

# How can we encourage good schools to expand?

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## **A CUBeC Short Report**

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# Executive Summary

## Introduction

The education system in England is widely referred to as a market and has been set up in part to function as one. But for a market to work, the main decision-making agents have to respond appropriately to the market incentives, and these have to be leading in the right direction. We analyse whether this is the case in the schools market in England. Specifically, we ask whether the system is doing a good job of mimicking market incentives for popular services to expand.

We examine the growth of schools in England, and in particular the growth of high performing schools. The question is whether there appears to be a key failure of the (quasi-)market in education. A well-functioning system should mimic market incentives for high-performing and popular schools to expand.

## Methodology

We address some of the possible reasons why popular schools may not expand, focussing on incentives, disincentives and constraints on expansion across three areas: the change in student intake from an expansion, the impact on school finances, and the personal financial incentives of the headteacher in terms of salary.

We provide an empirical study of changes in the availability of school places. Our analysis covers a period when the role of the Local Authority (LA) was beginning to decline due to the rise of Academies. We identify good schools through their performance and study the growth in their capacity compared to other schools. There is no scope with this data to conduct causal analysis, so all our results are descriptive of the facts rather than offering strong causal conclusions. We also use nine years of Consistent Financial Reporting (CFR) data to analyse the relationship between changes in current funding per pupil and changes in school size.

## Results

Over the last ten years, high-performing schools in England have grown barely any faster than other schools. They have added no more capacity than the average school. We show that over the last decade, school expansion has largely been determined by local population changes, with little differentiation between high- and low- performing schools.

We show that the incentive for a school to expand is weak at best; at worst there are disincentives to do so. Taking in turn quality incentives, resource incentives and pay incentives:

If there were very strong socio-economic segregation in the neighbourhoods around schools (with richer families living closer), we would expect schools admitting pupils from further afield to see on average a fall in the mean ability of the intake. In this report we focus on the popular schools that use proximity as the principal admissions criterion and show that this potential penalty could be

important for some schools, with mean prior attainment decreasing with distance from the school. However, in line with our earlier work, we show that this is not a serious problem for many schools.

In terms of financial incentives: the data show a zero or even slightly negative relationship between changes in current funding per pupil and changes in school size. Growing schools get the same or less money per pupil than static schools. While current funding provides no incentive to expand, for the period under analysis capital funding was relatively abundant (through the Devolved Formula Capital scheme and the Building Schools for the Future programme, although the latter was more used for refurbishment), so it is hard to see lack of access to capital as a major constraint.

We know of no robust evidence defining the objectives of Headteachers. Standard assumptions are that people care about their pay, career, hours, effort and stress, working conditions, and about the quality of the service they are providing. Most of these are not measurable in the data available. One that is feasible to study is pay. There is a statistical association between school size and headteacher pay. But it is quantitatively weak, amounting to around 3.7% higher pay for a secondary school with 150 extra pupils.

## **Recommendations**

We set out some ideas for consideration on how to weaken the disincentives to growth, and to provide positive incentives. We emphasise that any of these would need to be rigorously trialled and evaluated before being widely adopted. These ideas include:

- Introducing incentives: reforming school funding and headteacher pay so that schools reap financial rewards from expansion;
- Removing constraints: drawing a distinction between capital for refurbishment and capital for expansion, with the provision of new capital for expansion linked to the demonstration of high academic performance and a clear demand for places.
- Encouraging federations and chains: use school 'take-overs' to transmit methods and values from successful schools to those that are currently less popular.

## 1. Introduction

One of the core insights of economics is that markets can, under certain circumstances, allocate an economy's resources very well. This means that more of the things that society wants will be produced, and will be produced in relatively efficient ways. While there are well-known and important cases when that is not true, nevertheless the market has a built-in mechanism that will ensure that popular services and products will flourish and grow.

Does this apply to education? For about two decades now, the education system in England has been referred to as a market<sup>1</sup> and has been set up in part to function as one. But for a market to work, the main decision-making agents have to respond appropriately to the market signals, and the market signals and incentives have to be leading in the right direction. This is the perspective from which we examine the growth of schools in England, and in particular the growth of high performing schools. There appears to be a key failure of the (quasi-) market here: the system is not mimicking market incentives for popular services to expand.

There are three important arguments for wanting the market to work well in this regard. First, we might intrinsically value a system where parents are able to fulfill their wishes for the education of their child to the greatest extent possible. Second, if we assume that parents value schools that perform well academically (addressed below), this leads to an efficiency argument: we want as many students as possible to be educated in high-performing schools. Therefore, the more places there are in such schools, the better. One important consideration is whether high-performing schools that expand are likely to remain high-performing following expansion; this is the subject of section 5 below. The final argument is equity: expansion necessarily gives places to some pupils who could not previously access the school. If increasingly popular schools do not expand, they simply experience tighter and tighter catchment areas. This restricts access to these schools more and more, and the greater demand for housing pushes up the price of houses. This means that access is more correlated with household income, and the outcome is increased inequality.

The need to establish an empirical understanding of changes in the supply of school places is therefore important. In fact, it is becoming increasingly important as the school system changes from a largely planned system under the control of Local Authorities (LAs), to a more autonomous one in which currently half of all secondary schools are Academies or in line to become one. Precisely because of their autonomy, policy will have to rely more on market incentives for schools and headteachers to achieve the desired outcomes. Before the rise of Academies, LAs could in principle strategically match school intakes to local populations by managing capacity directly. Now, with rising school-age populations in certain areas, it is important to find some levers to increase the number of places available simply to meet needs. On top of a simple basic needs requirement, we would ideally like the system to encourage high-performing schools to expand disproportionately, in order to offer a better education to more students. This is the primary focus of this report.

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<sup>1</sup> Or a quasi-market (see Glennerster, 1991, and Le Grand and Bartlett, 1993)

The system is changing in other ways too. The recent (2012) publication of “School Funding Reform: Next Steps to a Fairer System” by the Department for Education (DfE) promises significant changes to the school funding landscape. One of the key characteristics of the current school funding system is complexity and lack of transparency. DfE (2012) states: “The way that schools are currently funded locally is highly complex. One implication of this opacity is that schools might reasonably be rather wary of any radical action. Expanding capacity may potentially have significant and it seems largely unknowable effects on a school’s budget. This seems likely to be an important constraint on any decision to expand”.

There are two broad categories of reasons why popular schools may not expand: they don’t want to; or they do want to but can’t. The former includes factors such as wanting to maintain a reputation for high quality and believing the peer group to be important, wanting to maintain the exclusivity and enjoying the long queue at the door, or simply preferring an easy life over the difficulties in securing an expansion. The latter might be because of physical space and planning regulations, or from lack of capital funding or current funding for extra teaching or management capacity. Public opinion can sometimes be vociferously against school expansion, though that is more an issue for a Local Authority than for an individual school.

In this paper we address some of these possible reasons why popular schools may not expand. We cannot analyse the issue of available physical space around the school, nor planning delays nor hostile public opinion because of lack of data (within the timescale of this Report<sup>2</sup>). We do study what we believe are likely to be the main issues weighing a school’s decision. These are the potential impact on the school’s performance (section 5), the impact on school budgets (section 6) and the impact on the headteacher her/himself through salary (section 7). This discussion is a combination of descriptive analysis and the application of behavioural economics; we cannot establish causal relationships here. Finally, we summarise our findings in section 8 and make some proposals on ways to encourage popular schools to expand.

Most of the empirical work reported below relates to secondary schools, because this is where the issues are more acute (in the sense that this is a greater source of parental angst). Also, because primary schools are so much smaller, an increase in capacity of one additional entry class is proportionately a much greater disruption to the school. It seems likely then that a primary school would need a more significant incentive to expand than a secondary would, so to the extent that we find only weak incentives for the latter, lack of expansion among the former is even more understandable. Our analysis is necessarily retrospective, referring to a decade (2002 to 2012) where most schools remained under local authority control. This should be borne in mind when extrapolating any finding to the current schooling system which now has high levels of autonomy.

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<sup>2</sup> None of these things are inherently unmeasurable. But collecting data on the planning status and value of land around each popular school would be very time consuming indeed, and probably not cost-effective.

## 2. The economics of school expansion

In this section we draw analogies between more conventional markets and school markets to highlight key differences and similarities. This highlights why there are multiple reasons why school management face very blunt incentives to expand their school, and under circumstances may even face clear disincentives to expand.

### Expansion in the private sector

A conventional small firm making a popular product for which there is high demand faces very clear incentives to expand production. This is because the price will rise as demand is higher than the available supply, and so profit per unit will rise. The desire to make more profit will lead to the firm producing more. As it does so, costs per unit may rise, stay constant or fall; the price will also tend to fall back down as supply increases. Expansion will continue until the point where profit is maximized. This is the classic mechanism behind the market producing more of popular products (and less of unpopular ones).

