact of conversion over time.

This work has added to the debate on the changes in dynamics of school intake over time. The historical underachievement seen in the pre-converted schools have resulted in these schools being largely undersubscribed. The question on whether or not there are changes in the quality of students admitted into these Academy Schools on conversion is also very important. An improvement or change in the quality of pupils admitted into year 7 of treated schools on conversion to Academy Schools could signify a change in parental attitude towards the Academy Schools or on the government's policy on these schools. Such a change in attitude may not be experienced very early in the life of Academy Schools but should be noticeable in the second year of treatment. Undersubscription in a school would result in the lowest quality of students being offered places. This has historically created an oligopolistic situation where oversubscribed schools have continuously cream-skimmed the best students thus improving their chances of continuously achieving better outcomes when compared to the undersubscribed schools. A change in student characteristics at entry point should create a coupling effect and hence result in a faster improvement in student aggregate GCSE outcomes than would be seen without improved student characteristics over time. It is thus pertinent that policy makers would be interested in knowing the policy impact on measures of pupil intake.

Machin and Vernoit (2011) and Machin and Eyles (2015) both investigated the second question. Both papers used schools existing during their sample period and later went on to become Academies after their sample period as comparison schools. The treated schools are the same Academies used in their estimation of the effect of Academy School conversion on student outcomes. Machin and Vernoit also compared the Key Stage 2 (KS2) outcomes of the students admitted into the Academy Schools to the KS2 outcomes of neighbouring schools. They compared the KS2 total point score of these schools with the KS2 results of their matched neighbouring schools. In this work, the KS2 total point scores will be compared with KS2 total point scores of the matched group of schools from across the country rather than to the estimates from a group of local schools. As mentioned earlier, a

national selection of matched schools gives a stronger field within which a true match group of schools could be found. This does not in any way exempt the local schools from the data. If the local schools are a better match than all other schools, they will in no doubt be the best matches to the treated schools.

The second question seeks to identify if there are changes in trends in the pupil intake quality (KS2 total point scores, Maths, science and English scores) of the students admitted by Academy Schools as a result of the change in status. Both research questions are important from a social welfare perspective, equity in the distribution of quality education and in the examination of the efficacy of government through its policies in addressing the defects in the educational sector. These questions also ensure quantifiable evidence to support or negate any claim that the policy in question has achieved the planned effects. The question also helps to determine if such a policy should be propagated further in education.

1.2 Motivation for Quantitative Approach

Quirk (1987) stated that an economic hypothesis could be *qualitative* or *quantitative* in nature. Expositions of economic reasoning often use two-dimensional graphs to illustrate theoretical relationships. At a higher level of generality, Paul Samuelson's treatise *Foundations of Economic Analysis* (1947) used Mathematical methods to represent the theory, particularly as to maximizing behavioral relations of agents reaching equilibrium. The book focused on examining the class of statements called '*operationally meaningful theorems'* in economics, which are theorems that can conceivably be refuted by empirical data (Samuelson, 1983).

The availability of large scale administrative datasets containing information on all pupils in state maintained secondary schools is central in the decision in adopting a quantitative approach in making generalised inferences about the effect of policies across England as a whole. The empirical analysis done here is able to exploit the National Pupil Database (NPD), available from 2002 onwards to investigate policy questions previously investigated using similar schools data.

Several clear examples (but not a very large group) of earlier literature on the evaluation of changes in school outcomes post-Academy School conversion exist. These works have all adopted quantitative approach in investigating policy impact on treated groups of schools. Examples of these earlier work include papers such as “does school autonomy improve educational outcomes” (Allen, R., 2010a), “public and private schooling initiatives in England: The Case of City Academies” by Machin, and Wilson (2009), “changing school autonomy: Academy Schools and their Introduction to England’s Education” by Machin and Vernoit (2011), “The Academies programme – A Report by the Comptroller and Auditor General, (NAO, Sept 2010) and the Academies evaluation: fifth annual report by PWC (2008). “The Performance and Competitive Effects of School Autonomy” by Clark (2009) is another example. In this work, the adoption of a quantitative approach provides an opportunity to estimate numerical values to outcomes of interest as a result of system efficiency. Similar to these earlier research papers, school level data will be used for this analysis. It is necessary to do so because the research questions are focused on a national picture of the effects of the Academy School policy rather than an in-school or a micro level analysis of policy effects. The school data exist in terms of cohorts hence effect due to policy changes could be clearly identified at the end of the second year.

In this thesis, both research questions are designed to contribute to the debate on the methods adopted in such analysis. The questions are hence theory-testing rather than theory building, lending them directly to a fixed-design quantitative analysis approach. The second question is designed to give a picture of the changes in quality of student intake and at the same time carryout a comparative study of intakes of both Academy Schools and similar but non-Academy Schools. It seeks to identify changes in the quality of pupils granted places into Academy Schools due to increased administrative autonomy. Estimated outcomes of these analyses do not necessarily imply causality or make causal claims about the effects of policies. The estimated impact values are not necessarily attributable to the conversion of the treated schools to Academy Schools. Where causal relationships are tentatively inferred in concluding remarks, it is only possible because the research questions are grounded by a combination of economic theory and existing smaller scale qualitative and quantitative studies.

Both thesis questions use quasi-experimental methods to make causal claims about the effect of increased school autonomy on pupil academic achievement. The thesis does so by using econometric techniques (difference-in-difference method, pupil fixed effects models). This type of analysis is necessarily reductionist, assuming that all `context' can be cancelled out via the use of a control group or variables. There is a counter position by some researchers challenging this approach arguing that a constant and controlled relationship between treatment and outcomes (known as the `constant conjunction') cannot exist when dealing with humans and social situations in which a treatment is necessarily always applied in a unique context (Allen, 2008). Allen pointed out that 'though econometric techniques can successfully produce quantitative verification for theory, the reverse is not necessarily true where analysis yields equivocal results. The theory cannot automatically be rejected since the null result is strongly dependent on the nature implementation of the policy, the context into which the policy was introduced or problems with the specification of the research design itself.

1.3 UK Secondary School Policy Background

About a thousand years ago English upper classes were encouraged to be educated to the exclusion of the masses. Statistics taken in 1845 showed that only one in six of the inhabitants of England could read, one in four write and one in fifty ciphers as far as the 'Rule of Three'. In 1870 the government assumed the obligation in ensuring the provision of education for all children of ages 5 to 14. Key features of this obligation include the creation and recognition of local agencies (private or church managers or elected boards) for the execution of this purpose and provision for the securing of efficient instruction by means of an annual grant from the treasury. The 1870 law for the first time created a central agency to carry out the provisions on the part of the government and of new local agencies or school boards which every school district must elect except upon satisfactory evidence that schools are efficient.

The current secondary school system, which mandates children to pass through secondary school from age 11 through to age 16 with an option of staying on up to

age 18, has its roots in the 1944 Education Act. The Education Act heralded the start of a system of universal, free and compulsory secondary education, backed by widespread popular and political support. Although full implementation by local authorities took some time, the Act established the principle of free education up to secondary schools level. Some historians see the 1944 Act as a means of strengthening of central government over local control (Jones, 2003). Jones argued that a focus on control is to miss the dynamism created and encouraged by this Act. The Act granted local authorities some powers to organise and reorganise schools, freedom of curriculum and pedagogy for classroom teachers.

In 1976, compulsory comprehensive re-organisation in Local Education Authority (LEA) was introduced by an Act of parliament. A bill in 1978 required LEAs to use admissions procedures based on parental preference hence the steering of parental views into education system. The 1988 Education Reform Act dismantled the tripartite system of education by fundamentally changing the relationship between the then Department for Education (DfE) and the LEAs in England and Wales. Following the continuous legal empowering of the central government and a reduction of powers given to LEAs in setting educational policies the 1988 Act defined a new role for LEAs in relation to the DfE by giving more freedom to schools and colleges. The Education Act of 1993 was enacted to ease access of conversion of independent schools to Grant Maintained (GM) School and for independent sponsors to set up new Grant Maintained Schools.

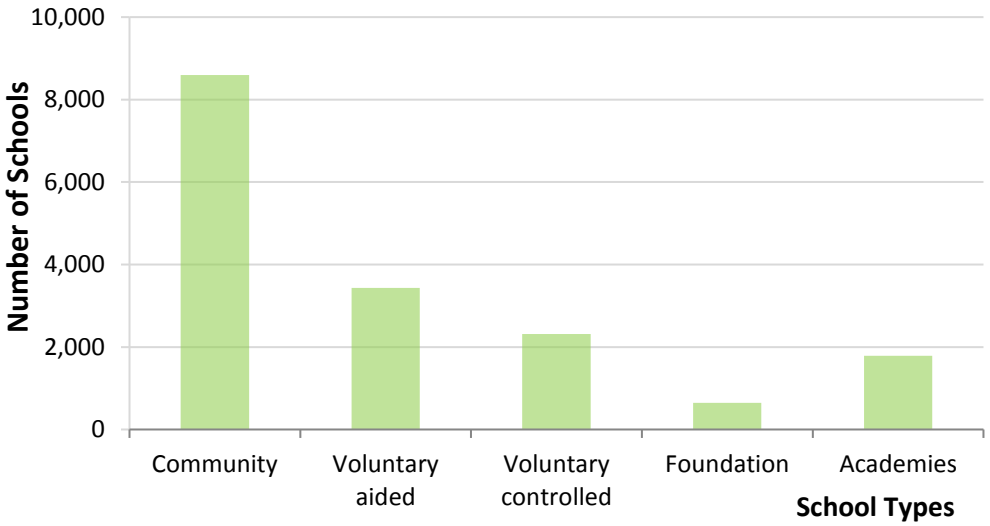
These schools have relatively more autonomy than the earlier schools. They are not under the control of the LEAs and are directly funded by grants from central government with some having selective admissions procedures due to oversubscription. The popularity of GM schools in some areas was attributed to the poor financial support offered by local education authorities. GM schools were entitled to apply to central government for capital grants for essential building works. The additional funding, distinct admissions policies and semi-independent status of Grant Maintained Schools were controversial and caused friction with LEAs. At their peak in early 1998, there were 1196 Grant Maintained Schools, most of them secondary schools. Within the state sector, they accounted for 3% of primary schools, 19% of secondary schools and 2% of special schools.

Currently, there are seven different school types that make up the British secondary education system. These are Academy Schools, Community Schools, Independent Schools, City Technology Colleges (CTCs), Voluntary Aided Schools (or faith schools), Foundation Schools and Voluntary Controlled Schools. Each school system is defined by a characteristic uniqueness in their autonomy and governance. These schools and their characteristic difference in governance were captured by Machin and Vernoit (2011). Academy Schools and Free Schools are the most autonomous of all Grant Maintained Schools. Key differences in Academies compared to other schools are highlighted in section 3.1.

1.4 School Types in England

This section seeks to explain the types of schools that make up the secondary school system in England. The key characteristics of these schools are highlighted with a view of showing the difference between these schools and the Academy Schools. Some of the restrictions placed on the managers of these schools due to the long standing governmental administrative and structural constraints could be inferred from the information provided below.

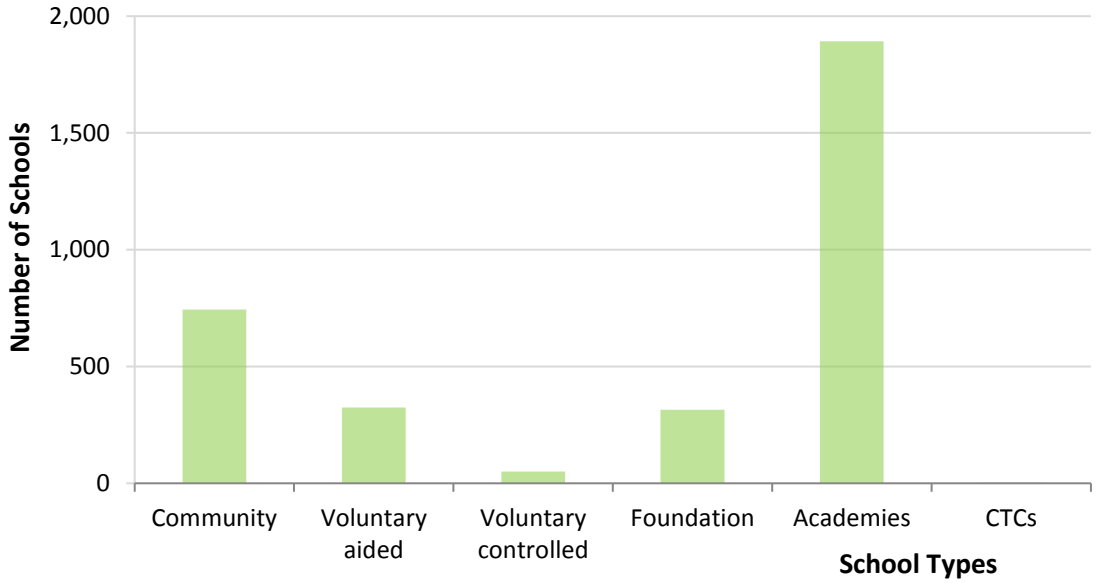
Figure 1. Breakdown of 16,784 UK Primary School Types at end of 2013/14 academic year



Notes: Source – School Performance Tables
www.gov.uk/government/uploads/system/uploads/attachment_data/file/335177/SFR15_2014_national_tables_v101.xlsx

Figure 1 and Figure 2 show breakdowns of primary and secondary schools in England at the start of the 2013/2014 academic year. Majority of primary schools are community schools whilst majority of secondary schools are Academy Schools (Converter and Sponsored).

Figure 2: Breakdown of 3,329 UK secondary schools at end of 2013/14 Academic year



Notes: Source – "School League Tables" www.gov.uk/government/uploads/system/uploads/attachment_data/file/335177/SFR15_2014_national_tables_v101.xlsx

1.4.1 Community Schools

These are schools strictly controlled by the Local Education Authority (LEA) and not influenced by business or any groups of Voluntary aided organisations. Community schools are state-funded schools, in which the LEA is responsible for employing the school staff. The administrators or board of governors of such schools have no responsibility or autonomies in all staffing decisions. They are required by law to follow the National Curriculum in all its ramifications. Community schools have the least autonomy of all existing school systems in England. They are centrally organised through the local education authority and have rigid governance structures. The LEA owns the lands upon which such schools are built, the schools buildings and determines the admissions arrangements. At the report

of the 2014 schools League Table, there are 8,598 community primary schools and 744 community secondary schools.

1.4.2 Foundation Schools

Foundation Schools are schools with more freedom to change the way they do things than community schools. By law, Foundation Schools exist in England and Wales and are state-funded schools. These schools have less freedom than independent and Academy Schools but greater freedom than Community Schools hence the governing bodies have more freedoms than the equivalent body in Community schools in running of the schools. Foundation Schools were set up under the School Standards and Framework Act 1998 to replace Grant Maintained Schools, which were funded directly by central government.

Previously, Voluntary controlled (but not Voluntary aided) Grant Maintained Schools usually became Foundation Schools. Being grant maintained, they are funded by the UK government through the LEA and they do not charge fees to students. As with Voluntary Controlled schools, all capital and running costs are met by the UK government. As with Voluntary Aided schools and Academy Schools, the governing body has the freedom to employ the staff and has responsibility for admissions to the school, subject to rules imposed by central government. But unlike Academy Schools, their pupils must follow the National Curriculum. A major difference between Foundation Schools and Voluntary Aided schools is on the freedom to determine administrative direction through nomination of members of its governing bodies. The sponsors of Foundation Schools are not by law able to appoint the majority of the governing body. On publication of the 2013/14 schools League Table, there are 646 community primary schools and 315 community secondary schools (see reference on charts).

1.4.3 Independent Schools

Independent or private schools are fee-paying private schools, governed by an elected board of governors and independent of many of the regulations and conditions that apply to state funded schools. Some of the older, expensive and more exclusive schools catering for the 13–18 age-range in England and Wales are known as Public schools, the term "public" being derived from the fact that they

were open to pupils regardless of where they lived or their religion. Preparatory schools, educate younger children up to the age of 13 to "prepare" them for entry to the public schools and other independent schools. Some former grammar schools converted to an independent fee paying model following the 1965 Circular 10/65 which marked the end of their state funding, others converted into comprehensive schools. There are however 2,411 registered independent primary and secondary schools in England.

1.4.4 City Technology Colleges

A City Technology College (CTC) is a state-funded all-ability secondary school. It is non-fee paying and is more independent of the LEA than Foundation and Community Schools. These schools were setup and were directly being overseen by the Department for Education. One fifth of the capital costs are met by private business sponsors, who also own or lease the buildings. The rest of the capital costs, and all running costs, are met by the Department. City Technology Colleges teach the National Curriculum, but specialise in mainly technology-based subjects such as technology, science and Mathematics and more practical subjects. CTCs also work closely with businesses and industry mainly via their links through their sponsors. Often times, their governors are directors of local or national businesses that are support or have supported the colleges. The CTCs has relatively been successful in the long term and are considered strong establishments with consistently high academic results. It is well known that these CTCs inspired and are the forerunners of the UK Academies. Several of these schools have converted to Academy Schools. The 2013/14 schools League Table show that there are 3 CTCs left in the country.

1.4.5 Voluntary Controlled Schools

A Voluntary Controlled School is a state-funded school in England, Wales and Northern Ireland in which a foundation or trust (usually a Christian denomination) has some formal influence in the running of the school. Such schools have less autonomy than Voluntary Aided schools, in which the foundation pays part of any building costs. There are over 2319 voluntary controlled primary and 50 voluntary controlled secondary schools in England.

1.4.6 Voluntary Aided Schools

A Voluntary Aided School is a state-funded school in England and Wales in which a Foundation or Trust (usually a religious organisation), contributes to building costs and has a substantial influence in the running of the school. Voluntary-Aided Schools like Foundation Schools and the Voluntary Controlled Schools are run in partnership between the state sector and voluntary organisations. Voluntary Aided Schools do not have the management and governance autonomy of Academies and Independent Schools. Such schools have more autonomy than Voluntary Controlled Schools, which are entirely funded by the state. In most cases the Foundation or Trust owns the buildings. In some circumstances Local Authorities can help the governing body in buying a site, or can provide a site or building free of charge. Voluntary Aided Schools are a kind of "maintained school", meaning that they receive all their running costs from central government via the Local Authority. They also do not have the curriculum freedom or staffing decisions. They are not responsible for the structure and length of the school day or the school budget or any other school policy. They are non-selective and the LEA is responsible for the admissions of the schools. The majority are also faith schools. There are over 3,436 Voluntary Aided Primary Schools and 324 Voluntary Aided Secondary Schools in England.

1.4.7 Academy Schools and Free Schools

These are schools formed either as a conversion of former Grant Maintained Schools through the UK government’s Academy School policy to Academies or they are formed from prior independent schools or they are new schools with no prior school. The schools are characterised by public-private sector partnership, public and private funds or wholly public funds and strong parental or community participation in school administration. These schools have more autonomy in school administration, hiring policies, curriculum covered in the schools, independence from LEAs and schools admissions. Free Schools in particular are technically Academy Schools. The 2014 schools data shows that there are 1,893 secondary Academy Schools in England, 1,789 primary Academy Schools and 98 Free Schools of which 72 are primary schools. At the start of the 2014/15 Academic year, the number of Sponsored Academy Schools alone has increased to 1336 schools.

There are two types of Academy Schools namely the Sponsored and Converter Academies. The Sponsored Academy Schools are former struggling schools taken over by sponsors as a result of their contract with the UK government with the aim of improving these schools. The Converter Academy Schools on the other hand are primarily outstanding schools who have opted to convert to Academy Schools due to the freedoms and benefits inherent in the UK government's Academy School policy. Further explanations of both types of Academy Schools and the Academy School model will be done in chapter 3.

Chapter 2

2. Academy School Model and Literature Review

This chapter seeks to explain the unique features of the Academy School model and show the rapid rate of conversion of other school types into Academy Schools. It is important to do so because the rate of conversion of other schools into Academy Schools is an indication that parents and the country is accepting these schools hence the need to know if these schools are achieving better higher outcomes than the predecessor schools and similar unconverted schools. Similarly, features which distinguish the English Free Schools from Academy School will be outlined. An extensive review of existing literature on Academy Schools and the impact of increases in administrative autonomy as a result of conversion of Grant Maintained Schools to Academy Schools on student academic outcomes are done in this section. The literature reviews explained here do not include Primary Academy Schools. Summary of existing literature on the quality of students admitted into year 7 of these schools is also done within these reviews where appropriate.

2.1 The Academy School Model

The Academy Schools are all ability, semi-autonomous, specialist, non-fee paying secondary schools, not under the administration of the LEA. They have been primarily set up to tackle the problems of underperforming schools in England. There are technically two major types of Academies based on the government Acts establishing these schools. These Academy School types are called Sponsored Academies and Converter Academies. The Sponsored Academies were established by the law to replace under-performing schools with the aim of improving educational standards and raising the aspirations of, and career prospects for, pupils from all backgrounds including the mostly disadvantaged. Most students from these schools are however from disadvantaged background.

Converter Academies on the other hand are successful schools that have chosen to convert to academies in order to benefit from the increased autonomy academy status brings. They were introduced in 2010 as part of the UK government's plan to expand the coverage of the Academy School programme.

Table 2.1 show that Academy Schools did not exist in September 2001/02 but in the January of the 2008/09 academic year, there were 203 Academy Schools. This number has drastically increased to 1893 Academy Schools in January of the 2012/13 academic year. The Table clearly show the sharp reduction in the number of community schools from 2001 to 2013 and the sharp increase in the number of Academy Schools. With the total number of schools remaining just over 3000, the drop in the number of Community Schools can be accounted for by the increase in the number of Academy Schools. Figure 3 gives a breakdown of the numbers of Academy Schools and Free Schools in England in February 2014.

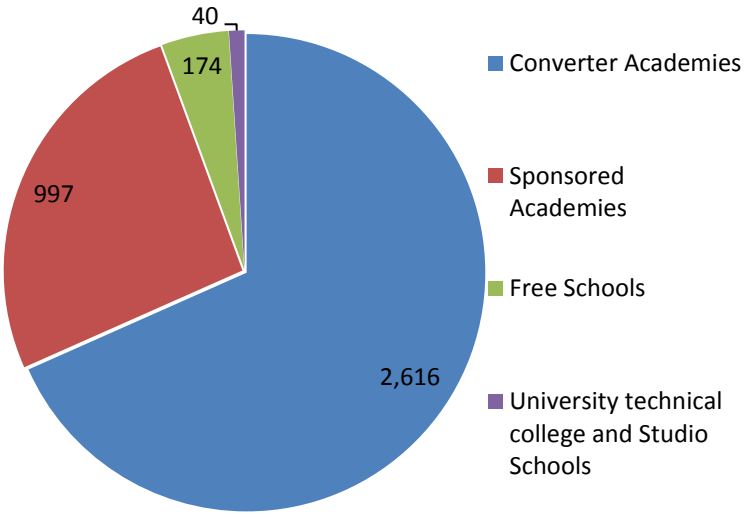
Table 2.1. Primary and Secondary Sponsored and Converter Academies established between 2001/02-2009/10 and 2010/11-2012/13 and the predecessor school type

Predecessor school Type	2001/02(%)	2009/10(%)	2012/13(%)
Academy School	0(0.0)	203(6.1)	1893(56.9)
CTC	15(0.5)	3(0.1)	3(0.1)
VA School	510(16.2)	540(16.2)	324(9.7)
Foundation School	499(15.8)	779(23.4)	315(9.5)
VC School	97(3.1)	102(3.1)	50(1.5)
Community School	2030(64.4)	1706(51.2)	744(22.3)
Total	3151	3333	3329

Note: Primary and Secondary Academies Schools established between 2001/02 and 2009/10 are all Sponsored Academy Schools while those established after 2009/10 are mainly Converter Academy Schools. Source – Schools Performance Tables.

Table 3.2 shows a breakdown of the sub-types of Academy Schools and Free Schools. It also shows the numbers and percentages of primary and secondary Academy Schools within the Academy School systems. There are several types of Converter and Sponsored Academies. These include regular primary and secondary Converter or Sponsored Academy Schools, Alternative Provision Converter or Sponsored Academy Schools and Special Converter or Sponsored Academy Schools. The breakdown of the number of these schools within the UK education system at the end of February 2014 can be seen in the Table 2.2. As earlier stated, due to financial reasons more outstanding schools have converted into Converter Academy Schools.

Figure 3: Breakdown of Academy Schools and Free Schools in England in Feb 2014



Notes: Source – School Performance Tables

Table 2.2: Number of Academies and Free Schools (and the sub-types) in Feb 2014

School type	Number of schools	% of School Type
Primary Converter Academy	1,210	46%
Secondary Converter Academy	1,299	50%
Special Converter Academies	90	3%
Alternative Provision Converter Academies	17	1%
Total	**2,616**	**100%**
Primary Sponsored Academy	507	51%
Secondary Sponsored Academy	478	48%
Alternative Provision Sponsored Academies	1	0%
Special Sponsored Academies	11	1%
Total	**997**	**100%**
Primary Free School	72	41%
Secondary Free School	76	44%
Alternative Provision Free Schools	18	10%
Special Free Schools	8	5%
Total	**174**	**100%**
University Technical College and Studio Schools	40	
Total	**3,787**	

Notes: Source – School Performance Tables

2.1.1 Sponsored Secondary Academy Schools

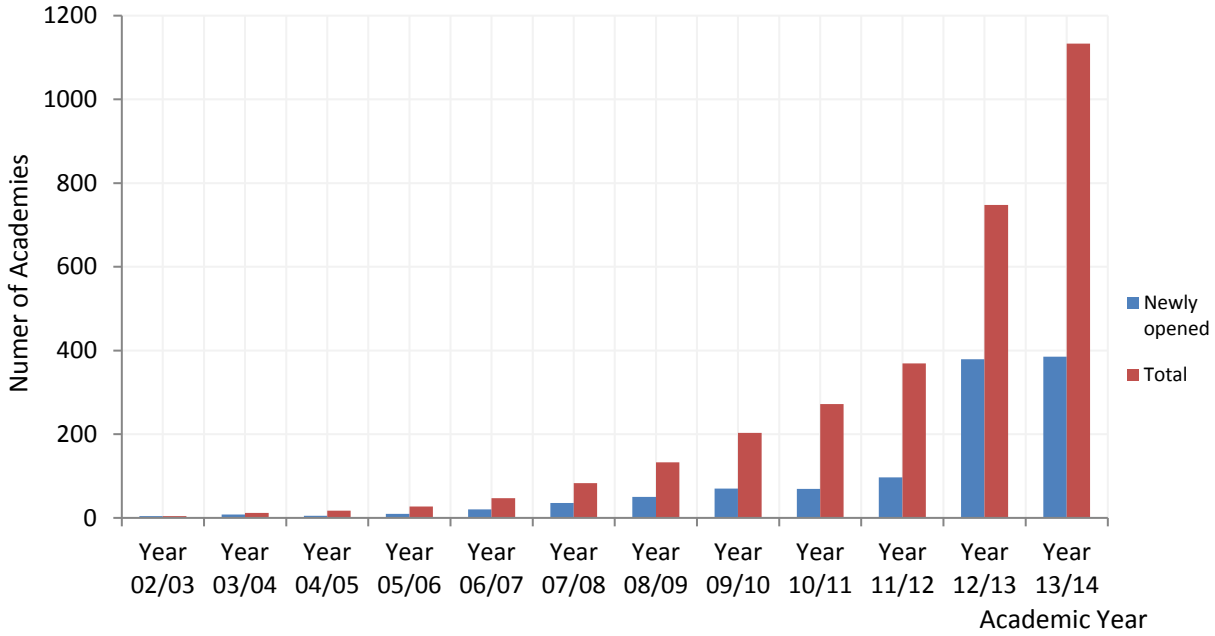
In 2002 the Secretary of Education David Blunkett, in response to the failed Labour Government strategy of the 'Fresh Start Scheme' agreed that "a more radical approach" was needed in order to tackle the problems of underperformance of schools. The Labour government's radical approach was the introduction of a public-private partnership (PPP) in the sector hence the Academy School policy. The decision to take this policy approach was hinged on successes seen within the independent school sector and the private sector as a whole. The government's justification was that such partnership will ensure that professionals within the private sector can bring their skills into improving the public schools and hence

raise standards. But do such partnerships really raise standards? Have they done so in the current Academy Schools?

