IOE, UCL's Faculty of Education and Society

The Free Schools Experiment

Analysing the impacts of English free schools on neighbouring schools

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Executive Summary

Free schools were introduced as a flagship policy of the new Conservative-led Government in 2010. The policy changed the way state-funded schools are opened in England. It enabled parents, teachers, charities, faith groups and other providers to apply to Government for the right and funding to set up and govern a new state school, including where there was no need for new places. Independent of local government, free schools were given 'freedoms' traditional state schools do not have, including over their curriculum, admissions and staff pay. The Government argued this would enable free schools to be high-quality schools that offered parents better choices and created new competition between schools. In turn, the Government argued, this would increase pressure for improvement in neighbouring schools, creating a "galvanising effect on the whole school system" (DfE 2010: 57). However, there was concern that the impact of free schools could in fact be negative, including by making neighbouring schools less viable (NAO 2013) or by increasing social segregation (NEU 2018).

Aims: we present a detailed analysis of the impacts of free schools on neighbouring schools:
- first, we analyse mechanisms through which free schools may impact on their neighbours, examining: where free schools locate; free schools' academic quality; whether student enrolment in neighbouring schools changes with a free school opening; and whether neighbouring schools perceive new competition and respond by taking any new actions.
- second, we analyse whether the opening of a free school is associated with any improvement or deterioration in student attainment in neighbouring schools.
- third, we analyse whether the opening of a free school is associated with any increase or decrease in social segregation in the surrounding local area.

Methods: we focus on the mainstream free school population as a whole and the average effects of free schools on their neighbours. We also explore potential variations. Using the National Pupil Database, we link this to other data including on deprivation and need for places. We report on a survey of 328 neighbouring schools and case studies of nine areas with a free school. Our main analyses focus on free schools opened from 2011 to 2020. This end date was influenced by Covid-19 as attainment data was not published from 2020 to 2022. Our survey and case studies updated the free school population to those operating in 2022. We identify a 'neighbour' when a school experiences the opening of a free school of the same phase in their own neighbourhood area. A neighbourhood was defined as the travel distance to a school's ninth-nearest school and we present evidence for the validity of this definition. Using these definitions, we find that over 10% of mainstream primaries and 35% of secondaries had become neighbouring schools of a free school by 2020.

Key Findings

Analysing free school **locations, intakes and quality**, we found:
- free school locations were associated with forecast need for new places and higher ethnic diversity. There was little evidence free schools prioritised areas with low academic quality or high deprivation, beyond responding to predicted place need in ethnically diverse areas.

- free schools were more ethnically diverse than their neighbours, with on average 6% fewer White British pupils at primary free schools and 8% fewer at secondaries. Primary free schools however had on average 5.4% fewer students eligible for a free school meal (FSM)

and 3.4% fewer pupils with special educational needs (SEN). Secondary free schools had on average similar proportions of FSM and SEN students to their neighbours.

- free schools were not 'high-quality' on average during our analysis period. Primary free schools performed on average worse than a matched sample of similar schools, by about a third of a standard deviation in attainment measures and half a standard deviation in progress measures. They also performed worse on average than their neighbours. Secondary free schools performed on average no better or worse in the main GCSE attainment and progress measures than a matched sample or their neighbours.

Analysing **choice and competition**, we found:

- free schools did affect neighbouring school student enrolment, throughout a six-year post-treatment period analysed, relative to a matched sample. In primary schools, estimated declines averaged about 2.5% of Reception Year students per year across four years. Student declines were slightly larger and more consistent in secondary schools, averaging about 4.5% of each Year 7 entry cohort across the six years.

- competition, rather than collaboration, was the dominant form of perceived relationship with the nearest free school among surveyed neighbouring schools. Nearly two-thirds of respondents reported competition, including over student recruitment and popularity among parents. Perceived competition was stronger where the free school was seen by respondents to appeal to advantaged students or where there were surplus places.

- where competition was perceived to be intensive in the case studies the practices of free schools were reported to generate social selection, increasing student compositional differences between schools. When a free school promoted a fast-paced academic or quasi-private ethos it was often seen by its neighbours to appeal to aspirational or middle-class families. Social selection was also identified where free schools were seen by their neighbours to counsel out children who might be harder to provide for, including by encouraging their parents to apply elsewhere.

- there was a strong relationship between perceived competition and reported action taking among surveyed neighbour schools. The strongest association was to 'externally-focused' actions, including marketing, promotion and extra-curricular activities. Competition was also associated with 'accountability-focussed' actions, including placing more emphasis on core curriculum subjects, student attainment in exams and Ofsted grades. Competition did not however predict 'internally-focused' actions, relating directly to the quality of teaching and learning. This points to free school competition spurring schools to deploy more resources to improve their appeal or performance in external metrics, in a race to recruit from a fixed pool of students, but without a focus on improving classroom practices.

- case study schools with surplus places also reported cutting staffing and curriculum. This was clearest in primary schools, with free schools often seen to exacerbate the current demographic decline in primary school pupil numbers. One head argued that the free school: "had an impact on numbers … we had less money coming in. It had a significant impact on the curriculum we were able to offer". Schools serving areas of deprivation also reported increases in 'hard to place pupils' needing "huge amounts of resources". This led

to viability issues. Several heads predicted their "solidly good school" would be shut. Pupils would be dispersed further afield and a deprived local community would lose the school as a community resource while the free school orientated to more middle-class communities.

On **student attainment**, we analysed English and Maths in neighbouring schools. We found:
- no improvement or deterioration on average in student attainment in primary schools.
- a modest increase in student attainment on average in secondary neighbours. In a hypothetical school market of 100 schools, a school with a nearby free school would move up between one or two positions in the league table each year over a four year period.

Investigating potential mechanisms underpinning the modest improvement in secondary schools, we analysed proxies of competition including distance to a free school, free schools' student attainment and Ofsted grades and the extent of pupil loss at neighbouring schools. None were associated with improvement. We also analysed whether estimated improvement related to a neighbouring secondary school's ability to recruit students better positioned to perform well. We found:

- improvement among secondary neighbouring schools experiencing, after a free school opened, a large increase in the percentage of students who had high prior attainment and were not eligible for FSMs or were not White British. These schools already served on average more advantaged intakes prior to a free school opening.
- little evidence of improvement among neighbours experiencing, after a free school opened, a large increase in students who had low prior attainment and were either eligible for FSMs or were White British. These secondary schools, on average, already served more disadvantaged intakes prior to a free school opening.

On **social segregation**, we measured relative isolation, examining whether free schools were associated with changes in the likelihood of students meeting peers from the same background as themselves at school. We found:

- primary free schools were associated on average with a modest increase in segregation. The trend in England was toward decreasing segregation, but areas in which primary free schools opened saw an opposite trend with increases in segregation for students speaking English as an Additional Language, Black, Asian and Ethnic Minority students (BAE) and White British students (WBri). We found a small decrease in segregation for SEN students.
- in the secondary phase, increases in segregation were not statistically significant on average. There was however a similar pattern of increased segregation for WBri students in low diversity, rural areas, which was statistically significant.

Conclusions. We make the following conclusions:
- First, while free schools are a diverse population, they have had observable impacts on their neighbours. Neighbours on average lost students, commonly perceived competition and, where they did, responded to a free school's presence. This provides some support to policy claims that free schools force existing schools to take new action, but we also found clear disruptions to such claims. Neighbours rarely saw free school competition to concern attainment or innovation, rather relating it to student numbers, funding and selective competition over students' socio-economic status. This influenced school actions. Free

school competition spurred neighbours to deploy more resources to improve their appeal and external quality metrics, but typically without a related focus on classroom practices. Exploring why, we argue this raises important questions about the nature of any measured improvement, where this is not based on changing the quality of teaching and learning.

- Second, free schools were not associated with improvement in student attainment in primary school neighbours on average, but there was modest improvement in secondary school neighbours. Our findings suggest social selection was a mediator of free school competition translating into improvement in secondaries. Schools gaining a substantively more disadvantaged intake after a free school opened did not improve. Schools gaining a more advantaged intake did. We relate this to the benefits of having more students better positioned to perform well.

- Third, we identified conditions perceived to destabilise specific schools. These included serving a deprived context, loosing students due to a free school and being downgraded to below 'Good' by Ofsted just before or after a free school opened. This had the potential to start a cycle of decline, by negatively influencing parental choice, further concentrating disadvantaged students and creating the need for cuts to staffing and the curriculum.

- Fourth, segregation increased where primary free schools opened, particularly relating to students' ethnicity. We attribute this to selective competition and to different ways in which specific free schools have created new options for parents from particular social groups to choose schools that are more homogenous than the local area. This has included *both* "self-segregation" by minority ethnic parents and perceived "white flight".

Recommendations: We recommend that the DfE should reassess the paradigmatic assumptions it sets out on how choice and competition work in quasi-markets. This should recognise schools have rarely prioritised change or innovation in classroom practices when subjected to new market pressures. The DfE should also recognise the potential of selective competition and the detrimental social outcomes this can create. We recommend this informs changes in:

- how DfE meets its legal duty to assess the potential impacts of free schools, by including criteria on social segregation locally and by giving greater priority to whether a free school risks destabilising good schools serving disadvantaged communities.
- how free schools are instructed to meet their duties on inclusion and community cohesion, and how these are monitored, including to ensure all 'pre-cropping' practices, in which students are encouraged not to apply to or take up a place at a school, are prohibited.
- how lessons are learnt. We recommend the DfE reviews phase differences and why on average primary free schools have been associated with a range of undesirable outcomes. We recommend the primary free school programme is paused until a review is published.
- how new schools are opened. The free school approval process enabled civil society groups to contract with central Government. It involved centralisation of decisions and reliance on forecast data that regularly over-estimated place need. We recommend a new approach is needed to better enable Local Authorities to meet their statutory duty to ensure sufficient places and to strategically manage places, particularly as the pupil population declines in the years ahead (ONS 2023).

Section 1: The free school policy

We begin this report by introducing the free school policy in England, including in relation to the original policy aims and their evolution over time. We consider the key policy claims on how free schools are expected to influence choice, competition and school improvement.

The aims of free school policy

The free school policy in England was introduced in 2010 by the Conservative-led Coalition Government. Building on prior narratives about the potential benefits of 'school autonomy' and freeing schools from local government "bureaucratic control" (Conservative Party 2001:5), free schools were intended to increase choice and competition by enabling non-state providers to open new independent state schools.

Free schools also became a flagship policy for the 'Big Society' agenda, which argued the state had become too big and was crowding out private interests and responsibilities (Wei 2010). Before becoming Prime Minister in 2010, David Cameron (2009: 9) argued the state should shrink, but also fund local groups, social enterprises and charities "from existing state budgets to deliver public services". The Conservative Party's (2010: 53) manifesto stated: "we will break down barriers to entry so that any good education provider" can open a new school. It argued this would "create a new generation of good small schools with smaller class sizes and high standards of discipline" that would be "beacons of excellence".

The Government's first piece of legislation was the Academies Act 2010. It enabled local groups and existing providers to apply into a central application process for the right and funding to set up a new school, with the Government acting as the sole authoriser of free schools. A prior constraint that new schools could only be set up where there was forecast need for new places was relaxed, so free schools could potentially locate where there were surplus places.[1] The main initial restrictions were that free school providers could not make a profit, preach hatred or teach creationism as science (DfE 2012a).

Reviewing the free school policy, the National Audit Office (2013: 5) described how the Department of Education's (DfE) "primary aim is to open high quality schools and it expects the [free schools] Programme to raise standards across the school system through:

- increasing local choice for parents;
- injecting competition between local schools;
- tackling educational inequality;
- and encouraging innovation."

[1] Prior to 2010, new schools were typically opened with involvement by Local Authorities (LAs). Parent-promoted schools were allowed but, with a range of constraints to their creation including existence of surplus school places, few were established. From 2010, the LA role was substantially reduced, with a 'presumption' that any new school was to be a free school or academy (except where a provider could not be identified). From 2015, a LA 'presumption' process was incorporated into the free school programme, so LAs could propose free schools to respond to forecast need but 'presumption free schools' had to be contracted out to independent providers. There was a wider 'roll-back' of LAs from 2010, including with: policies enabling and coercing an increasing number of schools to become academies independent of LAs; substantial reductions of central government funding for LAs; and wider centralisation over the funding of and intervention into schools. There were related concerns about a loss of local democratic oversight of schooling (LGA 2017; Gunter 2018).

Setting out its case, the DfE (2010: 57) argued: "It has been virtually impossible in this country to establish a new state-funded school without local authority support, despite convincing international evidence of the galvanising effect on the whole school system of allowing new entrants in areas where parents are dissatisfied with what is available". The then Secretary of State for Education Michael Gove (2011: 5) argued free schools would change how parental choice could be expressed:

> satisfying local demand is about more than the macro-level argument of basic need. On a human level, it's about meeting parents' desire for a good local school … . And even where there are places at local schools, they're not necessarily the type of school places parents are happy with. A choice between two things you don't want is hardly a choice at all. Free Schools offer a genuine alternative.

The DfE (2010: 59) described its approach to opening free schools as being "demand-led" so their distribution would "depend on individuals and organisations coming forward to play a role in improving provision in their community". This, the DfE argued, would tackle educational inequalities as: "We know from other countries – and from some of the early Free School proposers – that a significant proportion of the proposals will be motivated by the desire to make a difference in disadvantaged areas. We will prioritise such proposals".

Innovation would also occur, the DfE argued, by enabling people and organisations "who have the vision, drive and skills to set up a new school" to bring new ideas into the school system (ibid: 59). Free schools, like academies, were given certain 'freedoms' traditional state schools do not have. They can disapply the National Curriculum, do not have to adhere to national teachers' pay and conditions and can set the length of their school day. Partly borrowed from the Swedish free schools (Friskolar) policy, the Government in England associated the term 'free' with an argument that free schools "aren't run by the local council. They have more control over how they do things" (DfE, 2017: 1).

Choice, competition and improvement

The Government's argument that new free schools would raise standards across the school system, as they "force existing schools to up their game" (DfE 2015:1), can be seen to rest on a set of assumptions about how choice and competition operate in state schooling. As Betts (2009) identified in the case of Charter Schools in America – from which the free school policy was also partly and selectively borrowed – key policy assumptions are that:

- free schools will compete well in terms of academic quality;
- parents will express a strong preference for new free schools, because they will be high quality schools and/or offer distinctive provision;
- existing schools will perceive new competitive threats, particularly where they lose students or status to a free school, and will respond by improving academic quality.

There are numerous ways, however, in which this assumed "chain of causation" (Betts 2009: 197) can be disrupted or break down, potentially creating unintended consequences. Free schools may not, for instance, offer better quality environments. Parents may not prioritise or be able to identify academic quality or innovative provision. Their choices may be influenced by other factors, such as peer groups. Existing schools may not perceive new competition or, where they do, may not (be able to) respond in ways that improve quality. Little change or even deterioration in student outcomes could result.

There are also concerns free schools may increase inequalities. This could occur where neighbouring schools lose pupils due to a free school's presence and have to reduce their curriculum or make staff redundant (Hatcher 2011). The National Education Union (2019: 1) argued free schools "harm neighbouring schools in areas where there is no shortage of places". The National Audit Office (2017: 27) also expressed concern for the sustainability of neighbouring schools judged to provide a good quality education but with surplus places.

For the Government, however, the potential of negative effects on neighbouring schools may not be contrary to its aims of creating new competition. There is a legal duty on the Government to assess the possible impact of each free school prior to its opening. In these assessments the DfE has regularly argued that, where threats to a school's viability were identified, these could be tolerated if the risks were outweighed by potentially increased choice and pressures for improvement. The impact assessment of Saxmundham free school, for example, which opened in September 2012, identified a potentially 'high impact' on a neighbouring school, but the DfE argued this "should serve to drive up standards":

> "an estimated increase in the surplus of places in the area over the next few years will be compounded by the establishment of the Free School and will force the two schools to compete fiercely for pupils which could act as a driver to improve standards. If [the neighbouring school] does not innovate to improve their attractiveness to pupils, their long-term viability could be called into question. … While two schools competing for pupils in the area could lead to a reduction in the breadth of subjects offered, it should serve to drive up standards" (DfE 2012b: 1,9).

The House of Commons Education Committee (2015: 58) argued in January 2015 that the DfE should monitor existing schools and publish information on "what has happened after the [free] school has been established". In March 2015, the Prime Minister (2015: 2) argued there was evidence attainment was already improving for local students *not* attending free schools: "As Policy Exchange said this week, free schools don't just raise the performance of their own pupils – they raise standards in surrounding schools in the area too".

The referenced report by the Policy Exchange think-tank analysed student attainment at the three closest neighbours of the same phase to the 171 mainstream free schools opened in 2011-2014. The report argued: "Free Schools do not drag down results of neighbouring schools by causing oversupply or spreading resources too thinly. In aggregate, schools closest to Free Schools perform in line with national results at primary and better than either their Local Authority or national average at secondary. … Free Schools do not only benefit the middle class. High poverty schools close to Free Schools perform better than more affluent schools close to Free Schools" (Porter and Simons 2015: 6).

The report was criticised however for making an "implausible claim" using inappropriate methods (Green 2015: 1). It compared simple school averages with national attainment without controlling for student or school-level characteristics. It did not consider issues of 'reversion to the mean' or if any trends started prior to a free school (Allen 2015). It was also probably too early at the time to analyse free school effects (Morris 2015; NAO 2017).

Efficient and Selective Competition

There remains a lack of robust evidence with which to assess the potential impacts of free schools on neighbouring schools and students. As reflected in Betts' 'chain of causation',

there is a tendency for policy makers to believe free schools create efficient competition. This assumes free schools will incentivise neighbours to deploy resources more efficiently to compete over school quality. With stronger competition it is assumed: “the most efficient schools will gain pupils and resources, the others will decline” (Glennerster 1991: 1270).

An alternative perspective is free schools could incentivise selective competitive rather than or as well as efficient competition. Instead of (only) competing over quality and student numbers, schools may compete over student’s socio-economic status, particularly those perceived to be better positioned to perform well. From this perspective, assumptions of efficient competition can be critiqued for assuming schools treat students as homogenous inputs. This overlooks differences in prior attainment and family background that predict attainment gaps (Morris et al. 2016). Student composition also influences the relative status of a school, given it is not only quality metrics but socio-economic status, ethnicity and a school’s presented ethos that influence choice and competition (Higham 2023). As schools typically know this, faced with competition they may try to manipulate the composition of their enrolment, if allowed to do so, to retain or improve status (Jabbar 2016).

The differences between efficient and selection competition were exemplified in debates about the 1988 Education Reform Act (ERA). The ERA introduced much of the infrastructure of the state school market, including open enrolment and per capita funding (Le Grand 1991). Published inspection reports and standardised exams were also intended to enable parents to make informed judgements. The ERA market was and remains however a ‘quasi-market’. It does not have real price mechanisms, direct profit making or easy entry for new providers. In this context, Glennerster (1991: 1275) argued: “Selection bias is more likely as an outcome of competition between schools than competition on efficiency grounds. … Any entrepreneur acting rationally would seek to exclude pupils who would drag down the overall performance score of the school, its major selling point to parents” (p. 1271).

Student composition can also be a direct ‘selling point’. In addition to test results, choice can be informed by potential peers and socialisation (Gewirtz et al 1995). This includes middle class aims to “escape from class ‘others’” (Ball 2013: 16), as well as wider class and ethnic solidarities (Burgess et al 2015). Choice partly reflects residential segregation, but schools in England are more segregated than residential areas (Allen 2007). The processes leading to these compositional differences between local schools have been termed ‘social selection’, which can result from factors including “admissions policies and processes, parental decision-making and degrees of parental agency as well as geography, the social and cultural composition of communities and decisions by local authorities” (Latham 2024: 2). Policies that increase the diversity of school types can also increase social segregation, particularly when allowing schools to set their admission policies (Gorard et al. 2013).

There are theoretical reasons then to retain a healthy scepticism towards assumptions that free schools will (simply) incentivise efficient competition. Free schools represent a supply reform, making it easier for new providers to enter the school system. Free schools have opened at a time when student progress measures (rather than only raw attainment data) provide families new insights into quality. These changes might support more efficient competition, but there are a variety of ways in which free schools and their neighbours could act to increase selective competition. This includes ‘cream-skimming’ and the

potential of free schools to accentuate patterns where higher status schools "cream off the most able students, leaving 'sink' schools" in their periphery (Le Grand 1991: 1266).

In this report, we therefore draw on Betts' 'chain of causation' to summarise the core policy assumptions about how free schools might affect student outcomes in neighbouring schools and we test these empirically. We design our analyses so that we can also identify potential processes of selective competition. We capture other forms of interactions between free schools and their neighbours, including the potential for collaboration or no interaction.

Policy evolution

The Government continues to stress free schools provide choice, competition, innovation and improvement (DfE 2023a), but the policy and its enactment has evolved over time. The profile of providers accepted to open free schools has changed. Reflecting the Big Society agenda, free schools have been set up by parents, faith groups, charities, teachers and educational institutions (Higham 2014). Since about 2016, however, the growth in free schools has been driven by Multi-Academy Trust (MATs) (Higham 2017; Garry et al 2019). MATs govern chains of schools and are typically created and governed by sponsors and trustees (from the private and third sectors) and by higher status academy schools.

The policy also has evolved by placing more emphasis on how free schools have "a role in meeting local need for new school places" (NAO 2017: 9). For free schools opening up to 2014/15, proposers had to provide "evidence of demand" (DfE 2011: 21). For those applying from September 2015, the DfE included "evidence of need" for places. The 2016 application form required "valid evidence that there is a need for this school in the area". From 2018, the application required "evidence of need for good school places". Over time, the DfE has sought influence over free school locations rather than relying on a 'demand-led' approach.[2]

There are several potential reasons for these evolutions. There was concern about the cost of building free schools in areas of surplus places during a period of 'austerity' (Andrews and Lawrence 2018). There were increased forecasts of a need for new places during the 2010s, which the DfE argued free schools increasingly responded to. A changing profile of providers may reflect challenges in proposing a new school, DfE's growing preference for experienced providers and a wider growth in MATs. Policy evolution also occurred after the original political architects (were) moved away from education policy or resigned from politics.

Whilst these evolutions have led to criticisms of policy aims being diluted (Braverman 2019), local experience remains an empirical question. For free schools opened before 2021, policy evolution was gradual. While the DfE (2017b) reported c85% of free schools due to open between 2015-2021 were predicted to locate in areas of basic need for places, the NAO (2017: 9) noted how "57,500 of 113,500 new places in mainstream free schools opening between 2015 and 2021 will create spare capacity in some free schools' immediate area". In Section 3 of this report, we develop a detailed analysis of the locations of free schools. In the next Section, we set out our research aims, questions and analytical approach.

[2] Forecast need and quality were targeted in guidance for free school opening from 2020/21. Proposals were encouraged in specific districts "identified by the department as having the lowest standards" (DfE 2018: 21). In the 2022 guidance free schools were prioritised in 55 'education investment areas' of low attainment and economic disadvantage. Proposers had to demonstrate need for at least half the places they would create.

Section 2. The research aims and approach

In this section we set out our research aims, the research questions informing our study and our analytical approach. In the context of the free school policy, and the wider conceptual and empirical debates that we have overviewed above, the aims of our research were to:

- Test for the presence of potential free school effects on student outcomes in neighbouring schools.
- Identify the mechanisms through which potential free school effects are manifested, by analysing whether free schools compete well in terms of quality, whether parental preferences for local schools change with a free school opening and whether existing schools respond by changing their practices.

Informed by these aims, the project's research questions were as follows:

1. Where are free schools opened? Are the locations of free schools associated with any patterns of deprivation, population density, forecast need for new school places and/or the prior performance of neighbouring schools?

2. Do free schools compete well in terms of academic quality?

3. Do free schools influence local patterns of choice in ways that lead to changing preferences for, or a loss of students at, neighbouring schools?

4. Do neighbouring school leaders perceive the opening of a free school leads to new competitive pressures and to what extent do they respond to a free school's presence by taking any action?

5. How are choice and competition manifested in local markets in which a free school opens? To what extent do local structural conditions, a free school's aims and the local status of neighbouring schools influence perceived competition and action-taking?

6. Is the opening of a free school associated with any improvement or deterioration in student outcomes in neighbouring schools?

7. Is the opening of a free school associated with any increase or decrease in social segregation in the surrounding area?

In the following sections of this report, we progress analysis designed to answer each of these questions in turn.

Our Analytical Approach

Our research had a mixed methods design. The combination of quantitative and qualitative analysis provided an appropriate approach to answering our research questions. The primary focus was quantitative analysis, using data from the National Pupil Database and linked datasets. We also developed a survey of neighbouring schools and case studies of neighbourhoods in which a free school opened, interviewing the free school and

neighbouring schools' headteachers. In each section of this report, we set out the analytical approaches we developed. There are, however, several project wide approaches to summarise here.

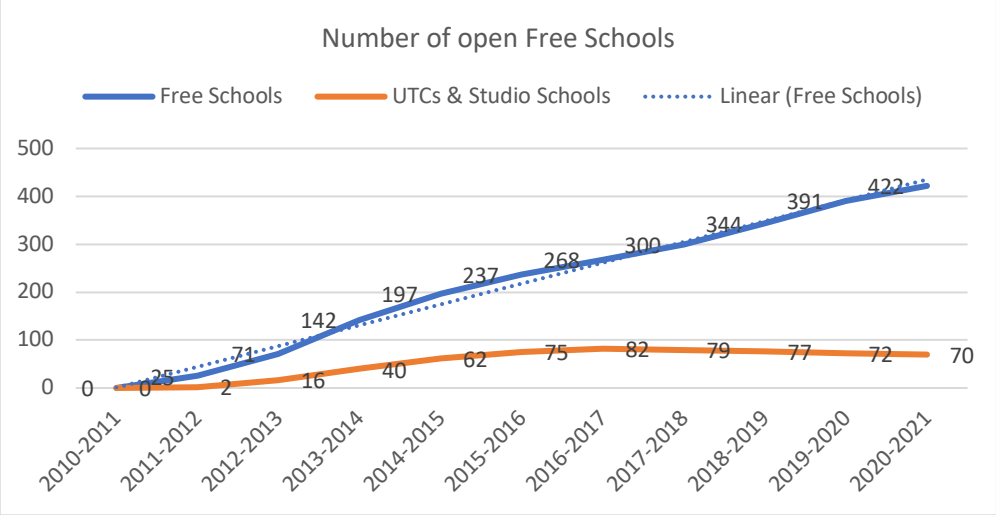
Free schools

For most of our analyses, the free schools included in this study were restricted to all mainstream free schools opened between 2011 and 2020. This end date of our main analytical period reflects the influence of the Covid-19 pandemic, including that student attainment data was not published for all schools between 2020 and 2022. (We originally planned to include all years up to 2022.) Our survey of neighbouring school leaders updated the free school population to those operating in 2022 (Section 6). Our sample of case study neighbourhoods was also developed from this population operating in 2022 (Section 7).

We excluded from our analyses free schools that were Special, Alternative Provision, UTCs or Studio Schools. These categories of free schools are intended to provide distinct provision in the system and hence may well develop distinctly different interactions with existing schools when compared to mainstream free schools.

By 2020, there were more than 430 mainstream free schools in operation (241 primaries, 192 secondary schools). The number of open free schools has grown by about 43 schools each year, on average, since the first free schools were opened in September 2011. (By contrast, growth of University Technical Colleges (UTCs) and Studio Schools tapered off within a few years of the programme's launch. Their numbers peaked in 2016-2017 and have declined since, including due to closures.) These trends are set out in Figure 2.1. We develop further analyses of the free school population in Section 3.

Figure 2.1: Operational mainstream Free Schools, UTCs and Studio Schools.



Source: Edubase version 20211007

Developing a consistent database of state-funded mainstream schools

As our study was interested in the potential effects of free schools on existing schools, it was essential to follow-up developments within schools over time. Our approach was as follows. First, following standard practice, state schools were defined as: Academies

(converter or sponsor-led), Community schools, Foundation schools, Voluntary aided and Voluntary controlled schools and City technology colleges. We did not include any provision before Reception year. Nor did we consider potential effects on existing free schools.

Second, most schools served either primary or secondary school years. If a school was active across phases (i.e., all-through), we treated each phase as a distinct school. This reflected the fact that a nearby free school was most likely to be a single-phase school. It also assumed that the phases of an all-through neighbouring school were sufficiently operationally distinct to potentially respond to a free school's presence. Alternatives such as designating all-through schools as secondary schools appeared more restrictive.

Third, there was considerable churn driven predominantly by locally maintained schools converting to academies. Legally 'new' schools, academies often retain many attributes of their direct predecessor (which is formally closed). In large part due to this, between 2010 and 2019, about 7.6 per cent of all state-funded mainstream schools in England closed in any academic year and 12 per cent of schools were new. We therefore derived a consistent school panel dataset between the years 2006 to 2021, using criteria set out in Appendix 2.1.

Table 2.1 reports a breakdown of school types and education phases between 2010-2011 and 2020-2021. As expected, there has been a clear shift away from maintained to academy schools. The total number of open state-funded mainstream schools changed little over the same period: at the primary level, the number of open state-funded schools in our database fell slightly from 16,869 in July 2011 to 16,790 in July 2021; open state-funded mainstream secondary schools edged up from 3,312 to 3,397.[3]

Table 2.1: Summary statistics for the academic years 2010-2011 and 2020-2021

Variable	2010-2011 (%)	2020-2021 (%)
School type		
Academy converter	2.62	30.24
Academy sponsor led	1.36	11.89
Community school	53.76	30.09
Foundation school	8.65	3.54
Free schools		2.09
Studio schools		0.11
University technical college		0.24
Voluntary aided school	20.98	13.51
Voluntary controlled school	12.62	8.29
Education Phase		
All-through	0.37	0.78
Middle deemed primary	0.06	0.03
Middle deemed secondary	1.08	0.48
Primary	83.56	83.16
Secondary	14.93	15.55

Source: Edubase. version 20211007

[3] Compared with Schools, pupils and their characteristics, Academic Year 2020/21 – Explore education statistics – GOV.UK (explore-education-statistics.service.gov.uk), the count of primary schools is almost exact (-1 due to closure), but 61 secondary schools were missing for 2020-21. About half of the shortfall is due to the inclusion of 30 further education providers and two institutions dedicated to Service children's education in the official count. Overseas institutions and a school on the Isle of Scilly make up the rest.

Defining neighbouring schools

Our neighbouring school population resulted from how we define 'neighbouring school'. Our preliminary definition, following precedents in the literature, was the nine nearest schools to a free school (Green et al 2015; Allen and Higham 2018). We tested and then refined this definition. Our final definition was subtly different. This identified a 'neighbouring school' when they experienced the opening of a free school of the same phase in their own 'neighbourhood area'. This improved on the preliminary definition because the incumbent school was at the centre of its neighbourhood and the area stayed constant over time. Once a free school entered a school's neighbourhood, the school became a free school 'neighbour' and we considered it to be 'treated'.[4]

A school's neighbourhood area was defined by the travel distance to its ninth-nearest neighbour at baseline. The baseline was 2010 or the academic year in which we first observed the school in our school history file (whichever came first). Travel distance from each school to its ninth-nearest neighbour was calculated in Stata using OpenStreetMap of England with the OpenStreetMap Routing Machine (Huber and Rust, 2016). Travel distance is preferable to distance as the crow flies as it takes infrastructure, geography and the built environment into consideration. Table 2.2 sets out the median travel distance to the ninth-nearest neighbour at baseline in our resulting neighbouring school sample.

Table 2.2: Median travel distance to the ninth-nearest neighbour at baseline (in km).

	Primary	Secondary
Conurbation	2.7	5.7
City and Town	4.0	11.7
Rural	9.0	19.1

We note that, as with any statistical definition, the derived neighbourhood boundaries were necessarily arbitrary. To test criterion validity, we analysed our survey data to examine if perceived competition with a free school was lower when free schools located beyond the defined school neighbourhood boundaries. As set out in Appendix 2.2, this analysis provided evidence for the validity of the proposed operationalisation of school neighbourhoods.

We also interrogated how our 'neighbouring school' definition may influence our findings. As reported in Section 5, we tested whether distance from a free school influenced patterns of competition (loss of students) and choice (preferences). In Section 8, when analysing student attainment, we developed a series of robustness checks. These gradually reduced the size of 'neighbourhoods areas' to test the consequences of only including schools with closer free schools (stratified by population density). Our smallest model equated to including neighbouring schools where the free school was approximately one of the 2-3 closest schools to a neighbouring school on average. These robustness checks showed no substantive differences to our main analysis model.

[4] Once treatment by a free school started, the potential addition of any further free schools in the neighbourhood did not change treatment status in our analysis. As more free schools open, the likelihood of there being more than one free school opening in any school's neighbourhood may well increase. Future research could usefully test whether this changes the intensity of any of the treatment effects we report.

Non-randomness of free school locations

There are potential endogeneity issues in analysing free school effects on student outcomes in neighbouring schools, not least as the distribution of free schools is non-random. If free schools opened on average in locations with recent declines in student outcomes, our analysis could over-estimate improvement if existing schools reverted to their prior means.

As we set out in Sections 5 and 8, our approach to analysing potential effects on student outcomes is based on matched difference-in-differences and fixed effect panel estimators. This approach mitigates the non-random location of free schools if decisions to open a free school depend on time-invariant characteristics of existing schools and the neighbourhood. It does not necessarily eliminate bias if free school locations are based on time-varying factors, such as a decline in neighbouring schools' performance. If a decline in performance triggers the entry of a free school, but neighbouring schools would have reacted to improve in any case (either through their own or externally imposed efforts), the difference-in-differences empirical strategy would overestimate free school competitive effects.

It is important to note, however, that our matched approach, where we match neighbouring school students to comparable students in similar schools and neighbourhoods, helps to mitigate time-varying factors to some extent. That is, if our matching approaches are effective, we would anticipate similar school improvement dynamics in our sample of comparator schools. Moreover, our analyses of where free schools locate, in Section 3, does not indicate that changes in student performance at neighbouring school predicted free school entry in the local area.

We also carefully examined if the parallel trend assumption held for our preferred matched difference-in-differences strategy. If this assumption does not hold it is more likely that developments that started before a free school entered the local education market explain diverging trends post free school entry. However, where the assumption does holds, it is more likely that any observed changes after the opening of a free schools are due to free school entry. We report on statistical analyses where the parallel trend assumption holds.

We also set out for our quantitative analyses how we worked to account for unobserved factors, including information on our models in appendices 3.1, 5.2. 6.1. and 9.1. We recognise that, as with any statistical analysis, there will be unobserved factors that our matching and analytical models do not (or only partially) account for. These are limitations to our analysis and might include, for example, factors such as parental engagement and interest in children's learning, family and school expectations for attainment and granular differences between schools in terms of their type and educational aims.

We also do not trace students into or out of the private independent school sector in England, primarily due to children in private schools not being included in the NPD. Where free schools have influenced changes in student enrolment in private independent schools we do not capture or account for these in our analyses. Our findings are also limited to the time-period we analysed. We have noted the free school programme has continued to evolve over time. It will be for future research to consider whether the main trends we report here persist as existing free schools mature and new annual waves are opened.

Section 3: The location of free schools

In this section we develop an analysis of where free schools have opened. We begin with this analysis for several reasons. First, the location of free schools has consequences for who may be impacted by these new schools, both directly and indirectly. Systematic variations in the likelihood of free schools opening across different regions or socio-demographic groups may limit the scope of the policy or indicate inequalities in state investment.

Second, analysing free school locations enables us to test whether policy has delivered on several of its multiple aims. The DfE claimed free schools would respond to 'demand' and 'need'. These aims evolved over time. In the initial years (2010-2014), policy stressed a 'demand-led' approach, arguing this would enable civil society groups to open new schools, including where unsatisfied with choice or quality. This was expected to respond to material disadvantage as providers would be motivated to "make a difference in disadvantaged areas" (DfE 2010: 59). From 2015/16, while continuing a demand-led approach, policy put stronger emphasis on opening free schools in response to forecast need for new places.

Third, analysing free school locations is important due to their non-random distribution. This results from the 'demand-led' approach. As noted in Section 2, our later analyses seek to control for differences in free school locations by using matched-sampling and difference-in-differences analysis. Our analysis here also helps us to understand whether free school locations are influenced by the past performance of existing schools (Ni and Arsen 2010).

In this section, we describe the growth and distribution of free schools before analysing the extent to which the opening of free schools has related to academic quality, deprivation, forecast need for places, school occupancy and ethnic diversity. We focus on characteristics of neighbouring schools that are associated with the entry of a free school in the locale. We assess the relationship of these different facets of 'demand' and 'need' to free school entry.

Our analytical approach

A free school's location is the outcome of decisions by those proposing it and the DfE who accept or reject applications. Location is also influenced by available sites. Accepted applications are listed on a DfE website but there are no public data tracking decisions about free school locations. Our analysis uses revealed outcomes of the process by observing where and when incumbent schools became a free school neighbour. We assume that, with the start of the free school programme, all mainstream state schools in England became 'at risk' of transition from being a 'non-neighbour' to being a free school 'neighbouring school'.

To test predictors of free school opening, we formulate a discrete-time proportional hazard model. We are interested in the chance, or hazard, of schools becoming a 'neighbour' in an academic year (t) given they were a `non-neighbour' the previous year (t-1). In Appendix 3.1 we set out this model, showing its appropriateness given the incremental rollout of free schools and the discrete, annual rhythm of the academic year (Allison 1982; Baker 2019).