The scale of the expansion depends on two things: the shape of the cost function and the degree of popularity. Costs may be relatively flat as more is produced if it is straightforward to simply add more identical capacity to the firm – one more team, or one more production line, or one more delivery van. However, even in this case, eventually costs will start to rise with expansion as there are fixed factors that constrain the capacity to add identical units. This may be physical space, or the ability of the management to coordinate more and more production units. Alternatively, costs may rise steeply with only a small expansion if existing equipment has to be worked harder through overtime or extra shifts.

One important issue determining the nature of any expansion is the efficient scale of operation. This is obviously going to vary enormously between different industries: consider cafés and car factories. All else equal, optimal expansion in a private firm would mean reaching the efficient scale, and then setting up another production facility and bringing that to the efficient scale and so on. This obviously relates to the issue of school chains and federations. There is an additional issue in service industries as opposed to manufacturing plants: the scale of operation itself may affect demand – small cafes may be more desirable than large ones, small schools may be more desirable than large ones, which we re-emphasise below.

### Special cases: reasons not to expand in the private sector

On top of this basic economic model of expansion, there are three specific issues that need to be considered. First, this model of expansion assumes that all inputs into production are infinitely available. This will not be the case if there are important fixed factors that cannot be reproduced: for example, a unique location or an individual with a special skill. The presence of unique factors may mean that the only option is to increase output at the first location, rather than create new facilities.

Second, there are cases in the private sector where it is not profit-maximising to expand, when staying small is best. Very popular restaurants, hotels, and clubs, for example, gain some of their popularity precisely from not expanding to meet the demand. The exclusivity is part of the attraction

and allows high prices to be charged. The calculation must be that an expansion would reduce demand so much that profits would fall. To get around this problem, popular restaurants and chefs open new restaurants, rather than making the original one a lot bigger. Again this relates to the idea of school chains and federations.

The third point is related to this exclusivity. For many transactions it is irrelevant who else is buying; even in the service sector when one has to be there in person, it doesn't matter who else is in a specific supermarket at the same time. But for other transactions it does matter: part of the attraction of particular clubs or bars is who else is there too. In insurance, it matters a great deal who else is being insured by the same company. For school expansion, the question is: are schools more like supermarkets or nightclubs?

### **State schools: a market without prices or profit**

A similar analysis of the state-funded education sector in England should start by identifying the main decision-makers, and what their aims might be. Headteachers along with their senior leadership teams make the executive decisions on school strategy, supported by their governors. As we discuss below, heads and governors are likely to be interested in the outcomes of their school, and heads additionally in their own career. The former will include the performance of the school in terms of exam performance as this is the most public and widely known indicator of the quality of the school; it may also include broader outcome measures such as pupil well-being, and pupils' future trajectories (e.g. how many secondary school pupils go on to university). School size *per se* may be important to the head and governors. Other factors that school leaders might care about such as finance, buildings and facilities are all instrumental in producing school performance, though it is possible that they also directly influence a headteacher's job satisfaction. Headteachers will also have an eye on their own careers, chiefly salary, working conditions and career prospects.

A new set of players in the quasi-market are Academy chains. These currently only cover a small minority of schools, they are growing quickly<sup>3</sup>. The formal chains are typically constituted as Trusts; for example, E-ACT formed as a not-for-profit social enterprise, and ARK Schools is an education charity. The aims and motivations of the chains vary (for example Oasis schools have an explicit Christian ethos), but all are concerned to raise the performance of the schools and seem set on a growth path by taking over more schools.

The other main actors are local authorities. They have a responsibility to ensure sufficient schools for all the children in their area, and also for the overall quality of education provided. The former is much more urgent than the latter and gives rise to much sharper incentives – more places have to be found, and the educational quality of those places is secondary to simply having enough. So to a degree, the aims of LAs and headteachers are congruent. There is also some conflict, however. The need of a LA to find a place for each child may clash with the desire of a head to restrict numbers in her/his school. This may be further sharpened if the last children to be allocated are more difficult-

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<sup>3</sup> Under 3% of schools in England, see Hill et al (2012).



to-teach students. This is a classic principal-agent relationship between the regulated (schools) and the regulator (LA), battling over information. For example, it is conceivable that some schools may understate their true capacity in order to manage admissions, while the LA, not knowing the true capacity will nevertheless want to increase pupils at the school.

Given these decision-makers in place, how does the system play out in comparison to the canonical private sector model? For schools in the state sector in England, the direct link between popularity and expansion is entirely missing. There is no price for school places, so this cannot rise to signal popularity and incentivise expansion. Schools cannot make profits, so there is no straightforward reason to offer more places. In the absence of this profit motive we need to study the more complex incentives facing school management. School expansion may be valued where there are direct benefits to school leaders through higher pay, better career prospects or prestige. It may also be pursued if it does not harm the wider interests of the school, including their overall financial situation and their league table performance.

It is critical to consider how the factors affecting school popularity are affected by either expansion *in situ* or the more radical decision to form a chain of schools. A method or style of teaching might easily be scalable; similarly school management methods may also be equally applicable to much larger schools. These would not be (much) diminished by expansion. On the other hand, there may be factors with similarities to the problem of a unique asset (for example an exceptional headteacher) or the people who are already there (the peer group). Expansion may lead to a deterioration in the average characteristics of pupils who attend the school. It may also lead to a direct fall in popularity given that small schools are valued by parents. Turning to the degree of popularity, from a headteacher's perspective it is important that any new demand for places is expected to persist for years since adding extra capacity and staff that are then not used is financially damaging. For example, a secondary school increasing capacity by one entry class, say 25 students, will eventually lead to 125 extra pupils in school in steady-state.

### Capital Constraints?

Expanding capacity necessarily involves capital expenditure, so it could be that one barrier to expansion is lack of capital funding. School expansion is certainly not cheap: modern pre-fabricated building structures cost at least £100k per classroom<sup>4</sup>; whole new teaching blocks and (for example) larger halls and dining facilities, obviously generate much higher costs.

Until 2010, capital funding was distributed through the 'Devolved Formula Capital' (DFC) scheme, amounting to about £0.5m for a typical secondary school by 2008 (some schools still receive DFC but at much lower levels). Schools also borrowed from the LA against future years' allocations. It was spent at the headteacher's discretion, and could be used to refurbish existing facilities or for expansion. This was supplemented from 2005/6 by the more strategic 'Building Schools for the Future' programme. Since 2010, the regime is rather different, necessitated in part by a transformed

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<sup>4</sup> One example is [http://www.terrapin-ltd.co.uk/downloads/schoolDownloads3/CoverNote\\_Standard.pdf](http://www.terrapin-ltd.co.uk/downloads/schoolDownloads3/CoverNote_Standard.pdf) accessed April 2012.

fiscal climate. If it sought extra capital, a Community school would approach its LA which could use some of its own capital funding if it so decided. Academies apply to the Academies' Capital Maintenance Fund, which is centrally administered.

Over the period of covered by the devolved capital scheme, schools did have capital funds for expansion. However, there may have been a divergence of incentives between using the capital for refurbishment and expansion. Society may want the money used for expansion at the high-performing schools, but if the incentives for expansion are not strong, the headteacher may prefer to refurbish existing facilities to improve quality of life for existing pupils and teachers. So, faced with the choice of using capital funding to make a school nicer or bigger, it would not be surprising if the former choice had been more prevalent.

### **Expansion through chains and federations**

As we noted above, the alternative to the straightforward expansion of an existing facility is the creation (or take-over) of new facilities. A typical example is a restaurant: a restaurant is set up, and proves very popular, with long waiting lists for tables. The owner decides to open up a new one with some explicit connection in the name, and if the set-up works and there is still more demand, more might follow in other cities, with explicit chain branding. This expansion is 'bottom up' and seems wholly positive.

What is the equivalent for schools? The direct read-across involves very popular schools 'taking over' the running of others, and on a larger scale, the operation of chains or federations of schools. There are collaborations of schools with varying degrees of formality. This includes very informal links and partnerships, through 'soft' federations, 'hard' federations to explicit chains. There is also a good deal of variation within chains, for example growing in different ways whether they are developing through 'sponsored' and 'converter' academies. Chains can be formalised partnerships where the schools share resources and staff or simply informal arrangements between schools for supporting each other.

The DfE recognise a number of variants of collaboration<sup>5</sup> including a multi-academy trust (where one academy trust governs a group of schools through a single set of members and directors); an umbrella trust (in which the schools retain the autonomy of having their own trust, but agree a structure with a group of schools to allow shared governance, collaboration and procurement); and a collaborative partnership model (in which academies work together in an informal chain, with the schools involved continuing to exist as separate academy trusts without any joint governance structure). There is also a commitment to support others embedded in any school becoming an

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[Hhttp://www.education.gov.uk/schools/leadership/typesofschools/academies/academiesfaq/a0068041/academy-chains-faqs#faq1H](http://www.education.gov.uk/schools/leadership/typesofschools/academies/academiesfaq/a0068041/academy-chains-faqs#faq1H)

academy<sup>6</sup>: “Every school that has become an academy will have committed to supporting another school, whether through a formal chain or more informal arrangement. ... Being a sponsor [to an under-performing school] is a challenging but valuable role for the lead school. It means a high standard of education is also made possible for pupils in the sponsored school. It will give the lead school the opportunity to share good practice, build on their reputation and develop the careers of their staff.”

