ISSN 2042-2695

CENTRE for ECONOMIC PERFORMANCE

CEP Discussion Paper No 1477

April 2017

What's in a Name? Expectations, Heuristics and Choice During a Period of Radical School Reform

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E·S·R·C ECONOMIC & SOCIAL RESEARCH COUNCIL

Abstract

Education policy worldwide has sought to incentivize school improvement and facilitate pupil-school matching by introducing reforms that promote autonomy and choice. Understanding the way in which families form preferences during these periods of reform is crucial for evaluating the impact of such policies. We study the effects on choice of a recent shock to the English school system – the academy programme – which gave existing state schools greater autonomy, but provided limited information on possible expected benefits. We use administrative data on school applications for three cohorts of students to estimate whether academy conversion changes schools' popularity. We find that families – particularly non-poor, White British ones – rank converted schools higher on average. Expected changes in composition, effectiveness and other school policies cannot explain this updating of preferences. Instead, the patterns suggest that families combine the signal of conversion with prior information on quality, popularity and proximity as a heuristic for assessing a school's expected future performance.

Keywords: school reform; choice and autonomy; parental preferences; heuristic-based decision making
JEL codes: I21; H75; C23; D03

This paper was produced as part of the Centre's Education and Skills Programme. The Centre for Economic Performance is financed by the Economic and Social Research Council.

Acknowledgements

This is a revised version of a paper previously circulated with the title "The Demand for Autonomous Schools". We would like to thank Anne Gombert and Joan Wilson for help with the data collection and the Birmingham Local Authority for sharing data about school applications and providing detailed information about the institutional context. We also thank Clive Senior for insightful discussions about the academy programme. Finally, we thank Josh Angrist, Eric Bettinger, Stephen Billings, David Card, Sarah Cohodes, Marta De Philippis, Sue Dynarski, Caroline Hoxby, Peter Hull, Andrea Ichino, Tim Leunig, Jesse Rothstein, Christopher Walters and seminar participants at the AQR 2015 Workshop in Barcelona, Brucchi Luchino 2016 Workshop, CESifo Economics of Education Conference 2016, CREST Paris, IFN Stockholm Conference 2016, IRVAPP Trento, LSE, SOLE 2016 Annual Meetings, Statistics Norway Oslo, Tinbergen Institute Amsterdam, University of Barcelona, University of Bristol, University of Helsinki, Universities of Milan – MILLS Seminar, University of Padua, UC Santa Cruz, University of York, UEA 2015 Annual Meetings and Warwick University for helpful comments and suggestions. We are responsible for any errors or omissions.

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Published by
Centre for Economic Performance
London School of Economics and Political Science
Houghton Street
London WC2A 2AE

1. Introduction

Giving schools greater freedom from state control is often advocated as way to improve educational standards and a number of countries have embarked in reforms that give state-funded schools greater flexibility and autonomy over budgets, personnel, curriculum and teaching. In the US, policy changes that started in the 1990s led to the creation of Charter schools. Similar reforms have occurred in Europe, with the birth of 'Friskolor' in Sweden in the 1990s and Academies and Free Schools in the UK in recent years.[1]

The notion that reforms that promote autonomy from state control can improve education is predicated on two main mechanisms. First, autonomous schools can differentiate their teaching offer – e.g. by adjusting taught curriculum or extending school days – thus catering for different pedagogical needs. Better matching between pupils' needs and differentiated school provision should raise standards.[2] Second, autonomous schools have more scope for changing management, teaching and recruitment practices in ways that promote student achievement. These channels can, in principle, raise standards when coupled with incentives generated through quasi-market mechanisms in the process of school choice. This in turn creates competitive pressure on other schools to improve or leave the market (i.e. close) – further increasing standards on average.[3]

The effectiveness of these channels – and thus of reforms promoting choice and autonomy – rests on the idea that families actively exercise choice and value the advantages that more autonomous arrangements can bring. However, little is known about how families respond to these changes *in practice* given that the educational benefits or costs of such reforms are largely unknown a priori. Our paper sheds light on this question by examining how preference rankings for schools changed in response to a far-reaching policy shock to the English school system – i.e., the academy programme. Academies are largely autonomous schools that, despite being part of the state sector, non-selective and non-fee-charging, fall outside the control of local government in terms of key strategic decisions and day-to-day management. Academies were originally introduced in 2002 as a small remedial intervention aimed at failing schools, forcing organizational change under the guidance of a private or charitable sponsor willing to invest in the school. However, from 2010, the new Conservative/Liberal Democrat Coalition Government dramatically expanded the academy programme and changed its nature by allowing high-performing schools to apply to become academies and acquire autonomy in terms of budgeting, hiring of staff, pay, working conditions, performance management,

[1] Clark (2009) studies the effects of a previous generation of partly autonomous schools in the UK – Grant Maintained schools. Abdulkadiroglu et al. (2011) and Bohlmark and Lindahl (2012) discuss the characteristics and effects of autonomous schools in the US and Sweden, respectively.

[2] Besley and Ghatak (2005) highlight another channel: diversity in the character and mission of schools can lead to better matching with staff who subscribe to the same mission.

[3] See among others Hoxby (2000) and (2004) and Gibbons et al. (2008) for a discussion of these mechanisms and their effects on educational attainments in the US and UK, respectively. See also Brunello and Rocco (2008) and McMillan (2004) for some counterarguments on the possible pitfalls of choice and competition in education.

curriculum and length of the school day. The shift was relatively unexpected and occurred almost overnight: the new Government was installed May 2010 and the Academies Act 2010 crystallising these changes passed in June 2010. Over 1100 academies – 35% of the secondary school stock – were created in the first 3 years of the programme. Despite their pervasiveness, little information or hard evidence was available to families on the likely structural changes associated with academy status and their potential benefits, and from a choice perspective not much changed in the short term apart from the school name – i.e., its 'branding'. In our work, we study the effect on families' school choices of the 'offer of freedom' that these academies provided. Our evidence sheds light on demand for autonomy and on who values it, as well as on the mechanisms by which families make their choices in the context of a radical reform with uncertain educational payoffs.

In order to carry out our analysis, we use merged administrative data on preference rankings, student and school characteristics. The data cover 40,000 families, over three years (2009-2011), choosing from the 125 secondary schools in and around Birmingham – the second largest metropolitan area in England. Estimation is based on choice models in which we quantify the impact of the academy-conversion event on the probability of listing a school as the top preference amongst a set of potential alternative schools. Birmingham (like other English admission authorities) uses a constrained deferred-acceptance allocation mechanism with six choices in which families rankings should reflect true preferences (Pathak and Sonmez 2013). The data structure allows us to control for school fixed-effects to partial out time-fixed school unobservables, as well to control for an extensive set of student, school-by-student and time-varying school characteristics. In our preferred specification, we restrict the choice set to schools which ever become academies up to 2015 – and either convert during our observation window or right afterwards – to further account for unobserved heterogeneity between schools that convert and those that do not.

Our results show that on average parents respond positively to academy conversion: all else equal, schools approved for conversion to academy are 8% to 14% more likely to be ranked as the most preferred choice relative to a baseline probability of picking a first choice school at random. However, this headline results mask substantial heterogeneity by family background. Families with higher income – i.e., those ineligible for Free School Meals (FSM) – rank a school higher by 16% to 27% when it converts, while poor families are indifferent or less likely to choose these schools. We detect a similar pattern when comparing White British families with other ethnic groups. When we split the sample by both income and ethnicity, we find that it is primarily high-income, White British families who drive our results – being 30% more likely to list a school as their first choice if it becomes an academy. This heterogeneity implies sorting into these the newly converted academies, and increased segregation along income and ethnic lines.[4] We present a wide range of tests which demonstrate that the estimated parameters represent a causal response to academy conversion, including: *(i)* balancing tests showing that the timing of conversion is unrelated to school characteristics and that conversion is uncorrelated with pre-dating trends in school characteristics; *(ii)* changes

[4] This is consistent with Eyles et al. (2016) who document changes in schools' intake following conversion to academy in the national sample.

of the potential school choice set; and *(iii)* an instrumental variables design that exploits institutional constraints in the government approval process that affect the timing of academy conversion.

We devote considerable attention to the mechanisms giving rise to our findings. One possibility is that higher income White British families expect academies to attract higher-status peer groups and to make policy changes which improve their effectiveness, and so rank them higher in their preference ordering in anticipation of these changes. However, we find that the effect of conversion on preferences cannot be explained by changes in composition, effectiveness (value-added) or other school policies (e.g., patterns of expenditure, offered curriculum, employed workforce) that occur when schools become academies: converters are still ranked higher even when we control for these factors in our regressions.[5]

A better explanation emerges when we study the influence of pre-existing school characteristics and home-school distance in interaction with academy conversion on the changing patterns of parental demand. First, we find that schools that are oversubscribed and deliver high standards before conversion become even more popular when they convert to academies, suggesting that these factors, in conjunction with academy status, become a focal point for choices amongst more affluent White British families. Seemingly, academisation provides a salient signal of excellence. Second, we find that the positive demand effect of academy conversion for wealthy and White British families is more pronounced for schools located close to home. This might be because living close to a converting school simply makes families more aware of academisation and more likely to choose an academy – irrespective of the benefits this may confer to pupils. Alternatively, proximity might make it easier for families to gather 'soft' non-codified information about what academy conversion actually means in terms of organisational change and impacts on achievement. Taken together, these patterns suggest that families use pre-policy indicators of a school's quality, popularity and proximity – in combination with the academy 'branding' – to form heuristic judgments on schools' future performance and suitability for their children, and update their preferences. These findings are consistent with and contribute to the evidence from behavioural economics showing that 'coarse thinking' and 'heuristic-based' choices are common in individuals' day-to-day real-life decision making (see Tversky and Kahneman, 1974 for the original insights; Pope, 2009 for an application to hospital rankings; Mullainathan et al., 2008 for a model of coarse thinking; and Della Vigna, 2009 for a comprehensive review). To the best of our knowledge, our paper is the first to document heuristic-based problem solving behaviour in relation to school choice and in the context of a large policy shock.

Our work also contributes to a growing literature on differences in educational choices according to family background. First, it is closely related to research on heterogeneity in preferences for Charter schools.

[5] Following Ferreyra and Kosenok (2015) we control for the *actual* school composition that pupils will experience once enrolled at the school to proxy for the effect of expected changes in peer composition. Further, we follow Eyles et al. (2016) and Abdulkadiroglu et al. (2016) and measure academy effectiveness by comparing the attainments of pupils already enrolled in academies prior to their conversion with the attainments of students already enrolled in schools that will become academies after our observation window.

Walters (2014) uses a structural model to study charter school choice in Boston (MA) and shows that poor, low attainment children stand to benefit most from going to a charter school attendance but are less likely to choose one. Similarly, Butler et al. (2013) provide evidence that richer students are more likely to choose charter schools. More generally, Hastings et al. (2005) document that better-off parents are more likely to choose high test score schools and willing to travel more to secure their pupils' attendance to a better school than worse-off families. These patterns are echoed by Burgess et al. (2015) on school choice in England, and Calsamiglia et al. (2015) on Barcelona. At the higher education level, Hoxby and Avery (2013) find that potentially suitable American students from poor background are unlikely to apply to selective colleges, while Arcidiacono et al. (2016) present marked differences in college selection between minority and non-minority students. Our findings on heterogeneity are broadly consistent with this previous evidence. One limitation of previous work is that it has been mostly cross-sectional – which makes it difficult to distinguish the effect of specific school characteristics or policy changes from the effect of unobserved school attributes and location. Our analysis goes beyond previous studies in this respect by exploiting multiple years of choices and by focussing on the impact of an explicit education policy change – while holding fixed unobservables. Lastly, our work indirectly contributes to the literature that looks at the role of information in influencing school choices (Figlio and Lucas 2004, Hastings et al., 2007, Hastings and Weinstein 2008, Gomez et al., 2012, Mizala and Urquiola, 2013, Hussain, 2016, and Imberman and Lovenheim 2016). However, we focus on a diametrically opposed case: the implementation of a vast scale policy reform with little information provided to guide parental decision making.

The rest of the paper is organized as follows. In Section 2, we discuss the institutional context while in Section 3 we describe the data that we use. Section 4 presents our empirical model. Section 5 discusses our results, while Section 6 investigates some potential mechanisms underlying our findings. Finally, Section 7 presents some concluding discussion.

2. Institutional context

2.1 Main features of the English school system

Compulsory education in England is organised into five stages referred to as Key Stages (KS). In the primary phase, pupils usually enter school at age 4-5 in the Foundation Stage (grade 0) and then move on to KS1, spanning ages 5-6 and 6-7 (grades 1 and 2). At age 7-8, pupils progress to KS2, and at age 10-11 they complete the primary phase (grade 6) and move on to secondary school (grade 7) where they progress through KS3 to age 13-14 (grade 9), and KS4, up to age 15-16, which marks the end of compulsory education (grade 11). Throughout their education, pupils are assessed on the basis of standardized national tests. At KS2, students take tests in English, Mathematics and Science, which are externally assessed. At KS4, pupils sit academic (GCSEs) and/or vocational (NVQ) tests in a range of subjects, although English, Mathematics and Science are compulsory for every student at this stage. These tests are externally assessed. School average attainments at these Key Stages and measures of school average value-added are published alongside other

school characteristics (such as size and composition) in performance tables. These are highly salient in the media and policy debate, and routinely used by parents to inform their school choices.

Admission to state schools at both the primary and secondary phase is based on principles of parental choice, although in practice parents' freedom to choose is constrained by the fact that popular schools become over-subscribed. When this occurs, various criteria are used to prioritise students, usually favouring those who live nearby, those with special educational needs or in care of the local authority (LA), and those with siblings in the school. Certain types of schools can prioritise students according to other criteria – e.g. religion (faith-schools) or specific aptitudes (music and other specialist schools). Finally, a small proportion of state secondary schools select on prior achievement or admission tests (Grammar schools).

In our analysis, we consider preferences expressed by pupils living in Birmingham for schools in the Birmingham LA as well as seven proximate LAs – namely Dudley, Sandwell, Solihull, Staffordshire, Walsall, Warwickshire and Worcestershire. Birmingham is the second largest English city with approximately 1.1 million inhabitants. Its population is very ethnically diverse: less than 55% of its inhabitants are of White British origin (compared to approximately 80% in England overall), with the second biggest ethnic group composed of Asians (in particular Indian and Pakistani). Birmingham adopts a centralised clearing house for secondary school applications, collecting parental preferences for all state schools – inside and outside the LA. This means we observe preferences expressed for all state secondary schools – even if these are located in other school jurisdictions.[6]

The LA contacts parents in late Spring of the academic year before students are expected to enrol in secondary education (e.g. April/May 2009 for secondary school admissions to the academic year 2010/2011) and provides detailed information booklets about school types, characteristics, admissions criteria and links to information about schools in other LAs. The booklets also explain the timeline of the admissions procedures and stress the fact that schools will hold open events during September of the current year (e.g., September 2009 for admissions to the academic year 2010/2011) and parents are expected to apply to their preferred schools by the beginning of October – even though applications close at the end of the month. After this, parents receive school offers the following March (e.g. March 2010 if they applied in October 2009), with the aim of starting secondary school in September of the same year (e.g. September 2010 for the academic 2010/2011). Families can apply to up to six secondary schools (on average, they express 3.8 preferences). In order to allocate pupils to their preferred schools, LAs use a constrained student-optimal stable mechanism (also known as Deferred Acceptance algorithm, or DA). Pathak and Sonmez (2013) have studied the details of the English admissions system and have shown that this matching algorithm is less open to manipulation than alternative arrangements and likely to elicit true parental ordering of schools.

[6] We do not observe preferences for private schools. However, aggregate statistics show that for the academic year 2010/2011 less than 5% of secondary school pupils are privately educated in Birmingham.

2.1. Academies: institutional details

When applying for school places, parents observe the institutional arrangements of schools. These can take one of the following alternative structures: community schools, voluntary controlled schools, foundation schools, voluntary aided schools and – since their introduction in the early 2000s – academy schools, which enjoy the most autonomous arrangements within the state-school system.

Community and voluntary controlled (VC) schools are mainly organized and managed through the LA, which employs the staff, owns the buildings and organises admissions. Their governing bodies include members of staff, representatives of the LA, parents, community representatives and, in the case of VC schools, members of the foundation (usually religious) supporting the school. Voluntary-aided (VA) and foundation schools enjoy more autonomy from the control of the LA and are run as a partnership between the state and a foundation in the voluntary sector (usually religious). The foundation owns the buildings and covers most capital costs. The governing body of the school employs the staff and is responsible for admissions. The LA has a lesser role on the governing body than in community and VC schools. In all these cases, funding comes from the LA using money provided by central government through general taxation.