The Labour government established Academy Schools or Sponsored Academy Schools sometimes referred to as traditional Academy Schools. The first three Sponsored Academy Schools opened in 2002 and by 2006 there were 46 established Academy Schools; these included five former City Technology Colleges and five schools opened with no predecessor schools. Half of these schools were opened in London due to the higher density of underperforming schools within the city. The Labour government's initial target was to open 200 Sponsored Academy Schools by 2010. Due to the perceived success of the Academy Schools, the government doubled its target to 400 schools joining the programme.

Figure 4 shows the slow start in the total number of Academies (Primary, Secondary and Special Schools) established in England up to the end of the 2013/14 Academic year. Close to the end of the Labour government's leadership of the country in May 2010, the number of established Academy Schools per year drastically increased. There were no signs of a slowdown in the conversion of schools into Academy Schools by the government. The government have supported the establishment of more sponsored and Converter Secondary Academy Schools all over the country. Figure 5 shows a more detailed view of the number of secondary Sponsored Academy Schools in operation up to 2014. The characteristics of Sponsored Secondary School Academy Schools have changed over time. The changes have been more rapid and since the later years of the Labour government which increased the number of Sponsored Academy School. This work is focused only on the Sponsored Secondary Academy Schools. Thus, where ever the term "Academy Schools" is used, it refers to Sponsored Secondary Academy Schools only and not Sponsored Primary Academy Schools or Converter Schools.

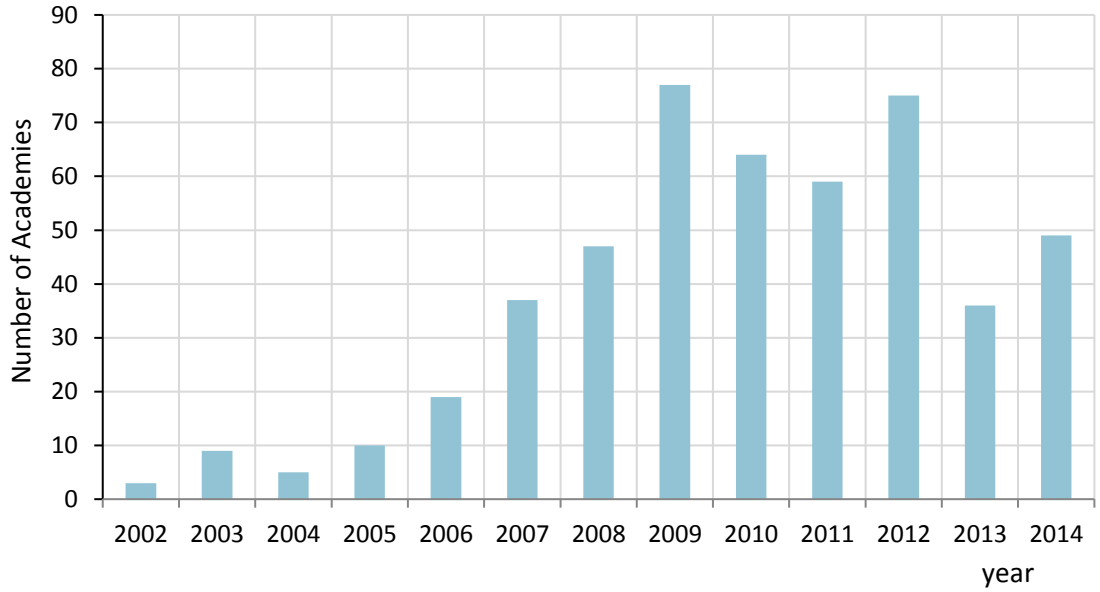
Figure 4: Increasing number of Primary and Secondary Sponsored Academies over time



Notes: Source – School Performance Tables
www.gov.uk/government/uploads/...data/.../SFR15_2014_national_tables_v101.xlsx

The Sponsored Academy Schools model allows for Academy Schools to be established in partnership with government by sponsors from business and faith or voluntary groups. Capital costs were to be provided by the sponsors and the DfE. Running costs were to be met by the DfE in accordance with the number of pupils, at similar levels to that provided by local education authorities for maintained schools serving similar catchment areas. Sponsored Academies share some of the characteristics of independent schools such as management's powers to determine all staffing decisions, freedom to make major curriculum decisions, freedom to determine the structure and length of the school day and they are legally allowed to select up to 10% of their intake based on aptitude in the Academy's specialism and decide on school budget and policies. Academies follow less restrictive curriculum when compared to other school types due to the fewer restrictions on the curriculum they are legally allowed to offer. They are only required to follow the national curriculum in English, Maths, Science and ICT (DfES, 2007) and free to impact strongly on all other curriculum they offer. The first batches of non-CTC converted Academy Schools were established in 2002.

Figure 5: Number of established Secondary Sponsored Academy Schools over time



Notes: Source – School League Tables
(www.gov.uk/government/uploads/...data/.../SFR15_2014_national_tables_v101.xlsx)

A comparison of pre-treatment school characteristics by Machin and Vernoit (2011) showed that when compared with other grant maintained secondary school types in England, schools that later converted to Academy Schools have higher proportion of pupils with Free School Meals (FSM) eligibility. The higher FSM ratio supports the notion that the pupils attending the earlier Sponsored Academy Schools were socioeconomically more underprivileged than pupils of other schools. Pupils of pre-treatment schools of Academies have an unusually higher percentage of unauthorized half school days absences. A high percentage of the pupils in the pre-treatment schools also have lower proportions of pupils who achieved the equivalent of 5 or more GCSE or more good grades (A*-C) including English and Maths when compared to other schools. Machin and Vernoit also showed that at entry into year 7, the pupils of the pre-treatment schools achieved lower grades at KS2. This of course is a measure of the quality of the pupils attending these schools. Sponsored Academy Schools are initially secondary schools but now comprises of about the same number of secondary schools as primary schools.

2.1.2 Converter Academies

The first sets of Converter Academy Schools were established in 2011. The Converter Academy Schools policy was enacted into law by the government in 2010 as part of government's plan to broaden the Academy School systems. The policy allows for Grant Maintained Schools to voluntarily convert to Academy Schools in order to benefit from the increased autonomy brought about by a gain in Academy School status. The Converter Academies came about as a result of fast-track treatment into the programme. Before conversion, these schools were Grant Maintained Schools rated 'outstanding' by Ofsted. The fast-tracking of schools was done through the Academy Schools Bill of July 2010.

The then Secretary of Education, Michael Gove reiterated the government's commitment to greater freedoms the education system. He also stated the government's trust in the teachers and head teachers in running their schools. This would suggest that the government favoured the transfer of the administration of more schools from the LEAs to the school's trust as seen in the Sponsored Academy Schools. These schools are not required to have sponsors but must have a school trust responsible for all major administrative decisions. By January 2011 there were 407 Sponsored and Converter Academy Schools opened in England. As at September 2011 there were 348 'Academy chains'. An overwhelming majority of Academies are Converter Academies. As could was seen in Figure 3, as at January 2014 were 2,616 Converter Academies and 997 Sponsored Academy Schools with the numbers almost equally split between primary and secondary schools. It could be argued that not enough time has been spent on investigating the effects of converting to Academy Schools. Although the government was interested in modernising the Grant Maintained Schools infrastructure, more time and resources should have been dedicated to studying the effects of such conversions on pupil sorting as a result of the conversion and key education indicators of achievement.

2.2 Key features of Academy Schools

Several distinctive features of Academy Schools clearly delineates these schools from other UK school types. These features are outlined in this section.

2.2.1 Autonomy

One distinctive feature of Academy Schools is the issue of autonomy. These schools were designed to be fully managed by trusts and governing bodies hence granting them independence from LEAs. The view of policy makers is that having the LEAs in the chain reduces efficiency in the decision making process thus negatively affecting school management. School funds from the central government had traditionally been sent to the schools through the LEAs who had the responsibility of administering schools within their jurisdiction. The LEAs had the responsibility for employing staff, teacher pay and all other priority decision. Because of these influences of the LEAs in the decision making process, underperformance in the education system was laid on the doorsteps of the LEAs.

Bypassing of the LEAs results in savings and enables higher per pupil funding and teacher salaries (Gadkowski, 2007). If indeed the cost per pupil has risen as a result of Academy Schools conversion, it should be of public concern if the Academy Schools are not increasing student achievement significantly above that of similar school that are still under the control of the LEAs. Although studies of the National Audit Office (NAO) and that of PriceWaterHouseCoopers (PWC) did observe some increases in outcomes, the academic research community has generally observed positive impact in pupil achievements post-conversion.

Increased autonomy is intended to substantially improvement school efficiency but such a move only removes one substantial administrative layer which could be defeated by gross internal inefficiencies within the schools themselves. Assignment to Academy School status also removes controls over buildings and staffing decisions from the LEAs giving these powers to school senior management teams and governors. It was also obvious that many of these Academy Schools found it difficult to recruit quality staff on establishment. Many are still suffering from these problems due to the general difficulties in recruiting quality staff to underperforming schools. In order to overcome this difficulty, the freedom granted these schools over budgeting matters has meant that the schools had paid higher wages to less qualified staff to recruit and retain such staff thus adding significantly to their costs.

2.2.2 Governing Bodies and Trust

All Academies at the point of establishment are legally required to have an Academy trust and a governing body. All single conversions have an Academy Trust and a governing body while some groups of Academy Schools have a single trust creating a similar layer as the LEA hence distancing the trust from the school management. In some cases, inefficient trust would create some degree of inefficiency rather than improve efficiency. The responsibility of the trust is to set out the strategic vision and ethos of the school and oversee the governing body. Academy trusts must have annual meetings and agree on annual reports. They also have legal responsibilities such as staff employment, student admissions and are the owners or the lessee of the land and buildings.

Governing bodies of the predecessor schools of Academies are not legally required to reconstitute the governing body but are almost completely reconstituted on inception. It is common to have a 13-member governing body with 7 members being appointed by the sponsor at commencement of the Academy School subject to approval by the central government education department (Astle and Ryan, 2008). Early Academy Schools were not required to appoint elected community or staff representatives to their governing body, nor were they required to have more than one elected parent governor and one LEA representative (Rogers and Migniuolo, 2007).

Academy Trusts usually have fewer members than the governing body, and may have representatives from other organisations such as a university or charity. Some multi-Academy trusts have local governing bodies for each Academy within the trust operating as a committee of the trust and may have less autonomy and fewer delegated powers than the governing body of single Converter Academy Schools. Other multi-Academy trusts have a hard federation organizational format such that the Academy trust is directly responsible for all the schools within the group with no local governing bodies. The governing body of the Academy has full delegated powers and operates in a similar way to the governing body of the original school, although with some new responsibilities including admissions and appeals, finance and accounting, human resources and estate management.

One criticism of moving from LEA control of the school to the control of Academy Trust is that unless the Academy Trust and its governing body are very dynamic and have impacted more positively on the schools, it could be said that the government has simply move the financial responsibility from one body to another without any advantages. This is especially so because all Academies are ran by qualified teachers and headteachers from the school system they are working on improving. Recruitment is done by the governing body through the headteachers and the staff allocations, observations and responsibilities for the improvement of student outcomes are in most Academies under the jurisdiction of the headteacher through his or her choice of recruited staff. An advantage though is that the Academies recruit for the best headteachers in a position to achieve targets and pay for these services. Critics would also argue that if such a freedom is given to the LEAs that they could achieve more than the Academies have done.

2.2.3 Sponsorship and Funding

Sponsors of the earlier Academies are from business fields, religious organisations, high-performing schools, further education colleges, sixth-form colleges, the voluntary and charitable sectors and individual philanthropists. Sponsors have voluntarily taken up sponsorship and or become sponsors through government invitations. On approval of a school for conversion to an Academy School, sponsors receive a grant to cover the pre-opening costs. These include costs such as staff recruitment cost, project management cost and legal advice. As at the time of this work, three levels of start-up grants exist: fast track (most Sponsored Academies follow this route), intermediate (support for schools needing more financial support than fast track provides, but less than full-Sponsored Academies) and full-Sponsored Academies (highest level of funding support available).

Originally, capital financing agreements with government required sponsors to put forward the lesser of £2 million or 10 per cent of capital costs towards the development of a new or refurbished Academy School building, payable over the lifetime of the building project. Since the 2005/06 session, building costs have subsequent been covered entirely by the Building Schools for the Future (BSF)

capital programme hence one good reason why many outstanding schools chose to participate in the Academy School programme.

2.2.4 Admissions

Although the full details of a school's admission policy is defined in the funding agreement with the government, the governing body makes all final decisions locally on the schools' admissions policy. With an exception of students that decide to seek admission in other schools, all newly formed Academies are required to readmit all students from the predecessor schools. These schools are generally non-selective schools hence could not prioritise admissions based on aptitude. They are however allowed to prioritise 10% of student admission based on aptitude.

2.2.5 Staffing

Principals were initially hand-picked by sponsors in the earlier established Academies. This decision was later made by governing bodies that now have final decisions on the employment of school staff. The advantage of this localisation of employment responsibility includes expediting of employment decisions, making quicker rationalisation of staff numbers, control pay structures, create a pay structure if required, have direct decision making responsibility on the quality of teaching staff and use of pay structures to enhance recruitment and retention of staff. The LEAs are not involved in these decisions.

2.2.6 Accountability

The governing bodies of existing Academy Schools are mainly directly accountable to the Secretary of State for Education. All possible changes to pre-funding agreement with the government must be approved by the secretary. As in all other secondary school systems, the Office for Standards in Education (OfSted) school inspections body is responsible for the monitoring and maintaining of compliance to national set standards of education provision.

2.2.7 Curriculum

Earlier cohorts of Academies were not required to adhere entirely to teaching the National Curriculum as done by Grant Maintained Schools. Instead their curriculum

was to be broad and balanced only requiring teaching and assessment in the core subjects of English, Maths and Science at Key Stage 3. The Sponsored Academies have been encouraged to be innovative in their choice of Curriculum. Governors and senior managers of Academies have the flexibility to develop a curriculum catering for the needs of individual low-attaining pupils. Additionally, Academy Schools are specialist schools and as such their curriculum includes a focus on chosen specialist subject(s) (Gadkowski, 2007). However, it is largely agreed that regulations combined with restrictions imposed by the National Curriculum have prevented most autonomous schools from pursuing a particularly distinct curriculum or identity (e.g. Bush et al., 1993; Sherratt 1994). One unintended consequence with the flexibilities given to Academies is that they have been able to 'game' their average GCSE outcomes by using non-traditional courses such as the diploma or vocational qualifications.

2.3 English Free Schools

Free Schools are all-ability state-funded schools administratively similar to the Sponsored and Converter Academies. The main differentiating features of these schools were expected innovations resulting from granted degree of freedom. Free Schools, Labour government's Sponsored Academies and the UK Government's Converter Academies have the same legal status as semi-independent schools. Like Academies, they are state funded independent schools held accountable through a legally binding funding agreement with the government.

A difference between English Free Schools and Academies is that Free Schools could be set up by parent and teacher groups. Free Schools are set up in response to the aspirations of local population for their children. The application for Free School establishment are in two stages – a proposal and a business case. The business case must detail all aspects of the school and demonstrate clear demand from parents for the particular provision being offered. They are mostly entirely new schools and independent schools seeking to become state funded schools for the first time. They are legally allowed to prioritise up to a maximum of 50% of school admission on religious affiliation. Like Academies, they could legally prioritise 10% of the student intake based on aptitude. Lastly, Free Schools can employ unqualified teachers (teachers without Qualified Teachers Status (QTS) or

uncertified teachers) but the Special Educational Needs Coordinator (SENCO) must be QTS qualified.

Free Schools can be primary, secondary, middle, or all-through schools offering nursery places. Free Schools are continuously being funded by the Education Funding Agency (EFA) and from the 2013/14 financial year, they were designed to be funded on new locally determined funding formula in line with all other schools as part of the wider reforms to school funding. As at the end of the 2013/14 school year, 72 Free Primary schools had opened, 76 conventional Free Schools and special Free Schools have been opened. Table 2.2 shows that Free Schools are a very small minority of the schools operating in England and are 174 schools in all.

2.4 Review of Existing Literature

Evidence of Academy Schools, their increased autonomy and their impact on the average academic outcomes of pupils and the impact on the quality of pupils admitted into these schools are discussed in this section. Despite the number of years of Academy Schools policy enactment and establishment, available evidence on the policy outcomes is still relatively limited. At the moment, the key published research work on the outcomes of Academies as a result of treatment include the five year research work done by PriceWaterhouseCoopers (PWC, 2008), Machin and Vernoit (2011), Machin and Wilson (2009), National Audit Office report (NAO, 2010) Gibbon and Silva (2011) and Eyles and Machin (2014).

2.4.1 Machin and Wilson (2009)

Machin and Wilson (2009) set out to investigate the impact of Sponsored Academy conversion on pupil achievement by comparing the average student outcomes of two identical schools contextualised on school characteristics. One group of schools was treated (Sponsored Academy Schools) and the other was not treated (comparison group). Machin and Wilson however noted a number of problems with comparing of Sponsored Academies with the national GCSE average outcomes. They believed that comparing such results of Sponsored Academies with national GCSE average outcomes invalidates the results of the PwC Report (2008) which also compared school outcomes with national averages. Both Machin and Wilson

(2008) and PWC (2008) admitted that drawing any strong conclusion from their results would have been precipitous.

The Methodology adopted by the authors in their work was the matching of each Sponsored Academy School with the nearest underperforming school through a one-to-one match on pre-policy exam levels and trends in pupil achievement. They also stated that they reported “results using all other secondary schools in the Sponsored Academy’s Local Education Authority (LEA) as a comparison group”. If the average outcomes of all schools in the LEA were matched with that of the Sponsored Academies, there would most likely be a significant difference in trends resulting in poor estimations. The Sponsored Academy Schools queried by the authors were all established between the years 2002 and 2003.

Using the measure of 5 GCSE with or without Maths and English, Machin and Wilson estimated increases in the results of matched untreated schools’ performed over that of Sponsored Academy Schools. The paper found increase in outcome of the 2002 and 2003 Sponsored Academy Schools cohort but the increases were less than increases in the LEA schools and the untreated matched schools. On investigating the pre-conversion trends of the Sponsored Academy predecessor schools and the comparison schools, the authors found consistently stable negative gaps between the Sponsored Academy predecessor schools and the comparison schools over time in the years prior to Sponsored Academy status. The authors mentioned their expectation of a dip in outcomes just before Academy School conversion. This dip in outcomes just before conversion was believed by the authors to explain the negative impact seen in their difference-in-differences estimates after conversion. The overwhelming pattern in the estimates showed no short-run impact on GCSE performance as a result of increase in autonomy.

2.4.2 PWC (2008)

“PwC was commissioned by the predecessor of the Department for Children, Schools and Families (DCSF) in February 2003 to conduct an independent longitudinal evaluation of the Academies initiative over a five-year period. The overall aim of the evaluation was to assess the programme’s contribution to educational standards and to examine the key features of Academies, including

sponsorship, governance, leadership, teaching and learning, and buildings. This is the final report in the series. The study included qualitative and quantitative evaluation, as well as analysis of pupil data and other documentary evidence: an account of the methodology is set out in Chapter 2". PWC was commissioned to research several questions by DCSF of which only two questions are in the scope of this research work.

The methodology adopted was designed to ensure a range of comparable data for the five years of the treatment of the Academies. These where all data of treated schools available at the time of the research work. They adopted a quantitative research method in querying the student achievement at school level. PWC examined administrative records on pupil profile and performance for over 20,000 Sponsored Academy School pupils over the period 2002‑07, and compared these with similar data for pupils in the Sponsored Academies' predecessor schools and a comparison group of schools. From this data, they conducted annual analysis of data on pupil characteristics and performance. PWC's work was a quantitative analysis of "pupils' educational performance at Key Stages 3 (KS3), GCSE and Post 16; rates of pupil attendance and exclusions; and the evolving nature of Academies' pupil population in terms of pupil numbers, social deprivation, ethnicity and Special Educational Needs (SEN). To assess the impact of teaching of the core subjects on overall performance, the impact of increased autonomy on five GCSEs at grades A-E across all GCSE subjects, and on the measure of five level 2 GCSEs with English and Maths included were analysed.

PWC researched the developing nature of Academy pupil intake into Year 7 by examining the Key Stage 2 (KS2) prior attainment levels of the students taking up Academy School places. They then compared Academy Schools students' end of KS3 attainment data to national averages (i.e. all maintained schools in England) as well as three key Comparison; "Comparison Group 1: all schools in the lowest 15% of the national distribution for their average KS2 prior attainment level; Comparison Group 2: all schools in the lowest 10% of the national distribution for their average KS2 prior attainment level; and Comparison Group 3: Overlapping Intake Schools (OIS) i.e. secondary schools whose feeder-primary schools overlapped with that of the Academy Schools. PWC stated their "rationale for the

use of Comparison Groups 1 and 2 was that Academy Schools replaced failing schools hence their progress would need to be compared with that of low performing schools more generally. This was to ensure they are identifying the added value of Academies in particular, not the impact of any general increase in standards (the subject of a separate set of initiatives). These two Groups include all schools with the pupil performance criteria used and are not further sampled on the basis of any other pupil characteristics. The latter dimension which was likely to include schools with comparable profiles for ethnicity, prior attainment and deprivation was covered in Comparison Group 3. The Free School Meal (FSM) characteristics of the students was the only measure of social deprivation used.

PWC concluded that as a group, 48% of 15 year old pupils of Academy Schools did achieved GCSE level 2 in 2007. They found this to be below the outcome of 58% in the OIS and the England average of 61%. It was also said to be slightly higher than the 46% achieved by their Comparison Group 1 and the 45% achieved by their Comparison Group 2. When the five subjects included Maths and English, they found the proportion of students achieving GCSE Level 2 much lower at 27%. This was attributed by the PWC to lower scores in Maths and English language compared to other subjects. Their key findings based on the research questions are that the average Academy improvement of 8 percentage points of all the Academy Schools irrelevant of the year of establishment exceeds that of the 4 percentage points achieved by the Comparison Groups. They also found it to be greater than the 2 percentage points seen in England as a whole. When achievement included English and Maths it was concluded in the analysis that the average Academy improvement reduces to 5 percentage points. It exceeds the Comparison Group's 2 percentage points and the gains of 1 percentage point seen in England as a whole.

PWC also concluded as part of their findings but not in the initial research question that the general pattern was one of growth in the total number of places offered by the Academy Schools hence an increase in the average size of Academies from 753 pupils in 2002 to 951 in 2007. It is also stated in the paper that their findings would suggests that Academies are meeting the needs of a wide range of pupils according to a number of different criteria set out at the onset of Academy School

policy. They found that the average percentage of pupils in Academy Schools with EAL background to be a percentage point higher than that of OIS and significantly above the 11% for England as a whole. They also found that the average level of prior achievement of pupils entering Academy Schools measured by Average Point Scores at Key Stage 2 was below the England average in 2007 by 1.4 points. It was however said to be above that of the predecessor schools in 2002 by a point. The overall percentage of pupils with SEN across all 24 Academies in 2007 (33%) was found to be considerably higher than the average for the OIS group (23%) and for England as a whole (18%). There were, however, marked differences between Academies, with two Academies reporting in excess of 50% of pupils with SEN and two others having percentages below the England average. Each Phase of Academies has seen an increase in the number of SEN pupils, substantially greater than that experienced in other similar schools. The greatest increase was in Phase 2 and Phase 3 Academies.

2.4.3 National Audit Office (NAO)

To assess the progress of Academy Schools in the improvement of educational achievement of their pupils, NAO compared the performance of the 62 Academy Schools that had at least two years of GCSE results in 2009 with the results of comparable maintained schools with similar intakes. They matched 5 comparator schools to each Academy School using measures of social deprivation and prior attainment of pupils. Social deprivation was measured by the proportion of pupils registered as eligible for Free School meals and prior attainment of pupils was measured by national test results in their last year of primary school. Justified by the larger scope for improvement by lower achieving schools, NAO took account of the proportions of pupils achieving five or more A*-C grade GCSEs or equivalent (including English and mathematics) when the Academy opened. Two separate groups of comparator schools were used to reflect the changes in the types of schools becoming Academy Schools. The first group of comparator schools include the schools matched with the 21 ‘earlier Academy Schools’ opening before 2006 (105 comparator schools), while the second group of comparator schools is with the 41 ‘later Academy Schools’’ that opened in or after 2006 (205 comparator schools).

The methodology adopted by NAO for the analysis of GCSE results of the 62 Academy Schools is based on the existence of GCSE results for at least two years post establishment (with the exclusion of former City Technology Colleges, former Independent Schools and former Primary Schools). The principal method used for this study by the NAO is the quantitative analysis of school-level and pupil-level data to examine Academic attainment and achievement, rates of absence and exclusion, and trends in pupil intake etc. The published paper had several research questions one of which is on the academic performance of the Academy Schools. Their study was a school-level and pupil-level quantitative analysis. The research was a statistical analysis of academic performance of achievement of pupils attaining five or more GCSEs at grade A*-C or equivalent. This measure was done with an inclusion of English and Maths where this is the best GCSE grades for the pupil and without necessarily including English and Maths for the years 2002-03 to 2008-09. NAO used the method of propensity score matching as was used by the then Department of Education in determining comparator schools. This technique uses a statistical package to calculate the probability of a maintained school being similar to an Academy School based on the measure of social deprivation and prior attainment at the end of KS2.

They matched each Academy to five Maintained public schools with replacement method used where there were clusters of very similar Academy Schools. NAO allowed for schools to be comparator school for more than one school based on the propensity scores but this was the case for a few schools. Their data showed 37 comparison schools were selected twice, eleven were selected three times, three schools selected five times and seven selected four times. In comparing the performance of pupils from different backgrounds, NAO examined the performance of pupils eligible for Free School meals, pupils for whom English is an additional language and pupils who have special educational needs. Pupil-level performance by ethnicity categories was not reported due to the small numbers involved in several cases.