Hill et al (2012) provide a very timely report on the growth of Academy chains. Early in 2012, they identified 48 sponsored chains comprising 3 or more academies including 9 chains comprising 10 or more academies. These include some well-known names such as the ARK Academy chain (<http://www.arkschools.org/>) which runs 11 academies; E-ACT (<http://www.e-act.org.uk/>) running 18 schools; the Harris Federation comprises 13 Academies (<http://www.harrisfederation.org.uk/>); the Oasis Academy Chain with 14 (<http://www.oasiscommunitylearning.org/>) and the Academies Enterprise Trust (<http://www.academiesenterprisetrust.org/>) which has 12 schools.

The goals of the loose federations are most likely to be mutual support and improvement. The incentives to grow of these chains have been summarised by Hill et al (2012). The benefits of growth are first the ability to improve attainment for more students, a greater opportunity to develop leaders and to give teachers a wider range of experience. The risks of expansion were largely fears of over-stretch, that the span of managerial attention might be spread too thinly, increased bureaucracy and over-burdened central services.

To summarise, the central questions are: what are the incentives for school management to expand a school, and how are the factors that generate school popularity affected by either expansion *in situ* or the formation of a chain? To what extent is the popularity of one school replicable in others through the formation of a chain? Does this diminish the value of the key assets, or actually allow economies of scale?

### 3. Data and definitions

#### Data – longitudinal analysis of year 7 cohorts

For the main part of the analysis we construct a database of secondary schools from 2001/2 to 2010/11. We drop tiny schools (with a cohort size of less than 15) and special schools and are left with all secondary and middle schools with a year 7 cohort. Our key variables are year 7 cohort size and school performance in GCSE examinations each year (all constructed from National Pupil Database each year). We measure GCSE examination performance using the % of pupils gaining five

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[Hhttp://www.education.gov.uk/schools/leadership/typesofschools/academies/academiesfaq/a0068041/academy-chains-faqs#faq13H](http://www.education.gov.uk/schools/leadership/typesofschools/academies/academiesfaq/a0068041/academy-chains-faqs#faq13H)

or more grades A\*-C since this was the league tables measure used throughout the period under consideration. We also use a broad measure of school average performance in pupils' best eight subjects (capped GCSEs) and contextual value added (constructed from underlying National Pupil Database information).

**Table 1: Summary of main longitudinal dataset of year 7 cohorts**

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Total number of pupils	544,481	549,758	545,519	530,586	533,730	523,474	508,818	521,485	518,467	512,643
Number of schools	2872	2890	2893	2910	2926	2927	2937	2942	2923	2893
Average school size	190	190	189	182	182	179	173	177	177	177
School mean GCSE 5 A*-C	51%	52%	53%	56%	58%	61%	65%	71%	78%	81%

### Measuring capacity changes

In order to understand school expansion and contraction we need to be able to distinguish between changes in school size that are caused by changing demand for school places by parents and changes that are due to a decision by the school to supply more or fewer places. The latter are the changes in capacity that we are particularly interested in here. Ideally we would be able to identify formal changes in capacity by observing a change in the school's Published Admission Number (PAN)<sup>7</sup>, but this data is not collected centrally in England. We also do not have accurate historical capacity figures for schools over this period.

Therefore we can only approximate whether a school has changed its capacity or not by using the actual changes in year 7 cohort size. It is likely to be a good approximation as the size of the cohort cannot be above true capacity. For this analysis we exploit the fact that schools usually change their capacity by a whole class size of pupils (i.e. 25-30) because any other change in capacity would be inefficient. So, for each year our schools are grouped in one of seven categories based on the change in their year 7 roll:

- Closure – year 7 roll falls to zero
- Reduction in capacity – fall in year 7 roll of over 20 pupils
- Demand-led fall in size – fall in year 7 roll of between 5 and 20 pupils
- No change in size – increase or decrease of 4 pupils or fewer
- Demand-led rise in size – increase in year 7 roll of between 5 and 20 pupils
- Increase in capacity – increase in year 7 roll of over 20 pupils
- Opening – year 7 roll rises from zero in previous year

Again it is worth noting that a secondary school increasing capacity by 20 pupils in year 7 will have to deal with 100 extra pupils in school in steady-state.

<sup>7</sup> This is the number of pupils in a year group that the admission authority has agreed will be admitted. The figures are collated and monitored locally by the local authority, but are not currently collected by DfE.

## Measuring local population changes

In understanding changes in capacity we need to account for changes in the number of 11 year olds in the local area. We do not use local authorities as the unit of analysis for local areas because they are far too large to reflect local population changes for some schools and far too small for others (e.g. in London). Instead, we count the number of year 7 pupils living in every lower super output area (LLSOA) from 2002 onwards using the National Pupil Database. A lower super output area is designed to have a roughly constant population size across the country and contains, on average, 22 year 7 pupils.

We construct two measures of a school's local population:

- The close area population counts the number of year 7 pupils each year who live in the 10 LLSOAs nearest to the school (regardless of which school they attend);
- The wider area population counts the number of year 7 pupils each year who live in the 25 LLSOAs nearest to the school.

Table 2 shows the summary statistics for the number of pupils in the year 7 cohorts across the 10 years of data. It illustrates the shrinking of the cohort population overall. The close population measure approximately represents the typical size of a secondary school. Although the variation between the minimum close area population and the maximum is huge, the differences between the 25<sup>th</sup> percentile and 75<sup>th</sup> percentile are very small, which is consistent with the aspiration of LLSOAs to incorporate fairly constant population sizes.

**Table 2: Number of pupils in population measures**

		2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Close population	min	9	16	9	13	13	12	18	14	22	19
	p25	172	175	172	167	167	162	156	160	159	156
	p50	196	200	197	190	189	184	178	182	180	176
	p75	220	222	220	211	209	203	199	203	199	197
	max	401	405	374	411	420	398	402	410	438	424
Wide population	min	58	63	63	64	52	59	54	52	70	68
	p25	438	442	438	424	424	413	397	407	405	397
	p50	487	496	490	472	470	456	443	450	446	440
	p75	533	542	536	513	510	499	483	492	484	478
	max	876	899	873	890	909	881	889	953	991	968

Note: N=3297

## Defining neighbouring schools

The activities in neighbouring schools are likely to affect demand for places. For each school we find the nearest four secondary schools in 2007, excluding those of the opposite sex for single sex schools. We then also include any schools that are closer than the fourth nearest school that were open before 2007 or have opened since. This means that, although most schools have four neighbouring schools on our definition, many have more or fewer than four in particular years.

If neighbouring schools actually affect demand for places, they would need to be within commutable proximity to each other. The key metric here is actually not the distance between the two schools, but whether any parts of a school's de-facto catchment area are within commutable proximity to another school. We have not imposed a maximum distance between neighbouring schools because England is relatively densely populated throughout. The furthest distance between a school and its nearest four neighbours in our dataset is 42 miles for schools on the Isles of Scilly. Four mainland schools have a furthest distance of 19 miles (in Northumberland, Cumbria and Cornwall). This is clearly a long distance, but equates to a journey time of just 40 minutes in these areas, comparable to journeys made by many children in more urban areas.

For each of these four neighbouring schools we record information on the % gaining 5 A\*-C each year and the size of the year 7 cohort. We then create three variables to describe relative changes at neighbouring schools:

- the % of neighbouring schools who have better exam results each year;
- the net number of closures and openings of neighbouring schools; and
- the net number of capacity increases/decreases at neighbouring schools.

### Identifying high performing and popular schools

This information leads directly to the main indicator of the performance and popularity of the school for this analysis. Theoretically a school is popular if many parents would wish to send their child there. This should be reflected in the number of applicants per place, though even this measure is imperfect because parents will usually only apply to schools where they know there is a chance of gaining a place. But in any case, data on school applications and admissions is not held by the DfE.

Given that we do not have a direct measure of school popularity, we use the school's relative performance and make the assumption that high-performing schools are more likely to be popular. This seems uncontroversial, relying on evidence that parents do value high academic attainment in schools (see Burgess *et al.* 2009). Using this approach we infer the popularity of a school by comparing its raw GCSE results two years before year 7 entry (since this is the cohort that parents can see when they think about school admissions). For the most part in this analysis, we define a school as popular if the % of neighbouring schools who have better exam results is less than 25%.

An alternative approach would be to use the radius of its de facto catchment area (relative to population density) as a rough measure of the demand for places in the school. This will not work perfectly as there are obviously other admissions criteria, for example with faith schools, but will be informative as the proximity rule is the most important single rule for allocating places in over-subscribed schools. So for example, we would argue that a school in which the furthest pupil admitted lives 2km from the school is more popular than a school in an area with the same population density and the furthest pupil lives 5km away. This approach is most effective for schools that make considerable use of catchment area or proximity oversubscription criteria, so we restrict analysis to community schools using this analysis. Because we cannot implement this measure of popularity for all schools, we only use it in the section on the role of admission policies.