The dataset comprises schools that were open (or whose predecessors were open) in the academic year 2010/2011, the year before the first free schools opened. We then focus on the transition of schools to becoming free school neighbours over the years 2011/2012 to

2019/2020. The dataset is restricted to schools with a complete history of observations until becoming a 'neighbour' or reaching the end of the period. The dependent variable was free school entry into a neighbourhood. The explanatory variables were as follows:

Need for places was measured using forecast need for places five years ahead in a school's education planning area. Using data from the School Capacity Survey, this reflected DfE's approach to assessing need for free schools (DfE 2017b). Our measure was expressed as the difference between forecast need and existing capacity. The model included forecast needs at baseline and lagged two periods.

Occupancy rate was defined for each academic year as the ratio of the total number of pupils on roll taken from the spring school census divided by school capacity.

School academic quality was calculated as the first principal component over attainment in English (at KS2: Reading) and Maths, value-added estimates in English and Maths and inequality in English and Maths attainment[5]. We first collapsed student-level information into school averages by school year before transforming the average values into percentile ranks. The ranked attainment variables were highly correlated across schools and form a single factor. Inequalities in attainment enter the index negatively. The first principal component explained about 68% of the variation in the underlying variables. The resulting index of academic quality was strongly correlated with schools' overall Ofsted grade.

School-level material deprivation was measured through an index comprising the median over students' local IDACI score, the proportion eligible for free school meals and typical house prices. Average annual house price for each lower super output area in England were taken from UK House Price Index (HPI) for the years 2010-2020 (HM Land Registry, 2022). This measure captures the typical house value in a given area in a specific year. School values on the three variables were transformed into percentile ranks by year. The three variables correlated moderately in the expected direction with the derived index of school academic quality. A single index of school-level material deprivation was derived as the first component over the three variables. This explained a substantial fraction of the variation in the underlying variables: 75% at primary and 71% at the secondary phase of education.[6]

School ethnic diversity: School ethnic diversity was collected for each school from the annual spring school census and was measured at school-level using Simpson's index of diversity:

$$D_{it} = 1 - \frac{\sum_g n_{igt}\left(n_{igt} - 1\right)}{N_{it}(N_{it} - 1)}$$

where n_{igt} is the number of students in school i at time t who are of ethnic group g. This followed school census grouping and distinguished between: Bangladeshi, Indian, Pakistani, African, Caribbean, Chinese, mixed, white British/ Irish, white other. N_{it} represents the total number of students over these groups in school i in t. D_{it} gives the probability that two randomly chosen students from a school identify with different ethnic groups. The index

[5] Inequality in attainment was measured as the ratio of attainment at the 80th percentile (top 20%) over attainment at the 20th percentile (bottom 20%).

[6] In 2020, schools in Wokingham, Windsor and Maidenhead and Richmond upon Thames were the least deprived, while schools in Knowsley, Nottingham and Blackpool were the most deprived on average.

ranges from 0 to 1. A higher value indicates a more ethnically diverse school. The index has been deployed elsewhere to measure ethnic diversity in schools (Juvonen et al., 2018; Munniksma et al., 2022).

Covariates: To account for structural differences in education markets across England, all models included levels of agglomeration (from major conurbations to rural hamlets) and a set of regional dummies as control variables. In combination they measured differences in population density, infrastructure, teacher recruitment or costs more generally.

Findings

We report first on the growth and distribution of free schools by phase, region, population density and ethnic group. We then consider the predictors of free school entry.

Free schools

By 2020, there were more than 430 mainstream free schools in operation (241 primaries and 192 secondaries). From 2011, free school student numbers rose with the expansion of provision so by 2020 there were about 179,000 free school pupils (74,000 at primary and 105,000 at secondary). This equated to about 1.5% of students nationally in the primary and 3% in the secondary phase. Only a small proportion of students had directly accessed free schools by 2020. However there has been continuous increase in the free school enrolment rate since 2011. As free schools tend to grow year-by-year from opening, admitting students into a main entry year-group, free school enrolments can be expected to grow further even without additional schools opening. Free school capacity stood at nearly 230,000 in 2019.

The growth in free school provision was not equally distributed across England over this period. There was a concentration of free school students in and around London both at primary and secondary level. As Figure 3.1 sets out, these geographic differences were more than a reflection of variations in school-age population. In 2020, in primary schools, free school enrolment varied from 0.9% in the North East to more than 3% in London. In secondaries, enrolment rates varied from 1.1% in the South West to just over 6% in London.

Figure 3.1: Free School pupil numbers and enrolment rate by regions in England, 2020

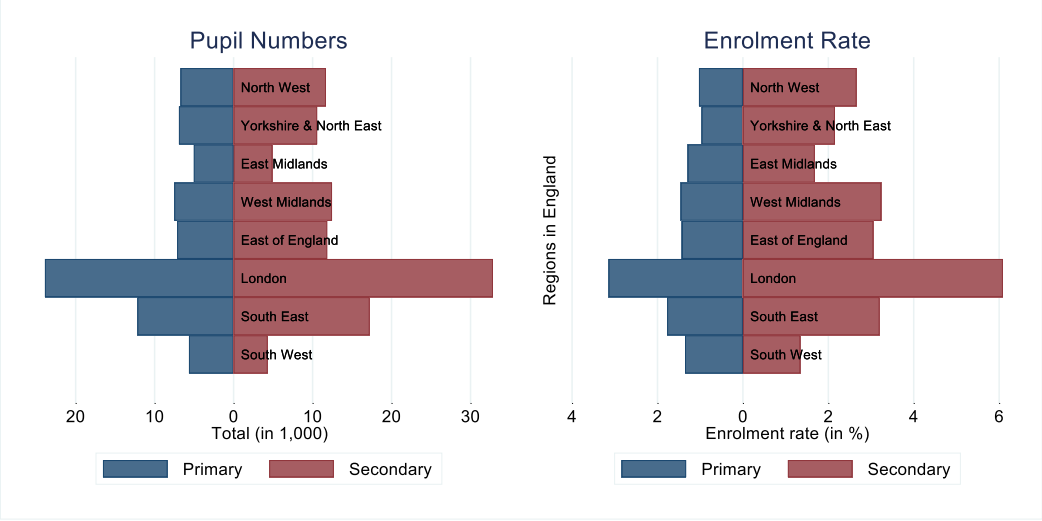
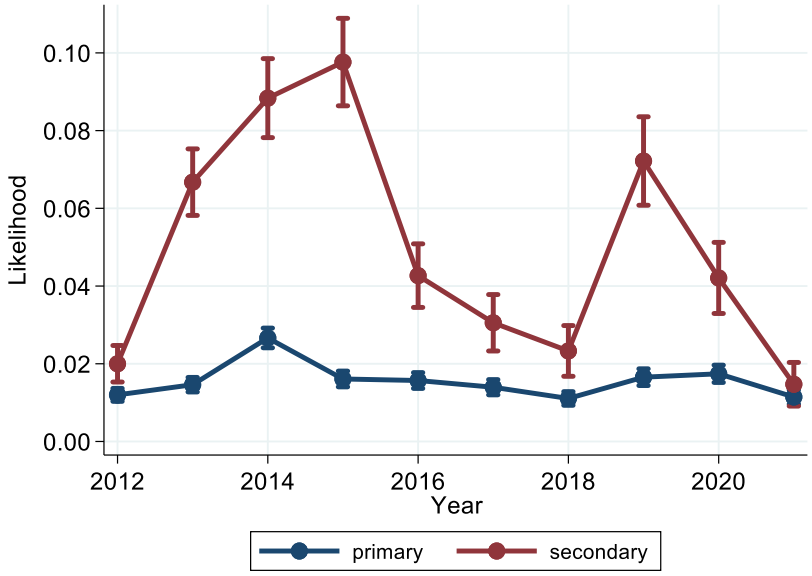


Figure 3.2 displays the baseline hazard function for incumbent schools as the probability of becoming a free school neighbour (among schools not already neighbours). At secondary level, there were two notable periods of free school expansion. An early phase up until the school year 2014/2015 and a second phase that peaked in 2018/2019. At the primary level, the diffusion of the programme took place at a steadier pace.

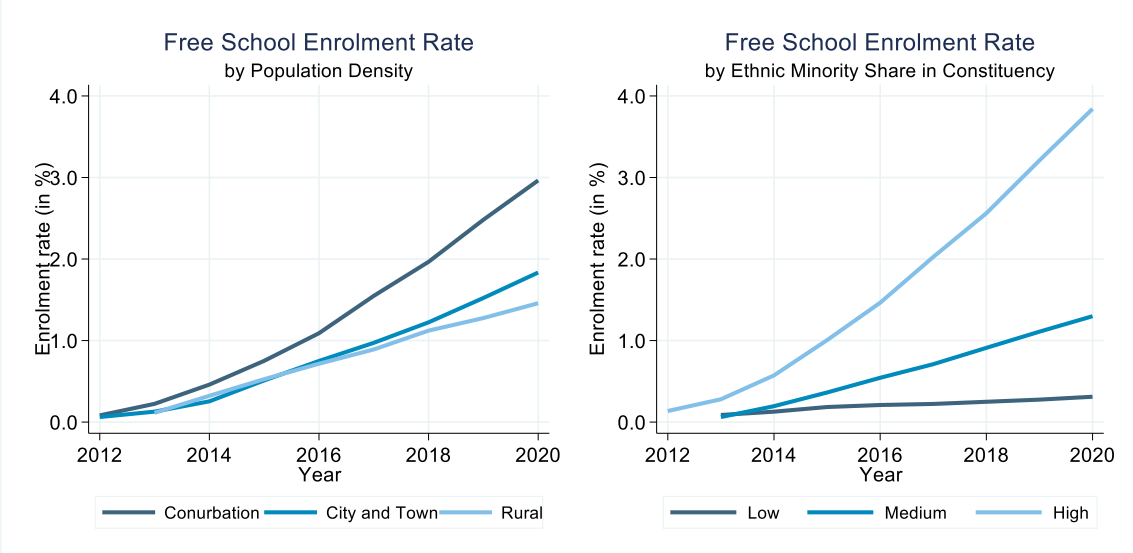
Figure 3.2: Likelihood of becoming free school neighbour by phase



There has also been faster growth of free school enrolments in conurbations. Figure 3.3(a) compares the evolution of the enrolment rate over time by population density. While 'City and Town' and 'Rural' locales initially followed similar paths, enrolments in 'Conurbations' subsequently grew more rapidly. In 2015, pupils in conurbations were about 40% more likely to attend a free school compared with pupils in rural areas. By 2020, this rose to 100%.

Figure 3.3: Free School Enrolment Rate by Population Density and Ethnic Minority share, 2012-2020

(a) (b)



Potentially overlapping with population density, free school enrolment growth was also concentrated in areas with a relatively high share of ethnic minorities. Here, free school

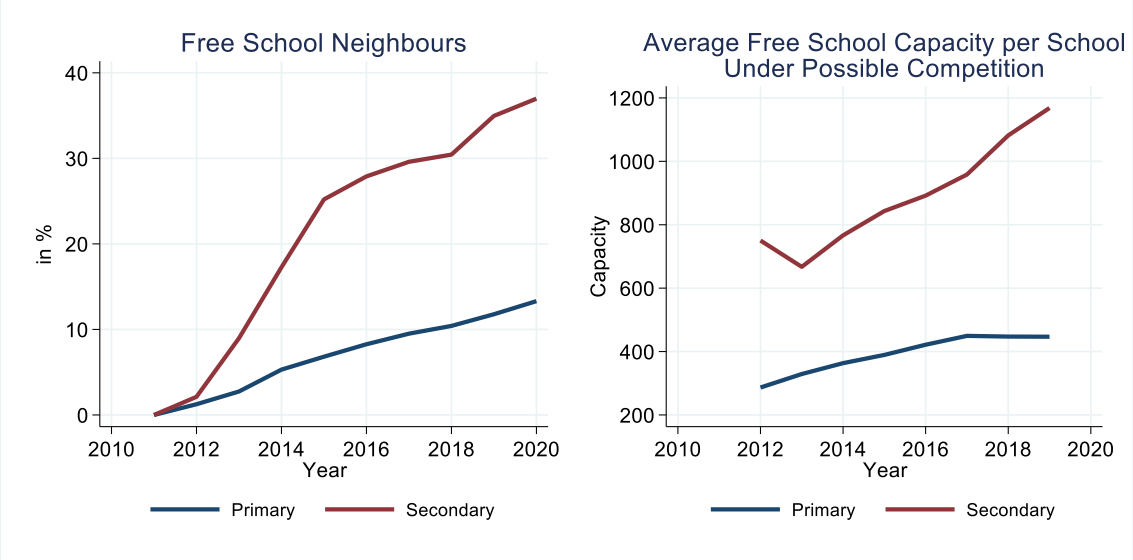
enrolment reached nearly 4% by 2020. By contrast, in areas of low ethnic diversity free school enrolment remained virtually flat at below 0.5% since 2015. The trend picture in Figure 3.3(b) suggests growing divergence in free school access across England.

Neighbouring schools

The number of existing schools that became free school neighbours increased over time. Figure 3.4 depicts the growth in the proportion of schools that became neighbours and hence faced possible free school competition. Figure 3.4 also sets out the average free school capacity per neighbouring school. This suggests an intensification of potential free school competition as the programme developed, so that a larger share of schools became free school neighbours and those neighbours tended to face an increase in free school capacity. This was particularly the case in the secondary phase.

According to our neighbouring school definition, over 35% of secondary schools (N=1169) were under possible free school competition by 2020. The trend grew more slowly in the primary phase, to just over 10% of primary schools by 2020 (N=2090). The average free school capacity per neighbouring schools in the primary phase has remained at about 450 places since 2016/17. There was an average free school capacity of nearly 1,200 places in the secondary phase by 2020. When we think about the size of primary schools (e.g. a two form entry = 420 students) and secondary schools (e.g. a six form entry with a 6th form = 1260 students), capacity differences by phase are not surprising. However, the growing capacity of secondary free schools is notable. This may mean the opening of additional free schools locally, but it may also or alternatively suggest that secondary free schools in more recently years have been planned as larger schools when compared to earlier openers.

Figure 3.4: Percentage of schools that are free school neighbours and free school capacity per neighbouring school (i.e. under possible free school competition).



These different dynamics of free school entry by phase may reflect different predictors of free school opening and hence different levels of potential competitive pressure from free schools by phases. It is also conceivable that these variations reflect different patterns of need across phase and locations. We examine, next, how local forecast need for new places,

schools' occupancy rates, levels of material deprivation, academic quality and ethnic diversity relate to the build-up of free school capacity locally.

Predictors of free school entry

We begin by comparing the average free school capacity per state-maintained school in 2018/2019 by area-level and school-level characteristics. These characteristics were measured in 2010/2011, the academic year before the first free schools opened. Average free school capacity is calculated for all state-maintained schools to highlight how and where free school capacity has expanded the most. We compute the ratio of average free school capacity between schools that scored low or high on our metrics of 'need' and 'demand'. The ratio sheds an initial light on the importance of the different measures of 'need' and 'demand' for free school entry. We split each potential predictor variable along its median by school phase, with above median termed 'high' and below median 'low'.

Table 3.1. sets out the findings, with the final column reporting on the ratio between the average free school capacity in the 'high' relative to the 'low' column. For example, in line 1 for the primary phase, schools in areas with low forecast need for places in 2010/2011 had on average 28 free school places in their neighbourhood by 2018/2019, whereas primary schools with high forecasted need for places had on average 78 free school places in their vicinity by 2018/2019, a ratio of about 2.79 (=78/28).

In the primary phase, schools in areas of higher forecast need for new places and higher ethnic diversity at baseline experienced the largest build-up of free school capacity in their neighbourhood on average. Schools in areas with higher occupancy rates, lower academic performance and higher levels of material deprivation also experienced a larger build-up of free school capacity on average, but these predictors of free school entry were less pronounced. In the secondary phase, we again find the largest differences in free school capacity by initial conditions were in levels of ethnic diversity and forecast need for new places. This was followed by occupancy rate and material deprivation. In terms of academic quality, by contrast to primaries, secondary schools of above average quality at baseline experienced a slightly larger build-up of free school capacity in their vicinity on average.

Table 3.1 Average free school capacity per state-maintained school in 2018/2019 by school characteristics measured in 2010/2011.

	Low N	Average free school capacity	High N	Average free school capacity	Ratio
Primary phase					
Forecast need for places	7,623	28	7,536	78	2.79
Occupancy rate	7,505	40	7,650	65	1.63
Academic quality	6,995	58	7,135	51	0.89
Material deprivation	7,627	41	7,525	65	1.59
Ethnic diversity	7,595	19	7,557	87	4.58
Secondary phase					
Forecast need for places	1,457	222	1,566	664	2.99
Occupancy rate	1,417	424	1,600	476	1.12
Academic quality	1,357	438	1,476	484	1.11
Material deprivation	1,562	343	1,462	567	1.65
Ethnic diversity	1,474	189	1,549	698	3.69

The free school programme thus appears to have responded primarily to demographic need for new places and to ethnic diversity and, at a lower level of priority, material deprivation. Evidence relating to academic quality is less clear and varies by phase. It is likely however that these factors intersect and potentially correlate with other unobserved school and area characteristics. For example, ethnic diversity and forecast need for places might be closely correlated through processes of demographic change and relate to population density. We therefore assess how these individual predictors relate to free school entry in a multivariate model. To do so, we set out the results from an estimation of equation (2) in Appendix 3.1 for, in turn, primary (Table 3.2) and secondary schools (Table 3.3).

Table 3.2: Average marginal effects of the likelihood of free school entry. Primary. 2012-2020

	(1) Pooled	(2) Pooled, adjusted	(3) Low need for places	(4) High need for places	(5) Difference between (4) and (3)
Need for places (t-1)	0.032***	0.035***			
	(0.0028)	(0.0029)			
School-level occupancy (t-1)	0.011***	0.012**	0.012***	0.011*	-0.001
	(0.0033)	(0.0039)	(0.0034)	(0.0048)	(0.0035)
Academic quality (t-1)	-0.001*	-0.000	-0.000	-0.000	-0.000
	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0002)
Material deprivation (t-1)	-0.002***	-0.000	-0.001	0.000	0.001
	(0.0004)	(0.0012)	(0.0009)	(0.0014)	(0.0007)
Ethnic diversity (t-1)	0.041***	0.049***	0.037***	0.054***	0.017***
	(0.0024)	(0.0061)	(0.0046)	(0.0069)	(0.0032)
Control variables	X	X	X		X
Baseline values		X	X		X
Observations	118,867	118,867	118,867		118,867

Notes: Average marginal effects with respect to forecast demand for places, school-level occupancy, academic quality, material deprivation, ethnic diversity from complementary log-log estimation of Equation (1). The dependent variable is a schools' likelihood of becoming a new free school neighbour. Control variables include a full set of region dummies and period dummies (hazard function) interacted with population density. Baseline values were taken from the school year 2010/2011 for the predictors of interest. The dataset was restricted to incumbent schools whose predecessor or who themselves were open at baseline. School clustered standard error in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

For primary schools, the estimates in column (1) of Table 3.2 show that demographic drivers of forecast need for new places, school occupancy rate and ethnic diversity all predicted free school entry significantly. The reported coefficients give the predicted change in the chance of a free school setting up with respect to a unit change of the explanatory variables. The effect of school academic quality and material deprivation were negligible albeit statistically significant. Column (2) in Table 3.2. presents the estimates after accounting for initial conditions. Compared to column (1) the estimates change only marginally suggesting a limited role of correlated but omitted determinants of free school entry. The estimates in

column (2) confirm the importance of demographic factors in determining free school entry. Neither academic quality nor material deprivation were statistically significant in this specification with near-zero coefficients.

In other words, neither academic quality nor material deprivation were clear predictors of primary free school entry over and above the considered demographic factors. Ethnic diversity rather than need for places also emerged as the more decisive factor in terms of coefficient size and their underlying variation across locales. While most neighborhoods operated between just below or slightly above capacity (i.e. with the forecast excess demand varying between about -0.10 to just above zero), the index of ethnic diversity varied from below 0.1 to 0.5 across most neighborhoods.

In column (5) we compare the impact of school-level determinants on free school entry in areas with low and high forecast need for places. There is no evidence that the relevance of school occupancy, academic quality or material deprivation changed with forecast need. The effect of ethnic diversity on free school entry was significantly larger in high-need than in low-need areas. Even in low-need areas, however, ethnic diversity remained a clear predictor of free school entry suggesting a role beyond population growth.

Table 3.3: Average marginal effects of the likelihood of free school entry. Secondary. 2012-2020

	(1) Pooled	(2) Pooled, adjusted	(3) Low need for places	(4) High need for places	(5) Difference between (4) and (3)
Need for places (t-1)	0.109***	0.086***			
	(0.0149)	(0.0154)			
Occupancy rate (t-1)	0.017	0.010	0.015	0.011	-0.003
	(0.0129)	(0.0168)	(0.0160)	(0.0201)	(0.0178)
Academic quality (t-1)	-0.002	-0.002	-0.002	-0.002	-0.000
	(0.0012)	(0.0014)	(0.0014)	(0.0016)	(0.0015)
Material deprivation (t-1)	0.002	-0.030***	-0.018**	-0.032***	-0.014***
	(0.0018)	(0.0070)	(0.0057)	(0.0076)	(0.0031)
Ethnic diversity (t-1)	0.076***	0.126***	0.045	0.138***	0.093***
	(0.0096)	(0.0305)	(0.0257)	(0.0322)	(0.0130)
Control variables	X	X	X		X
Baseline values		X	X		X
Observations	20257	20257	20257		20257

Notes: For detailed explanations see footnote to Table 3.2. School clustered standard error in parentheses.
* p < 0.05, ** p < 0.01, *** p < 0.001

For secondary schools, the estimates are set out in Table 3.3. The estimates in column (2) confirm the importance of forecast need for new places and school-level ethnic diversity for free school entry in a neighbourhood. Local academic quality does not in itself accelerate or decelerate free school entry. Material deprivation has a small but statistically significant

negative effect on the likelihood that an incumbent school becomes a free school neighbour. Compared with column (1), this effect emerges conditional on baseline values, which indicate that free schools were less likely to enter areas that have become relatively more deprived over time. The comparison of predictors of low- and high-need areas in columns (3) and (4), indicate that the effects of ethnic diversity and material deprivation rose with the forecast need for places. In other words, secondary schools in high-need areas that experienced rising ethnic diversity and (to a smaller extent) falling levels of material deprivation were particularly 'at risk' of becoming a free school neighbour.[7] Like the primary phase, ethnic diversity was the main predictor for free school emergence.

As we noted in Section 1, the Government's priorities for the free school programme have evolved. Responding to forecast need for new places was argued to be an increasingly important aim from about 2015/16. To test whether the patterning of free school openings described above also changed over time we compare free schools opened before 2016 (termed 'early openers') to those that opened from September 2016 onwards (termed 'later openers'). Set out in Appendix 3.2, our findings confirm free school entry responded more strongly to forecast need for places among late openers than early openers, particularly in the secondary phase. The response to ethnic diversity was also stronger among later openers in the secondary phase. We find no evidence, however, of a stronger response to either academic quality or to material deprivation among later openers.

We have focused so far on the likelihood of becoming a free school neighbour. As suggested by Figure 3.3., free school exposure can also change on the intensive margin. Total free school capacity around neighbouring schools might increase, for example, where local providers propose additional free schools, the Government approves more than one free school in a neighbourhood or an existing free school applies to expand their capacity in response to continued local need. Examining changes in free school capacity can document if the determinants that predicted free school entry in the first place continued to apply.

To test this, Table 3.4 summarises the result of fixed effect estimations of equation (3) in Annex 3.1. by phase. The data were restricted to free school neighbours. In contrast to becoming a free school neighbour, we find higher forecast need for places predicted slower growth of free school capacity conditional on the other variables. That is, once a school became a free school neighbour, continued forecast need for new places was on average unlikely to lead to additional free schools locally or an expansion of existing free school(s) to meet continued forecast need. We note that none of the other variables emerge as significant predictors of growth in nearby free school capacity, apart from in the secondary phase where we can again observe a negative effect of rising material deprivation.

[7] Falling material deprivation implies a decline in the material deprivation index and thus, through the double negative, an increase in the probability of becoming neighbour.

Table 3.4: Predictors of nearby Free School capacity among schools with free school neighbour (intensive margin). Semi-elasticity. 2012-2019

	(1) Primary	(2) Secondary
Need for places (t-1)	-0.206***	-0.266***
	(0.0494)	(0.0652)
Occupancy rate (t-1)	0.051	0.073
	(0.0781)	(0.1019)
Academic quality (t-1)	-0.001	0.002
	(0.0021)	(0.0050)
Material deprivation (t-1)	-0.023	-0.148***
	(0.0202)	(0.0419)
Ethnic diversity (t-1)	-0.159	0.292
	(0.1268)	(0.3044)
School Fixed Effects	X	X
Period Fixed Effects	X	X
Period X Urban/Rural Fixed Effects	X	X
Observations	6462	4089
R-sq(within)	0.200	0.255

Notes: Linear estimation with school fixed effects of total log free school capacity in a neighbouring school's vicinity. Controls include a full set of period dummies interacted with urban/rural categories. Standard errors in parentheses. Clustered at school-level. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Summary

To consider the characteristics of local areas and neighbouring schools that are associated with the opening of a free school, we first carried out univariate analyses. These showed the free school programme responded primarily to higher forecast need for new places and to higher ethnic diversity. Local areas with higher material deprivation were also shown to have experienced a larger build-up of free school capacity on average but, as a predictor of free school entry, deprivation was less pronounced than forecast need or ethnic diversity. The evidence relating to academic quality was again less pronounced and varied by phase.

These findings broadly corroborate existing research that analysed the early waves of free schools. Prior research suggested, similarly, a strong relationship to forecast need (Garry et al 2018), but with: free school places also created in areas with little additional need; free school capacity growing faster in areas of higher rather than lower deprivation; no strong relationship to local school quality, with secondary free school capacity expanding slightly faster in areas with above average academic quality (Andrews and Johnes (2017).

There has been, however, little prior multivariate assessment of the determinants of free school entry to assess the balance or interaction of different facets of demand and need in combination with one another. Multivariate analyses account for the relationships between the explanatory factors and help to disentangle the partial contribution of individual determinants on the outcome, holding the other covariates constant. If material deprivation were itself a predictor of free school entry for example, it would have a clear independent effect on free school entry over and above demographic determinants. By contrast, if material deprivation was merely correlated with free school entry because more deprived school neighbourhoods had, on average, a larger demographic need for new places,

material deprivation would not show an independent effect in a multivariate model of free school entry. In short, multivariate analysis establishes the primary determinants of entry.

Our multivariate analysis found forecast need for new places and ethnic diversity were consistently related with free school entry. The responsiveness to forecast need for places increased slightly with time, consistent with changing priorities set out by the Government. Ethnic diversity was more strongly related to free school entry in areas of high rather than lower forecast need, indicating predicted demographic growth intersects with a changing composition of local populations (ONS 2021). Nonetheless, at least at the primary level, ethnic diversity was a predictor of free school entry even in low growth areas.

By contrast to the univariant analysis, however, we found no evidence that the free school programme prioritised areas with lower academic quality or higher deprivation over and above responding to predicted needs for new places in ethnically diverse populations. This suggests that proposals for free schools and DfE's approval process have not been primarily influenced by lower academic quality among existing schools. We note this strengthens the plausibility of our subsequent analysis of potential academic improvement or deterioration in neighbouring schools following free school entry. As entry was largely unrelated to the academic quality of its neighbours, any changes in academic performance following free school entry are less likely to be due to catch up processes (i.e. reversion to the mean).

Our multivariant analysis also found little influence of material deprivation on the likelihood of a free school opening. In the primary phase there was no clear patterning. In the secondary phase, the likelihood of an existing school becoming a free school neighbour rose with falling deprivation. This suggests that the positive bivariate relationship between material deprivation and average free school capacity in the univariate analysis reflects an indirect outcome of free school location choice. Contrary to Government claims proposers would be motivated to target deprived areas 'to make a difference', the analysis suggests this has not occurred widely as a primary aim. The slight over-representation of free schools in areas of above average deprivation in the bivariate comparison is seemingly a by-product of its relationship with the other dimensions of 'need'. In conjunction with the positive effect of forecast need and ethnic diversity and the concentration of free schools in conurbations, the finding on falling material deprivation also suggests the entry of secondary free schools may have intersected with urban change or gentrification.

There are two caveats to set out regarding forecast need and provision of places. First, our models showed a difference between forecast need for new places as a strong predictor of free school entry and neighbouring schools' occupancy rates that were not a predictor of entry. This suggests the likelihood of a period after opening when at least a proportion of free schools are likely to have created places that were not immediately needed locally. Second, we need to remain cautious about the accuracy of 'forecast need' as a measure of actual need for places. The DfE calculation of forecasts are based on small area predictions. These are difficult to make given the movement of families (DfE 2023). DfE's assessment of the accuracy of its forecasts shows a regular 'over-forecast' of need.[8] We should therefore be cautious about whether forecast need has always materialised around free schools.

[8] The DfE's annual 'Local Authority schools places scorecard' assesses the accuracy of three-year forecasts by comparing predicted need to actual student numbers in the relating year once actual numbers are known.

Section 4: Free school academic quality

In this section we progress an analysis of the academic quality provided by free schools. This relates to the first part of Betts' (2009) 'chain of causation', that we set out in Section 1, which is the assumption that free schools 'will compete well in terms of academic quality'.

We progress this analysis in two different ways, informed by two aims. Our first aim is to understand information about free schools that parents and students may draw upon when expressing preferences about which school they want to attend. While choice is informed by a range of non-academic factors, including travel distance, social networks and the ethos of schools (Ball and Vincent 1998; Morris and Perry 2019), published measures of school quality also matter for choice-making (Burgess et al. 2015). Parents and students in England are able to view measures of academic quality reported at a school level. This includes data on student attainment and progress, as well as Ofsted reports and gradings.

Families are also able to consider quality measures alongside information about a school's student composition. This includes data on the proportion of students who are eligible for free school meals, have Special Educational Needs and who speak English as an additional language, as well as the ratio of boys to girls. It is well established that student composition can inform parents' choice sets (Ball 2013; Burgess et al. 2015). Further, given free school students do not typically take external exams with published results for 5 years (at secondary school) and 7 years (at primary) after they open, families will have necessarily made decisions about preferences and enrolment during this time using other information. In addition to Ofsted grades, this includes potential 'proxies' of quality, such as student composition, school ethos and branding (Morris and Perry 2019; Higham 2023).

To understand what parents and students have seen, on average, if and when they compare publicly available data on free schools to other local schools, we first develop an analysis of these 'simple' measures of academic quality and student composition. In these analyses we are primarily interested in data that is unadjusted, so we do not control for differences in context or school level characteristics (beyond the extent that student progress data already does this). This allows us to interpret from a local perspective whether, on average, free schools 'compete well in terms of academic quality' and the extent to which free schools recruit student who are representative of the local areas in which they are located.

Our second aim is to develop a rigorous analysis of academic quality to help evaluate whether free schools have met the Government's policy aim "to open high-quality schools" (NAO 2013: 10). To do this we develop a matched sample of schools that have similar characteristics to free schools. This enables us to compare free schools to schools that serve

During our period of analysis when the DfE has published this data (2015-2019) there has been an 'over-forecast' of need by three-year forecasts in every year and in both phases (DfE 2020). We calculate the simple 5-year average is an over-forecast of over 1.5% in the primary phase and over 2% in the secondary phase. (In 2020 the DfE did not published the LA scorecard due to Covid-19. In 2021, the over-forecast was 2.6% for primary and 2.5% for secondary schools). We were not able to check the accuracy of the forecasts used for free school locations as the DfE publishes accuracy data at the Local Authority level while forecasts used for free school locations draw on data from the substantially smaller local planning level.

similar contexts and intakes. We analyse student attainment and progress data and Ofsted inspections in free schools and in the matched sample using multiple regression models.

To help to provide context to our findings, we also carry out unadjusted comparisons between free schools and the average of all untreated state schools. This means we compare free schools to all schools that have never been potentially affected by having a free school in their neighbourhood. Given that this is the majority of schools in the country, this is similar to the national average, which a range of commentators have used to provide a baseline against which to judge free schools. Comparisons between our matched analysis and unadjusted, untreated schools thus help us to interrogate the existing national conversation about free school quality.

Analytical approach

To achieve these aims, we develop two main analytical approaches to estimate the average differences between, first, free schools and their local neighbours and, second, between free schools and matched comparator schools. We describe each strategy in turn. For both analyses we use data from the year 2018/19, the last year for which school performance information was available (due to the Covid-19 pandemic, as described in the Introduction). This necessarily excludes later cohorts of free schools that, at that time, had not been in operation long enough to have entered students into external exams.

'Simple' measures: comparing free schools to their neighbours

To compare the quality of free schools to schools nearby, our aim was to estimate the average difference in quality outcomes between free schools and their potential competitors (defined again as schools for which a free school is one of their nine nearest neighbours). We therefore defined clusters comprised of each free school and their neighbours and estimated linear regression models that control for the fixed effect of the free school cluster, with standard errors in turn clustered at the school level. For binary outcomes, such as Ofsted grade, we estimated conditional logistic regression models grouped along free school clusters with robust standard errors.

Based on this specification, we interpret the coefficient of the treatment dummy in the unadjusted model (that is, without any other predictor) as the free school quality premium or penalty that parents and students will observe, on average, when comparing the free school to its neighbours.

Given phase differences in national tests and exams, we split our analysis by school phase. In the primary phase, we analysed the probability of obtaining an Outstanding grade in the last Ofsted inspection on record, as well as the probability of receiving either a Good or an Outstanding grade. We report on marks in Reading, Maths and GPS (grammar, punctuation and spelling) and Progress measures in Reading and Maths included in Key Stage 2 datasets. For the secondary phase, we analysed the same Ofsted outcomes as well as GCSE data on Attainment 8 scores, average performance in the English Baccalaureate, average Progress 8 scores and Progress 8 scores in English, Maths and the English Baccalaureate.

To analyse differences in student composition, we repeated our analysis using regression models including cluster fixed effects but with intake characteristics as our dependent

variables. In these regression models, the treatment indicator identified the average difference between free schools and their neighbours in the student composition measure. These measures were the percentage of students who were reported to: be eligible for free school meals; have Special Educational Needs; speak English as an additional language; be White British; and be female. These measures were calculated for the student cohorts taking the Key Stage 2 and GCSE qualifications that we analyse in this section. As we were interested in estimating the average differences actually observed by parents, these models did not adjust for any covariates.

Comparing free schools to a matched sample of 'non-neighbours'

To compare free schools to schools serving similar contexts and intakes we constructed a matched sample of free schools and schools that are non-neighbours of free schools, also seeking to adjust for any remaining imbalance in characteristics using multiple regression models estimated using the matched sample. We used non-neighbouring schools as potential comparators in the matched sample on the assumption that the experience of these schools is unaffected by the presence of a local free school. We again split our analysis by phase. We constructed the matched sample using propensity score matching. An outline of our matching approach is set out in Appendix 4.1.

Our matching exercise yielded well-balanced samples. In the primary phase this comprised 65 primary free schools and 124 non-neighbour comparators, out of an unmatched sample of 81 free schools and 13,156 non-neighbours with available Key Stage 2 results. In the secondary phase, we matched 80 free school secondaries to 143 non-neighbour comparators, out of an unmatched sample of 104 and 1,947, respectively. The average absolute standardised difference between the free school and matched groups on the variables entered in the matching model was 0.05 standard deviations in the primary phase and 0.04 in the secondary phase. (Such differences are generally considered to be small.)

For the two matched samples, we report estimates of average differences between free schools and their non-neighbours in the same quality outcomes used in the 'simple' analysis above. Differences between free schools and matched non-free schools in continuous outcomes were first estimated through linear regression models with an indicator of the free school group as the only predictor. These differences were then adjusted further to account for potential residual imbalance between the free schools and their matched comparators by re-estimating the same model, except adding all the covariates already used in the matching exercise (Rubin, 1973).

Before fitting the regression models, and to ease interpretation across different quality measures, in both primary and secondary phases continuous outcomes were standardised to have mean zero and standard deviation of one within the analysis sample. Differences in binary outcome measures, such as Ofsted grades, were estimated using logistic regression models, meaning that effect sizes between binary and continuous outcomes are not directly comparable.[9] In these analyses, we estimate robust standard errors. We report statistical significance using p-values and, in line with conventional practice, interpret findings as statistically significant if $p<0.05$.

[9] We also fit linear probability models for Ofsted outcomes but ruled in favour of logistic regression given that the former returned unrealistically small standard errors.

Findings

We report first on the findings that compare free schools to their neighbours. These are the 'simple' unadjusted signals that parents would be able to view locally, reported as an average across neighbouring schools in contexts with a free school. We consider first primary and then secondary schools.

Primary free schools and their neighbours

What did Ofsted's inspection gradings tell parents and students about the quality of free schools compared, on average, to their neighbouring schools in 2018/19? As set out in Table 4.1, there was no statistically significant difference in the odds of receiving an 'Outstanding' grade between primary free schools and their neighbouring schools. Considering 'Good' and 'Outstanding' grades together, however, we find that primary free schools were less likely to receive a Good or Outstanding rating (coefficient = -0.65; odds ratio = 0.52).

When we consider student attainment and progress data from Key Stage 2 tests, we also find primary free schools sent on average lower quality signals into their local markets than neighbouring schools. Table 4.1 sets out how free school students had lower attainment in Key Stage 2 Maths, by just under one third of a standard deviation (-0.29). In Progress measures the average quality gap between free schools and their neighbours was larger: over half a standard deviation in both Maths (-0.65) and Reading (-0.58) progress measures.