NAO also compare the results of the Academies with that of neighbouring schools. They sought to determine whether there is any association between the opening of an Academy School and a change in the intake of its nearest neighbouring

Schools. They classified neighbouring schools as schools located within 1.5 miles of an Academy School. The schools have to be in the same LEA but could be in adjacent LEAs when within London. This research work is taking the distance between the closed Academy School and the new site of the new building as 1.5 miles and could be in adjacent LEAs because students would normally attend the closest schools to their houses irrelevant of the LEA.

They then ran multiple regressions with an output variable of the 62 Academy Schools' average annual growth rates in percentage of five or more A*-C grade GCSEs or equivalent (including English and mathematics) absolute terms and relative to each Academy Schools' comparator schools. The regression analysis were ran to test features of the Academy Schools' model for correlations with higher rates of school improvement.

NAO concluded that at the time of publication of their report, most Academy Schools were achieving increases in academic attainment for their pupils compared with their predecessor schools. They however noted that although the results were still below the national average. The proportion of their pupils achieving five or more GCSEs at grades A*-C or equivalent was said to be improving faster than the same rate for maintained schools having similar intakes. A small number of Academy Schools were said to have made little progress, particularly when English and mathematics were included in the measure of achievement.

2.4.4 Machin and Vernoit (2011)

Machin and Vernoit investigated the impact of Academy School conversion on pupil intake, pupil performance and possible external effects working through changes in the pupil intake. They also investigated the impact of conversion into Academy School on the pupil performance of neighbouring schools. The paper considered these lines of enquiry over the school years 2001/02 to 2008/09. To bypass the inherent selection bias seen in previous evaluations of Academy Schools, they compared the outcomes of interest in Academy Schools to that of a specific group of comparison schools, namely those state-maintained schools that later went on

to become Academy Schools after the end of the sample period. This approach was done to produce a well-balanced treatment and control group of schools.

The comparison groups of schools used by Machin and Vernoit (2011) were state maintained schools during the sample period but later went on to become Academy Schools. These schools were termed ‘Future Academies’. Future Academies may have other unobservable characteristics similar to that of the Academy Schools hence this approach would be appropriate. The study adopted similar Academy cohort groupings as was done by Machin and Wilson, PWC and NAO. The cohort groupings is made up of Academy Schools grouped as of earlier and later established Academies.

Machin and Vernoit tracked pupil-intake quality of each school over the 2001/02 to 2008/09 period through the use of the average standardised KS2 total points score of their year 7 pupils. The paper used four different specifications to report estimates of the impact of Academy status on its pupil intake. Difference in difference modeling was used contextualizing for time-varying controls variables. The paper also estimated heterogeneous effects for different cohorts of Academies by first placing the first five Academy cohorts from the treatment group into an early group and the remaining two Academy cohorts of Academy School into a late group. Separate estimates of Academy effect was then found for each group. The comparison schools are the latter two Academies cohorts while the first set of converted schools were considered taken as the treated group.

A difference-in-difference methodology was adopted by Machin and Vernoit in their study of the impact of Academy School conversion on academic achievements and the study of the quality of pupils admitted into these Academy Schools. Machin and Vernoit placed the first five cohorts of Academies into the earlier Academy group and the latter two cohorts of Academy Schools of their treatment period in the later Academy group. The possible problem with doing this is that the pre-conversion outcomes of the later Academies were much higher than the outcomes of the earliest Academy Schools. There are no clear demarcations or investigations justifying the decision to keep this group separate. A direct comparison of these two groups will suffer from unmatched group bias. Because the later Academies

have better pre-conversion characteristics than the earlier Academy Schools, they have less scope for increase in outcome hence affecting the impact estimates.

Contrary to the longitudinal trend investigated by Machin and Wilson, NAO, PWC, Machin and Vernoit assumed that a one-time effect on the outcomes of interest would suffice in explaining the Academy effect. This approach would suggest that the estimated Academy effect is not a function of time. Taking strictly a one-time effect would suggest that value of the outcome of interest of any year in the life of an Academy would be consistent with the value in any other year. This idea would be suspect since Academy outcomes have evidently increased over time and not at a uniform rate either. An average effect over time would compare average impact resulting from trends.

Machin and Vernoit used a school-level difference-in-difference method to estimate the impact of an Academy School conversion on pupil performance after using matching approaches in matching treated schools to untreated schools. The same approach was used by Machin and Eyles, NAO and Machin and Wilson.

Machin and Vernoit estimated the parameter of interest, the coefficient δ in the difference-in-difference equation in equation (4) seen below for school s in year t.

$$y_{st} = \alpha_s + \alpha_t + \delta A_s * PolicyOn_{st} + \sum_{j=0}^{J} \lambda_{1j} X_{jst} + u_{1st} \quad (4)$$

Where y was denotes the outcome of interest, A is a dummy variable that equals to 1 for treated schools and 0 for schools in the control group. PolicyOn is a dummy variable equal to 1 for each school s in year t for every year the Academy status has been awarded otherwise equals 0. X_{jst} was described as a set of control variables, α_s are school fixed effects, α_t represents the year fixed effects and u_{1st} is an error term (Machin and Vernoit, 2011).

Machin and Vernoit concluded that the published empirical results demonstrated that an Academy School conversion increased the proportion of their pupils who achieve the equivalent of five or more GCSEs at grades A*-C. The increase was found to be by an insignificant 0.095 standard deviations and with English and

Maths included. This average performance effect changed to an insignificantly lower amount of 0.071 standard deviations when all controls except average KS2 standardised test scores were added. The authors also showed that the KS4 performance improvements due to the Academy School conversion were substantially higher in the earlier Academy School conversions than in the later Academy Schools. These earlier Academy Schools conversions saw a KS4 performance increase by a statistically significant and non-trivial 0.181 standard deviations compared to the 'later' cohort Academy School conversions which saw a decrease in their KS4 performance by an insignificant of 0.029 standard deviations. When average KS2 standardised test scores were added to the list of controls, see that the performance improvements for the early Academy School cohort conversions remain higher than was seen in the later Academy Schools.

On the impact of Academy School conversion on the quality of pupil intake, Machin and Vernoit concluded that on average, schools responded quickly to an increase in school autonomy through Academy School conversion by sharp increases in the 'quality' of their pupil intake at year 7. They suggested that this result was largely driven by the early cohorts of schools that converted to Academy Schools. The improvements in the quality of pupil intake by the early Academy School cohorts were found to be significant compared to the later Academy Schools. Besides seeing higher improvements in the early Academy Schools, Machin and Vernoit believed that the performance improvements of Academy Schools are a function of time with scope to be replicated in later cohorts of schools that convert to an Academy if given more time.

The publication also finds that neighbouring schools consistently experienced a sharp decrease in the 'quality' of their pupil intake at year 7. They however highlighted the large significant improvements in pupil performance of neighbouring schools compared to Academy Schools despite the reduction in the quality of student intake. This they suggested means it is possible for performance improvements in Academy Schools to generate significant beneficial external effects on their neighbouring schools. This would suggest that overall, there are increases in pupil achievement overall and across board nationally.

2.4.5 Eyles and Machin (2015)

This publication developed mainly on the foundation laid by Machin and Vernoit (2011). Like Machin and Vernoit, Eyles and Machin estimated the impact of increased autonomy on the achievement of pupils and on Academy School conversion on the quality of pupil intake. In studying the causal impact of Academy School conversion on pupil intake and pupil performance, Eyles and Machin considered data on pupils in schools over the school years 2000/01 to 2008/09. Data within these years were included in the study because they cover the before and after conversion timeframe required for estimation of the impact. They compared outcomes of interest for children enrolled in Academy Schools to outcomes of pupils enrolled in a specific group of comparison schools. These schools are state maintained school that later went on to become Academy Schools after the end of the sample period. This is the same approach taken by Machin and Vernoit. The main data source used is the National Pupil Database (NPD), the annual National Curriculum key stage attainment data at the pupil level and the Pupil Level Annual Census data (PLASC) data containing information on characteristics of all pupils in the English maintained sector.

To study intake for pupils enrolling in secondary school in year 7, the first year of secondary school, Eyles and Machin looked at the KS2 test scores (KS2) taken by pupils at the end of primary school. To study performance in year 11, the final year of compulsory secondary schooling, we look at the key stage 4 (KS4) examinations that pupils take at the end of compulsory education in grade 11. The investigation of the quality of pupil intake was done by interrogating the KS2 test scores taken at the end of primary school. In particular, the standardised KS2 total point score with a mean of zero and standard deviation of one of pupils who enrolled into year 7 of Academy Schools was queried for changes in student quality. As in Machin and Vernoit, this measure is more common to all schools. There are no evidence in dip as a result of an Ashenfelter dip in the report of Machin and Vernoit and Eyles and Machin. .

As was done by Machin and Vernoit (2011), Eyles and Machin in the study of the quality of pupil intake adopted a difference-in-difference methodology. This was done in the estimation of two pre-conversion differences between the pre-

conversion years of the converted Academy Schools and the comparison schools. The same is done for two conversion years of the Academy Schools and the comparison schools. They also allowed for heterogeneous effects by recognising that Academy Schools with different forms of predecessor schools gain different amounts of autonomy when on conversion to Academy Schools. They also allowed for differences by 'autonomy distance' by allowing effects to vary with the type (conversely the degree of freedom in the pre-converted school) of predecessor school. Two separate versions of the impact estimates for Academy School conversions from community schools and conversions from non-community schools was done. The reason for doing this was based on the presumption that the autonomy distance is largest for conversions that take place from predecessor community schools. This presumption is based on empirical evidence seen in their work.

In studying the effect of increases in autonomy on pupil performance Eyles and Machin looked at the Key Stage 4 (KS4) performance of year 11 students. Contrary to the approach adopted in the study of the pupil intake, three specifically, three important empirical strategies where used to justify causal effect of Academy School conversion on pupil performance. These include the consideration of children whose parents made their decision to enrol their children in the Academy Schools before it converted. This the authors said does ensure that Academy School conversion was exogenous to enrolment in secondary school. They also limited the event study on pupil performance to a maximum of four years post conversion (including the year of conversion itself). The authors when compared to earlier publications have significantly more data to work with as a result of most Sponsored Academy Schools being established for a significant number of years. The number of years of pre-conversion or post-conversion studied by the authors is most significant compared to other papers. If at all significant, the number of years of post-conversion studied would test the idea seen in Machin and Vernoit that ‘Academy Effect’ is time-dependent.

In conclusion, and contrary to a report produced by the Education Select Committee on England’s school system which stated that ‘there are no clear evidence that Academy Schools raise standards overall’ as reported in a BBC

(2015), Eyles and Machin concluded that post-conversion Academy Schools attract students with higher KS2 outcomes than the pre-conversion schools and over schools that became Academy School after the 2002/03-2008/09 sample period. Eyles and Machin's results suggest that (on average) there has been a step-change in the pupil intake of schools when they convert to Academy School status. Such schools they found attract and admit higher ability pupils once they convert to Academy Schools. 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, it could be suggested that such substitutions will generate a more pronounced impact on the neighbouring schools (given the closeness in proximity).

Eyles and Machin found that the pre-conversion schools showed no differences in trends between pupils in the treatment and control schools pre-conversion. Their results showed that a conversion year impact gain in GCSE grades at A*-C of 0.010σ. This rose year on year post conversion with more statistically significant results reaching up to 0.082σ by the fourth year. The results of the first four years of the life of Academy Schools would be the results of students already in the Academy Schools on conversion hence do not reflect the results of students that later joined the Academy Schools or any changes in intake quality post conversion.

In a more recent paper, Eyles et al. (2016) found that over time, some early Academy Schools showed positive effects in student outcomes at the end-of-compulsory schooling. Their findings were somewhat different from that of Gorard (2009) who highlighted instances in which earlier Academy School students performed worse over time rather than better. In his report, Gorard however warned that it was too soon to evaluate fully the overarching effects of 'mass' Academisation. A recent analysis by the Local Government Association (LGA 2016) has suggested that Academies in England on average do not perform 'better' than schools which have continuously been under the maintenance of the LGA's. The paper demonstrated that there is a broad similarity between Academy School student performance and schools that have continuously been under LGA management.

2.4.6 Summary

Impact on Achievements

Overall, the earlier publications compared the outcomes of the Academy Schools to comparison schools that may not necessarily reflect the true impact of Academy School conversion on schools. Schools with similar trends in outcome prior to treatment would be good comparisons. Comparing final outcomes with LEA and national schools could give some perspective of the state of affairs with the Academy Schools but would not give impact estimates. All of these earlier publications queried data for all years of the sampling period in their investigations with exemptions. The same is done in this work but with more exemptions as described here. Eyles and Machin worked on a 4-year post-conversion study (which is the study with the longest post-conversion study). This paper on the other hand is not forcused on a long term study of the Academy effect over a very long term. It is however looking at the study over the earliest two years of the life of an Academy School. Like Machin and Wilson, a two-year treatment period will be investigated as Academy impact effect may be a function of time but such effect would be difficult to justify over a very long time span greater than 4 years. This paper uniquely queries much larger amount of data than the earlier papers and drastically reduces the distance between the pre-converted school and the new school in the case where the Academy opened in a new site. This is done to ensure that the school characteristics between the pre-conversion school and the converted are the same.

A clear argument has been about the method adopted by these earlier papers, the data refining decisions and the choice of the comparison groups. This paper seeks to use the method adopted by almost all of these papers (difference in difference method) exempt all data from the first year of establishment of each Academy School and expand the comparison group of schools to a national population of schools with similar pre-conversion characteristics as the Academy Schools. This work also queries other measures of student outcomes such as the Maths, English and capped GCSE standardized z-score of the best 8 GCSE score of the schools.

Impact on Pupil Intake Quality

The comparison group as estimated by Machin and Vernoit are less representative of the treatment group compared with similar comparison by Eyles and Machin. Like Eyles and Machin, Machin and Vernoit also found significant improvement in the intake quality of Academy Schools after Academy School conversion. Based on similarities in characteristics between Academies and schools that later became Academies both papers adopted the future Academy Schools as the comparison group. Perhaps better match of schools could be achieved by looking for matches nationally irrespective of school type. The same group of nationally expanded comparison schools will be used in the investigation of the intake quality of students accepted into these Academy Schools.

Aggregate school level data is being queried here for the changes in pupil quality against the pupil level studies done by all or the earlier publications. The control group is the control group derived from the first research question and estimates impacts of pupil quality using the measures of school standardised KS2 total scores, the KS2 Maths, English and science z-scores. This wider analysis of student quality has not been done by any of the earlier papers. The sampled period will also be four treatment years and not a one-time effect or very long term perspective of the earlier publications.

2.5 International Examples of Autonomous School Systems

This section highlights other none UK semi-autonomous school systems and their similarities to the English semi-autonomous schools. This section also reviews literature on the impacts of these school systems on the individual country's education systems. It is essential to discuss some of these systems and literature as the then UK Labour government cited some of these schools as evidence for why successes of such semi-autonomous school systems were credible reasons for setting up the Sponsored Academy Schools.

2.5.1 US Charter Schools

Traditionally, the educational system in the US has taken a relatively different path than the UK system. The US federal government has not enjoyed central control powers over schools as seen in most countries. Like in England, public education

is universally available but with control and funding coming from the state, local, and federal government. Public school curricula, funding, teaching, employment, and other policies are set through locally elected education/school boards, which have jurisdiction over individual school districts. State governments set educational standards and mandate standardized tests for public school systems. In England, the LEA has traditionally played a similar role as the US states and school boards. Poor performance in some of these school boards has been placed mainly on their doorsteps.

Boyer and Hamil (2008) concluded that poor reading abilities, as well as the other problems mentioned here [reading epidemic, lack of parental involvement, high teacher attrition rates], are not going to go away overnight. By the term “reading epidemic”, Boyer and Hamil were referring to the well-known fact of the poor reading ability of a large majority of students within the US educational system. The final problem is that of the reading epidemic facing American education. The students are not able to read at grade level resulting in a devastating effect on their education. These problems and more have plagued the US public secondary education hence the alarming problems in student outcomes and high dropout rates. To stem such problems, the US government in 1990 created the US Charter school systems. With greater autonomy from the government and local authorities, these schools are public schools but privately operated. Charter schools are by law open to all children and reflect the local community they serve. The students are as racially and economically diverse as non-charter students. As public schools, Charter schools must be open to all students that wish to attend. If applications for admission exceed the targeted enrolment for the school or grade, enrolment is determined by a "public random drawing" or lottery. However, charter schools may also design admissions processes tailored to assist them in carrying out their educational mission.

Unlike traditional public schools, however, Charters can be shut down by their authorizers if they are underperforming. Like the UK Academy Schools, Charter schools are considered innovative in their approach to education within the public school landscape. This is because they have more freedom to experiment with alternative curricula and pedagogical methods. They also have different

approaches to hiring and training of teachers (Betts and Tang, 2011). Although Charter schools enrol only a very small 1.5% of American students, 38 states have laws that support Charter schools and Charter enrolment continues to grow (Hoxby and Rockoff, 2004). Like all other state maintained schools, Academies are bounded by many public school regulations, including testing and other requirements of states' accountability systems. On the other hand, Charter schools are often fully or partially exempt from teacher certification regulations.

There are diverse types of Charter schools because Charter schools must be chartered by a public authority and the range of the authorities depends on the state and may include a state board, school districts, and public universities. Most Charter holders are non-profit organizations, teacher groups, or parent groups, but not all Charter holders manage their schools on a day-to-day basis. Many Charter holders contract for-profit and non-profit school management organizations to manage the schools. Charter schools are obliged to accept all applicants but are allowed a lottery system in allocating place if they are oversubscribed thus creating room for selection. They typically also run conventional academic curriculum but some Charter schools have a curriculum that targets specific student population, such as likely drop-outs, students who do badly in formal school settings, students who reject traditional curricula, or students interested in the arts. Possible advantages of the Charter school system as described by Bettinger (1999) include an increase in innovation, efficiency, competition, accountability and attracting private resources. Possible disadvantages include greater inequality, lower standards, fewer resources, group exclusion and more.

In a paper by Betts and Tang (2011), the authors concluded that Charter schools in some cases outperformed traditional public schools in terms of students' reading and Math achievements and in other cases performing similarly or worse. The reports also investigated the results within different grade spans concluding that Elementary school Math and reading, middle school Math and only if included the Knowledge is Power Program (KIPP) school estimates, middle school reading all exhibit a pattern of students performing better at Charter schools than at traditional public schools. The report also showed that at high school level, there is no overall significant effect of Charter schools, but there is considerable heterogeneity,

suggesting that in some locations Charter high schools outperform traditional schools, while in others they underperformed. The analyses suggested larger effect sizes in urban schools than for all Charter schools in almost all cases. The analyses also suggested that Boston's Charter middle and high schools and New York City's Charter schools are producing achievement gains far larger than other Charter schools.

A similar (2009) report by the Stanford Center for Research in Education Outcomes (CREDO) on Charter school performance in 16 states concluded that relative to their Traditional Public School (TPS) peers, the average performance of Charter students in reading was significantly positive in Arkansas, California, Colorado (Denver), Louisiana, Missouri, and North Carolina. In the District of Columbia, Georgia, Illinois (Chicago) and Ohio, the effect was not significantly different than the gains for their traditional public school peers. In Arizona, Florida, Minnesota, New Mexico and Texas, the effect for Charter school students was significantly worse than the gains realized by the TPS students. Gleason et al (2010) in a large scale study of 36 Charter middle schools in 15 states reported no impact overall in attending a Charter school on the test scores or on any other outcomes. Positive impacts due to attendance of Charter schools were also reported by Hoxby and Rockoff (2004), Hoxby et al (2009), Abdulkadiroglu et al (2009), and Tuttle et al (2010). These impacts were sometimes very large because the schools considered are strictly over-subscribed schools. The schools studied also serve students from low income backgrounds hence not inconsistent with the non-experimental study that found marginal positive impact for low income children.

2.5.2 Swedish Free Schools

Sweden is a country with low income inequalities, a country with an adult population exhibiting low inequalities in skills levels, relatively high immigrant population (especially with refugee background) and with very high education expenditure. The pre-reform educational system operated by municipalities was very highly centralised. A voucher scheme was introduced into the Swedish school system in 1992 with an aim to decentralise education and achieve all other benefits expected from relative freedom of choice created by a voucher system. The scheme allows the schools to be privately run by for and non-profit schools who receive public

funding for each pupil they educate on the same terms as municipality schools. Since private providers were given the possibility to run schools on a for-profit basis, not surprisingly, they have become heavily involved in setting up Free Schools. According to Holm and Arreman (2010), in 2007, five out of six Free Schools made a profit of more than half a billion SEK. Many of them made a profit of between 8 to 50 percent of the turnover.

The Free School system was introduced by the government to create a higher degree of autonomy through a market system in which schools get more funds by increasing the number of students they educate. The reforms are intended to facilitate innovation and more efficient resourcing decisions. Other intended benefits of the market reforms included deregulating teachers' pay and conditions, decentralising school financing, increasing schools' discretion over curriculum, goal-setting and test regimes. Today, about 10% of lower secondary aged pupils in Sweden choose to attend privately run Free Schools, with places strictly allocated on a 'first-come, first-served basis (Allen, 2010b). Swedish Free Schools have very large variations in their regional expansion. More have been established in urban, affluent and gentrifying areas and in neighbourhoods with second generation immigrant communities. Within these municipalities, more educated parents and second-generation immigrants are most likely to use the Free Schools, so the overall system is stratified (Böhlmark and Lindahl, 2007). The largest group of Free Schools are for-profit providers of a general education, but special pedagogy, religious and special language/ethnic group schools are also prevalent (Allen, 2010b).

The introduction of vouchers drastically improved conditions for Free Schools in Sweden and resulted in a rapid expansion of the non-public school sector. Free Schools have more autonomy than all state governed schools but had to comply with the 1994 Swedish education act. All Swedish Free Schools are regulated by ordinance (1996:1206). Education providers must essentially match the knowledge and skills and comply with the general objectives and values expressed in these national documents (Wiborg, 2010). Free Schools are non-fee paying schools and they provide school health care and mother tongue tuition. Like all other state controlled schools, the Free Schools are regularly and controlled by regional school

inspectorates to ensure that the required standards are being met and maintained. The Swedish Free Schools are unique because although they are called “Free Schools”, they are heavily regulated and controlled by the government of the region in which they are located. This is a major difference between a UK Academy Schools and a Swedish Free School.

The most significant and recent analysis of Swedish Free Schools show increases in attainment (see Björklund et al (2006) and Böhlmark and Lindahl (2007 and 2008)). Wiborg (2010) showed that Björklund et al and Böhlmark and Lindahl were not able to identify a consistently positive impact of Free Schools’ share on educational attainment. In the first study Wiborg suggested that the papers analysed the relationship between growth in Free Schools share in a municipality and changes in test scores over a short period of time. They however found a small positive impact on Swedish and English language attainments, but, a negative impact on Mathematics results. The gains estimated for native-born students whose parents are relatively highly educated are fairly small. They could not find any evidence to suggest that student attainments from traditional public schools are harmed by competition from Free Schools.

One argument for introducing school choice was that competition between schools should produce the same amount of learning at lower cost. In a report from 2006, the Swedish National Agency for Education suggested that municipalities with higher proportion of Free Schools have not reduced cost. On the other hand, there has been an increase in the financial effects in the form of overcapacity and significant increases in costs. The increases were attributed to the rule that each school is obliged to accept every pupil living in specified attendance zones, long-term facilities rental, expensive buildings and teacher contracts kept high as a result of the general agreement between teacher unions and the municipalities which did not make it easy to make staff redundant.

A study by Frederickson (2009), focused on the marketisation of education in Sweden. The report found significant differences between teachers in municipal schools and teachers in Free Schools. Most importantly, Frederickson stated that the Free School teachers are less experienced. While municipal school teachers

on average have worked for about 18 years, Free School teachers have worked for six years or less. Free Schools tended also to employ staff with lower levels of education with a smaller number of Free School teachers being qualified college or university degree holders. In addition, the profit-interest causing the existence of market norms in Free Schools had led to market-oriented behaviour among teachers. These factors would largely impact heavily on student outcomes.

The Swedish voucher reforms opened up the Swedish education system to private providers at the same time creating an immense impact on the municipal schools. The competition for funds, in conjunction with parental choice had resulted in a segregated school system within municipalities. Popular schools have experienced a sharp increase in applications whilst less popular schools have lost pupils and therefore funding. This is similar to the outcome of the generalised Voucher School system in Chile where the middle class children move into private schools. In the Chilean case, private schools also get the student pupil voucher funding per student. Wiborg (2010) asserted that housing segregation causes an increase of educational segregation and parental school choice has exacerbated the trend. These neo-liberal reforms were seen to increase inequality of achievement as well as social segregation in Sweden. Naturally, the enhancing of social segregation would be of interest to Swedish and other policy makers because Sweden is a country which prides itself in its universal welfare system and a relatively high level of social equality.

Although there are parallels between the ‘English Free-Schools’ and ‘Swedish Free-Schools’, the two school systems are in many ways far from identical. The schools were set up to address similar needs within both countries’ school systems but Acts setting these up are limited by each country’s social norms and laws. The English Free Schools for one are not- for-profit organisations while the reverse is the case in Sweden. The Swedish Free School have turned out to be more expensive for the municipalities than initially anticipated but the reverse is the case in England. The Swedish Free Schools have strongly contributed to inequality in society even in the context of an egalitarian society such as Sweden. Wiborg suggested that if the Swedish model was adopted in England it may have far more damaging effects on inequality and school segregation. In reality, the English

Academy School system or the English Free Schools are very similar to the Swedish Free Schools.

2.5.3 Chilean Voucher Schools

Torche (2005) wrote in-depth on the privatisation of education and education reformation within Chile. The author gave an in-depth analysis of the Chilean educational system. It showed that the system is characterised by a tripartite system of eight years of compulsory primary education; four years of secondary schooling and three types of tertiary education. The tertiary education comprises of colleges, professional institutes and Technical institutes. The system does not allow for academic-ability grouping at any level and tracking starts at the secondary school level where students are required to choose between Vocational and Academic High Schools.

Access to tertiary education was extremely stratified (Soto, 2000:55), access to tertiary education was extremely stratified, with only 3 percent of the college students coming from working-class families. A pioneer longitudinal study conducted during the 1970s found pervasive inequality in educational attainment and achievement within the Chilean educational system. For instance, the high school graduation rate of children who started the eighth grade in 1970 was 100 percent for children of university-educated parents, but 32 percent for children of parents with a secondary education, 12 percent for children of parents with a primary education, and only 3 percent for children of parents with no education (Schiefelbein and Farrell 1982:89). The system was largely characterised by strong centralisation in the state system and elitist private school system.

Chile reformed its educational system by adopting a privatization model in 1981. Full parental choice through a voucher system was introduced in the context of a market-oriented transformation of the country as a whole and in education in particular. The Chilean educational reform was the Chile's equivalent of an introduction of a universal education. The model is a voucher system, in which a subsidy was paid to public and private schools on the basis of students' enrolment. For the first time, freedom was given to parents to make a choice of school among several schools for their children. Like public schools, private schools could receive

the subsidy in exchange for not charging fees to students but some private schools are given the rights to charge top-ups.