Academies enjoy a much larger degree of autonomy than any of these school types, despite remaining non-fee-charging, state-funded schools. Academies were introduced by the Labour Government starting from September 2002 with the aim of replacing failing and heavily under-subscribed schools. Initially, the academy programme was a small and targeted remedial intervention aimed at addressing underperformance by imposing organizational restructuring and linking schools to a Government-approved sponsor – usually a charity or a business group – enlisted to drive through educational improvements. As a result, this type of academy has commonly been referred to as a 'sponsored' academy.

The academies programme dramatically changed in May 2010 with the appointment of the new Conservative/Liberal Democrat Coalition Government. The aim of the Academies Act 2010 – swiftly proposed by the Conservative education secretary Michael Gove and passed in June 2010 – was to allow as many schools as possible to convert to academies and drive transformational changes to the organization and governance of the English state school sector. Under this new system of 'converter' academies, the process of conversion is initiated by the schools themselves. To grasp the rapid expansion of the programme, consider that at present there are more than 1800 secondary academies out of around 3200 secondary schools. Of these, around 500 are sponsored academies – with almost 300 created during the Labour Government. More than 1300 converter academies were instead created between 2010 and 2015 – with approximately 85% of this expansion taking place in the first three years. These represent 40% of all secondary schools and 80% of the increase in the academy sector in the past five years. In our analysis, we focus on these converter academies to identify the impact of autonomy on parental preferences.[7]

[7] Conversely, we do not investigate the impact of conversion through the sponsored route because, during sponsored academisation, management, pedagogical methods and teaching workforce undergo substantial restructuring. Further,

Applications for conversion are reviewed and processed by the Department for Education (DfE), which provides the following guidelines for governing bodies: *(i)* discuss the possibility of converting to academy with parents of enrolled pupils, members of staff and the interested community at large; *(ii)* obtain consent from the foundation or religious body backing the school (if any); *(iii)* register with the DfE the intention to apply and send information about school attainment, pupil progress and school finances for the past three years; and *(iv)* provide the most recent school report prepared by the school inspectorate (OFSTED). After receiving this information, the Department considers the application and initiates discussions about funding arrangements, teaching matters and transfer of assets (such as the school building) or liabilities from the LA to the school. This process can take two to five months, with the exact timing dependent on specific aspects of the proposed conversion as well as the volume of applications in the system.

A few important aspects are worth noting. First, performance at OFSTED inspections is an important determinant of approval for conversion. OFSTED visits schools every three to five years and inspections result in publicly available school reports rating schools from 'Outstanding' to 'Inadequate' on overall quality as well as on specific aspects such as teaching, management and pupil behaviour. Initially, only 'outstanding' schools could apply for conversion and were fast-tracked for approval. Subsequently 'good' schools with 'outstanding features' (e.g., in teaching or management) were allowed to apply if their average attainments and value-added were above average (further changes to eligibility criteria were enacted after our observation window). The aim of this change in eligibility criteria was to expand the academy programme *without reducing the quality* of schools allowed to convert – and indeed we find little difference in our data between schools rated as 'outstanding' and those rated as 'good with outstanding features'.

Second, while would-be academies have to consult with the 'interested community at large', the main force behind the decision to apply for conversion to academy is usually the head-teacher or governing body. Community consultation process is mainly an 'advertising exercise' and parents whose children are not enrolled in the school play little role in the decision to convert. Available (scant) survey evidence on family awareness of academies shows that fully 58% of parents say they do not understand what academies do, and 32% think there is not enough information on the benefits of academisation (HCSS Education, 2015).

Finally, approval by Department takes place in two steps. First, 'Lead Teams' are assigned to evaluate academies' proposals for conversion. Teams work independently and are assigned to applications coming from broad geographical areas. Teams are given targets for percentages of applications processed within a given time (irrespective of the amount of applications received), and best performing teams are flagged as 'best-practice' examples within the Academies Unit at the DfE. Note that objective criteria for approval make it highly unlikely that faster turnover time is associated to less scrutiny and more leniency in the approval decision. The second step in the approval process involves an 'Academy Board' where senior civil servants, policy makers and education experts (external to the Department) meet to discuss and finally approve the

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sponsored academies generally reopen in new or completely refurbished buildings. In short, sponsored status identifies a host of changes – and not just the impact of autonomy.

cases put forward by Lead Teams. Members of the Academy Board are the real 'gate keepers' of the approval process. The frequency of these meetings is not fixed and varies depending on the amount of applications in the pipeline. At times of high demand, Academy Boards meet more than once per week, and the number of applications assessed at each gathering is not capped. Conversely, at times at low demand, board meetings can be delayed. Although this is not institutionalised, the reason why delays happen is due to the fact that it becomes more difficult to coordinate the tightly scheduled diaries of the involved senior figures when a sense of urgency is lacking. All in all, this means that the system processes applications faster when larger numbers are in the pipeline.

Academies enjoy considerable autonomy. They broadly fall outside the control of the LA in terms of strategic decisions and day-to-day management – which is administered by the head-teacher and a self-appointed board of governors with limited representation from the LA. This body has responsibility (shared with the head-teacher) for hiring staff, negotiating pay and working conditions, managing the school budget, and deciding on matters such as career development, discipline and performance assessment and management. Furthermore, academies enjoy more autonomy in terms of the taught curriculum (except for English, Maths, Science and IT), as well as of the structure and length of the school day. According to the DfE (2013) 'Survey of Academy Freedoms', secondary schools reported having implemented the following changes since becoming converter academies: *(i)* 65% to 75% changed their taught curriculum by focussing on core subjects/topics; *(ii)* 60% to 70% introduced new systems to monitor pupil and teacher progress/performance more formally, regularly and/or thoroughly; *(iii)* around 85% linked more explicitly teachers' pay and promotions to pupils' performance. On the other hand, very few secondary schools reported that they were able to substantially alter the length of the school day – although they wanted to implement this change – because of teachers' resistance. Approximately 60% of the schools' head-teachers believe that standards improved as a result of these changes – with leadership, curriculum and teachers' management being the driving forces.[8]

It should also be noted that although academies become their own admissions authority, the criteria that they can use to prioritise students when over-subscribed remain broadly unaffected after conversion and follow the same principles that apply to other schools. Further, their funding is still mainly linked to the number of students on roll – i.e., 'money follows pupils'. However, differently from other schools, they receive funding directly from the Government – not from the LA. Academies also become responsible for their own 'back-office' administrative functions and maintenance of the premises vis-à-vis the release of resources previously held by the LA for the centralised provision of these services. Lastly, legally academies cannot run budgetary deficits and the DfE can close academies after two years of financial shortcomings.

[8] Note that these are self-reported and retrospective assessments of changes implemented since conversion, and of their impact on standards. At present little 'hard' evidence has been collected using administrative data to document whether these changes actually occurred and had an effect on attainments. We take a first stab at this issue later in the paper when we study the mechanisms giving rise to our findings.

Sibieta (2016) argues that these changes have made academies more financially accountable and likely to engage in strategies aimed at sustaining their pupil roll (e.g., marketing).

3. Data construction

In order to carry out our investigation, we combine information from several administrative datasets. In the next sections, we describe these data and the sample selection criteria we apply.

3.1 Applications and school choice set

Information of parental preferences for schools comes from administrative records from the Birmingham LA. We have been granted access to full information about the preferences expressed by parents residing in Birmingham and applying for a place in a secondary school for their children for the academic years beginning in September 2010, 2011 and 2012. The data contain the ordered list of preferences expressed by parents; whether any special criteria for admission (i.e., having siblings in the school; being looked after by the LA; having special educational needs) applies for a given pupil; the postcode at the time of the application; the pupil's gender; and a unique pupil identification number that allows us to match students with other data sources. The data also contains details about the school(s) where the pupil was offered a place and the school finally attended.

We observe applications for a total of 40,924 pupils over the three cohorts (13,836 for admission in 2010, 13,536 for 2011, and 13,552 for 2012). As discussed, the Birmingham LA acts as a centralized hub coordinating parents' applications for schools within the LA as well as schools in other LAs. In our data we initially observe preference for nearly 300 different schools – i.e., schools that received at least one preference in one of the three years – of which approximately one third is located in Birmingham and two thirds in other 42 LAs. Of the schools outside Birmingham, however, around 130 receive just one preference in one given year and are clearly not part of a consistently defined and stable choice set. Similarly, other schools receive more preferences – but only in one of the three years and none in the other two. In order to avoid including 'outliers' within the set of schools commonly chosen by pupils residing in Birmingham, we define our choice set to include only: (a) all Birmingham schools; (b) LAs other than Birmingham that receive at least 30 preferences from pupils residing in Birmingham in each of the three years of data; and (c) schools within these LAs that received preferences from Birmingham pupils in each of the three years of data. The LAs selected for our analysis are all adjacent to Birmingham, and include: Dudley; Sandwell; Solihull; Staffordshire; Walsall; Warwickshire; and Worcestershire. Our final data contains 125 schools, 75 of which located in Birmingham. We exclude female-only and male-only schools for males and females, respectively. As a result, the choice set counts 110 schools for boys and 115 schools for girls.

3.2 Background data on pupils' characteristics and attainments

To obtain information on pupils' background and attainment in National Curriculum tests, we merge our data on school preferences to the National Pupil Database (NPD) and the Pupil Level Annual School Census (PLASC). These are administrative datasets covering the student population in England's state schools. The

NPD/PLASC data provides information on pupils' KS2 test score records in English, Mathematics and Science at the end of primary school (age 11/grade 6); pupils' eligibility for free school meals (FSM; a commonly used proxy for poverty); special educational needs (SEN) status; and information on ethnicity (we use White British or not). The data also provide postcode of residence for each pupil in every year from grade 2 (at KS1/age 7, when pupils are in the middle of primary education) to grade 7 (when pupils have just started secondary schooling). In the UK, postcodes typically correspond to 15-17 contiguous housing units on one side of a street. This detail allows us to assign students to residential neighbourhoods with very high precision and compute home-to-school straight line distance. We can also track individuals who change address, which we use in a robustness check to address potential issues in relation residential moves in response to the academy conversion.

The preference and NPD/PLASC data are linked using a unique pupil identifier which is available for 39,318 pupils out of the original 40,924. The missing pupils are either enrolled in private schools (not in the NPD) or lost because of tracking problems with the Birmingham's LA – possibly because they move to another LA or another country before the start of secondary school. From this sample, we further drop around: *(i)* 670 pupils who submitted their preferences after the deadline, as we cannot reconstruct the exact information about schools' academy status available to these students at the time of listing their choices; *(ii)* 120 pupils who did not express any preference; or expressed the same preference ranking for different schools, thus preventing us from correctly sorting their choices; or only applied to schools outside of the choice set we consider (described above). Approximately 1400 pupils have missing values in some of these variables – mainly due to non-reported ethnicity and missing Key Stage data for students that have been privately educated for their primary education (few cases) or have recently moved to the country from abroad (the majority of instances). After dropping these observations, our final sample consists of 37,140 pupils (12,605 starting secondary school in September 2010; 12,388 in 2011; and 12,147 in 2012) or approximately 91% of the original set of pupils.

3.3 School level data

We collect a wealth of information on each of the 125 schools in our data, merging data from several administrative sources. To start with, we use a school register (Edubase) to gather information about each school's exact location (the postcode), type (our data include community, foundation, voluntary aided schools, and academies; there are no voluntary controlled schools), gender composition (mixed or male-/female-only), and admission procedure (selective/Grammar or comprehensive).

The dataset also contains information on the academy opening date. While the vast majority of sponsored academies open in September at the beginning of the academic year, the open date for converter academies is spread out across the months. In our sample, approximately 60% of the converters open between July and September, with the other opening dates clustered in October, January, April and July – i.e., during the academic year. Although opening marks the conclusion of legal aspects of academisation (e.g. land transfers from the LA to the school) and any official inaugural event, it is not necessarily the most relevant milestone when considering school choice. Before opening, families will be aware that a school is to convert from

information provided by LAs during the application process, for instance via application booklets or at open days held by schools. Therefore, in our preferred analysis, we define schools as academies if they are approved for conversion in time for families to identify them as academies before the deadline for application for school admission – i.e. the end of October in the year prior to starting secondary school. Information on each convertor schools' stage in the process of academy conversion was provided by DfE (up till March 2015, the time when the data was assembled). Using this information, we identify: *(a)* the time when a school applies for conversion to academy; *(b)* the time when the application is approved (on average 2.3 months after application, with a standard deviation of 3.7); and *(c)* the time when the school opens as an academy (on average 4.5 months after approval, with a standard deviation of 3.4).

Measures of school composition are obtained by aggregating the pupil data from the NPD/PLASC at the school-by-year level and using all pupils in the secondary school from grade 7/age 12 to grade 11/age 16. Demographic variables include the proportion of girls, share of pupils registered for FSM, share of pupils with special educational needs, and share of White British pupils. Achievement-related variables are mean KS2 scores (averaged across English, Mathematics and Science) of pupils enrolled in a given secondary school in 7th grade (the first year of secondary education), mean scores at the KS4/GCSE (again averaged across English, Mathematics and Science) and KS2-to-KS4 (primary-to-secondary) value-added. Mean KS2 scores proxy intake quality, KS4/GCSE scores are the headline academic 'quality' indicator that is advertised in school league tables, while value-added provides an indicator of the school's educational effectiveness.

Other school-level indicators – such as total roll, total number of teachers, the pupil-to-teacher ratio and the number of support teachers that assist SEN students – are obtained from the School Level Annual School Census. Lastly, as discussed in Section 2.1, inspection results are an important determinant of schools' eligibility to conversion, so we collect data on the dates and outcomes of OFSTED inspections.[9]

In terms of timing, we line up the information on school composition, performance and inspections with our data on school applications in a way that reflects the information that was available at the time families made their choices. Specifically, for pupils starting secondary school in September 20XX and expressing their preference by October of 20XX-1, we match school level data that refer to the academic year 20XX-3/20XX-2. OFSTED inspections are not carried out every year, so we match the most recent OFSTED data prior to the time-window during which parents choose their schools.

[9] We also gather yearly Consistent Financial Reporting (CFR) information about schools' expenditure and sources of income. This information is missing for some academies, which do not have the same financial reporting obligations as other state-maintained schools. We therefore only use this information in some extensions and checks. Similarly, we use the School Workforce Census to collect yearly data about schools' workforce characteristics, including: number of teachers; percentages of permanent teachers, female teachers, part-time teachers and teachers with post-degree qualifications; average age of teachers; teacher turnover; and a dummy for head-teacher change. Because of problems with the original data collection, information on teachers is not consistently available for all schools in all years. Therefore, we use this data only in some extensions.

4. Empirical approach

The aim of our analysis is to estimate the average causal effect of a switch to autonomous institutional arrangements on a school's ranking in the list of preferences that families submit when choosing schools. To do this, we compare preference rankings for autonomous academies before/after conversion with those of comparable non-academy schools while holding constant other school, pupil and neighbourhood level characteristics that affect school demand and correlate with the likelihood of converting to academy.

Our baseline specification is as follows:

$$Pref_{ist} = \alpha_i + \sigma_s + \theta_t + \beta Academy_{st} + \delta dist_{ist} + X_{it}^{'} \Gamma + Z_{st}{}' \Delta + \varepsilon_{ist} \quad (1)$$

Where $Pref_{ist}$ measures the preference of pupil *i* for school *s* at time *t*; α_i, σ_s and θ_t capture respectively pupil, school and time specific unobservables; $Academy_{st}$ is a dummy identifying whether school *s* operates as an academy by time *t* when pupils/parents in our three cohorts express their preferences; $dist_{ist}$ measures logarithm of the (straight-line) distance between the residence of pupil *i* at time *t* and school *s*; $X_{it}^{'}$ is a set of pupils characteristics measured at the time *t* – when pupils/parents choose their school; and Z_{st} is a time-varying set of school characteristics that would have been observed by parents at time *t*. Finally, ε_{ist} is an error term assumed to be uncorrelated with the other regressors in Equation (1). In our analysis, we allow unobserved shocks to be correlated across students applying to the same school across cohorts and thus cluster standard errors at the school level. We also experimented with two-way clustering – at the pupil and school level – and found virtually identical results.