As there is no prior attainment data for primary schools, progress measures at Key Stage 2 are calculated using teacher assessment judgements at Key Stage 1, informed by student attainment in national curriculum tests (undertaken towards the end of Year 2). In this Key Stage 1 data, students attending free schools performed on average higher (0.42 standard deviation) than students in neighbouring schools. (This gap narrowed by half (0.2), but did not disappear, when we controlled for school intake and contextual variables.) There is a number of potential reasons for this higher Key Stage 1 performance, including that free schools either recruit students with higher prior attainment and/or provide relatively higher academic quality in Key Stage 1. We cannot directly differentiate between these, but the findings certainly suggest primary free schools were on average less effective than their neighbours in supporting student attainment and progress during the Key Stage 2 phase.

Table 4.1: Average difference in performance between primary free schools and their neighbours

Primary school outcomes	Unadjusted free school difference	Std. Err.	P-Value	N
Ofsted Outstanding	0.28	0.33	0.40	1465
Ofsted Good or Outstanding	-0.65	0.32	0.04	1123
Reading Mark	-0.18	0.11	0.11	888
Math Mark	-0.29	0.12	0.01	888
GPS Mark	-0.20	0.13	0.11	888
Reading Progress	-0.58	0.12	0.00	888
Math Progress	-0.65	0.12	0.00	888
Key Stage 1 assessment	0.42	0.12	0.00	888

We also report on the composition of students taking Key Stage tests in primary schools. We looked again at 'simple' measures, using student compositional data that parents would have been able to observe. Table 4.2 summarises the results. The composition of students taking Key Stage 2 tests in free school primaries was more advantaged than the average of their neighbouring schools. Free school primaries had 5.4% fewer students who were eligible for a free school meal than their neighbours. Free schools also had 3.4% fewer pupils with special educational needs. Students in free school primaries were less likely to be white British, with on average 6.2% fewer white British students than their neighbours. There were no statistically significant differences in relation to the proportion of students who spoke English as an Additional Language or in the ratio of girls to boys.

Table 4.2: Average differences in student intake between primary free schools and their neighbours

Primary school intake	Unadjusted free school difference	Std. Err.	P-Value	N
% FSM	-5.43	1.74	0.00	876
% EAL	-1.63	2.83	0.56	876
% SEN	-3.39	1.17	0.00	876
% White British	-6.22	2.00	0.00	876
% Female	-0.54	0.99	0.58	876

These are not large differences in student composition but may be noticeable to local families. A hypothetical average two-form entry free school with 60 students in a year group would, in comparison to a hypothetical average neighbouring school of a similar size, have approximately 3 fewer students eligible for free school meals and 2 fewer children with special educational needs in the year group.

Secondary free schools and their neighbours

We now turn to secondary free schools and their neighbours. As set out in Table 4.3, average differences in both 'Outstanding' and 'Good and Outstanding' Ofsted gradings were not statistically significant. This was also true for headline attainment and progress measures in GCSE exams in which, on average, there was no statistically significant difference between free schools and their neighbours in Attainment 8 and Progress 8. There were differences in several secondary measures of progress. In the Progress 8 scores in English (0.24) and Progress 8 scores in the English Baccalaureate (0.41) free school students performed better on average.

Table 4.3: Average difference in performance between secondary free schools and their neighbours

Secondary school outcomes	Unadjusted free school difference	Std. Err.	P-Value	N
Ofsted Outstanding	0.04	0.24	0.88	1243
Ofsted Good or Outstanding	-0.15	0.23	0.52	1123
Attainment 8	0.02	0.11	0.82	1094
English Baccalaureate	0.2	0.11	0.06	1094
Progress 8	0.19	0.13	0.15	1094
Progress 8 English	0.24	0.12	0.04	1094
Progress 8 Math	0.19	0.13	0.15	1094
Progress 8 Eng Bacc.	0.41	0.13	0.00	1094

We also looked at the composition of students taking exams in secondary free schools and their secondary school neighbours, using again the 'simple' measures that parents would have been able to observe. There were no significant differences, on average, between secondary free schools and their neighbours in terms of the proportions of students eligible for free school meals, those with Special Educational Needs or those who speak English as an Additional Language. Secondary free schools were more ethnically diverse than their neighbours, with 8% less pupils of white British origin. Free schools also had fewer girls than their neighbours (5%). The prior attainment of students (in Key Stage 2 tests) was also lower in secondary free schools than on average in neighbouring schools, by approximately one third of a standard deviation (-0.39).

Table 4.4: Average differences in student intake between secondary free schools and their neighbours

Secondary school intake	Unadjusted free school difference	Std. Err.	P-Value	N
Prior Attainment (KS2)	-0.39	0.13	0.00	1094
% FSM	0.16	1.43	0.91	1082
% EAL	0.19	2.43	0.94	1082
% SEN	0.72	0.93	0.44	1082
% White British	-7.95	1.95	0.00	1082
% Female	-4.73	2.13	0.03	1082

Free school quality: a matched sample

Having considered the 'simple' signals free schools send on average locally, we now report on the matched sample analysis. As discussed, alongside the matched sample, we also report results for an 'unmatched' unadjusted analysis, comparing free schools to all other schools that are not neighbours of any free school (which had the necessary data).

Primary free schools and the matched sample

Table 4.5 sets out the results of comparing primary free schools to the 'matched' sample of comparable non-neighbour schools. When comparing Ofsted grades, we found no statistically significant differences. There were differences, however, in each of the student attainment and progress measures we analysed. On measures of attainment, free school students performed on average less well than the matched sample in Key Stage 2 Reading (-0.32), Maths (-0.40) and GPS (-0.38). Similarly on progress measures, free schools performed less well relative to the matched sample in both Reading Progress (-0.41) and Maths progress (-0.50).

Table 4.5: Primary free schools and the matched sample

Outcome	Sample	Free school difference	Std. Err.	P-Value	N
Ofsted Outstanding	Matched	0.06	0.45	0.89	184
	Unmatched	0.66	0.26	0.01	13225
Good or Outstanding	Matched	-0.46	0.49	0.35	184
	Unmatched	-0.44	0.29	0.13	13225
Reading Mark	Matched	-0.32	0.12	0.01	189
	Unmatched	-0.17	0.14	0.22	13233
Math Mark	Matched	-0.4	0.14	0.01	189
	Unmatched	-0.16	0.15	0.28	13230
GPS Mark	Matched	-0.38	0.13	0	189
	Unmatched	0	0.15	1	13230
Reading Progress	Matched	-0.41	0.15	0.01	189
	Unmatched	-0.3	0.13	0.02	13233
Math Progress	Matched	-0.5	0.15	0	189
	Unmatched	-0.32	0.15	0.03	13230

Table 4.5 also sets out the results of the 'unmatched', unadjusted model, comparing free schools to all other primary schools in England that are not free-school neighbours. Here we find free schools were more likely (coefficient = 0.66; odds ratio = 1.93, i.e. 93% higher odds or almost double) than other schools to be graded as 'Outstanding' by Ofsted. There were no differences in attainment data. Student progress in Reading and Maths was again lower (by about a third of a standard deviation) in free schools than all other schools.

Secondary free schools and the matched sample

Table 4.6 sets out the results of comparing secondary free schools to the sample of matched non-neighbour schools. When comparing Ofsted grades, we found a significant difference, with free schools more likely to be graded Outstanding by Ofsted. The difference when comparing the likelihood of being judged Good or Outstanding was not statistically significant. On each of the attainment and progress measures, whilst secondary free school students performed modestly better than in matched schools, these differences were not statistically significant. The exception was the secondary measure of Progress 8 scores in the English Baccalaureate subjects, where free schools on average outperformed their matched counterparts by just under on third of a standard deviation (0.30).

Table 4.6: Secondary free schools and the matched sample

Outcome	Sample	Free school difference	Std. Err.	P-Value	N
Ofsted Outstanding	Matched	1.20	0.43	0.01	223
	Unmatched	0.38	0.23	0.10	2051
Good or Outstanding	Matched	0.41	0.37	0.27	223
	Unmatched	0.17	0.24	0.47	2051
Attainment 8	Matched	0.04	0.08	0.67	223
	Unmatched	-0.02	0.11	0.88	2051
English Baccalaureate	Matched	0.11	0.09	0.20	223
	Unmatched	0.18	0.1	0.08	2051
Progress 8	Matched	0.15	0.13	0.23	223
	Unmatched	0.41	0.13	0.00	2051
Progress 8 English	Matched	0.17	0.12	0.16	223
	Unmatched	0.54	0.12	0.00	2051
Progress 8 Math	Matched	0.10	0.13	0.45	223
	Unmatched	0.38	0.13	0.00	2051
Progress 8 Eng Bacc.	Matched	0.30	0.13	0.02	223
	Unmatched	0.63	0.12	0.00	2051

Table 4.6 also sets out the unmatched, unadjusted model, comparing secondary free schools to all other secondary schools that are not free-school neighbours. Here, the difference in Ofsted gradings was not statistically significant. Free school students also did not have higher attainment (with the slightly higher attainment in English Baccalaureate subjects only significant at the 90% confidence level). There was, however, a positive and significant difference between free schools and other schools on each of the Progress outcome measures (Progress 8, Progress 8 English, Progress 8 Maths and Progress 8 English Baccalaureate), with secondary free school students making on average more progress.

Summary

Our findings indicate free schools were not, on average, demonstrably 'high-quality schools' during our analysis period. Our matched sample analysis provided a rigorous assessment of academic quality. This showed primary free schools performed, on average, less well in national attainment and progress measures when compared to schools with similar characteristics. Secondary free schools, when compared to a matched sample, were more likely to receive an Ofsted 'Outstanding' grade and to have higher scores in the secondary progress measure of Progress 8 in the English Baccalaureate. Other outcomes, including the headline Progress 8 measure and attainment, were not significantly different.

These findings broadly corroborate earlier reports on free school quality. Mills et al. (2019) analysis found 'a mixed picture' with below average outcomes for primary free schools and above average for secondary free schools. Julius et al (2021) reported pupils in primary free schools performed less well than a matched sample of schools, noting higher achievement at KS1 but with lower attainment in the end of primary school KS2 test. Julius et al. also

found secondary free school students made slightly more progress. They reported that secondary free schools had higher attainment at GCSE than a matched sample of schools, but notably this was only significant at the 90% confidence interval.

Our matched sample findings stand in some contrast to earlier Government statements that drew on Ofsted inspections gradings to suggests free schools were providing a better quality of education. These have tended to stress that 1 in 4 free schools "has been rated outstanding by Ofsted – above the national average" (DfE 2016a:1). Suella Braverman MP (2019) went further by arguing in a Westminster Hall debate on free schools that: "free schools have been an unqualified success. The latest figures reveal that a free school is 50% more likely to be rated outstanding when compared with other types of state school". [10]

We now have a more comprehensive understanding of free school quality beyond Ofsted grades prior to the Covid pandemic. Even when we compare free schools to all untreated schools, that is regardless of context and intake, we find that while primary free schools were more likely, on average, to have received an Ofsted 'outstanding grade', the progress of their students in Reading and Maths was lower than in other schools. For secondary free schools, on average, students did make more progress, including in the headline Progress 8, but did not have higher attainment or Ofsted grades than untreated schools. We note that there were in both phases high performing free schools (Bertoni et al. 2023), but at the same time there were low performing free schools (Mills et al. 2019).

The Ofsted gradings of free schools are of interest. Whilst we showed secondary free school Ofsted gradings to be broadly reflective of our findings on attainment and progress, for primary free schools there was a tendency for Ofsted gradings to be higher than, or not as low as, our findings on attainment and progress data. A summary of the findings for primary and secondary free schools by each comparison sample group (i.e., unmatched; matched sample; and neighbours) is set out in Table 4.7 and Table 4.8.

Table 4.7. Summary of findings on primary free schools

	Measures			
Sample	Outstanding	Good/Out	Attainment	Progress
Unmatched	positive	-	-	negative
Matched	-	-	negative	negative
Neighbours	-	negative	negative	negative

Note: - denotes no significant difference between free schools and the comparison sample group.

[10] Braverman appears to have drawn on or made the same mistake as an earlier DfE (2014: 3) statement that argued: "free schools are twice as likely to be 'outstanding', with 21% of open free schools rated 'outstanding' compared to 10% of all schools inspected under the same framework". This statement was later withdrawn given, under the new Ofsted framework, schools inspected (that were not free schools) were more likely to have been targeted for inspection due to lower-than-average student attainment. Hence, they were unlikely to be reflective of the national average of schools and were therefore an unrepresentative comparison group.

Table 4.8. Summary of findings on secondary free schools

	Measures			
Sample	Outstanding	Good/Out	Attainment 8	Progress 8
Unmatched	-	-	-	positive
Matched	positive	-	-	-
Neighbours	-	-	-	-

Note: - denotes no significant difference between free schools and the comparison sample group.

There are several potential explanations for the differences in Table 4.7. Bokhove et al. (2023) find inspection judgments do not provide a good prediction of future student outcomes. Initial Ofsted inspections of free schools have also preceded tests scores, with free schools inspected in approximately their second year. Primary school tests are only taken and reported 7 years after opening. Primary free schools may thus have benefited from a period during their initial years when Ofsted gradings were on average more favourable than subsequent attainment and progress data. These differences were less clear, however, when comparing free schools to their neighbours, where Good or better gradings were more reflective of our findings on attainment and progress. Relatively higher Ofsted grades may not have had a widespread influence on local patterns of choice.

By the time test results were available, assessed from a parent perspective, primary free schools were more likely to be below average locally in student progress and attainment during our analysis period. Primary free school students were on average more ethnically diverse but less likely to have special educational needs or be eligible for FSMs. Secondary free schools were similar to the local average, performing on average no better or worse in the main attainment and progress measures. The student composition of secondary free schools was more ethnically diverse than neighbours, but similar in FSM eligibility.

We recognise, finally, that academic quality can change over time. The focus in this section has been on academic quality during our analysis period, including to inform our later analyses of choice and competition. We can note however that in the most recent headline metrics, in 2023, on average primary free schools were above the national average in both attainment and progress metrics (DfE 2023f). This is suggestive of free schools improving, including as the number of free schools with tests results has increased. Headline metrics are descriptive, however, and attainment measures do not compare free schools to schools serving similar students and contexts as our matched analyses have done. It will be for future research to develop this more rigorous analysis of free school quality in the years ahead.

In the next section, we consider whether the presence of a free school has on average had any impact on neighbouring schools in terms of student rolls. We also consider whether any changes in student rolls might reflect changing parental preferences.

Section 5: Neighbouring schools' student rolls

In this section we develop an analysis of whether free schools influence local patterns of school choice and student admissions. We explore whether the opening of a free school leads to changing preferences for or a loss of students at neighbouring schools. In terms of policy assumptions on how school choice and competition work, we are interested in this section in the second part of Betts' (2009) 'chain of causation'. We consider the assumptions: parents will express a strong preference for new free schools (as they will be high quality schools or offer distinctive provision); and, as a result, at least some neighbouring schools will experience competition in terms of changes in student enrolment.

We note how findings in the preceding sections raise potential disruptions to aspects of these assumptions. We evidenced in Section 4 that free schools were not on average 'high quality schools' during our study period, particularly primary free schools. We know that measures of academic quality are not however the only information used by families to make choices. Indeed, we discussed how, given students do not usually take national tests for an extended period of time after a free school opens, families will have necessarily made decisions about preferences and enrolment using other information. This includes potential 'proxies' of quality, such as composition, ethos and branding (Morris and Perry 2019).

We also found in Section 3 a strong association between free school locations and forecast need for new places. Local need for places could hypothetically dampen choice and competition, for instance where free schools relieve pressure on places. This would mean we might not expect to observe declines in enrolment in neighbouring schools due to a free school's presence. As noted, however, forecast need does not necessarily translate into actual need, not least as there has been an over-forecasting of need nationally.

In this section, then, we analyse whether neighbouring schools experience changes after a free school opens in both the preferences expressed for their school and the number of students they enrol. To develop these analyses, we use data on 'preferences' expressed by families and data on student enrolment. In England, parents and students express 'preferences' for which school they would like to attend (Burgess et al. 2015). The number of ranked preferences families can express varies by local authority, from 3 to 6 schools.

Nationally, in the primary phase, approximately 90% of students received an offer of a place from their first preference school during our study period, and over 95% from one of their top three preferences. This was lower in secondary schools, with a bit over 80% for first preferences, but about 95% for top three preferences (DfE 2018b). If a school receives more preferences than available places, as defined by their Pupil Admission Number (PAN), then the school's published over-subscription criteria are used to allocate places to students[11].

[11] We do not analyse oversubscription criteria in this section, but it is useful to understand the English context. Schools must conform to the national admissions code. Most schools are not allowed to select students by academic tests and many use a simple distance measure as a final tie-breaker oversubscription criterion. Schools can however create prioritized catchment areas, use more or less locally representative 'banding' (based on tests), and/or select 10% of students by aptitude (based on tests) where they have designated 'specialisms' in performing arts (including music), visual arts, modern foreign languages, sport, and design or information technology (DfE 2014). Voluntary aided schools (mainly Catholic) can select 100% of students by

Analytical approach

To progress the analysis, we created a longitudinal panel of English schools that traced the evolution of parental preferences and pupil numbers over time. As student number data can be directly derived from the pupil censuses our panel extended from the year before the first free schools opened in 2011 through to the outbreak of the Covid-19 pandemic in 2019.

Preferences data is available nationally only since 2014/15. We needed to link preferences microdata with the pupil census conducted the following year, so we could trace pupils into the schools in which they enrolled. As such our analysis of preferences was restricted to free schools opened between 2016 and 2019, those we have termed 'later-openers'. This makes the analysis of rolls and preference not directly comparable.

Our empirical strategy followed a quasi-experimental design, identifying within-school changes in patterns of choice and enrolment due to treatment (by a free school opening) relative to the counterfactual scenario that a neighbouring school had not been impacted by a free school opening. To do this, we used matched difference-in-differences design (MDiD). We matched treated neighbouring schools with never-treated schools on similar pre-treatment trajectories. The aim was to produce a matched dataset in which treated neighbouring schools and comparator schools could be expected to have the same trends in our outcomes of interest (prior to treatment), such that the common trends assumption of the difference-in-differences method was plausible. Using propensity score matching, neighbouring schools were matched with a single comparison school with the closest propensity score on a sequential year-by-year basis, separately for primary and secondary schools. We set out a description of our matching approach in Appendix 5.1.

Using our matched analysis sample, we employed a difference-in-differences approach to estimate treatment effects, estimating our models using two-way fixed effects[12]. Specifically, school-level fixed effects to remove time-invariant unobserved differences between schools, and year-level fixed effects to remove school-invariant unobserved differences between years. We also estimated difference-in-difference-in-differences (DDD) models that tested for heterogeneity in free-school effects based on a set of theoretically relevant moderators. In Appendix 5.2. we set out in detail how we built up these models, demonstrating the relevance of this approach to producing unbiased estimates. Using this approach, we estimated conditional free-school effects on yearly changes in two main outcomes of interest: parental preferences and number of pupils at entry.

To analyse preferences, we counted the number of times parents ranked neighbouring schools (and the matched sample of schools) first when expressing preferences (total first preferences), as well as the number of times parents ranked the school in the first three preferences (total first three preferences). Both are informative of the desirability of the school among parents, with the former representing a higher threshold. To enable

faith. Free schools with a faith designation can select up to 50% of students by faith. Academies, free schools and foundation schools are their own admission authorities and determine their own admissions policies.

[12] Recognising some of the potential issues with two-way fixed effects estimators with staggered treatment, as we have in this setting (Goodman-Bacon 2021), we also re-estimated our core models using an imputation approach, as suggested by Borusyak et al. (2022). This had no substantive implications for our findings.

interpretation of results, counts were transformed into logarithms, so estimated changes in our model can be interpreted as percentage change in the number of preferences.

To analyse student enrolment, we recovered the impact of free schools on neighbouring schools' ability to recruit pupils by analysing changes in the counts of students enrolling in the main entry year group. This is Reception year in primary and Year 7 in secondary, when pupils are 5 and 11 years old, respectively. We transformed the variables to be logarithmic so our estimates recover percentage changes in pupil numbers.

As well as estimating average treatment effects for the total population of neighbouring schools, we fitted difference in difference in differences (DDD) models in which variables that potentially moderate the effect of free school opening on patterns of choice and competition were interacted with the treatment status indicator at each time point before and after treatment.[13] We distinguished two types of moderators. First, those associated to the free school itself and observed only in the treated group. These were: distance to the nearest free school; and recruitment areas shared with the free school. Second, attributes of all schools, observed regardless of treatment status. These moderators were: academic quality (at baseline); local levels of deprivation; and school intakes (in terms of ethnicity and FSM eligibility). In Appendix 5.3 we set out how we calculated these variables and the covariates we used in our models to reduce any remaining imbalances between our treated and control groups, not accounted for by our matching strategy. To provide suggestive evidence that we have an analysis sample suitable to proceed with our analyses, we set out descriptive statistics of our matched sample in Appendix 5.4. This includes our outcome variables, moderators and baseline covariates. Overall, these demonstrate that, after matching, we obtain a sample that is broadly similar in terms of baseline characteristics between free school neighbours and the rest of the sample.

Findings

As our data for school rolls includes all neighbouring schools in our analysis period, we begin with student intakes and then consider parental preferences, for only 'later-openers'.

The entry cohort of neighbouring schools

Does the opening of a free school hinder neighbouring schools' ability to recruit students into their main entry year group? As Table 5.1 sets out, we find neighbours experience, on average, a persistent decline in the number of pupils enrolling into their main entry year group once a free school opens nearby relative to our estimated counterfactual. As discussed in Appendix 5.2, we build up our models from a naïve approach, which essentially ignores the longitudinal dimension of our data, to one in which we take advantage of it, to deal with time-invariant unobserved differences between schools and school-invariant unobserved differences between years, as well as the timing of treatment to understand treatment dynamics. The first column of Table 5.1 reports findings from the naïve model, the second column includes school- and year-level fixed effects and the third column restricts the finds to our matched sample of schools. The final two columns report on the difference in differences (DiD) framework by phase.

[13] Our statistical tests exclude analysis where there was concern about parallel pre-trends and we report moderators when the samples were significantly different from one another during the post treatment period.

For neighbouring primary schools (column 4), our DiD models estimate a reduction in students in the Reception year group of, on average, 2.2% in the first two post-treatment years. This increased to 3.9% in the third year after treatment. This estimated reduction in student numbers, relative to the counterfactual scenario of no free school opening, was statistically significant in post-treatment years 1-3 and 5, but not years 4 and 6. For neighbouring secondary schools (column 5), the effect was slightly larger and more consistent, being statistically significant in each post-treatment year we analysed (years 1 to 6). In the first treatment year, the estimated reduction was 2.6%. This increased to 6.0% in the third post-treatment year and was at an average of 5% across post-treatment years 2-6.

Table 5.1: Free School effect on total number of pupils in neighbouring school reception/year 7 (natural log)

	Naive		TWFE		TWFE Matched		DiD Prim.		DiD Sec.	
Treatment Status										
Free-School Neighbour	-0.011	*	-0.031	***	-0.030	***				
	(0.005)		(0.004)		(0.005)					
1 Year Post-Treatment							-0.022	*	-0.026	*
							(0.010)		(0.011)	
2 Years Post-Treatment							-0.022	*	-0.047	***
							(0.011)		(0.014)	
3 Years Post-Treatment							-0.026	*	-0.060	***
							(0.012)		(0.016)	
4 Years Post-Treatment							-0.016		-0.050	**
							(0.013)		(0.017)	
5 Year Post-Treatment							-0.039	**	-0.046	*
							(0.014)		(0.018)	
6 Years Post-Treatment							-0.028		-0.055	**
							(0.016)		(0.020)	
Adjusted R-squared	0.92		0.05		0.06		0.08		0.19	
Number of clusters	4759		4759		2774		2006		768	
Number of observations	35557		35557		21272		15378		5894	
Residual Degrees of Freedom	4758		4758		2773		2005		767	

Notes. Coefficients from linear regression models. *** p<.001, ** p<.01, * p<.05

The average decline in the size of a school's entry cohort in any one year was, thus, not large. As these declines occurred year-by-year, however, there is the potential of an accumulating impact on a neighbouring school's student roll. With schools in England receiving per-capita funding, sustained declines in student numbers cumulatively affect a school's finances in subsequent years. We also note, this occurred during a period of wider sustained cuts in school spending per pupil in England (Sibieta 2023).

In Appendix 5.5, we set out a simple analysis of the potential impact of a free school on the per capita funding of a hypothetical, average-sized primary and secondary school. We do this to exemplify the size of a cumulative financial impact of an average decline in student numbers. Over the first three post-treatment years, we reason a hypothetical school would, on average, lose funding equivalent to the cost of employing 0.2 of a full-time newly

qualified teacher in the primary phase and 1.5 newly qualified teachers in the secondary phase. When we extend this to a six-year period in secondary schools, average funding losses equate to approximately 3 newly qualified teachers.

This clarifies how the average impact is larger in absolute terms in secondary schools. We note how, in relative terms, the size of a teaching team in a secondary school is substantially larger than a primary school, so the potential to 'manage' these loses may vary by phase. Schools may of course look to avoid staff redundancies, not least as small student declines may be spread across year groups. We explore examples of such rationalising of provision in Section 7. Our simple calculations here, however, highlight how relatively moderate student losses can accumulate over time to impact funding in neighbouring schools.

Moderators of pupil decline

As well as average effects, our moderator analyses suggest declining student rolls were experienced more clearly by neighbouring schools with certain characteristics.

Primary neighbours

Progressing our moderator analyses, we found that among neighbouring primary schools the impact of pupil loss was experienced primarily by the 50% of schools most closely located to a free school, as measured by travel time. Neighbours located above the median travel time did not experience a statistically significant reduction in pupils. This difference between closer and further away schools was statistically significant in post-treatment years 4, 5 and 6 when we estimate between a 4% and 7% higher decline in pupils in closer schools.

We found the onset of free-school competition yielded statistically significant effects primarily in primary schools located in above median socioeconomically deprived areas, as measured by IDACI. Schools in less deprived areas did not experience consistent declines in pupil numbers. The difference was statistically significant in post-treatment years 4, 5 and 6, when we estimate at least a 5% gap in levels of pupil loss against schools with above median IDACI scores compared to schools with below median IDACI scores.

We also find neighbouring schools' academic quality exercised a moderating influence on post-treatment pupil rolls. Neighbour primaries with below median academic quality scores in the year before treatment experienced a significant impact on pupil rolls in Reception year. Those with above median academic quality scores did not. This difference was statistically different in the fifth and sixth years after treatment, when we estimate between a 5% and 7% higher decline in pupils in schools with below median academic quality.

Neighbouring primaries for which the last Ofsted grade received pre-treatment was Requires Improvement (3) or Inadequate (4) experienced a statistically significant impact on pupil rolls in Reception year, whilst those with Ofsted grades Good (2) or Outstanding (1) did not. Apart from year 4, this difference was significant in all post-treatment years, when we estimate between a 4% and 8% higher decline in pupils in schools with a 3 or 4 grading.

Secondary neighbours

Among secondary schools, by contrast, we found distance from the free school did not exercise a significant moderating influence on the impact of a free schools' presence on

neighbouring schools' rolls. On school level characteristics, again, neither local deprivation nor a neighbour's Ofsted grade or academic quality exercised a significant influence.

In our final moderation analysis, we found that among neighbouring secondaries the impact of pupil loss was experienced primarily by schools with below median proportions of FSM and White British students at baseline. Neighbours with above median proportions of FSM and White British students did not experience a statistically significant reduction in pupil rolls. This difference was significant in post-treatment years 5 and 6, when we estimate a 5% and then 10% higher decline in pupil rolls in schools with below median proportions of FSM and White British students. This suggests the effect of choice and competition may have been experienced primarily by schools serving less disadvantaged and more ethnically diverse student bodies. This moderation variable was not significant in the primary phase.

Preferences

We report finally on the findings from our analysis of preferences. We look at the total number of first preferences received by the school before and after a free school opens nearby. As stated, we also analysed the total first three preferences received. For reasons of space, we do not report the latter findings here, but we note that the results are similar to, but slightly smaller in effect size than, the results for first preferences. We also note this analysis was restricted to 'later-opener' free schools.

Table 5.2 again reports findings from the naïve model to the difference in differences framework by phase in the final two columns. In the primary phase (column 4) we can observe a decline in the first preferences expressed on average for neighbouring schools after a free school opened, relative to the matched sample. We estimate a reduction in first preferences of approximately 4-5% that is statistically significant in the first and third post-treatment years. By contrast, changes in first preferences for secondary schools (column 5) are smaller, more unstable, and nonsignificant in each post-treatment year.

Table 5.2: Free School effect on total first preferences received (natural log)

	Naive	TWFE	TWFE Matched	DiD Prim.	DiD Sec.
Treatment Status					
Free school neighbour	-0.008	-0.029 ***	-0.036 ***		
	(0.007)	(0.007)	(0.009)		
1 Year Post-Treatment				-0.038 *	-0.019
				(0.018)	(0.018)
2 Years Post-Treatment				-0.040	-0.035
				(0.022)	(0.027)
3 Years Post-Treatment				-0.050 *	-0.000
				(0.024)	(0.029)
4 Years Post-Treatment				-0.053	-0.033
				(0.034)	(0.041)
Adjusted R-squared	0.88	0.09	0.07	0.06	0.25
Number of clusters	4751	4751	1506	1054	452
Number of observations	28319	28319	9036	6324	2712
Residual Degrees of Freedom	4750	4750	1505	1053	451

Notes. Coefficients from linear regression models. *** p<.001, ** p<.01, * p<.05

Summary

In this section we analysed how the presence of free schools has on average affected the number of students enrolled at, and preferences expressed for, neighbouring schools. The impacts of free schools on neighbouring schools' rolls, relative to a matched sample, were observable throughout the six-year post-treatment time period we analysed. This suggests that despite free school locations being associated with forecast need for new places, neighbouring schools have experienced competition in the form of declining enrolments.

On average, declines in student numbers were larger and more consistent in secondary schools, averaging an annual decline in each Year 7 entry cohort of just over 4.5% across the six-year post-treatment period. In primary neighbours, declines were slightly smaller, averaging about 2.5% during the four post treatment years when these declines were statistically significant. Our moderator analyses also indicated the significance of structural conditions and school characteristics in how choice and competition were experienced. Among neighbouring primaries, the impact of declining pupil rolls was experienced most clearly by schools: located closer to a free school; in more socio-economically deprived areas; and that had below median academic quality. These moderators were either not observable or not statistically significant among secondary neighbours.

These findings suggest choice and competition due to the presence of a free school may be influenced by structural differences between primary and secondary school markets. Students are more likely to travel further to secondary school including by bus (Department of Transport 2014), so choice and competition take place over wider geographical areas, while primary markets are more concentrated in particular recruitment neighbourhoods. Certainly, the moderator analyses suggest that our definition of neighbourhoods has been effective in capturing patterns of choice and competition in secondary phase. The distance moderator also points, however, to the importance of testing our neighbourhood model in our later analyses of student outcomes, particularly for primary schools. We do this in a series of robustness checks in Section 8, that reduce the size of our neighbourhood model.

Our moderator analyses also suggested the composition of neighbour schools influenced how choice and competition were experienced after a free school opened. In secondaries, pupil loss was experienced primarily by schools that had below median proportions of FSM and White British students at baseline. This suggests the outcome of secondary competition may have impacted more clearly on schools serving less disadvantaged and more ethnically diverse student bodies. This was qualitatively different to primaries school where free school competition more clearly impacted schools located in more deprived areas.

While not directly comparable, as preferences data were limited to 'later-openers', the impacts of free schools were also observable in parental preferences expressed for schools in the primary phase. Primary neighbours experienced, on average, a decline in first preferences of approximately 4.5% in their Reception year cohort, which was statistically significant in the first and third post-treatment years (out of the four years analysed). Declines in preferences for secondary neighbouring schools were not statistically significant. In the next section we go on to analyse whether neighbouring school leaders perceive impacts on their own school from a nearby free school. We also analyse the extent to which headteachers report taking any new actions due to the presence of the free school.

Section 6: Neighbouring schools' perceptions and actions

In this section we develop an analysis of neighbouring school leaders' perceptions and reported actions. In relation to the policy assumptions set out in Section 1, we consider the assumptions that: existing schools will perceive new competitive threats from a free school (where they lose students or status to free schools); and existing schools will respond by improving their academic quality. As Betts identifies, however, in practice schools may not perceive new competition or, where they do, may not (be able to) respond in ways that improve quality (including potentially due to a loss of student and funding).

We investigate the following themes:

- neighbouring schools' awareness of a nearby free school, including of its reputation and quality.
- perceptions of competition with the free school, including on student recruitment and popularity, as well as perceptions of collaboration.
- the perceived impacts of the free school on the neighbouring school, including in terms of student numbers, funding and student composition.
- reported actions taken by neighbouring schools due to the free school's presence.

There are a variety of ways in which neighbouring schools could take action. 'Improvement' can take different forms ranging from providing new extra-curriculum activities to more costly changes to classroom practices. Schools might seek to improve their reputation through marketing and by competing over particular students. While policy has emphasised improvements in efficiency leading to better quality, there is also the potential of selective competition where a free school's presence is perceived to increase incentives for schools to compete over the socio-economic characteristics of students (Glennerster 1991). Schools may also respond though collaboration, either as they compete or as an alternative to competition, Actions could also be informed by any free school innovation, either as a form of perceived competition or where innovation incentivises collaboration.

To investigate, we report on a survey of neighbouring school leaders. Survey data enables us to move beyond the limits of administrative data. Equally, we recognise limitations to survey data. Leaders' responses may include (un)conscious biases, including about free schools. It is important, however, to view potential limitations in the context of our aims. As Levacic (2004: 188) argued it is because perceptions of competition reveal a "complex set of factors, relating to local relations between schools and the values and behavioural norms on which these are based" that perceptions are important in analysing competition. Perceptions, as subjective assessments of competition, collaboration and impact, are thus likely to inform school decision-making and the allocation of resources beyond objective, contextual factors.

Analytical approach

To collect data, a questionnaire was piloted with school leaders and revised based on their feedback.[14] All neighbouring school headteachers were sent an email invitation to

[14] The pilot incorporated a three-stage pre-test (Artino et al. 2014) to: i) assure key items are not omitted, by validating the survey with our Advisory Board; ii) to assess how respondents may interpret questions, by conducting 'cognitive interviews' with 2 pilot respondents, asked to 'think out loud' when answering questions (Willis 2005); and iii) to assess respondents' experiences, by piloting the survey with 3 headteachers.

participate in the survey. Headteacher titles, names and school email addresses were obtained through a Freedom on Information request to the Department for Education.[15]

The survey asked respondents about the nearest free school to their school. We focused on 'nearest free school' so respondents reported on a single free school and answers were comparable across different contexts. Respondents were asked to check if they agreed with the name of a pre-populated 'nearest free school', which was over 98% accurate. Where they did not agree, respondents could provide the name of a different nearest free school.

The survey ran from February to April 2022. A social research company was contracted to administer the survey via computer assisted web interviewing (CAWI) and telephone interviewing (CATI). CAWI contributed the majority of responses. A parallel, smaller CATI mode was used to collect data from schools that were harder to reach to mitigate potential response bias. Respondents in neither mode received incentives to participate. As well as direct emails, the National Association of Headteachers (NAHT) and Association of School and College Leaders (ASCL) kindly included invitations to participate in their membership e-newsletters. Headteachers received up to six email reminders, starting 7 days after an initial invitation. There was a need to balance follow-up reminders with the wider pressures on headteachers, including as they continued to work in a ('post'-) Covid-19 context.

We used our definition of a free school opening in a school's neighbourhood to identify neighbours. Out of a population of 3,669 neighbours, 328 schools provided a valid survey response, relating to 235 nearby free schools[16]. This was a response rate of 9%. Although lower than anticipated, this was comparable to other school leader surveys undertaken at the time (IFF 2022). The achieved sample was well-balanced in terms our population quotas, but to compensate for potential non-response bias we deploy survey weights in univariate analyses. Weighting factors were modest again showing a well-balanced achieved sample.

Variables in the analysis

The survey was designed to ask headteachers about the following thematic areas which constitute the variables in our analysis below:

i) Free School Attributes. Respondents were asked to report on several attributes of their nearest free school. This included an assessment of the free school's *reputation* and *quality of education* from 'A very good reputation/quality' to 'A very poor reputation/quality' on 5-point scales. To measure perceived *free school innovation*, respondents were asked to report whether "the nearest free school provide[d] new or innovative practices not previously present locally in any of the following areas": School ethos, curriculum, pedagogy, pastoral care, extra- or co-curricular activities, uniform, or length of school day.

[15] The number of respondents who received an invitation to participate may have been lower that our total population of neighbouring schools. This is due, firstly, to the DfE record of 'school email addresses' including potentially old emails and, secondly, our invitation not being passed from a school email to the headteacher. The DfE decided after the Data Protection Act 2018 to withhold individual emails from FOI requests. The DfE now only provides what a school has given it as a 'school level address' rather than of the headteacher. This had implications for the quality of the email addresses we accessed. We worked to improve this, by manually checking headteacher emails on school websites for a stratified sample of 390 schools.

[16] 85% of respondents described their role as being a headteacher, principal or executive head/principal or CEO. The remaining 15% included Head of School, Deputy Head and School Business Manager roles.