## Data – longitudinal analysis of school financial data

We construct a longitudinal database of school financial data for both primary and secondary schools using the Consistent Financial Returns from 2002/3 to 2010/11. The information recorded in these databases varies each year but we are able to extract consistent information on:

- the school identifier and phase of education;
- the number of full-time equivalent pupils at the school;
- the total budget for the school; and
- the budget per pupil (derived from above if necessary).

## Data – cross sectional analysis of schools in 2011

To analyse how expansion and contraction might affect a school's intake we focus on a single cohort of pupils who were in year 7 in 2011. We have postcodes for these pupils so we are able to accurately map their geo-location. We use a very small number of variables for this analysis: Key Stage 2-scores (re-scaled to have a mean of zero and standard deviation of one) are used as a measure of prior attainment of the pupils; the year 7 school identifier tells us their current school attended; northing and easting co-ordinates locate all schools and all pupils.

From this data we calculate the distance that each pupil currently travels to school and record these distances for each decile for every school. We then record the average KS2 score for pupils who live in each of these deciles from each school, regardless of whether they actually attend the school or not.

## 4. The relative growth of popular schools

This section illustrates the extent to which different types of schools have actually increased or decreased their capacity over the past 9 years for which we have detailed pupil-level data. Changes in school size that are driven by variation in demand are distinguished from changes in capacity using the categorisations described in the previous section; Bradley *et al.* (2000) addressed this issue using only the much more aggregate data available then.

Table 3 shows the number of secondary schools in different categories of annual change in year 7 cohort size. This is a period of contraction in secondary school roll overall, reflected in a far larger number of schools removing capacity over the 9 year period (765) than those increasing capacity (316). The opening and closure data is slightly distorted by middle school re-organisations taking place across local authorities during the period. For example, of those 'opening', 52 are actually former high schools acquiring a year 7 intake through reorganization. 11 of the closures were middle schools.

**Table 3: Annual change in secondary school size, 2002 to 2011**

	2002-3	2003-4	2004-5	2005-6	2006-7	2007-8	2008-9	2009-10	2010-11	Over 9 years
Closure	19	23	14	18	36	49	55	94	98	378
Capacity down	228	343	497	277	396	487	159	329	290	765
Size down	528	667	789	576	698	895	523	568	588	417
No change	1066	1064	1007	1145	1157	923	1066	1037	1237	573
Size up	667	559	457	682	509	431	765	696	525	423
Capacity up	364	234	129	212	130	142	369	218	185	316
Opening	37	26	31	34	37	59	60	75	68	399

Note: Capacity change is defined as change in year 7 roll greater than 20; changes of between 5 and 20 inclusive are changes in school size; no change is movements of fewer than 5 pupils on the school roll.

In this paper we are particularly interested in identifying whether popular or oversubscribed schools are choosing to increase capacity or not. Figure 1 divides the type of change in school size over the 9 year period by the local league table position of the school at the start of the period. We are particularly interested in the choices made by schools at the top of their local league table on the proportion of pupils gaining at least 5 good GCSEs. The data shows that they are indeed more likely to have increased capacity over this period, but only marginally more so than other schools. It confirms that, for the most part, popular schools do not increase their capacity.

**Figure 1: Changes in school size by league table position**

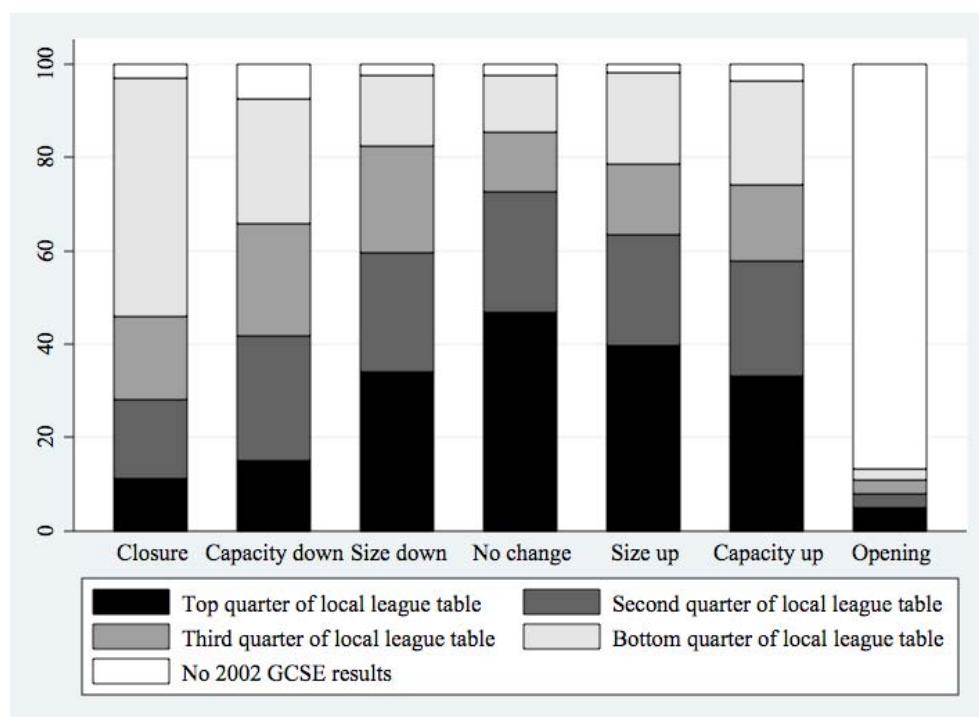
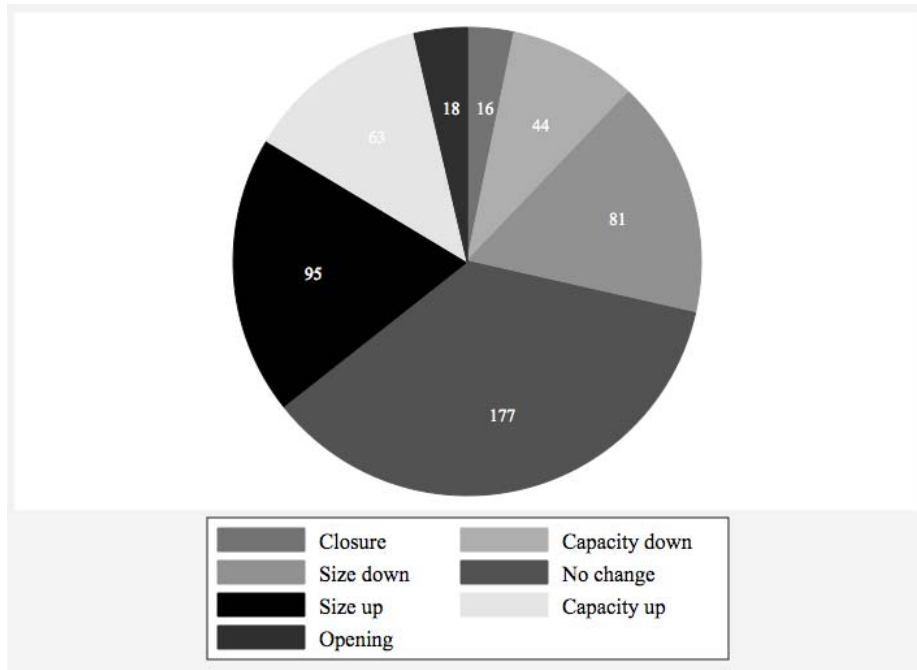


Figure 2 reports the 9-year change in year 7 cohort size for a sub-set of 671 schools that are consistently in the top quartile of their local league table between 2002 and 2006. The largest group have experienced no change in their cohort size, suggesting they were full to capacity in 2002 and continued to remain full through to 2011. Just 63 or less than 10 percent of these schools choose to increase capacity over the period.



Figure 2: Changes in cohort size over 9 years for schools at the top of their local league table between 2002 and 2006



Finally in this section we run regressions to explore the main determinant of change in school size. We are particularly interested in the extent to which school exam performance is associated with subsequent growth in cohort size. We will study changes in pupil numbers (intake year) following good or bad results. We will consider absolute results and relative to other schools in the area. Absolute school results are measured as the % gaining at least 5 good GCSEs at time  $t=t-2$ , since these would be a results available to parents at the time they were choosing a school for their child. We also include a measure for the improvement in exam results for the school between  $t-3$  and  $t-2$ . Relative school results are measured as the improvement or deterioration in the school's local league table position for the same period, where a low ranking is good and a high ranking is poor.

There are two important refinements to make to a straightforward analysis. Firstly, it is important to control for neighbourhood population changes, so that we do not mistake general growth in pupil numbers for market-driven reallocation of pupils towards more highly performing schools. Our two measures are the change in both the close and the wider population between  $t-1$  and time  $t$ . Secondly, we include indicators for actions taking place at neighbouring schools – whether they have closed or chosen in change their capacity.