The main variables of interest are $Pref_{ist}$ and $Academy_{st}$. The first variable captures parental preferences for schools. For most of our analysis, we create a dummy variable equal to one if the school was rated as the most preferred school and zero for all other schools. However, in some extensions we experiment with two alternatives: *(a)* a dummy variable taking value one for the three most preferred schools and zero otherwise; and *(b)* a variable that captures the ordered nature of parents' preferences by assigning schools listed by parents on the application form (up to six) the inverse of their rank (that is value 6 to the 1st ranked school down to value 1 for the 6th ranked school) and 'missing' for all other unranked schools. The second variable, $Academy_{st}$, identifies whether school *s* at time *t* is operating as an academy. As already discussed, we mainly focus on whether the school was approved for conversion to academy at the time when parents expressed their preferences.[10]

In our main specifications, we estimate the model in Equation (1) by OLS (i.e., using a linear probability model), and using all pupils and all the alternatives in their school choice set (discussed in Section 3.1).[11] This set up allows us to include in our specification both school and pupil fixed-effects. School fixed-effects partial

[10] In our sample four schools become sponsored academies. While we control for this switch in our analysis, we do not consider the effect of sponsored academisation as it does not solely capture the impact of autonomy (see Section 2.2).

[11] In a robustness check, we apply a conditional logit estimator for multiple choices (instead of OLS) using the same data structure and specification.

out the impact of time-fixed unobservable school characteristics that make them more likely to become an academy and at the same time affect parental preferences. These could include persistent dimensions of 'quality' – such as the managerial talent of the head teacher or the dynamism of the school governing body. We also control for an extensive set of time varying school characteristics, including: school average KS4 attainments; the incidence of pupils eligible for FSM; the shares of female and of White British students; the pupil-teacher ratio; and a dummy indicating whether the school was rated 'outstanding' at the school OFSTED inspection. Pupil fixed-effects take into account unobservable characteristics of both pupils and their place of residence (α_i in our model) which affect their choice sets. Given the data set up, in our baseline specification pupil fixed-effects effectively only capture cohort effects (θ_t) and net out differences in the choice sets for the two genders (because of single-sex schools; see Section 2.1) – so they could be replaced by cohort and gender dummies. However, we include pupil fixed-effects in all specifications because in a number of extensions we either change our dependent variable (e.g., we consider only ranked preferences for listed schools) or restrict the sample of schools available to pupils (e.g., in the number of schools within 2.5km from home) in ways that generate pupil-level variation in choice sets.

The identifying assumption underlying our analysis is that the timing of conversion to academy is 'as good as random' and unrelated to school unobserved shocks that might affect parental preferences and the school propensity to become an academy. In order to deal with potential residual confounders, we make the baseline specification in Equation (1) progressively more demanding.

First, we restrict our analysis to consider a *converters* sample that contains only schools that convert to academy *within* our data period – the treated group – and schools that will convert after our observation period – i.e. a control group formed of future converters (up to March 2015, when the data collection took place). By dropping institutions that never convert, we exclude schools that may differ from those that convert along *unobservable* dimensions – possibly valued by parents and correlated with the choice to *ever* convert to academy. Furthermore, in this way, we only exploit the timing of conversion – within the set of schools that convert at some point – to identify the impact of autonomy on parental choice. We provide evidence that – conditional on school fixed-effects – time-varying characteristics of schools and the neighbourhoods from which they attract pupils are uncorrelated with the likelihood that a school is approved for conversion in a given year. We also show that there is no difference in pre-conversion trends in these characteristics between 'current' and 'future' converters. Stated different, the timing of conversion is balanced with respect to observables and likely to be as good as random.

Second, we include in our specifications interactions between cohort dummies and: *(i)* a detailed set of school characteristics; or *(ii)* a school-specific 'academy propensity', obtained as the prediction of a linear probability model of school approval for academisation on school characteristics. These controls effectively account for changes over time in parental preferences for school attributes that might be correlated with academy conversion, allowing us to isolate the impact of autonomy on preferences.

Lastly, we use two instruments that predict the timing of academisation using institutional details of the process of academy application and conversion. The first one exploits a change in the criteria demarking eligibility for conversion occurring between 2010 and 2011 (see Section 2.2 for more details). Initially, only

schools rated 'outstanding' by the school inspectorate (OFSTED) could apply for conversion, whereas subsequently 'good' schools with 'outstanding features' could apply if their average end-of-secondary attainments and primary-to-secondary value-added were above average. In practice, there is little difference between these two categories of schools in terms of observable characteristics and quality, so the change in rule is in effect an arbitrary random shock which determines which schools can convert in which year – but is otherwise uncorrelated with school attributes.[12] The second instrument is the number of applications for conversion received by the DfE from LAs other than those in our sample in the same year and same month in which our schools apply for conversion. As discussed in Section 2.2, the volume of applications affects the rate at which conversion is approved by the DfE, so the instrument is relevant for the probability of a school converting during our sample period. However, the number of contemporary applications from other parts of the country is unlikely to be correlated with attributes affecting school choices amongst Birmingham residents. Indeed, we find no correlation between the characteristics of the schools applying to convert in our sample and the number of applications received by the DfE from other LAs at the same time. These instruments allow us to net out of our estimates the impact of unobservables that might drive schools' decision to apply for conversion in a given year (e.g., a change in head-teacher) and obtain swift approval (e.g., a high-quality application presented to the Department) – and might correlate with parental preferences for schools.

Throughout the analysis, we present a number of checks and extensions that confront the possibility that features of the school admissions system bias our findings. These include: *(i)* dealing with strategic mobility of families that move to gain admission when over-subscribed schools prioritise applications by distance; *(ii)* accounting for the impact of admissions rules that give priority to students with special needs or with siblings already at the school; and *(iii)* taking into account any differential availability of converter academies for pupils with different backgrounds given their place of residence.

5. Results

5.1. Descriptive facts

Table 1 presents descriptive statistics for our sample. Panel A tabulates information on pupils' background. KS2 attainments averaged across English, Mathematics and Science have a mean of approximately 27.8 points on a scale ranging from 15 to 39. This is in line with the national average and corresponds to the expected level of attainment for pupils at this age. The statistics also reveal that pupils in our sample are much more likely to be on FSM (33% against a national average of approximately 16%) and less likely to be White British (40% against a national average of nearly 80%). This reflects the overall ethnic make of Birmingham,

[12] More precisely, we construct this instrument by first identifying whether schools satisfy the early or the revised eligibility criteria based on time-fixed schools' characteristics measured at the beginning of our observations window and prior to the 2010 Academy Act. We then interact this variable with the time of the change in eligibility criteria to give the instrument variation along the time dimension.

which is inhabited by a diverse and relatively deprived population. Further, the data show that on average parents in our sample expressed preferences for 3.8 schools (out of the 6 they are allowed to rank on the application form), and that only 3% of them only chose schools outside the LA.

As far as school-level information is concerned, the first two columns of Panel B of Table 1 report descriptive statistics for the full sample of 125 schools in our data (over three years), while the next two columns repeat the analysis on the sub-sample of converter schools only.[13] On average, approximately 12% of the schools are approved as converter academies (roughly a third within the converter-only sample). However, this figure masks a very dynamic evolution of the sector. As Appendix Table 1 shows, while there were no converter academies in 2009, three were approved for conversion by October 2010 and forty-one by October 2011 – representing approximately 33% of the secondary schools in our choice-set. Note that 32 of the 41 schools approved for conversion are also open as academies by October 2011 (i.e., 78%). Of the remaining nine, two open by December while the others open within the academic year – mainly in April and May.

Appendix Table 1 further shows that converter academies quickly started attracting growing parental demand: although they represented approximately 33% of the secondary sector by October 2011, they attracted almost 41% of first preferences. Interestingly, heterogeneous patterns already emerge from simple descriptive statistics: better-off parents are substantially more likely to rate academies as their preferred choice than parents of pupils eligible for FSM. On the other hand, parents of low achievers like academies more than parents of high achievers, and White British parents are more likely to apply for a seat at an academy than non-White British ones – although the heterogeneity along these margins is less marked.

Panel B, Column 1 of Table 1 shows that around 40% of all schools in our sample are located outside the Birmingham LA and that 10% admit pupils on the basis of academic ability (i.e., they are selective Grammar schools). The KS2 average attainments of their intake (i.e. the end-of-primary achievement of pupils starting secondary school) and average KS4 (end-of-secondary school) attainment are close to the national average. The mean proportions FSM-eligible and White British pupils are 24% and 55% respectively. This is less than in the Birmingham pupil data in Panel A because two-fifths of the schools are located in more affluent LAs surrounding Birmingham. The average pupil-to-teacher ratio is 15 and the share of schools rated outstanding by OFSTED is 29%. Converter schools are broadly similar to other schools in our sample (Columns 3-4) in terms of demographics. Given the criteria for conversion, it is unsurprising that more of them are rated outstanding. They also exhibit slightly higher intake ability (KS2) and final achievement (KS4) and more of them are selective, again features that are most likely due to the conversion criteria.

The last panel of Table 1 displays two choice-level variables. These refer to the dataset in which the parents of the 37,140 pupils retained in our sample are paired with each of the 125 schools retained in our analysis (see Section 3.1 for a discussion) with the exception of: *(a)* 15 female-only school excluded from the choice set of male pupils; and *(b)* 10 male-only schools excluded from the choice set of female students. This gives rise to a total of 4,176,755 observations that we will use to estimate empirical models laid out in

[13] We collected information on some variables solely for converter schools, as we use them only in this sub-sample.

Equation (1). The proportion of first choices in this student-by-school data is 0.088. This corresponds to an estimate of the probability that a school gets picked as first choice at random by a pupil of the eligible gender. Furthermore, the average home-to-school distance is approximately 11.2km with a 6.7 standard deviation and a median of 10km. However, the median distance among the schools listed by the parents on their application forms is much shorter, at 2.5km, while the median distance from the most preferred school is even shorter, at 1.8km. Parents of FSM eligible pupils tend to list schools that are closer to their home than parents of non-FSM eligible pupils, although this difference is not pronounced: the median distance for all listed school is respectively 2.25km and 2.54km. A similar pattern emerges for White British and non-White British families (the median distances for listed schools being 2.53km and 2.38km), and for parents of pupils with below and above median KS2 scores (median distances of 2.22km vs. 2.71km).[14]

5.2. Regression results

We present our first set of results in Table 2. Across all columns, the outcome is a dummy variable identifying whether the school was listed as the most preferred choice by parents. The coefficients (and standard errors) on schools' academy status have been multiplied by 100. The implied academy effects are semi-elasticities and have been obtained rescaling the coefficients by dividing by the probability that a school is top-ranked by parents. Standard errors are clustered at the school level. Finally, we report the coefficient on the (log of) home-to-school distance for comparison.

Columns (1) to (3) consider all schools in the sample and control for: school fixed-effects, cohort dummies and pupil gender (Column 1); school and pupil fixed-effects (Column 2); and school and pupil fixed-effects alongside time-varying school controls (detailed in the note to the table and described in Table 1; Column 3). Our results show that, following approval for conversion to academy, an average school is approximately 8% more likely to be listed by parents as their top preference. The remaining columns of the table assess the robustness of this finding.

To start with, in Column (4) we focus on the converters sample that includes current and would-be academies – but excludes schools that do not become academies at any point in time up to March 2015 (when the data was collected). More precisely, we identify the impact of autonomy on parental demand by comparing preferences for schools approved for conversion to academies at the time when parents choose schools (i.e. before October of year *t*) to preferences for schools that will be approved to become academies in future academic years – but excluding the immediately adjacent academic year (i.e. from November of year *t* to September of year *t+1*) to overcome possible anticipation effects and spill-overs between current and future converters. When we do this, we find a slightly larger and still significant effect of academy conversion, at 9.3%.

[14] The number of schools listed is also not starkly different across the subgroups. FSM pupils list 3.6 schools, while non-FSM express a preference for 3.9 schools. The average number of schools listed is 3.3 for White British and 4.1 for non-White families. Finally, low KS2 students choose 3.5 schools, while high KS2 pupils list 4.1.

Column (5) and (6) deal with the possibility that our results are driven by changes in parental preferences for school attributes that are correlated with academy conversion. Column (5) includes interactions between cohort dummies and the following characteristics (averaged over the three years): KS4 attainment; share of FSM eligible pupils; share of female pupils; share of White British pupils; pupil-teacher ratio; and OFSTED rating.[15] Column (6) instead includes interactions between cohort dummies and a school-specific 'academy propensity'. This is obtained as the prediction from a linear probability model that estimates the likelihood that a school is an academy as a function of the school characteristics listed above. Irrespective of the approach we use, we find that our previous results are confirmed – in fact, our estimates become more sizeable, at 12%-13%, and more precisely estimated.

Finally, in Column (7) of Table 2, we use the instrumental variable strategy described in Section 4 (but drop the additional controls added in Columns 5 and 6). The two instruments generate a strong first-stage: the F-test on their joint significance is 41.04. This stems from a first-stage coefficient of 0.235 (with a standard error of 0.090, significant at the 5% level) on the instrument based on the changes in eligibility criteria; and a coefficient of 0.0038 (with a standard error of 0.0004, significant at less than the 1% level) on the instrument based on the number of concurrent applications. The average number of concurrent applications is approximately 118 with a standard deviation of 54. Figure 1 shows the variation in the instrument in the months between June 2010 – right after the Academies Act was passed and converter academies were introduced by the new Government – and December 2014 – when the last of the academies in our data applies for conversion. The left panel depicts this information for all months and including applications coming from our eight LAs, while the right hand side panel presents the variation in the data only for the months in which our schools apply and only considering applications coming from other parts of the country. Although there is a sizeable peak in the central part of 2011 and some obvious seasonality (fewer applications in the summer months), the plots display substantial variation. As for the positive sign of the first-stage coefficient on this instrument, this is consistent with the institutional details discussed in Section 2 which make it more likely that applications are processed faster when there are more requests in the pipeline. The second stage results confirm our previous conclusions: we find that schools approved for academy conversion are 14% more likely to be ranked as the most preferred choice by parents. It is interesting to note that this implied effect is remarkably similar to the one obtained in Columns (5) and (6). This is likely due to the fact that both approaches deal with time-varying unobservables that correlate with academisation and could be valued by parents. Given their similarity, in the rest of our analysis we use the specification adopted in Column (6) which we regard as our favourite.[16]

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[15] We also experimented with the inclusion of interactions between cohort dummies and time-varying school characteristics (rather than time-averaged). This approach yields almost identical findings.

[16] We also tried to use the two instruments separately. When we only use the number of concurrent applications, we find a strong first stage (t-stat on the instrument: 8.80) and a similarly sized second stage effect (0.119; standard error: 0.078). When instead we only use the eligibility instrument, we find a bigger but very imprecisely estimated effect. This reflects

How sizeable is this effect? To benchmark our results, note that a 1% increase in the home-to-school distance (i.e. approximately 110m) reduces the likelihood of a school being top-ranked by approximately 5%. Our findings therefore suggest that the impact academisation is equivalent to a 2%-3% decrease in the home-to-school distance, assuming constant elasticity with respect to distance. We return to this point below where we investigate how the impact of academisation varies with school distance from home.

5.3. Tests for the randomness of the timing of academy conversion and other robustness checks

One of the assumptions underlying the approach used in Table 2, Columns (1)-(6) is that the timing of academisation within the set of current and future converters is as good as random and uncorrelated with other changes occurring simultaneously or pre-existing trends. We provide support for this assumption in Table 3. In the top part of Panel A, we regress time-varying school characteristics on a dummy capturing whether the school is approved for conversion at that point in time. In the bottom part of Panel A, we perform a similar analysis, but focus on the characteristics of neighbourhoods around the schools. These are defined as the set of postcodes that falls within the 75th percentiles of the home-to-school distance measured for all pupils attending the schools in the years 2007 to 2009, prior to our observation window – i.e., postcodes in the *de facto* catchment areas of these schools (see Gibbons et al., 2008). While these areas are identified using attendance patterns prior to the years in our analysis, the characteristics of these postcodes are: *(i)* time-varying and measured at the same time as the school variables; and *(ii)* calculated using pupils of all ages between 5 and 16 (except for KS2, only available for pupils aged 11; and KS4, only available for pupils aged 16). Regressions are run at the school level with standard errors clustered by school. Column (1) only includes year dummies, while Column (2) adds school fixed-effects. Results in Column (1) suggest that academies have better intakes (KS2), higher attainments (KS4), fewer FSM eligible pupils and are more likely to be rated 'outstanding', which is to be expected given the criteria for conversion. Similar patterns are observed in the neighbourhoods surrounding these schools. However, all these associations become insignificant, substantially smaller or of the opposite sign once school fixed-effects are included. This implies that the timing of conversion is uncorrelated with time-varying school and neighbourhood characteristics and support the assumption that the moment in which current and future academies receive approval for conversion is as good as random. In Appendix Table 2, we present a similar analysis for the instrumental variables used in Column 7, Table 2. The results show that the two instruments predicting the timing of conversion are uncorrelated with changes in school and neighbourhood characteristics and are therefore plausibly uncorrelated with unobservable confounders related to parental preferences.