To measure the perceived appeal of the free school to local families, respondents were asked whether "the nearest free school appeals particularly to any of the following groups of students": from lower-income families; with lower-than-average prior learning or attainment; with EAL; with SEN; from a minority ethnic group; with higher-than-average prior learning or attainment; from wealthier families. We defined an indicator variable if a free school was reported to appeal particularly to *advantaged students,* which included students with higher-than-average prior attainment or from wealthier families, or to *disadvantaged students,* which included lower prior attainment or lower-income families. All questions on the free school's attributes offered a 'don't know' response option. To measure headteachers' overall *awareness* to the nearest free school, we counted up the number of valid responses to the questions on free school reputation, quality, innovativeness, and recruitment appeal.

ii)Free School Impact. Free schools can potentially impact neighbours in a variety of ways. We distinguish between schools that perceived they were 'ever' or 'never' affected by their nearest free school. Schools were never affected if survey respondents replied, "The free school has never had any impact on my school" to the question, "To what extent has the overall impact of the nearest free school on your school changed in intensity over time?". To measure free school impact more granularly, we construct an index that summarises the extent to which respondents reported experiencing adverse changes in any of the following areas due to the free school's presence: number of students, percentage of students eligible for free school meals, popularity of the school with parents and funding (α=0.64).

iii) Competition. To measure perceived free school competition, headteachers were asked whether their school competes with the nearest free school in any of the following areas: recruitment of students, recruitment of staff, popularity among parents, and attainment of students in national tests or exams. Responses were combined into a single index (α=0.71).

iv) Collaboration. To measure perceived free school collaboration, headteachers were asked whether their school collaborates with the nearest free school, in any of the following areas: drama, arts or music activities, joint curriculum provision, school improvement activities or any form of collaboration. Responses were combined into a single index (α=0.64).

v) Actions. The survey asked respondents a range of questions about potential actions their school may have taken and the extent to which these were taken due to the presence of the nearest free school. Actions were grouped conceptually into three main types of responses.

- *Externally-focused actions* summarises actions relating to marketing or promotional approaches to students and parents and actions on extra-curricular activities.
- *Accountability-focused actions* summaries activities to strengthen external signals of academic quality including by placing greater emphasis on improving student attainment in national tests and exams, improving or retaining the overall Ofsted grade, and placing more emphasis on core subjects within the curriculum.
- *Internally-focused actions* summarises actions relating to organisational changes, including to improve the quality of classroom teaching, changes to the performance management of teachers, and changes to the monitoring of student progress.

A confirmatory factor analysis of survey responses supported the grouping of actions into these three types of responses. Subsequent analyses considered action taking across types and overall. We note a limitation to the analyse here is the restriction on the number of survey questions asked to make it a manageable task for respondents. We acknowledge there are likely to be potential actions not included in the survey. We sought to identify and analyse action in more depth in our nine local area case studies, reported on in Section 7.

Control variables. To account for general differences in the endogenous variables between schools, the models include dummy variables for school phase (primary, secondary), conurbation (yes/no), low Ofsted grade (yes/no), low share of free school eligible students (yes/ no), academy school (yes/ no), member of the same MAT as nearby free school (yes/ no), as well as a continuous variable that measures the years since the free school opened and approximate travel distance to the nearest free school.

To derive scales for free school awareness, innovativeness, impact, competition, collaboration and overall action taking by neighbouring schools, we fitted one-parameter logistic item response (Rasch) models for each of the six latent characteristics using responses to the underlying items.[17] As the aim was to deploy an analytical strategy that yields insights into the effect of free school competition, we developed a difference-in-differences design that exploited variation in exposure to the common shock of a free school setting up in the neighbourhood. This analytical strategy is set out in Appendix 6.1.

Findings

We present descriptive statistics of school leaders' responses, before then setting out the multivariate findings (from estimations of Equation (5) in Appendix 6.1). We explore first how responding neighbouring school leaders viewed their nearest free school. Table 6.1 describes respondents' awareness and perceptions. On awareness, only 7% of respondents did not know how to respond to any of the questions about the nearest free school's attributes. A non-negligible minority was relatively unaware, however, of their nearest free school. 15% did not know the reputation of their nearest free school, a third did not know about its quality, 3 in 10 did not know if the free school was innovative in any way, and just over a quarter did not know to whom the free school appealed.

The majority did however have perceptions. About 40% of school leaders perceived their nearest free school had a good/very good reputation and provided a good/very good quality of education. By contrast, 34% thought the free school's reputation was mixed or poor. Just over a quarter perceived their nearest free school neighbour provided a mixed/poor quality education. For comparison, about 57% of free schools in the sample were rated good or outstanding by Ofsted in the summer of 2022. A third did not have an Ofsted rating.

On potential innovation, about a quarter of headteachers perceived their nearest free school had developed some form of practice that was not previously present locally. Perceived free school innovation was concentrated around provision (curriculum, extra-curriculum activities, length of school day) and less on ethos or pedagogy. On perceptions about whether the nearest free school appealed to any groups of students, over a third of

[17] Rasch models weight the contribution of each item to the latent factor based on its 'difficulty', which derives from the schools' likelihood to take a specific action or register a particular impact (Panayides et al., 2013).

respondents perceived the free school to appeal to more advantaged students. Only about 1 in 10 respondents perceived the free school appealed to more disadvantaged students.

Table 6.1: Perceptions of the nearest free school neighbour

	Unweighted Frequency	Percent
Reputation		
Good/very good reputation	137	41.60
Mixed/poor/very poor	111	33.70
No reputation yet	31	9.71
Don't know	49	14.99
Quality		
Good/very good quality	129	40.30
Mixed/poor/very poor quality	90	26.23
Don't know	109	33.47
Any Innovation	89	25.09
Innovative provision (curriculum, extra-curriculum, length of day)	74	21.25
Innovative ethos or pedagogy	32	8.76
Innovation (don't know)	100	30.70
Appeals to disadvantaged students (lower income, lower attainment)	35	10.46
Appeals to advantaged (higher-income, higher attainment)	122	35.36
Appeal (don't know)	89	26.69
Neither know reputation, quality, innovation, nor appeal	22	6.82

Source: Survey of 328 neighbouring headteachers. Weighted percent using the provided survey weights.

Findings relating to perceived impacts of the nearest free school on neighbouring schools are set out in Table 6.2. A third of respondents perceived the free school had never affected their own school. The most common form of impact was a decline in a school's student roll followed by its popularity, perceived by almost 4 in 10 and 1 in 3 respondents, respectively. More than a quarter reported a loss in funding. Nearly 2 in 10 reported an increase of pupils eligible to Free School Meals. About 15% reported an adverse impact on teacher recruitment. By contrast, very few respondents reported favourable impacts of the free school, such as an increase in student numbers or reputation. Nonetheless, only a minority of schools perceived they had been negatively affected on all of these dimensions.

Table 6.2: Perceived adverse impact of the nearest free school on neighbouring school rolls and recruitment

	Unweighted frequency	Percent
Never affected	107	33.38
Affected student numbers	130	39.85
Affected popularity	107	31.92
Affected funding	94	27.52
Affected FSM student share	62	18.32
Affected teacher recruitment	49	15.31

Source: Survey of 328 neighbouring headteachers. Weighted percent using the provided survey weights.

We also looked at the timing of the free school impact. For the majority of affected schools, the perceived impact either remained time-constant (37%) or grew with time (36%). For 19% the free school's perceived impact reduced over time.

In relation to interactions between the schools, Table 6.3 describes perceived competition and collaboration between the neighbouring school and the nearest free school. Nearly 2 out of 3 school leaders reported some form of competition. More than half perceived the schools were engaged in competition over student recruitment. Nearly 40% perceived competition in relation to their school's popularity among parents. Competition over staff recruitment was report by about 30% of respondents. Only about 13% of respondents reported competition over student attainment in national exams.

Collaboration between neighbouring schools and their nearest free school was less frequent than competition, but existent. About 28% of respondents perceived some form of collaboration between their school and the free school. (We note that 'any other form of collaboration' was the largest single response item, indicating a wider diversity of collaboration beyond the specific forms of collaboration our survey asked about.[18])

Table 6.3: Competition and collaboration with free school neighbour

	Unweighted Frequency	Percent
Any competition	207	62.37
Recruitment of students	178	53.14
Popularity among parents	129	38.41
Recruitment of staff	94	29.82
Attainment of students in national tests or exams	42	12.82
None of the above	109	34.47
Any FS collaboration	87	28.09
Any other form of collaboration	65	22.05
School improvement activities	42	14.03
Joint curriculum provision	17	4.72
Drama, arts or music activities for students	13	3.37

Source: Survey of 328 neighbouring headteachers. Weighted percent using the provided survey weights.

There was some overlap between perceived competition and collaboration. About 15% of neighbouring schools reported both collaboration and competition with the free school. About 10% of neighbouring schools reported only collaborating with the free school. Approximately half of respondents reported only competing with the free school. The remaining quarter of respondents reported neither competition nor collaboration.

On any actions respondents reported their school had taken due to the presence of the nearest free school, the findings are set out in Table 6.4. About half reported taking any

[18] Cirin (2014) in an early survey of 74 free school headteachers by the DfE reported that collaboration by free schools with any other schools (not specifically local neighbours) was perceived by free school heads to include shared use of facilities and/or the sharing of specialist subject teachers.

action because of the entry of the nearest free school. A little under a half reported taking externally focused actions due to the free school's presence, including making changes to marketing or extra-curricular activities. About 1 in 5 reporting taking actions to improve or maintain external measures of academic quality by working on student test results, Ofsted grades and/or by emphasising core subjects in the curriculum. Only a small minority (<10%) reported internally-focused actions directly relating to the quality of teaching and learning.

Table 6.4: Actions taken due to the presence of the free school.

	Unweighted frequency	Percent
Any action	164	49.32
Externally focused actions	152	45.73
Accountability-focused actions	64	19.44
Internally-focused actions	26	7.33

Source: Survey of 328 neighbouring headteachers. Weighted percent using the provided survey weights.

Table 6.5 contrasts the responses between school leaders who reported their school had never been affected by their nearest free school neighbour with those who had experienced some form of impact. This used the derived indices and, where indicated, indices are z-standardised so that group differences are expressed in standard deviations units of the underlying index.

School leaders of ever-affected schools were better informed about their nearest free school than those never-affected (Awareness was half a standard deviation higher) and reported substantially higher levels of competition, overall impact and action taking (about a standard deviation or higher). Headteachers of ever-affected schools were also more likely to report the free school appealed to more advantaged students (a difference of 16 percentage points). To a lesser extent, headteacher of ever-affected also agreed that their neighbouring free school was locally innovative (0.21). By contrast, whether the free school appealed to disadvantaged students, or the degree of inter-school collaboration, was virtually the same between affected and unaffected schools.

Table 6.5: Facets of FS impact and its relationship with perceptions of competition, FS quality and changes at neighbouring schools due to FS

Facets	Ever affected by FS		Difference
	No (n=107)	Yes (n=221)	Yes - No
Free school appeals to disadvantaged students (%)	11.2	10.4	-0.8
Free school appeals to advantaged students (%)	26.2	42.5	16.4
Free school innovativeness score (z-score)	-0.143	0.069	.212
Awareness score (z-score)	-0.323	0.156	.480
Free school competition (z-score)	-0.694	0.336	1.031
Free school collaboration (z-score)	0.022	-0.011	-.032
Free school impact on school roll (z-score)	-0.785	0.380	1.164
Actions taken due to free school (z-score)	-0.656	0.318	.973

The bivariate sample statistics in Table 6.5 provide then an initial insight into how perceptions of school competition relate to free school attributes, impact and action taking due to the presence of the free school. We now examine these patterns in greater depth,

including in relation to the commonly assumed 'chain of causation' from perceived competition to action.

Examining competition and collaboration

We begin with an explorative analysis of antecedents of competition and collaboration between neighbouring schools and their nearest free school. To do this, we estimate linear regression models of the z-standardised competition or collaboration index on neighbouring school characteristics and free school attributes.

The results in Table 6.6 indicate that perceived competition was stronger when the nearest free school was perceived to appeal more to advantaged students, was located in areas with surplus school capacity, when neighbouring schools were judged 'inadequate' or 'requires improvements' by Ofsted, and at secondary phase. Free school competition decreased slightly with years since a free school opened and with approximate distance by travel time.

Collaboration, by contrast, increased with perceived free school innovativeness and, in particular, if the neighbouring school and the free school were reported to be part of the same MAT. In all, the models explained 15% and 29% of the between school variation in reported competition and collaboration, respectively.

Table 6.6: Predictors of competition and collaboration

	(1) Competition	(2) Collaboration
Free school innovativeness	-0.025	0.320*
	(0.1002)	(0.1329)
Free school appeals to advantaged students	0.302***	-0.017
	(0.0723)	(0.0711)
Conurbation	-0.072	-0.178
	(0.1172)	(0.1199)
Surplus school capacity	0.287*	0.072
	(0.1222)	(0.1446)
Academy school	-0.070	-0.134
	(0.1174)	(0.1004)
<=11% FSM	-0.036	0.009
	(0.1332)	(0.1273)
Low Ofsted grade	0.375*	-0.059
	(0.1484)	(0.1375)
Shared MAT with nearest FS	0.048	1.919***
	(0.2631)	(0.2580)
Typical travel time (car)	-0.039*	-0.015
	(0.0180)	(0.0144)
Years since FS opening	-0.072***	0.012
	(0.0179)	(0.0203)
Secondary phase	0.488***	0.053
	(0.1366)	(0.1289)
Number of Cases	328	328
R-squared	0.15	0.29
Residual DF	234	234

Standard errors in parentheses

+ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Action taking

We now consider the effects of school competition and collaboration on reported action taking due to the presence of the nearest free school. Table 6.7 reports the results from an estimation of equation 5 (in Appendix 6.1). In Table 6.7, Column (1) summarises the headline findings. Column (2) adds perceived adverse *impact* as a potential mediator from competition to actions. Column (3) estimates the baseline model for primary schools and Column (4) does the same for secondaries.

The results in Column (1) confirm a strong and significant relationship between free school competition and action taking. Neighbouring schools' exposure to free school competition was positively associated with action taking. By contrast, collaboration with the free school was not associated with action taking. Free school innovativeness or the perceived appeal to advantaged student groups did not develop a direct effect on action taking, over and above its contribution to competition (as reported in Table 6.6). In terms of control variables, action taking was more likely among schools with a less than 'good' Ofsted rating, in schools in conurbation (only at 10% level of significance), and at secondary phase.

Column (2) documents that the effect of competition on action taking was partly mediated through the perceived (adverse) *impact* of the nearest free school on neighbouring schools. Perceived free school impact on individual schools predicted action taking, over and above competition. The competition effects dropped by 40% after accounting for impact but remained statistically significant. Results in columns (3) and (4) do not indicate major differences in the association of competition and collaboration with action by school phase.

The analysis in Table 6.7 confirms, then, a strong relationship of exposure to free school competition with action taking, mediated by perceived impact. A standard deviation increase in the competition index was associated with almost half a standard deviation increase in action taking, with no noticeable difference by phase (columns 3 and 4).

Table 6.7: The free school effects on action taking within school clusters

	(1) CRE	(2) Mediator	(3) Primary	(4) Secondary
Free school competition	0.496***	0.289*	0.497***	0.491**
	(0.1144)	(0.1249)	(0.1436)	(0.1653)
Free school collaboration	-0.097	-0.054	0.065	-0.320
	(0.1508)	(0.1371)	(0.2198)	(0.2191)
Free school impact		0.513***		
		(0.1407)		
Free school innovativeness	0.048	0.036	0.071	0.043
	(0.0933)	(0.0886)	(0.1258)	(0.1547)
FS appeals to advantaged	0.073	-0.003	0.128	-0.084
	(0.0762)	(0.0745)	(0.0956)	(0.1201)
Number of Cases	328	328	221	107
R-squared	0.27	0.37	0.33	0.15
Residual DF	234	234	153	85

Results from a linear regression of action taking on perceptions of the nearest free school, school cluster average perceptions and control variables. Control variables include conurbation, surplus capacity, FSM %, Ofsted grade, MAT membership, travel time, years since free school opening, secondary/ primary phase
Cluster-robust standard errors in parentheses. $^{+}$ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

There are reasons to expect, however, that free school competition may have a differential impact on action taking by domains of action. To examine the impact of competition and collaboration on types of actions, Table 6.8 presents findings separate for 'externally focused actions', 'accountability-focused actions' and 'internally-focused actions' as the dependent variables. The control variables are the same as in Table 6.7. Table 6.8 reports then on the average marginal effect of a change in competition and collaboration on the likelihood of action taking in each domain.

Comparing across models shows that free school competition was closely related to actions to enhance the appeal of the school to students and parents (Externally-focused actions). Competition was also related to actions to improve or maintain school performance against external indicators (Accountability-focused actions). Competition was not significantly related, however, to actions that directly concerned with the quality of teaching and learning (Internally-focused actions).

These results estimate that a standard deviation increase in exposure to free school competition raised the likelihood of taking Externally-focused actions by 0.2 of a standard deviation and Accountability-focused actions by 0.1. These are substantial effects when compared to the average prevalence of externally-focused actions (nearly half of schools) and actions to improve performance indicators (about one in five, see Table 6.4). School competition was not significantly correlated with Internally-focused actions in the sample. There was again no significant effect of collaboration on action taking.

Table 6.8: Effect of competition and collaboration on likelihood of externally-focused, accountability-focused and internally-focused actions.

	(1) Externally-focused	(2) Accountability-focused	(3) Internally-focused
Free school competition (within)	0.214***	0.101*	0.050
	(0.0463)	(0.0445)	(0.0344)
Free school collaboration (within)	-0.090	-0.031	0.041
	(0.0631)	(0.0589)	(0.0344)
Number of Cases	328	328	328
DF Model	13	13	13

1: Externally focused actions (marketing, extra-curriculum), 2: Accountability-focused actions (attainment in national tests, Ofsted grade performance, emphasis on core subjects), 3: Internally-focused actions (quality of classroom teaching, teacher management, student progress monitoring). For the control variables see the notes to Table 6.7. Cluster-robust standard error in parentheses. $^{+}$ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Summary

Our findings evidence that perceived competition predicted reported action directly, as well as indirectly through adverse impacts of a nearby free school. The effect of perceived competition on action also held within free school clusters: for a given free school, schools that felt stronger competition were more likely to take action. At first glance, then, the policy narrative that assumes competition will lead to action (and in turn improvement),

sees some support. Upon closer inspection, however, there are important aspects to our findings that complicate and disrupt the assumed 'chain of causation'.

First, the policy narrative privileges an efficiency view of competition, where schools deploy resources to compete over quality and/or educational provision. Our findings however evidence the existence of selective competition, where schools compete over the socio-economic characteristics of students, including those perceived to be better positioned to perform well. These were not mutually exclusive processes. For instance, our analysis shows how perceived free school competition was influenced by student composition (appeal to advantaged students), external metrics of quality (Ofsted) and local structural conditions (including surplus places). This is indicative of competition working through a combination of mechanisms, rather than solely quality signals, This may well in turn inform school decision-making. We also found that whilst a quarter of free schools were perceived to offer some form of local innovation, free school innovativeness (as a potential aspect of efficient competition) was not associated with perceived competition or action taking.

A second disruption to the assumed 'chain of causation' concerned the nature of actions incentivised by perceived competition. We found the strongest association of competition was to the 'Externally-focused' domain. This related to marketing, promotion and extra-curricular activities. Such work can include improving communication and enrichment. However, promotion typically prioritises symbolic images and branding focused on student recruitment and reputation (Jabbar 2015), both of which were shown to be important in perceived free school competition. This strong association to external promotion is thus suggestive of perceived free school competition incentivising neighbours to deploy scarce resources in a race to recruit from a fixed pool of potential students. This has the potential to divert resources away from activities directly related to student learning (Lubienski 2009).

Perceived competition was also associated, to a lesser extent, to the 'Accountability-focussed actions' domain. This related to placing more emphasis on student attainment in national exams, improving or retaining a school's Ofsted grade and emphasising core curriculum subjects. This suggests free school competition can also spur schools to focus more resources on activities relating to student attainment, as measured by external metrics. Perceived competition did not, however, predict action in the third 'Internally-focused' domain. This related directly to internal practices, including the quality of teaching and learning, performance management of teachers and monitoring student progress.

The difference in our findings between these two domains is intriguing. It relates to debates about what 'improvement' is (and how it can be measured). From a view of improvement that includes meaningful change in the quality of classroom practices, perceived free school competition did not incentivise respondents in our sample to take such action. From a more limited output view of improvement, focussed primarily on changes in external quality metrics, perceived free school competition was associated with relating action.

There are widespread concerns however about output-only views of improvement, as these leave processes of change in a black box. Existing high-stakes accountability pressures can incentivise actions on test preparation, curriculum narrowing, gaming and triaging strategies and fabrication in response to inspection (Ingram et al 2018; Meadows and Black 2018;

Youdell 2004; Colman 2022). Such action can increase performance in a particular exam or inspection, but without improving students' academic knowledge or skills (Ravitch 2010).

Our survey findings are suggestive, then, that free school competition can reinforce and extend action on improving external accountability metrics, but without a relating focus on improving internal processes. We acknowledge there are limits to which our survey data can differentiate further between these domains of actions, not least as insights would be needed on schools' rationales for action-taking. This is one of the foci of the next section. We can however identify reasons why schools perceiving new competition from a nearby free school would prioritise action-taking in the ordering we have identified:

- Marketing and promotion are relatively cheap, low risk options for action providing opportunities for differentiation from a free school and/or emphasis of similarities. New extra-curricular activities offer, sometimes high-profile, 'add-on' provisions, without requiring change in core practices. These actions have potential to both improve a school's local appeal and respond to perceived cream-skimming by targeting messages at particular audiences, accentuating selective competition (Lubienski 2005).

- External accountability metrics inform parental choice and external state intervention. Taking actions to improve against external metrics can thus directly influence local reputation and perceived legitimacy. Such action is also in keeping with existing practices in a school system increasingly governed centrally through remote data and high-stakes accountability (Greany and Higham 2018)

- Internal action can, by contrast, be expensive and risky, not least because it involves changes to organisational patterns of behaviour, teachers' practices and potentially wider professional norms (Cuban 2012). Such improvement takes time to enact, is not always easily accessible or intelligible to parents and may not be successful in the terms measured by external performance metrics (Allen et al. 2021).

Finally, we note that while competition was the predominant from of relationship (reported by nearly two-thirds of respondents), collaboration between neighbouring schools and their nearest free schools also existed. Collaboration occurred both in the absence of perceived competition (10% of respondents) and alongside competition (15%). Collaboration increased where the free school and neighbouring school were in the same MAT. Collaboration also increased with perceived free school innovation. Collaboration was not associated with action-taking (in terms of the actions we asked about). In the next section we explore further the relations between free schools and neighbouring schools in nine local areas.

Section 7: Local market arenas

In this section we report on qualitative research in nine local areas in which a free school has opened. Interviews with the headteachers of both the free school and a sample of neighbouring schools provide insights into the local context, events that took place as and after a free school opened and what meanings these had for participants.

Drawing on this data, we are able to exemplify, elaborate and deepen our understanding of the patterning of perceptions, impacts and actions reported in the previous section. We do so by locating free schools in specific contexts, describing the origins and aims of the free school and by analysing the free school and neighbouring schools' perceptions of local patterns of choice and competition. We also explore the actions neighbouring schools report taking due to the presence of the free school and the logics of these actions. That is, we consider why particular actions were taken and what rationalities informed actors' decision making, as far as we can determine these.

The analysis confirms the conclusions made in the prior section, whilst also showing a slightly wider range of actions taken by neighbouring schools. We are also able to analyse the extent to which action-taking varies by context, including the influences of local structural conditions and a free school's aims and ethos on perceived competition and actions. Further we are able to evidence more closely the importance of the local 'status' of neighbouring schools to both their perceptions of competition and action taking.

By status, we refer to the reputational positioning a school is attributed locally relative to other schools, within a 'local status hierarchy'. As noted in Section 1, positionings in a local hierarchy can reflect quality signals, in terms of exam 'league tables', but are also commonly informed by a wider range of norms, values and inequalities that ascribe status in society (Woods et al 1998; Van Zanten 2009). These can include where a school is located and its perceived history, the socio-economic status of students and the "educational offer" of the school, including how curricular and extra-curricular activities are presented to and perceived by parents (Higham 2023). How these factors combine varies by context. Not all local markets have a clear local status hierarchy, but many do. The steepness or flatness of a status hierarchy can also vary over time in relation to changes in choice and competition. In this section we therefore use headteachers' perceptions of their own school and other local schools to infer an approximate status positioning for each school.

Analytical Approach

In each of the localities researched, a case study approach was employed. A case study approach enabled us to explore the perspectives of different schools and the relations and interactions between them (Woods et al. 1998). Researching nine cases also allowed for an appropriate range of school types and local contexts to be included, while retaining the in-depth "case-oriented analysis" of qualitative data (Sandelowski 1995: 183). Following our wider project's neighbourhood definition, the boundaries of each case study were defined as a free school and neighbouring schools, for which the free school was one of their nine closest schools of the same phase.

The cases were initially sampled using criteria that were informed by our research aims and questions. Our primary sampling criteria were: phase of the free school; number of years since opening; and level of forecast need for new student places (one year before the free school opened). We used these criteria to create eight sample groups. From these sample groups we randomly selected a first free school case and reserve cases. Invitations to participate were made to the headteacher of each free school and then the nine closest neighbouring schools by email and follow-up phone calls. We found however that where a free school agreed to participate it was almost impossible to recruit neighbouring schools, despite following up an initial invitation with up to six email and/or telephone reminders. This reflected the ('post'-) Covid recruitment context described also for the survey and we were again mindful of balancing recruitment with the wider pressures on headteachers.

We therefore developed an alternative strategy. This drew on the survey responses, where respondents were asked whether they would be willing to participate in a follow up interview. We identified respondents in the survey where more than one neighbouring school of an individual free school were willing to participate in an interview. We analyse the resulting free school groupings using our original sampling criteria, to locate clusters into our sampling groups. We again randomly selected a first case and reserve for each case. Invitations to participate were made to the headteacher of the free school and neighbouring schools that had not participated in the survey. All communication was undertaken by the case study researchers (Higham and McGinity). The achieved sample, including the number of participating neighbouring schools in each case, is summarised in Table 7.1 below.

Table 7.1: Achieved case study sample

Cluster	Case	Phase	Forecast need prior to opening	Population density	Participating neighbouring schools
1	A	Primary	Surplus	Conurbation	3
	B	Primary	Shortfall	'CT/TF/V'	2
2	C	Primary *	Surplus	Conurbation	4
	D	Primary	Shortfall	Conurbation	3
3	E	Secondary	Surplus	'CT/TF/V'	3
	F	All-through	Surplus	'CT/TF/V'	5
	H	Secondary*	Shortfall	Conurbation	4
4	G	Secondary	Shortfall	'CT/TF/V'	3
	J	Secondary	Surplus	'CT/TF/V'	1

Notes: For cases C and H, marked with a *, we were unable to finalise an interview at the free school, including after a headteacher agreed to participate. In Case J, the interview with the free school head was conducted before the sampling and recruitment approach was changed to draw on the survey respondents willing to participate in a follow-up interview. As one neighbouring school completed a survey response, we decided to include the data from Case J as a ninth local case in our analysis. For population density, the lower super output area in which the neighbouring school is located is reported, using the ONS 2011 rural-urban classification for small area geographies. To protect the confidentiality of respondents, due to the smaller proportion of free schools opened in rural areas, we only report the following distinction: conurbation (ONS categories A1 and B1); and 'CT/TF/V' which is City and Town; Town and Fringe; and Village (ONS categories C, D and E). In cases A and E to J, one neighbouring school was included based on their survey response alone, as we were unable to organise or finalise an interview, including after an agreed interview was postponed.

A common set of research procedures in each case supported comparative cross-case analysis. In each case study we combined two data collection methods:

i) *Documentary analysis*. We analysed a range of publicly available documents for each participating school. The documents included: i) The school's public presentation of itself, including the school's website and related marketing material; ii) Media, including local print and online media, to review local media representations of the school; iii) School performance data and Ofsted reports; iv) Student population data, including on eligibility for free school meals, Special Educational Needs and English as an Additional Language; v) Locality data, including: the Indices of Multiple Deprivation.

ii) *Semi-structured interviews.* We interviewed the headteacher of the participating free school and the headteachers of participating neighbouring schools. The aims of the interviews at each free school were to understand the headteacher's perceptions of: the free school's origins and location, its educational aims and ethos and local reputation; who the school served and student admissions in the context of local patterns of choice; the free school's educational practices and organisation; areas of potential innovation; experiences of competition locally; the free schools own competitive actions and logics of those actions; wider relations with other local schools, including potential collaboration; and reflections on the wider consequences of the free school opening for local students.

The aims of the interviews at neighbouring schools were to understand the headteacher's perceptions of: the context of their school, its ethos, improvement priorities and reputation locally; relations with other schools locally; the origins of the free school and perceptions about its reputation, educational practices and quality; the extent to which the free school impacted on other schools locally and whether that influenced relations between schools; the extent to which the free school's presence impacted upon their own school; whether they have felt specific types of 'competitive pressure'; whether they had responded to the presence of the free school in any way; the logics of any actions, including their motivations and decision-making; whether their school collaborated with the free school, in any way.

The interviews were recorded and transcribed verbatim. The data was coded by hand and analysed thematically through a parallel inductive and deductive approach, using the initial codes of: context; structural conditions; free school origins and ethos; student recruitment; perceived impacts of the free school; responsive actions; logics of action; and local consequences. Apriori codes were refined and added to through engagement with the data.

On the basis of this thematic analysis, we wrote individual reports for each case study to enable cross-case analysis. The cross-case analysis identified 4 clusters. Local cases were clustered on the basis of similarities in: contexts and structural conditions; and free schools aims and ethos. We were then able to analyse the extent to which these factors influenced perceived competition and, in turn, any action-taking. The four clusters (as set out in Table 7.1) include two primary free school clusters (1 and 2), one cluster including two secondary and one all-through free school (3) and one cluster with two secondaries free schools (4).

Findings

We set out the findings for each of the four clusters, before discussing the common themes.

Cluster 1

The two cases in the first cluster were located in a suburban area of a conurbation (case A) and in a town (case B), with both experiencing above-average socio-economic deprivation. The participating neighbours were all primary schools and judged to be 'good' by Ofsted. The primary free schools in each case had been proposed at a time of moderate forecast need for new places. In case A, a charity aiming to serve a deprived community identified a local area with forecast need. In case B, the free school originated from a local authority presumption proposal to the DfE as part of local place planning. The subsequent free school contracting-out process was won by a MAT operating in the region.

Prior to the free schools opening, schools had been asked by their local authority to help mitigate a 'bulge' in students via increased class sizes or an increased form of entry. A majority had been oversubscribed and prior competitive relations were not intensive. The local status hierarchy in both cases was characterised as having been relatively flat. All the schools participated in local clusters or partnerships that sought to provide mutual support. It was widely recognised, however, the shortfall of places had transitioned to an emerging surplus since the free schools opened. This reflected a national trend of a declining primary school population (DfE 2023c). These shifting conditions meant neighbouring schools all reported falling school rolls, with the majority under-subscribed in their early years.

Both free schools claimed to offer new aspects of provision locally. At free school A, the head described a focus on "core knowledge", "explicitly teaching children information" and "direct instruction". At free school B, the head described "a good old fashioned primary school" with traditional "solid teaching" and "high standards": "We will not have it that our children won't achieve". Personal development was also stressed with, at free school A, a "character curriculum", a focus on cultural capital through trips and "family lunch", so staff could model etiquette. Both schools had a slightly longer day and paid wraparound care designed to appeal to working parents. Neighbours perceived both free schools to be more "formal": "very much sat at a desk, they're doing a very formal style of learning. Whereas our set-up is very much play-based, independent learning" (B-NS1)[19].

Neither free school recruited to capacity in their first years. Free school B was supported financially at this time by its MAT. Both became oversubscribed in later years, however reversing local under-subscription trends. The free schools marketed heavily, in local press, at open days and on social media. Marketing messages related to a new school with a new ethos, in new buildings and facilities providing "better-quality education". Free school A was judged 'outstanding' by Ofsted in its second year. (B was yet to be inspected). Both free school heads argued they served local communities but noted patterns of choice. Free school B's head described recruiting "the 'considered parents', the parents that think and look because they've had to make a considered choice to choose the new school".

Neighbours perceived competitive pressures due to the free schools. These were not related clearly to a free school's quality, with participants reporting they either did not know the

[19] We refer to each case by an alphabetical letter (as set out in table 7.1.) and each case study school by its case letter and a number, indicating the order in which the interviews were conducted. So 'B-NS1' denotes the first neighbouring school headteacher to be interviewed in case B. 'B-FS' denotes the free school in case B.

free school's quality or perceived it to be 'mixed' (rather than good or poor). Competition was rather seen to concern student number and funding losses, with the free schools argued to have exacerbated a wider decline in pupil numbers. Neighbours regularly noted how "you're talking £3,000, £3,500 per child" (B-NS1) and if "those 60 children could have been allocated elsewhere" funding would have been manageable. The free schools were argued to have a competitive advantage in their "new shining buildings", while neighbours' had old estates and lacked access to similar capital funding. The free schools' recruitment practices were criticised, with both perceived to pursue "underhand tactics" and "poaching" of children when they had any spaces, particularly at the time of the student census, which impacts on funding. Whilst neither free school was argued to be overtly socially selective, free school B was seen not to take a fair share of children with Special Educational Needs.

All the neighbouring schools acted due to the free schools' presence. They had all raised *opposition* initially, arguing it was clear surplus places would be created. They felt ignored by their local authority and, in case B, angry when the Regional Schools Commissioner stated the free school would open due to poor quality rather than place need. The majority were engaged in *financial re-organisation* and rationalisation, to different degrees, to manage provision in response to surplus places. This included decreasing the main entry year by a form (A-NS1), closing nursery provision (A-NS3; B-NS2), replacing retiring staff with early career teachers (B-NS1) or not replacing staff (A-NS1; B-NS2), senior leaders taking on more back-office tasks (B-NS1) or no longer having a school business manager (B-NS2). These cuts were recent, yet to have clear impacts, but recognised to influence educational provision. Heads who felt most impacted by the free school made the clearest association. B-NS2 head argued: "the budget issues I believe are completely down to the free school".

A majority of schools also took new actions on *marketing*. Schools had developed new virtual tours, investment in webpage infrastructure, adverts, banners, flyers, presentations, social media activity, open mornings, outreach into private nurseries and events at the local supermarket. Messaging tended to focus on: "numbers and the numbers battle" (A-NS3) rather than social selection. Heads were also "moving swiftly" to welcome parents to the school after offers of a place went out to secure their acceptance.

A shared perception was local *collaboration* offered a means to protect schools. Each head reported deepening collaboration in response to the free school, but not with it. In case A, an existing partnership began to co-fund a shared business manager, curriculum projects and a bid writer to try to raise funds. Heads sought not to take in-year transfers from other partners and encouraged parents "to stick with that school". This was also evident in case B. None of the neighbours worked with the free school in these or less formalised ways, with B-NS1's head describing relations as "very much, us and them". The free schools reported they did not seek out local collaboration and rather oriented elsewhere: A to a network of other free schools and B to schools in its regional MAT.

Cluster 2

The two cases (C, D) in this cluster were located in inner-city suburbs with ethnically diverse communities, high deprivation and socio-economic inequalities. Both had seen demographic change and gentrification. Participants in case C saw an increasing lack of affordable homes: "housing that's going up in the area it's not really family homes and it's not really affordable

housing. So, a lot of my families have been moved out of the local area" (C-NS1). Primarily this affected poorer families, but young professionals living in new apartments also "move out … because they can't afford to have a house and a garden" when "they have had children" (ibid). These changes reinforced a prior trend towards less local children and residential segregation. Schools reported growing competition and a steep status hierarchy.

In case D, gentrification was concentrated in a neighbourhood where "professional" families began to move in a decade earlier to buy Victorian houses. The free school head described it as "one of those up-and-coming areas", where parents: "tend to be professionals in the service sector, teachers, social workers". Surrounding neighbourhoods were reported to be "more Asian and predominantly less affluent" (D-NS1).

Free school C was proposed by a group of parents who argued a new school would provide greater choice and higher quality provision in an area of existing surplus places. Free school D was proposed when there was a projected shortfall of places. A local school worked with the local authority to develop a free school, with the gentrified neighbourhood selected partly as it was where a site could be found. Neighbours noted the free school initially "took pressure" off local place demand (D-NS2), but this turned into a surplus of places. There were not "enough children to go around" (D-NS2) and "intense competition" (D-NS1).

Both free schools claimed to offer provision responding to their urban context. Following the national curriculum, they also developed materials to help children "learn about their local City area". The intention was to support "active engagement" as part of an enthusiasm for learning. Both schools aimed to provide a broad curriculum with art, drama, music and sports and to develop a nurturing small school or a school with small classes. Both were judged 'outstanding' several years after opening and became oversubscribed. Free school D almost exclusively served its gentrified neighbourhood. Free school C was seen to actively 'cream' students. Neighbours described extensive free school marketing and extra-curricular differentiation, including free musical tuition, which: "really appealed to the middle-class families … they made themselves the school of choice and I think a big part of the intake were influenced by reputation and marketing and the image" (C-NS1). Both free schools were notably more affluent, with lower proportions of EAL students, than the local average.

Higher status neighbours perceived some impact by the free school. C-NS3's head reported no change in student numbers but a slight increase in free school meals eligibility, arguing: "We have a great reputation … We maintained 'outstanding', so the free school, although pulling some higher income family local kids from our intake, hasn't had much impact really". D-NS2 had "always been a school of choice" but "lost outstanding recently": "One of our challenges is [the free school's] 'outstanding', and people go for the outstanding label. So that has had an impact on us". D-NS2 was no longer oversubscribed and perceived "a tendency" at the free school "to try and persuade parents of high needs children that they should go to [other schools]".