Table 4 reports the change in cohort size using a variety of different regression specifications. Focusing on the first column of regression results, this models the total change in year 7 cohort size over the 9 year period with one observation per school. Our interpretation of the regression is as follows:

- Smaller schools are more likely to experience an increase in cohort size over the period. This largely reflects regression to the mean, as many schools fluctuate around a long-run average

size. The magnitude of the coefficient implies a school with, say, 150 pupils at the start of the period might gain 4 students more than a school with 175 pupils.

- Higher performing schools are more likely to expand over the period. Comparing two schools with exam results of 50% and 60%, the latter would grow by 6 additional students compared to the former.
- Improving schools are also very marginally more likely to grow, though this is not statistically significant and the magnitude of the coefficient is trivial (a 10 percentage point improvement in 5 A\*-C associated with half an additional pupil over the period).
- Growth in the size of the local population is associated with school expansion, though the wider population measure is not statistically significant. It suggests that if 10 additional students join the local area, the school will expand by 2 students.
- A neighbouring school choosing to increase capacity is associated with an increase in school size of 4 students. This sounds counterintuitive and suggests that changes in neighbouring capacity act as a proxy for population growth.
- A neighbouring school closing is associated with a gain of 7 students, as expected.

This first regression does suggest that school popularity – as measured by absolute and relative exam performance – explains some of the variation in school growth and contraction. However, comparison between columns 1 and 4 of the regression table emphasises that most of the variation we are able to explain in column 1 is actually explained through the population variables alone.

Column 3 of the regression analysis explores annual changes in year 7 cohort size so each school has up to 9 observations. Most of the coefficient sizes are reassuringly similar, but the impact of the exam performance variables has weakened – changes in absolute and relative exam performance are now not correlated with changes in school size. Column 4 repeats this panel data regression including school fixed effects, which means it should be interpreted as exploring whether changes in a school's performance and local circumstances are associated with changes in school size. Once again, whilst most coefficients are similar the impact of our exam performance variables is either slight or statistically insignificant.

Table 5 replicates this analysis but using a binary indicator for whether the school increased capacity for each year. The results tell a very similar story. We also repeat these regressions on areas with selective schooling systems and those with high proportions of voluntary-aided schools and the results are broadly consistent.

Overall, there is very weak evidence that either relative or absolute exam performance is associated with capacity increases. We have explored whether these relationships are stronger in high population growth areas, but we still find this very weak relationship. Instead, changes in capacity are strongly associated with changes in the size of the local population. This, and the positive relationship between changes in own school and neighbouring school capacity, are indicative of the importance of central (or local authority) planning in the decision to allow or force schools to increase in size.

Table 4: Determinants of change in cohort size

	Change in cohort size over 9 years			Change in cohort size over 9 years			Change in cohort size over one year - panel data, no clustering			Change in cohort size over one year – school fixed effects		
	Coef.	S.E.	Sig	Coef.	S.E.	Sig	Coef.	S.E.	Sig	Coef.	S.E.	Sig
Cohort size at t-1	-0.162	(0.012)	***	x	x		-0.033	(-0.002)	***	-0.490	(0.006)	***
GCSE 5A*-C at t-2	59.203	(6.126)	***	x	x		10.800	(-0.615)	***	13.290	(1.661)	***
Change in GCSE between t-3 and t-2	39.219	(7.487)	***	x	x		-0.342	(-0.588)	n.s.	-0.642	(0.570)	n.s.
Change in league table position	5.630	(2.588)	*	x	x		-0.257	(-0.209)	n.s.	-0.153	(0.186)	n.s.
Growth in very local population	0.210	(0.034)	***	0.472	(0.042)	***	0.127	(-0.007)	***	0.094	(0.007)	***
Growth in wider local population	0.012	(0.018)	n.s.	0.075	(0.022)	n.s.	0.076	(-0.005)	***	0.056	(0.004)	***
Change in neighbouring capacity	4.314	(0.319)	***	x	x		6.728	(-0.135)	***	5.243	(0.129)	***
Neighbouring school closure	6.568	(0.895)	***	x	x		5.789	(-0.412)	***	4.057	(0.393)	***
Year	x	x		x	x		-0.408	(-0.059)	***	-1.380	(0.071)	***
Constant	-15.977	(5.594)	**	-3.722	(1.020)		818.178	(-117.579)	***	2851.445	(141.906)	***
Number of observations	2,375			2,494			19,279			19,279	(3,027 schools)	
Adj. R-squared	0.253			0.177			0.278			0.062	0.4628 (within)	

Table 5: Log-odds regressions of capacity increase

	Change in cohort size over 9 years			Change in cohort size over 9 years			Change in cohort size over one year - panel data, no clustering			Change in cohort size over one year – school fixed effects		
	Coef.	S.E.	Sig	Coef.	S.E.	Sig	Coef.	S.E.	Sig	Coef.	S.E.	Sig
Cohort size at t-1	-0.011	(0.001)	***	x	x		-0.006	(-0.001)	***	-0.074	(0.004)	***
GCSE 5A*-C at t-2	-0.091	(0.583)	n.s.		x	x	-1.616	(-0.200)	***	1.494	(0.777)	n.s.
Change in GCSE between t-3 and t-2	1.248	(0.722)	n.s.		x	x	0.348	(-0.177)	*	0.013	(0.281)	n.s.
Change in league table position	0.192	(0.257)	n.s.		x	x	-0.021	(-0.064)	n.s.	-0.063	(0.087)	n.s.
Growth in very local population	0.010	(0.003)	**	0.010	(0.003)	***	0.019	(-0.002)	***	0.013	(0.003)	***
Growth in wider local population	0.005	(0.002)	**	0.007	(0.002)	***	0.004	(-0.001)	***	0.003	(0.002)	n.s.
Change in neighbouring capacity	0.220	(0.034)	***		x	x	1.845	(-0.051)	***	1.861	(0.083)	***
Neighbouring school closure	0.308	(0.082)	***		x	x	1.062	(-0.114)	***	1.158	(0.205)	***
Year	x	x			x	x	0.037	(-0.019)	n.s.	-0.083	(0.037)	**
Constant	-0.026	(0.529)	n.s.	-1.653	(0.065)	***	-76.356	(-38.765)	*	x	x	
Number of observations	2,375			2,494			19,279			6,830	(1,028 schools)	

## 5. The role of admissions and pupil intakes

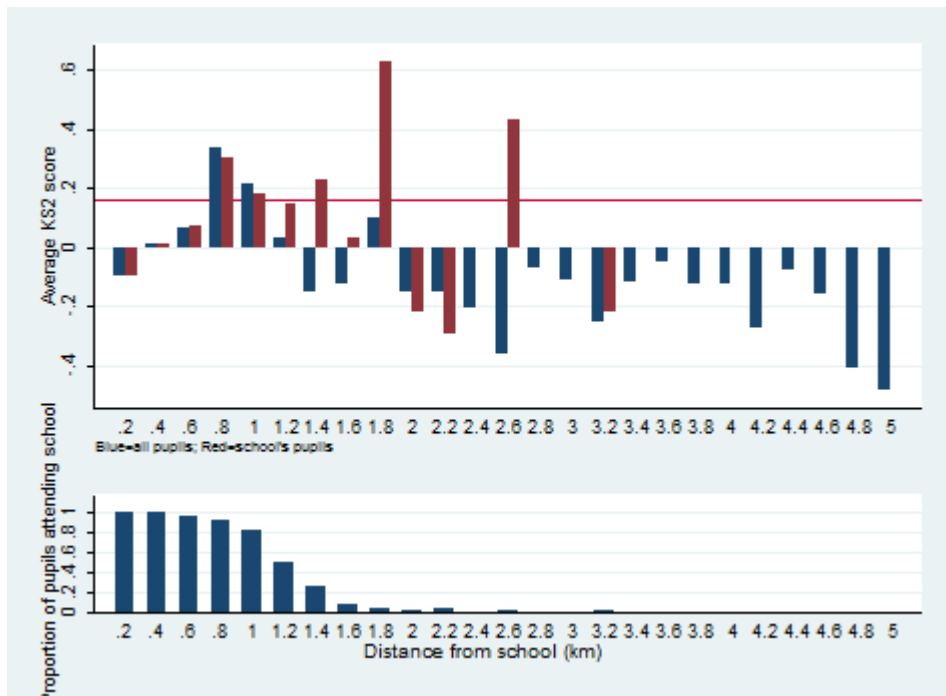
We know from theoretical models of school choice (e.g. Epple and Romano, 2003) that if admission to schools is on the basis of proximity rules, the likely outcome will involve pupils systematically sorted on the basis of household income. This in turn will produce schools with wide variation in average pupil characteristics. These models rely on evidence that: (1) the average ability of school peer groups affects individual pupil achievement; (2) household income and pupil ability are correlated; and (3) households are willing to pay for school quality.