The validity of our research design also hinges on the assumption of counterfactual parallel trends in demand for early and late converters. Since we do not have data on preferences for schools before 2010, we cannot directly test the assumption of parallel pre-trend in demand. However, we provide supportive evidence

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the fact that this second instrument alone does not generate enough time variation in the timing of approval and so is too weak to yield a reliable estimate of the impact of conversion on preferences.

by comparing trends in observable characteristics that might correlate with demand for these two groups of schools in the years before our observation period. Our results are presented in Table 3, Panel B. The only significant coefficients suggest a slight decline in intake ability prior to conversion (KS2), and a marginal increase in neighbourhood disadvantage (FSM) – neither of which is likely to explain the *increase* in demand shown in Table 2. We also find that, for the academic year just before our observation period (2009/10), early and later converters are similar with respect to two broad measures of school 'popularity': the ratio of the number of enrolled pupils to total school capacity and an indicator for whether the school was oversubscribed (gathered from the LAs admission booklets). This brings further support in favour of the ex-ante comparability of these two groups of schools.

We carried out a number of other checks on our main results which are available in an on-line appendix. These include: *(i)* modifying the way we measure preferences by using ranked preferences or school listed as top three; *(ii)* using a different estimation method (conditional logit); *(iii)* restricting the choice set for each family to schools within 2.5km or to the 10% nearest schools; *(iv)* dropping recent residential movers to check for sensitivity to residential sorting on preferred schools; *(v)* excluding all students who end up admitted because they already have siblings at the school to rule out the possibility that parents who list a school first because they already have children at the school exerted some influence of the conversion decision; and *(vi)* changing the set of school-level control variables. None of these modifications make any substantive difference to the results.

5.4. Who chooses academies? Family income, student prior achievement and ethnicity

Table 4 and Table 5 present results on the heterogeneity of parental demand for school autonomy, focussing on income, prior achievement and ethnicity – measured by FSM/non-FSM status, above/below median student KS2 test scores and White British/other ethnic group respectively (we also investigated differences by gender but found nothing of interest). The tables present the effect of academy conversion on the probability of ranking a school first estimated separately for sub-samples of pupils in each income, prior achievement and ethnic group. These specifications allow the effect of observed time-varying school characteristics (the control variables) and unobserved time-fixed school characteristics (the school fixed effects) to vary by pupil group.

Columns (1a) and (1b) suggest that a converter academy is 17% more likely than an average school to be ranked first by families of non-FSM children. Conversely, these schools are only 6% more likely to ranked first by poor households eligible for FSM, and this effect is not statistically significant. Although the difference in the point estimates across the two groups in not statistically significant (p-value: 0.443), it is sizeable and economically meaningful. Interestingly, given the usual finding that poor families are more likely than non-poor to choose local schools (see Burgess et al., 2015), the impact of home-to-school distance on our metropolitan study area is similar for non-FSM and FSM pupils.

Next, we show that the change in probability of a school being ranked first when it converts is less marked conditional on a family being poor than on being non-poor, but this difference does not appear to be related to child ability. To see this, in Columns (2a) and (2b) we repeat the analysis, splitting the sample by above and below-median student KS2 test scores (measured at the end of primary school). Comparing the two

columns, schools are 21% more likely to get ranked first when they convert by families of low-KS2 families, but only 7% more likely to be ranked first by high-KS2 families. Once again, this difference is not statistically significant – with a p-value of 0.412 – but it is sizeable.

Table 5 extends this analysis to look at differences by ethnic group and income, given the strong correlation between these two. Columns (1a)-(1b) split the sample by White British and other ethnicity, revealing a marked heterogeneity in preferences. White British families are almost 26% more likely to list a school as their first choice after conversion to academy; on the other hand, we detect no significant effect among other ethnicities. To understand whether it is income or ethnicity that is drives the heterogeneous patterns of demand, we further distinguish between FSM and non-FSM eligible pupils within the two ethnic groups. Our results – reported in Columns (2a)-(2d) of Table 5 – show that the positive effects previously documented separately for non-FSM eligible pupils and for White British families are in fact caused by the stark preference for academies expressed by the subgroup of non-FSM eligible, White British pupils. A school is 31% more likely to be listed by this group as a first preference when it converts to academy. On the other hand, the effects for the other three sub-groups, while still positive, are much smaller in magnitude (ranging between 12.6% and 5.4%) and not statistically significant. These differences across demographic groups are large in magnitude and statistically significant: A test for the equality of the coefficient for the non-FSM, White British group and the coefficient for the FSM, White British group rejects the null with a p-value of 0.069. Similarly, the coefficients for non-FSM, White British group and FSM, other ethnicity group are statistically different with a p-value of 0.100. Lastly, the p-value for the equality test on the remaining pair (non-FSM, White British versus non-FSM, other ethnicity pupils) is 0.147. While not significant at conventional level, the difference in the implied effect on preferences is still sizeable.[17]

We study the robustness of these results along several dimensions.[18] First, we adopt alternative specifications where we interact academy conversion and other school controls in the empirical model with the relevant student characteristic – but restrict school unobservables (i.e., the fixed effect) to be valued similarly by pupils with different backgrounds. Second, we consider whether heterogeneity in preferences is due to differential academy availability (conditional on place of residence) for individual with different characteristics. To do so, we take two complementary approaches: *(i)* we focus on the sub-set of pupils who have academies within their local choice set. Specifically, we only consider students who have at least a converter academy within 2.5km of their home address (approximately 70% of the pupils), or students who fall within the *de facto* catchment area of at least an academy (defined as in Gibbons et al., 2008 and discussed above; approximately 98% of the sample); and *(ii)* we control for interactions between school fixed effects and home-to-school distance in our specifications. This approach accounts for the possibility that schools with characteristics (possibly unobservables) that correlate with academisation and are valued by parents might

[17] Further results show that there are no additional patterns of heterogeneity when we consider jointly the White British/non-White British and the high/low KS2 attainment dimensions. Results are not tabulated for brevity.

[18] Results are not tabulated for brevity but are available from the authors.

lead to increased sorting of families across space. This would in turn compress their *de facto* catchment area – i.e., their availability – affecting the impact of distance on parental preferences estimated pooling all schools. All in all, our findings suggest that the heterogeneity along the dimensions of income and ethnic background is robust. However, the patterns of preferences for high/low achievers are not always consistent across our checks. In the rest of the paper we therefore focus on the effect of academisation on all pupils in the sample – as well as on non-FSM eligible students, White British students and non-FSM eligible White British students – where we observe the biggest and most consistently signed response to academy conversion.

An important implication of these results on heterogeneity in preferences is that they imply a high degree of sorting of students of different incomes and ethnicities in response to changes in school policy. Previous research (e.g., Burgess et al., 2015 for England) provides evidence of sorting into schools due to differences in preferences for school quality and school composition between socioeconomic groups. However, to the best of our knowledge, the vast majority of previous studies have only had a single cross section of choice data, making it difficult to determine whether this sorting represents a causal link between school quality and demand, or something unobserved and persistent about the geographical area or the school. The results above are the first to show that families respond quickly to changes in institutional characteristics, with significant heterogeneity in demand across different groups, and the potential for sorting and segregation.[19]

6. Exploring the mechanisms

So far, the results suggest that conversion to an academy increases the probability that a school is ranked first by families applying for admission, and that this response is particularly marked amongst White British, non-FSM families. In this section, we explore some mechanisms that could explain these patterns.

6.1. Expectations about changes in school composition, effectiveness and other policies

We start by investigating the most likely explanation *a-priori:* families choose a converter academy because of the expected changes in the characteristics and performance of the school. Of course, given that in our context academies are a new phenomenon, families have limited information on which to base these expectations *ex-ante*. We assume that families have perfect foresight and that their expectations are correct, and so estimate the impact that controlling for *actual* changes in school characteristics *ex-post* has on the patterns of demand for academies observed in Tables 3-5 (similar to Ferreyra and Kosenok, 2015). The results of this analysis are presented in Table 6, in which the coefficient for the effect of academy conversion is presented first for all pupils (Column 1), and then by the FSM and ethnic group (Columns 2-4). Panels A to E show how this coefficient changes as we control for school post-conversion characteristics – i.e., our proxies for expectations about school changes following academisation – which might plausibly explain the decision

[19] These patterns are consistent with Eyles et al. (2016) who show that academies become more segregated following conversion but cannot disentangle whether this is due to changes in school practices or parental demand.

to list an academy first (and on which we have data). Although these variables are potentially endogenous and so we do not present the associated coefficients (they are 'bad controls' in the sense of Angrist and Pischke, 2009), it is instructive to study whether the coefficient on academy conversion is attenuated once we control for specific school characteristics that could explain the academy effect on choices.

Panel A introduces controls for school composition – i.e., the proportions of FSM, White British and female students, and the mean KS2 prior achievement in the entry cohort – measured in the year when students enrol in secondary school (one year after expressing preferences). Panel B investigates whether expectations about changes in school academic effectiveness following academy conversion can explain the demand for academies. In order to estimate academies' effectiveness, we follow the approach used in Eyles et al. (2016) and compare the KS4 attainments of pupils that already enrolled for secondary education (grade 7) in converter academies prior to their conversion, to the attainments of pupils enrolled in schools that convert to academies in the future after our observation window. By focussing on students enrolled in academies prior to their actual conversion, we by-pass the endogeneity of school choice/mobility. The use of 'legacy' students is similar to the 'grandfathering' approach followed Abdulkadiroglu et al. (2016) for US charter takeovers. (more details are available in an on-line appendix).[20] Panels C to E introduce controls for school inputs and policies, specifically: *(i)* expenditure (Panel C); *(ii)* overall number of KS4/GCSE subjects offered (Panel D); *(iii)* and characteristics of the school workforce as captured by number of teachers, teacher average age, teacher turnover, a dummy for a head-teacher change and proportions of teachers who are permanent, female, part-time, and with post-degree qualifications (Panel E). These characteristics are chosen to capture the key dimensions on which the autonomy granted by academy status might influence the organisation of the school (see Section 2.1).[21]

The striking finding from Table 6, and comparison with Tables 3 to 5, is that adding in these controls for actual characteristics post-conversion makes very little difference to the estimated impact of academy conversion on preference rankings. This is true both for the full sample (Column 1) and for the various income and ethnic groups (Columns 2-4). We went further and controlled for other post-conversion characteristics disaggregated along various dimensions – including academies' effectiveness for different demographic groups (most importantly, considering pupils' ethnicity and FSM eligibility); counts of qualifications offered

[20] We find that schools rated 'outstanding' by OFSTED prior to conversion have a positive and significant effect on students' KS4 attainment following academisation. Conversely, we find no evidence that schools rated 'good' or 'satisfactory/inadequate' significantly affect their students' outcomes after conversion (neither positively nor negatively).

[21] Empirically, we find little evidence that academies introduce significant changes in any of these dimensions. Regarding the taught curriculum, we find that academies offer 1.25 more subjects (out of an average of 25 subjects) although this estimate is not significant. This number mainly stems from (non-significant) increases in humanities, science, arts and technology. Similarly, we find no evidence of school expenditure changes and limited evidence of meaningful differences in schools' workforces following conversion. The only significant estimate concerns the change in head-teacher, which shows an increase after academisation.

in different subject categories (humanities; science; arts; business; mathematics; technology; and physical education); and funds raised from private donors. None of these modifications affected the key finding.

In conclusion, families' decision to rank a converter academy is not related to changes in composition, effectiveness, expenditure, subject choices or teacher characteristics that we control for here. Of course there may be some important characteristics that we are missing, but given that our measures track the most important margins of freedoms/action granted to academies, it is not obvious what these could be. The other possibility is that families cannot observe these changes in school characteristics *ex-ante* and have little information to form expectations – given the sudden and radical nature of the shock represented by academies. Parents might therefore guide their decision making by using pre-conversion school characteristics and other attributes to form heuristic-based (possibly non-rational) expectations about the possible benefits of academy conversion. It is to this possibility that we next turn our attention.

6.2. Academisation and pre-conversion school quality/popularity – the 'excellence' heuristic

Table 7 repeats the structure of Table 6, but now introducing interactions between pre-existing school characteristics and academy converter status. These pre-existing characteristics are selected to represent school attributes observable by parents – either through school league tables or admissions booklets – which might signal quality or popularity. In conjunction with academy 'branding', these features might be salient in conveying a sense of school excellence which influences families' choices. Throughout the table we study heterogeneity in the response of preferences to academy conversion by fixed pre-existing school characteristics – in contrast to Table 6 which included controls for future time-varying school characteristics (the main effects of fixed pre-existing school characteristics are thus absorbed by school fixed effects in the regressions).

Panel A interacts converter academy status with an indicator that the school had an above-median proportion of students scoring A*-C in their KS4/GCSE qualifications over the 2007-2009 period. This is the headline performance figure reported in the publicly available league tables on school quality. Panel B interacts converter status with a similar indicator based on a more complex measure of performance that is also reported in league tables – the 'contextual value added' meant to measure a school's effectiveness given its intake (CVA; this is basically the residual from a regression of KS4 test scores on KS2 test scores and student characteristics). Panel C introduces an interaction between academy status and an indicator that the latest school OFSTED inspection rating prior to 2010 was 'Outstanding' (see Section 2.1). The OFSTED inspection reports are an important public source of published information on school quality, other than the performance league tables. Panel D and E instead look at interactions between school popularity and academy status – assuming that popularity suggests quality through revealed preference. First, we use an indicator that over the period 2007-2009 (all years) the school had more pupils enrolled than its official capacity, (over-capacity; Panel D). Gibbons and Machin (2006) show that preferences for this indicator of quality are revealed in house prices. Next, we refer to the LA admission booklet that is available to families to help them make

decisions about their applications and derive and indicator of whether a school had more applicants than places in 2009 prior to our study period (over-subscribed, Panel E).[22] Lastly, in Panel F, we use principal components analysis to construct an index of prior school excellence based on the five quality indicators just described. In all cases, the coefficients represent the effect of academy conversion on the preference ranking for the group referred to in the table column and row headings.

The initial picture from Table 7 for the whole population of pupils (Column 1) is that there is a moderate difference between high-quality schools and lower-quality schools in the effect of conversion on family choices. High quality schools do tend to attract more demand on conversion than do low quality schools, although the differences between the coefficients are generally quite small and not statistically significant (p-values >0.2). Nevertheless, substantial differences emerge for high CVA schools (Panel B), over-capacity (Panel D) and over-subscribed schools (Panel E) – with effects that are 1.6 to 1.9 times larger in the high quality versus low quality groups.

This heterogeneity between high and low prior quality converters becomes more marked amongst non-FSM (wealthier) families in Column (2), White-British families (Column 3) and especially so amongst better-off families who are both White British and non-FSM (Column 4). For the latter group, prior-quality – as captured by the KS4/GCSE scores and CVA in the performance tables and as revealed by the school popularity – is a crucial factor conditioning the demand for converter academies. The coefficient on the interaction between above-median KS4/GCSE performance and convertor status in Panel A Column 4 is very large and statistically different from that for low KS4/GCSE converter schools (p-value: 0.0143). Similarly, high CVA schools attract a substantially larger increase in demand following conversion than low CVA schools. An equivalent pattern emerges when focussing on overcapacity (Panel D, Column 4): the impact of academy conversion for popular schools is three times as larger as the effect for schools that are in lesser demand – and this difference is statistically significant (p-value: 0.0125). Similar findings emerge when focussing on non-FSM pupils (Column 2) and White British pupils (Column 3) only – with the difference in the effects for popular/non-popular academies being sizeable (by a factor of two to three) and significant (at better than the 10% level). For most other quality indicators in Table 7, the coefficient on the high-quality academy interaction is generally considerably larger and much more significant than that in the low-quality academy interaction (even if the differences between the coefficients are not statistically significant). This includes our composite indicator showing that the effect of academy conversion among high quality schools is approximately twice that for lower quality converters among White British and non-FSM White British families (borderline significant with p-values of 0.100 and 0.148, respectively). An exception is the OFSTED rating, which has no substantial effect on the demand for academies – in fact the most significant effect is found for non-outstanding academies, although the point estimates for the outstanding group are always larger.

[22] In the converters-only sample, there are 50% and 85% over-capacity and over-subscribed schools. These numbers are not statistically different between current converter and future converters. See balancing Table 3.

Overall, the evidence is that families treat academy conversion in conjunction with pre-existing quality signals as markers of excellence – a mechanism we call an 'excellence' heuristic.