McEwan (2000) defined school vouchers as government-funded tuition coupons redeemable by parents at the public or private school of their choice. Belfield (on the other hand defined education vouchers as tax-funded coupons or grants giving limited purchasing power to an individual to choose among a restricted set of goods and services. For this reason, the Chilean voucher model is known as a "funds follow the student" system (Mizala and Romaguera 2000; West 1996). Friedman (1962) and Coons and Sugarman (1978) defined the basic principles that guide voucher systems as a competition among schools and freedom of the family to choose among schools. These are also the bases of the Chilean system. Carnoy 1998; Carnoy and McEwan 2001; Contreras 2001; Hsieh and Urquiola 2003; McEwan 2000; McEwan and Carnoy 2000; Mizala and Romaguera 2000; Parry 1997 also describe the Chilean choice model as a voucher system. The Chilean reforms placed no restrictions on school admissions. No top-up fees are chargeable at state controlled primary schools. Low fee caps are allowed in state secondary schools and higher fee caps allowed in the subsidised private sector.

As the educational system expanded observed trends suggested that dire economic conditions, coupled with the retrenchment of the social safety net rather than the Voucher School system itself may have caused growing educational stratification (Torche, 2005). Hsieh and Urquiola (2005) in a study to determine the effect of a generalized school choice on achievement and satisfaction from the Chilean experience showed that the first order consequence of the voucher program was the flight by the middle-class into private schools. They suggested that the shift to Voucher School system did not seem to have resulted in achievement gains especially not of the magnitude claimed by some choice advocates. The paper pointed out the possibility that their estimates could be biased by unobserved trends in schooling outcomes, but further went on to show no changes in estimated outcome trends with an introduction of a number of controls. Also Hsieh and Urquiola did not infer that vouchers have not produced any gains at all but that it could be the case, for instance, that after twenty years of choice, Chilean schools are spending their money in ways that parents valued

more rather than efficiently. An example was a situation where school choice could improve welfare without doing the same to academic achievement. Secondly, the underlying institutions and the precise details of the program implemented were seen as critically important details in thinking about the potential impacts of school choice. A good understanding of this is the likelihood of a different response will be seen if private schools where not as important as they were in Chile in the 1980s.

2.5.4 Summary

The Chilean example, Swedish Free Schools and the US Charter schools are clear examples of established autonomous school systems existing internationally. The publications have however not been definitive on the issue of progress made as a result of further autonomy. Publications on the US Charter schools, the Swedish Free Schools and the Chilean Voucher School systems have not given credence to the notion that school outcomes improve as a consequence of autonomous school conversion. The results have been patchy with progress made in different curriculum areas or in different communities but not as a school system.

It is clear from the US experience that the outcomes of each research are strongly linked with the method used for the research. Charter schools in some cases outperformed traditional public schools in terms of students' reading and Math achievements and in other cases performing similarly or worse. Betts and Tang (2008) could not find any overall significant effects at high school level due to the adoption of Charter school status but a considerable heterogeneity was observed suggesting that in some locations Charter high schools have outperformed traditional schools. On the other hand, Charter schools have been outperformed by other schools in other neighbourhoods. Other research such as Hoxby et al (2009), Abdulkadiroglu et al (2009), Tuttle et al (2011), Hoxby and Rockoff (2004) all found positive impact of attending Charter schools on outcomes such as achievement. In all of these papers, different assumptions were made in refining their data.

English Academies are held accountable on the basis of the same Performance Tables used by other schools in the country thus they are being compared with better schools. Judgment of Academies is based on final performance and not

improvements in outcomes. Silva and Machin noted that the use of the final outcome of students 'has the potential to distort schools incentives towards coaching students most likely to perform well in the national exams in order maximise school ratings, and neglect pupils at the bottom of the ability distribution'. Silva and Machin concluded that on the long run, poorer or less performing Academies at the tail will keep losing students and the best 'Academies will flourish and spread their practices across the education market in a tide that lifts all boats and so raises the achievement of pupils of all abilities'.

As a result of the establishment of Swedish Free School system, private schools have declined in importance in Sweden (Wiborg, 2010). This would suggest that higher quality students joined the Free Schools as a result of establishment of these schools. Bohlmark and Lindahl (2012) described the positive impact of Sweden's Free Schools but Fryer (2012) said 'as a whole, Free Schools have yielded inconsistent results'. The most significant analysis of Swedish Free Schools by Björklund et al (2006) and another by Böhlmark and Lindahl (2007 and 2008) showed small increases in attainment but these papers and Wiborg (2010) were not able to identify a consistently positive impact of Free Schools' share on educational attainment. Swedish Free Schools have shown small positive impact on English language attainments, but a negative impact on Mathematics results. The gains estimated for native-born students whose parents are relatively highly educated are fairly small. In general, like the US Charter schools and the earlier reviews on the UK Academy Schools estimates of gains in student academic achievements as a result of gains in autonomy has been mixed.

The Chilean experience has introduced a large degree of stratification in the educational system. The consequence of the Chilean Voucher School policy is that the educational gap between the middle class and the lower class has widened due to flight of the middle-class from the public school system. This stratification that has been created over time in the Chilean system is similar to the system of stratification occurring in the high performing Academy Schools. The Chilean Voucher Schools have shown insignificant to no gains in student achievement over time questions are continuously raised over the policy.

Chapter 3

3. Data Source

The sources of data used in this research and the fields of data are discussed within this chapter. Besides the sources of the data, this chapter also has information on the method of standardisation of the data where standardisation has been done. It also deals with the assumptions made in the cleaning of the data in preparation for the analysis. As mentioned earlier, 'Academies' where used in this thesis refers to Sponsored Academies. This section explains the models and assumptions made in impact estimation in this work. It also describes the contextual data used in the modelling. Explanations are given for the exemption of some data and inclusion of others.

This chapter holds a very significant position in understanding of what data is exempted or included in the data used for this work. Getting this right ensures the identification of schools with similar characteristics as the pre-treated schools which later converted to Academy Schools. Most important reason for ensuring that both the treated and control schools have similarity in pre-treated outcomes and characteristics without which the policy impact could not be estimated. "The propensity score is the probability of treatment assignment conditional on observed baseline characteristics. The propensity score allows one to design and analyse an observational (nonrandomized) study so that it mimics some of the particular characteristics of a randomized controlled trial. In particular, the propensity score is a balancing score: conditional on the propensity score, the distribution of observed baseline covariates will be similar between treated and untreated subjects" (Austin, 2011a). The propensity scores are discussed in the next chapter.

3.1 NPD Data

The data is an extract of pupil-level record from the NPD dataset for every 16 year old student at a state-maintained school for the years 2002 through 2009. For the purpose of estimation, the outcomes of measure referred to will be summer 2003 to summer 2010 GCSE results and other data for all of these schools. The NPD data is a pupil level data which is then collapsed to school level data for the purpose of this analysis. The KS2 data exists for all schools from 1995/96 academic year and contains pupil and school characteristics (school census) combined with the annual pupil level National Curriculum key stage attainment data. The deprivation indices are based on data from the census of population and other administrative sources Office of UK Deputy Prime Minister (ODPM, 2004). The Income Deprivation Affecting Children (IDACI) index is a good but imperfect indicator of pupil social background measuring average social characteristics of households in the lower super output area containing an average of 17 pupils in the cohort (Allen, 2010a). The article stated that the Super Output Level is a "measure of multiple deprivation and is made up of seven Domain Indices which relate to:

- income deprivation;
- employment deprivation;
- health deprivation and disability;
- education, skills and training deprivation;
- barriers to housing and services;
- living environment deprivation; and
- crime."

NPD data is a School census data containing pupil level background indicators such as special educational needs data (SEN, 3 categories), year group of pupils, eligibility for Free School meals (FSM), each school's unique code (SSURN), gender of each pupil, first language of pupil, the local education authority (LEA) for the school attended by each pupil and the ethnicity of the pupil (11 categories in all). Similar to Machin and Vernoit (2011), the year-on-year January collection data has been used because it is the most available and consistent dataset over time. For the purpose of this analysis, the KS4 data of pupils aged 15/16 is most relevant in estimating pupil performance of Sponsored Academies. The NPD variables

described allows for the matching of multiple measures of time-variant school percentage pupil background variables such as percentage FSM, KS2 outcomes, GCSE outcomes (5 GCSEs at grade A*-C with English and Mathematics included and another dataset of 5 GCSEs not necessarily including Maths and English), Ethnicity and SEN.

A wide and more robust measure of exam performance across individual pupil's best eight subjects in GCSE exams standardising to a mean of zero and standard deviation of one standardised for all schools each year (called 'capped GCSE z-score') is used (Allen, 2013). The school-level average capped GCSE z-score has a standard deviation of about 0.5. The proportion of students gaining 5 GCSEs at grades A*-C, including English and Maths is a key component in the schools League Tables hence is key in this analysis. The inclusion of English and Maths in the analysis is essential as such standards are also needed in order to standardise outcomes of all schools to the same core subjects.

Table 3.1 shows the number of Sponsored Academies with background information established between 2002 up to and including the end of 2009/10 academic year and their change types. The Academy change type defines the nature of formation of the Sponsored Academies on opening. The change type indicates whether or not there exists a predecessor school, if the Sponsored Academy was formed from two or more predecessor schools or formed from a predecessor primary or middle school. It also shows the number of simple openings from a prior private school, if the Academy School opened on the same site or if it opened on a far site from the predecessor school, if the Academy School has no predecessor school of any type but opened as a new school.

Table 3.1. Change type of existing Academies at the end of 2009/10 academic year

	Year Opened								
Change Type	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**Total**
1 to 1 far site	0	0	0	0	1	0	1	0	2
1 to 1 near site	0	1	1	1	2	1	2	2	10
1 to 1 same site (+CTC)	2	6	1	8	11	25	32	53	138
1 to 1 same site (with gap)	0	1	0	0	1	0	0	4	6
1 to 2	0	0	0	0	2	0	0	0	2
2 to 1 change	1	0	0	1	1	3	5	8	19
3 to 1 change	0	0	0	0	1	1	0	1	3
Major Middle School Reorganisation	0	0	1	0	0	0	0	3	4
Simple Opening	0	1	2	0	0	7	7	6	23
Total	3	9	5	10	19	37	47	77	207

Some schools due to building space constrictions were opened far from the predecessor school. This factor significantly affects the school dynamics hence the average school characteristics from that of the predecessor school. ‘Far site’ describes schools opened at distances greater than 1km from the predecessor school site thus would require significant commute. These descriptions largely influence the ability of the new school to retain its students from predecessor schools thus retaining school characteristics data from the predecessor school thus enabling the schools to be close enough to be included in the treatment group.

In some instances, a Sponsored Academy School derives its characteristics from two or three predecessor schools. Some Sponsored Academies are offshoots of a previously closed school hence a gap period between the closure of the previous school and the newly opened Sponsored Academy. Table 3.2 shows the number of Academies with a 1-to-1 opening characteristics on same site as the predecessor school or close enough to the predecessor school site that are accepted into the treated group. These enable them to be considered close enough to be included in the treatment group.

Table 3.2. Summary of Sponsored Academies with prior data available opened on or close to the site of the predecessor school accepted into the studies per year

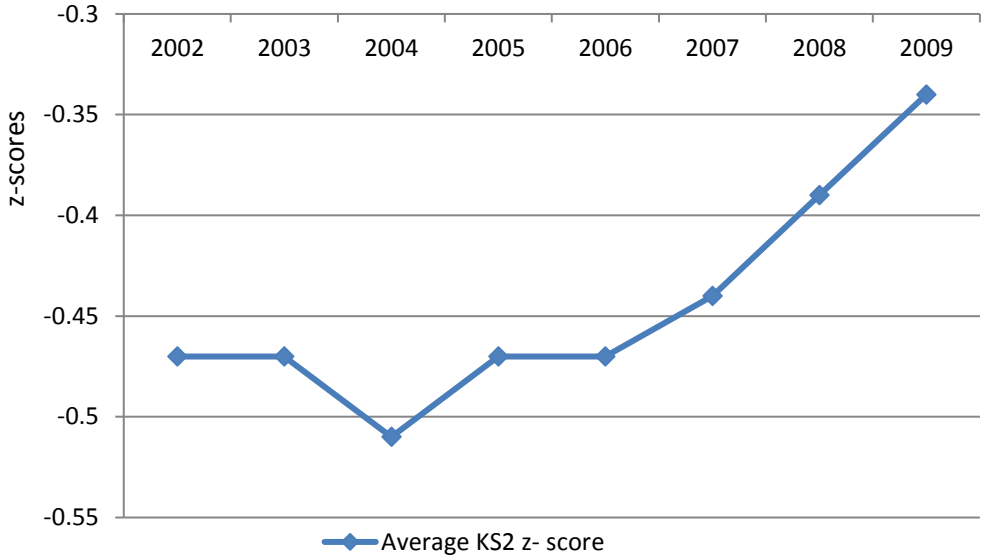
	Academies opening included in data								
Year Opened	2002	2003	2004	2005	2006	2007	2008	2009	Total
1 to 1 near site	0	1	1	1	2	1	2	2	10
1 to 1 same site	2	7	1	8	12	25	32	54	141
Total	2	8	2	9	14	26	34	56	151

3.1.1 Key Stage Test Data

All pupils in state maintained schools are by law assessed using national tests at the end of all three Key Stages. This is traditionally done at ages 7 (KS1), 11(KS2), 14 (KS3) and 16 (KS4). At ages 7, 11 and 14 pupils are awarded levels on a scale of 1 to 8 and exceptional performance on each test. Up to age 7, pupils expected outcomes should rise from levels 1 to 3, levels 2 to 5 at age 11 and levels 3 to 8 at age 14. In this work, the analysis uses data at the end of KS2 and KS4 only. The analysis of student achievements across the country at the end of KS4 is done here in this work by analysing student performance in national GCSE tests. Also for the purpose of the analysis of increases in pupil intake quality on entry into Academy Schools at the end of KS2, the prior attainment of pupils is measured in terms of the average Key Stage 2 test scores in Maths, English and science. More specifically, the standardised KS2 average Maths, English and science scores are transformed to z-scores for each school for ease of interpretation.

Figure 6 shows the increasing values of the average KS2 z-scores of the Sponsored Academies at the point of establishment. This KS2 measure is particularly relevant for the estimation of changes in pupil quality in the second research question and the balancing test for the first question. The graph shows improvements in the quality of pupils accepted into schools being converted to Academy Schools over time with the most changes in pupil quality taking place post 2007.

Figure 6. Increasing values of average KS2 z-score of Academies on establishment

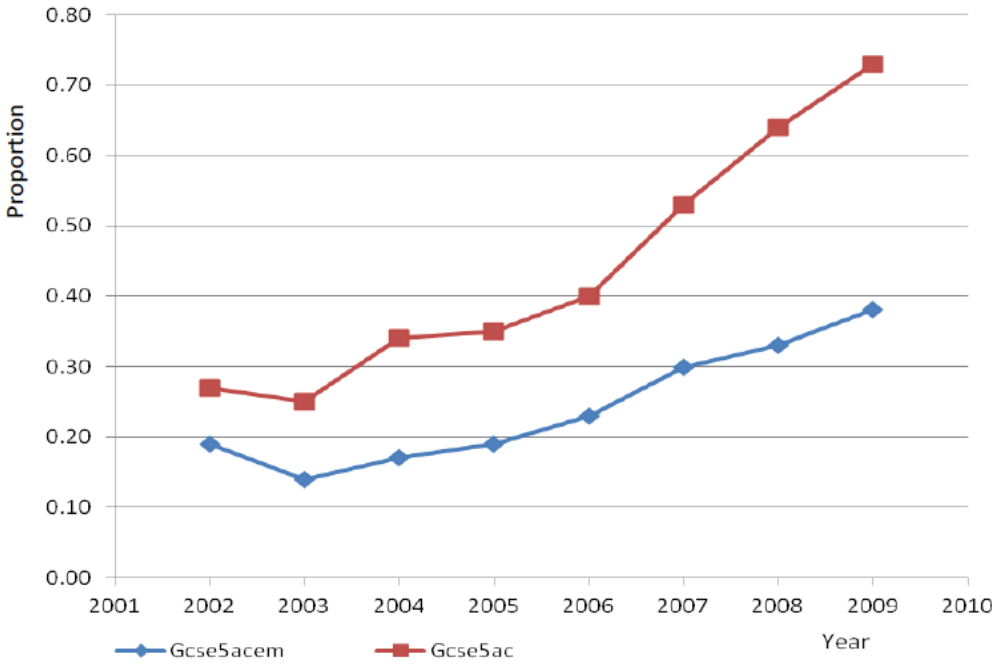


3.1.2 GCSE 5 A*-C

This metric summarizes the pupil achievement in GCSE exams (KS4) is as the total points achieved by pupils over their best GCSE/GNVQ or equivalent examinations. The GCSE exam is graded from A* through G, with the A* carrying a weight of 58 points and grade G with a weight of 16 points. There is a 6 point reduction between higher grades and the grade below hence 6 points between grades. This metric is further subdivided into two sub-metrics.

The Figure 7 shows the low values of the average 5 GCSEs at grades A*-C (GCSE5ac) without necessarily including the English and Maths outcomes at the point of establishing the Sponsored Academy Schools. The students of the earliest established Sponsored Academies (between 2002 and 2003) have very low average performance hovering below 30% on the measure of GCSE5ACem. The later Sponsored Academies show higher average student outcomes before treatment although the outcomes are on the average lower than that of schools nationally. The sharper increases seen in this measure when compared to the same results benchmarked on the English and Maths result could be as a result of the introduction of NVQ and other diploma courses.

Figure 7. Increasing values of GCSE 5 A*-C (with and without English and Maths) of Academies on establishment



3.1.3 GCSE A*-C with Maths and English included

In this paper, the estimation of the impact of an Academy School conversion on its pupil performance is also done by looking at the school percentage GCSE 5 A*-C with Maths and English included. This is a more robust measure than the simple measure of 5 GCSEs at A*-C. The inclusion of Maths and English language ensures a standardization of the 5 GCSE requirements against the Maths and English core subjects taken by all students in England. This largely reduces the indiscriminate use of equivalent non-GCSE qualifications in skewing outcome.

Sponsored Academies status has historically been assigned to the least underperforming schools. The Figure 7 shows the low values of the average 5 GCSEs at grades A*-C with English and Maths (GCSE5ACem) at the point of establishing the Sponsored Academy Schools. The values of the outcomes without necessarily including English and Maths are reduced on benchmarking on English and Maths. The students of the earliest established Sponsored Academies (between 2002 and 2005) have very low average performance hovering below 20% on the measure of GCSE5ACem. The later Sponsored Academies show higher

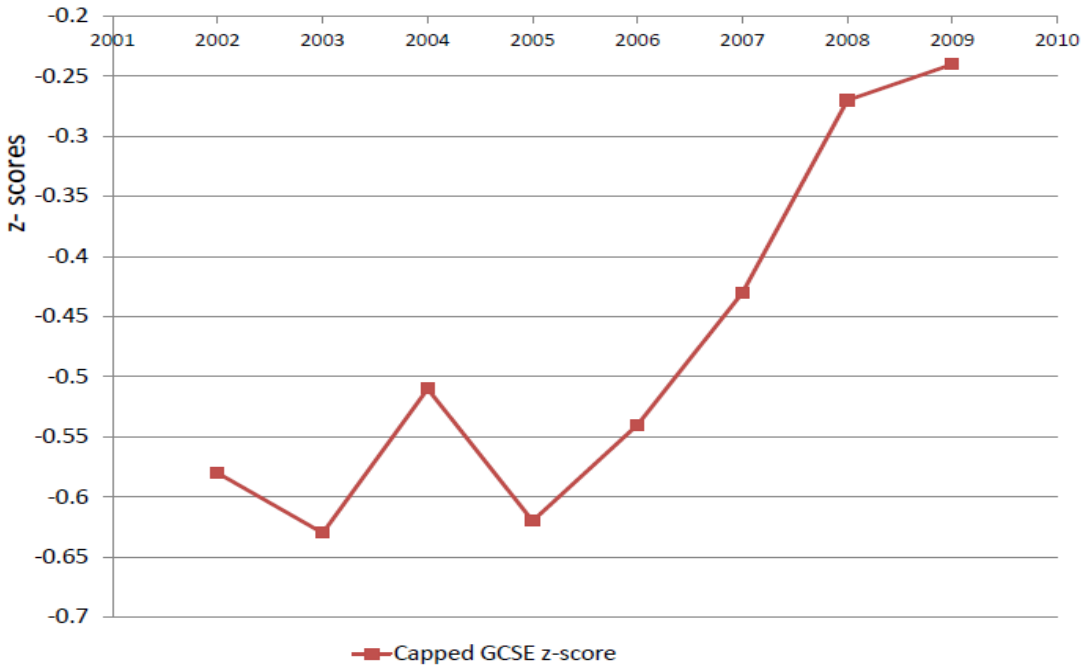
average student outcomes before treatment although the outcomes are on the average lower than that of schools nationally.

3.1.4 Capped GCSE z-score

The average capped GCSE score can measure pupil achievement using the capped GCSE point score on their best eight subjects. The percentage gaining 5+A*-C at GCSE is a rather crude measure of achievement that is often manipulated by schools. For this reason, after the publication of League Tables using this measure in 1992, many schools took advantage of this and were able to rapidly improve their League Table position with little extra effort. This was done by schools paying more attention to students on the grade C/D borderline and offering `easier to teach' subjects. Capped GCSE point score is a better reflection of school performance because it captures the performance of all pupils across a wider range of subjects. Another advantage with this measure is that we can be less concerned about the short-run negative (and positive) effects of losing (and winning) assignment into the Academy School status confounding our estimates of treatment effect since, for example, negative effects of losing a vote on school morale and headteacher turnover would have disappeared.

Capped GCSE z-score on the other hand is a measure of the pupil's exam performance across their best eight subjects in GCSE exams, standardising to a (pupil-level) mean of zero and standard deviation of one. The school-level average capped GCSE z-score has a standard deviation of about 0.5. The flaw in this measure is that it could be comparing groups of students with no GCSE exams in common despite comparing 8 subjects. The measure of 5 GCSE A*-C with English and Maths included has an advantage of at least comparing all schools' outcomes using Maths and English outcomes as core subjects. From Figure 8, the evolution of the capped GCSE z-score of schools joining the Academy program could be seen to be similar to the patterns seen in other measures of estimation.

Figure 8. Increasing mean values of best GCSE 5 A*-C of Academies on establishment



3.1.5 Average KS2 Point Score

At the end of KS2, majority of pupils are expected to achieve Level 4 in the National Curriculum Tests in English and Maths. The 'Key Stage 2 average point score (APS) per pupil' measure of performance shows the total number of points achieved in each subject by all eligible pupils, divided by the number of eligible pupils. At school level or pupil level the APS is calculated using the sum of pupil's reading test and writing assessment divided by 2. The Maths results are added to these scores and the final sum divided by 2 to give the APS. At primary school level, a year on year comparison of this measure enables readers to see whether a school's performance has remained consistent or improved over time. When the same are transferred to the secondary school level, a year on year comparison would give information on the quality of pupils accepted into a school. The average point score that a child is expected to get at the end of year 6 (KS2) is 27 points. The higher the point scored the higher the children's attainment. A pupil's missing information for any of the two tests required in calculating the APS is calculated from the remaining subjects. These are then averaged over all eligible pupils in the school. This measure is more robust than measures of achievement at all other key stages because it is restricted to English and Maths outcomes. This measure

is particularly important in the estimation of changes in the quality of students accepted by the treated schools.

3.2 Indicators of Pupil Family Background

Individual pupil's family socio-economic status is central to the analysis because there is a strong correlation between socio-economic background, postcode of residence and their choice of schools. Inversely, these key factors are very strong determinants of child's educational achievement. This is a key determinant of child's educational achievement and degree of choice of secondary school.

3.2.1 IDACI Scores

The measure of deprivation used in this work is Income Deprivation Affecting Children Index (IDACI) produced by the Office of the Deputy Prime Minister (2004). As a measure of deprivation, IDACI is a sub-domain of the education, skills and training deprivation domain. It is an imperfect index of a pupil's social background. It is an average measure of social characteristics of households in the super output area. The indirect problem with this is the specific problem with the context of choice and sorting analysis. A clear example of this problem could be seen where the presence of a faith school in a town might allow a church-going family to purchase a less expensive house in the catchment area for a Community school with a deprived intake, knowing that their children would attend the faith school. Geo-demographic data are therefore likely to systematically underestimate the socio-economic characteristics of this family, thus biasing all parameters of interest in sorting models (Allen, 2008). The IDACI scores are in particular very important in differentiating Sponsored Academy Schools from other state schools. This is because Sponsored Academy Schools in particular are mainly established in socio-economically deprived neighbourhoods. This measure is also useful in the characterisation of control schools similar to the Sponsored Academies.

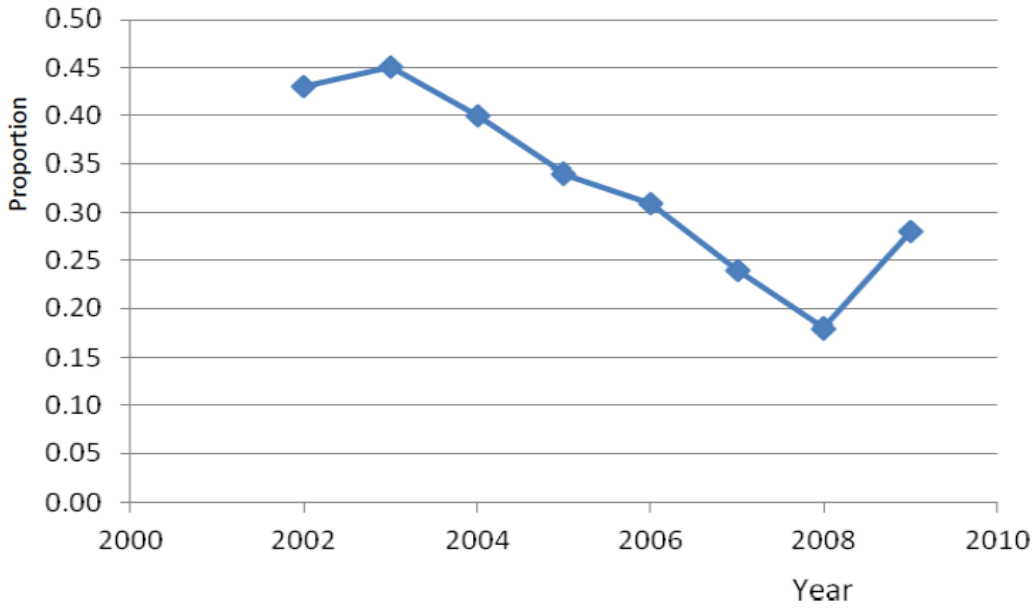
3.2.2 Free School Meals Eligibility (FSM)

The NPD data has an inherent disadvantage because it is a weak socio-economic indicator. The child's eligibility for Free School Meals (FSM) is the only metric indicator within the NPAD data contained for determining socio-economic status. "It is a good indicator of low income because eligibility for FSM is contingent upon

the family receiving other benefits/tax credits, such as Income Support, Income Based-Job Seeker's Allowance and Child Tax Credits" (Allen, 2008). However, Hobbs and Vignoles (2007) reported a poor relationship between the FSM eligibility and net household income. This is principally because the receipt of means-tested benefits (and tax credits) pushes children eligible for FSM up the income distribution (Allen, 2008). There is also a concern that the pupil's probability of applying for FSM eligibility status depends in part, on the culture of the school (Croxford, 2000).