The consequence of these types of theoretical models is that when a popular school expands, the additional marginal students it would then accept will have lower prior attainment than the average of those already at the school. In accepting these pupils, the school would eventually experience a deterioration in their exam performance.

Figure 3 illustrates this type of argument for a single English secondary school that uses proximity as its principal oversubscription criteria. We can observe the strong role of the proximity oversubscription criterion in the bottom half of the chart, which shows the proportion of year 7 pupils who live close to the school that actually attend it. This proportion is 100% for the group living between 0 and 0.2 km and around 50% for those living between 1 and 1.2 km from the school, for example. The bottom half of this chart shows that the oversubscription criterion of proximity was set at around 1-1.2km for this cohort of pupils since most living this close attend and few living further than this were accepted. Where pupils live further than 1.2km and are able to attend the school, they likely have siblings at the school who were accepted on the basis of a slightly different cut-off distance or the family has moved house.

The top half of the chart shows the average Key Stage 2 score for pupils living close to the school. Key Stage 2 scores are a measure of the prior attainment of the pupils and are reported here as z-scores so the pupil-level national average is zero with a standard deviation of 1. The horizontal red line shows the current average KS2 score for the school is 0.16 (only about one-third of schools have a better average than this). The blue lines show the average KS2 scores for each 0.2 km distance from the school for all pupils, *regardless of whether they actually attend the school or not*. The red lines show the average KS2 score for pupils who attend the school. The chart shows that, if this school chose to expand their capacity and accept pupils who lived 1.4-2.0 km from the school, these pupils would have a lower average KS2 score than those who are currently at the school. Assuming that school has some general sense of the nature of its catchment area and admissions, it is understandable that it might not want to expand.

Figure 3: An oversubscribed school using the proximity criterion



This illustration is just for one school, but we can use the National Pupil Database to gain a sense of how many schools are subject to this type of disincentive to expand. This type of analysis is only possible where we can say something about the likely characteristics of the additional pupils, so we restrict our attention here to:

1. schools that clearly make heavy use of the proximity oversubscription criterion (i.e. they accept a large proportion of those living closer than the distance of the current median (50<sup>th</sup> percentile) pupil's distance to school; and
2. schools that are reasonably popular in that they do not lose high attaining pupils who live close to the school but do not choose to attend (i.e. their average KS2 score is at least as good as the average for all pupils living closer than the median pupil's distance to school).

Table 6 shows that the necessarily rather arbitrary criteria that we set means that we identify about one-quarter of schools as both making use of proximity and retaining local high performing pupils. Not surprisingly, a large proportion of these are community schools where proximity/catchment area oversubscription criteria are almost always present. There are very few voluntary-aided faith schools in this group since they do not tend to recruit local children.

**Table 6: School making use of proximity oversubscription criterion**

	Appear to make use of proximity		Make little use of proximity	
	Retain local high KS2 pupils	Lose local high KS2 pupils	Retain local high KS2 pupils	Lose local high KS2 pupils
Academy	38	161	22	46
Community	368	752	42	109
Foundation	236	425	104	81
Voluntary-aided	89	66	254	80
Voluntary-con	27	32	6	5
Total	758	1436	428	321

Of this set of ‘popular proximity’ schools, we need a set of metrics to assess whether the average prior attainment is indeed likely to fall if they expand their intake. This is not straightforward because in reality many schools make use of non-circular proximity zones and sibling policies always produce fuzzy distance criterion. Pupils also move house and there are errors in postcodes such that pupils who are in the 90<sup>th</sup>-100<sup>th</sup> percentile for the journey to school for a school often (rightly or wrongly) appear to travel very long distances and are not useful for this analysis. We can see that of these ‘popular proximity’ schools, only about half are in a situation where the pupils who are living close to the school (closer than the median pupil’s distance to school) have higher KS2 results than the average of those who live between the distance of the 60<sup>th</sup> percentile pupil and the 80<sup>th</sup> percentile pupil. We also compare the KS2 results of those living between the 60<sup>th</sup> and 80<sup>th</sup> percentile to the current average for the school and observe that all these ‘popular proximity’ schools have current intakes that are higher attaining than those who live between the 60<sup>th</sup> and 80<sup>th</sup> percentile.

Overall, we interpret the data as showing that, although some schools face a clear incentive not to expand due to the characteristics of the pupils who would be likely to be the additional entrants, this is certainly not the case for the vast majority of our popular proximity schools. This finding, although inconsistent with theoretical models, is relatively consistent with analyses of data that show that England’s level of school segregation is only low to moderate (e.g. Allen, 2007; Gibbons and Telhaj, 2007).

Of course, the use of this data to illustrate problems of deterioration in quality of the marginal student has its limitations because it is not dynamic: if the school were to expand its intake, the new parts of the catchment area would gentrify thus raising the average prior attainment of those living in these areas and resolving the short-term dis-incentive to expand. That said, our own recent analysis of house moving between the ages of 5 and 11 suggests that this behaviour is not actually very stratifying (Allen *et al.*, 2010).

We can say nothing about the marginal student who applies but is not successful for a place at an oversubscribed faith school. They may well be potentially assigned by proximity criterion (that are often used after faith places are given), in which case similar arguments hold. Alternatively, they may not have sufficiently demonstrated faith adherence, compared to successful applicants. It is

more difficult to argue, *a priori*, whether these unsuccessful applicants will be more or less advantaged than those given a place.

Where popular schools do face this disincentive to expand, there is no useful direct policy response to deal with this. We could allow them to select additional pupils using ability or other criteria, but it is not clear why this would be a desirable policy given that it would effectively exclude access to popular schools for educationally disadvantaged students. Giving them a choice between a lottery or using proximity may be appealing to a school who can then consider recruiting from a much wider area. Whether or not this is desirable would depend on the demographics of the area itself. But the key point is that wherever a policy or circumstance makes it desirable for an already popular school to expand, this is likely to be stratifying to the system overall (unless it forces the most deprived school to close).

## 6. The role of school finance

The recent (2012) publication of “School Funding Reform: Next Steps to a Fairer System” by the DfE promises significant changes to the school funding landscape. Progress is in train towards a single national funding formula for schools, with fewer criteria used in the formula. The Minimum Funding Guarantee of minus 1.5% per pupil remains (p. 5), which protects the per-pupil funding of schools from significant changes in local funding formulae or other changes in data, though explicitly not changes “directly related to pupil numbers” (p. 22). Finally, the Education Funding Agency (EFA) became responsible for capital and revenue funding from April 2012, directly funding Academies and Free Schools and channelling funds to LAs for maintained schools.

One of the key characteristics of the school funding system is complexity and lack of transparency. DfE (2012) states: “The way that schools are currently funded locally is highly complex. Whilst receiving broadly equivalent budgets, maintained schools, Sponsored Academies, Converter Academies and Free Schools, University Technical Colleges (UTCs) and Studio Schools all have their funding calculated in different ways and these are often based on complicated formulae that take account of many different factors. There is also lots of variation across the country in the services that are funded centrally.” (p. 8). Indeed, one of the ambitions of the new model is “we want schools to understand how their budgets have been calculated” (p. 4).

For the purposes of this report, one implication of this opacity is that schools might reasonably be rather wary of any radical action. Expanding capacity may potentially have significant and it seems largely unknowable effects on a school’s budget. This seems likely to be an important constraint on any decision to expand. Interestingly, the second paragraph of the Executive Summary says “We want to enable good schools to expand more easily” (p. 4)

Perhaps because of the Minimum Funding Guarantee, the data show a relatively high degree of inertia in per-pupil funding. In a school-level regression of funding per pupil in 2010 on a full set of structural and demographic characteristics of the school, the level of funding per pupil in 2005 (and even earlier) is still strongly significant. This either suggests that budgets are unresponsive to the

schools' circumstances or that there are important and unmeasured school needs. Regardless, this degree of inertia in budget setting is likely to raise doubts in headteachers' minds as to the financial wisdom of expansion.

In order to encourage schools to expand, we need the system of (current) finance to do two things. Firstly, it must facilitate expansion by providing sufficient funds to cover additional costs. If there are economies of scale, this may allow per pupil funding to fall slightly although not necessarily by much given that the costs of classroom teachers dominate budgets. Furthermore, expansion in secondary schools can be particularly complex where it involves the hiring of fractions of different specialist subject teachers. Secondly, the financial system must incentivise school expansion by making the lives of school leaders better in some way, otherwise they simply will not choose to do it. Furthermore, the system should recognise that expansion presents a risk for schools who may not fill their new classes to capacity, thus producing new inefficiencies in the use of school resources. This implies that a school finance system might need to cover additional costs *and* provide a school bonus on top.