These results beg the question of whether parents are behaving rationally or following potentially non-rational heuristics. Although it is impossible to provide a conclusive answer, the latter is more likely the case: our evidence offers little support for the idea that the better performing and more popular schools before conversion are those that make most of their margins of autonomy to improve effectiveness. The correlation between the post-conversion changes in effectiveness and pre-conversion school CVA is negative (-0.37), while the correlation with pre-conversion KS4 attainments is positive, but very small (0.16). Similarly, the associations between changes in effectiveness following academisation and pre-conversion measures of popularity are small – at 0.02 and 0.06 when considering overcapacity and oversubscription respectively. In a nutshell, our results are more likely to suggest that parents alter their preferences by combing data on prior school quality – which contain useful information – with academy 'branding' – which might instead convey no useful signal about school attributes – into an indicator of excellence that they perceive as revealing new, relevant information about school quality even when this might not be the case.

6.3. Academisation and home-school distance – the 'availability' heuristic

All the regressions so far controlled for log-home-school distance, but ignored how the effect of academy conversion varies with distance between home and school. We next turn to this issue and explore the idea that geographic proximity of a school to home makes academy conversion more salient to families when making school choices. Our results are presented graphically in Figure 1 which displays the impact of academy conversion on parental demand at varying levels of the home-to-school distance (with confidence intervals). The plotted effects come from specifications that include the usual academy conversion indicator and the control for home-to-school distance (in logs) – but now also add an interaction between the two. The panels display the linear combination of the effect of conversion – representing the impact of academisation at zero log-distance (1km) – with the estimated interaction term effect at varying distances. Therefore they represent the increase in the probability that a school at a given distance is ranked as top preference following conversion relative to a comparable school at a similar distance that does not convert. The top-left panel considers all pupils (Panel A), whereas the other panels focus on the sub-samples of students who are: non-FSM eligible (Panel B, top-left); White British (Panel C, bottom-right); and non-FSM eligible, White British (Panel C, bottom-right).

Panel A shows a very strong effect of conversion on the chances that a *close-by* school is rated as the top preference as well as a strong spatial decay in the demand for academies as these are located further away from home. At the median distance for schools listed by parents on their application form (2.5km), a school that converts to academy is approximately one-and-a-half times more likely to be listed as top preference. This impact further climbs to factor of more than two for schools 1.5km away from home – i.e., at the median distance for schools top ranked by parents. Conversely, the positive impact of conversion to academy on preferences dissipates quite quickly for schools that are located further away from home – and become insignificant after 6.5km (i.e., around the 90th percentile of the home-to-school distance for schools listed on

the choice form). This effect stems from a significant, positive and large effect of converter academy at zero log-distance (i.e. the academy dummy) coupled with a steeper spatial decay of preferences for academies relative to other schools (see Figure 1 in our on-line appendix).

The remaining three panels confirm these results for the three sub-groups of pupils we have considered above. The top-right panel shows that a school that converts to academy and is located 2.5km away from a non-FSM eligible pupil's home experience a 190% increase in the likelihood of being listed as the most preferred option – further increasing to 260% if the school is 1.5km away. Once again, we find a steep spatial decay with the 'extra' effect of academisation on preferences dissipating at around 6.5km. Even bigger effects are displayed in Panels C and D where we focus on White British and non-FSM eligible, White British pupils. For the latter group, a school that becomes academy at 2.5km from home is three times as likely to be listed as the family's top choice as a comparable school that does not convert.

All in all, this evidence suggests that proximity is crucial in explaining preferences for academies. There are a number of potential explanations behind this finding. First, it could be that living close to a school that becomes an academy simply makes families more aware of the fact that it is converting and irrationally more likely to choose it – irrespective of whether academy conversion confers any educational benefits to students. Alternatively, proximity may make families more aware of what academy conversion actually means in terms of organisational change and potential impacts on student achievement: proximity may make it easier to gather 'soft' non-codified information about institutional changes and their likely benefits. Irrespective of the mechanism, the effect of conversion on preferences is evidently mediated by whether the school is accessible – either from a geographical or from an informational point of view. We therefore class this mechanism as a kind of 'availability' heuristic – although it is not possible to conclusively determine at this stage whether it represents an irrational or rational response.

To conclude, we investigate whether the 'excellence' and 'availability' heuristics interact in determining parental preferences for schools that become academies by comparing the findings of Table 7 with similar results estimated on sub-samples of students and schools in close proximity (i.e., home-school distance below 2.5km). Overall, we find little evidence that prior quality signals becomes more (or less) important when schools are close by. These results (available in our online appendix; see Table 2) suggest that the information derived from hard evidence on league tables and oversubscription is used independently from the 'soft' information obtained through school proximity when families form judgements about the value of academy conversion.

7. Discussion and concluding remarks

In this paper, we have exploited pupil level information about school preferences coupled with the rapid expansion of the academy sector in the England to uncover how parents respond to policy changes that inject significant amount of school autonomy within the state sector while providing little guidance about possible expected benefits that these alternative arrangements might confer to students. Stated differently, we have

studied how families value the offer of freedom and the 'branding' of schools as autonomous – irrespective of the actual changes implemented under this label.

Our results show that – on average – families have a significant preference for schools that opt-out of the control of the local authority. However, this average result masks some substantial heterogeneity along dimensions of family background. In particular, better-off families respond strongly to conversion to autonomous school arrangements and are significantly more likely to list converter academies as their most preferred school. Conversely, worse-off families with pupils eligible for FSM and/or non-White British students either show no significant interest in schools converting to academy status.

We have investigated several possible mechanisms that could give rise to our findings. To start with, we assumed that parents and their children are rational and forward looking, and can correctly anticipate the changes schools will experience following academy conversion. We therefore studied whether expectations of shifts in the student composition of academies, their effectiveness at raising end-of-secondary education attainments and other school policies – such as funding, taught curriculum and teacher workforce – can account for our findings. All in all, we find this is not the case. Given the context, this result is not surprising: the education system was hit by a sudden 'shock' and experienced a very rapid increase in the number of academies – even though little was known about their functioning and impacts. Therefore, families had little valuable information to form forward-looking expectations on the effects of academy conversion and choose on the basis of these aspects.

We then studied whether families' increased preference ranking for academy converters depends on indicators of prior performance, quality and popularity. Our evidence in this respect suggests that high performing and popular schools are those gaining most of the extra demand following conversion – especially among parents of non-FSM, White British pupils. A potential explanation is that families interpret the event of academy conversion, alongside prior information on high quality and popularity, as an 'excellence' heuristic for judging a school's future performance, which in turn affects their choice rankings. We also found evidence that converter schools close to pupils' homes are those experiencing the biggest increases in demand. Most likely this is because parents are just more aware of the conversion happening – a kind of 'availability' heuristic – or can more easily to gather 'soft' information about the possible advantages. Irrespective of the exact mechanisms, our evidence suggests that parental decision making with respect to academies followed a heuristic-based (possibly non-rational) approach to dealing with complex information. This interpretation is consistent with growing evidence from behavioural economics showing that 'coarse thinking' is common in individuals' day-to-day real-life decision making (see Della Vigna, 2009 for a review of the field).

Besides advancing our understanding of parental preferences and choice behaviour in the context of significant school reforms, our findings carry clear and important policy implications. To being with, there is evidence – from the UK, Sweden and the US – suggesting that more autonomous schools tend to have more stratified pupil intakes relative to other comparable schools. These findings have often been taken as suggesting that these institutions operate selective admission practices – either openly or 'by the back door' when the code of practice regulating school admissions does not allow selection (as in the English case). Our results suggest that irrespective of school admission practices there is a more fundamental problem at the heart

of this evidence: parental preferences for autonomous schooling are heterogeneous along dimensions of family background. 'Demand-side' policies aimed at raising awareness of any benefits of autonomous school and – more generally – awareness of the value of a good education among worse-off parents are more likely to have significant effects in terms of counterbalancing schools' tendency to become stratified along the dimensions of family background.

More fundamentally, our findings of heterogeneous patterns of response across demographic groups carry a note of warning for policies centred on parental choice, autonomy and school competition. Although at present there is only limited and mixed evidence to suggest that converter academies are effective at improving students' end-of-secondary school achievements (see Eyles et al., 2016), the autonomous arrangements of these schools might still impact students' non-cognitive abilities as well as their longer-run attainments and labour market outcomes (see Angrist et al., 2016 and Dobbie and Fryer, 2015 for some evidence on US charter schools). Furthermore, the skewed composition of these schools might concentrate beneficial peer effects among better-off pupils. Once more, evidence on the impact of schoolmates' characteristics on short-term achievement in England is mixed (see Lavy et al., 2012 and Gibbons and Telhaj, 2011). However, recent work on the long-term impact of peers shows that school composition is an important determinant of young adults' wellbeing and success (see Black et al., 2013; Bifulco et al., 2011; and Chetty et al., 2011). Lastly, academies' autonomous arrangements might make them more responsive to competition-like incentives in education by raising students' achievement. In the English context – with its growing emphasis on quasi-market reforms in education and a share of autonomous secondary schools set to increase in the near future – these features might make these schools better positioned at thriving in the education arena. At present no evidence has been gathered on these issues. Understanding the systemic 'general equilibrium' effects of academisation is clearly a crucial area of future investigation.

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Tables and Figures

Table 1: Key descriptive statistics – full sample and converters sample

	Full Sample		Converters sample	
	Mean	Std. Dev.	Mean	Std. Dev.
Panel A: Pupil level information				
KS2 attainment	27.79	4.121	--	--
Pupil is FSM eligible (FSM)	0.328	0.470	--	--
Pupil is female	0.491	0.500	--	--
Pupil is White British	0.401	0.490	--	--
Number of preferences expressed	3.773	1.800	--	--
Pupil has only preferences outside LA of residence	0.034	0.180	--	--
Panel B: School level information				
School approved as a converter academy	0.117	0.322	0.336	0.474
School is outside LA of residence	0.400	0.490	0.420	0.495
School is selective	0.096	0.295	0.168	0.375
KS2 average attainment (lagged)	27.53	2.097	28.188	2.383
KS4 average attainment (lagged)	38.00	6.288	40.582	6.848
Share of FSM pupils (lagged)	0.244	0.188	0.190	0.186
Share of female pupils (lagged)	0.497	0.224	0.512	0.229
Share of White British pupils (lagged)	0.546	0.322	0.555	0.329
Pupil/teacher ratio (lagged)	15.16	1.671	12.44	1.628
School rated 'Outstanding' by OFSTED (most recent)	0.291	0.455	0.389	0.489
School was overcapacity in 2009	--	--	0.500	0.504
School was oversubscribed in 2009	--	--	0.850	0.360
School rated 'outstanding' by OFSTED, last inspection up to 2009	--	--	0.367	0.486
Panel C: Choice level information				
Probability school is highest preference	0.0088	0.0939	0.0097	0.0983
Pupil-school straight-line distance (in km)	11.159	6.655	11.885	7.045

Note: Number of observations in the full sample: 37,140 pupils; 125 schools over three years (i.e. 375 school-by-year observations); 4,176,755 pupil-school possible choice combinations. Converters sample considers only schools that are already academies at the time when pupils choose (i.e. prior to October of year *t*) and schools that will become academies in the future (but excluding the immediately adjacent year, i.e. the one starting from November of year *t* and finishing in October of year *t+1*). Number of observations in the converters sample: 37,140 pupils; 60 schools; 1,448,688 pupil-school possible choice combinations. In both the full and the converters sample, schools in the choice set exclude 15 female-only and 10 male-only schools for male and female respectively. LA of residence is Birmingham. Other LAs include Dudley, Sandwell, Solihull, Staffordshire, Walsall, Warwickshire and Worcestershire. KS2 (age 11/grade 6) attainment refers to level attained on average in English, Maths and Science (average point scores). KS4 (age 16/grade 11) attainment refers to level attained on average in English, Maths and Science (average point scores). KS2 at the school level refers to primary school test scores (taken in grade 6) of pupils starting secondary school (in grade 7). Lagged school characteristics refer to the academic year prior to the one in which pupils express their preference (e.g. for preferences expressed between May 2009 and October 2009, school characteristics refer to the academic year 2007/2008). OFSTED is the English school inspectorate. OFSTED inspections are not carried out every year. The rating refers to the most recent inspection available at the time when parents were making their school choice. Overcapacity in 2009 identifies schools with a ratio of total pupils to total capacity higher than one. Information on oversubscription in 2009 is obtained from local authority booklets. Information on these two variables and for 2009 OFSTED rating only collected for converter schools.

Table 2: The impact of conversion to academy on the demand for schools – pupils' highest preference

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Full Sample	Full Sample	Full Sample	Converters Sample	Converters Sample	Converters Sample	Converters Sample
	OLS	OLS	OLS	OLS	OLS	OLS	IV
Converter Academy	0.070 (0.031)**	0.071 (0.031)**	0.068 (0.029)**	0.091 (0.055)*	0.118 (0.057)**	0.132 (0.061)**	0.136 (0.069)*
Log of pupil-school Distance	-0.045 (0.002)***	-0.048 (0.002)***	-0.048 (0.003)***	-0.053 (0.004)***	-0.053 (0.004)***	-0.053 (0.004)***	-0.053 (0.004)***
Implied academy effect	*7.95%*	*8.07%*	*7.72%*	*9.32%*	*12.09%*	*13.52%*	*13.93%*
F-Test first stage	--	--	--	--	--	--	*41.04*
School effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Pupil effects	No	Yes	Yes	Yes	Yes	Yes	Yes
School time-varying controls	No	No	Yes	Yes	Yes	Yes	Yes
School time-averaged controls × Year effects	No	No	No	No	Yes	No	No
School 'academy propensity' × Year effects	No	No	No	No	No	Yes	No

Note: The table reports coefficients and standard errors in parenthesis (clustered at the school level) on a dummy for academy conversion (multiplied by 100) and on the log of home-to-school distance. All regressions control for a variable identifying schools approved as 'sponsored' academies. The dependent variable is a binary outcome denoting the students' highest preference. Number of observations in Columns (1) to (3): 4,176,755 (125 schools and 37,140 pupils). Converters sample considers only schools that are already academies at the time when pupils choose (i.e. prior to October of year *t*) and schools that will become academies in the future (but excluding the immediately adjacent year, i.e. the one starting from November of year *t* and finishing in October of year *t+1*). Number of observations in Column (4) to (7): 1,448,688 (60 schools and 37,140 pupils). Implied academy effect obtained by rescaling the coefficient by the probability of a school being the highest preference (0.0088 in full sample and 0.0097 in converters sample). School-level, time-varying controls include: KS4 attainment; share of FSM eligible pu0.08pils; share of female pupils; share of White British pupils; pupil-teacher ratio; and school rated 'Outstanding' by OFSTED. School time-averaged controls are averages of the latter over the period 2009-2011. School 'academy propensity' refers to the predicted probability of a school becoming an academy over the period under analysis (2009-2011) estimated using a linear probability model and including the school controls described above. Column (7) instruments the binary indicator capturing whether the school is an approved converter academy at that time. The two instruments are as follows. 1- Whether the school meets the time varying eligibility criteria to apply for conversion (see body text for a discussion); 2-Total number of applications received by the DfE from LAs other than the ones used in the analysis in the month and year in which the academy has submitted its application for conversion (summary statistics of instrument: mean=117.6; std.dev.=54.4). First stage coefficients (standard errors) as follows. School meets eligibility criteria: 0.235 (0.090)**. Total number of applications: 0.0038 (0.0004)***.***: significant at the 1% level; **: significant at the 5% level; *: significant at the 10% level.