The Sponsored Academies on average have high numbers of pupils receiving FSM. Figure 9 show that schools converted to Academies between 2002 and 2004 have 40% and above pupils on the FSM register with percentage of pupils on the register falling beyond this point. Figure 9 would also suggest lower FSM status of intake students of the predecessor schools of the pre-treatment group. Lower FSM status would also suggest that the students come from higher socio-economic backgrounds.

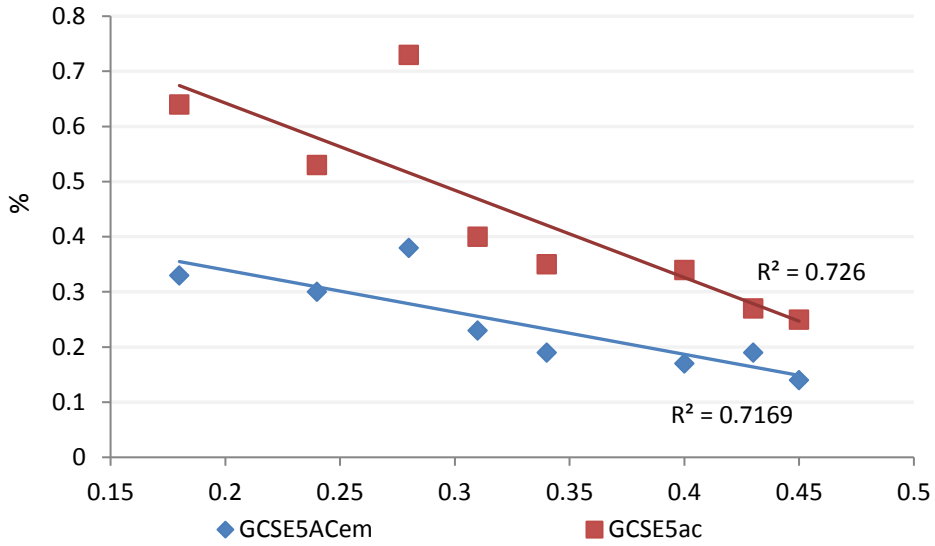
Figure 9. Values of proportion of Free School Meals recipients of Academies on establishment.



On the other hand, Figure 10 shows strong negative correlation between FSM and the measures of GCSE 5 A*- C with English and Maths included and GCSE 5 A*- C without necessarily including English or Maths. This would suggest that pupils

from higher socio-economic background achieve more at GCSE level than pupils with lower socio-economic status. This strong correlation between FSM and student outcome is a strong enough reason for contextualising on this characteristics for both research questions.

Figure 10. Correlation between FSM and average student outcomes of Academies on establishment



3.2.3 Special Educational Needs (SEN)

The SEN characteristics consists of several categories classified under this term. It includes the SEN statement, SEN Action, SEN Action plus.

3.3 Cultural Characteristics

Other characteristics defined here include the English as an Additional Language (EAL) and the percentage of students with Ethnic White Background (EWB). These characteristics are measures of difficulties experienced by students in learning in a second language and show the difference in the student demographics of the treated schools in comparison with their counterfactuals.

3.3.1 English as an Additional Language (EAL)

This measure seeks to collect information on first language profile of students. It ultimately gives information on non-English as first language speakers without giving their first language background. The codes are English or 'other than English' (in addition, some pupils are coded as 'not known but believed to be

English' or 'not known but believed to be other than English'). First language is defined as the 'first language to which the child was initially exposed during early development' and if they were exposed to more than one language including English, the variable should be coded as 'English' (Ray, 2006). This criterion does not in any way distinguish different languages other than English. As with ethnicity, there is some small changes year-on-year in this variable, even though it ought to remain constant. The Sponsored Academy Schools are established mainly in economically deprived neighbourhoods. These neighbourhoods characteristically have large populations of immigrants and students with English as an Additional Language (EAL) background.

3.3.2 Ethnic White Background

The data also holds information on pupils' ethnic background. A much more disaggregated form of ethnicity has been available after 2002. It has been possible to go behind some of the more broad categories such as White British, African, and Caribbean. It has been designed to avoid general inferences about a group of pupils from a whole continent. From 2003 onwards there are two main variables. There is a minor grouping variable that contains 18 categories and a major groupings variable with 6 categories. It is very common to find missing data which are for the most part coded as refused or not yet obtained. There is a degree of fluctuation in pupil ethnic coding. This could be adduced to pupils redefining their perceived ethnicity. Alternatively, if parents are involved in the data collection process, both parents may give different codes from that submitted by the student. This could in most cases be seen as a positive effect than negative as the codes submitted by the parents are more accurate and can be used to correct prior data submitted by the student. Of particular interest in this work is the proportion of students of white British background. This is because the vast majority of students in the UK are of this background and knowing this information will produce useful information of students with non-white British background. This information is also of important in the matching of the treated and untreated schools for trends.

3.4 Gaming Achievement Measures

The Special Education Needs (SEN) data are officially reported by the schools and other responsible agencies. It indicates whether a pupil has learning difficulties or disabilities that make it harder for them to learn than most children of the same age. The SEN variable contain several sub categories which categorise pupils into several difficulties. Some schools apply the SEN status to pupils more rigidly than others hence there is significant variation between schools in categorising pupils with SEN. A clear problem with the data is that a child of low ability may not be categorised as SEN in a low ability school but would be if transferred to a school with a high ability cohort. Often times, the data is not up to date either. Many schools however review their data before School Census, particularly if their local authority uses data on numbers of pupils with SEN but without statements in their local funding formulae.

3.5 Gaming Achievement Measures

This section deals with the limitations placed on measures of achievement at KS4 level due to freedom of the choice of curriculum offered by autonomies granted to Academy Schools.

3.5.1 The Use and Misuse of 'Equivalents'

Sponsored Academies rely on 'equivalents' to GCSE twice as likely as other schools to boost their attainment scores (Wrigley and Kalambouka, 2012). This act has been referred to by Government ministers as the practice of 'gaming'. Wrigley and Kalambouka suggested that although some other non-Academy Schools use this strategy when faced with the pressure of the schools League Tables and Ofsted inspections, Academies use it the most. This could be as a result of the degree of freedom available to Academies in their ability to decide on the choice of non-core curriculum compared to non-Academy Schools. This act of gaming is a clear unintended consequence of the degree of autonomy given to schools and a clear contradiction in Government policy in that its claims for the success of Academies depend extensively on qualifications that ministers distrust. It has clearly created a two-tier system where other schools perform poorly because they could not game the system as much as the Sponsored Academies have. This creates an environment where non-Academies have been forcibly converted to

Sponsored Academy Schools because they fall below the 'floor'. The Sponsored Academies went unchallenged despite having very few pupils actually achieving five or more GCSEs at grades C and above with the inclusion of English and Mathematics.

The inclusion of some vocational courses in the English curriculum provides a wider curriculum offered to all young people and can raise the motivation and opportunities of those who are less 'academic'. These are all well and good but the problems arise when the curriculum is driven by accountability statistics and surveillance systems such as League Tables and Ofsted inspection. Schools with less advantaged pupils are often placed under pressure by threats of closure if their headline statistics are deemed to be 'too low'. In particular, such numbers have favoured the establishment of more Academies.

The UK Government on the other hand has claimed that Academies are successful on the basis of academic performance. These statements do not stand up to scrutiny when the heavy use of equivalent qualifications is examined. The problems associated with the way that vocational qualifications have been used in recent years as equivalent GCSEs include

- Danger of forcefully channeling students into taking the vocational courses hence stifling choice and curriculum on offer
- Some of these alternative qualifications were worth multiple GCSEs and are not rigorous enough to be deemed equivalent to one or more GCSE qualifications at A*-C grades.

Saying these, since schools were encouraged to offer vocational qualifications to Key Stage 4 students, it would have been unreasonable not to count these vocational qualifications towards attainment statistics. The qualifications are fundamentally different from other GCSE qualifications yet a simplistic numerical equivalence is drawn for the purpose of the League Tables. The very idea of drawing up numerical equivalences between very different kinds of qualification is itself fraught with errors. As it were, about a third of the students achieve grades D-G in the GCSE exams. On the other hand, to pass the vocational courses,

students pass the qualification provided they complete the required tasks to a basic specification. Not that there was something wrong with this in itself, but the official assumption that these qualification with such basic requirements were automatically equivalent to the GCSE A*-C grades which were more stringently ascertained.

3.5.2 Equivalents Game

A third of Sponsored Academies make no more use of alternative qualifications than maintained schools nationally, and a few don't use them at all (Wrigley and Kalambouka, 2012). The paper also suggested that many of the Sponsored Academies making little use of these equivalents were selective schools (former grammar schools or CTCs) or other schools with very low levels of deprivation. The results of Wrigley and Kalambouka shows that for half of Academies, the gap between the students achieving 5 A*-C English and Maths (gamed with equivalent courses) and 5 A*-C with English and Maths not gamed with vocational courses was more than 10 percentage points. The difference was reported to be more than 20 percentage points in a fifth of the schools. Their data showed very little difference in outcomes based on how long the Academies had been established. The same picture was apparent whether or not the schools were run by major sponsors.

The paper estimated the average gap between the percentage of pupil achievement due to gaming and no gaming as between 11 and 14 percentage points without showing any variance and independent of whether or not the research was focused on all Sponsored Academies or focused on the longer-established Sponsored Academies and on whether or not such schools are managed by major sponsors. Such data would suggest a strong potential for gaming due to use of equivalent courses in the estimation of school performance. This would clearly render the Performance Table suspect. Clear examples from the paper shows that 'a gap of 20 percentage points can mean that 40% of pupils count as achieving five or more A*-C grades with English and Maths including the 'equivalents', but only 20% of pupils actually achieve five or more higher level *GCSEs*.

3.6 Comparison Schools

Although this section discusses the comparison schools data, the method adopted in selecting the comparison group of schools will be discussed in the next chapter.

Table 3.3. Summary of comparison groups and treatment group data of existing publications

Paper	Data	Number of Treated Schools	Comparison Groups
This thesis	2002/03 - 2008/9	111	Nationally matched UK schools conditioned on school characteristics All Schools with predecessor schools within 1km of the new school building are included in the pre-match treatment group Earliest three-year treatment period
PWC (2008)	2002/03 - 2006/07	24	(1) All schools in the lowest 15% of the national distribution for their average KS2 prior attainment (2) All schools in the lowest 10% of the national distribution for their average KS2 prior attainment (3) Overlapping Intake Schools (OIS) whose feeder primary schools overlapped by at least 10 students with those of an Academy's predecessor school
Machin & Wilson (2009)	2002/03 - 2006/07	27	(1) Most similar schools within same LA on pre-policy exam levels and trends in pupil achievement (2) All schools in the same LA
NAO (2010)	2003/04-2008/09	62	(1) Five schools with similar intakes, matched using % FSM and average KS2 results (2) Comparators separated into pre-2006 opening (21 Academies and 105 matched schools) and 2006-onwards opening (41 Academies and 205 matched schools)
Machin & Vernoit (2011)	2002/03 - 2008/09	102	Schools that are due to become Academies in the future, matched on pre-Academy characteristics to schools that have already become Academies
Eyles and Machin (2015)	2002/03 - 2008/09	106	100 schools that later converted to Academies (Future Academies). Comparison schools are future Academies Long term (>>4 year) sampling period Weighted data used to describe schools established far from the pre-conversion school.

The first research question on the achievement of Academy Schools in itself relies on a considerable theoretical literature and methodological consideration of the measurement of outcomes. The comparison group is a group of schools with similar characteristics drawn from across England and not a group of schools that later became Academies or a group of local schools with similar schools as seen in Marchin and Vernoit (2011). This is because drawing from a group of local

schools will vastly reduce the chances of arriving at a group of schools with similar characteristics. A group of schools could evolve in a similar manner without necessarily being in the same locality. This approach does not exclude the local schools but includes them in a broader look at trends in evolution of these schools.

The nature of the comparison groups for all the previous publications are not the same hence some difficulties exist in comparing the estimated impacts of all of these publications. Table 3.3 reflects the amount of data available to each of these publications (after cleaning). The Table also shows the nature of the comparison groups for all of these major previous publications.

The comparison groups have not been the same for all publications hence some difficulties exist in comparison of impact estimates of these publications. The amount of data available to each research group is an issue because a small dataset seriously restricts the quality of the analysis. Also restricting are the characteristics of the Academies accepted into the treated groups for research purposes and the number of academic years used in impact estimation. A slow and gradual assignment of schools to Academy School status, availability of a prior school and prior student data and allowing for Academy effect to take hold by the treated schools are significant limiting factors. The amount of available data to researchers has increased over time and has influenced evaluation in later publications (see Table 3.3). The Table 3.3 also gives a summary of the definition of the control schools of each of the key existing research work and this thesis.

The amount of data available to each research group is an issue because a small dataset seriously restricts the quality of the analysis. Also restricting is the characteristics of the Academies in the treated group. For impact estimation purposes, the sample period is subject to the amount of data available. A slow and gradual assignment of schools to Academy School status, availability of a prior school data and the amount of time allowed for Academy effect to be effectively taken-up by the treated schools are all significant limiting factors. The amount of available data to researchers has increased over time as more Academy Schools are established. This has had significant influence on evaluation of all prior publications.

3.6.1 Local-National Schools Comparison

One of the comparison groups of the report of PWC (2008) was is a group of schools in the lowest 15% of the national distribution for their average KS2 prior attainment. Another was a group of all schools in the lowest 10% of the national distribution for their average KS2 prior attainment. PWC also compared their treatment group with overlapping Intake Schools (OIS) whose feeder primary schools overlapped to a notable extent with those of an Academy's predecessor school. Machin and Wilson (2009) on the other hand decided on a comparison of the treatment group with a local group of schools. Such a comparison serves to compare schools within the same locality with students drawn from the same population. If the characteristics of such schools are similar, a common evolution should be expected if none of the schools are treated.

This work is looking into the effects of the Academy School policy by comparing the outcomes of the Academy Schools with that of schools with similar characteristics and pre-conversion trends nationally. Without treatment of one of the schools, they would continue with similarity in trends over time. One advantage of this approach is the increase in the possibility of finding a matched school with more similarity in trends pre-conversion across the country. Another advantage is the increase in the number of control schools thus improving estimation. Also, it would be much harder to find schools with similar student and school characteristics within the same locality and a narrow calliper no greater than 0.02. By using a local school comparison, locality would have to be defined by much larger radius in order to find control schools. Doing so may mean that commonality in evolution may not necessarily exist as increases in the distance between schools would impact on pupil pool and characteristics. If fast, tumultuous and major changes do occur within locality in very short amount of time, it would most advantageous to make local and not national comparisons. This comparison of schools on a national scale assumes little or no changes in local population dynamics.

3.6.2 Educational Segregation

Another reason for moving away from local comparison is educational segregation (see Burgess and Wilson, 2004) resulting from social segregation. Burgess and Wilson in their work showed significant degree of variation both across Local

Education Authorities (LEA) and across ethnic groups: segregation is higher for pupils of Indian, Pakistani or Bangladeshi origin than for pupils with black Caribbean or African heritage. Burgess and Wilson identified areas of particularly high segregation, especially for pupils of Asian origin. This factor considerably limits the possibility of finding a local equivalent with similar school characteristics for the purpose of comparison. On a national stage, the possibility of finding similar schools is much higher.

3.7 Exemptions

To improve confidence in estimated values of Academy impact estimates, it is necessary to identify and remove as many sources of bias as could be done. To improve information, all data from the earliest two years of the life of an Academy Schools will be considered. All previous research papers on such impact estimates, suggested that it should take a minimum of two years for 'Academy effect' to fully take effect in each of the newly established schools. There is clearly a two year period between the date of establishment and the end of the second year of Academy School operation hence the GCSE results at the end of the second year are the first sets of GCSE outcomes to be analysed. Previous publications had either used data from all years of the life of an Academy and this work will do the same. This section also discusses other reasons for exempting some the treated schools from the data used in this work.

3.7.1 City Technology Colleges and Independent Schools

Due to the level of freedom inherent within the structures of the City Technology Colleges (CTC) prior to Academy conversion, they already have similar autonomies as Academy Schools. Academy Schools in the first instance were modelled after the successes of the CTCs hence treatment on these schools had gone on for much longer than the established Academy Schools. Adding these schools to our data would undoubtedly introduce a high degree of bias. It would not matter if the CTCs on assignment of Sponsored Academy School status are poorly performing schools because some degree of treatment be it partial, had been applied on these schools before assignment to Academy Schools. For these reasons, these schools have been excluded from our data. Between 2002/03 and

2009/10 academic years, three CTCs were assigned Academy School status. On the other hand, predecessor school data on independent schools converted to Academies do not exist. These data are not collected by the DfE.

Independent (private) schools already have much more autonomy than Academy Schools hence are exempted for the same reason as the CTCs. Even if data on such schools existed, the characteristics of these schools drastically differ from that of other Academies as the pupils from such schools would mostly be from middle class background with socio-cultural values difficult to mimic within failing schools. The outcomes of such schools would largely bias our outcomes because if at all there are any changes in the outcomes of these schools due to treatment, the changes would be miniscule compared to changes experienced in initially very poorly performing schools (which almost all the Academies are).

3.7.2 New Site Openings and Gaps

On establishment, some Academy Schools with predecessor schools opened in new buildings. Due to availability of land for building the new buildings, some of these buildings were either opened after a few years of closure of the predecessor school or at some distance away from the predecessor school. In some cases, the distance of the new school from the predecessor school means that the pupils require transportation to get to school. The gap between closure of the predecessor and the opening of the new school means that most pupils would change schools or the students from such schools would have been taken on by other undersubscribed schools within close proximity. For this reason, all schools with such backgrounds were exempted from our data except those opened within a 3km radius of the closed school. Sponsored Academies with time gaps between the closure of the predecessor school and the newly opened schools are not accepted into the treatment group. This ensures that the characteristics of the schools are representative of the predecessor schools. Two schools were opened at distances over 3 km away from the former school sites while all other new site openings were opened at distances less than 1km away from the predecessor schools. Six schools were opened on the same site but with gap years between closures of the old and opening of the new school hence were excluded from the data.

3.7.3 Simple Opening

Some Academies have no predecessor schools but are completely new schools. Some of these schools were established as a result of acute shortages of school places within localities. These schools usually open with students in year 7 and increase student enrolment over time. It is easy to identify the KS2 results and characteristics of the students from such groups of schools but it would be impossible to determine comparison schools due to lack of prior school data to determine trends. There are 23 schools with simple new opening status dropped from our data.

3.7.4 Mergers and Splits

In two instances, Academies were formed by the splitting up of one predecessor school into schools. This would cofound analysis if used in our research because it would not be accurate to adduce all the properties of the predecessor school on the new school or any accurate portion of these characteristics on each of the new schools. In other instances, the treated school is formed as a result the merger of two or three predecessor schools.

Nineteen Academies were formed as a merger of two predecessor schools while three were formed as a result of three predecessor schools. These were usually done in instances where all of the predecessor schools were grossly undersubscribed and the local education market had been experiencing a reduction in the number of school age children to take up these places. In such communities, high achieving schools would be oversubscribed and would be the first choice schools for all able and average students while the underperforming and haemorrhaging schools would continue to suffer student losses. To reduce expenditure and at the same time improve student outcomes, merging schools and adopting a new administrative approach fit the design of the Academy School policy. Four Academies were created as a result of a major reorganisation of middle schools. All of these schools were exempted from our data due to inexistence, incomplete or multiplexed prior data. Table 2.1 also gives a summary of treated schools (Academy Schools) from 2003/4 through 2009/10 academic years cleaned for the exempted change type.

3.7.5 Missing data

Three Academies with missing data were exempted from the final list of treated schools. Every effort to complete the missing information were not fruitful hence the exemptions. On exclusion of schools with incomplete data, the number treated schools available for this thesis can be seen in Table 3.4 below. Not all of these treated Academy Schools were matched in this research. This is explained in the next chapter of this work.

Table 3.4 Number of Sponsored Academies with complete data

	Year Opened								
Groups	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**Total**
Treated Group	2	6	2	6	10	20	31	52	129

Chapter 4

4. Methodology and Analytical Strategy

This chapter addresses the methodology adopted in estimating the impact of further gains in school autonomy on the GCSE achievements of students at the end of compulsory education. It also addresses the methodology adopted in determining if there are changes in the quality of pupils admitted to the Academy Schools on converting to Academy Schools. The methodology section 4.3 contains explanation of propensity scores and propensity score matching. The balancing test section then analyses the propensity scores to ensure it adequately balances the characteristics between the treatment and control groups. This will be followed by a section on difference in difference explaining how the impact is estimated from the balanced group of control and treatment groups. The main source of the methodology of propensity score matching used in this section is the method by Heinrich et al. in 2010. The section also describes the difference in difference method as used in this work.

4.1 School Effectiveness

'The term 'school effectiveness' has come to be used to describe educational research concerned with exploring differences within and between schools with a principal aim of obtaining knowledge about relationships between 'explanatory' and 'outcome' factors using appropriate models. In its basic form it involves choosing an outcome, such as examination achievement, and then studying average differences among schools after adjusting for any relevant factors such as the intake achievements of the students' (Godlstein, 1997). School effectiveness research is mostly interested in the estimation of important values such as the relative size of school differences and by how much indicators such as student social background, student past achievements or curriculum organisation explains differences seen in outcomes between treated and untreated groups.

School effectiveness is a difficult concept to define, and ones defined is of a nature that is difficult to measure (Scheerens, 2000). School improvement concerns the raising of students' achievements and the school's ability to manage change (Reynolds *et al*. 2001) but the central focus of school effectiveness research concerns the idea that, 'schools matter, that schools do have major effects upon children's development, and that, to put it simply, schools do make a difference' (Reynolds and Creemers, 1990). School effectiveness research precisely seeks to compare schools with similar socio-economic, socio-cultural and innate pupil abilities in a bid to make conclusions on outcome outputs. School effectiveness research could be said to be traceable to the influential work of Coleman (1966) and Jencks et al. (1972). Also influential in school effectiveness literature was the work of Rutter et al (1979) which argued that the effect of schools upon pupil performance was neglected.

In an ideal scientific environment experimental evaluation method is used in studying matters of causation in education. In this method, assignment of schools to treatment group is random. It has been used in several publications but the method is highly restricted by ethical and other reasons. It is used in the evaluation of treatments due to its statistical advantages in identifying program impacts. In experimental methods, random assignment is used in order to ensure that participation in the intervention is the only differentiating factor between units of the treated schools subject to the intervention and those excluded from this group. Although it would be ideal to randomly assign schools to treatment, randomisation of schools to programmes is not general practice by governments. Grant Maintained School system, pupils or schools are not randomly assigned to specific treatments either. Randomisation would be done with a hope that the effects of the treatments (which could be teachers, curriculum, teaching approach, forms of organization etc) or 'treatment effects' give the ideal desired responses. Several literatures have adopted experimental controlled experiments where randomisation has been used. This work is however a non-experimental work with secondary data. To mimic a typical experimental method, groups identical to the treated schools are selected. Changes between the pre- and post-conversion outcomes are estimated and then compared. Empirical models are very important in the

estimation of post conversion impact estimates hence the explanation of the empirical framework next.

This work uses empirical approach as a result of available data. The same was done by most historic publications in their comparison of schools with similar characteristics. To identify any school impact the treated schools are matched to schools nationwide with similar characteristics. One important characteristic is the necessary location of the treated school and the control schools within the same region of deprivation characterised by the IDACI score. The methodology used in investigating the two research questions are explained in section 4.3.

4.1.1 Empirical Framework

In the 1980s and 1990s, school effectiveness research was conducted in the form of a simple summary of lists of characteristics of effective and ineffective schools, leadership, administration type or management, key issues in effective teaching, learning and assessment, motivation and challenge, feature predominantly in such defining lists. In other words the degree of effectiveness of a school was determined by comparing the individual student and whole school performance against a set of benchmarks and criteria from the international literature on school effectiveness and school improvement. In a similar manner, Her Majesty's Inspectorate (DfES, 1988) improved on this through its twelve characteristics of effective secondary schools. Over the years, the membership of this list has been in a state of flux. Smith and Tomlinson (1990) suggested a shorter list of four key characteristics of successful secondary schools: effective leadership and management by senior and middle managers, teacher involvement in decision-making, climate of respect between all participants, positive feedback to and treatment of students. School effectiveness research is more concerned with the estimated change in the outcomes of a given school or school system in the context of a group of characteristic factors that are key influential factors in the explanation of individual students' and whole school outcomes (Mortimore, 1991). Goldstein, 1997 surmised that the term school effectiveness was being used to describe educational research concerned with exploring differences within and between schools. The statistical models used for such research are explored here.

4.1.2 Performance Indicators and School Comparison

In comparison with other schools, an effective school adds extra value to its student's outcomes. The value-added is the concept used to describe this procedure (Sammons et al, 1995). A key objective of school effectiveness research is the concern with the investigation of "explanatory and outcome factors using appropriate models" (Goldstein, 1997). Therefore, it is of main importance to develop adequate and reliable ways to measure the quality of the school (Mortimore, 1991). The development of multi-level modelling has helped to improve the statistical estimation of school effects (Creemers, 1994). Multilevel modelling method allows researchers to explore differences between schools and the characteristics of their student intakes. All the differences could be taken into account and therefore they could be included in the analysis of schools quality (Sammons et al, 1995). More than this, special emphasis is put on the issues of consistency and stability in schools effects upon different kinds of outcome and over time (Reynolds et al, 1994). Unlike League Tables and raw data, the multi-level modelling approach is successful in taking into account a variety of relevant factors in its judgments (Goldstein and Spiegelhalter, 1996; Goldstein, 1997).

Sammons and Bakkum (2011) defined an effective school as one in which students make progress further than might be expected from consideration of its intake. In effect, an effective school thus adds extra value to its students' outcomes, in comparison with other schools serving similar intakes. In order to assess value added, measures of individual students' prior attainment are needed to provide a baseline against which subsequent progress can be assessed. Whatever adopted method in the analysis of outcomes will require the comparison of like for like hence prior attainment is one of the key benchmarks. In addition to prior attainment, school effectiveness research studies seek to include other factors in assessing the impact of schools (Saunders, 1999).

4.2 Estimation Models

The establishment of a national curriculum and new sources of linked national data enabled consistent value added models to be based on pupil level data. In England school Performance Tables have always shown empirical evidence of school effectiveness using the VA or the Contextual Value Added (CVA) measures.

Without too much generalization, Goldstein raised a series of questions about 'effectiveness', which, also for convenience, he judged to be by academic performance. Academic performance in itself has several measures and within each measure of performance resides some degree of advantages not intrinsic to others. It is however key that whatever measure is adopted, the metric should not be subject to manipulation by individual constituents, should accurately measure the skill of interest in all participants and should not be biased against a group of participating students or schools. Multilevel modelling is now an established technique with a growing body of applications, some of it highly technical (Goldstein, 1997). Two key multilevel models used on the onset of empirical analysis in England are the Value Added Model (VA) and the Contextual Value Added Model (CVA) is a Model.