Lower status schools described substantive impacts. C-NS1 and C-NS2 were schools serving ethnically diverse "working-poor" families (C-NS1). The heads reported significant decreases in students and funding due to the free school, creating viability issues. In-year transfers out to the free school exacerbated student mobility, with the schools receiving increased 'hard

to place children', requiring a "huge amount of resources" (C-NS1). This had "knock on effects" where "more educated parents … take their children out of the school because they see these very challenging children … misbehaving". Both schools had been judged 'requires improvement' just before or just after the free school opened, which the heads perceived accentuated the free school's impact and contributed to destabilising their schools.

In case D, viability issues were not as advanced, but D-NS1 described an "element of white flight" where: "it's parents who are looking for children who will socialize in the same way that theirs will as they get older". D-NS3's head described how the school was now referred to as 'The Muslim School'. Both argued the free school was exclusionary, so their schools were "getting a disproportionate number of difficult parents … who've been told their children's needs can't be met" by the free school (D-NS1). A similar pattern of choice and perceived exclusion was reported in case C. C-NS1 and 2 reported how white middle class parents visiting on open days had told them: "'I want my child to go to a school where they can have play dates' and they didn't see that the demographic here" (C-NS1). Both heads also described reverse transfers by disadvantaged families who had chosen the free school but were unhappy there. C-NS2's head reported how: "several of the pupils here left, who weren't middle class, and went to [the free school] and came back". C-NS1 argued returning parents: "didn't feel like the [free] school was interested in them … [they] felt [the free school] didn't understand the complexities of children living in [here]".

All the neighbours took actions due to the free schools' presence. There were similarities to Cluster 1, but variations by status. High status schools did not take *financial re-organisation*, while cuts were particularly deep at C-NS1 and 2, extending to cutting school clubs and reducing staffing and classes (with mixed-age-group teaching). The majority also developed new *marketing*, with D-NS2's head stating: "we've all started marketing and we've all got the banners out … it is a competitive market and is really key to us". Lower-status schools were more cautious about messaging. D-NS1: "put a lot of glossy stuff out about special needs, all we end up doing is we're getting even more children who are challenged". This reflected a feeling of being constrained, partly financially ("we can't afford to market in the way that a free school can (C-NS2)), but also in terms of efficacy as marketing was "not going to change" the recruitment context. C-NS1 and 2 rather focused on being community resources for higher-needs families, including "running a mini food bank every day" (C-NS1).

There were also differences to Cluster 1. Schools reported taking actions on *external accountabilities* due to the free school. High status heads reported placing more emphasis on retaining or improving their Ofsted grade. Lower status schools perceived pressures to improve, but again saw limited efficacy. Both C-NS1 and 2 argued working from 'requires improvement' to a 'good' grade did not affect recruitment. Working towards 'outstanding' was still important: "I mean I think the biggest marketing we can do is to keep pushing to try and get that outstanding label. Even though I disagree with it completely" (C-NS1). C-NS2's head also reported placing more emphasis on core subjects. But both were clear that, from the perspective of a low status school, parental choice was not influenced primarily by quality measures but rather social composition and selective competition.

The lower status schools also felt exposed to external intervention. In case D, this concerned forced academisation, which D-NS3 had fought off, while D-NS1 feared being "asset

stripped". In case C, there was a real possibility of C-NS1 or C-NS2 closing: "I would be amazed if it wasn't an eventual outcome" (C-NS2). The heads highlighted the perceived inequities. Both argued that not only would "a solidly good school" be shut, but important financial and cultural resources would, in essence, transfer from schools serving deprived communities to a free school orientated to middle-class communities. For C-NS1's head:

> My worry about that is it's those parents that can shout the loudest that get. That's fine if you're an articulate person that understands the education system in this country. What it doesn't do is support those really marginalised communities.

Cluster 3

The cases in this third cluster were located in or near a town (E and F) and a city suburb (H). Cases F and H were among the top 20% least deprived areas in England, while E was close to the national average. In E and H, the free school was a secondary school. F was all-through and so its neighbours were primaries (F-NS2, 3, 5) and secondaries (F-NS1 and 4). A majority of all schools were near or at capacity during the research, but a notable minority were under-capacity. Prior to the free schools opening, relations between schools were reported as competitive but relatively stable. In H, several high-status schools topped a steep hierarchy. In E and F, a less steep hierarchy existed, but with several lower-status schools.

A common motivation among the free school proposers was a belief that local schools (with spare places children could access) were "not good enough" (E-FS). The proposers were a group of parents (E, H) and a group of local professionals (F). Each free school claimed to offer traditional, knowledge-based and academic education with high expectations. Free school E's head described a "no excuses, high expectations, everybody's going to do well, very strong behaviour culture" (E-FS). In cases F and H, there were commitments to fast-paced academic learning, 'knowledge-rich' teaching and "strict" behaviour and uniform policies (F-FS). Each school reported emphasis on enrichment activities (with musical tuition stressed) and a longer day. The schools were smaller-than-average and argued to provide supportive learning environments. They had all become oversubscribed over time.

A majority of neighbouring heads argued the free school ethos influenced recruitment. In case H, the ethos was similar to local high-status schools and attractive to middle class families. In case E, neighbours argued the free school reflected local demographics, but the ethos was "self-selective" (E-NS2) appealing to "aspirational" and minority ethnic group families with "a really strong commitment to self-improvement through education" (E-NS1). 'No excuses' were also seen to increase permanent exclusions. In case F, the free school was seen to appeal to a "certain type of parent" who "can't afford to pay for private" (F-NS1), were "happy to send their children to a state school, but don't want them mixing with a broad range of society" (F-NS3). Free school F was also seen to engage in 'pre-cropping', by contacting parents of potential SEN children: "it's another way of pushing away difficult children who might be hard to provide for (F-NS4)". The free school heads (E and F) were aware of and contested these accounts. Both argued fast-paced academic settings should be available to anyone, while noting their schools were "not for everyone" (E-FS).

The extent to which the free schools were perceived to impact on neighbours varied by their status. Higher status schools were unlikely to report any impact, with one "very relaxed"

about intense competition (H-NS2). Middle status schools were more likely to report student losses, but at secondary phase felt this was compensated by rising numbers locally. 'Lower-middle' status schools felt the impact intensified as their school "wasn't in such a great place" (F-NS1) when the free school opened. This led to student losses described as a "sort of destabilisation" and "a little bit of a brain drain" (F-NS1). This was felt acutely at F-NS3, a primary facing a viability crisis. The head reported potential parents talking about F-NS3 students being: "'from the wrong side of the tracks' … It feels really uncomfortable because it's becoming the haves and have nots". In all three cases, participants identified another school or schools perceived to be of low status and impacted heavily by the free schools. These schools did not reply to our invitation to participate.

The influence of status was also evident in action-taking due to the free schools' presence. High-status schools typically reported no action, although neighbours suggested otherwise. Our focus is thus on middle and lower-middle status schools, with high status schools referenced when relevant. All the schools reported new *marketing* and promotion, including work with marketing companies on branding and PR. Free schools noticed this. F-FS's head argued: "I did see, when we came along … definitely a lot more money being put into their marketing". Neighbours' promotional messaging contested the idea their school was 'not good enough'. They focussed on "reputation-building" and "giving people an insight into the great things that go on" (F-NS4), including through more active primary liaison (H-NS1).

A second action was '*differentiation*', which typically meant showing how a good school could still look and feel different to the free school. E-NS1 was "at pains I suppose to highlight our inclusivity. We don't see us as going head-to-head with them on which can be the stricter school … that's not what we're about" (E-NS1). F-NS4's head argued: "I know we could have higher standards of uniform or punctuality, all these other things, but it would push people away". This reflected a wider logic, with heads arguing: "we maintained our ethos and principles, possibly strengthened them, as a result of the free school" (E-NS1). In case F, heads talked about sustaining a 'broad and balanced curriculum' and educating "the whole child" (F-NS3). In E and H, neighbours reported a closer "degree of common thinking" with the free school around subjects considered "important, useful, valuable" (E-NS1). Here, differentiation meant more progressive pedagogies and/or different curriculum options.

Neighbours also worked to make some activities more *similar* to the free school. This included *extra-curricular activities*, with schools (re)introducing the Duke of Edinburgh Award, improving music provision and other enrichment activities. Schools reported *improving facilities*, especially sports amenities, to support primary liaison (H-NS1) or respond to a free school's "brand new buildings" (F-NS4). Schools also changed *student recruitment* practices. Higher status schools in each case were argued to have recruited over capacity (PAN). H-NS4's head saw competition was "less about one free school" and more how other schools went over PAN or "expanded their PAN, especially [higher-status schools] … which have had a very negative impact on our school and skews the cohort".

A final area of action was school improvement. Several low-middle status schools described intensive improvement work after a less than good Ofsted judgement before the free school opened. H-NS1's head reported working on *external-accountability*, but also on *internally-focussed* work on student behaviour, engagement with learning and a more 'challenging'

curriculum. Evidence the school's status was improving included a full Year 7 intake and, the head argued, "more white British students in Year 7 than Year 11". While perceiving it was hard to disentangle the pressures of Ofsted, parental choice and the free school, s/he argued the free school had made improvement harder as it: "exasperated the challenges … because it had an impact on numbers … we had less money coming in. It had a significant impact on the curriculum we were able to offer".

Cluster 4

In this final cluster, cases G and J were located in areas we are not describing to protect confidentiality. Both free schools were secondaries. The free school heads reported a need for places locally, but a primary motivation was to provide curriculum specialisms. (These are again not described to protect confidentiality). Although different, the specialisms related to curriculum or learning approaches not previously provided locally. The heads argued this offered choice. The original sponsors included either a further or higher education institution, which was intended to support access to curriculum resources.

Both free schools reported several years of undersubscription. Students came from "across the whole spectrum" (G-FS), but with reported higher than average special educational needs and lower prior attainment. This was corroborated by neighbours. The free school heads argued their provision was attractive to these families. Both argued they had also been sent, by the local authority and other schools, harder to place children, as they had spaces. Free school G's head argued the perception was: "It's not full, so let's send our difficult children to the new school". Both heads reported interventions to support learning not originally foreseen. They undertook marketing to publicise "what we are doing well and making sure that people who come realise that. It isn't for everybody" (G-FS). Changes were also made to both schools' admissions policies to try to recruit a broader student mix.

Reflecting local growth in student numbers, both free schools were full or nearly full during the research. The head of J reported: "there are no issues in the school, it's all very stable, it's financially very strong, quality of education is really good". Both heads however saw challenges. Resourcing the curriculum specialisms meant costs savings elsewhere, by employing less support staff or teachers taking on 'dual-roles'. Ofsted and performance tables were also perceived to create pressures for compliance, whilst not recognising all the learning activities the schools prioritised. The head of J reported how several qualifications offered "don't count for the school. So, when you look at published headline measures, you're effectively taking GCSE's away" (J-FS). Both saw a "fine balance", of "making sure that we're seen as being professional but also a specialist provision" (G-FS).

The free schools reported collaborating with neighbours on moderation, professional development and, in the case of J, shared procurement. G's head stated: **"**We've gone into each other's schools … We'll share facilities. We'll do lots of planning together". This was corroborated by G-NS2 and to a lesser extent G-NS3. Both free schools argued they had not created strong competitive pressures locally, in part as they recruited relatively widely so impacts were dispersed. Neighbours all reported some form of competition with the free school, over student recruitment (G-NS1; G-NS2), staff recruitment (G-NS1; J-NS1) and/or popularity among parents (G-NS1; G-NS3). The free schools' admissions changes were one cause of competition but reduced over time with growing rolls. In case G, competition was

perceived to be dampened by the free school's 'mixed' reputation. Neighbours saw the free school as innovative – in ethos, curriculum, extra-curricular and/or length of school day – but did not perceive this was appealing to students from wealthier families or with higher prior attainment. G-NS1's head argued this reflected the lower status middle class parents attributed to the curriculum specialisms: "a large number of my parents are aspirational middle class and would never consider [the free school] because they don't see the offer as what they desire for their children. … They don't see the prioritisation of the academic".

The neighbours in this cluster reported taking no actions due to the free school, except G-NS1, where the head described receiving an 'inadequate' Ofsted judgment soon after the free school opened. S/he argued: "I think that increased the propensity of parents in my natural catchment area to look elsewhere, because a devastating judgement of inadequate does that. … I think [the free school] has done well out of that judgement". The head reported actions on *marketing* and promotion due to the free school: "I'm working much harder to be full, to retain my students". This was a protective strategy: "I don't want to have spaces, because then, of course, if you have spaces, you're at the mercy of the local inclusion panel … So that all feels like a ridiculous battle that a local free school has made".

Action on *extra-curricular activities* at G-NS1 resulted from parental requests in response to the free school. The head stressed this was "a little bit of extra-curricular adaptation" (not described here to preserve confidentiality). S/he also "resisted because it shouldn't be a competition and I need my school to stay faithful to what my school is. And I'm not losing massive numbers." The school also placed *more emphasis on core subjects* as measured by the English Baccalaureate (EBACC). This was partly to respond to Ofsted, but also an outcome of competition. A minority of parents and students also pressured the headteacher for a different form of narrowing: to not do specific EBACC subjects because friends at the free school were perceived not to have to. The headteacher resisted this, in part due to Ofsted's inspection framework, but had been persuaded to do so a case-by-case basis.

Summary

We now draw out four sets of insights from the presentation of the clusters above. First, the analysis highlights factors influencing the intensity of perceived competition, due to the presence of a free school. Local structural conditions were shown to be important, including both the extent of residential segregation and the balance of supply and demand for places. That perceived competition was stronger in areas with surplus places reflected the survey findings. The clusters also showed how structural conditions changed over time. Declining rolls and increasing surplus places, particularly in primary schools, increased the perceived intensity of competition and the impacts of the free school. This had occurred even where presumption free schools opened initially in response to a need for places.

The clusters also demonstrated the influence of a free school's aims and ethos on perceived competition. This related less to innovation and more to how a free school was perceived to appeal to different socio-economic groups. In cluster 3, for example, the free schools' promotion of fast-paced academic environments, in the forms of 'no-excuses' or quasi-private-schooling, were seen to increase competition by appealing, respectively, to self-selecting aspirational families and to middle class families keen to limit mixing with more

disadvantaged groups. By contrast in cluster 4, the lower status attributed to the free schools' specialisms, particularly by middle-class parents, informed weaker competition.

Second, the analysis demonstrated several foci of competition. In Cluster 1 competition was over student numbers and funding. In Clusters 2 and 3, it extended to social selection. This was influenced by the free school's marketing, negative stereotyping of neighbours and recruitment practices perceived to cream, crop or exclude students. Neighbours argued cropping existed where students were unable to cope with a free school's demands for obedience or pressures for attainment or where students from poorer families returned to a neighbour reporting they were "not part of what the free school wanted". In Cluster 2, several neighbours also described 'white flight' to the free schools.

The free school's perceived quality did not emerge as a consistent influence on competition, although Ofsted grades were important to its perceived appeal. The unclear role of quality may reflect the lag between a free school opening and test results. Several neighbours did not have clearly formed views on a free school's quality despite competing with it. Free school heads were keener to stress their quality as a competitive threat, particularly when judged Outstanding with above average student progress data. Higher status neighbours in Cluster 2 were particularly sensitive to their Ofsted grade, but its influence was related mainly to parental choice and selective competition rather than to teaching and learning.

Third, action-taking in response to a free school's presence was common, although not universal, and was influenced by perceived impact corroborating the survey. *Marketing and promotion* were widespread. Sometimes this combined with new *extra-curricular activities*, particularly in middle and high-status schools, highlighting their use in signifying status. *Differentiation* was also identified, where schools used messaging to (seek to) restate the legitimacy of their provision. There was caution on claiming differences signifying lower status; and differentiation could combine with highlighting similarities to the free school.

Action on *external accountabilities* was widespread, reflecting its perceived role in choice. Schools in steeper status hierarchies reported more action. High status heads placed an emphasis on retaining or improving their Ofsted grade. Lower status schools were more likely to also report work on student attainment and narrowing their curriculum. Action on *internally-focused* classroom practices was limited. An exception was where schools were downgraded by Ofsted and working to achieve 'Good' required internal change. It was hard for participants to disentangle these influences, but a loss of students to the free school intensified pressure to act. Yet this combination of loss and downgrade was a perceived cause of destabilisation, argued to make improvement harder (Munoz-Chereau et al 2022).

Action-taking also extended to activities not captured in the survey. *Rationalisation* was common, clarifying how cuts to provision or staffing resulted from free school competition, both generally (cluster 1) and in lower status schools (cluster 2 and 3). Primary schools were more affected (here than in Section 5), reflecting the influence of recent declines in primary rolls. *Collaboration* was identified as a protective strategy, including in seeking economies of scale. This commonly excluded the free school (Cluster 1). Intensive competition could also preclude collaboration (Cluster 2). Neighbours had *opposed* the free school, due to a lack of need for places, but perceived they had been ignored. Action on *recruitment practices* was

also reported, but mainly about other, particularly higher status, schools. A potential limitation was that heads were less willing to discuss their own potential actions here.

Fourth, while headteachers' logics of action were often context-specific, there was a clear difference between high and low status. High status schools had locally advantaged intakes, likelihood of historic oversubscription and greater financial security. Their heads were less likely to report negative free school impacts and perceived greater capacity for action. Their dispositions towards action did vary by context, reflecting a distinction made by Van Zanten (2009). Where heads perceived their intake remained relatively stable, they tended towards a "monopolistic" logic, relying on an existing reputation to remain socially selective. Where heads perceived stronger competition, they tended towards a "entrepreneurial" logic, using promotional, differentiation and recruitment strategies to sustain an advantaged intake.

Lower status schools often had more disadvantaged students, higher student mobility and/or undersubscription. Their heads were more likely to report adverse compositional change due to a free school's presence. They were more likely to undertake rationalisation and perceive their wider actions had less efficacy given the patterning of parental choice. There was again variation. In one school in a wealthier neighbourhood with growing local rolls, the head's disposition was similar to Van Zanten's "tactical" logic of action. S/he was defensive but sought to attract students with a 'good attitude to learning'. In more deprived urban contexts, heads were more comparable to Higham's (2023) "'survivalist" logic. They felt "compelled to rationalise staffing and curriculum options, whilst reframing who their school served", with high proportions of EAL students eligible for FSMs.

Finally, we note how free school and neighbouring heads often held different perceptions about the consequences of the free school's presence. Free school heads regularly saw their school incentivised improvement. They typically did not know their neighbours well, so this argument was often articulated in relation to assumed competitive incentives. FS-C's head argued: "I would imagine they must be thinking, 'Right, we need to start doing more.' … Like, I guess competition in a way does that. It should raise the standards for everybody". FS-E's head argued: "we have driven up the standard of education because, it's that natural competition, isn't it?". FS-F's head argued neighbours: "had to really up their game". The exception was Cluster 4, where the free schools were perceived to have lower status.

Neighbouring schools typically argued that, while they were working to improve, they rarely did this due to the free school's presence. D-NS2's head argued: "We're constantly improving our curriculum. We're constantly improving the quality of teaching and learning … I would say it's an absolute priority in our school, as it is anywhere, but I don't think more so because of the free school". Several heads were critical of the policy assumption that: "'the rising tide should carry all ships'. I don't think there's really any significant evidence … that that's happened". Rather, particularly in Cluster 2 and 3, neighbours argued the free school's presence destabilised specific local schools, making them more fragile. Where competition was most intense, perceived social selection by free schools and higher status neighbours was also seen to have the potential to increase social segregation.

In the next sections we progress our analyses of, first, student attainment in neighbouring schools and then, social segregation in the localities in which free schools have opened.

Section 8: Student attainment in neighbouring schools

In this section we develop an analysis of whether the opening of free schools is associated with any improvement or deterioration in student attainment in neighbouring schools. We thus focus on a key outcome anticipated in policy from choice and competition: that neighbouring schools will respond to the presence of a new free school by improving their academic quality as measured by student attainment.

Policy makers have often assumed existing schools will perceive new competitive threats due to a free school and respond by improving their academic quality, particularly where they are losing students. In earlier sections of this report, we have seen evidence that supports aspects of this assumed 'chain of causation' (Betts 2009). The presence of a free school was shown to influence change, on average, in choice patterns and to reduce student enrolments in neighbouring schools (Section 5). When neighbouring school leaders in our survey perceived competition from the free school, this predicted them reporting action-taking in response to a free school's presence (Section 6).

We have also seen evidence, however, that complicates and disrupts the policy narrative. Rather than improving internal practices, survey respondents reported responding to competition by prioritising actions on promotion and marketing and, to a lesser extent, external accountability metrics. This was not argued to preclude improvement but raised the possibility of resources being diverted away from activities relating directly to student learning. There was also evidence of selective competition where, in addition to external quality metrics, schools reported competing over students perceived to be better positioned to perform well in school. A loss of students and funding was perceived in our case studies to have the potential to destabilise schools, particularly those serving deprived communities

In light of these findings, we progress the following analyses in this section. We develop an analysis of student attainment in neighbouring schools, including in terms of observed improvement or deterioration. We test for any heterogeneity in free school effects on student attainment in neighbouring schools, using a set of theoretically relevant moderators including distance, recruitment areas and pupil loss. We also analyse whether any observed changes in student attainment are mediated by the extent of any compositional change in neighbouring schools after a free school opened.

Analytical approach

To develop these analyses, we draw again on the longitudinal panel of English schools introduced in Section 2. This extends from the year before the first free school opened in 2011 through to the outbreak of the Covid-19 pandemic in 2019. The data were drawn from the DfE's annual school-level data collections, formed into a panel dataset to allow us to track changes in schools' characteristics and performance over time.

Our empirical strategy followed a quasi-experimental design, identifying within-school changes in pupil attainment that are due to treatment relative to the counterfactual scenario that the school had not been affected by the opening of a free school nearby. We regard a school as being treated from the first academic year in which a free school of the

same phase (i.e. primary or secondary) opens within a school's 'neighbourhood area'. (In Section 2 we set out our approach to identifying neighbouring schools).

To develop the analyses, we used a matched difference-in-differences design (MDiD). First, we matched schools affected and not affected by free-school competition on similar pre-treatment trajectories. In this analysis, we use the same matched sample of schools as use in Section 5. Appendix 5.1 sets out a detailed description of our matching approach. Second, using our matched sample, we employed a difference-in-differences approach to estimate conditional free-school effects on yearly changes in our outcomes of interest, estimating our models using two-way fixed effects.[20] We also estimated difference-in-difference-in-differences (DDD) models that tested for heterogeneity in free-school effects. Following the same strategy as in Section 5, Appendix 5.2 set outs how we built up these models, demonstrating the relevance of this approach to producing unbiased estimates.

Our outcome measures in this section are schools' relative average performance across the core subjects of English and maths at age 11 (for primary schools) and age 16 (for secondary schools). We focus on these core subjects and relative performance to maximise the comparability of these measures over the fairly extensive time period we are using. This is particularly important given substantial changes in national assessments in England across this period, which are known to have affected schools with particular intakes and, hence, could confound any treatment effects that are correlated with schools with such intakes. We note how these national assessment changes represent a limitation of our analysis, in that we are limited to the core subjects of English and Maths and cannot analyse attainment across the wider curriculum, particularly at age 16.[21]

We take schools' within-year average grades in English and maths, as reported in the NPD, and based on these place schools into a 1000 point ranking (divided by 10 so that our results can be interpreted as %-point changes in a school's position in national rankings). As such, our results capture relative changes in performance that push schools up or pull them down these rankings. The advantage of this is that it should improve the robustness of our approach to changes in performance measures over time (at least to the extent that they affect all schools similarly), but at the cost that we ignore any absolute changes in performance that are being felt across all schools. However, we think this is not much of a

[20] Specifically, we employed school-level fixed effects to remove time-invariant unobserved differences between schools, and year-level fixed effects to remove school-invariant unobserved differences between years. In addition, recognising some of the potential issues with two-way fixed effects estimators with staggered treatment (Goodman-Bacon, 2021), we re-estimated our core models using an imputation approach, as suggested by Borusyak et al. (2022). This had no substantive implications for our findings.

[21] We note that in this section and sections 3 and 4, we use student attainment as a measure of academic quality. We do this while recognising a broader range of outcomes, including wellbeing, enjoyment and skills for lifelong learning, for which there is no nationally available data. We also differentiate between action-taking and student attainment as an educational outcome. Student attainment is a highly visible quality signal and school decision-making on action-taking is subjected to external accountabilities. There are a range of pressures on schools to improve or sustain standards of attainment. Schools can work to improve attainment without necessarily taking actions on classroom teaching and learning (see Section 6). This highlights a limitation of using student attainment in English and Maths as a measure of academic quality, given the range of potential ways to influence attainment, which have implications for the quality of student learning.

limitation in the context of an analysis method in which we are, in any case, comparing with the changing performance of untreated schools.

Our regression models included a set of time-varying covariates that are likely correlated to pupil outcomes, thereby further reducing any remaining imbalances between our treatment and comparison groups not accounted for by our matching and difference in differences strategies. In Appendix 8.1, we set out a summary of these covariates, as well as our approach to developing a set of mediation analyses that we discuss below.

To provide suggestive evidence that we have an analysis sample suitable to proceed with our analyses, we set out descriptive statistics of our matched sample in Appendix 8.2. This includes our outcome variables, moderators and baseline covariates. Overall, these demonstrate that, after matching, we obtain a sample that is broadly similar in terms of baseline characteristics between free school neighbours and the rest of the sample.

Findings

We set out our main findings in Table 8.1. As discussed in Appendix 5.2, we build up our models from a naïve approach, which essentially ignores the longitudinal dimension of our data, to one in which we take advantage of it to deal with time-invariant unobserved differences between schools and school-invariant unobserved differences between years, as well as the timing of treatment to understand treatment dynamics.

The first column of Table 8.1 reports from the naïve model, finding that schools that have free schools for a neighbour in a given year have slightly higher performance than schools without such a neighbour, conditional on the covariates included in the model, but this is not statistically significant. The second column includes school- and year-level fixed effects and, after accounting for both of these sources of heterogeneity, our estimated difference in performance between treated and untreated school becomes larger and statistically significant. In the third column, restricting the analysis to our matched sample of schools ends up making surprisingly little difference to the estimated difference.

We then report on our main treatment estimates from our DID models segregated into primary and secondary sectors, since these are the principal estimates of interest. Adopting a difference in differences framework also allows us to see whether any differences tend to build in the years following treatment.

Our results considering performance in the primary school phase are reported in Table 8.1, Column 4. These estimates of average rank scores in reading and maths – based on Key Stage 2 exams taken at the end of primary phase – do not show statistically significant effects on neighbouring primary schools. In other words, schools located in areas where a free school opened nearby during our period of analysis see no change in pupil performance relative to similar schools that are not affected by free school competition. On average, primary neighbours neither improve nor do they decline.

Turning to secondary schools, the main findings are set out in Table 8.1, Column 5. Here we find on average student outcomes in Key Stage 4 qualifications do improve in the years following the opening of a free school relative to the trends in similar schools where a free

school opening did not occur. The increase begins one year after treatment and becomes stronger in the following two years. This improvement is quite moderate. At its peak, the opening of a free school appears to induce a boost of less than 2 percentiles in the average rank score. In a hypothetical school market of 100 secondary schools, a secondary school affected by free school competition would move up between one and two positions in the league table each year for four years beginning the second year after a free school opened.

Table 8.1: Free School Effect on Average rank scores in English and Maths (KS2/KS4)

	Naive	TWFE		TWFE Matched		DiD Prim.	DiD Sec.	
Treatment Status								
Free-School Neighbour	0.435	1.188	**	1.154	**			
	(0.393)	(0.382)		(0.391)				
0 Years Post-Treatment						0.696	0.743	
						(0.852)	(0.417)	
1 Years Post-Treatment						1.083	1.312	**
						(0.959)	(0.488)	
2 Years Post-Treatment						-0.396	1.863	***
						(1.018)	(0.557)	
3 Years Post-Treatment						1.386	2.075	***
						(1.124)	(0.603)	
4 Years Post-Treatment						-1.006	1.860	**
						(1.241)	(0.628)	
5 Years Post-Treatment						1.669	1.700	*
						(1.359)	(0.736)	
Adjusted R-squared	0.37	0.01		0.01		0.01	0.04	
Number of clusters	5091	5091		4849		3161	1688	
Number of observations	38857	38857		37280		24294	12986	
Residual DF	5090	5090		4848		3160	1687	

Notes. Coefficients from linear regression models. Standard errors are calculated taking into account the clustering of observations within schools across time (with number of clusters reported at the base of the table). Asterisks indicate statistical significance: *** p<.001, ** p<.01, * p<.05. TWFE indicates inclusion of two way fixed effects for years and school to account for idiosyncratic variations by year and time invariant school differences, respectively.

We test these findings in a set of robustness checks. In Section 5, we noted the potential importance of testing the size of our neighbourhood model. This was because, specifically for primary schools, the impact of declining pupil rolls was shown to be experienced more clearly by schools located closer to a free school. This raised the possibility that, while our definition of neighbourhoods was effective in capturing patterns of choice and competition in secondary phase, our neighbourhoods might be too large in the primary phase.

We therefore developed robustness checks that reduced the size of our neighbourhoods in three stages. In a 75th percentile model, we excluded neighbouring schools that were outside the 75th percentile of distance from a free school, stratified by population density (specified as: rural, town, conurbation). Then in a 50th percentile model and a 25th percentile model, we excluded neighbouring schools that were, respectively, outside the 50th and 25th percentile of distance from a free school, again stratified by population density. The latter model equates to including neighbouring schools where the free school is approximately one of the 2-3 closest schools to a neighbouring school on average.

Across these robustness checks we find the same overall trends as in our main models. There are no statistically significant effects on primary free school neighbours in any of our robustness checks. In the secondary phase there are statistically significant effects and the size of our estimates are marginally larger than in our main model, as we might expect when we exclude the furthest away schools. In Appendix 8.3, we set out the Table for the 25% robustness check model and we also compare the overlapping recruitment LSOAs of neighbouring schools and free schools between the main model and the robustness model.

Given the consistent lack of overall effects, we do not investigate pupil performance in primary schools further. Rather we consider secondary schools in more detail.

Secondary schools: moderator and mediator analyses

We now develop our moderator and mediator analyses for secondary school. We ask, can the small but non-negligible improvements we observe on average in neighbour secondary schools be attributed to efficiency gains driven by market pressures or by something else?

We know from our analyses in Section 5 that the onset of free-school competition produces a reduction in the size of cohorts enrolling in secondary neighbours of up to 6% in the third year on average after the free school opened. Over time, changes in rolls may translate into a different average intake. In Sections 6 and 7 we observed the importance attributed to selective competition by neighbouring headteachers. We thus raise the hypothesis in this section that the estimated improvement in pupil outcomes may depend on a school's ability to retain pupils who, due to their prior achievement, ethnic background or socioeconomic status are better positioned to perform well in secondary school. This would imply social selection may be an important mediator of competition translating into improvement.

In the interest of simplicity in interpretation, these analyses are carried out by splitting the sample into two, either at the median of these characteristics or at some other natural cut point, so that we can explore the potential for differences in treatment estimates above higher or lower levels of the characteristic. We are cautious in the interpretation of moderator and mediator analyses, since common trend assumptions are less likely to hold in the context of sub-groups of our matched sample. However, these provide useful indicative evidence about potential reasons for our overall finding.

We began by exploring proxies of competitive pressure commonly used in the literature on school choice and competition, including distance (above/below median distance from free school), the number of overlapping recruitment areas (defined in our data using Lower-layer Super Output Areas, LSOAs), geographical context (urban/rural) and the academic quality of neighbouring schools, measured by attainment and Ofsted grades at baseline. None of these moderators were associated, however, with improvement or deterioration effects.

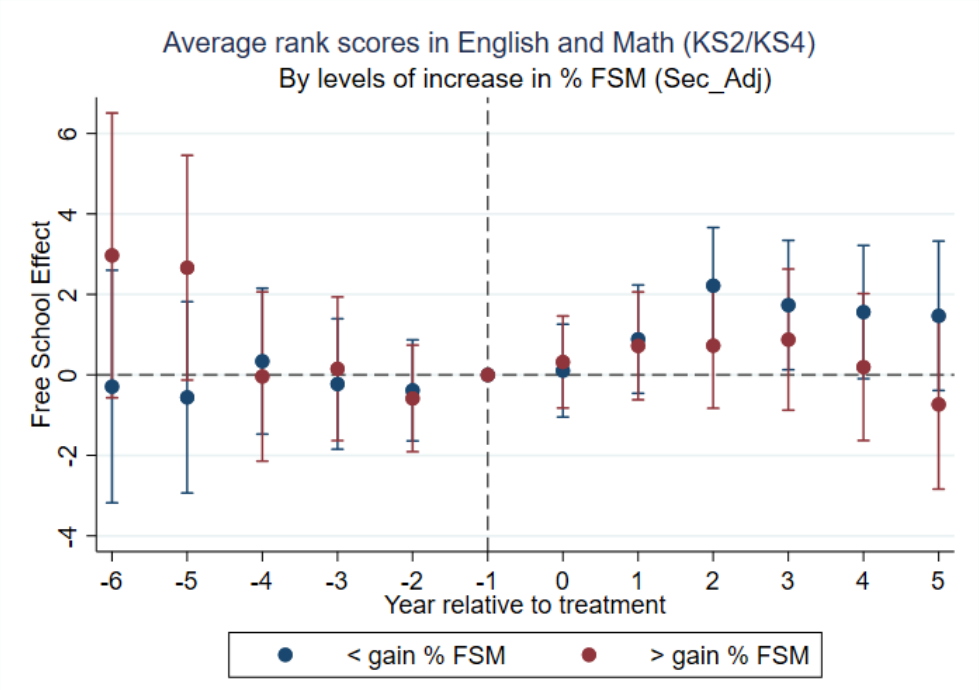
Second, we analysed additional measures of competitive pressure calculated as part of our analyses in Section 5. Specifically, we used our estimates of the extent of pupil loss for neighbouring schools, compared to their matched comparator school, to estimate the extent of pupil loss experienced by a neighbouring school as a result of the free school

opening. We also calculated the estimated change in that school's composition of pupils eligible for free schools meals (FSM).

The overall extent of pupil loss was not associated with differential outcomes for secondary schools. There were tentative signs, however, that the extent to which this changed the composition of the neighbouring school was linked to changes in school performance. To investigate this, we examined differential impacts of a nearby free school opening, focussing on whether or not neighbouring schools experienced a large (>1 within-school SD above mean) increase in their %FSM eligible pupils in the years after the free schools opens.[22]

As set out in Figure 8.1, schools which lost substantially more non-FSM pupils (increasing the % FSM eligibility of their cohort) were less likely to be able to improve their performance. Neighbouring schools with a smaller or no increase in their %FSMs were those schools driving the overall observed improvement gains in the secondary phase. This would be consistent with our hypothesis above that the estimated gains from competition are mediated by changes in composition that also result from that competition, albeit that we note these are suggestive results relating to quite substantial changes in composition.

Figure 8.1: Free school effect on average rank scores in English and Math by levels of intake change (%FSM)



Notes. Figures derived from regression models. Unweighted observations: 12,790; Residual degrees of freedom: 1687.

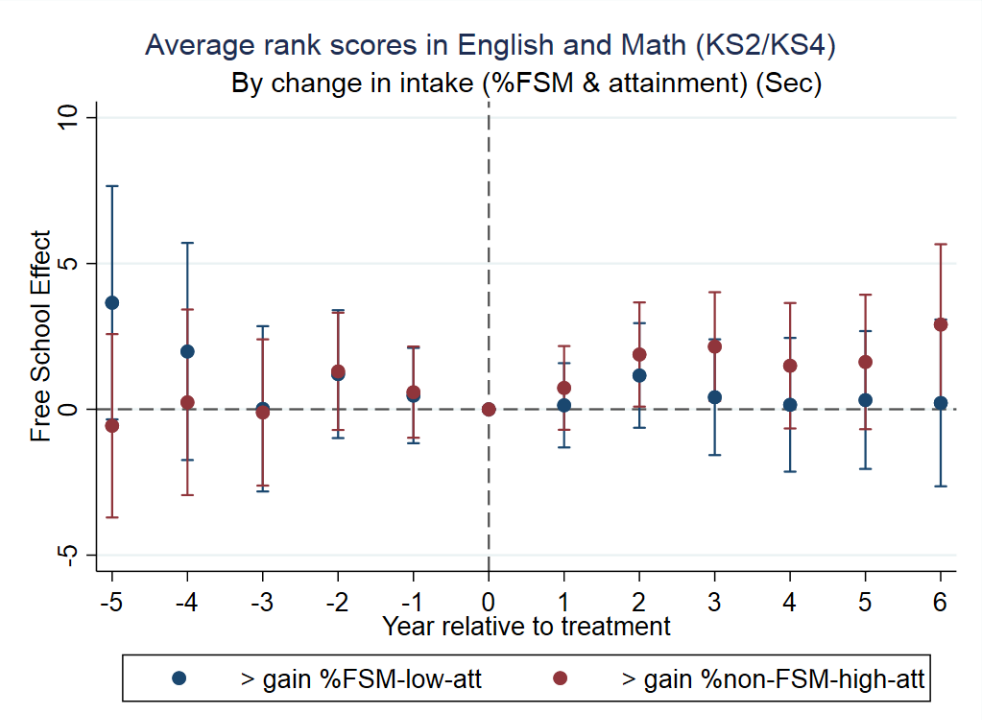
Based on this, we further analysed compositional change as a potential influence on competitive effects. First, noting that schools may well experience competition differently in

[22] We also carried out this analysis including all schools but splitting by above/below median change in %FSM. This showed a similar pattern of change but was not statistically significant. As such, it should be borne in mind our findings here are driven by schools that are particularly affected by change in composition due to a free school opening nearby.

relation to compositional change, we compared two groups of schools. The first group comprised schools experiencing a large (>1 within-school SD above mean) increase in FSM students with low-prior attainment. The second group included schools experiencing a large increase in students not eligible for FSMs with high prior attainment (PA).