Table 3: Timing of academy approval and selected school and neighbourhood characteristics – Converters sample, balancing evidence

	(1)	(2)
	Cross-sectional	Within-school
Panel A: Time-varying shocks		
School:		
KS2 average attainment	1.668 (0.537)***	-0.061 (0.221)
KS4 average attainment	5.331 (1.643)***	-1.409 (0.911)
Share FSM pupils	-0.131 (0.056)**	0.014 (0.009)
Share of White British pupils	0.116 (0.117)	-0.054 (0.038)
Pupil/teacher ratio	0.735 (0.614)	0.420 (0.692)
School rated 'Outstanding'	0.416 (0.144)***	-0.052 (0.174)
Neighbourhood:		
KS2 average attainment	0.796 (0.310)**	0.060 (0.181)
KS4 average attainment	2.868 (1.086)**	-0.030 (0.584)
Share FSM pupils	-0.081 (0.038)**	0.001 (0.005)
Share of White British pupils	0.084 (0.094)	-0.001 (0.007)
Neighbourhood size (pupils)	-1.795 (1.166)	0.068 (0.099)
Neighbourhood turnover	-0.001 (0.003)	0.001 (0.005)
Panel B: Initial conditions and pre-trends 2007-2009		
School:		
Pupil-to-capacity ratio, 2009	0.028 (0.024)	--
Oversubscribed, 2009	0.166 (0.113)	--
KS2 average attainment, change 2007 to 2009	-0.352 (0.157)**	--
KS4 average attainment, change 2007 to 2009	-0.010 (0.603)	--
Share FSM pupils, change 2007 to 2009	0.000 (0.008)	--
Share of White British pupils, change 2007 to 2009	-0.014 (0.022)	--
Pupil/teacher ratio, change 2007 to 2009	0.145 (0.361)	--
Neighbourhood:		
KS2 average attainment, change 2007 to 2009	-0.113 (0.085)	--
KS4 average attainment, change 2007 to 2009	-0.335 (0.244)	--
Share FSM pupils, change 2007 to 2009	0.007 (0.004)*	--
Share of White British pupils, change 2007 to 2009	-0.010 (0.008)	--
Neighbourhood size (pupils) , change 2007 to 2009	-0.098 (0.069)	--
Neighbourhood turnover, change 2007 to 2009	-0.002 (0.003)	--

Note: The table reports coefficients and standard errors (clustered at the school level) of each of the school/neighbourhood characteristics listed in the first column on a dummy variable indicating whether a school has been approved as a converter academy. Each cell corresponds to a different regression. Neighbourhoods are time fixed and defined as postcodes that fall within the 75th percentiles of the school-specific home-to-school straight line distance for secondary school pupils (year 7 to year 11) attending the secondary school in the three years prior to our observation window (2007 to 2009). Neighbourhood characteristics are calculated using all pupils in primary and secondary education (reception to year 13) residing in these areas. Turnover measures the percentage of pupils in the neighbourhood who changes the postcode of residence across two adjacent years. Regressions at the school level and only include schools belonging to the converters sample (60 schools). Correlated time-varying shock regressions consider time-varying school and neighbourhood attributes measures in the year prior to the current observation. Initial condition and pre-trends use time fixed attributes either measured in 2009 or as the difference between 2009 and 2007. Number of year-by-school observations: 131. ***: significant at the 1% level; **: significant at the 5% level; *: significant at the 10% level.

Table 4: The impact of conversion to academy on the demand for schools– heterogeneity by free school meal eligibility (FSM) and prior Key Stage 2 (KS2) attainments

	(1a)	(1b)	(2a)	(2b)
	Pupil is non-FSM	Pupil is FSM	Pupil is High KS2	Pupil is Low KS2
Converter Academy	0.169 (0.064)**	0.059 (0.078)	0.071 (0.087)	0.207 (0.076)***
Log of pupil-school distance	-0.053 (0.005)***	-0.052 (0.004)***	-0.052 (0.005)***	-0.054 (0.005)***
Implied academy effect	*17.3%*	*6.0%*	*7.3%*	*21.3%*

Note: The table reports coefficients and standard errors in parenthesis (clustered at the school level) on a dummy for academy conversion (multiplied by 100), on the log of home-to-school distance and on the interaction between the two variables. All regressions control for a variable identifying whether schools become 'sponsored' academies and for: *(i)* pupil and school effects; *(ii)* school time-varying controls, and *(iii)* school 'academy propensity' × year effects. The dependent variable is a binary outcome denoting the students' highest preference. Regressions use schools in the converters sample only (i.e. schools that are already academies at the time when pupils choose and schools that will become academies in the future). Results come from split-sample regressions run separately for non-FSM and FSM pupils, and for high KS2 and low KS2 pupils. High and Low KS2 identify pupils with prior KS2 attainments above or below the sample median (at 27 points). Number of observations as follows. Columns (1a) and (1b): 974,218 and 474,470, respectively (in 60 schools). Columns (2a) and (2b): 687,877 and 760,811, respectively (in 60 schools). Implied academy effect obtained by rescaling the coefficient by the probability of a school being the highest preference. ***: significant at the 1% level; **: significant at the 5% level; *: significant at the 10% level.

Table 5: The impact of conversion to academy on the demand for schools– heterogeneity by ethnicity (White British) and free school meal eligibility (FSM)

	(1a)	(1b)	(2a)	(2b)	(2c)	(2d)
	Pupil is White British	Pupil is other ethnicity	Pupil is White British & Non-FSM	Pupil is White British & FSM	Pupil is other ethnicity & Non-FSM	Pupil is other ethnicity & FSM
Converter Academy	0.251 (0.082)***	0.096 (0.088)	0.306 (0.094)***	0.126 (0.083)	0.121 (0.089)	0.054 (0.111)
Log of pupil-school distance	-0.048 (0.006)***	-0.058 (0.005)***	-0.050 (0.007)***	-0.039 (0.006)***	-0.056 (0.005)***	-0.061 (0.006)***
Implied academy effect	*25.7%*	*9.8%*	*31.3%*	*12.9%*	*12.4%*	*5.5%*

Note: The table reports coefficients and standard errors in parenthesis (clustered at the school level) on a dummy for academy conversion (multiplied by 100), on the log of home-to-school distance and on the interaction between the two variables. All regressions control for a variable identifying whether schools become 'sponsored' academies and for: *(i)* pupil and school effects; *(ii)* school time-varying controls, and *(iii)* school 'academy propensity' × year effects. The dependent variable is a binary outcome denoting the students' highest preference. Regressions use schools in the converters sample only (i.e. schools that are already academies at the time when pupils choose and schools that will become academies in the future). All results come from split-sample regressions run separately for the groups of pupils reported in the column headings. Number of observations as follows. Columns (1a) and (1b): 584,019 and 864,669, respectively (in 60 schools). Columns (2a), (2b), (2c) and (2d): 426,669, 157,350, 547,549, and 317,120 respectively (in 60 schools). Implied academy effect obtained by rescaling the coefficient by the probability of a school being the highest preference. ***: significant at the 1% level; **: significant at the 5% level; *: significant at the 10% level.

Table 6: The mechanisms behind the impact of conversion to academy – school expected composition and effectiveness

	(1)	(2)	(3)	(4)
	All pupils	Pupil is non-FSM	Pupil is White British	Pupil is White British & non-FSM
Panel A: Controlling for expected composition (intake) changes				
Converter	0.120	0.149	0.223	0.264
Academy	(0.059)**	(0.057)**	(0.074)***	(0.089)***
Panel B: Controlling for expected changes in academies' effectiveness (KS2 to KS4 value-added)				
Converter	0.131	0.169	0.249	0.301
Academy	(0.061)**	(0.064)***	(0.083)***	(0.097)***
Panel C: Controlling for expected changes in total expenditure				
Converter	0.119	0.149	0.256	0.317
Academy	(0.063)*	(0.064)**	(0.087)***	(0.098)***
Panel D: Controlling for expected changes in total number of KS4 modules offered				
Converter	0.122	0.173	0.236	0.294
Academy	(0.057)**	(0.064)***	(0.090)**	(0.108)***
Panel E: Controlling for expected changes in teacher workforce characteristics				
Converter	0.158	0.205	0.318	0.427
Academy	(0.080)*	(0.088)**	(0.129)**	(0.153)***

Note: The table reports coefficients and standard errors in parenthesis (clustered at the school level) on a dummy for academy conversion. All regressions control for a variable identifying whether schools become 'sponsored' academies and for: *(i)* pupil and school effects; *(ii)* school time-varying controls, and *(iii)* school 'academy propensity' × year effects. The dependent variable is a binary outcome denoting the students' highest preference. Regressions use schools in the converters sample only (i.e. schools that are already academies at the time when pupils choose and schools that will become academies in the future). Column (1) considers all pupils. Column (2) considers non-FSM eligible pupils only. Column (3) considers White British pupils only. Column (4) considers White British, non-FSM eligible pupils only. Panel A controls for expected changes in intake composition by including among the controls the percentage of FSM eligible pupils, the percentage of White British pupils, the percentage of female students and the average KS2 (age 11) attainments of pupils at the beginning of secondary school in year 7 at the time when pupils will enrol (i.e. one year after the period under analysis when they express their preferences). Panel B controls for a proxy for the expected changes in school effectiveness following academy conversion. This refers to the school-specific extra KS4 attainments generated by the school following conversion. School effectiveness estimated comparing performance of actual converters to the performance of future converters using only 'legacy pupils' enrolled in schools prior to conversion. See Appendix Figure 1 and Appendix A for more details. Panel C controls for expected changes in total expenditure. Panel D controls for expected changes in total number of KS4 modules. Panel E controls for expected changes in the following teacher workforce characteristics include: number of teachers; percentages of permanent teachers, female teachers, part-time teachers and teachers with post-degree qualifications; average age of teachers; teacher turnover; and a dummy for head-teacher change. Data on teachers only available for 52 schools in the converters sample. Number of observations as follows. Columns (1): 1,448,688 in 60 schools (1,188,491 in 52 schools in Panel E). Columns (2): 974,218 in 60 schools (799,352 in 52 schools in Panel E). Columns (3): 584,019 in 60 schools (479,319 in 52 schools in Panel E). Columns (4): 426,669 in 60 schools (350,061 in 52 schools in Panel E). ***: significant at the 1% level; **: significant at the 5% level; *: significant at the 10% level.

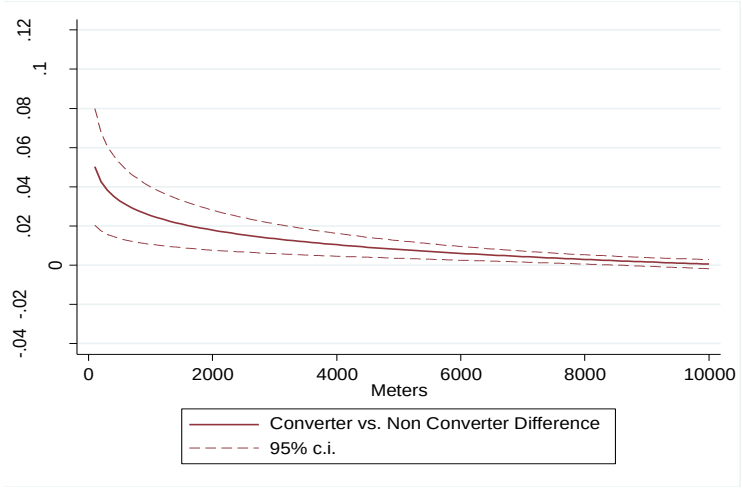
Table 7: The mechanisms behind the impact of conversion to academy – pre-conversion school quality and popularity

	(1)	(2)	(3)	(4)
	All pupils	Pupil is non-FSM	Pupil is White British	Pupil is White British & non-FSM
Panel A: % 5 A-C GCSEs (average 2007-2009)*				
Converter Academy × School has above-median % 5 A*-C GCSEs	0.136 (0.067)**	0.187 (0.072)**	0.335 (0.098)***	0.420 (0.114)***
Converter Academy × School has below-median % 5 A*-C GCSEs	0.124 (0.073)*	0.131 (0.077)*	0.073 (0.089)	0.065 (0.103)
Panel B: KS2 to KS4 Contextual Value Added (CVA, average 2007-2009)				
Converter Academy × School has above-median CVA	0.161 (0.071)**	0.215 (0.076)***	0.279 (0.101)***	0.358 (0.120)***
Converter Academy × School has below-median CVA	0.089 (0.067)	0.101 (0.077)	0.210 (0.096)**	0.231 (0.117)*
Panel C: OFSTED rating (latest available up to 2009)				
Converter Academy × School is OFSTED 'Outstanding'	0.133 (0.116)	0.190 (0.126)	0.279 (0.192)	0.337 (0.218)
Converter Academy × School is not OFSTED 'Outstanding'	0.132 (0.061)**	0.165 (0.066)**	0.246 (0.080)***	0.300 (0.097)***
Panel D: School overcapacity (2007-2009)				
Converter Academy × School is overcapacity	0.197 (0.086)**	0.282 (0.089)***	0.487 (0.137)***	0.620 (0.159)***
Converter Academy × School is not overcapacity	0.106 (0.063)*	0.124 (0.069)*	0.158 (0.082)*	0.181 (0.100)*
Panel E: School oversubscribed (2009)				
Converter Academy × School is oversubscribed	0.136 (0.063)**	0.173 (0.066)**	0.258 (0.084)***	0.311 (0.097)***
Converter Academy × School is not oversubscribed	0.083 (0.061)	0.118 (0.063)*	0.175 (0.117)	0.242 (0.129)*
Panel F: Principal-component 'school quality'				
Converter Academy × School is above-median 'school quality'	0.158 (0.082)*	0.208 (0.091)**	0.351 (0.116)***	0.425 (0.138)***
Converter Academy × School has is below-median 'school quality'	0.112 (0.058)*	0.139 (0.061)**	0.174 (0.082)**	0.214 (0.102)**

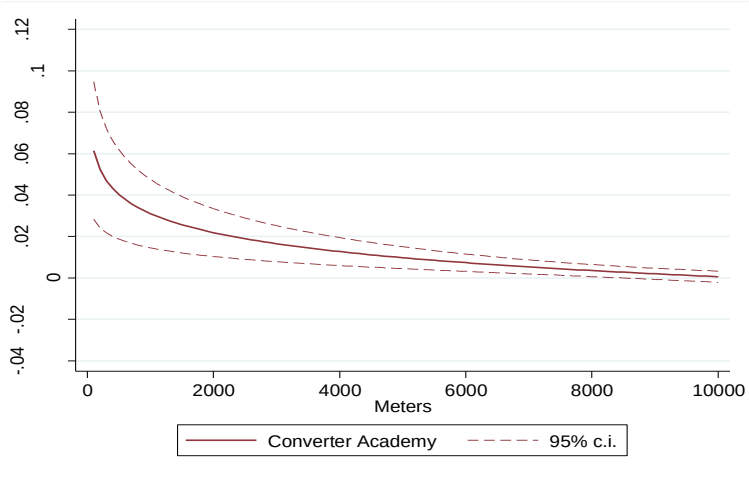
Note: The table reports coefficients and standard errors in parenthesis (clustered at the school level) on a dummy for academy conversion and its interaction with a proxy for 'salience' (multiplied by 100). All regressions control for a variable identifying whether schools become 'sponsored' academies and for: *(i)* pupil and school effects; *(ii)* school time-varying controls, and *(iii)* school 'academy propensity' × year effects. The dependent variable is a binary outcome denoting the students' highest preference. Regressions use schools in the converters sample only (i.e. schools that are already academies at the time when pupils choose and schools that will become academies in the future). Columns (1) consider all pupils. Columns (2) consider non-FSM eligible pupils only. Columns (3) consider White British pupils only. Columns (4) consider White British, non-FSM eligible pupils only. The various panels create converter academy interactions with school quality and popularity proxies using the variables described in the panel headings. % of 5 A*-C GCSEs and CVA obtained from school performance tables; median values: 0.44 and 1004, respectively. Principal component 'school quality' derived using first (un-rotated) component of a principal component analysis based on the school characteristics used for interactions in Panels A-E (i.e., % of 5 A*-C GCSE, CVA, Outstanding OFTSED rating, overcapacity 2007-2009, and oversubscribed 2009). Number of observations as follows. Columns (1): 1,448,688 (in 60 schools). Columns (2) 974,218 (in 60 schools). Columns (3): 584,019 (in 60 schools). Columns (4): 426,669 (in 60 schools). ***: significant at the 1% level; **: significant at the 5% level; *: significant at the 10% level.

Figure 1: Variation in the effect of of academy conversion over distance

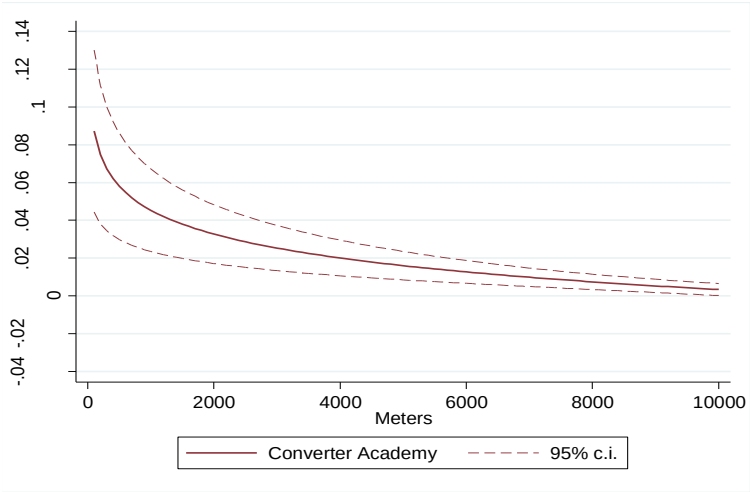
Panel A: All Pupils



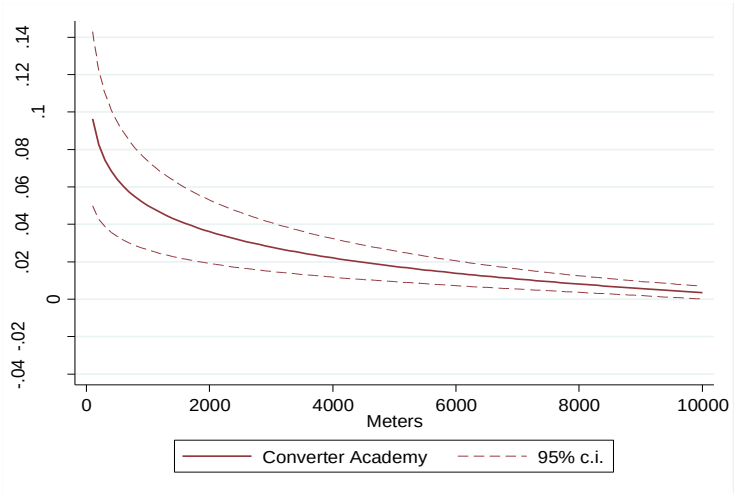
Panel B: Non-FSM Pupils



Panel C: White British Pupils



Panel D: Non-FSM, White British Pupils



Note: The figures show the effect of converter academies at varying pupil-to-school distances for all pupils and for pupils with the displayed background characteristics (non-eligible for free school meals and White British). Figures obtained from specification that: use the converters sample; including all controls and school 'academy propensity'× year effects; add an interaction between school academy conversion and the log of pupil-to-home straight line distance; and consider only the displayed sub-set of pupils. Estimation sample only includes non-movers. 95% confidence intervals come from standard errors clustered at the school level.