4.2.1 Value-Added Models (VA)

In England value added models were developed first in various projects for particular groups of schools. Mortimore et al (1988), Goldstein et al (1993) and others were able to carry-out Value Added (VA) analysis where pupils in a group of schools took specific tests. These were also carried out by analysts in Local Authorities with variations in complexity and purpose: some involved the provision of specific feedback to promote school improvement while others were more concerned with developing (VA) methods and the evidence on school effectiveness. Value added in its general economic sense refers to the extent to which the value of the inputs into the production process is increased when these inputs are transformed into the outputs of the production process. The concept of value added, or added value, is defined by Kay (1993) as "the difference between the (comprehensively accounted) value of a firm's (in this case school's) output and the (comprehensively accounted) cost of the firm's (school's) inputs", arguing that "In this specific sense, adding value is both the proper motivation of corporate activity and the measure of its achievement".

Findings of the National Project were taken into account in the simple value added piloted in the 1998 Performance Tables. The VA system seeks a robust means of identifying and recognising the progress and achievements of these groups of students without lowering expectations. The model took advantage of the

availability of student data use of link Key Stage 4 outcomes to Key Stage 3 prior attainment. The method is designed to compare individual pupil's expected outcome, predicted on national median GCSE result for individual level of Key Stage 3 prior attained outcomes with their actual outcome. On the level of schools, the value added scores were taken as the average of aggregate pupil level differences. This method was referred to by Ray (2006) as the 'median method'. This method for deriving schools scores was consistent with the approach taken in presenting earlier national charts. Ray suggested that 'although there were positive responses to this 1998 pilot, a major problem identified was that in covering only Key Stage 3 to 4 (the last two years of secondary schools), these measures gave an incomplete picture of overall value added. The secondary and primary value added scores have appeared in Performance Tables in each subsequent year and were also used by Ofsted in their Performance AND Assessment Reports (PANDA).

Advantages of adopting a value-added model include its simplicity to work-with and interpret as it is based on the idea of a median line. It uses prior attainment which is easily the most important variable in explaining test results. It explains test results by avoiding the use of a regression model. An important strength is that it is able to avoid a linear relationship between prior attainment and outcomes and significantly its use of the median makes the expected outcomes robust to the effect of outliers. Disadvantages on the other hand include its avoidance of the use of contextual information (see Tymms and Dean, 2004) which can strongly influence school effectiveness. The effects of excluding contextual factors is 'that school VA scores are correlated with school prior attainment levels, i.e. schools with more low attainers in their intake tend to have lower VA scores' (Ray, 2006). Without context, value-added models will not be comparing likes for like hence counterfactuals may be more difficult to find for treated group of schools. The mean is also not a very good average in data comparison hence the method is flawed because the scores are not centred creating a difficulty in interpretation. The Value-added model has inherent ceiling effects for high achievers and at the other end scores for small schools show relative instabilities.

4.2.2 Contextual Value-Added Model CVA)

Whilst the publication of value added measures in the Performance Tables was generally seen as a positive advance on the publication of 'raw results' only, there were some concerns about aspects of the methodology and presentation (Ray, 2006). The development of the link of each pupil unique number with individual pupil contextual data from the Pupil Level Annual Schools Census (PLASC) in 2002, created an opportunity to reconsider the possibility of including contextual data alongside prior attainment in value added models. Once PLASC data could be matched to individual pupil unique progress information, statisticians in the DfES began probing it to understand the relationships between the variables to retrieve national performance information. In October 2004 a prototype 'contextualised' value added (CVA) model covering the Key Stage 2-4 age range was discussed with schools. The following year a system of KS2-4 CVA scores was piloted for use in Performance Tables.

CVA measures past performance over a given period of time and allows comparisons to be made given what is known about the progress made by pupils during that time and with the same characteristics. CVA could not be used to set lower expectations for any pupil or group of pupils. When setting targets for future performance expectations, schools could strive to set equally challenging aspirations for all pupils generally. The CVA goes further than simply measuring progress based on prior attainment by making adjustments to account for the impact of certain external factors. Nevertheless, no single measure of performance can tell the whole story about a school's effectiveness and CVA could not be viewed in isolation. Attainment data continues to play an important role in painting the full picture of a school's effectiveness. Advantages of the CVA model over the VA model include the use of multilevel models in accounting for contextual factors and the hierarchical structure of the data.

4.2.3 Multilevel Models

The simple but realistic multilevel model relating an outcome or response variable y_{ij} to membership of different institutions was described by Goldstein (1997). The model was explained using data from Primary schools having a measure of reading attainment at the end of Primary school on a random sample of students from each

of a random sample of Primary schools. The reading score of the *i*th student in the *j*th school is described by the model below.

$$y_{ij} = \beta_j + u_j + e_{ij} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (1)$$

This Goldstein described shows that that the reading score can be broken down into a school contribution (β_j) and a deviation (e_{ij}) for each student from their school's contribution. The school contribution was decomposed in the second line into an overall mean (β_o) and a departure from that mean for each school. These departures (u_j) are referred to as school 'residuals'.

The equation (1) simply re-expresses the response, or reading test score, into the sum of contributions from the students and the schools. In traditional statistical terms this model has the form of a one-way analysis of variance, but significantly different in some important respects. For analysis purposes, the first interest lies in whether there are any differences among schools. Since the schools are being treated as a random sample of schools in order to be able to make large scale generalizations about schools, u_j would need to be treated as having a distribution among schools. It would be essential to assume that this distribution is Normal with a zero mean (since we have already accounted for the overall population mean by fitting β_o) and variance, σ_u^2. Also, we assume the student residual e_{ij} to have a variance σ_e^2.

Again, the significance of σ_u^2 has more to do with the school contribution to the variations in the model. If the value of σ_u^2 is relatively small, it could be deducted that schools had little effect. In other words, knowing which school a student attended does not clearly predict their reading score. The paper described the total variance as

$$\left(y_{ij} - \beta_j\right) = var\left(u_j + e_{ij}\right) = \sigma_u^2 + \sigma_e^2 \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots..\ldots. (2)$$

The values of e_{ij} and u_j *vary* independently and measures the relative size of the between-school variance. Also, it happens to be equal to the correlation of reading

scores between two students in the same school. We can 'fit' such a model by taking a data set with students identified by the schools they belong to and then estimating the required parameter values ($\beta_o,\ \sigma_u^2,\ \sigma_e^2$). This can be accomplished by different software packages.

It is generally found that the most powerful predictor of achievement at the end of a period of schooling is the achievement measured at the start of the period. This is one of the possible contexts accounted for in a multilevel model. For example, be accounting for the context of Mathematics test scores taken at the age of eight years (at the end of primary school) for a group of students now at the end of their studies in secondary school in the equation (1), the model becomes

$$y_{ij} = \beta_o + \beta_1 x_{ij} + u_j + e_{ij} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (3)$$

The end of primary school score is represented by x_{ij} and β_1 represents the average impact or increase in the end of secondary school score for every unit increase in the end of primary school score.

The non-adoption of a multilevel approach will most likely affect the standard errors for the coefficients of higher-level predictor variables. This is as a result of ignoring the groupings at pupil level. In a fixed effects model as implemented in this work, the effects of group-level predictors would most likely be confounded with the effects of the group dummies. It is not possible to separate the effects due to observed and unobserved group characteristics. The groups in the sample in a multilevel model would be treated as random sample from within a population of groups. It is however important to note inferences cannot be made beyond the groups in the sample if a fixed effects model is adopted in multilevel approach. In this work, the available data is at school level hence would not allow for a multilevel analysis.

Software such as R, Stata, MLWin, Mplus etc are available today for fitting such models. Stata (using Psmatch2 by Leuven and Sianesi, 2003 was used in this work.

4.3 Impact of Autonomy on Achievement

The impact of Academy status on average student achievement of a treated school is done by comparing school level outcomes of both the treated and control schools with similarity in trend in outcomes. By extrapolation, these schools should continue with this consistent trend unless there is a change in one of the determinate factors. For a difference-in-difference method to be adopted, a well-known assumption for identification is that common trends for participation over time should be similar for treatment and control groups in the period preceding treatment. It is useful to compare trends in outcomes between both groups. A test of the appropriateness of the control group is addressed in Figure 11.

Figure 11. A comparison of pre-treatment means of 5 GCSE at grade A*-C of treated and control schools.

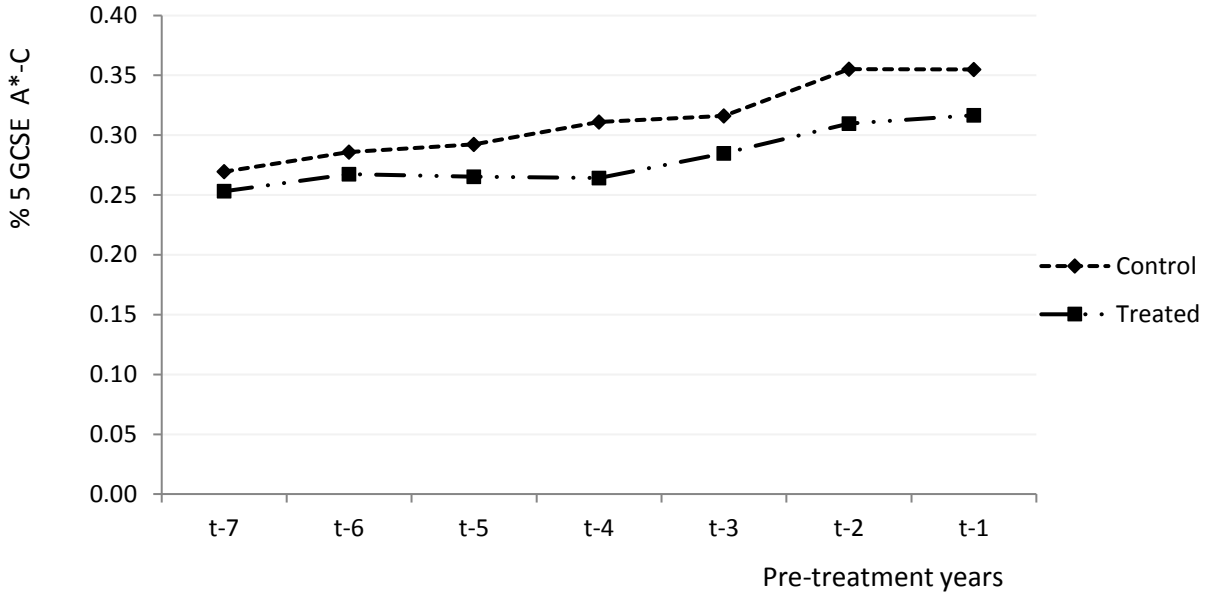


Figure 11 shows that the pre-treatment period mean outcomes of the treated group and the control group look similar. On grant of Academy School status, the increases in freedom could explain a sudden change in trend of the outcome of the assigned school. The treated and control schools are expected to have similarities in trends post-conversion and the same degree of mean reversion. Comparison of student achievement of both school types (Academies and similar schools but non-Academies) can provide an estimate of the impact of becoming an Academy on educational achievement.

Although the differences between the estimated mean pre-treatment outcomes of the treated and the control groups of schools over time is relatively small, inconsistent and non-zero, schools granted Academy School started with higher student outcomes. These pre-conversion outcomes and characteristics continuously improved for subsequent years when compared to those of the schools granted Academy School status in the previous year. The average outcomes and characteristics of the Academy in this investigation can be seen in Table 4.1 below. This would suggest that schools with better student quality are opting for the Academy School model due to the benefits of the freedoms.

Table 4.1. Year prior to Academy School conversion student outcomes

Opening date	Observation.	5GCSE A*-C (incl. English and Maths) (1)				5 GCSE A*-C (2)				Capped GCSE z-score (3)			
		Mean	S.D.	Min	Max	Mean	S.D.	Min	Max	Mean	S.D.	Min	Max
2002	2	0.19	0.01	0.17	0.18	0.27	0.08	0.21	0.32	-0.47	0.12	-0.66	-0.49
2003	6	0.06	0.03	0.04	0.08	0.24	0.10	0.11	0.40	-0.68	0.24	-1.09	-0.35
2004	2	0.15	0.06	0.10	0.22	0.24	0.08	0.17	0.33	-0.72	0.27	-0.94	-0.42
2005	6	0.18	0.11	0.07	0.37	0.32	0.14	0.08	0.58	-0.55	0.23	-0.91	-0.14
2006	10	0.18	0.07	0.06	0.34	0.32	0.11	0.15	0.51	-0.61	0.22	-0.91	-0.17
2007	20	0.23	0.08	0.06	0.40	0.45	0.16	0.20	0.84	-0.47	0.26	-0.86	0.11
2008	36	0.29	0.12	0.11	0.16	0.52	0.16	0.24	0.99	-0.37	0.30	-0.80	0.89
2009	52	0.35	0.12	0.15	0.99	0.62	0.16	0.29	1.00	-0.26	0.34	-0.93	1.65

Mean results in column (1) are proportions. E.g. Mean value of 0.27 represents 27% of students achieving 5 GCSE at grade A*-C
Mean results in column (2) are proportions. E.g. Mean value of 0.19 represents 19% of students achieving 5 GCSE at grade A*-C including Math and English
Mean results in column (3) are the standardized z-score of the best 8 GCSE grades at the end of G11. These are wider and more robust measures of exam performance across individual pupil's best eight subjects in GCSE exams standardising to a mean of zero and standard deviation of one standardised for all schools each year (called 'capped GCSE z-score') is used (Allen, 2013).

Table 4.2 also shows that the percentage of white English students is higher for schools that were later granted Academy School status. The percentages of students on the Free School meals (FSM) register are higher for the better performing schools that became Academies. The increase in the ethnic white British student percentages could be as a result of more parental acceptance of the model, due to similar reason explained for the reductions in the numbers of the students on the FSM register. It could also be as a result of underperforming

schools within higher socio-economic status adopting the Academy School model as a means of improving their results. A sharp and clear impact signal in outcomes is expected for these Sponsored Academies because the GCSE outcomes of these schools prior to Academy School conversion were some of the lowest in the country. These Academies with higher prior outcomes would naturally yield smaller estimates of impact signals. There is an overlap in the data of this work and that of all earlier publications. Because, a one year dip in outcome just prior to treatment is expected and the reports of Machin and Wilson (2009) and Machin and Vernoit (2011) both concluded that more than 2 years are required for the Academy effect to fully percolate through the system. This will be examined through the three-year estimated impact in outcomes.

Table 4.2. Improving trends in school characteristics of schools at assignment

Opening date	Observation.	Average KS2 z- score (1)				Free School Meals (FSM) (2)				White British Pupils (Ethnicity) (3)			
		Mean	S.D	Min	Max	Mean	S.D.	Min	Max	Mean	S.D.	Min	Max
2002	2	-0.51	0.12	-0.47	-0.43	0.43	0.01	0.43	0.44	0.40	0.51	0.04	0.76
2003	6	-0.67	0.52	-2.13	-0.31	0.45	0.09	0.33	0.60	0.37	0.33	0.16	0.93
2004	2	-0.72	0.31	-1.08	-0.45	0.40	0.01	0.39	0.41	0.60	0.20	0.46	0.74
2005	6	-0.51	0.31	-0.86	0.06	0.34	0.15	0.21	0.55	0.81	0.21	0.39	1.00
2006	10	-0.53	0.24	-0.93	-0.04	0.31	0.13	0.12	0.64	0.51	0.31	0.15	0.93
2007	20	-0.40	0.21	-0.89	-0.06	0.24	0.11	0.02	0.44	0.69	0.33	0.00	0.99
2008	36	-0.42	0.27	-1.02	0.77	0.18	0.10	0.01	0.38	0.79	0.25	0.07	0.99
2009	52	-0.25	0.29	-0.95	1.13	0.28	0.16	0.02	0.73	0.71	0.28	0.01	1.00

FSM, Ethnicity are proportions. E.g. FSM value of 0.03 represents 3.0% of students on FSM list

Modelling Approach

The rationale behind the selection of the treated schools was addressed in the last chapter but the methodology is explained here. The control group of schools is a group of schools from across the country and not necessarily from the same LEA as the Academy School. To determine the control group, propensity scores matching was done. The propensity matching approach is used to identify a group of untreated schools so as to create a set of counterfactuals yielding an unbiased average treatment effect on the treated (ATT). The nearest neighbour matching method was adopted in the attempt to deal with a number of potential sources of

selection bias (in addition to the previous eliminated mentioned sources) making two key assumptions: without the imposition of functional form assumptions or risk. The first being a *conditional independence assumption:* where X is the vector of observable covariates such that after controlling for these covariates the potential outcomes are independent of the treatment status (Heinrich et al., 2010). This means that if Y_i and Y_o are potential outcomes in presence or absence of treatment respectively, with D as a binary variable indicating the treatment status of the observed units, the statement below holds.

$$(Y_i, Y_o) \perp D \mid X \tag{5}$$

The observed characteristics are such that after controlling for these covariates, the potential outcomes are independent of the treatment status. Conditional independence implies that with random assignment, all the characteristics of the individuals are equally distributed between treated and untreated groups (i.e. the proportions are the same). In this case, it means that the groups will be identical (balanced) except for the fact that the group of Academies received a treatment of increases in Autonomy to choose some of its curriculum, employ its own teachers, make more administrative decisions, manage its own funds etc. While members of the group of counterfactuals could be any untreated school similar (in characteristics and hence would be expected to exhibit similar evolution without treatment) to the treated schools. For the purpose of this research, the above expression resolves the randomisation questions. After controlling for X, the treatment assignment could be said to be "as good as random" (Heinrich et al., 2010). This is simply a selection of the counterfactual based on the observable hence is also known as *unconfoundedness or selecting on observables*.

$$0 < P(D = 1 \mid X) < 1 \tag{6}$$

Another key condition is the condition of *common support.* This condition ensures that for each observed value of our vector X, there is a positive probability of being a treated and an untreated school.

The propensity score is the probability of treatment assignment conditional on these observed baseline covariates: $e_i = Pr(Z_i = 1|X_i)$ (Rosenbaum and Rubin,

1983). Due to the non-randomisation of the schools into the treatment, propensity scores which are the probabilities that both the treated and the untreated schools could have been assigned to treatment are estimated for both the treated and untreated schools. In this work, the probit regression model was adopted in the estimation of propensity scores.

Where $\varphi(X'\beta)$ is the Cumulative Distribution Function (CDF) of the standard normal distribution represented as:

$$\varphi(X'\beta) = \int_{-\infty}^{X'\beta} \varphi(z)dz \quad (7)$$

Where β could be estimated by maximum likelihood method. The probabilities could be predicted from this.

$$\Pr(Z_i = 1|X) = \varphi(X'\beta) \quad (8)$$

Propensity scores are determined for all non-Academy, non-CTC and non-private schools across England are calculated using a probit regression using the software 'stata' (see Long, 1997).

The following variables are chosen on the basis that they are statistically important in determining both participation and attainment:

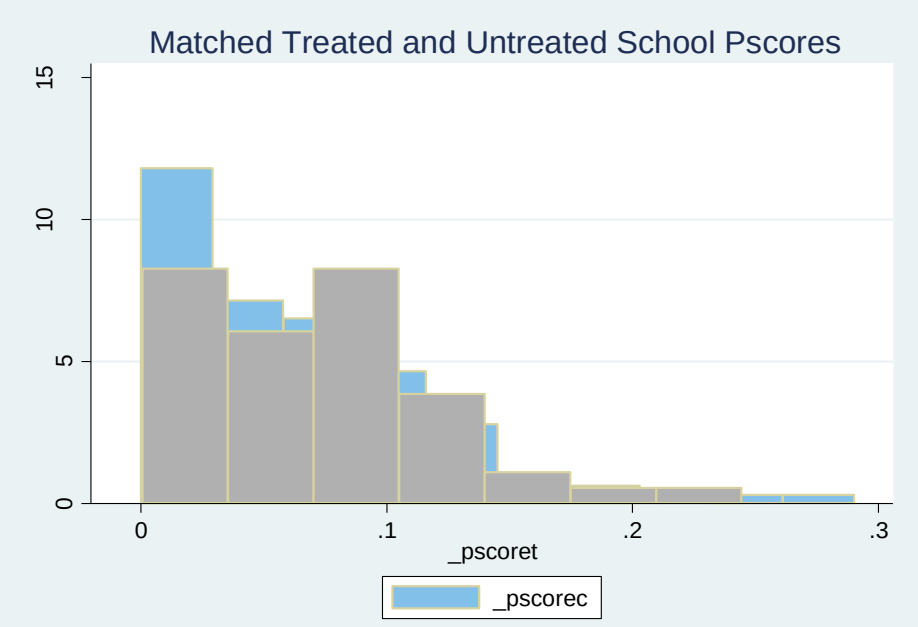
- school average prior attainment of pupils at age 11 (i.e. mean Key Stage 2 score);
- average deprivation of pupil's small area neighbourhood (i.e. IDACI);
- proportion eligible for Free School meals;
- proportion of white British ethnicity;
- Special Education Needs;

Propensity Scores

Propensity score matching is implemented in Stata using Psmatch2 (Leuven and Sianesi, 2003). Conditional independence requires the propensity score to capture all variables that correlate with the outcome and programme participation. The matching covariate "Change in GCSE results between t-3 and t-1" is particularly important since it is aimed at capturing any underlying changes taking place in schools during the period just before they converted to Academies (Ashenfelter dip

included). For example, the treatment may be correlated with improvements in performance at the school prior to the programme. A nearest neighbour matching method with a calliper of 0.02 was adopted with an imposition of common support to avoid very poor matches contributing to the calculation of the average treatment effect. The nearest neighbour method ensures that the most similar observations are used in the construction of the counterfactuals. This in essence minimises the bias since the characteristics between both units will be in general, very similar (Heinrich et al., 2010). Describing the Ashenfelter dip, Ashenfelter and Card in 1978 noted that participants in a training programme often experience a dip in earnings just before they enter the program. This they said was presumably why they did enter the program in the first place. Wages on the other hand have a natural tendency of mean reversion, hence leading to an upward bias of the difference-indifference estimation of the program effect.

Figure 12. Propensity scores of matched treated and untreated schools



Note: _pscoret represent propensity scores of the treated group, _pscorec represent propensity scores of the control group

Austin (2011b) stated that 'in the most common implementation of propensity-score matching, pairs of treated and untreated subjects are formed whose propensity scores differ by at most a pre-specified amount (the caliper width)'. In this work, the pre-specified of a 0.02 calliper used in this work reduces the number of the treated schools to 111 for whom 51 matched control schools were found. This is because

the difference in the propensity scores of the match schools is no more than 0.02 points. The propensity scores are distributed as seen on Figure 12 and Figure 13 below.

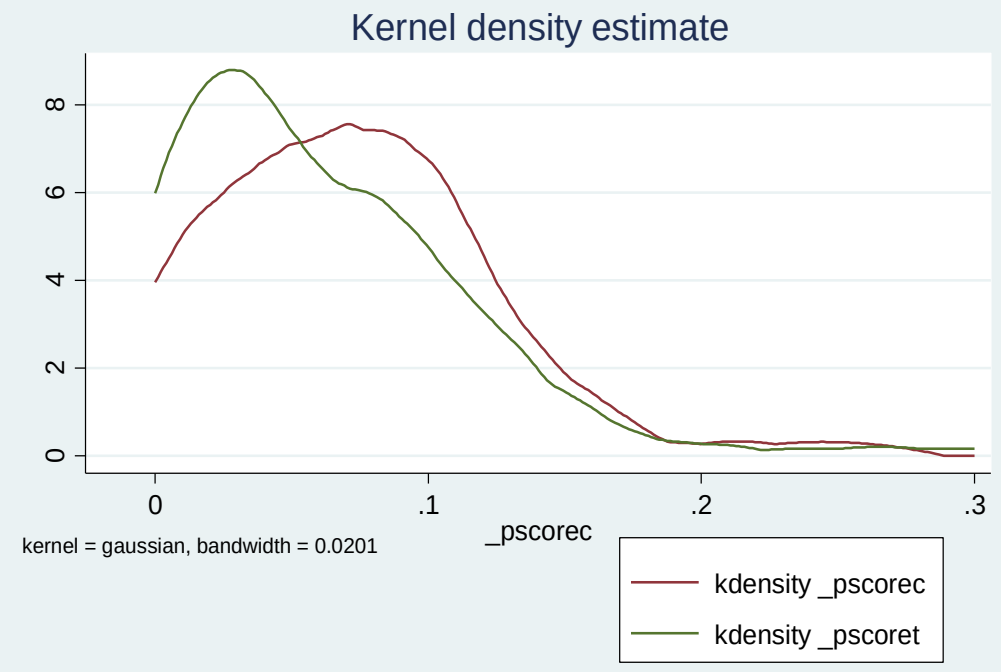
The odds of participating in the treatment as conditioned upon observed characteristics lie between 0 and 1. Heinrich *et al.* (2010) highlight the fact that the common support condition ensures that units with the same X_i values have positive probabilities of being either participants or nonparticipants in the Academy School program. In this case, the condition of common support between treatment and comparison groups is checked through visual inspection of their propensity score distributions. The histograms shown in Figure 12 show the distribution and the common support area across the treated and untreated schools in the sample. Both Figure 12 and Figure 13 show good degree of overlap in the propensity scores of the treated and comparison groups. This would suggest that the control and the treatment groups equally likely to be treated if assignment was random.

The number of matched treated Sponsored Academy Schools over time that were matched can be seen in the Table 5.3. This reflects the number of the 111 Sponsored Academies matched one-to-one to control schools within a 0.02 calliper for each Academy opening date.

Table 4.3. Sponsored Academies with matches

	Year Opened								
	2002	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**Total**
Treated Group	0	2	2	5	8	17	25	52	111

Figure 13. Kernel density and Common Support area across treated and control groups.



Balancing Test

Within the group of comparison schools, a major concern may be the difficult in finding schools with similar characteristics as the treated schools. This could be said for the earliest participating schools assigned to Academy School status in September 2002. Finding matched schools for the two schools established in 2002 was not possible because of the very poor state of their GCSE outcomes before conversion but it was possible to find matched schools for the Sponsored Academies established post 2002. The 2002 established Academies started with the lowest baseline characteristics at the point of establishment compared to the later established Academies. Table 5.1 shows that the early cohort schools were established with GCSE 5 A*-C results (with English and Maths) as low as an average of 6% in 2002 (with a minimum of 4%). These patterns are similar for results of GCSE 5 A*-C (with Maths and English not necessarily included). A balancing test was done to check whether the propensity score adequately balances the characteristics between the treatment and comparison groups. Balancing test outcomes are as seen in Table 5.4 on a wide variety of covariates at year t-2 and t-1 where t represents the year of Academy School conversion.