The results are set out in Figure 8.2. Similar to the findings by %FSM composition change, we found suggestive evidence of an influence on post-treatment improvement trends. Among the second group of schools (large increase in non-FSM students with high PA), there were statistically significant positive estimated effects on student attainment in lagged years 2 and 3. Among the first group of schools (large increase in FSM students with low PA) the overall trend was of schools not on average improving. We note the differences between the two groups were however not statistically significant.

Figure 8.2: Free school effect on average rank scores in English and Math by levels of intake change (%FSM & prior attainment)

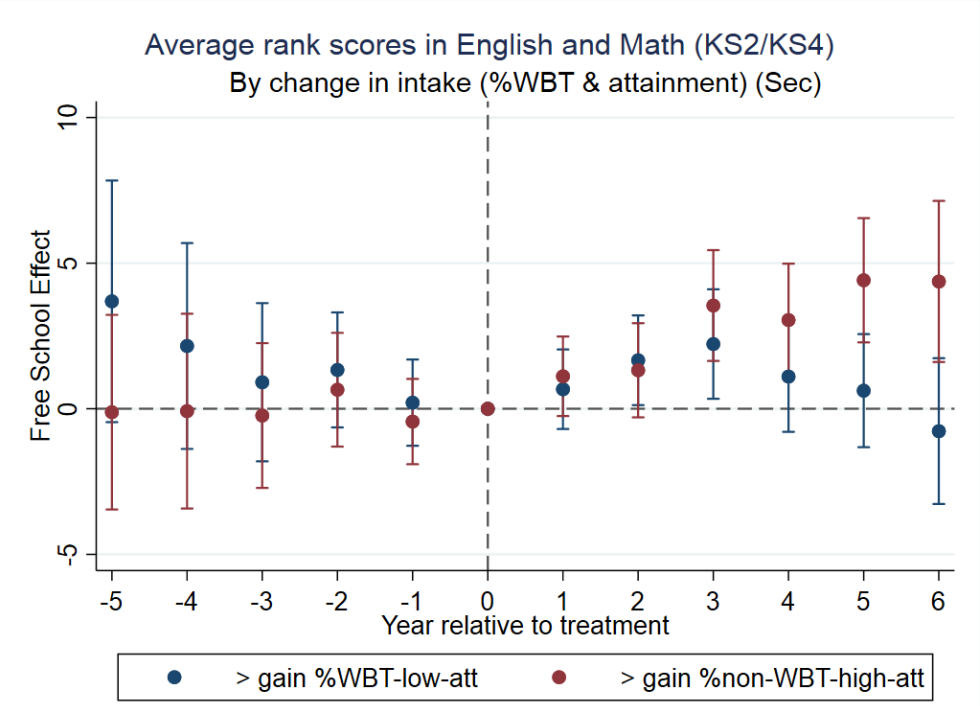


Notes. Figures derived from regression models. Unweighted observations: 12,790; Residual degrees of freedom: 1687.

Second, we also compared two further groups. The first group included schools experiencing a large (>1 within-school SD above mean) increase in White British students with low-prior attainment. The second group comprised schools experiencing a large increase in non-White British students with high prior attainment (PA).

The findings are set out in Figure 8.3. Here there was a similar, but somewhat stronger, patterning of difference. Among the second group of schools (large increase in non-White British students with high PA), there were statistically significant positive estimated effects on student attainment in lagged years 3-6. Among the first group (large increase in White British students with low PA) schools did not on average sustain initial improvement. The differences between the two groups were also statistically significant.

Figure 8.3: Free school effect on average rank scores in English and Math by levels of intake change (%WBT & prior attainment)

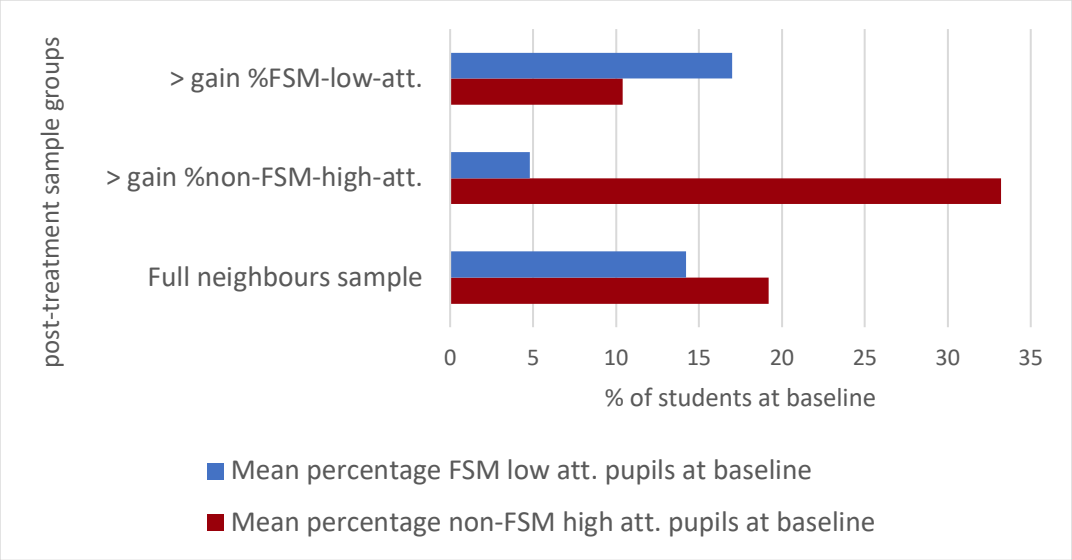


Notes. Figures derived from regression models. Unweighted observations: 12,790. Residual degrees of freedom: 1687.

To understand the context of these differential trends, we investigated the student composition of these two sets of groups of schools in the year prior to a free school opening. This provided insight into whether these schools were already different from one another at baseline as well as compared to the average of all neighbouring schools.

As Figure 8.4 demonstrates, in respect of prior attainment (PA) and FSM eligibility (the groups set out in Figure 8.2), there were notable differences at baseline. Schools with substantially growing percentages of FSM students with low-PA post-treatment were already more likely pre-treatment to have a larger proportion of these students (17.0%) and a lower proportion of non-FSM students with high PA (10.4%). By contrast, schools with faster growing percentages of non-FSM students with high PA post-treatment were already more likely pre-treatment to have a larger proportion of these students (33.2%) and a smaller proportion of FSM students with low-PA (4.8%). Both groups were also different to the average composition of all neighbouring schools.

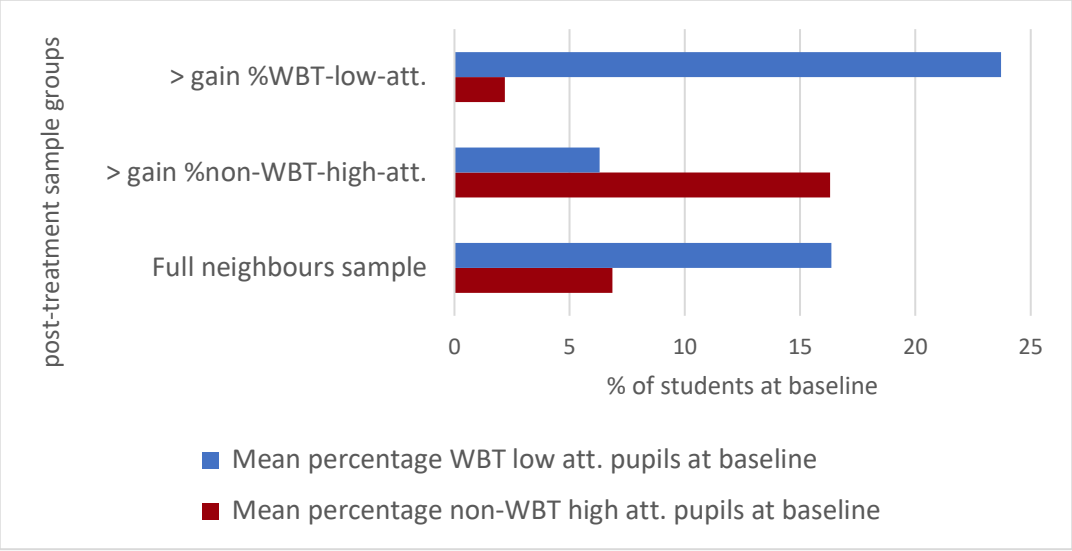
Figure 8.4: Mean of school composition at baseline by FSM eligibility and prior attainment for the analysis groups in Figure 8.2, compared to full analysis sample of neighbouring schools.



Notes. The number of schools in each post-treatment sample group were as follows: > gain %FSM-low-att: 344. > gain %non-FSM-high-att. 271. Full neighbours sample 841. FSM = Free School Meals. High Att. = percentage of pupils achieving the government's 'higher standard' at age 11. Low Att. = percentage of pupils failing to achieve the government's 'expected standard' at age 11. Figure 8.2 analysis groups defined as schools that see a >1SD increase in %FSM low prior attaining students and schools that see a >1SD increase in %non-FSM high prior attaining students.

There was a similar patterning in respect of prior attainment and ethnicity, set out in Figure 8.5. Schools with substantially growing percentages of White British students with low-PA post-treatment, were already more likely pre-treatment to have a larger proportion of these students (23.7%) and a lower proportion of non-White British students with high-PA (2.2%). By contrast, schools with faster growing percentages of non-White British students with high-PA post treatment, were more likely pre-treatment to have a larger proportion of these students (16.3%) and a smaller proportion of White British students with low-PA (6.3%). Both groups were again different to the average composition of neighbouring schools.

Figure 8.5: Mean of school composition at baseline by ethnicity and prior attainment for the analysis groups in Figure 8.3, compared to full analysis sample of neighbouring schools.



Notes. The number of schools in each post-treatment sample group were as follows: > gain %WBT-low-att. 372. > gain %non-WBT-high-att. 235. Full neighbours sample 841. WBT = White British. Figure 8.3 analysis groups defined as schools that see a >1SD increase in %White British low prior attaining students and schools that see a >1SD increase in %non-White British high prior attaining students.

Our interpretation is there is suggestive evidence that the competitive effects on secondary school performance (as proxied by changes in rankings of their Maths/English performance) are somewhat mediated by the extent of compositional change caused by the arrival of a nearby free school. This compositional change in turn appears to be predicted by the existing composition of neighbouring schools when a free school opens.

Summary

In this section we analysed whether the opening of free schools is associated with any improvement or deterioration in student attainment in neighbouring schools. Our findings evidenced a mixed picture. We found student attainment in neighbouring schools in English and Maths has not, on average, deteriorated after the opening of a free school. In terms of improvement, we found a phase difference. There was no observed improvement, on average, in student attainment in primary neighbours. There was, on average, a modest increase in student attainment in secondary neighbours. We confirmed these findings in a set of robustness checks that reduced the size of our neighbourhood models.

We also found evidence of variation among neighbouring secondary schools in relation to improved student attainment. There was evidence of improvement among schools that experienced, after a free school opened, an increased percentage of students who may be better positioned to perform well in school. This included non-FSM-high prior attainment and non-WBT-high prior attainment students. These 'compositional gainer' schools were, on average, already serving more advantaged intakes prior to a free school opening. By contrast, there was little evidence of improvement among neighbouring schools that experienced increasing percentage of FSM-low prior attainment student or White British-low prior attainment students. These schools were, on average, already serving more disadvantaged intakes prior to a free school opening.

There are likely to be a range of reasons in different contexts for these patterns, but we can draw on our wider data to briefly identify several potential influences. In terms of variations among secondary schools, we note schools gaining more advantaged compositions may have improved in our rankings because they had an increasing proportion of students better positioned to perform well. We measured relative changes in attainment that push schools up (or pull them down) our rankings, in comparison to a non-treated matched sample. The matching was at baseline so matched schools may not have seen similar compositional change if this were due to choice and competition incentivised by a free school's presence.[23]

[23] A caveat is that, with compositional change occurring primarily in the main intake year (Year 7), there would be a 5-year time tag from enrolment to examination (Year 11). We do see the strongest differences in the fifth and sixth post-treatment years, but we also see differences from the third and fourth post-treatment years, suggesting additional factors may be involved. We note that gaining a more advantageous composition may however have wider benefits to a school beyond a specific year group, potentially enabling prioritisation of students preparing for exams before more advantageous year groups reach their examination year.

The intensity of competition may have also been an influence. In Section 5, we showed that secondary schools with higher proportions of non-FSM and non-White British students at baseline were more likely to have experienced pupil loss. Pupil loss itself was not associated with changes in student attainment, but the potential of student loss and advantageous compositional gain is interesting to consider.

One image of 'compositional gainers' might be of schools expanding. Our case studies certainly identified higher-status schools perceived to have gone over PAN while remaining socially selective. Given the potential of pupil loss, however, it is probable 'compositional gainers' also included schools that became slightly smaller after a free school opened. These schools may well have felt competitive pressures but been able to protect their advantaged intakes. This reflects a second type of selective competition observed in the case studies, involving creaming (and potentially cropping) of students to sustain competitive advantage.

That 'compositional gainers' were likely to have more advantaged intakes at baseline, may have also influenced their capacities to respond to competition. In Section 7, we found schools with advantaged intakes tended to enjoy higher status locally and greater symbolic and financial resources to act. While actions varied, higher status schools perceiving strong competition tended to use promotion, differentiation and recruitment to try to sustain advantaged intakes, while also placing more emphasis on external accountability metrics.

By contrast, in schools experiencing pupil loss and increased proportions of disadvantaged students, headteachers were more likely to report cutting staffing or curriculum options. Theoretically it has been argued deterioration in student attainment is more likely to occur where neighbours lose pupils and funding due to the presence of a free school (Hatcher 2011; NAO 2017). Insofar as our analysis shows, the student number losses we evidenced in Section 5 have not, on average, undermined neighbouring schools' capacity to sustain prior levels of student attainment over our period of study.

Our case studies did, however, identify a set of conditions perceived to destabilise specific neighbouring schools. These included: serving contexts of deprivation; experiencing a loss of students due to a free school; having low status in a steep local hierarchy, with high status schools perceived to intensify selective recruitment practices after a free school opened; and being downgraded to below 'Good' by Ofsted either just before or just after a free school opened. These factors were hard for headteachers to disentangle and were not conceived as deterministic of deterioration. Their combination, however, was argued to negatively influence parental choice for their school, leading to a further concentration of disadvantaged students, whilst also creating the need for rationalisation.

Our conclusion is that it was not pupil loss per se that influenced deterioration or improvement. Rather, it is how this combined with the direction and intensity of any compositional change and with schools' different capacities for competitive action. In particular, competitive effects on secondary school performance appear to have been mediated by the extent of compositional change caused by the arrival of the nearby free school and, in turn, this compositional change appears to have been predicted by the existing composition of neighbouring schools prior to a free school opening. In the next section we explore a second potential outcome of choice and competition, segregation.

Section 9: Social Segregation

In this section we develop an analysis of social segregation between local schools following the opening of a free school. We analyse whether free schools are associated with changes in the likelihood of students meeting peers from the same background as themselves at school. We are concerned therefore with relative isolation, with isolation measured relative to a student year-group in a local area. In a fully segregated local system, a student would only meet students from the same background as themselves. In a fully inclusive system, there would be no relationship between a student's background and the background of the other students they meet. We analyse whether free schools have influenced change in how predictive a student's background is of the backgrounds of their peers at school.

The importance of segregation between schools is widely recognised. Greater segregation of students from different backgrounds has the potential to increase inequalities of access to good schools (Burgess et al. 2005) while also contributing to intolerance and discrimination (Anderson 2010). Increased inclusion, by contrast, has been argued to support community cohesion (Weeks-Bernard 2007), a culture of mutual respect and participation (Anderson 2010) and to reduce socio-economic gaps in attainment (Gorard et al 2022; Greaves 2023).

In this section, we thus extend beyond the assumed 'chain of causation' regarding free schools and student attainment, analysed in previous sections, to ask whether the opening of free schools – and the ensuing forms of choice and competition we have documented – have wider social consequences in terms of segregation.

Theoretically, the opening of new free schools could influence existing patterns of social segregation in a number of ways. Structurally, free school could reduce the constraints families face in attending their first preference school, by providing more and closer places (Burgess et al. 2019). This could also widen the choice options available for families. Where this facilitates families to choose less segregated schools, social segregation could reduce.

New and different choices could also, however, increase segregation where families have strong preferences for peers with similar backgrounds, associate social composition with academic quality or do not have equal access to information or resources (Wilson and Bridge 2019; Monarrez et al. 2022). Existing evidence in England suggests that preferences expressed by families tend to be segregating (Allen 2007). Greaves (2023) reports schools would be less segregated by both family income and by ethnicity if students were enrolled into their closest school by distance rather than according to their preferences.[24]

There has been one prior analysis of the influence of free schools on segregation. Green et al. (2015) considered segregation by student free school meals eligibility (FSMs) within local authorities. They found a very small rise in FSM segregation in primary schools and no association in the secondary phase. Analysing the first three annual free school waves to open (2011-13), Green et al. (2015: 922) concluded there were probably "too few free schools, with very small cohort sizes" at the time. Given free school intakes were not

[24] As Greaves (2023) notes, this comparison assumes residential segregation would not change as a result of enrolling students by distance (rather than by preferences). In practice, residential segregation might change if families made different decisions about where to live in response to changes in school admissions policies.

representative of local neighbourhoods, however, Green et al. argued "as the number of free schools grows … we would expect these impacts to become more noticeable".

In this section, we progress the analysis of free schools and social segregation by considering segregation in relation to Free School Meals eligibility (FSM), ethnicity (White British (WBri) and Black, Asian and minority ethnic groups (BAE)), English as an Additional Language (EAL) and Special Educational Needs (SEN). We measure 'between school' segregation within the specific geographical areas of electoral wards for primary schools and parliamentary constituencies for secondary schools. For reasons we set out below, our analysis is preliminary, in that we show how future research could test our findings at different geographical scales and by using different measures of segregation.

Analytical approach

We first outline the data sources and the analytical approach employed to analyse trends in school segregation. The main dataset for our analysis is derived from the school census collected over the span of a decade. The analytical period of our analysis encompasses the academic years 2011 to 2020.

The school census dataset provides information about the range of individual student characteristics outlined above (FSM, WBri, BAE, EAL and SEN). We explore school system segregation along these socio-demographic dimensions to develop a comprehensive understanding of how free school entry might re-shape segregation between students. The census dataset also contains details pertaining to the schools themselves, such as school type and geographical location. Our analysis focuses on mainstream state schools, including mainstream free schools.[25]

For the analysis, pupil information was aggregated to the school system level. This was done year group by year group. This enables us to estimate the effect of free schools on segregation as student cohorts progress through education. Our geographical framework adheres to the electoral geography of electoral wards for primary schools and parliamentary constituencies for secondary schools (with constituencies also employed as a robustness check in for primaries). This hierarchical structure positions electoral wards within both Local Authority Districts (LADs) and constituencies, with constituencies nested in regions.

In determining our geographic framework, we carefully considered alternatives. We did not use our neighbouring school's 'neighbourhood' model, employed in earlier sections, because these neighbourhoods overlap and are therefore not mutually exclusive. Our preference was for defined areas with clear boundaries within which to measure segregation over time. We also reviewed other officially defined geographical units. An analysis of school segregation requires that at least two schools serve a year-group-system cell. While some official definitions, such as Middle Layer Super Output Areas (MSOAs), were too granular often with no or at most one schools, others, like Local Authority Districts (LADs), provided insufficient precision.

[25] We again exclude University Technical Colleges (UTCs) and Studio schools as well as special and alternative provision free schools from our analysis given of their narrower scope.

Our chosen level of disaggregation strikes a balance between these extremes, informed by selecting a scale at which parents could conceivably consider choice and schools compete for students. We note, however, that no official geographical unit provides a flawless fit for analysing segregation as these units are not defined in relation to schools and the number of schools in any unit can vary (Mitchell 2023). This is a limitation to our analysis.

Our final analytical datasets encompass up to 306,555 observations for primary school years Reception to Year 6, where the system aligns to electoral wards, and 26,621 observations for secondary school Years 7 to 11, where the system aligns with constituencies. In this analysis, the median number of primary schools in a ward was 3 and the median number of secondary schools in a constituency was 6. Appendix 9.1 sets out these medians together with the range and standard deviation for each phase.

Measuring Segregation

Our measure of school segregation looked at how likely pupils from the same background are to meet each other compared to pupils from different backgrounds within a local area and school-year group. We measure this difference for a specific background ("*D*"). Pupils either share (*D=1*) or do not share this background (*D=0*). The benchmark is total segregation: where students with background "*D=1*" only meet others with the same background "*d*" and have zero chance of meeting students from different backgrounds. More formally, school segregation for background D is summarised by the variance ratio index (also called eta-squared):

$$\eta_j^2 = \frac{E\left[d_{ij}\middle|D=1\right] - D_j}{1 - D_j}$$

where, i indexes school-year-groups, and j the local system, D_j is the system-wide share of pupils of background D. The segregation index measures how likely it is that a student of group D meets another student of the same group in their school year group in system *j* compared to the benchmark of full segregation. In a perfectly integrated systems, individual pupil characteristics are not predictive of their peers' characteristics. All schools would share the same system-wide proportion of group D pupils. The nominator would evaluate to zero. By contrast, in a perfectly segregated systems, pupils in group D are only exposed to themselves ($E\left[d_{ij}\middle|D=1\right]=1$), and the index would thus take the value one. An increase of the index implies a move closer to the benchmark of complete segregation and vice versa.

Leveraging the aggregated data, we track trends in segregation within system-year groups across the designated time frame. A central facet of our research entails evaluating the impact of free schools on these observed trends in school segregation. Our approach is informed by Monarrez et al. (2022), who analysed the effect of student enrolment into charter schools on school segregation in America. In Appendix 9.2. we set out our approach to measuring the effect of free school enrolment on school segregation in England.

Findings

Setting out the findings we overview school segregation trends observed between 2011 and 2020 in England. We then analyse the impact of free school enrolment on segregation. Our index was scaled to range from 0 (fully integrated) to 100 (fully segregated).

School Segregation Trends in England

In the primary phase, information from more than 4600 Wards (and 530 constituencies as a robustness check) was used in the analysis, representing nearly the whole of England. As Table 9.2 sets out, school segregation in the primary phase at the level of wards fell across all the considered characteristics: Free School Meals (FSM), Black, Asian, Ethnic Minority (BAE), White British (WBri), Education as an Additional Language (EAL) and Special Education needs (SEN).

Compared with 2011, by 2020 students in primary schools were more likely to encounter peers who were dissimilar to themselves. English local primary school systems thus became less segregated over our time frame, even if the downward trend started to stall for some groups in later years. This holds whether school systems were defined at the level of Wards or Constituencies. As Table 9.2 demonstrates, in 2011, EAL students were the most isolated group followed by FSM students and WBri students. Despite an evident drop in segregation for EAL students by 2020, they remained the most isolated group ahead of WBri students.

Table 9.2. Predicted level of school segregation within wards-year group over time. Primary Phase

	(1)	(2)	(3)	(4)	(5)
Year	FSM	BAE	WBri	EAL	SEN
2011	6.5	4.9	6.0	7.7	4.9
2012	6.4	5.0	6.0	7.7	4.7
2013	6.3	4.8	5.9	7.6	4.4
2014	6.1	4.7	5.8	7.1	4.4
2015	6.0	4.7	6.0	7.5	4.2
2016	5.7	4.6	6.0	7.4	4.1
2017	5.5	4.4	5.4	5.8	4.0
2018	5.3	4.3	5.5	5.7	3.9
2019	5.3	4.3	5.6	5.7	3.8
2020	5.3	4.3	5.4	5.7	3.7
Observations	302,729	269,680	295,945	260,122	303,429

Note: Time trend estimates within ward-year groups using linear regression. (Average marginal effects computed using Stata's margins command)

Table 9.3. Predicted school segregation within constituency-year group over time. Secondary Phase

	(1)	(2)	(3)	(4)	(5)
Year	FSM	BAE	WBri	EAL	SEN
2011	6.6	5.8	7.3	6.9	5.2
2012	6.7	5.9	7.1	6.9	4.8
2013	6.7	6.1	7.4	6.7	4.6
2014	6.9	6.2	7.7	6.9	5.3
2015	6.7	6.3	7.8	6.9	5.7
2016	6.6	6.4	7.6	6.8	5.2
2017	6.3	6.4	8.1	6.9	4.6
2018	6.2	6.4	7.9	6.9	4.4
2019	6.0	6.4	8.0	7.1	4.3
2020	5.8	6.4	8.0	6.9	4.0
Observations	26,621	26,621	26,621	26,620	26,621

Note: Time trend estimates within constituency-year groups using linear regression. (Average marginal effects computed using Stata's margins command.)

In the secondary phase, local systems were defined by constituencies. We analysed 532 school 'systems' at this geographical level, again representing nearly the whole of England. As Table 9.3. shows, the time-trends in segregation across pupil characteristics were varied at secondary level. Segregation by ethnicity (BAE and WBri) rose across the time period, while segregation by EAL remained broadly stable. Segregation for FSM and SEN students fell. WBri students had been and remained the most isolated group.

These findings are broadly consistent with other recent analyses of social segregation in England. First, they suggest that the school systems were overall relatively well integrated with index values generally in the single digit range. Second, like others, of findings suggest segregation has generally been on a downward trend nationally. Gorard and colleagues, for instance, report FSM segregation decreased in both primary (Gorard et al. 2022) and secondary phases (Gorard 2023) between 2011 and 2019. They suggest this was associated with the provision of Pupil Premium funding from 2011.

Harris and Johnson (2020) report segregation by ethnicity 2011 to 2017 decreased in both primary and secondary phases, influenced by demographic changes, with a relative decline in WBri students and an increase in other ethnic groups. One difference in our findings to note is thus in the secondary phase, where Mitchell (2023) also finds segregation by ethnicity deceased between 2006 and 2019. We find between a slight increase in the secondary phase between 2011 and 2020. This difference may, as noted in Appendix 9.2., reflect the different time periods, geographic units of analysis and segregation indices used.

Impact of Free Schools on social segregation

We now analyse the impact of free schools on social segregation, first for primary and then secondary schools.

Primary schools

At the primary phase, where schools tend to be smaller, more numerous and in closer proximity, we again prioritise the discussion of findings for Years R-at the Ward level. As set out in Table 9.4, our estimation results indicate a modest, statistically significant impact of free school enrolment on increasing segregation for EAL, WBri and BAE students. We also find a small reduction in segregation for SEN students.

These estimated effects are relatively modest. For example, we can consider this for EAL students, which shows the clearest increase in segregation due to the opening of free schools (column (4)). For EAL students, a 1 percentage point increase in free school enrolment is associated with a 0.154 increase in the segregation index.

The average national primary free school enrolment rate was 1.5% in 2020 (see Section 3). This level of free school enrolment predicts a 0.23-point increase in EAL segregation. Given the mean EAL segregation index was 7.38, an average increase in free school enrolment shifted EAL segregation by approximately 3%.

If we considering the 80th percentile of free school enrolment nationally, we observe approximately a 5-point increase in enrolment. This large increase in free school enrolment predicted a 0.77-point increase in EAL segregation, equating to a shift in EAL segregation of just over 10%. For comparison, system wide, the EAL segregation index fell by more than

25% over the 10-year analytical period, relative to its baseline value in 2011 (see Table 9.2). We can approximate then, in terms of the declining national trend, a large 5-point increase in free school enrolment set EAL integration back by about 3.5 years in primary schools.

The predicted effect of free school enrolment on segregation was smaller for the other considered pupil characteristics. Nonetheless, the main finding of a modest segregation increasing effect on EAL and WBri students following free school enrolment also held when primary school systems were defined at the constituency level.

Table 9.4: Association of primary free school enrolment with school system segregation. Year R-6. Ward. 2012-2020

	(1) FSM	(2) BAE	(3) WBri	(4) EAL	(5) SEN
Free School Enrolment	0.011	0.036*	0.090***	0.154***	-0.041**
	(0.0152)	(0.0168)	(0.0202)	(0.0257)	(0.0125)
Mean Outcome	5.79	5.35	6.43	7.38	3.89
Observations	302,620	268,570	295,709	258,341	303,325
Systems	4614	4548	4606	4503	4614
Within R-squared	0.02	0.01	0.01	0.00	0.01
Residual Degrees of Freedom	4613	4547	4605	4502	4613

Note: Estimates from a linear fixed effect model of free school enrolment on school system segregation in a ward-yeargroup-year panel. Models include log pupil count, the number of schools, and the fraction of students of interest. Fixed effects by system-schoolyear, system-yeargroup and region-yeargroup-schoolyear. Standard errors in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

We also assessed whether free schools' contribution to student segregation varied by context. We compared the effect of free school enrolment on segregation between system with high and low ethnic diversity and between urban and rural areas. The underlying rationale was that the ethos and target audience of free schools and/or the patterning of choice and competition might vary by context and therefore shape segregation differently.

Table 9.5 summarises the results by levels of ethnic diversity, measured by the system-wide share of ethnic minority pupils in 2011. The first coefficient row in Table 9.5 sets out the free school effect on pupil segregation in less diverse systems. The second row shows how patterns of segregation associated with free school enrolment in high-diversity systems differed from those in less diverse systems. The first row is considered the main effect, the second row an interaction effect. The sum of the main effect and interaction effect gives the estimated effect of free school enrolment in high diversity settings.

We find free schools in less diverse settings contributed specifically to WBri and EAL segregation. By contrast, in high-diversity settings, free school enrolment contributed more strongly to FSM, BAE, and EAL segregation, with the former two differences reaching statistical significance at common levels. The contribution to WBri pupil segregation was significantly smaller than in low-diversity settings. For SEN pupil, there was desegregation in high-diversity settings. Given the distribution of free schools (set out in Section 3), the average effects in Table 9.4. are close to the patterns in high-diversity systems.

Table 9.5. Association of primary free school enrolment with school system segregation in wards with initially high/ low black, mixed and Asian student population. Year R-6. 2012-2020

	(1) FSM	(2) BAE	(3) WBri	(4) EAL	(5) SEN
Free school enrolment (in %)	-0.034	-0.040	0.171***	0.115*	-0.001
	(0.0238)	(0.0359)	(0.0477)	(0.0454)	(0.0189)
Free school enrolment # High Diversity	0.055*	0.093*	-0.101*	0.046	-0.050*
	(0.0277)	(0.0388)	(0.0502)	(0.0524)	(0.0217)
Observations	302620	268570	295709	258341	303325
Within R-squared	0.02	0.01	0.01	0.00	0.01
Residual Degrees of Freedom	4613	4547	4605	4502	4613

Estimates from a linear fixed effect model of free school enrolment on school system segregation in a ward-yeargroup-year panel. Models include log pupil count, the number of schools, and the fraction of students of interest. Free school enrolment interacted with a dummy variable that splits wards into a group with high and low ethnic diversity at baseline. Fixed effects by system-schoolyear, system-yeargroup and region-yeargroup-schoolyear. Standard errors in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 9.6 compares patterns of free school induced segregation in rural and urban systems, paralleling the results in 9.5. Free schools in rural contexts contributed specifically to WBri and somewhat less to EAL segregation. In urban (probably more ethnically diverse) systems, free school enrolment was again more strongly associated with BAE segregation and integration for SEN. The free school effect on EAL segregation was evident in rural settings and increased in urban settings, but neither coefficient reached statistically significance.

Table 9.6. Association of primary free school enrolment with school system segregation in urban and rural wards. Year R-6. 2012-2020

	(1) FSM	(2) BAE	(3) WBri	(4) EAL	(5) SEN
Free school enrolment (in %)	-0.040	-0.071	0.128**	0.112	0.015
	(0.0246)	(0.0435)	(0.0459)	(0.0611)	(0.0221)
Free school enrolment # Urban	0.060*	0.122**	-0.044	0.047	-0.065**
	(0.0285)	(0.0456)	(0.0494)	(0.0659)	(0.0244)
Observations	302,620	268,570	295,709	258,341	303,325
Within R-squared	0.02	0.01	0.01	0.00	0.01
Residual Degrees of Freedom	4613	4547	4605	4502	4613

Estimates from a linear fixed effect model of free school enrolment on school system segregation in a ward-yeargroup-year panel. Models include log pupil count, the number of schools, and the fraction of students of interest. Free school enrolment interacted with urban/rural indicator. Fixed effects by system-schoolyear, system-yeargroup and region-yeargroup-schoolyear. Standard errors in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

At primary level then free schools in rural/low diversity settings are associated with an increase in WBri segregation, while in urban/high diversity systems free schools are associated with, in particular, an increase in EAL and BAE segregation but reduced SEN segregation.

Secondary schools

In the secondary phase, incorporating year 7-11, local school systems were defined at the level of constituencies. As set out in Table 9.7, we find positive point estimates of free school enrolment on BAE, WBri, and EAL segregation, but none of these were statistically significant, making generalisation beyond our specific set of data difficult.

Given the point estimates and generally higher free school enrolment at secondary level, a large change in free school enrolment (of 18 points) was predicted to shift segregation by a magnitude comparable to what we estimated for the primary phase. The lack of statistical significance might thus indicate a lack of statistical power rather than a zero effect on segregation. In the aggregate, the impact of secondary free schools was ambiguous with small contributions to WBri, BEA, EAL segregation, but too large standard errors to draw firm conclusions.

Table 9.7. Association of secondary free school enrolment with school system segregation. Year 7-11. Constituency. 2012-2020

	(1) FSM	(2) BAE	(3) WBri	(4) EAL	(5) SEN
Free school enrolment (in %)	-0.021	0.036	0.065	0.033	-0.038
	(0.0212)	(0.0256)	(0.0425)	(0.0310)	(0.0271)
Mean Outcome	6.47	6.84	8.20	7.34	4.84
Observations	26,620	26,620	26,620	26,619	26,620
Groups	533	533	533	533	533
Within R-squared	0.02	0.01	0.01	0.00	0.01
Residual Degrees of Freedom	532	532	532	532	532

Estimates from a linear fixed effect model of free school enrolment on school system segregation in a parliamentary constituency-grade-year panel. Models include log pupil count, the number of schools, and the fraction of students of interest. Fixed effects by system-schoolyear, system-yeargroup and region-yeargroup-schoolyear. Restricted to yeargroups 7-11. Standard errors in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

The effect of secondary free school enrolment on segregation was also context specific. As set out in Tables 9.8 and 9.9, there was a free school effect in increasing white British segregation in areas with low diversity and in rural areas. This was not evident in high diversity/ urban systems.

We also see an integrating effect of free school enrolment for SEN students in low-diversity settings, but this did not reproduce in the comparison of rural and urban areas. In contrast to primary free schools, there is no firm evidence that secondary free school enrolment contributed to FSM or BAE segregation.

Table 9.8. Association of secondary free school enrolment with school system segregation in constituencies with initially low/ high black, mixed and Asian student population. Year 7-11. 2012-2020. Reference group = low diversity systems

	(1) FSM	(2) BAE	(3) WBri	(4) EAL	(5) SEN
Free school enrolment (in %)	-0.003	-0.010	0.238*	0.064	-0.166**
	(0.0426)	(0.0113)	(0.0947)	(0.0515)	(0.0593)
Free school enrolment (in %) # High Diversity	-0.023	0.057	-0.216*	-0.039	0.159*
	(0.0487)	(0.0317)	(0.1000)	(0.0614)	(0.0638)
Observations	26,620	26,620	26,620	26,619	26,620
Within R-squared	0.02	0.01	0.01	0.00	0.01
Residual Degrees of Freedom	532	532	532	532	532

Estimates from a linear fixed effect model of free school enrolment on school system segregation in a constituency-yeargroup-year panel. Models include log pupil count, the number of schools, and the fraction of students of interest. Free school enrolment interacted with a dummy variable that splits constituencies into a group with high and low ethnic diversity at baseline. Fixed effects by system-schoolyear, system-yeargroup and region-yeargroup-schoolyear. Restricted to yeargroups 7-11. Standard errors in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 9.9. Association of secondary free school enrolment with school system segregation in rural/urban constituencies. Year 7-11. 2012-2020. Reference group = rural systems

	(1) FSM	(2) BAE	(3) WBri	(4) EAL	(5) SEN
Free school enrolment (in %)	-0.003	0.016	0.452*	0.131	0.020
	(0.0444)	(0.0386)	(0.1980)	(0.0844)	(0.0917)
Free school enrolment (in %) # Urban	-0.019	0.020	-0.394*	-0.100	-0.059
	(0.0486)	(0.0463)	(0.1983)	(0.0870)	(0.0936)
Observations	26620	26620	26620	26619	26620
Within R-squared	0.02	0.01	0.01	0.00	0.01
Residual Degrees of Freedom	532	532	532	532	532

Estimates from a linear fixed effect model of free school enrolment on school system segregation in a constituency-yeargroup-year panel. Models include log pupil count, the number of schools, and the fraction of students of interest. Free school enrolment interacted with a dummy variable that splits constituency into urban and rural areas. Fixed effects by system-schoolyear, system-yeargroup and region-yeargroup-schoolyear. Restricted to yeargroups 7-11. Standard errors in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Summary

In this section we developed an analysis of social segregation between local schools following the opening of a free school. In the primary phase, we found free schools were associated with a modest increase in social segregation. While the general trend has been toward decreasing segregation in England, the wards in which primary free schools opened

have seen an opposite trend with increasing segregation locally. Greater primary free school enrolment has led to modest statistically significant increases in segregation for EAL, BAE and White British students. At the same time, we find a small decrease in segregation for SEN students. These changes in segregation also varied by context. In high diversity and urban contexts, there has been increased segregation for BAE and FSM students. In low diversity and rural contexts there has been increased segregation for White British students.