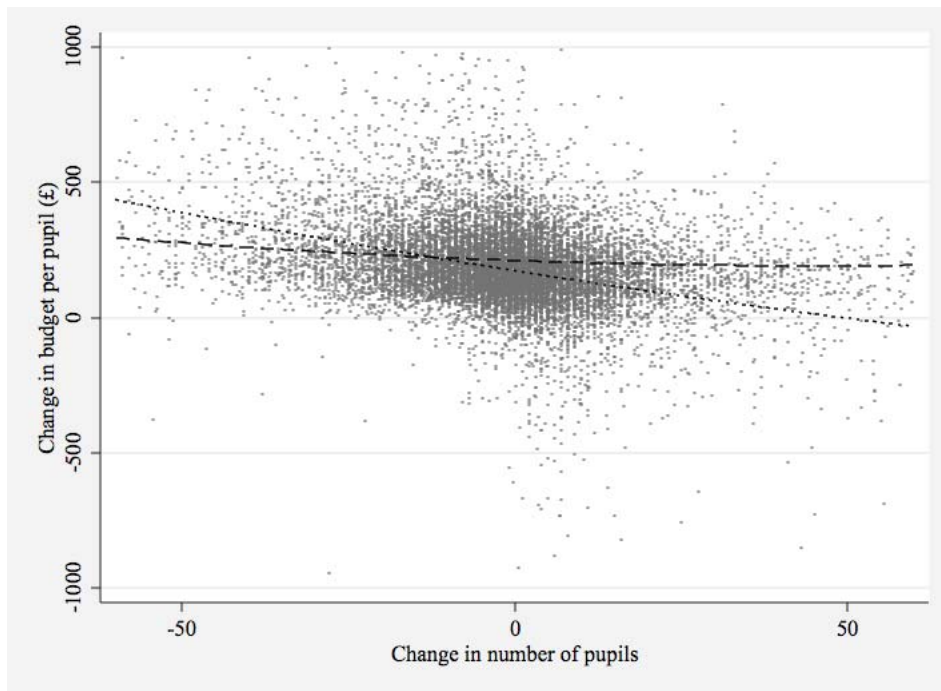
We explore the extent to which the system of school finance over the last decade reflects this ideal by using a panel of 10 year's financial data to estimate the impact of changes in pupil numbers at a school on their subsequent change in per pupil funding. Since these are annual changes there are up to nine observations per school, with two quadratic lines of best fit plotted for primary and secondary schools separately in Figure 4. While there is huge variation (again see Allen et al, 2012) it is clear that there is little relationship between the two (and this is also true if we use five-year changes in funding).

If anything the lines are downward sloping, more so for primary than secondary schools. This strongly suggests the importance of fixed costs. To take an extreme example, the addition of one more child to a class is almost costless in terms of school finances: same teacher, same classroom, and the same facilities, with only a very trivial amount of extra expenditure required on a few more books and pens. If this is the view of the local authority then it will (reasonably) allocate very little extra funding to that school, and measured per-pupil funding will fall as the denominator will have risen.

Scaling up to capacity increases, the principle of the argument is the same. There are important fixed costs at school level which can be spread over a lot more pupils. So the reason that the empirical relationship is (slightly) negative is that the funding body believes that there are important fixed costs and it gives the schools just what it thinks is needed to cover the marginal costs. Put another way, where a school increases in size, at least part (or perhaps all) of the benefit of economies of scale is being passed back to the wider local authority. This can be used by the local authority (using 'roll protection') to boost per pupil funding at schools experiencing a decline in popularity.



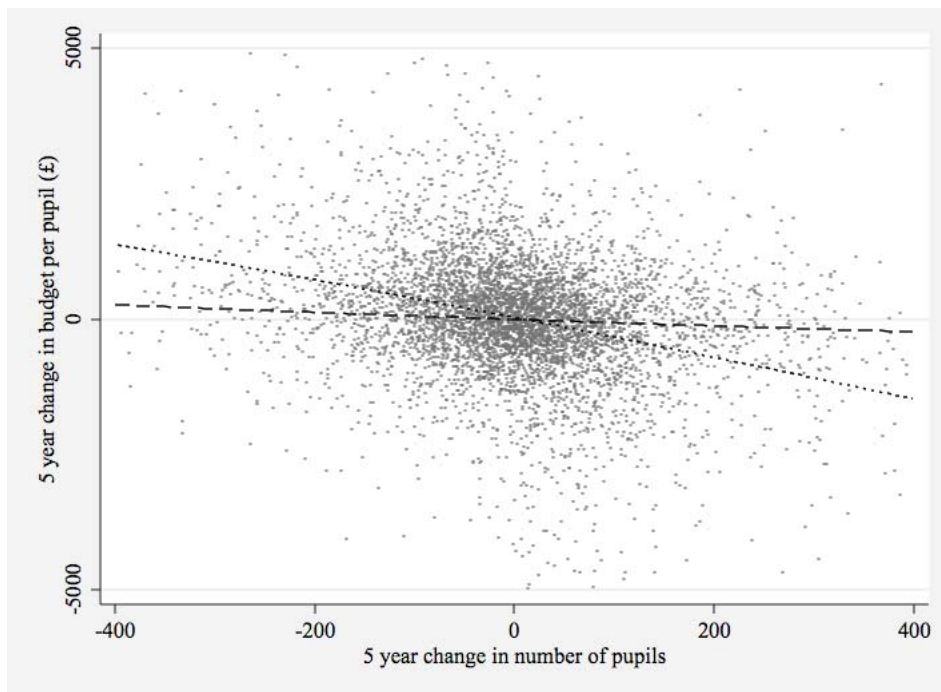
Figure 4: Change in number of pupils (t-2 and t-1) and change in per pupil funding (between t-1 and t)



Note: outliers are excluded for illustrative purposes (i.e. large changes in pupil numbers or funding)

Looking at five year changes, perhaps surprisingly shows the same pattern:

Figure 5: Five-year change in the number of pupils and five-year change in per pupil funding



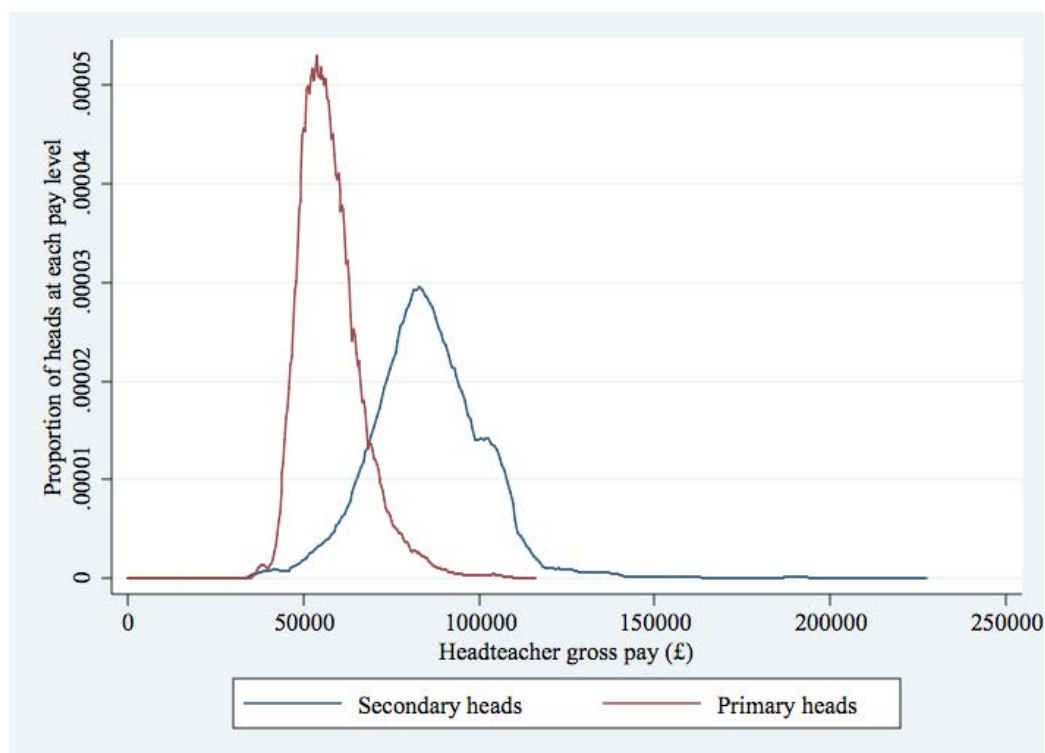
## 7. Headteacher pay and incentives for school expansion

School expansion will only take place when it is in the interests of stakeholders, of which the headteacher is the most important. There are a number of ways in which leading an expanding school might be rewarding for a headteacher. First, intrinsic motivation, challenge and job satisfaction could play a role in incentivising headteachers to expand their schools. Second, it may be that leading school expansion helps career prospects and put the headteacher in line for a job at a more preferred or more prestigious school. Third, leading school expansion may generate the resources to fund a larger school management team and so potentially offer the headteacher an easier life. Finally, it may be rewarding in the very straightforward sense of yielding higher pay.

Unfortunately the data are not yet available to provide evidence on the first of these. We only have the first full wave of the School Workforce Census and so cannot yet determine whether headteachers who expand their school go on to have a successful career running more desirable schools. This is something that can be investigated in the future. On the second point, the School Workforce Census does show that larger schools have larger management teams (see Allen et al., 2010), but we cannot show whether this size sufficiently compensates for the additional complexity of larger organisations, or not.