Table 4.4. Balancing test

Balancing test outcomes	Number of schools	Avg. KS2 point Score	3 year prior GCSE change	Avg. capped GCSE Z-score	5 GCSE A*-C incl. English and Maths	Free School Meals	Avg. IDACI score	White British	SEN
Treatment group	111	-0.313	0.051	-0.322	0.308	0.241	0.341	0.723	0.029
Control group	51	-0.337	0.044	-0.339	0.302	0.248	0.339	0.710	0.023
Combined	163	0.321	0.047	-0.328	0.306	0.243	0.341	0.719	0.029
Difference		0.024	0.007	0.017	0.006	0.007	0.002	0.013	0.004
Standard error		(0.048)	(0.013)	(0.052)	(0.021)	(0.026)	(0.021)	(0.050)	(0.006)

Average capped GCSE score is the standardised z-score for the school level average best 8 GCSE results.
Average KS2 point score is the standardised school level z-score of Maths, English and science results.
IDACI, 5 GCSE A*-C, FSM, SEN, Ethnicity are proportions. E.g. SEN value of 0.029 represents 2.9% of students in the school

In other words, the balancing test verifies that treatment is independent of unit characteristics after conditioning on observed characteristics as estimated by the propensity score matching (Heinrich C. et al., 2010)

$$D \perp X \mid p(X) \tag{9}$$

On conditioning on X, the probability P(X) of the existence of other variables that could be added to the conditioning set of the propensity score models that could improve estimation must be zero.

The Table 5.4 indicates a strong match of the treated schools to the control schools as reflected by the very low differences in characteristics and outcomes. In general, the differences are not statistically significant at between 1% and 5% level thus confirming the similarity of both groups of schools. Nearest neighbour matching with a caliper of 0.02 is important to the achievement of this strong match. The matching of treated schools to untreated schools nationally has made it possible to find schools with similar propensity scores. The matching was however not done on percentage of students with any form of special education needs (SEN).

Difference in Difference Estimation

Programme impact was estimated as the difference between the change in outcome over the two years period for the treatment group and that of the matched control group, controlling for time-varying variables (percentage Free School Meals (FSM), percentage ethnic white student population, KS2 total point score and percentage of students with English as an additional language). This is not without accounting for the difference between the treated and control groups. This is an unbiased estimate of the impact of autonomy under the following circumstances: there are common time effects between the treatment and control groups; the outcome is independent of assignment to treatment; and there are no unmeasured composition changes that occur over time in either group (measured composition changes are captured by X_{jst}).

The data is a balanced panel of a minimum of three observations for the treated and untreated schools pre-conversion and three observations for every year of the observation period. The treated schools are matched to control schools with at least three observations prior to first adoption of Academy status. It is important to consider trends and hence observations just before the schools opted into the Academy School programme rather than long term pre-conversion trends hence the use of three years of observation before conversion. This is better seen in Figure 11 where it is best to consider the three years prior to conversion for matching purposes than all prior available pre-conversion years. The school fixed effects regression equation modelling Y_{st} is as seen in equation (10):

$$Y_{st} = \beta_o + \alpha_s + \alpha_t + \sum_{j=1}^{J} \vartheta_j . X_{jst} + \delta T_{st} . A_s + \varepsilon_{st} \qquad (10)$$

This supposes that we have two group of individual schools j for which T_{st} is a policy on and off dummy variable equalling 1 for each school s in treatment years $\mathrm{t}\ \mathrm{and}\ (\mathrm{t}+1)$ otherwise 0 for all pre-policy years $(\mathrm{t}-2)\ \mathrm{and}\ (\mathrm{t}-1)$. On the other hand, A_s is a dummy variable with a value of 1 for every school in the treatment group and 0 for all schools in the control group.

The coefficients $\beta_o,\ \alpha_s,\ \alpha_t,\ \vartheta_j$ and δ are all unknown parameters where α_t and α_s are the year and school fixed effects respectively. Where β_o is a constant, α_s

accounts for the average permanent difference between the treatment and the control groups, while α_t accounts for the year-on-year effects common to all schools. Y_{st} are the outcomes of interest for schools s with two observations each in times t (two consecutive time periods during treatment) and ε_{st} is an error term. The purpose of this evaluation is to determine good estimates of the true treatment effect δ. Machin and Vernoit assumed Academy effect was not a function of time thus a one-time Academy effect on the outcome of interest was estimated. In this work, the Academy effect is assumed to be more effective over time. The treatment period was not extended any further than two years because missing data for the third and fourth years of some of the schools. Clustered standard errors at the school level are reported for all of the estimated measures of achievement shown and discussed here. These were done using the cluster option in STATA.

The R-Squared value explains the goodness of fit of the model. The R-squared value here does not have all the properties of the Ordinary Least Square (OLS) estimates. The value of the R-squared reported here is the in-between value. It is as a result of the collapse of the data thus removal of the time component by taking the means of the variables for each panel unit individually.

Robustness Tests

In response to the problem of uncertainty in economic modelling, several definitions of robustness testing emerged over time. Many social scientists have stressed that "all models are wrong" (Box 1976, Box and Draper 1987) and "all statistical models are always simplifications" (Feldstein, 1982). Robustness test has however been defined in different ways over time. For example, Box (1979) "robustness may be defined as the property of a procedure which renders the answers it gives insensitive to departures, of a kind which occur in practice, from ideal assumptions" (Duncan, O. D., 1975). Neumayer and Plumper in a working paper in 2016 stated that 'statistical significance maintained its status as the predominant criterion for making inferences even among scholars who doubted the assumption that estimation models sufficiently closely model the true data-generating processes. They also stated that "while Leamer's sensitivity testing is – at least in principle – consistent with any type of inferential rule, in reality Leamer (1978) suggested an

extreme bounds analysis in which inferences are perceived as valid if all model permutations generate parameter estimates for the variable of interest that have the same sign and are statistically significant" and "that most social scientists who undertake robustness tests have followed suit".

Machin and Vernoit appraised the sensitivity of their results on the impact of an Academy School conversion on their pupil intake and pupil performance by testing the robustness of their estimated Academy effects to see if these could be explained by other factors. This was done through a barrage of tests of robustness including a kernel matching method. Similarly, a barrage of different tests are done here to equally appraise the sensitivity of the impact estimates of the Academy School conversion on the quality of pupil intake and on achievement at the end of KS4. The aim of implementing kernel matching is to compare the balance test of the treated and control schools pre-treatment with that of the nearest neighour matching. This is with the aim to determine if the adoption of any of these matching approach creates large difference in the size or the significance of the estimated coefficients. The aim of implementing a robust test on the sensitivities of the different measures of achievement used in this work is to investigate the possible effect of key subjects or aggregated measures on impact estimates. In essence, these tests are carried out to see if the results hold in each case. See the section on robustness checks in the last chapter.

4.4 Impact of Autonomy on Pupil Intake Quality

In order to isolate the impact of increased autonomy on the quality of pupil intake, the earlier estimated group of schools was used as the control group. KS2 total point score of three years prior to conversion was used for the purpose of establishing a group of control schools. The first year of opening (*t*) is again taken as the year the Academy is established. Similar to the earlier work on impact of increased autonomy on academic achievements, a dip is expected at establishment due to assignment to treatment but not assumed during the modelling process. All pupil intakes into year 7 during the earliest two years of Academy School establishment were considered. As in the earlier work on impact of autonomy on student achievement, only a short term window of two years for

each Academy School was studied to ascertain the impact of changes in trend due to a gain in Academy School status.

To estimate the impact of Academy School conversion on the quality of pupils who joined these Academies in grade 7, the group of Academies and the matched group of schools from the previous investigation are queried for changes in pupil quality. The impact of the increases in autonomy on pupil intake quality is estimated by estimating the average change on the standardised average KS2 total points score (with a population mean of zero and a standard deviation of one). The impact of increase in autonomy on the quality of pupil intake is estimated as the difference between the change in the KS2 total point score over the two years period for the treatment group and that of the matched control group, controlling for time-varying variables (percentage Free School Meals (FSM), percentage of students of ethnic white British background, percentage of students with 5 A*-C at GCSE level and the percentage of students with English as an Additional Language).

In addition to the listed variables, contextualisation is also done on Special Education Needs (SEN). SEN variables indicates whether pupils have learning difficulties or disabilities that make it harder for them to learn than most children of the same age. It is important to contextualise on these variables to produce an unbiased estimate of the impact of autonomy. The SEN includes 3 categories of Special Education Needs: SEN statistics, SEN action and SEN plus. The (SEN) variables indicates whether a pupil has learning difficulties or disabilities that make it harder for them to learn than most children of the same age. Kalambouka et al. (2008) concluded in their paper that there are no adverse effects on pupils without SEN of including pupils with special needs in mainstream schools, with 81% of the outcomes reporting positive or neutral effects. This however does not distance SEN from influencing the aggregate school outcomes.

The fixed effects regression model is similar to that of the first investigated question but the outcome of interest Y_{st} represents standardised average KS2 total score, standardised z-scores of Maths or English for the treated and untreated school s (s is 1 or 0 for the treated and untreated schools respectively). Where, V_{jst} are the

SEN averages for each school, the FSM, proportion, EAL proportion of the students within each school. The proportion of students with ethnic white British background is also a member of the control variables. The average KS2 total score is the outcome of interest in the impact analysis on the quality of student intake of the converted schools as a result of the treatment. As was carried out in the first research question, the data is queried for the quality of the pupil intake over the first two years of treatment. Where ω_o is a constant, $\emptyset$ is the impact estimate, φ_s are the permanent difference between the control and treatment groups and φ_t are the year-on-year effects common to all schools.

$$Y_{st} = \varpi_o + \varphi_s + \varphi_t + \sum_{j=1}^{J} \rho_j . V_{jst} + \phi T_{st} . A_s + \varepsilon_{st} \qquad (11)$$

Impact estimates for the measures of KS2 Maths and KS2 English standardised z-scores are also estimated. The clustered standard errors at the school level are reported for all impact estimates using all measures of pupil quality. Y_{st} are the outcomes of interest for schools s with two observations each in times t (two consecutive time periods during treatment) and ε_{st} is an error term. As in the case of the primary question on student achievement, the purpose of this evaluation is to determine good estimates of the 'true treatment effect δ'. Also, as defined earlier, T_{st} is a policy on and off dummy variable equalling 1 for each school s in treatment years $\mathrm{t \ and \ (t+1)}$ otherwise 0 for all pre-policy years $\mathrm{(t-2) \ and \ (t-1)}$. On the other hand, A_s is a dummy variable with a value of 1 for every school in the treatment group and 0 for all schools in the control group.

4.5 Empirical Results

The impact of Academy School status on achievement is a combination of the relative effectiveness of individual Academy Schools themselves, the impact of the effectiveness of leadership structures as a school and effective leadership within subject departments. Of strong importance are the outcomes of Maths and English departments as a yardstick of measure and the best 8 GCSE measure of achievement. The Maths and English outcomes are key in determining a universal measure of school's percentage 5 GCSEs at grade C and above with and without Maths and English (captured here as gcse5acem and gcse5ac). As explained in

the data section earlier, these metrics of measure have different advantages hence each outcome is presented here with comparisons made.

4.5.1 Impact of Autonomy on Achievement

The difference-in-difference estimates are presented on table 4.5. A balanced panel data estimate of two observations per school pre-conversion and two observations per school post conversion was done. This is done using a total of 10 regression equations with the samples restricted to treatment schools (Academies) matched to a control group of schools nationally. These results are expressed in all 10 columns of tables 4.5 and 4.6. The top half of the table shows the impact estimates for the two years before treatment and for the two earliest years of treatment. The regression results shown are with and without time-varying control variables (as seen in the table). The value of δ is however significant at (t-1) and (t-2) using the measures seen in columns (2), (4), (5) and (6) with and without the introduction of the controls. The value of δ seen in column (3) at (t-1) and (t-2) is not significant thus this is the only situation where both controls and treated schools show similarity.

The capped GCSE z-scores impact estimates increases in the values of this measure from the two years pre-treatment shows that there are significant differences between the treated and the control schools. The same situation is reported without the introduction of control variables for the measure of the proportion of pupils with 5 or more GCSEs at grade A*-C. This could be seen in 5 out of the 6 reported measures seen on table 4.5. There is however no significant difference between the treated and control group prior to treatment when the measure of pupils with 5 GCSEs at grade A*-C when maths and English language are included in the results as seen in column (3). This renders the results of other measures unreliable for the purpose of this work. The result shows that without the introduction of control variables, the assignment into Academy School status results in an increase in achievement (with maths and English included) increased by between 0.052 and 0.071.

Table 4.5. The 2-years pre-treatment and 2-years treatment effect δ using the measures of capped GCSE z-scores and 5 GCSE A*-C with English and Maths included.

	Capped GCSE z-score		**Capped GCSE z-score**		**Prop. 5+A*-C, Eng & Maths incl.**		**Prop. 5+A*-C, Eng & Maths incl.**		**Prop. 5+A*-C,**		**Prop. 5+A*-C,**	
	(1)		(2)		(3)		(4)		(5)		(6)	
	δ	**Sig**	δ	**Sig**	δ	**Sig**	δ	**Sig**	δ	**Sig**	δ	**Sig**
Treatment year (t-2)	-0.126 (0.039)	*	-0.134 (0.062)	**	0.001 (0.041)	n.s.	-0.075 (0.015)	*	-0.102 (0.021)	*	-0.113 (0.027)	*
Treatment year (t-1)	-0.106 (0.039)	*	-0.122 (0.060)	**	0.005 (0.14)	n.s.	-0.072 (0.013)	*	-0.079 (0.021)	*	-0.090 (0.022)	*
Treatment year (t)	0.008 (0.039)	n.s.	-0.004 (0.051)	n.s.	0.052 (0.014)	*	-0.020 (0.011)	**	0.002 (0.021)	*	-0.013 (0.017)	n.s.
Treatment year (t+1)	0.057 (0.039)	***	0.048 (0.040)	n.s.	0.071 (0.014)	*	0.001 (0.010)	*	0.012 0.021)	n.s.	0.001 (0.012)	*
Control Variables++	No		Yes		No		Yes		No		Yes	
FSM			0.015 (0.186)	n.s.			-0.126 (0.061)	**			0.106 (0.016)	n.s.
EAL			-0.117 (0.121)	n.s.			-0.023 (0.044)	n.s.			-0.069 (0.063)	n.s.
SEN			-1.144 (0.571)	**			-0.676 (0.155)	n.s.			-0.894 (0.343)	*
EthnicWhite			-0.165 (0.097)	***			-0.033 (0.041)	n.s.			-0.039 (0.046)	n.s.
KS2 Total			0.372 (0.070)	*			0.199 (0.025)	**			0.130 (0.038)	*
Rho (Var due to u_i)	0.779		0.719		0.815		0.751		0.783		0.768	
R-sq (overall)	0.027		0.347		0.091		0.418		0.150		0.213	
Total Obs.	648		648		648		648		648		648	
Treated	111		111		111		111		111		111	
Controls	51		51		51		51		51		51	
Total Schools	162		162		162		162		162			

Notes: The numbers in the parenthesis are the Robust Standard errors clustered at the school level. (a) * = Significant at 1% level, (b) ** = Significant at 5% level, (c) *** = Significant at 10% level and (d) + = Time variant controls included are capped GCSE z-score and proportion of FSM, EAL and white English ethnic background. (Rho) explains the percentage of the variation in the individual school level specific fixed effects (ε_{st})

On introducing of the school SEN, FSM, proportion of ethnic white pupils and KS2 outcomes as control variables, the results pre-conversion seen in column (3) shows that the treated and control schools are not similar. This thus means that the treated schools and the control schools were poorly matched using the specific measures of achievement. Despite this, the estimated results in all two investigated post-

treatment years are in the same order of magnitude and also show progression in the estimated outcomes of the treated schools above that of the untreated. The R-squared value of 0.347 would suggest that the regression model with context explains the outcomes more accurately. This is a positive outcome since we have no reason to believe that the time-varying control variables are correlated with Academy School status. As explained earlier, these values are largely affected by the pre-treatment values.

(Rho) explains the percentage of the variation in the individual school level specific fixed effects (ε_{st}). The value of Rho is high in both cases. The control variables show that each additional unit rise in the value of the FSM, EAL, ethnic white British students and the KS2total would result in -0.015, -0.117, -0.165 reduction and 0.3732 rise in the aforementioned controls respectively. The errors are robust standard errors accounting for clustering in the data. The impact of the outcome of a pupil's best 8 subject grades (i.e. capped GCSE z-score) on table 4.6 column (1) and (2) would suggest that Academy School participation has impacted positively on the capped GCSE z-scores of the schools over time.

The measure of 5 GCSE at grade A*-C including Maths and English without controlling for context suggest a non-significant difference in outcome of between 0.1 and 0.5 percentage points in the two years just prior to treatment. These estimates suggest that the outcomes of the treatment and control schools prior to treatment were similar. This in effect is the test of common trends pre-treatment. For this reason, this is the only measure that fulfils this test. Post-treatment, without the introduction of control variables the impact estimates show a significant 5 percentage points increase in the first year of treatment and a significant 7 percentage points at the end of the second year. The value of Rho is high at 0.815 while the robust standard errors are not significant at lower percentage levels. The R-squared value without controls was very small (0.091). On the introduction of the control variables, a much larger R-squared value of 0.418 is seen for the model. The impact estimates are however negative for the two years prior to treatment and the first year of treatment. Little or no increase is seen in the second year of treatment and the increase in trend also suggests progression in the outcomes of the Academies due to treatment. Despite the fall in the Rho value to 0.751, the

estimated impacts are significant at 1% and 5% levels. The mean values of the FSM, EAL, ration of students with ethnic white background and the KS2 total are within the range of expectation.

The same pattern in impact estimates can be seen when the measure of GCSE 5 A*-C without necessarily including Maths and English but the difference prior to conversion is significant thus raising questions in the matching. Column (5) shows falls in the average outcomes of the Academies when compared with the control schools in the two years just before treatment without accounting for the control variables. At the end of the first two years of treatment, the estimated average GCSE outcome without necessarily including Maths and English shows that the outcomes of the Academies are higher than those of the control schools. The results also show a progressive increase from the first to the second year of treatment. All estimates in column (5) are significant at 1% significance level but the second year result is not significant. On introduction of control variables in column (6), all impact estimates for the two years before treatment and the first year of treatment shows that the control schools performed better than the Academy Schools. The first year estimates although negative shows significant improvement compared to the outcomes of the control schools. The estimates at the end of the second year shows that the Academy Schools achieved higher outcomes post conversion than they did pre-conversion. This result is consistent with the results of in column (3) and (4) with the inclusion of English and Maths. The R-squared and Rho values are 0.213 and 0.768 respectively.

The mean EAL and ethnicity per unit increase in this GCSE measure are in expected order but the value of 0.106 for the FSM would suggest an increase in this measure of 5 GCSE's due for unit increase in the number of students on FSM. This would suggest that students on FSM achieve better in Academies than they do in the untreated schools without benchmarking on the core subject of Maths and English. This would not be out of place as many of the Academies adopted non-academic curriculum in order to boost student and school averages. The robust standard errors are non-significant. The table 4.6 however suggests that a unit increase of one standard deviation of the KS2 total standardised z-score would result in an increase of approximately 20% in the measure of 5 GCSEs at grade C

and above with Maths and English included. The increase will be about 13% without the inclusion of Maths and English language and an increase of 0.372 standard deviations in the measure of capped GCSE z-score.

Table 4.6. The 2-years pre-treatment and 2-years treatment effect δ using the measures of English and Maths.

	Proportion of C+ in Maths		**Proportion of C+ in Maths**		**Proportion of C+ in English**		**Proportion of C+ in English**	
	(1)		(2)		(3)		(4)	
	δ	**Sig**	**δ**	**Sig**	**Δ**	**Sig**	**δ**	**Sig**
Treatment year (t-2)	-0.173 (0.064)	*	-0.205 (0.087)	**	-0.094 (0.066)	n.s.	-0.138 (0.084)	***
Treatment year (t-1)	-0.239 (0.064)	*	-0.284 (0.076)	*	-0.223 (0.066)	*	-0.277 (0.078)	*
Treatment year (t)	-0.008 (0.064)	n.s.	-0.031 (0.058)	n.s.	0.029 (0.066)	n.s.	-0.005 (0.068)	*
Treatment year (t+1)	0.028 (0.064)	n.s.	0.006 (0.054)	n.s.	0.115 (0.067)	***	0.105 (0.051)	**
FSM			-0.512 (0.270)	***			-0.517 (0.295)	***
EAL			0.025 (0.182)	n.s.			-0.303 (0.273)	n.s.
SEN			-4.256 ((1.218)	*			-3.567 (0.958)	n.s.
EthnicWhite			-0.408 (0.160)	***			0.237 (0.197)	n.s.
KS2 Total			0.787 (0.089)	*			0.846 (0.097)	*
Rho (Var due to u_i)	0.841		0.780		0.769		0.725	
R-sq (overall)	0.073		0.469		0.089		0.363	
Control Variables	No		Yes		No		Yes	
Treated	111		111		111		111	
Controls	51		51		51		51	
Total Obs.	648		648		648		648	
Total Schools	162		162		162		162	

Notes: The numbers in the parenthesis are the Robust Standard errors clustered at the school level. (a) * = Significant at 1% level, (b) ** = Significant at 5% level, (c) *** = Significant at 10% level and (d) + = Time variant controls included are capped GCSE z-score and proportion of FSM, EAL and white English ethnic background. (Rho) explains the percentage of the variation in the individual school level specific fixed effects (ε_{st})

In order to observe the patterns inherent in the key subjects of Maths and English, the estimates of the impact of autonomy on Academy School achievements is done. Column (1) of table 5.6 shows the impact estimates without contextualising on the control variables. Without controlling for contextual variables, the difference in outcomes of the pre-treatment and control schools prior to conversion show that there are differences in outcomes at a percentage significance level. There are no significant difference in outcomes of both treated and control schools for the two years post conversion. At the end of the second year, there is a 2.8 percentage point increase in the Maths achievements of the Academy Schools over that of the control schools. The value of Rho is 0.841 without context and 0.078 with context. On introducing the control variables, the R-squared value is 0.469. This R-squared value shows that the results when the control variables are introduced gives better explanations to the changes seen in the outcome of interest. Of note is the insignificant 0.025 increase in the value of the Maths outcome at grade C and above with a unit increase in the percentage of EAL students.

Column (3) of table 5.6 shows the estimated impacts on the measure of English at grades A*-C without the introduction of control variables. The difference in outcomes between the pre-treatment and control schools were not significant two years before conversion but significant at 1% significance level a year before conversion. The dip in estimated outcome of Academy Schools in the year (t-1) is more than the fall in the year (t-2). In the first year (t) of treatment, the estimated English outcome shows that the Academy Schools are achieving about 2.9 percentage points more than the control schools and 11.5 percentage points more at the end of the second year of treatment (t+1). These numbers suggest that the treated schools largely underperformed when compared to the control schools. As in the earlier measures of 5 GCSE's at grade C and above, the Academies outperformed the control schools over time by as much as 11.5 percentage points.

The results suggest that the upturn in the outcomes of the Academy Schools started immediately after assignment but their results overtook that of the control schools at the end of the second year. All of these dips or increases are again not impact estimates as the difference in pre-conversion outcomes of both the treated and the control schools are not consistently similar. On introduction of the control

variables, the R-squared value increased from 0.083 to 0.363 while the value of Rho fell slightly from 0.769 to 0.725. Thus the control variables largely explain the variations in the values of the outcome of English. Contrary to the increase in the Maths outcome as a result of unit increase in the EAL characteristics, an increase in the percentage of schools achieving grade C and above in English is seen in column (4) of Table 4.6. Similarly, Rows (2) and (4) of Table 4.6 shows that GCSE Maths grades C above increases by 78.7 percentage points for unit increase in the KS2 standardized z-scores and 84.6 percentage points in English language results. These results of all the models in Tables 4.5 and 4.6 show that Academy School conversion has slightly negative or no effect of conversion on the measures of capped GCSE z-scores, percentage of students with 5 GCSE at grade C and above with maths and English language included, and the measure of 5 GCSE at grade C and above without necessarily including maths and English language. The coefficients are not always significant, and the models with controls violate the common trends assumption so these results cannot be considered causal, but suggestive.

4.5.2 Impact of Autonomy on the Quality of Pupil Intake

The difference-in-difference estimates of pupil KS2 total point scores are presented in Table 4.7. The balanced panel data estimate of the mean of four observations per school for the untreated and treatment periods combined was done using regression equations with and without context for measures of KS2 total point score standardised z-scores, the standardised z-scores of KS2 Maths, science and English. The Maths, English and science analysis is done because the three measures constitute the KS2 total point scores. These three estimates would serve as robustness checks on the estimates of the KS2 total point scores.

The column (1) of Table 4.7 shows the estimated impact of the increase in autonomy on the measure of KS2 z-score of pupils admitted into the treated schools over the two years just before conversion and two earliest treatment years of the life of these schools. The impact estimate using the measure of KS2 z-score as seen in column (1) shows that the estimates for the Academies was below that of the control schools just before treatment but the difference in outcomes was insignificant.

The estimates are also below that of the control schools during the first two treatment years but again not at significant levels. This would suggest that the quality of pupils admitted by the Academy Schools using the measure of KS2 standardised z-score was not impacted positively or negatively by the conversion into Academy Schools. The value of Rho is 0.856 but the R-squared value of 0.001 shows that without the controls, the model does not explain the variations seen in the KS2 z-score. Introduction of the control variables show that the model explains these variations in the values of the outcome of interest much stronger but the pre-conversion outcomes show that the treated and pre-treated schools are not similar. The value of Rho is reduced slightly to 0.793 and the two-year average impact estimate of the KS2 z-score is approximately -4% of a standard deviation. The data does give a clear picture of reduced KS2 z-scores for unit increases in FSM. An increase of about 5% of a standard deviation in the KS2 z-score for unit increases in the fraction of students with ethnic British background.

Columns (3) and (4) of Table 4.7 shows the impact estimates using the measures of Maths, English and science school standardized z-scores. The pre-treatment outcomes also show that the pre-treatment schools and the control schools are not similar across column (2), (3), (4) and (5). Because these values are significant, the non-significant estimates post-conversion do not necessarily give the picture of the estimates we intend to achieve. Clear similarity in trends can be seen in all three curriculum areas and in the KS2 z-scores with contextual variables. This means that more contextual variables would need to be used to achieve similarity in pre-conversion and control schools. The values of Rho for all three curriculum averages about 0.750 and the R-squared values show that the control variables contribute strongly to the variations seen in the outcome variables.

Unit increases in the ethnic white British population show increases of 0.101 and 0.026 standard deviations in the English and science measures. The opposite is the case for the measure of Maths. The ethnic white students' performance dropped in the treated schools for unit increases of ethnic white students. The Table 4.8 also shows that unit increase in the ratio of FSM and EAL students will

generally result in falls in achievements hence the quality of students admitted to these schools.

Table 4.7. The 2-years pre-treatment and 2-years treatment effect δ on pupil quality using the measures of standardised KS2 z-scores, English, Maths and Science z-scores.