Appendix Tables and Figures

Appendix Table 1: Additional descriptive statistics

	School types and preferences by October 2009 (for aayy 2010/2009)	School types and preferences by October 2010 (for aayy 2011/2012)	School types and preferences by October 2011 (for aayy 2012/2013)
Panel A: Prevalence of academies			
Converter academies	0	3 (2.4%)	41 (32.8%)
Other schools	125	122 (97.6%)	84 (67.2%)
Panel B: Pupil preferences: % of students choosing first			
All pupils:			
Converter academies	0	1.68%	40.84%
Other	100%	98.32%	59.16%
Non-FSM eligible students:			
Converter academy	0	1.55%	46.72%
Other	100%	98.45%	53.65%
FSM eligible students:			
Converter academy	0	1.94%	29.01%
Other	100%	98.09%	71.18%
High KS2 achievement students:			
Converter academy	0	1.55%	50.97%
Other	100%	98.45%	49.03%
Low KS2 achievement students:			
Converter academy	0	1.78%	68.86%
Other	100%	98.09%	30.14%
White British students:			
Converter academy	0	1.62%	42.78%
Other	100%	98.38%	57.22 %
Non-White British students:			
Converter academy	0	1.72%	39.65%
Other	100%	98.28%	60.35%

Note: see notes to Table 1a. Aayy refers to academic year. High/low KS2 achievement identifies students with age-11/grade 6 KS2 test scores above/below the sample median.

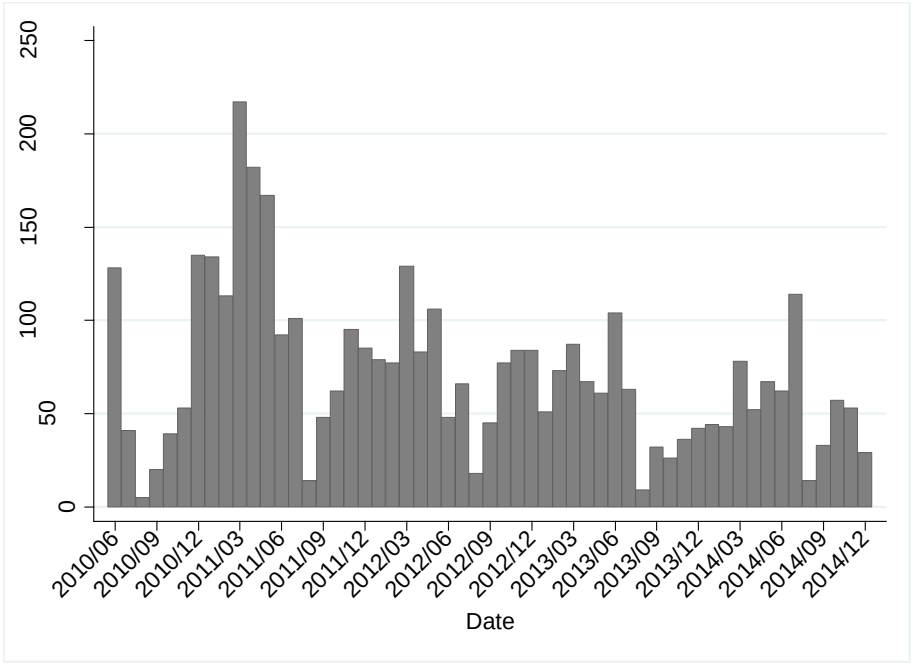
Appendix Table 2: Balancing of instruments – Converters sample

	(1)	(2)
Panel A: Instrument is changes in eligibility criteria		
KS2 average attainment – school	1.495 (0.560)***	-0.077 (0.199)
Share FSM pupils – school	-0.071 (0.049)	-0.002 (0.009)
Share White British pupils – school	0.063(0.089)	0.024 (0.034)
Pupil/teacher ratio – school	-0.108 (0.503)	0.079(0.434)
KS2 average attainment – neighbourhood	0.554 (0.339)	-0.051 (0.129)
Share FSM pupils – neighbourhood	-0.028 (0.039)	-0.004 (0.004)
Share White British pupils – neighbourhood	-0.001 (0.075)	0.001 (0.005)
Neighbourhood size (pupils)	-0.819 (0.833)	0.113 (0.086)
Neighbourhood turnover	0.002 (0.003)	-0.002 (0.004)
Panel B: Instrument is total number of applications		
KS2 average attainment – school	-0.003 (0.007)	--
Share FSM pupils – school	-0.000 (0.001)	--
Share White British pupils – school	0.001 (0.001)	
Pupil/teacher ratio – school	-0.000 (0.005)	--
KS2 average attainment – neighbourhood	0.005 (0.003)	--
Share FSM pupils – neighbourhood	-0.001 (0.001)	--
Share White British pupils – neighbourhood	0.001 (0.001)	
Neighbourhood size (pupils)	-0.011 (0.010)	--
Neighbourhood turnover	-0.000 (0.001)	--
Year effects	Yes	Yes
School effects	No	Yes

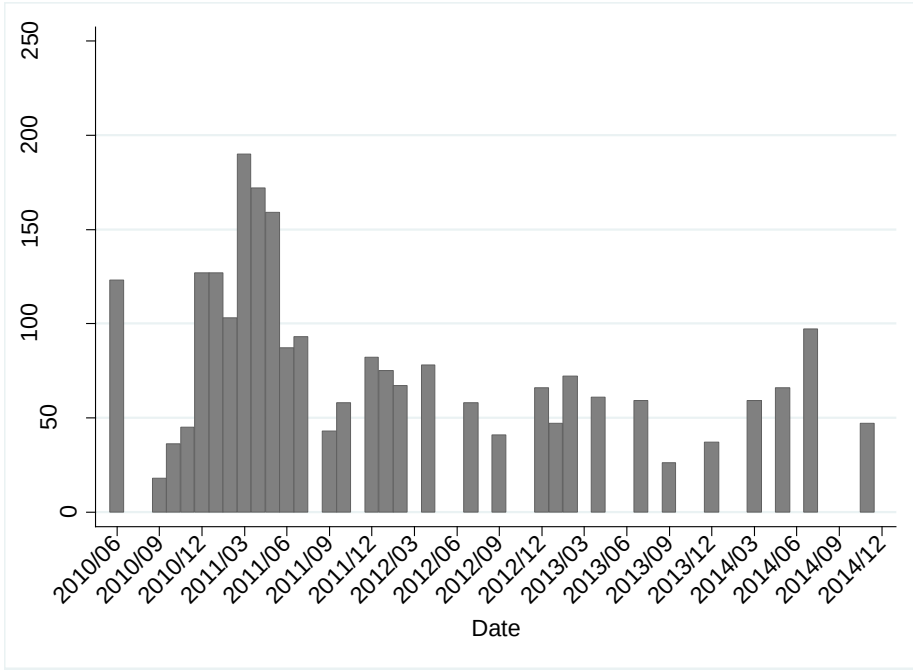
Note: The table reports coefficients and standard errors (clustered at the school level) of one of the school/neighbourhood characteristics listed in the first column on a dummy variable indicating whether a school has been approved as a converter academy. Each cell corresponds to a different regression. Neighbourhoods are time fixed and defined as postcodes that fall within the 75th percentiles of the school-specific home-to-school straight line distance for secondary school pupils (year 7 to year 11) attending the secondary school in the three years prior to our observation window (2007 to 2009). Neighbourhood characteristics are time varying and calculated using all pupils in primary and secondary education (reception to year 13) residing in these neighbourhoods in the year prior to the current observation. Turnover measures the percentage of pupils in the neighbourhood who changes the postcode of residence across two adjacent years. Regressions at the school level. Number of year-by-school observations: 131. ***: significant at the 1% level; **: significant at the 5% level; *: significant at the 10% level.

Appendix Figure 1: Number of application for converter academies received by the Department for Education

Panel A: All schools in England; all months



Panel B: Schools outside the LAs under anlysis; selected months



Note: The figure presents number of applications for converter academies received by the Department for Education by month between 2010/06 and 2014/12. The left-hand side figure uses data for all schools in the whole of England. The right-hand side figure uses number of applications for converter academies received by the Department for Education for dates in which converter academies in our sample have applied to the Department for Education (DfE). Numbers only include applications from outside the LAs considered in our analysis. This is the instrument used in Column (7), Table 2. Figures based on the authors' manipulation of information collected by the Department for Education (DfE).

On-Line Appendix A: Robustness checks

In this section, we discuss a number of checks and extensions on our main results. These are presented in On-Line Appendix Table 1. To start with, Column (1) considers the effect of academisation on the rank order of preferences (as opposed to top preference only – as done up to now). We find a positive and significant effect although the impact size is reduced to approximately 3%. Additional results (not tabulated) show that academisation also increase the probability that a school is listed among the top three preferred school – with an effect size of 6%-10% depending on the exact specification adopted. This pattern suggests that the most important margin of adjustment of parental demand occurs along the 'top choice' dimension. In Column (2) we estimate a conditional logit model instead of a linear probability model, and include alternative specific constants (school dummies). The results again show a positive impact of academy conversion on parental preference of a similar order of magnitude to or main results (from Table 3, column 4-6, the increased probability is 0.0013 on a baseline of 0.0097 implies an odds ratio of 1.21 given the 33% share of converted academies in our ever-converter sample). Columns (3) and (4) restrict pupils' choice set to only include the 10% closest schools (i.e., 12 per pupil) or schools within 2.5km from a pupil's residence (a number that varies by pupil; approximately 5.9 each, with a standard deviation of 1.9). In this case there is a much bigger semi-elasticity – between 24% and 33% – implying that the relative increase in a converting schools' probability of being chosen first within a local choice set is substantially larger than the corresponding increase compared to the overall LA choice set. We return to these issues in Section 6.3 where we focus on the interaction between home-school distance and academisation to study the mechanisms underpinning our findings.

Given the importance of distance, Column (5) checks that our baseline results are not affected by families moving in the years preceding secondary school in order to admission to over-subscribed academies which rank admissions by the home-to-school distance. To control for this possibility, we drop from our analysis all students that move their residential address between grade 3 (right after KS1, and at the beginning of the second primary school stage) and grade 7 (right after the beginning of secondary school). As shown in Column (5), dropping these strategic movers does not affect our conclusions.

The next two columns of On-Line Appendix Table 1 investigate whether other institutional features of the English admission system affect our estimates. To start with, in Column (6) we drop pupils with special education needs (SEN), as these are prioritised for admissions to their preferred schools. This exclusion does not affect our findings. In Column (7), instead we focus on rules that prioritise children with siblings at the school for admission and consider the possibility that parents of these pupils might act as a 'driving force' (e.g., by leading consultations) for a school's decision to convert to academy. This dynamic would generate a sort of 'reverse causal' link between parental preferences and conversion, confounding the interpretation of our results. To deal with this possibility, we exclude from our analysis all pupils who are admitted to schools on the basis of the sibling criterion. When we apply this restriction, we still find a positive effect of conversion on parental preference, with an implied effect of approximately 14%.

Finally, Column (8) adds more school controls to the specification, namely: the share of SEN pupils; the ratio of pupils to SEN-support teachers; and the percentage of school sessions missed because of absences.

This extension does not affect our results. We further experimented with replacing the control for average end-of-secondary (KS4) school attainments with a measure of average primary-to-secondary (KS2-to-KS4) value-added. This also did not substantially affect our results.

On-Line Appendix B: Estimating Academies' Effectiveness using Legacy Enrolled Pupils.

We follow the approach used in Eyles et al. (2016) and compare the KS4 attainments of pupils that already enrolled for secondary education (grade 7) in converter academies prior to their conversion – i.e., 'legacy enrolled' students – to the attainments of pupils enrolled in schools that will become academies after our observation window – i.e., students in 'future converter' control schools. This approach is essentially a difference-in-difference (D-i-D) method that exploits differences in age-16 attainments among the following three groups of students: *(i)* pupils that start secondary education in schools that convert to academies within our observation window, but are not exposed to academy teaching – i.e. they complete secondary education before the school converts; *(ii)* pupils that start secondary school in converter academies prior to conversion and are exposed to one, two, three or four years of academy education; and *(iii)* children that start secondary education in schools that will convert to academy after the end of our observation window and so are not exposed to any academy year.

We focus on the school in which students are enrolled grade 7 and prior to conversion to by-pass the endogeneity of school choice/mobility in relation to academisation. By concentrating on where pupils 'start' secondary education, we measure an 'intention-to-treat' (ITT) exposure to academy education. However, we follow pupils through their subsequent moves and thus identify actual academy exposure. We then use ITT exposure to instrument for actual exposure and estimate Instrumental Variable (IV) D-i-D models to identify the causal effect of academy on end-of-secondary school KS4 attainments

To estimate these models, we use KS4 attainment data on all pupils in England (not just our eight LAs) for the academic years 2005/2006 to 2013/2014. As in Eyles et al. (2016), we identify converter academies as 'operative' for the academic year *t/t+1* if they open by December of year *t* so that they have two full terms of academy teaching before impacting students' KS4 exams in May of *t+1* (still part of the same academic year t/*t+1*).[1] To clarify, consider the following example: a student who starts secondary school in September of 2007 – in the academic year 2007/2008 – who takes his/her KS4 tests in May 2012 – in the academic year 2011/2012 – and whose school converts to academy in December 2010 – i.e. during the academic year 2010/2011. If the student does not change school, he/she will have ITT and actual academic exposures equal to two years. If instead the student changes school in September 2011, he/she will be assigned to two years of ITT exposure, although actual exposure will only be one year. Note that more than 95% of the pupils we observe in converter academies do not change school. This means that the first stage coefficient of our

[1] Academies opened by December of year *t* are essentially all approved by October of year *t*, as in the timeline in our main analysis. Academies that open after December of year *t* – predominantly in April/May of year *t+1* – are deemed 'too late' to influence their students' attainment in that period and assigned to students' KS4 tests for the academic year *t+1/t+2*. Note that we experimented with alternative timelines and found that the results are fairly robust.

procedure is very close to one and that IV and ITT estimates of the effectiveness of converter academies are virtually the same.

Throughout the analysis, we use standardized KS4 test scores as our dependent variable. All regressions control for student demographics (FSM eligibility, SEN status, gender, English as first language and White British ethnicity) and end-of-primary KS2 attainments. Because of this, all specifications are 'lagged dependent variable' models. Adopting more restrictive value-added models does not affect our findings. It should also be noted that all individual covariates are balanced with respect to conversion. This is a virtue of using 'legacy enrolment' and assigning students to school using grade 7. Finally, throughout our analysis, we cluster standard errors by school.

Besides estimating academies' average effectiveness, we investigate heterogeneous impacts by pupil sub-groups – e.g., FSM vs. non-FSM eligible pupils – and across schools. The former models are estimated by pooling all pupil observations but interacting all controls included in the specification (including year effects) with the relevant sub-group indicators. In essence, these models only restrict school fixed-effects to be the same for the various strata. Split-sample models yield almost identical estimates. As we found no evidence of significant heterogeneity across pupils with different background, these results are not tabulated or used in our analysis. The latter models instead are estimated to recover standardized school-specific policy-on academy effects. These are obtained by interacting each school identifier with a dummy capturing whether the school is open as an academy in time to influence KS4 attainments of that academic year (irrespective of how many academic years the academy has been open for).