In the secondary phase, we did not find statistically significant changes in segregation (possibly due to a lack of statistical power). We did, however, find a similar contextual pattern of increased segregation in low diversity and rural areas. There, the presence of secondary free schools was associated with White British students becoming more likely to see peers who are also White British at school. We note that free schools in rural areas are a relatively small proportion of the free school population.

In comparison to Green et al. (2015), who found that the first three waves of free schools were associated with a very small rise in FSM segregation in primary schools, we extended the analysis to the first nine annual waves. As Green et al. predicted, we found segregation has "become more noticeable" in the primary phase as free school enrolment has increased. However, this has particularly been in relation to ethnicity rather than FSM eligibility. The strongest association was with EAL segregation in the primary phase. As Strand et al (2015) note, EAL and ethnicity are closely related. EAL students are associated with lower achievement on starting primary school. This difference reduces with age but remains observable at the end of primary schools in Key Stage 2 (in reading and writing).[26]

There are likely to be a range of reasons for these patterns, not least as social segregation commonly "results from a complex and multifaceted set of processes" in specific contexts (Burgess et al. 2005: 1053). We can though draw on existing evidence and our wider data to briefly identify potential influences on segregation associated with free schools.

First, having drawn on their analytical approach, we note Monarrez et al.'s (2022) finding that racial segregation increased where charter schools opened in America. They argue this was clearest in high-diversity urban areas, potentially because many urban charters seek to serve poor, minority ethnic students. Arguing these relatively homogenous charters "have been found to increase student achievement", Monarrez et al suggest negative effects of segregation "may be offset" by attainment gains in underserved populations (p.336).[27]

[26] In primary schools, Strand et al. report: "96% of Bangladeshi students, 88% of Pakistani, 88% of Chinese, 86% of any other group, 79% of Indian, 74% of White Other and 71% of Black African students are recorded as EAL". The notable exceptions are Black Caribbean (4% EAL), and Mixed White and Black Caribbean (2% EAL) groups. Strand et al (2015: 11) also highlight that there is substantial variation among EAL students as the official EAL definition "reflects exposure to a language other than English at home or in the community; it gives no indication of a student's proficiency in the English language". EAL thus includes students who may use English as their everyday language as well as student who are new migrants to England who speak no English.

[27] Similar conclusions were made by Whitehurst et al (2016) from a summary of earlier research evidence on charter schools. Garcia (2008) argued however that increased racial segregation patterns in America resulted from not only Black and minority ethnic students self-segregating into charter schools but also from White flight. Further, we note wider debates about the inclusivity and performance of urban charter schools (Bilfico and Ladd 2006; Lubienski et al. 2009), which question Monarrez et al's conclusions about their effectiveness.

In England, there are urban free schools serving disadvantaged students, including those explicitly emulating urban charter schools. In section 7, we saw evidence of 'no excuses' free schools perceived to appeal to aspirational and minority ethnic group families. 'Reverse-creaming' free schools are not however a prominent feature of the population (Garry et al. 2018) and their role in increasing segregation appears less significant that in America.

Second, another group of free schools creating clearer options for minority ethnic parents to choose schools that are relatively homogenous are 'minority faith' schools. Historically state funded faith schools have been almost entirely Church of England or Roman Catholic. Free schools have enabled Islamic, Hindu, Sikh and Jewish schools, constituting about 10% of free schools (Allen and Higham 2018). These have been argued to increase segregation (Social Integration Commission 2015). DfE (2016b: 30) data indicated that at Islamic, Sikh and Hindu free schools "80% or more [student are] classified as Asian ethnic origin; 2% or less classified as from white ethnic origin". For Jewish free schools: "over 80% of students [are] from white ethnic origin". Further research is needed on these schools, including in relation to the areas they serve, but to date they appear to contribute to social segregation.

Third, our case study data evidenced how specific free schools in urban contexts have also offered new choice options for middle-class and White British families. In Section 7, Cluster 2 showed how two urban primary free schools were perceived to offer families access to less deprived and less ethnically diverse settings than local schools with spare places. For neighbouring headteachers, this increased the concentration of "poorer and EAL" or "Asian and predominantly less affluent" students into lower-status schools, including due to an "element of white flight". This was seen to illustrate increasing segregation of BAE and FSM primary school students in specific ethnically diverse urban contexts.

Fourth, our case study data also illustrated cases where White British segregation was perceived to have increased in low ethnic diversity, semi-rural contexts, including in the secondary phase. In Cluster 3, for example, a free school's ethos, described by its head as offering private education in the state system, was seen by all five neighbours to appeal to middle class and predominately White British families keen to limit their mixing with more disadvantaged and ethnically diverse social groups living in nearby towns. Neighbouring heads argued families at the free school were "happy to send their children to a state school, but don't want them mixing with a broad range of society". The free school was also argued to be "pushing away difficult children who might be hard to provide for".

We have highlighted, then, four different patterns of choice and competition that may be contributing to the forms of increased social segregation we identified in this section. We note how socially selective choice and competition were not a feature of all the free school contexts we studied. Where segregation was seen to be occurring, it was also not solely related by respondents to free schools, but also to the responsive actions of particularly higher-status schools. In the context of these observations, we have less insight into the small decrease in SEN segregation that we estimated in this section. Future research may usefully seek insights into this. It may also test our wider findings on free schools and social segregation, including at different scales and by using different measures of segregation.

Section 10: Conclusion

The research questions of this report asked whether free schools have had effects on either student outcomes in neighbouring schools or on social segregation locally. We also asked about a range of mechanisms through which potential free school effects might be manifested, including in terms of whether free schools competed well on quality, whether student enrolment in local schools changed with a free school opening and whether neighbouring schools took any new actions due to a free school's presence.

In Section 1 we investigated the free school policy aims and evidence the Government has drawn on when claiming: "free schools don't just raise the performance of their own pupils – they raise standards in surrounding schools in the area too" (Cameron 2015:2). This drew on a Policy Exchange report criticised for using an inappropriate methodology (Green 2015).

We also identified two theoretical perspectives on how free schools might impact on neighbouring schools. The first perspective concerned 'efficient competition'. This sees a free school's presence to increase incentives for neighbouring schools to deploy resources more efficiently to compete over school quality. The second perspective concerned 'selective competitive'. This sees a free school's presence to increase incentives for schools to compete over the socio-economic characteristics of students, particularly those perceived to be better positioned to perform well in school (Glennerster 1991).

Policy makers have commonly assumed free schools will create efficient competition. Betts 2009) characterised this as a 'chain of causation', from free schools creating competition, to neighbouring school action, to improvement. At first glance our findings offer some support to this assumed chain. Upon closer inspection however we show how competition due to a free school's presence worked through a mix of mechanisms, including selective competition. We highlight how this disrupted the chain of causation and helps to explain the outcomes we observe. We now summarise these insights in four themes, before returning to the policy aims to consider what we might learn from the free school experiment.

The nature of competition

We found new and elevated forms of competition did often occur due to the presence of a free school. Neighbouring schools on average lost students and, in the primary phase, experienced a decline in parental preferences. Competition was also reported to be the dominant relationship with the nearest free school by neighbouring school survey respondents. Academic quality did play a role in this competition, with lower-performing schools more likely to lose students in the primary phase. Schools judged by Ofsted to be less than Good were also more likely to perceive competitive pressure in the survey.

Academic quality was not however the only or principal component of competition. Free schools were not, on average, 'high-quality' schools during our analysis period, particularly in the primary phase. Surveyed neighbouring schools rarely saw free school competition to relate directly to student attainment and rather saw it to concern student numbers, funding and popularity among parents. Competition was stronger when the nearest free school was perceived to appeal to advantaged students or where there was a surplus of school places.

Schools were influenced, therefore, not simply by efficient but also by selective competitive incentives and by local structural conditions. Selective competition, while not reported in all locations, was related in the case studies to more intensive competition. This involved the creaming and cropping of students by free schools and by high-status neighbours, in response to the free school's presence. This occurred through recruitment and exclusion practices as well as in how promotion, branding and a school's ethos appealed to different families, including by socio-economic status, ethnicity and students' prior attainment.

How these factors combined in specific contexts with the perceived aims of a free school influenced the local practices we observed, revealing variation and diversity. Not all neighbours in our survey, for instance, perceived they had been impacted by the nearest free school. About one in ten reported they collaborated with the nearest free school, without competing with it. For the majority, however, competition was the dominant relationship and the nearest free school had adversely impacted on their school.

Forms of action

Investigating action-taking among neighbouring schools, half of our survey respondents reported taking actions due to the presence of the nearest free school. Perceived competition also predicted reported action-taking directly as well as indirectly through adverse impacts of a nearby free school. The distribution of actions taken, however, reflected the mix of identified incentives rather than solely efficient competition.

The strongest association of competition in the survey was to 'externally-focused' actions, relating to marketing, promotion and extra-curricular activities. These were relatively low risk options to try to improve a school's appeal but were also suggestive of competition incentivising schools to deploy scarce resources in a race to recruit from a fixed pool of students. As the case studies clarified, this had the potential to divert resources away from student learning and to accentuate selective competition, by targeting messages at specific audiences, particularly when combined with socially selective recruitment practices.

Competition was also associated, to a lesser extent, to 'accountability-focussed actions', including more emphasis placed on core subjects, student attainment in exams and Ofsted grades. Competition did not however predict 'internally-focused' actions relating directly to the quality of teaching and learning. This suggested free school competition could spur schools to deploy more resources to improve against external quality metrics, but typically without a related focus on classroom practices. This raised questions about the nature of any ensuing improvement. Accountability-driven actions may increase performance, without necessarily improving students' academic knowledge or skills (Ravitch 2010).

The case studies also showed how competition could lead to cuts in provision due to per-capita funding losses. Resource loss is central to the narrative of efficient competition, underpinning the threat of decline that is argued to incentivise improvement. Actions to cut provision, however, had a clearer socio-economic (rather than academic quality) patterning in our cases, with schools serving deprived communities more likely to report making cuts to staffing and curriculum. This was argued to compound existing inequalities, making harder the work of schools disproportionately serving families living with multiple deprivations.

The distribution of improvement and deterioration

As might be anticipated given our evidence on the nature of competition and forms of action, we found a mixed picture in relation to student attainment in neighbouring schools. There was, on average, no improvement in attainment in English and Maths in neighbouring primary schools. There was on average, however, a modest increase in attainment in English and Maths in neighbouring secondary schools. This was statistically significant each year for four years beginning the second year after a free school opened.

We explored whether this small but non-negligible improvement observed in secondary neighbours could be attributed to efficiency gains driven by market pressures or something else. We tested common proxies of competitive pressure, including distance to a free school, population density and shared recruitment areas with a free school. We tested the academic quality of neighbouring schools, measured by attainment and Ofsted grades at baseline. We also tested the extent of pupil loss at neighbouring schools due to a free school. None of these were associated with improvement or deterioration effects.

Given identified selective competition, we also explored whether estimated improvements might depend on a school's ability to retain students better positioned to perform well in school. We found evidence of improvement among schools that experienced, after a free school opened, a large increase in the percentage of students who had high prior attainment and were either not eligible for Free Schools Meals or were not White British. These schools already served more advantaged intakes, on average, prior to a free school opening. We found little evidence of improvement among neighbours that experienced a large increase in students who had low prior attainment and were either eligible for Free School Meals or were White British. These schools, on average, already served more disadvantaged intakes prior to a free school opening.

These findings suggest social selection has been a mediator of free school competition translating into neighbouring secondary school improvement. Social selection, in turn, appeared to be influenced by the composition of neighbouring schools prior to a free school opening. This insight was corroborated by our case studies. Schools with advantaged intakes tended to have higher-status and more symbolic and financial resources to act. Actions varied by context, but higher status schools perceiving stronger competition tended to use promotional, differentiation and recruitment strategies to seek to sustain advantaged intakes, while placing more emphasis on performance against external quality metrics.

By contrast, schools experiencing student loss and increased proportions of disadvantaged students were more likely to report cutting staffing and curriculum. As noted above, while efficient competition sees resource loss to incentivise improvement, resource loss and adverse compositional change has also been conceived as being likely to lead to a deterioration in student attainment (Hatcher 2011). Insofar as our analyses showed, the student number losses and adverse compositional changes we estimated did not, on average, undermined neighbouring schools' capacity to sustain prior levels of attainment.

Our case studies did, however, identify a set of conditions perceived to destabilise specific neighbouring schools. These included: serving contexts of deprivation; experiencing a loss of students due to a free school; having low status in a steep status hierarchy, with local high

status schools perceived to intensify selective recruitment practices after a free school opened; and being downgraded to below 'Good' by Ofsted either just before or after the free school opened. These factors were not conceived as deterministic of deterioration, but their combination was argued to negatively influence parental choice, leading to a further concentration of disadvantaged students, whilst also creating the need for rationalisation.

Where competition was most intensive, including where there was population change and decline in student numbers, these conditions had the potential to create a cycle of decline. For example, two school leaders of low status case study schools believed their school would be closed, in significant part due to a free school's presence. This would not only mean their now "solidly good school" would shut and their students dispersed further afield, but vital educational, financial and cultural resources would be transferred, indirectly, from schools serving deprived communities to a free school serving a less deprived and less ethnically diverse student body.

The patterning of social segregation

We also analysed social segregation between local schools following the opening of a free school. This extended our analysis beyond the outcomes typically considered in the 'chain of causation', to examine whether the opening of free schools – and the ensuing forms of choice and competition – had wider social consequences in terms of segregation.

In the primary phase, we found free schools were associated with a modest increase in segregation. While the general trend in England was toward decreasing segregation, local areas in which primary free schools opened saw an opposite trend. Greater free school enrolment led to increases in segregation for students speaking English as an Additional Language, Black, Asian and Ethnic Minority students (BAE) and White British students (WBri). We found a small decrease in segregation for Special Educational Needs students.

Changes in primary school segregation also varied by context. In high diversity and urban contexts, there was increased segregation for BAE students and those eligible for FSMs. In low diversity and rural contexts there was increased segregation for WBri students. In the secondary phase, we found increases in segregation were not statistically significant on average. There were, however, similar contextual patterns of increased segregation for WBri students in low diversity, rural areas.

Relating these patterns to choice and competition, we noted theoretical arguments that free schools might reduce segregation where they widened choices and this facilitated families to choose less segregated schools. This has not happened on average, however. Rather, drawing on existing evidence and our wider data, we suggested ways in which different types of free schools may have created new options for parents from particular social groups to choose schools that were relatively more homogenous than their local area.

These examples included: free schools emulating 'no-excuses' charter schools, perceived to appeal to aspirational and minority ethnic families; 'minority faith' free schools creating new options for minority ethnic parents to choose schools that are relatively homogenous; urban primary free schools perceived to offer families access to less deprived and less ethnically diverse settings than schools with spare places; free schools in semi-rural areas perceived to

offer WBri families new options to limit their mixing with more disadvantaged, ethnically diverse families living in nearby towns. These examples were not intended to be exhaustive or explanatory, but rather exploratory and suggestive of areas for future research.

The observed contextual patterns of segregation also reaffirmed how, underneath the four themes set out above, there was local variation. This reflected how choice and competition typically took place in local areas, as parents tended to choose from nearby schools. It also reflected the different aims and motivations of free school providers. Increased segregation, for example, appeared to result differently in relation to specific free schools enabling either "self-segregation" by minority ethnic parents or forms of "white flight" (Garcia 2008). This was not simplistically a story of white middle-class advantage, not least as free schools on average serve students who are more ethnically diverse than their neighbours. Our case studies also highlighted how segregation was unlikely to be solely the outcome of free school practices, but also the responsive actions of particularly higher-status schools.

The free school experiment

Building on our analysis above, we conclude this report by considering how our evidence relates to the original aims of the free school policy. This helps summarise what we might learn from the free school experiment and leads to specific policy recommendations.

The free school policy aimed to open new schools rapidly, including by enabling providers from civil society to propose and govern free schools. We found sustained growth in the number of mainstream free schools up to 2020/21. We discussed research showing early waves enabled free schools to be set up by parents, faith groups, charities and teachers. Since about 2016, however, much of the growth in free schools has been driven by Multi-Academy Trusts rather than local civil society groups (Garry et al. 2019). Possibly reflecting this change, we showed that, while the original aim to open 'small schools' was reflected in early secondary free schools, their average size has increased over time.

In relation to intended policy outcomes, the National Audit Office (2013: 10) described how the Government's "primary aim is to open high quality schools and it expects the Programme to raise standards across the school system through: increasing local choice for parents; injecting competition between local schools; tackling educational inequality; and encouraging innovation". We now review each of these aims.

On the aim of opening 'high quality' schools, we have shown free schools during our analysis period were not on average of high quality. This was particularly true of primaries, where student progress in KS2 Reading and Maths was lower in free schools than similar schools, local neighbours and all other non-neighbouring schools. These findings corroborate prior reports on free schools (Mills et al 2019; Julius et al 2021), but contrast earlier Government statements drawing on Ofsted grades, which suggested free schools were of better quality than other schools. For primary free schools, we found there was a tendency for Ofsted grades to be higher than, or not as low as, subsequent student attainment and progress.

We note that how free schools are narrated in policy may influence parental perceptions. To avoid appearing to promote one type of state school over another, we recommend the DfE provides a more balanced account of the evidence on free school quality. We also recognise

academic quality can change over time. In the most recent headline metrics from 2023, on average free schools in both phases were above the national average in attainment and progress metrics (DfE 2023f). This is suggestive of free schools improving, including as the number of free schools with tests results has increased after the end of our analysis period. Headline metrics are descriptive, however, and attainment measures do not compare free schools to schools serving similar students and contexts, as our matched analyses did. It will be for future research to develop such analysis of free school quality in the years ahead.

On the aims of 'increasing choice' and 'injecting competition', our evidence is that these have occurred widely, including with free schools on average influencing enrolment into neighbouring schools and parental preferences (in the primary phase). The assumptions underpinning these aims – that choice enables equity and competition incentivises efficiencies – have however been carefully critiqued. They do not recognise the mix of mechanisms through which choice and competition work due to a free school's presence.

We recommend the DfE reassess the paradigmatic assumptions it sets out on how choice and competition work in quasi-markets. This should recognise that schools have rarely prioritised change or innovation in classroom practices when subjected to new market pressures. The DfE should also recognise the potential of selective competition and the detrimental social outcomes this can create.

We recommend this also takes immediate concrete form in impact assessments. The Secretary of State (SoS) has a legal duty to consider the impact of opening a free school on existing schools. Where published DfE assessments provide commentary, these typically argue risks to a school's viability due to a free school are outweighed by increased choice and efficient competition. We argue this is an insufficient approach to assessing impact. It rarely considers the potential of selective choice and competition and gives insufficient weight to problems associated with having multiple schools in an area struggling financially due to undersubscription and to the difficulties schools face once they have a falling roll.

We recommend DfE assessments should also be extended to include local area outcomes, such as social segregation, missed by a focus on individual schools. This would better enable the SoS to meet their public sector equality duty under the Equalities Act 2010, including to have "due regard to the need to advance equality of opportunity between persons who share a relevant protected characteristic and persons who do not share it". Where free schools increase segregation by ethnicity, but this is not assessed, it is unclear whether the SoS is meeting their legal duty as regards to the protected characteristic of race.

Current assessments also appear to lack purpose where they simply state whether impacts on a school are predicted to be 'minimal', 'moderate' or 'high', without providing analysis. This reflects questions about the value of impact assessments when these are "treated as an item on a 'to do' list" or to "justify a decision already taken" (Secondary Legislation Scrutiny Committee 2022: 2). To support transparency, we recommend the DfE provides an annual statement on: how impact assessments have informed decisions about whether to open a free school; the number of proposals not progressed due to an impact assessment; any actions taken by the DfE or required of free school providers due to impact assessments.

On the aim ‘to tackle education inequality’, the Government argued that this would occur as “a significant proportion” of free school providers would “be motivated by the desire to make a difference in disadvantaged areas”. This has not happened widely as a primary aim. There was no clear pattern in the primary phase, while among secondaries the likelihood of becoming a free school neighbour rose with falling deprivation. Considering inequalities in student attainment, while there was on average improvement in the secondary phase, the distribution of improvement was suggestive of increasing inequalities between existing schools serving more and less advantaged students.

A related concern was that rationalisation of provision due to a free school’s presence had a socio-economic (rather than academic quality) patterning, with perceived destabilisation concentrated in more deprived schools. We recommend the DfE more closely assesses the potential of selective competition, due to a free school’s presence, to undermine good schools serving disadvantaged communities.

On the aim to ‘encourage innovation’, a quarter of free schools were perceived by their neighbours in our survey to offer some form of local innovation, including in the curriculum, extra-curriculum or length of the school day. These innovations were not associated with perceived competition, but rather collaboration. We also highlighted how marketing, branding and recruitment actions, while not necessarily innovative, regularly constituted newly elevated forms of action that could accentuate selective competition both by free schools and neighbours. This echoed research reporting free schools often used marketing to distinguish themselves through symbols designed to position the school advantageously, rather than through promoting substantive innovations (Esper 2023; Wiborg et al. 2018).

In its guidance, the DfE has also encouraged free school providers to “have a marketing plan in place” and that it is “absolutely essential that you have an unrelenting focus on pupil recruitment”. While not prioritised in earlier guidance, more recent iterations (DfE 2023e) have added vital sections on ‘inclusivity’ and ‘community cohesion’ to clarify that providers must: encourage applications from pupils from a range of backgrounds; promote an intake that reflects the wider local community; and crucially on: “the characteristics of the school that are emphasised in publicity materials, which should not discourage parents from particular socio-economic, ethnic or religious groups from applying to the school” (p.60).

Given our findings, however, and earlier analysis showing few free schools were aware of their obligations on equalities (Bolloten 2013), we recommend the DfE assesses whether free schools adhere to its guidance and their legal duties. The DfE should remove incentives for ‘innovations’ that either naively or purposefully increase social selection. Given these were often perceived to relate to how marketing combined with recruitment practices, the DfE should act to re-strengthen the National Admissions Code, weakened from 2010 (Coldron, 2015). This should prohibit all socially selective pre-cropping practices through which particular students and their families are encouraged not to apply to a school.

We also recommend that the Government ends the practice of free schools acting as their own admission authorities. There is no clear basis for this ‘freedom’ given adaptations could be agreed by an independent authority where these support educational purposes. While developing a fairer admission system is beyond this report’s scope, one option is for Local

Authorities (LAs) to act as the admission authority for all state-funded schools in their area. This would reflect their legal duties for arranging suitable education for all children and potentially enable LAs to also take a more strategic approach to place provision, so that less schools struggle financially through being undersubscribed. Further, this change would also reflect the fact that it was not only free schools but also higher-status neighbouring schools that were reported to pursue socially aims through recruitment practices. These schools were often academies, and hence also acted as their own admissions authorities.

On the aim of raising standards across the school system, we found mixed evidence, with, on average, no improvement in primary neighbours but modest improvements in secondaries. There were three related insights. First, actions reported by neighbours gave rise to caution about the nature of improvement incentivised by a free school's presence. Second, the distribution of improvement in the secondary phase was indicative of social selection being a mediator of competition translating into improvement. Third while social segregation was not an aim of free school policy, it has been an outcome, particularly with moderate increases in segregation by ethnicity in the primary phase.

These findings highlighted significant variations by phase. Primary free schools were shown on average during our analysis period to be socially selective, to be below average in terms of external quality metrics and to be associated with increased social segregation. These outcomes warrant a review of the criteria and process through which primary free schools have been opened (for which evidence is predominately not in the public domain). Given there is predicted surplus capacity (ONS 2023) and little forecast need in the primary phase (including in the DfE's priority educational investment areas (DfE 2023a), we recommend the primary free school programme is formally paused until such a review is published.

Finally, we can return to the aim of changing how new schools are opened in England. The free school policy originally enabled a 'demand-led' approach, but we showed how this has evolved over time. The current DfE guidance seeks to prioritise opening free schools where there is a need for new places and low average school quality (DfE 2023a). Local experience once a free school opens, however, remains an empirical question for future research. For example, Whittaker (2023: 1) reports that among approved free schools in planning in 2023, "three in five … are slated to open in areas with rising numbers of surplus pupil places".

This may well reflect the changing student population nationally, with larger than average cohorts moving out of primary schools and through secondary schools, leaving behind more surplus places. While free school locations have been associated with forecast need for places, we also highlighted the limits of over-reliance on forecast data, which has regularly over-estimated need for new places. As the National Association of Headteacher Teachers (2016: 1) argued, a national measure of forecasted need is "not the same as a coordinated and measured approach ... to create school places exactly where they are needed".

The free school programme was designed to enable local civil society groups to contract directly with central Government. It involved centralisation of decision-making, with the Government acting as the sole authoriser of new schools. As this 'demand-led' approach is no longer a primary aim, we recommend a new approach to opening new schools is needed that systematically incorporates local intelligence and planning into decision making.

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Appendices

Contents

Appendix 2.1. Developing a consistent schools dataset

In Section 2 we noted there was considerable churn in the state school sector, driven predominantly by conversion of locally maintained schools to academies. Not all this churn reflected significant changes in the operations of schools. While legally 'new' schools, academy converters often retained most attributes of their direct predecessor. By contrast, school mergers, splits, or the addition of a new phase constituted a potentially more significant disruption to the nature of a school.[28]

To derive a consistent school panel dataset, we linked schools using the following criteria:

- Predecessor closed for "Academy Converter", "For Academy", "Change Religious Character", "Change in status", "Transferred to new sponsor", "Academy Free School" or "Fresh Start" according to Edubase.
- Successor schools share the same local super output area, school phase, and gender intake as their direct predecessor.
- Successor and predecessor schools opened and closed within a month of each other.

New schools that emerged from more significant changes were considered distinct from their predecessor(s) schools. These checks were repeated every time a school closed.
We used Edubase [version 20211007] to set up an annual longitudinal panel of state-funded mainstream schools. From Edubase, school entries without valid postcode information, no local authority code or missing URN were dropped. We also dropped observation on the Isle of Scilly, because of its remote nature. July 31st was set as the annual census date.

The longitudinal file was restricted to the years 2006 to 2021. Schools were linked into predecessor-successor pairs using data on establishment links from Get Information about Schools [version 20211111]. The most recent school URN was used as a unique identifier to trace schools over time. The resulting unbalanced panel contains 324,368 school-year rows representing 23,868 unique schools that contribute 13.6 years to the panel.

[28] This rough distinction between significant and non-significant changes in the transition from LA-maintained schools to an Academy is also reflected in exemptions from routine section 5 inspection or eligibility for a short inspection under section 8 of the Education Act 2005 (Ofsted 2018). In addition, Academy converters also typically maintained their direct predecessor's four-digit establishment number.

Appendix 2.2. Testing our neighbouring school definition.

As set out in Section 2, when developing our final definition of neighbouring schools, to test criterion validity, we analysed the neighbouring school leaders survey data to examine if perceived competition with a free school was lower when free schools located beyond the defined school neighbourhood boundaries.

We were able to progress this analysis as our initial population for the survey utilised our preliminary definition of neighbouring schools (i.e., the 9 closest schools to a free school). Following testing and our decision to use our final definition (i.e., that a free school opened in a neighbour's neighbourhood area) we removed from our survey analysis any responding schools that did not meet our final definition.

As set out in Table 1, we found perceived competitive pressure of the nearest free school was substantially lower (about 0.5σ) when the free school did not locate in our defined neighbourhoods. In column 2, we added travel distance to the nearest free school. If differences in perceived competition between free schools in and outside our neighbourhoods were due to the former being nearer to their neighbours, we would expect that distance explained the pattern in column 1. This was not the case. There was thus evidence for the validity of the proposed operationalisation of school neighbourhoods.

Table 1: Perceived competition by neighbourhood status.

	(1) Competition	(2) Competition
Nearest Free school outside neighborhood	-0.561***	-0.579***
	(0.151)	(0.159)
Travel distance to nearest Free School		0.006
		(0.021)
Number of observations	275	275
Residual Degrees of Freedom	262	261
R-Sq	0.15	0.15

Linear regression of a standardised school competition index on neighbourhood status, distance to nearest free school, school phase, region, % FSM, and Ofsted grade. Sample of neighbouring school leaders
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Appendix 3.1. A discrete-time proportional hazard model

To test predictors of free school opening, we set out here how we formulated the discrete-time proportional hazard model that we employ in Section 3.

Intuitively, we are interested in the chance, or hazard, of schools becoming 'neighbours' in the academic year t given that they were `non-neighbour' in the previous year, $t-1$. If the policy aims associated with the free school programme influence free school locations, the hazard function, $h_0(t)$, will change with measures of 'need' or 'demand' that apply in the context of a specific mainstream school i. The conceptual model is given by:

$$h_i(t, x, \beta) = h_0(t) r(x_i, \beta) \quad (1)$$

The school-specific hazard function $h_i(t, x, \beta)$ is a product of the baseline hazard $h_0(t)$ which changes with time and measures the diffusion of free schools through the English school system and a function $r(x, \beta)$ that characterises how the hazard changes subject to covariates.

This model is suitable because of the incremental rollout of free schools and the discrete, annual rhythm of the academic year (Allison, 1982). It models the diffusion of free schools throughout the English education system. The approach is well-established and has been used, for example, to examine changes in education expectation with age (Anders, 2017) and the diffusion of specific education policies (Baker, 2019).

We estimated Equation (1) in a generalised linear model with a complementary log-log link. Equation (2) summarises the estimation model.

$$h_i(t, x, \beta) = 1 - \exp\left(-\exp\left(h_0(t) + \mathrm{x}_{it-1}\beta\right)\right) \quad (2)$$

The dependent variable is a binary indicator measuring whether a school has become a neighbour of a free school in t. The model assesses how well, if at all, local school characteristics in the year before t, x_{it-1}, have contributed to the chance that a free school entered the local education market in t. Time-variant school characteristics were entered as lagged to account for the timing from an application to the opening of a free school. The baseline hazard function is specified by a set of year dummies. Because of the differences in size and geographic reach, Equation 2 was estimated separately by phase (primary/ secondary).

As with any statistical analysis using observational data, unobserved factors might bias the estimated relationship between the covariates and the outcomes. In this application, these are school characteristics or attributes of the locale that correlate with the considered covariates and influence the chance of a free school entering the school market.

To account for some of the unobserved heterogeneity between, the model conditions on baseline values of the covariates taken in the academic year 2009/2010 before the free school programme was announced. This inclusion of baseline values of the covariates in the estimation model serves a similar purpose to school fixed effects. It makes it more plausible that the predictors measure exogenous contributions.

Subsequent analyses relax some of the assumptions in Equation (2) to test additional hypotheses:

1. To test if school characteristics affect the hazard of becoming a free school neighbour differently in areas with low and high forecast need for places.
2. To test if school characteristics affect the hazard of becoming a free school neighbour differently between early and later opening free schools.

Finally, to assess the relationship of facets of need with changes in free school capacity once schools have become neighbours, we formulate a linear fixed effects model in the unbalanced panel of schools under potential competition.

$$\log(FScapacity_{it}) = \alpha_i + \tau_t + X'_{it-1}\,\beta + \varepsilon_{it} \quad (3)$$

Where $\log(FScapacity_{it})$ is the natural log of total free school capacity in the neighbourhood of school i in the academic year t. τ_t measures aggregate trends in free school capacity and α_i is the incumbent school fixed effect. X'_{it-1} is the vector of school characteristics including local forecast need for new places, schools' occupancy rates, levels of material deprivation, academic quality and ethnic diversity.

Together, Equations (2) and (3) examine the determinants of 'need' that took priority in free school entry and free school expansion.

Appendix 3.2. 'Early openers' and 'later openers'

This appendix sets out the results of our analysis of 'early openers' and 'later openers' discussed in Section 3. Table 3.4 summarises the results. It reports results by phase (columns) and for each covariate between early and later openers (rows).

Table 3.2: Becoming free school neighbour between early and later opening free schools. 2012-2020

	(1) Primary	(2) Secondary
Need for places (t-1)		
Early openers (<2016)	0.025***	0.062*
	(0.0042)	(0.0251)
Later openers (>=2016)	0.041***	0.122***
	(0.0037)	(0.0169)
Δ	0.017**	0.061*
	(0.0054)	(0.0294)
Occupancy rate (t-1)		
Early openers (<2016)	0.009	0.007
	(0.0062)	(0.0259)
Later openers (>=2016)	0.013**	0.004
	(0.0045)	(0.0172)
Δ	0.005	-0.003
	(0.0070)	(0.0278)
Academic quality (t-1)		
Early openers (<2016)	0.000	-0.002
	(0.0003)	(0.0021)
Later openers (>=2016)	-0.000	-0.002
	(0.0003)	(0.0014)
Δ	-0.001	-0.000
	(0.0004)	(0.0024)
Material deprivation		
Early openers (<2016)	0.000	-0.016
	(0.0015)	(0.0091)
Later openers (>=2016)	-0.001	-0.019**
	(0.0012)	(0.0057)
Δ	-0.001	-0.003
	(0.0007)	(0.0049)
Ethnic diversity (t-1)		
Early openers (<2016)	0.058***	0.065
	(0.0074)	(0.0381)
Later openers (>=2016)	0.041***	0.109***
	(0.0058)	(0.0236)
Δ	-0.017***	0.045*
	(0.0046)	(0.0219)
Control variables	X	X
Baseline values	X	X
Observations	118867	20257

Average marginal effects after an estimation of Equation (1) in Appendix 3.1. using a complementary log-log model with interaction terms between times of free school opening (early/later) and incumbent school characteristics. For details see footnote to Table 3.2 in Section 3. School clustered standard error in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Appendix 4.1. Matched sample of free schools' non-neighbours

In this Appendix we set out the propensity score matching approach we developed to progress our analyse of free schools and a matched sample of schools in Section 4.

As potential analytical approaches, both regression modelling and matching methods attempt to adjust for observable confounding factors between treated (here, free schools) and untreated (here, non-free school non-neighbours) and untreated units. In many circumstances they provide similar results, although matching provides substantially greater flexibility in obtaining a well-balanced sample and providing us with the opportunity to understand the extent to which we have achieved balance (on observable characteristics) and the extent to which there is 'common support', i.e., that we are not basing our comparisons on questionably extrapolated counterfactuals.

For non-neighbour primaries, we explored different ways of matching each free school with comparable schools using the R package MatchIt (Ho et al., 2011). We tried multiple specifications, guided in our choice by considering imbalance in school characteristics and baseline attainment, not considering outcome measures until we had selected our preferred approach. Ultimately, our preferred matched sample was selected by imposing exact matching on quintiles of prior pupil attainment (average scores in Key Stage 1 tests) as well as levels of agglomeration, namely, whether the school is in a) urban conurbations, b) cities and urban towns, or c) rural towns, villages, hamlets and isolated dwellings. Within each exact matching stratum, we then matched on the propensity score (estimated by a logit regression model) that predicts free school status on prior attainment (this time entered as a continuous variable), the percentage of pupils ever eligible for free school meal (% FSM), the percentage of pupils learning English as an additional language (%EAL), the percentage of pupils with special education needs (% SEN), the percentage of pupils identified as white British (% WBR), the percentage of female pupils (% Female), a set of dummies for English regions, IDACI scores, and school size (entered in its simple, quadratic, and cubic forms).

The algorithm used for matching on the propensity score was the "greedy" nearest neighbour, which searches for one or more comparator school with the closest propensity score match (subject to exact matching constraints) for each free school without optimizing across subsequent matches. We also imposed common support restrictions to both treated (free schools) and comparison units (non-free schools) and set the maximum calliper for matching units at a value of 0.1. We did not allow for comparison units to be matched to more than one treated unit, but we did set the algorithm to find up to two matches per free school.

The matched sample identified based on this specification was preferred to a wide selection of plausible alternatives in as much as it best minimised imbalance between the treatment and control group in all the relevant covariates considered as a whole (judged by an average absolute standardised difference), as well as a small number of key variables for which a good balance we judged to be particularly important for producing credible estimates of school performance, namely, average prior attainment of the school's intake, %FSM, and school size.

For non-neighbour schools in secondary phase, we followed a similar strategy, although we tweaked the specification compared to that used in the primary phase, once again guided by the principle of minimising imbalance, particularly on the same set of key characteristics. Unlike in the primary phase, we did not enforce any exact matching, setting the algorithm to find matches based only on the propensity score. Second, prior attainment (average scores in Key Stage 4) was entered into the propensity score model twice: as a continuous variable and as a rank dividing the ordered distribution in twenty parts. Third, judging school intake to be more important than its geographical location in the context of our research question, we decided to exclude the categorical variable for English regions, as its inclusion led to a highly unbalanced matched sample. As in primary phase, we did not impose common support, nor did we allow for potential comparators to be matched with more than one free school (i.e., we carried out matching without replacement). Our preferred specification, this time with a calliper set at a 0.2 value of the propensity score.

Appendix 5.1: Matched sample of treated-neighbour and untreated schools.

This Annex sets out a description of our matching approach to developing the matched sample of treated-neighbour and non-treated schools used in the analyses reported in Section 5 and Section 8.

Given the differences between schools affected by the opening of a free school nearby and others across the country, we performed a preliminary matching exercise in order to select an appropriate comparison sample (i.e., schools never affected by free school competition) with which to compare changes in the pupil rolls, intake and performance of the treated sample (i.e., schools who become affected by free school competition at some point during our period of analysis). This approach has similarities with that carried out by Ridley and Terrier (2018) in their analysis of spill-overs from charter school expansion in the USA.