	KS2 Stand. z-score		**KS2 Stand. z-score**		**KS2 Maths z-scores**		**KS2 English z-scores**		**KS2 Science z-scores**	
	(1)		**(2)**		**(3)**		**(4)**		**(5)**	
	Ø	**Sig**	**Ø**	**Sig**	**Ø**	**Sig**	**Ø**	**Sig**	**Ø**	**Sig**
Treatment year (t-2)	-0.015 (0.026)	n.s.	-0.051 (0.025)	**	-0.063 (0.026)	**	-0.071 (0.031)	**	-0.094 (0.030)	*
Treatment year (t-1)	-0.041 (0.026)	n.s.	-0.078 (0.028)	*	-0.046 (0.028)	***	-0.074 (0.034)	**	-0.097 (0.33)	*
Treatment year (t)	-0.025 (0.026)	n.s.	-0.037 (0.027)	n.s.	-0.036 (0.025)	n.s.	-0.011 (0.032)	n.s.	-0.054 (0.033)	***
Treatment year (t+1)	-0.007 (0.026)	n.s.	-0.003 (0.027)	n.s.	-0.013 (0.024)	n.s.	-0.004 (0.030)	n.s.	-0.018 (0.033)	n.s.
Two-year Treatment Average	-0.016 (0.026)	n.s.	-0.020 (0.027)	**	-0.025 (0.025)	***	-0.008 (0.031)	***	-0.036 (0.033)	**
Rho (Fraction of var due to u_i)	0.856		0.793		0.780		0.725		0.781	
R-sq (overall)	0.001		0.484		0.468		0.512		0.405	
Controls^{+}	No		Yes		Yes		Yes		Yes	
Total Obs.	648		648		648		648		648	
Treated	111		111		111		111		111	
Control Schools	51		51		51		51		51	
Total Schools	162		162		162		162		162	
FSM			-0.120 (0.127)	n.s.	-0.263 (0.123)	**	-0.019 (0.133)	n.s.	-0.083 (0.166)	n.s.
EAL			-0.133 (0.119)	n.s.	-0.199 (0.112)	***	-0.148 (0.110)	n.s.	-0.082 (0.096)	n.s.
EthnicWhite			0.053 (0.049)	n.s.	-0.007 (0.055)	n.s.	0.101 (0.056)	***	0.026 (0.060)	n.s.
SEN			-1.011 (0.270)	*	-0.849 (0.286)	*	-1.252 (0.299)	*	-0.810 (0.310)	***

Notes: The numbers in the parenthesis are the Robust Standard errors clustered at the school level. (a) * = Significant at 1% level, (b) ** = Significant at 5% level, (c) *** = Significant at <10% level and (d) + = Time variant controls included are the proportion of students on FSM, EAL, SEN, SENPLUS, SENACT registers and white English ethnic background.

4.6 Discussions

In order to have an appreciation of the magnitude of the numbers in section 4.5, the mean, minimum and maximum values of the outcomes and characteristics of the 111 Sponsored Academies can be seen in Table 4.8 and 4.9. It is relevant to understand the magnitude of these measures in order to appreciate the estimated outcomes.

Table 4.8. Summary of the range of magnitude of KS2 and KS4 measures of interest

Measures of interest	Mean	Std. Dev.	Min	Max
KS2 Maths	-0.305	0.289	-0.986	1.436
KS2 English	-0.330	0.288	-1.023	1.134
KS2 Science	-0.324	0.310	-1.346	1.088
KS2 total z-score	-0.327	0.288	-1.047	1.220
GCSE Maths	3.860	0.729	1.973	7.433
GCSE English	4.057	0.629	2.205	6.988
GCSE5ACem	0.326	0.144	0.030	1.000
GCSE5AC	0.575	0.199	0.137	1.000
Capped GCSE z-score	-0.316	0.325	-0.972	1.653

Table 4.9. Summary of the range of magnitude of the characteristics of the 111 Academies

Variable	Mean	Std. Dev.	Min	Max
FSM	0.265	0.155	0.010	0.732
IDACI	0 .335	0.123	0.083	0.615
EAL	0.184	0.228	0	0.854
EthnicWhite	0.703	0.290	0.007	1.000
SEN	0.021	0.018	0.000	0.096
SEN Action	0.195	0.113	0.000	0.646
SEN Action Plus	0.091	0.067	0.000	0.371

4.6.1 Impact of Autonomy on Pupil Achievements

PWC's comparison with the group of schools within the lowest 15% of the national distribution for their average KS2 prior attainment levels would not necessarily exhibit similar evolution as the Academies schools. Neither would all schools in the lowest 10% of the national distribution for the KS2 results necessarily evolve in a similar manner. These schools may not necessarily have characteristics similar to

that of the Academy Schools. PWC estimate show an average GCSE impact estimates of about 28 percentage points for Academy Schools using the 5 GCSE A*-C with English and Maths included. Using this same measure of achievement, this investigation estimated the impact of autonomy to be between a fall of 2.0 percentage points in the first year and an increase of 0.1 percentage points at the end of the second year. Eyles and Machin on the other hand found increases of between 1.9 and 2.6 percentage points the end of the first year and between 5 and 5.6 percentage points at the end of the second year. Without English and Math necessarily included in the measure, the estimated impacts are between a fall of 1.3 percentage points in the first year and an increase of 0.1 percentage points in the second. In all cases of Table 5.5, changes in the estimated impact in the first year of treatment suggests a sharp turnaround of student achievement from the very poor results in the two years just before treatment.

Looking at a small number of 27 Academies up to 2007, Machin and Wilson compared these to a group of similar schools within the same LEA on pre-policy exam levels and similar trends in pupil achievement. They also made the same comparison with all schools in the same LEA. The authors estimated improvements in the average GCSE outcomes of their Academies and the matched group of schools when compared to the predecessor schools. When benchmarked against each other, the Academies underperformed by single digit percentages. This may have been due to the quantity of data available to the authors and the narrowing of comparison schools to schools within the same LEA.

NAO on the other hand has just about half the amount of data of Academy Schools available to them as is available in this work. They considered Academy Schools with a minimum of two years of GCSE data as at 2009, this work has done the same for Academies established between 2002 and 2009. Machin and Vernoit compared the schools that had already become Academies schools to those that were due to become Academies by matching on pre-Academy characteristics. Like other publications, this limitation placed on the pool of schools from which the counterfactuals restricts the chances of arriving at a much better match of schools. This may have largely affected the choice of schools available for consideration as counterfactuals. These limitations introduce bias into the analysis. This choice of

counterfactuals also assumes that schools that later became Academy Schools must have evolved in the same way as the Academy Schools. This assumption may not necessarily be accurate because the later Academies may not necessarily have the same characteristics as the earlier Academy Schools pre-conversion of the earlier Academies. These earlier Academy Schools had some of the lowest student achievement at the time of conversion. Their achievements were extremely low compared to other schools hence the later Academy Schools most likely have higher achievements than the earlier Academy Schools on the inception. These limitations are bypassed in this work by looking at more years and considering schools with similar characteristics and not necessarily those that went on to become Academy Schools.

In comparison with this work, the paper by Machin and Wilson investigated significantly less Academies, three years fewer data and assumed strictly a first year one-time Academy effect. The choice of counterfactuals was drawn from all non-Academy Schools nationally with similar characteristics hence a greater probability of finding schools with similarity in evolution of outcome. When compared with the future Academies, Machin and Wilson found a 3 percentage point increase in outcomes of the early Academies but they did not find increases in the outcome of 5 GCSE A*-C of Academies that had been opened for less than 2 years. The findings of this work for the earliest two years of the life of Academies are very similar to the results of Machin and Wilson. The results in this work are however hampered by the pre-conversion difference in the performance of the treated schools and the counterfactuals thus putting the results in question. Notwithstanding, rather than 3 percentage points as reported by Machin and Vernoit, an increase of 0.1 percentage point is seen for Academy Schools when compared to non-Academies at the end of the second year of treatment.

The common practice of focusing on the borderline groups and giving extra Maths and English language tutorial sessions to borderline student groups in preparation for the exams may have contributed positively but this effect was not clearly identifiable. As seen in columns (2) and (4) of Table 4.6, there are however a 10.5 percentage point increase in the English results and 0.6 percentage point in the Maths results of Academies over that of the control schools. The English results of

Academies have clearly surpassed that of the control schools. Although not conclusive, the Academies may have very good strategies in ensuring that the students access the English curriculum than they are doing with the Maths curriculum. The 10.5 percentage point jumps in English when compared to a 0.6 increase in the Maths results at the same time would suggest that the Academy Schools impacted faster on English than they did on Maths. The 0.1 percentage point increase in the measure of 5 GCSE at grade C (with Maths and English included) would suggest that Maths and English results have very strong deterministic influence on the estimated measure of 5 GCSE. It is again important to state that these results are significantly limited by the fact that the pre-treatment difference in value between the treated and counterfactuals are significant.

The capped GCSE z-score and the 5 GCSE impact outcomes did not agree with Machin and Vernoit's assertion that the treated groups would require at least 2 years to recover from such dip in outcome due to assignment. The outcomes seen here suggest that Academy effects are positive or show a change in trend in the first year of the life of Academy Schools but the interpretation is highly hampered by the significant difference in the difference in the outcomes of the treated group and the counterfactual pre-treatment.

4.6.2 Impact of Autonomy on the Quality of Pupil Intake

Most of the measures used show significant difference between the treated and control schools except for the measure of KS2 standard z-score without the introduction of control variables. Pre-conversion, the treated and counterfactuals show similarity in outcomes using this same measure of achievement. On introduction of control variables, column (2) of Table 4.7 shows that the treated group and control schools are not similar thus the questionable nature of the impact estimates.

With the relatively low significance level in the achievements shown for the two years prior to conversion, some conclusions reached would include these: the two-year treatment average of -0.016 standard deviations and no significant difference seen between the treated and control schools would suggest there that the measure of KS2 standardised z-score is without controls is a reasonable measure

whose impact estimation could be improved by introduction of control variables. Introduction of control variables seen however nullifies this notion again suggesting that further explanatory variables may be required. On accounting for the control variables, the two-year impact average for the treatment years shows an improvement on the average but the second year impact value is even much larger than the first. This would suggest that on the average, the quality of student intake marginally improved over time as a result of a gain in Academy School status. The change in trend observed in column (2) of Table 4.7 shows that treatment impacts positively on the outcomes of the Academy Schools. It is very important to note that in the study of the quality of pupil intake, many of the pre-treatment impact estimates are significant at 1% significance level and above hence reducing the potential for a conclusive inference. For this reason and for the reason of significant difference in the outcomes of the treated and control schools pre-treatment, a direct estimated impact estimates could not be directly compared with that seen in Machin and Vernoit. Also, these authors estimated cohort impacts (one year impact on Academies strictly for the year the schools are established) but this work has estimated aggregate impact for the earliest two years of the life of Academies established between 2002 and 2009.

Although the estimated impacts of treatment on the KS2 Maths, science and English language outcomes show increases in the pupil intake quality in the first year, the interpretation of these values as “impact estimates” would not technically be accurate because the pretreatment are significant in magnitude. These increases are sustained over the second year. These outcomes would largely suggest that parents may have been receptive to the Government’s Academy School policy right from inception. Clark (2009) suggested that gains seen in Grant Maintained Schools due to the increases in autonomy gained as a result of assignment to Foundation School status could not have been due to a gain in such a status. This work would suggest that the gains are very likely to be as a gain in Academy School status.

4.7 Robustness Checks

The robustness test displayed in column (2) of Table 4.10, considers the definition of treatment and control schools based on a one-to-one match with and without

replacement. Up to this point in this work, a multiple match of the control schools to the available Academies has been adopted. 51 control schools have been matched to 111 treated schools. Also, the control schools have been chosen from all school with similar characteristics nationally rather than the same LEA. Based on these restrictions, it is necessary to verify the how sensitive the estimates are to a definition of the treatment and control schools based on the estimated impact of the two years studied. Results of several tests of other measures can be seen on column (4) and column (5).

Firstly, rather than allowing for replacement when matching is done, no replacement is allowed in column (2). This ensures that no more than 52 Academy Schools were matched to 52 schools only. Although matching with replacement can often decrease bias because controls that look similar to many treated individuals can be used multiple times. This is particularly helpful in settings where there are few control individuals comparable to the treated individuals (e.g., Dehejia and Wahba, 1999). In this work, a comparison of the trend of the impact estimates shown in all of the columns of Table 4.10 and Table 4.11. There is however consistency in the magnitude of estimates of all columns (1) through (8) but the same could not be said of the estimates seen in column (2). As in the results of this study seen in Tables 4.5 through Table 4.7, the difference in values between the outcomes of the treated and untreated schools are significant. This largely limits the accuracy of the “impact estimates”.

The magnitude of the estimated impact in the first year seen in column (1) of Table 4.10 shows that the estimated 5 GCSE A*-C impact values with the inclusion of Maths and English and allowing for matching control schools to more than one treated school is as would be expected smaller than the impact values seen in columns (5), (6) and in columns (7) and (8) of Table 4.11. The R-squared value on columns (1), (3), (5) and (7) show that the model allowing for replacement using all of these measures of achievement explains the outcomes much better than the model that does not allow for replacement.

Table 4.10. Robustness Checks – Student achievement.

	GCSE Standardised z-scores Original Estimate With Replacement		GCSE Standardised z-scores Match without Replacement		GCSE Standardised z-score Matched within LEA With Replacement		GCSE Standardised z-score Matched within LEA Without Replacement		Prop. 5+A*-C, Eng & Maths incl. (Robust Errors) With Replacement		Prop. 5+A*-C, (Robust Errors) With Replacement	
	(1)		(2)		(3)		(4)		(5)		(6)	
	δ	**Sig**	**δ**	**Sig**	**δ**	**Sig**	**δ**	**Sig**	**δ**	**Sig**	**δ**	**Sig**
Treatment yr (t-2)	-0.134 (0.062)	**	-0.132 (0.065)	**	-0.206 (0.062)	*	-0.239 (0.069)	*	-0.075 (0.015)	*	-0.133 (0.027)	*
Treatment yr (t-1)	-0.122 (0.060)	**	-0.098 (0.060)	***	-0.187 (0.058)	*	-0.194 (0.061)	*	-0.072 (0.013)	*	-0.090 (0.022)	*
Treatment yr (t)	-0.004 (0.051)	n.s.	0.048 (0.055)	n.s.	-0.053 (0.049)	n.s.	-0.035 (0.053)	n.s.	-0.020 (0.011)	*	-0.013 (0.017)	n.s.
Treatment yr (t+1)	0.048 (0.040)	**	0.069 (0.069)	***	0.033 (0.036)	n.s.	0.062 (0.037)	***	0.001 (0.010)	*	0.001 (0.012)	*
Rho (Fraction var due to u_j)	0.719		0.732		0.743		0.763		0.751		0.768	
R-sq (overall)	0.347		0.139		0.128		0.089		0.418		0.213	
Control Var++	Yes		Yes		Yes		Yes		Yes		Yes	

Notes: The numbers in the parenthesis are the Robust Standard errors clustered at the school level. (a) * = Significant at 1% level, (b) ** = Significant at 5% level, (c) *** = Significant at <10% level and (d) + = Time variant controls included are the proportion of students on FSM, EAL, SEN, SENPLUS, SENACT registers and white English ethnic background.

To determine the control group of schools, the matched group of schools was taken from across the country and not simply from the LEA. By considering only schools within the same LEA, there would be a severe restriction on the ability to find a matched school within that community. In a situation where a matched school could be found within the same LEA, the chance of similar evolution will be higher. It could however be argued that underperforming schools are in general undersubscribed hence most schools within commutable distance from such a school would attract more able students. This would strongly affect the quality of students accepted into the underperforming schools. It could thus be safe to assume that the worse underperforming schools would not have similar matched schools within the same LEA hence the focus of this work on matching Academy Schools to schools with similar characteristics and trend in the three years just before conversion.

The estimated impact values within LEA with and without replacement seen on Table 4.10, columns (3) and (4) show similar trends but different magnitudes. Again, the pre-treatment difference in values between the treated and the control schools are significant. This shows that the counterfactuals are not effectively matched to the treated schools hence reducing the room for inference. The value of Rho for both estimations with and without replacement of the controls are similar but the R-squared value of 0.128 for the estimation with replacement suggests that allowing for replacement also explains the LEA estimations better than without allowing for replacement. Nevertheless, matching the Academy Schools to no-Academy Schools across the country as seen in column (1), better estimates the values of the impact.

The estimates of KS2 standardised z-scores not allowing for replacement seen on column (10) of Table 4.11 shows that the treatment and counterfactuals have similar magnitude and trend in achievement prior to treatment of the treated schools. These estimates would also suggest that there are no significant differences in outcome between the treated schools and counterfactuals post conversion to Academies.

Table 4.11. Robustness Checks – Student achievement and intake quality.

	Prop. 5+A*-C, Eng & Maths incl. (Robust Errors) Without Replacement		Prop. 5+A*-C, (Robust Errors) Without Replacement		KS2 standardized z-score With Replacement		KS2 standardized z-score Without Replacement		Prop. 5+A*-C, (Robust Errors) Without Replacement + Kernel Matching		KS2 standardized z-score With Replacement + Kernel Matching	
	(7)		(8)		(9)		(10)		(11)		(12)	
	δ	**Sig**	**δ**	**Sig**	**δ**	**Sig**	**δ**	**Sig**	**δ**	**Sig**	**δ**	**Sig**
Treatment yr (t-2)	-0.063 (0.017)	*	-0.127 (0.027)	**	-0.051 (0.025)	**	-0.028 (0.033)	n.s.	-0.072 (0.019)	*	-0.054 (0.027)	**
Treatment yr (t-1)	-0.065 (0.015)	*	-0.098 (0.022)	*	-0.078 (0.028)	*	0.028 (0.033)	n.s.	-0.069 (0.017)	**	-0.082 (0.030)	*
Treatment yr (t)	0.003 (0.011)	**	0.005 (0.017)	*	-0.037 (0.027)	n.s.	0.007 (0.023)	n.s.	0.009 (0.014)	**	-0.034 (0.025)	
Treatment yr (t+1)	0.006 (0.012)	*	0.001 (0.012)	***	-0.003 (0.027)	n.s.	-0.017 (0.035)	n.s.	0.008 (0.014)	*	-0.001 (0.027)	
Rho (Fraction var due to u_j)	0.767		0.762		0.793		0.796		0.764		0.790	
R-sq (overall)	0.296		0.352		0.484		0.307		0.301		0.479	
Control Var++	Yes		Yes		Yes		Yes		Yes		Yes	

Notes: The numbers in the parenthesis are the Robust Standard errors clustered at the school level. (a) * = Significant at 1% level, (b) ** = Significant at 5% level, (c) *** = Significant at <10% level and (d) + = Time variant controls included are the proportion of students on FSM, EAL, SEN, SENPLUS, SENACT registers and white English ethnic background.

The estimates showed that the schools suffered as much as 0.017 standard deviations dip in student intake quality in the second year but had an increase in pupil intake quality of 0.007 standard deviations in the first. The results of year (t) and (t+1) show gradual improvement in the estimates as would be expected if treatment is efficacious. The R-squared and Rho values also support allowing for replacement than they do for not allowing for replacement. The impact estimates as a result of the implementation of Kernel matching seen in columns (11) and (12) show similarity in the magnitude of the original estimates using nearest neighbor matching. The results require more or improved covariates to improve the estimation. The weakness in estimation could also be because the estimations are done at the school level only and not considering pupil-level estimation.

4.8 Limitations

Like other quantitative research work, the validity, generalisability and reliability of these estimates is mainly threatened by the complexity in implementation of the key theoretical constructs, estimate the policy impacts in school academic outcomes and the quality. There is also a risk to internal validity because the analysis is done on a single national cross-section of schools. This clearly has major limitations when trying to describe a constantly evolving quasi-market. It means that comparisons of policies takes place between-schools as against exploring the evolution of one school over time. This makes it extremely difficult to remove context from associations between variables and the control variables available may not prove adequate to achieve this.

If a claim of validity is made to the target construct (two year window in the life of an Academy School i.e. end of years 1 and 2) it would not be appropriate to extrapolate the outcomes beyond the window of investigation. It would also not be accurate to ‘in exact terms’ extrapolate the outcomes beyond the group of schools considered in this research but it will give a broad understanding of the likely effect of the policy change on a large number of the schools converted to Academies. It should in particular describe the effect of the policy on the schools in question, the UK Labour Government’s Sponsored Academy Schools in general (as a sizeable number are included in this work) over the sampled period. All causal statements are inevitably contingent, but in education research the wide variation in persons,

settings, treatments and outcomes across countries and over time means that evidence for a quantitative position that is upheld in this study is of limited use in making policy predictions in other contexts. Such evaluations are however excellent reference points for policy evaluation purposes.

Chapter 5

5. Concluding Chapter

This thesis has presented limited evidence to add to the research on the effects of increases in administrative autonomy on pupil achievement and the quality of student intake by these schools into year 7. By so doing, this work contributes to the quantitative literature on the government's Academy School policy and the effects of assignment of schools to Sponsored Academy status on the change in school admissions dynamics of Academy Schools. This conclusion brings together the research findings from previous chapters and discusses the implications of these results for policy-makers and the public on the adoption of the Academy School policy by the UK secondary school system.

This work has considered the effectiveness of Academy Schools through the lens of its impact of improvements in student GCSE outcomes as a result of the increases in autonomy. A robustness check of consistency of outcomes was done looking at the impact of increases in autonomy on pupil Maths and English outcomes, the trend of estimates and the justifiability of estimates based on the degree of estimation of the outcomes by the model and the magnitude of the estimates. In particular, Maths and English are fundamental tests taken by all students in English schools. This study has added in a limited way to the ongoing debate on the impact of further reduction in historical administrative burdens placed by the government and local education authorities (LEA). The burden of controls was lifted for some schools as a result of an increase in school autonomy as a result of assignment of Academy School status. This addition is done through the interrogation of student achievements of 5 GCSEs at grade C and above with maths and English included. This is the only measure of achievement in this study where the pre-treated and counterfactuals have similar trends. From these results, conclusions about the impact of Academy School conversion on pupil achievement could not be made.

The comparison group is made up of a matched sample of state-maintained schools drawn from all Grant Maintained UK secondary schools irrelevant of whether or not they go on to become Academies during as adopted by Machin and Vernoit (2011) or after our sample period ends. The observance of common trends in pre-Academy characteristics of Academies and their comparison schools has been ascertained for the years 1999 through 2002. This is against the creation of a comparison group from a group of schools that later opted for Academy School status as was adopted by Machin and Vernoit (2011). It could be argued that an observance of common trends in both groups of schools before the sampling period is critical in ATT estimation. This approach was meant to allow for the determination of groups of well-balanced treatment and control groups but was only achieved when maths and English are included. Estimates of the impact of an Academy conversion on the four chosen measures of achievement may not necessarily result in the same outcomes due to the more volatile nature of the measures of capped GCSE z-scores of the best 8 subjects at GCSE level, average of 5 GCSE grades at A*-C (Maths and English not necessarily included), average of GCSE Maths at grade C and above and average of GCSE English language at grade C and above. Although not investigated, it could be expected that without necessarily conditioning on an inclusion of maths and English, all measures used will have some degree of volatility. The volatility would be as a result of the discretion of the schools and students to decide on

- The choice of subjects used for the measures
- The choice of subjects studied by the students
- The choice of including or not including maths or/and English
- The disposition of the school(s) to gaming of achievements using the equivalent game

In isolation, the Maths or English results achievement of the counterfactuals and the treated schools pre-conversion still are not similar. This would greatly challenge the suggestion in the previous paragraph.

The gradual introduction of Academy Schools has been a controversial area of the UK Labour government education policy since the first group of Academy Schools

opened in September 2002 (Machin and Vernoit, 2011). The findings of earlier publications of the impact of Academy School policy on converted schools do not generally report similar results but generally point to increases in the performance of students in the Academy Schools post-conversion.

The counterfactuals of previous publications have been defined using different criteria. This has to a large extent been as a result of the difference in the research questions. The counterfactuals have been defined according to the locality of comparison. Some are compared to national statistics, local statistics or a group of similar schools that later gained the Academy School status. Some papers have investigated short term effects while others have taken a snap-shot of a one-time policy effect on Academy Schools. Despite the findings of these earlier publications, the jury is still out on the effects of these semi-autonomous schools on the school system. By focusing on a two-year estimation of outcome, this approach is similar to that of Machin and Wilson but rather than looking at these on a cohort basis, the first and second year outcomes of all Academies are combined across the schools. This is very important since most of the early Labour Academies started from a very low baseline on all measures of effectiveness. In particular, this study has been done through the comparison of key outcomes of interest in Academy Schools to a group of comparison schools.

Impact of Autonomy on Pupil Achievement

It was stated in the introduction, the Education Select Committee chairman Graham Stuart asserted that current evidence did not prove that Academies raise standards overall or for disadvantaged children. He also disputed the speculations of some positive benefits of Academy Schools on students from lower-income families. Academy Schools in the sample have a minimum IDACI score of 0.083 and mean distribution of 0.335 seen in Table 4.9. The national IDACI mean scores of 0.21 was stated by Crawford and Greaves (2013) but significantly, 50% of students from Academy Schools have IDACI scores lower than the national mean score. Crawford and Greaves also stated a national FSM average of 0.15 while the value estimated for the 111 Academies in this paper is 0.265. This means that on the average, 26.5% of students in the Academy Schools are on the FSM register.

Academy Schools clearly have significantly higher number of students from economically disadvantaged background compared to the national school average.

The findings in this work could not necessarily conclude that Academy Schools largely underperform when compared with the achievement data of the control schools. Based on poor matching, conclusions on intake quality could not be made based on most measures of student quality used here. Where the pre-conversion school and the counterfactuals were matched, the post conversion result shows show no difference in the quality of the pupil intake between the Academy Schools and the counterfactuals. This is not by any means a conclusive result. More and improved matching could be done using other measures of pupil quality. Although direct comparison of the results of this work is done with that of earlier publications, it should be noted that a direct comparison of the estimated effects with the estimates of any of the existing research papers may not be ideal due to the difference in comparison school definitions, the span of the data available to each study and the modelling approach. Despite the differences in assumptions between all publications and this work, each work has made assumptions that are unique to each of the adopted approaches.

Due to the significance in difference of all measures but the measure of GCSE 5 A*-C including Maths and English prior to conversion, the result would suggest that all other measures used could not have been said to have reasonably estimated the impact of the increased autonomy on the treated schools. These results suggests support for Robinson's assertion in 1950 that there is a possibility of drawing seriously misleading inferences about individual relationships from aggregate data. Woodhouse & Goldstein (1989) illustrate this with examination data and show also that estimates of aggregate level relationships can be very unstable. Goldstein described another major difficulty with aggregate level analyses as their inability to model random coefficients that is to study differential effectiveness. A pupil level approach may thus produce better results than the aggregate method used here.

Impact of autonomy on Pupil Intake Quality

Similar to the results above, the difference in pupil quality of both the treated and control groups prior to conversion is significant hence this seriously affects the estimated impact of treatment on conversion. This work does not make any conclusion on the quality of pupil intake post conversion.

The estimated impact on the pupil intake quality is not consistent with results of pupils in Community predecessor schools seen in Machin and Eyles (2015). Despite the difference in the outcomes of both the treated and counterfactuals pre-treatment, the order of the magnitude of the results seen in this work are same as seen for pupils from non-Community predecessor schools seen in the same paper. The magnitude of the estimates from Machin and Vernoit is at least ten times larger than that estimated in this paper. This work estimated increases in the quality of the students admitted but gradual reduction in the magnitude of the increases in impact suggests that “Academy effect” is very much time dependent.

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