On-Line Appendix Figure 1 graphically presents our estimates of the effectiveness of converter academies. These are estimated separately for schools rated 'outstanding', 'good' and 'satisfactory/inadequate' at the latest inspection prior to 2010. We follow this approach since different schools had different eligibility criteria to convert to academy depending on their inspectorate rating (see again Section 2.2). The top left-hand side plot display the average impact of converting to academy up to four years after conversion (for 'outstanding' schools; up to three for the other two groups as not enough schools with these ratings convert early enough to impact KS4 attainments in the academic year 2013/2014 – the last year we use in our analysis) and up to five years before conversion – with the omitted group being the year just before academisation. The other diagrams instead present histograms displaying standardized KS4 school-specific policy-on academy effects.

Our findings show that 'outstanding' converters display no significant pre-policy effects (i.e., the standard D-i-D parallel-trend assumption is likely to hold) and a significant positive impact on pupils' KS4 attainments in the first three years after opening – before dropping somewhat four years after conversion and becoming insignificant. This dip is most likely explained by the fact that very few schools converted by December 2010 in time to have four full years of impact by the end of the academic year 2013/2014 – and should be somewhat discounted. However, we find a much less neat picture for the other two group types. To begin with, there is some evidence of pre-trends in KS4 in the years leading up to conversion – in particular for good schools – which complicates causal inference. Furthermore, we find little evidence to suggest that converter academies in these two groups improve the attainments of their students following conversion.

The other panels show that average performance measures hide substantial heterogeneity in effectiveness across schools. The average policy-on impact for outstanding schools is 3% of a standard deviation with a standard deviation of 10.6%. On the other hand, the average policy-on impact is 0.4% for 'good' schools and -3.7% for institutions in the residual group. Both estimates display substantial amounts of variation with 12.7% and 13.9% standard deviations, respectively.

On-Line Appendix Table 1: The impact of conversion to academy on the demand for schools – robustness checks

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Ordered school pref's	Conditional logit – odds ratios	Keeps only 10% closest schools	Keeps schools within 2.5km from home	Non-movers only	No SEN pupils	No pupils with pref's for sibling school	Extra school controls
Converter Academy	0.140 (0.048)***	1.205 (0.065)***	2.049 (0.568)***	4.579 (1.137)**	0.147 (0.073)**	0.141 (0.062)**	0.142 (0.068)**	0.118 (0.055)**
Log of pupil-school distance	-0.473 (0.051)***	0.108 (0.002)***	-0.181 (0.015)***	-0.225 (0.0190)***	-0.054 (0.004)***	-0.053 (0.004)***	-0.050 (0.004)***	-0.053 (0.004)***
Mean outcome	*5.065*	--	*0.0800*	*0.1401*	*0.0098*	*0.0098*	*0.0101*	*0.0098*
Implied academy effect	*2.7%*	--	*25.6%*	*32.7%*	*15.0%*	*14.4%*	*14.1%*	*12.0%*

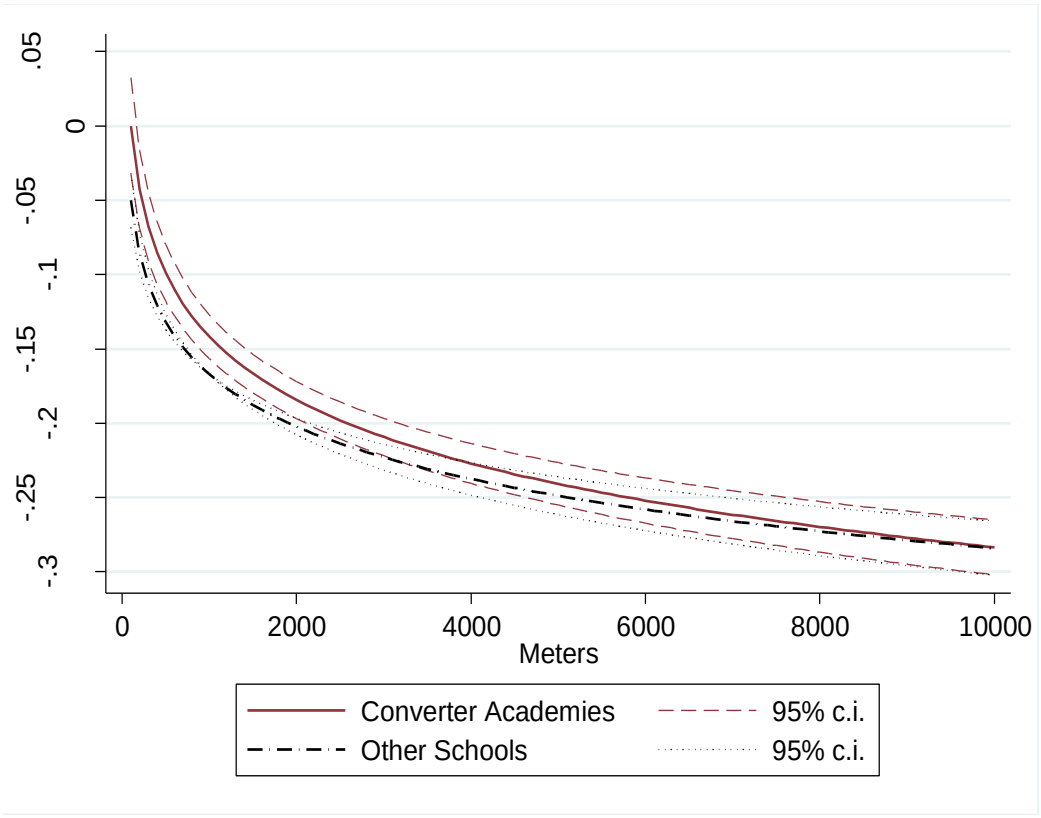
Note: The table reports coefficients and standard errors in parenthesis (clustered at the school level) on a dummy for academy conversion (multiplied by 100) and on the log of home-to-school distance; except for Column (2) where it reports odds ratios. All regressions control for a variable identifying whether schools become 'sponsored' academies and for: *(i)* pupil and school effects; *(ii)* school time-varying controls, and *(iii)* school 'academy propensity' × year effects. The dependent variable is a binary outcome denoting the students' highest preference, except for Column (1) where it corresponds to the rank of the preferences up to the sixth and does not consider (coded as missing) schools not ranked by students. Columns (3) and (4) only consider the 10% closest schools to a pupil's home address and schools within 2.5km of the home address, respectively. Column (5) only considers pupils who do not change their postcode of residence between grade 3 (right after their Key Stage 1 test in the third year of primary education) and grade 7 (right after they have entered secondary education). Column (6) drops pupils with Special Education Needs (SEN) with statements. Column (7) drops pupils who express preferences for schools where they have priority admissions because of 'sibling rules'. Additional school controls in Column (8) include: school share of pupils with SEN; ratio of pupil to SEN-support teachers; school percentage of sessions missed because of absences (authorized and unauthorized). Number of observations as follows. Column (1): 40,596 in 59 schools. Column (2): 631,299 in 60 schools. Column (3): 142,220 in 50 schools. Column (4): 51,174 in 42 schools. Column (5): 916,030 in 60 schools. Column (6) 1,427,329 in 60 schools. Column (7): 1,037,258 in 60 schools. Column (8): 1,448,688 in 60 schools. Implied academy effect obtained by rescaling the coefficient by the probability of a school being the highest preference except for Column (1) which uses the average rank of listed schools and Column (2) which presents the marginal effect (unscaled). ***: significant at the 1% level; **: significant at the 5% level; *: significant at the 10% level.

On-Line Appendix Table 2: The mechanisms behind the impact of conversion to academy – 'excellence salience' and 'availability' heuristics

	Sample only includes: Pupils with an academy within 2.5km from home				Sample only includes: Schools within 2.5km from home			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	All pupils	Pupil is non-FSM	Pupil is White British	Pupil is White British & non-FSM	All pupils	Pupil is non-FSM	Pupil is White British	Pupil is White British & non-FSM
Panel A: % 5 A-C GCSEs (average 2007-2009)*								
Converter Academy × School has above-median % 5 A*-C GCSEs	0.162 (0.083)**	0.191 (0.088)**	0.330 (0.118)***	0.405 (0.139)***	3.932 (1.294)***	4.391 (1.291)***	5.918 (1.795)***	5.130 (2.212)**
Converter Academy × School has below-median % 5 A*-C GCSEs	0.193 (0.094)**	0.187 (0.099)*	0.063 (0.123)	0.392 (0.136)	5.430 (1.756)***	5.456 (2.133)**	4.051 (2.382)	-0.328 (2.885)
Panel B: KS2 to KS4 Contextual Value Added (CVA, average 2007-2009)								
Converter Academy × School has above-median CVA	0.232 (0.091)**	0.267 (0.095)***	0.287 (0.133)**	0.345 (0.156)**	5.001 (1.175)***	5.270 (1.279)***	5.116 (1.708)***	4.904 (1.902)**
Converter Academy × School has below-median CVA	0.084 (0.080)	0.076 (0.091)	0.181 (0.105)	0.203 (0.131)	2.230 (1.962)	2.547 (1.763)	2.768 (2.295)	1.439 (2.695)
Panel C: School overcapacity (2007-2009)								
Converter Academy × School is overcapacity	0.245 (0.097)**	0.306 (0.099)***	0.498 (0.160)***	0.628 (0.187)***	5.663 (1.432)***	5.168 (1.416)***	7.035 (2.241)***	5.699 (2.678)**
Converter Academy × School is not overcapacity	0.143 (0.084)*	0.143 (0.090)	0.142 (0.110)	0.151 (0.133)	4.089 (1.251)***	4.669 (1.452)***	2.035 (1.839)	1.900 (2.162)

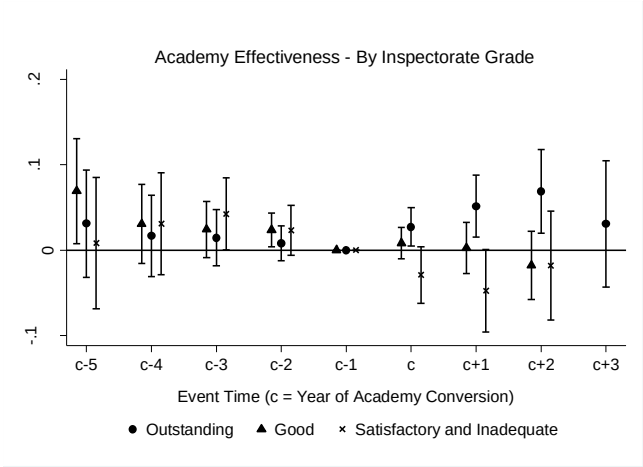
Note: The table reports coefficients and standard errors in parenthesis (clustered at the school level) on a dummy for academy conversion and its interaction with a proxy for 'salience' (multiplied by 100). All regressions control for a variable identifying whether schools become 'sponsored' academies and for: *(i)* pupil and school effects; *(ii)* school time-varying controls, and *(iii)* school 'academy propensity' × year effects. The dependent variable is a binary outcome denoting the students' highest preference. Regressions use schools in the converters sample only (i.e. schools that are already academies at the time when pupils choose and schools that will become academies in the future). Columns (1) and (5) consider all pupils. Columns (2) and (6) consider non-FSM eligible pupils only. Columns (3) and (7) consider White British pupils only. Columns (4) and (8) consider White British, non-FSM eligible pupils only. The various panels create converter academy interactions with school quality and popularity proxies using the variables described in the panel headings. % of 5 A*-C GCSEs and CVA obtained from school performance tables; median values: 0.44 and 1004, respectively. The first four columns only consider pupils with an academy within 2.5km from home (approximately 70% of the observations). The last four columns only consider schools within 2.5km from pupil's homes (number of schools varies across pupils). Number of observations as follows. Columns (1): 1,019,753 (in 60 schools). Columns (2) 15,027 (in 42 schools). Columns (3): 375,730 (in 60 schools). Columns (4): 279,710 (in 60 schools). Columns (5): 51,174 (in 42 schools). Columns (6) 33,931 (in 42 schools). Columns (7): 584,019 (in 60 schools). Columns (8): 426,669 (in 60 schools). ***: significant at the 1% level; **: significant at the 5% level; *: significant at the 10% level.

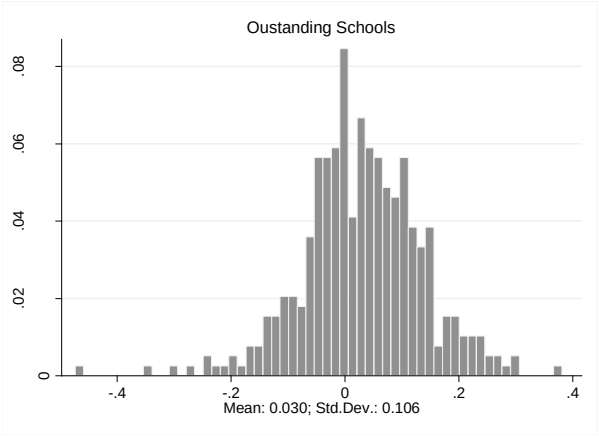
On-Line Appendix Figure 1: The impact of distance for converter academies and other schools

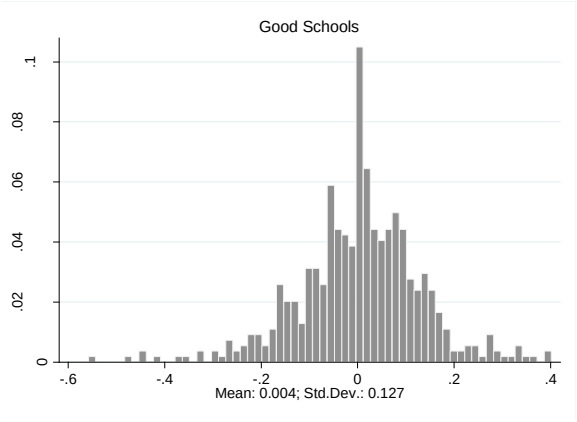


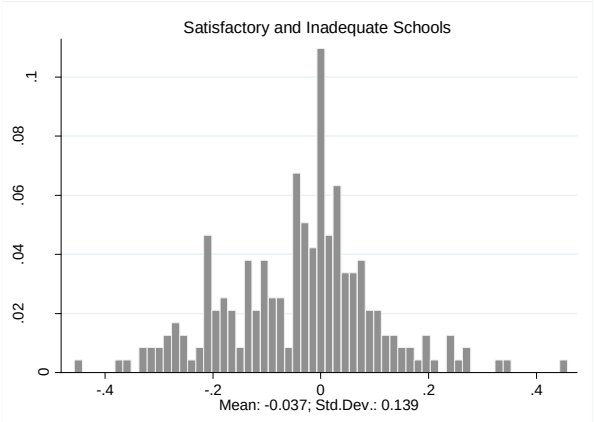
Note: The figures show the effect of distance from schools on the probability that a school is top ranked for converters and non-converters. Figures obtained from specification that: use the converters sample; including all controls and school 'academy propensity'× year effects; and add an interaction between school academy conversion and the log of pupil-to-home straight line distance. Estimation sample only includes non-movers. 95% confidence intervals come from standard errors clustered at the school level. Median distance for schools chosen (ranked) by students: approximately 2.5km. Median distance for highest preference school: 1.7km.

On-Line Appendix Figure 2: Academy effectiveness and variation in policy-on effects – by OFSTED inspection grade









Note: Plots present estimates of the impact of academy conversion on KS4 attainments. Regressions run at the pupil level with standard errors clustered at the school level. Regressions consider pupil KS4 outcomes in the academic year 2005/2006 to 2013/2014. School are considered operating as academies if they open before December of year *t* and impact on KS4 outcomes in May of year *t+1* (e.g. open by December 2011 and impact on KS4 in May 2012 – both dates referring to the academic year 2011/2012). Sample only includes: *i*- converter academies open between September 2010 and December 2013 (treated) and converter academies open between January 2014 and March 2016 (controls); *ii*- pupils enrolled in these schools before academy conversion (legacy enrolment). Number of pupils and schools as follows. Outstanding schools: 564,340 pupils in 395 (380 treated and 15 control) schools. Good schools: 803,039 pupils in 566 (516 treated and 50 control) schools. Satisfactory and inadequate schools: 346,684 pupils in 259 (220 treated and 39 control) schools. Top, left-hand side plot presents results for academy impact at time of conversion and up to four years after (c to c+3); and prior to conversion (c-2 to c-5). Omitted group: c-1 (year prior to conversion). There are no good schools/too few satisfactory and inadequate schools converting in the first year (up to December 2010) to present estimates for c+3 for these groups. The other plots present school-specific estimates of academy effectiveness. These are obtained from a school-specific 'policy-on' dummy indicating whether the school was open as academy at that time.

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