A key feature of this application, with relevance for our matching approach (as well as other aspects of the empirical design), is the staggered nature of treatment. In looking to find an approach to matching in this context, there are various trade-offs in terms of flexibility, complexity and feasibility. After considering alternatives, we chose to carry out matching on a sequential year-by-year basis, which allows for variation in the selection mechanism over time (aligning with previous evidence on the changing pattern of free school openings). However, we accept that this means that fewer untreated and unmatched schools were available as potential matched comparators for schools that were treated in later years of our panel. To check that this was not causing issues for our design, we checked the quality of match both overall and year-by-year to ensure that match quality was not declining over the period of the panel.

After exploring a range of approaches to matching and characteristics on which schools should be matched, we settled on a nearest neighbour propensity score matching approach for both primary and secondary matching exercises (which were carried out separately). Schools were matched with a single comparison school with the closest propensity score, subject to a caliper of 0.2, exact matching on prior attainment decile groups and geographical classification (i.e., how urban/rural the school's setting is), and the imposition of common support. The propensity score was estimated using a logistic regression model with the following predictors:

- School size
- Urban/rural categories
- Average Index of Deprivation Affecting Children and Infants (IDACI) measure of pupils at the school (primary schools only)
- Proportion of pupils with English as an Additional Language (EAL)
- Proportion of pupils who have ever been eligible for Free School Meals (FSM)
- Proportion of pupils with an identified Special Educational Need (SEN)
- Proportion of female pupils
- Proportion of white British pupils
- Baseline attainment (different for primary and secondary schools):

- Secondary schools: average KS2 performance of school's intake (i.e., in tests that pupils sit in their final year of primary schooling), as well as the exact matching on decile groups of KS2 attainment mentioned above
- Primary schools: average KS1 performance of school (i.e., in tests that pupils sit four years before the end of their primary schooling, since no true primary school baseline is available for these cohorts), as well as the exact matching on decile groups of KS1 attainment mentioned above

To check the robustness of the above specification, we compared our preferred matched sample to a wide selection of plausible alternatives. Two of these alternatives used different values of calliper (0.1 and 0.4) while keeping the same input variables. A third alternative fixed the baseline calliper at 0.2 but removed common support constraints. The fourth alternative matching specification instead added indicators of English regions as an extract matching constraint, while a fifth alternative removed all these constraints to only match on the propensity score. A final specification enabled the replacement of control units, allowing the same non-free-school neighbours to match newly treated schools in subsequent years. None of these alternatives proved any better at minimising imbalance in the relevant covariates than our preferred matched sample, which in each phase yielded an average absolute standardised difference between the treated and control groups of 0.02 standard deviations or lower.

Ultimately, we should stress that the aim of the matching process was to produce a matched dataset in which treated and comparator schools may be expected to have the same trends in our outcomes of interest (prior to treatment), such that the common trends assumption of the difference in differences method (i.e., that treated and comparator units would have had the same trends post-treatment, in the absence of treatment) is plausible. We were not necessarily looking for the treatment and comparison groups to be balanced on levels of all characteristics, although this increases the plausibility of that identifying assumption. We also explored the plausibility of common trends in our analytic sample group further as part of our difference in differences analysis by looking at pre-treatment trends in outcome measures directly.

Appendix 5.2: Difference in differences modelling

In this appendix, we set out how we built up our difference in differences models in Sections 5 and Section 8.

Using our matched analysis sample, we employed a difference in differences approach to estimated treatment effects, specifically estimating our models using two way fixed effects[29] (school-level fixed effects to remove time-invariant unobserved differences between schools, and year-level fixed effects to remove school-invariant unobserved differences between years). In order to demonstrate the relevance of this approach to producing unbiased estimates, we build up this model in the following way.

We begin with a relatively naïve model, which pools data from the multiple years that we have available and estimates the impact on outcome $y$of treatment (Treat) (which varies between schools j and over time t) in coefficient τ conditional on a vector of time-varying observable characteristics X. The fact that the data are from multiple years is dealt with by including a vector of year-level fixed effects μ.

$$y_{jt} = \mu_t + \tau Treat_j t + X'_{jt} + \varepsilon_{jt}$$

The clustered nature of the data, due to being from the same schools at multiple time points, is taken into account when estimating the standard errors.

However, this initial model can be improved upon by including school-level fixed effects (FEs) η – as well as the year fixed effects already included – in order to deal with all underlying time-invariant differences between schools in the outcome of interest. As such, our estimate of \τ is conditional on both school- and year-specific systematic variations, as well as the vector of observable characteristics in X:

$$y_{jt} = \eta_j + \mu_t + \tau Treat_j t + X'_{jt} + \varepsilon_{jt}$$

Again, we take into account the clustered nature of the data, due to being from the same schools at multiple time points, when estimating the standard errors.

We still may be concerned that there are time-varying differences between the schools being compared through our approach above. As such, we turn to the matched sample that we have constructed in order to provide a specific group of comparator schools that are as similar as possible in observable characteristics as those that have been treated. We estimate the treatment effects under this approach using the same regression model as in the equation above, except that they are estimated only on the matched sample discussed above, rather than our full sample of schools.

[29] We recognise the potential issues with two-way fixed effects estimators with staggered treatment, which we have in this setting (Goodman-Bacon, 2021), although these are likely to be minimised using a design in which we select never-treated matched comparators for each treated school, in a similar spirit to that employed by Jackson (2023). Nevertheless, we have also checked the robustness of our findings to such issues by re-estimating our core models using Borusyak et al.'s (2022) imputation approach. This has no substantive implications for our findings.

Finally, we adjust our approach allowing us to take full account of the information that we have on the timing of treatment, given the existence of cohort-specific comparator schools constructed as part of the matching process. We shift into a difference-in-differences (DID) conceptual framework, specifically introducing the age of a treated school's exposure (where $k = 0$) in the final year before treatment, $0 < k < 7$ are the number of years of exposure it has had to treatment, and $0 > k > -7$ are the number of years prior to treatment (plus one) – these are also extrapolated from each treated school to its relevant matched comparator. Introducing a DID framework allows us to engage meaningfully with exploring whether there is evidence of differential pre-treatment trends between treatment and comparator groups, despite attempts to deal with confounding, and to explore post-treatment evolution of differences between the two groups over the following years.

To operationalise this, we once again include a linear regression model of the basic form set out above, but replacing the simple treatment dummy variable with a vector of binary variables ρ indicating this year relative to onset of treatment, which are interacted with treatment status, and with vector coefficients δ' now recovering estimates of pre-treatment differences (when $0 > k > -7$).

$$y_{jt} = \eta_j + \mu_t + \delta' Treat_j . \rho_k + X'_{jt} + \varepsilon_{jt}$$

As ever, clustered standard errors accounting for the observations being drawn from the same schools over time are estimated. As we also wish to estimate heterogeneity in treatment effects depending upon treated schools' characteristics, we also estimate a variant of this model as follows:

$$y_{jt} = \eta_j + \mu_t + \delta' Treat_j . \rho_k + \lambda' Treat_j . \rho_k . Mod_j + X'_{jt} + \varepsilon_{jt}$$

where Mod is a variable capturing variation in a time-invariant treated school characteristic, meaning that λ are our additional estimates of interest in this model, reporting variation in the treatment compared to that estimated for schools where the value of the moderator in question is zero. No term for the simple interaction between the moderator and the treatment status is included as this would be collinear with the fixed effects in the model.

Appendix 5.3: Moderation variables and covariates used in Section 5

In this appendix we set out how we calculated the moderation variables used in Section 5. We also set out the covariates we used in our models.

Moderation Variables
As state in Section 5, we distinguished two types of moderators: those that are associated to the free school itself and are therefore observed only in the treated group; and those that are attributes of all schools and are therefore observed regardless of treatment status.

For free school characteristics, we examined changes in free school effects by distance to the nearest free school, measured as travel time in minutes. We also tested whether free school effects vary according to the intensity in which pupil recruitment takes place in similar geographical areas, operationalised as the share (expressed in percentage) of all Lower Super Output Area (LSOA) from which the neighbouring school and its nearest free school have recruited at least two pupils (Allen and Higham 2018). To construct this variable, we extracted all the LSOAs where the pupils attending the neighbouring school live, compared them to pupils' LSOAs in the free school, generated counts of the LSOAs in which there is recruitment overlap and calculated percentages over the total number of LSOAs from which any of the two schools recruit its pupils.

For each moderator (distance and shared recruitment), we created an indicator splitting schools below and above median values, calculated separately for primary and secondary neighbours and considering only the first year of treatment. We then extrapolated the value of each treated school in the moderation indicator to its matched comparator. As formalised in equation 4 in Appendix 5.2 the interactions between treatment status, treatment time, and the moderation indicator therefore identify the difference in difference in differences (DDD) estimators.

Moderation models were also estimated using a variety of neighbourhood school attributes. Unlike indicators derived from free-school characteristics, all moderation factors based on neighbourhood school attributes were made time-invariant by imputing baseline values (the year before treatment) across all years. Because in this case the moderators were observed regardless of treatment status, we ruled against extrapolating from treated to matched controls. Again, median values were calculated independently for each phase.

First, we tested whether free school influence on choice and competition is amplified when a neighbouring school had below median education quality at baseline. The median value of quality was calculated considering our analytical sample (comprised of free-school neighbours and their matched comparators) for the year before treatment.[30]

Second, we tested whether schools located in contexts of higher socioeconomic deprivation experience greater impacts after the opening of a free school relative to those located in

[30] Index scores were computed by retaining the first factor of a principal component analysis including Ofsted grade, standardised scores of key stage results in reading and maths, standardised scores in unconditional value added in reading and maths (key stage results adjusted by prior attainment), and the log-ratio between the eightieth and twentieth scores in key stage tests in reading and maths (a proxy of inequality in attainment).

less deprived areas. We use a moderation indicator that splits schools between below and above median standardised scores in the Index of Deprivation Affecting Children (IDACI), corresponding to the lower-layer super output area where the school is located.

A third moderation model tested whether free school effects are larger in schools with less ethnically diverse and socioeconomically disadvantaged intakes. We interacted treatment status with an indicator identifying schools that are above and below the median percentage of ever free-school-meal eligible pupils that are white (%FSM-White British).

Covariates

To further reduce any remaining imbalances between our treatment and control groups, not accounted for by our matching strategy, our regression models included a set of time-varying covariates that are likely correlated to our choice and competition outcomes.[31] First, we controlled for demand/capacity ratio, measured as the forecast need for places at entry year group for the school planning area relative to aggregate school capacity at planning area level for that same year group.

Secondly, we added covariates that capture different aspects of school context and intake, including the percentage of pupils deemed as special education needs (% SEN), the percentage of pupils learning English as Additional Language (% EAL), the percentage of ever free-school-meal eligible pupils that are white (%FSM-White), and IDACI (with IDACI measured again at the LSOA of each neighbouring and matched school).

Thirdly, we included an indicator of whether the school received a low grade (Requires Improvement or Inadequate) from Ofsted at its last inspection. Fourthly, we controlled for different measures of school size depending on the outcome at stake. When estimating preferences, we included the total number of pupils of the entering cohort in both the year the preferences were expressed and the year before, thereby making sure that any identifiable change in choice patterns is due to the free school's influence and not to recent changes in pupil rolls. For estimates of competition outcomes (entering pupil numbers and intake), we controlled for the total number of pupils across all year groups, also entered in quadratic and cubic forms to better capture nonlinear effects.

In all our models, the covariates were lagged one year before the year in which we observe the outcome, thereby ensuring that predictors pre-date within-school changes in outcomes. We also tailored the set of covariates entering the regression in order to minimize cofounding effects and reduce collinearity with moderation variables. Missing values in covariates were dealt with by mean imputation within each year and phase. When the observation of an outcome was missing in either the free-school neighbour or its matched comparator in a given year, i.e., the full trend was incomplete, we dropped both the treatment and its matched comparator. Consequently, final estimation sample sizes varied across outcomes, and were always smaller than the sample yielded by the matching exercise.

[31] Again, mindful of the literature on the complications of including covariates in two-way fixed effects estimation of difference in differences analyses, we draw attention to the robustness of our results to use of alternative estimation approaches and minimal difference in our findings depending on including covariates (which is perhaps unsurprising given the pre-estimation matching).

Appendix 5.4: Descriptive statistics for matched sample in Section 5

In this appendix we set out the descriptive statistics of our matched sample in Section 5, including our outcome variables, moderators and baseline covariates, in Table 1 for primary schools and Table 2 for secondary schools.

Table 1: Descriptive statistics of outcome, moderation, and control variables (Primary)

	Treatment Status	
	Non-Free-School Neighbour	Free-School Neighbour
Nbr of first preferences received		
Mean	44.83	47.73
Standard deviation	25.67	27.28
Nbr of first preferences received (FSM only)		
Mean	6.02	6.72
Standard deviation	8.68	7.00
Nbr of first preferences received (SEN only)		
Mean	13.98	14.69
Standard deviation	17.51	16.85
Nbr of first preferences received (White only)		
Mean	23.41	24.17
Standard deviation	19.28	18.91
Nbr of first three preferences received		
Mean	96.35	105.71
Standard deviation	60.32	67.03
Nbr of first three preferences received (FSM only)		
Mean	11.68	13.25
Standard deviation	18.72	12.40
Nbr of first three preferences received (SEN only)		
Mean	30.17	32.38
Standard deviation	36.69	35.61
Nbr of first three preferences received (White only)		
Mean	49.66	52.51
Standard deviation	42.55	41.72
Percentage pupils listing school as first preference		
Mean	85.21	85.68
Standard deviation	15.18	12.43
Percentage pupils listing school as first preference (FSM only)		
Mean	84.45	86.02
Standard deviation	23.90	20.72
Percentage pupils listing school as first preference (EAL only)		
Mean	82.23	82.31
Standard deviation	22.54	22.59
Percentage pupils listing school as first preference (White only)		
Mean	85.85	86.28
Standard deviation	18.94	16.98
Percentage pupils listing school within first three preferences		
Mean	92.12	93.68
Standard deviation	13.11	9.16
Percentage pupils listing school within first three preferences (FSM only)		

Mean	90.43	92.94
Standard deviation	19.37	15.68
Percentage pupils listing school within first three preferences (EAL only)		
Mean	91.13	91.58
Standard deviation	17.90	16.66
Percentage pupils listing school within first three preferences (White only)		
Mean	91.99	94.02
Standard deviation	16.20	11.45
Nbr of pupils in reception/ year 7		
Mean	45.52	47.56
Standard deviation	23.92	23.74
Percentage of FSM pupils in reception/ year 7		
Mean	17.97	17.84
Standard deviation	15.95	15.23
Percentage of White-FSM pupils in reception/ year 7		
Mean	9.00	8.54
Standard deviation	11.29	10.38
Percentage of SEN pupils in reception/ year 7		
Mean	9.17	9.35
Standard deviation	8.56	9.03
Travel distance to the nearest free school (min)		
Mean	.	4.95
Standard deviation	.	3.21
Percentage of LSOAs with recruitment overlap		
Mean	.	25.42
Standard deviation	.	21.84
Proportion of schools located in London		
Mean	0.21	0.29
Standard deviation	0.41	0.45
Forecasted demand at baseline		
Mean	-0.09	-0.08
Standard deviation	0.09	0.09
Proportion SEN		
Mean	0.16	0.16
Standard deviation	0.07	0.08
Proportion EAL		
Mean	0.27	0.29
Standard deviation	0.27	0.26
Standardised IDACI score		
Mean	0.28	0.31
Standard deviation	1.13	1.15
Academic quality		
Mean	0.05	0.11
Standard deviation	1.93	1.94
Ofsted grade below good		
Mean	0.21	0.18
Standard deviation	0.40	0.39
Proportion White-FSM		
Mean	0.14	0.13
Standard deviation	0.13	0.12
Number of non-missing values	1,479	1,479

* indicates that these values were obtained from the year after free school opened, since they are not realised before this point, rather than year before.

Table 2: Descriptive statistics of outcome, moderation, and control variables (Secondary)

	Treatment Status	
	Non-Free-School Neighbour	Free-School Neighbour
Nbr of first preferences received		
Mean	180.97	188.10
Standard deviation	88.48	97.04
Nbr of first preferences received (FSM only)		
Mean	49.57	52.00
Standard deviation	30.80	31.92
Nbr of first preferences received (SEN only)		
Mean	23.29	27.23
Standard deviation	33.11	36.58
Nbr of first preferences received (White only)		
Mean	127.37	124.98
Standard deviation	73.91	71.59
Nbr of first three preferences received		
Mean	377.79	403.28
Standard deviation	196.89	220.04
Nbr of first three preferences received (FSM only)		
Mean	102.57	108.38
Standard deviation	69.07	69.03
Nbr of first three preferences received (SEN only)		
Mean	54.76	66.70
Standard deviation	73.37	84.03
Nbr of first three preferences received (White only)		
Mean	252.04	250.39
Standard deviation	147.73	145.07
Percentage pupils listing school as first preference		
Mean	83.49	82.82
Standard deviation	16.94	15.25
Percentage pupils listing school as first preference (FSM only)		
Mean	81.58	81.33
Standard deviation	17.75	16.15
Percentage pupils listing school as first preference (EAL only)		
Mean	77.82	72.82
Standard deviation	22.79	23.96
Percentage pupils listing school as first preference (White only)		
Mean	86.62	86.11
Standard deviation	15.05	14.82
Percentage pupils listing school within first three preferences		
Mean	92.07	92.51
Standard deviation	13.66	12.23
Percentage pupils listing school within first three preferences (FSM only)		
Mean	90.29	90.80
Standard deviation	14.59	13.11
Percentage pupils listing school within first three preferences (EAL only)		
Mean	90.03	87.33
Standard deviation	16.88	18.21
Percentage pupils listing school within first three preferences (White only)		

Mean	93.70	93.80
Standard deviation	12.73	12.60
Nbr of pupils in reception/ year 7		
Mean	177.27	181.29
Standard deviation	59.12	60.47
Percentage of FSM pupils in reception/ year 7		
Mean	32.54	33.16
Standard deviation	18.15	18.13
Percentage of White-FSM pupils in reception/ year 7		
Mean	20.48	20.66
Standard deviation	14.68	14.42
Percentage of SEN pupils in reception/ year 7		
Mean	20.41	21.59
Standard deviation	10.86	11.00
Travel distance to the nearest free school (min)*		
Mean	.	9.75
Standard deviation	.	6.17
Percentage of LSOAs with recruitment overlap*		
Mean	.	17.68
Standard deviation	.	17.61
Proportion of schools located in London		
Mean	0.13	0.19
Standard deviation	0.33	0.39
Forecasted demand at baseline		
Mean	-0.11	-0.11
Standard deviation	0.08	0.08
Proportion SEN		
Mean	0.18	0.19
Standard deviation	0.10	0.10
Proportion EAL		
Mean	0.16	0.16
Standard deviation	0.21	0.19
Standardised IDACI score		
Mean	0.10	0.12
Standard deviation	0.91	0.92
Academic quality		
Mean	0.25	0.23
Standard deviation	1.89	1.92
Ofsted grade below good		
Mean	0.30	0.31
Standard deviation	0.46	0.46
Proportion White-FSM		
Mean	0.21	0.22
Standard deviation	0.14	0.14
Treatment Status (Without UTC/ Studio)		
Number of non-missing values	839	841

* indicates that these values were obtained from the year after free school opened, since they are not realised before this point, rather than year before.

Appendix 5.5: A simple calculation of per-capita funding loss

In this Appendix, we develop a simple calculation of how much funding a hypothetical neighbouring school of average size would lose per year if it experienced the average estimated decline in student numbers after a free school opened that we report in Section 5.

We consider this for the first three year after a free school opened – a period of time during which a reduction in student numbers was statistically significant in both school phases. We stress this is a simple analysis. We use an estimate of teacher costs, and we assume that the hypothetical school was not able to re-fill in later years the places estimated to be lost in Reception/Year 7. (We recognised in practice schools may be able to re-fill places in later years, but to different degrees).

A hypothetical primary school
We consider a hypothetical 2-form entry primary school with a capacity of 60 in Reception, which we assume admitted in previously years 56 students into Reception, in two classes of 28 students each. The estimated decline in student numbers in the school's Reception classes in the first three years after a free school opened would be, rounded to the nearest student, 1 in the first year, 1 in the second year and 1 in the third year. (This is a decline respectively of 2.2%, 2.2% and 2.6% each year). These losses accumulate. In treatment year 1, the school would lose 1 student in Reception. In treatment year two, the school would lose 1 student from Reception and also be 1 student down in Year 1. In treatment year three, the school would lose 1 student from Reception and also be down 1 student in both Year 1 and 2.

If we used the minimum funding schools should have received in 2018/19 as an estimate of per-student funding, this was £3,300. The loss of funding at the hypothetical school would thus equate to £19,800 over the three-year period (that is, 1 + 2 + 3 students x £3,300). This would be out of a total per-capita budget over the three years, without having experienced any student loses, of £554,400.

The national English minimum salary for a qualified teacher was £23,720 in 2018/19 (NASUWT 2019), which rises with on-costs (pensions, taxes) to about £34,963 (using Surrey County Council annual employers on-cost calculator (Surrey County Council 2023)). The funding lost at the hypothetical primary neighbouring primary school would thus equate roughly to employing 0.2 or one fifth of a newly qualified teacher across the whole of the three-year period. (We might reason that the school would probably find other ways to make this savings, for instance by reducing the contracted time of a teaching assistant and/or by making cuts to textbooks, trips or other activities.)

A hypothetical secondary school
In the secondary phase, we can consider a hypothetical 6-class entry secondary school, with capacity for 180 students in Year 7, which admitted 168 students into 6 classes of 28 students. Rounded to the nearest student, the decline in student numbers in the school's Year 7 in the first three years after a free school opened would be 4 students in the first year, 8 in the second year and 10 in the third year. (This is a decline respectively of 2.6%,

4.7% and 6.0% each year). Accumulating, these would lead to the school being 38 students down by the third year after free school opened.

The minimum funding secondary schools should have received in 2018/19 per-student funding was £4,600. The loss of funding at the hypothetical secondary school would thus approximate £174,800 over the three-year period (that is, 4 + 12 + 22 students x £4,600). This would be out of a total per-capita budget over the three years, without having experienced any student loses, of £2,318,400. Using the minimum salary and on-costs for a NQT of £34,963, this funding loss would be the equivalent to the salary of at least 1.5 newly qualified full-time teachers across the 3-year period (costing £157,333, not including salary scale increments).

We can also note that our models showed that, on average, secondary neighbouring schools experience a statistically significant decline in student numbers, relative to the counterfactual, across all six post-treatment years. Extending the analysis to these six years (with declines in years 4-6 of respectively, 5.0%, 4.6% and 5.5%), and assuming the school has five year groups (Year 7-Year 11) (so that the first year of loss is not included in the sixth post-treatment year), then the accumulating loss be 149 students (4+12+22+30+38+43). This would mean a funding loss of £685,400, equating to about 3 NQTs employed full time across the 6-year period (costing £629,334, not including salary scale increments).

At first sight, then, free-school competition may appear to cause only a moderate decline on average in a neighbouring school's student roll in the short run. As moderate losses accumulate over time, however, the impact in funding may be sufficiently sizable to impact on staffing or wider school budgets, particularly in the secondary phase.

Appendix 6.1: Analytical strategy in Section 6

This appendix sets out the analytical strategy for Section 6. We developed a difference-in-differences design that uses variation in exposure to a common shock (free school setting up in the neighbourhood) to estimate effects of interest:

$$y_{ijt} = \eta_i + \beta X'_{it} + \tau T_{ijt} + \varepsilon_{ijt} \quad (1)$$

where y_{ijt} measures school outcome such as improvement action taking, student intake or attainment for school i with free school neighbour j, η_i and X_{it}measure unobserved and observed school characteristics, respectively. T_{ijt} measures exposure of school i to competition by free school j in time t. ε_{it} is the idiosyncratic error term.
First differencing equation (1) removes time-invariant school-level differences:

$$\Delta y_{ij} = \beta \Delta X_i' + \tau \Delta T_{ij} + \upsilon_{ij} \quad (2)$$

where T_{ij} measures changes in free school competition. Free school competition results from free school j setting up in the local education market ($I = 1$), the observed, $\bar{S}_j$, and unobserved, θ_j, competitiveness of the new school and the susceptibility of school i to free school j.

$$I(\gamma_1 S_{ij} + \gamma_2 \bar{S}_j + \theta_j) \quad (3)$$

Plugging (3) into (2) yields:

$$\Delta y_{ij} = \beta \Delta X_i' + \tilde{\tau}_1 S_{ij} + \tilde{\tau}_2 \bar{S}_j + \tilde{\theta}_j + \upsilon_{ij} \quad (4)$$

With $\tilde{\tau}_1$, $\tilde{\tau}_2$ and $\tilde{\theta}_j$ as reduced form parameters.

The challenge is to estimate (4) in the presence of unobserved free school competitiveness. We do so by decomposing S_{ij} into a between component ($\bar{S}_j = n^{-1} \sum_i S_{ij}$) and within component ($S_{ij} - \bar{S}_j$) and treating $\tilde{\theta}_j$ as a normally distributed random effect. The resulting hybrid model is:

$$\Delta y_{ij} = \beta \Delta X_i' + \tilde{\tau}_1 (S_{ij} - \bar{S}_j) + \tilde{\tau}_2 \bar{S}_j + \tilde{\theta}_j + \upsilon_{ij} \quad (5)$$

The coefficient of $\tilde{\tau}_1$ yields unbiased effect of free school competition on school-level outcome y_{ij} in the presence of time-invariant unobserved school and free school effects. Because the model is estimated as a correlated random effect model with clusters at free school j, we yield estimates of $\tilde{\tau}_2$. However, for $\tilde{\tau}_2$ to be unbiased, the typical random effects assumptions would need to hold.

The model specification follows a correlated random-effects model, which are routinely used in panel analysis (Schunck, 2013; Wooldridge, 2019). Depending on the nature of the outcome under consideration, the models are estimated as linear regression or probit models. Moreover, we test for potential heterogeneity in $\tilde{\tau}_1$ by education phase, need for places, Ofsted grade, % FSM, academy status (yes/ no), and population density.

Appendix 8.1. Covariates and mediation analysis in Section 8

In this appendix we set out the covariates we used in our models in Section 8, as well as our approach to developing a set of mediation analyses.

Covariates

We adjusted for covariates that capture different aspects of school context and intake, namely, a measure of school-level demand/capacity ratio, the percentage of pupils deemed as special education needs (% SEN), the percentage of pupils learning English as additional language (% EAL), and IDACI.

Secondly, we included an indicator of whether the school received a low grade (Requires Improvement or Inadequate) from Ofsted at its last inspection. In addition, we controlled for school size (total number of pupils across all year groups), which we also entered in quadratic and cubic forms to better capture nonlinear effects.

We did not include measures of ethnicity and FSM eligibility to avoid confounding effects in DDD models where these variables are used to estimate mediation effects (see Section 8).

All the covariates were lagged one year to ensure that measurement of school characteristics precede school outcomes. Missing values in covariates were imputed, the mean value calculated within each year and phase. In contrast, we dropped both the treatment and its matched comparator when in either school the full trend of an outcome variable was incomplete due to missing values.

Mediation analyses for secondary schools

To examine whether improvement in pupil outcomes in secondary phase is driven by efficiency gains or adjustments in schools' intake, we analysed the pupil census and constructed school-level variables that characterise the school's entering cohort by its academic, ethnic, and socioeconomic composition. First, we linked the characteristics of the pupils entering secondary phase to their achievement in the Key Stage 2 examinations in the last year of primary phase, enabling us to identify groups of pupils of different prior attainment, ethnicity and FSM eligibility.

Second, we classified schools based on their average prior attainment at baseline, as well as on whether the percentage of pupils entering the school that are white or FSM and are at the same high-/low-achievers has increased after the opening of the free school. Change in the relative representation of relevant groups of pupils (e.g., percentage of high-achieving non-FSM pupils, percentage of low-achieving FSM pupils, and so on) was determined through a school-level fixed-effects regression of the percentage of pupils in the entry cohort that belong to the group on a set of covariates, namely, levels of excess demand, percentage pupils with special education needs, percentage pupils learning English as additional language, percentage pupils that are white and FSM, IDACI scores, last Ofsted grade, average priori attainment in Key Stage 4 exams (that is, the cohort ending secondary phase) and house prices in the local area. We also included interactions between census year and indicators of English regions, levels of agglomeration, and local authorities. Crucially, the predictive model was estimated only in the years before treatment.

Based on this model, we then made an out-of-sample prediction of the outcome in the post-treatment years and compared them to the observed figures. Schools that, compared to predicted values, experienced an increase of at least one within-standard deviation in the percentage of pupils in the relevant group in any of the first three years after free-school opening were coded as one (zero otherwise). When then combined polar categories into a single mediation variable such that DDD estimates of free school effects on neighbouring schools with growing percentages of disadvantaged pupils (e.g., FSM-low-attainment) could be contrasted with free school effects on schools with growing percentage of advantaged pupils (e.g., non-FSM-high-attainment). Importantly, polar categories in the mediation variable were set to be mutually exclusive, meaning that, to be included in the comparison, a school that experiences an increase in disadvantage in, say, year 2 after free-school opening cannot experience a decrease in disadvantage in, say, year 3 after treatment.

Appendix 8.2. Descriptive statistics for matched sample in Section 8

In this appendix we set out the descriptive statistics of our matched sample in Section 8, including our outcome variables, moderators and baseline covariates.

Table 1: Descriptive statistics of outcome, moderation, and control variables (Primary)

	Treatment Status	
	Non-Free-School Neighbour	Free-School Neighbour
Average rank scores in English and Math (KS2/KS4)		
Mean	49.98	51.08
Standard deviation	27.53	28.14
Rank scores in English (KS2/KS4)		
Mean	48.82	49.38
Standard deviation	27.86	28.54
Rank scores in Math (KS2/KS4)		
Mean	50.44	51.74
Standard deviation	27.44	27.93
Forecast demand at baseline		
Mean	-0.09	-0.08
Standard deviation	0.09	0.09
Proportion SEN		
Mean	0.16	0.16
Standard deviation	0.07	0.08
Proportion EAL		
Mean	0.27	0.29
Standard deviation	0.27	0.26
Standardised IDACI score		
Mean	0.28	0.31
Standard deviation	1.13	1.15
Ofsted grade below good		
Mean	0.21	0.18
Standard deviation	0.40	0.39
Prior attainment rank scores (KS1/KS2)		
Mean	48.70	49.29
Standard deviation	26.66	27.64
Log average house price (LSOA)		
Mean	12.19	12.34
Standard deviation	0.61	0.61
KS1 average scores in Reading and Math		
Mean	.	.
Standard deviation	.	.
Percentage non-WBT high att. Pupils		
Mean	.	.
Standard deviation	.	.
Percentage WBT low att. Pupils		
Mean	.	.
Standard deviation	.	.
Percentage non-FSM high att. Pupils		
Mean	.	.
Standard deviation	.	.
Percentage FSM low att. Pupils		
Mean	.	.
Standard deviation	.	.
Treatment Status (Without UTC/ Studio)		
Number of non-missing values	1,479	1,479

Table 2: Descriptive statistics of outcome, moderation, and control variables (Secondary)

	Treatment Status	
	Non-Free-School Neighbour	Free-School Neighbour
Average rank scores in English and Math (KS2/KS4)		
Mean	65.18	65.04
Standard deviation	17.59	17.80
Rank scores in English (KS2/KS4)		
Mean	64.85	64.99
Standard deviation	17.65	17.65
Rank scores in Math (KS2/KS4)		
Mean	63.19	62.80
Standard deviation	18.00	18.20
Forecast demand at baseline		
Mean	-0.11	-0.11
Standard deviation	0.08	0.08
Proportion SEN		
Mean	0.18	0.19
Standard deviation	0.10	0.10
Proportion EAL		
Mean	0.16	0.16
Standard deviation	0.21	0.19
Standardised IDACI score		
Mean	0.10	0.12
Standard deviation	0.91	0.92
Ofsted grade below good		
Mean	0.30	0.31
Standard deviation	0.46	0.46
Prior attainment rank scores (KS1/KS2)		
Mean	69.43	69.26
Standard deviation	18.33	19.14
Log average house price (LSOA)		
Mean	12.13	12.21
Standard deviation	0.49	0.57
KS1 average scores in Reading and Math		
Mean	-0.03	-0.02
Standard deviation	0.37	0.33
Percentage non-WBT high att. Pupils		
Mean	6.55	6.85
Standard deviation	9.13	9.93
Percentage WBT low att. Pupils		
Mean	17.08	16.34
Standard deviation	10.53	9.93
Percentage non-FSM high att. Pupils		
Mean	19.59	19.21
Standard deviation	15.75	14.23
Percentage FSM low att. Pupils		
Mean	11.75	11.44
Standard deviation	7.98	7.35
Treatment Status (Without UTC/ Studio)		
Number of nonmissing values	839	841

Appendix 8.3: The 25% robustness check model in Section 8

In this appendix we set out the findings for the 25% robustness check model in Section 8. These are summarised in Table 1. In Table 2 we compare the overlapping recruitment LSOAs of neighbouring schools and free schools between the main model reported in Section 8 and the 25% robustness model reported here in Table 1.

Table 1: Free School Effect on Average rank scores in English and Math (KS2/KS4): Excluding schools outside 25% quantile of distance from free school (stratified by primary and secondary)

	Naive	TWFE		TWFE Matched		DiD Prim.	DiD Sec.	
Treatment Status								
Free-School Neighbour	1.391	1.974	**	2.012	**			
	(0.792)	(0.753)		(0.774)				
0 Years Post-Treatment						0.029	2.099	**
						(1.727)	(0.734)	
1 Years Post-Treatment						1.215	1.939	*
						(1.901)	(0.979)	
2 Years Post-Treatment						0.810	3.715	***
						(1.986)	(1.099)	
3 Years Post-Treatment						0.876	3.250	**
						(2.150)	(1.099)	
4 Year Post-Treatment						1.070	2.811	*
						(2.476)	(1.194)	
5 Years Post-Treatment						-0.172	2.941	
						(2.609)	(1.571)	
Adjusted R-squared	0.41	0.01		0.01		0.02	0.06	
Number of clusters	1272	1272		1208		790	418	
Number of observations	9699	9699		9289		6049	3240	
Residual DF	1271	1271		1207		789	417	

Notes. Coefficients from linear regression models. *** p<.001", "** p<.01", "* p<.05

Table 2: Median % Recruitment Overlap by density - Full Matched Sample vs Closest 25% Schools

Full Matched Sample

Phase of education: primary

	Urban-rural classification		
	Conurbation	City and Town	Rural
% Recruitment Overlap			
Mean	40.7	48.7	41.8
Number of nonmissing values	4110.0	2645.0	982.0

Phase of education: secondary

	Urban-rural classification		
	Conurbation	City and Town	Rural
% Recruitment Overlap			
Mean	30.8	36.4	27.0
Number of nonmissing values	1978.0	1942.0	496.0

Closet 25% Schools model

Phase of education: primary

	Urban-rural classification		
	Conurbation	City and Town	Rural
% Recruitment Overlap			
Mean	45.4	57.5	53.8
Number of nonmissing values	1090.0	681.0	234.0

Phase of education: secondary

	Urban-rural classification		
	Conurbation	City and Town	Rural
% Recruitment Overlap			
Mean	34.8	51.8	39.8
Number of nonmissing values	484.0	438.0	115.0

Appendix 9.1. Average number of schools in wards and constituencies in Section 9

In this appendix, for our analysis in Section 9, we set out in Table 1 the median number of primary schools in an electoral ward and secondary schools in a constituency, together with the range and standard deviation.

Table 1: Average number of schools per year-group per electoral ward for the primary phase and per constituency for the secondary phase.

	Number of nonmissing values	Mean	50th percentile	Standard deviation	Range
Primary (Ward)	306555	3.1	3.0	1.3	9.0
Secondary (Constituency)	26621	6.0	6.0	1.7	17.0

Our decision to use wards in the primary phase was informed by the fact that at the constituency level the mean number of primary schools was 28, the standard deviation 8.8 and the range of 67.

Appendix 9.2. Approach to estimating social segregation in Section 9

To measure the effect of free school enrolment on school segregation in England we followed closely Monarrez et al (2022) and estimated:

$$Y_{jgt}^{d} = \beta E_{jgt}^{d} + X_{jgt}^{d\prime}\Gamma + \tau_{jg} + \delta_{jt} + \gamma_{rgt} + \varepsilon_{jgt} \quad (1)$$

The dependent variable Y_{jgt}^{d} measures the segregation of school system j in year group g for the academic year t. The superscript d denotes the specific socio-demographic group. Segregation is modelled to change with the free school enrolment rate E_{jgt}^{d} in that year group and school year for the specific socio-demographic group under consideration. The relationship is estimated conditional on a set of control variables X_{jgt}^{d} that vary at the system-year-group-school year level including the log of total enrolment, the fraction of students from a given group d, and the number of schools serving system-year group jg at time t. In addition, the model includes sets of fixed effects to account for unobserved influences. First, the model includes system-year group fixed effects, τ_{jg}, to restrict the comparison of segregation within the same system-year group. This term removes level differences in segregation across systems. Second, to account for unobserved time-varying segregation shocks at the school system level, for instance large housing developments, the estimation model includes system-year fixed effects δ_{jt}. Finally, to remove changes in segregation due to regional demographic change the model includes region-year group-year fixed effects, γ_{rgt}.

Equation (1) is estimated using linear regression separately for primary and secondary school systems. In additional analyses, we relax the assumption of a constant β to test if the free school effect on segregation changes with school system's ethnic diversity and population density.

The main confounding stems from potential reverse causality. In other words, changing segregation influences parent's decisions to enrol or not enrol their children in free schools. As noted in section 9, our analysis is also preliminary in that our findings could also be usefully tested. Future research might use different geographical scales, different measures of segregation, including the dissimilarity index (Allen et al 2015), as well potentially a multi-group segregation index to further test for segregation by ethnicity (Mitchell 2023).

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