Turning to headteacher pay, Figure 6 displays the distribution of gross pay in primary and secondary schools. We can see that there is substantial dispersion, particularly for secondary school heads. In Allen *et al.* (2012) we further show that much of this variation is idiosyncratic, unexplained by school and pupil characteristics. This shows that there is clearly scope in principle for headteachers to paid different amounts in otherwise similar circumstances.

Figure 6: Distribution of headteacher pay



Source: SWC, Authors' calculations

We cannot use this data to ascertain whether a headteacher presiding over an expanding school is rewarded with higher pay, but we can explore the cross-sectional relationship between headteacher pay and school size. Table 7 (taken from Allen and Howson, 2012) shows that there is indeed an association between headteacher gross pay and school size, which persists even controlling for other characteristics of the school. However, it is quantitatively unimportant, working out at around £3k per year for an increase of 150 pupils in a secondary school (a per-pupil coefficient of about £20 times 150 pupils equals £3k). Even if this represented a purely causal relationship, this is unlikely to be enough to incentivise a headteacher on a mean salary of around £80k per year.

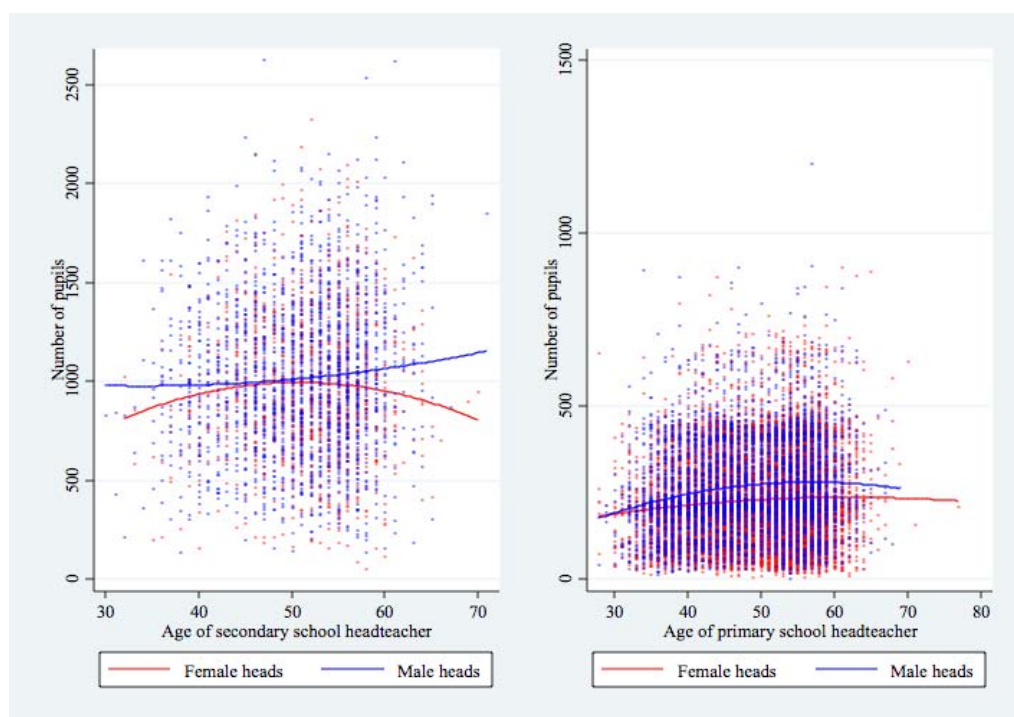
**Table 7: Association between school size and headteacher pay**

	<b>Secondary</b>		<b>Primary</b>	
Number of pupils	20.994 (0.710)***	18.787 (0.845) ***	47.927 (0.434) ***	38.015 (0.513) ***
School type controls	-	Academy heads paid much more	-	Foundation schools pay more
Pay and government indicators	-	London and SE generously paid	-	London and SE generously paid
School age range and admissions	-	Sixth form and grammars pay more	-	Older age range paid more
Pupil demographic	-	Deprived pay more	-	Deprived pay more
N	2965	2951	15286	15239
R-sq	22.76%	37.02%	44.38%	57.27%

Source: Allen and Howson, 2012

A well-functioning labour market would direct the most effective or most experienced headteachers to the largest schools who should be able to pay them the most. This might mean that headship of the largest schools becomes reserved for second or third headships within a career. We cannot identify either the most effective or the most experienced headteachers in SWC, but we can use the headteacher's age as a very rough proxy for experience. Figure 7 shows that there is very little relationship between school size and headteacher age.

Figure 7: Relationship between headteacher experience and school size



## 8. Conclusions

We summarise our results and then discuss the implications of the findings in the context of education policy in England.

### Discussion

One route to improving the overall effectiveness of an education system is to ensure that popular and efficient schools grow to meet demand for places as far as is possible. In this paper we have shown that over the last ten years high performing schools in England have added no more capacity than the average school. Instead, school expansion and contraction has largely been determined by local demographic change, with little differentiation between high and low performing schools.

It is important to recognise that the nature of the education system has changed with the rise of Academies. While schools were perhaps not micro-managed and directly ruled by LAs (at least after Local Management of Schools), it is clear that many more secondary schools now have more autonomy from LAs. This might mean two things: they may be less amenable to changing capacity at the request of the LA, and they may choose to determine their capacity for themselves. This means that the analysis in this report of the incentives for the schools themselves is even more relevant to the new landscape of school autonomy. It is unclear what the aims and objectives of the academies will be, but they will continue to operate in, and be influenced by, the broad framework of incentives and constraints that governed the behaviour of the schools we have analysed here.

We consider a number of potential benefits and penalties to a school choosing to increase capacity, and also the presence of any constraints on expansion. It is not clear that popular schools have been explicitly constrained from growth. It is true that from 2011 onwards, capital funding for schools has been very scarce. However, over much of the previous decade, through the Devolved Formula Capital scheme and later the Building Schools for the Future programme, capital was easier to acquire, and, at least in the case of the former, could be spent at the discretion of the school. So over the period we have studied it is hard to see lack of access to capital as a major constraint.

Our analysis of financial data shows that schools cannot reap the usual benefits of expansion that are available through the exploitation of economies of scale. This is because funding per pupil can often fall slightly as expansion takes place (and has a tendency to rise as contraction takes place). We take this as evidence that schools can indeed exploit certain economies of scale, but that the benefit of these economies tends to be distributed across a local authority rather than retained within the school itself. This, and the lack of a profit motive or rights to retain surpluses, substantially blunts the incentive for schools to expand to meet demand.

Individual headteachers also do not appear to face a personal incentive to pursue a growth strategy for their school. There is a statistical association between school size and headteacher pay. But it is quantitatively weak, amounting to around 3.7% higher pay for a secondary school with 150 extra pupils. It seems that headteachers are not likely in general to be incentivised by any existing size premium<sup>8</sup>. The caution about this analysis being descriptive rather than necessarily having a causal interpretation is particularly important here.

One possible obvious strong disincentive exists where a school can observe that expanding their intake to admit pupils who live outside the current catchment zone will cause a deterioration in the academic quality of the intake. This would happen if there were very strong socio-economic sorting around schools and would clearly directly impact on the school's exam results, thereby reducing its popularity and even threatening the success of its expansion strategy. We show that this clear disincentive exists for some schools, but that it is not generally present across all popular schools.

So, overall there do not appear to be any obvious incentives for high-performing or popular schools to expand. In some cases there may be penalties in that an expansion risks lowering the academic quality of the intake and subsequent school performance, but this is not a particularly strong effect.

The question "why don't popular schools expand?" implies a context in which there are good reasons for popular schools to expand, but for some reason, they choose not to.

In fact, our results suggest the opposite and that the question is better put the other way around: "why would a popular school ever choose to expand?" There are no obvious incentives to do so unless the headteacher is simply interested in school size *per se*. And there are potential costs, in

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<sup>8</sup> The literature on incentives for teachers is not relevant here, as this is about a management-type activity rather than a pedagogical activity.

terms of adding a very considerable extra administrative and management burden, financial issues, and the potential in some cases for reducing school academic performance.

There is also a question of the communication of objectives. In a system where more and more schools are becoming autonomous, they will be increasingly driven by the perceived 'mission' of the headteacher and governors. Of course, the accountability mechanisms in the system (league tables and Ofsted) place a limit on the extent to which schools can aim for different things. But one question is: do the headteachers and governors of high-performing and popular schools believe it is their primary role to make their school better, or bigger? We suspect that it may be the former. In which case not only may there be no incentive to do this, but also no-one has told them that they should be trying to do so.

### **Proposals – How can we encourage good schools to expand?**

Our analysis suggests that there are essentially no incentives in the external environment for school expansion, and there may be important constraints in some cases. In this final section we focus on the issues we have discussed above and consider some ideas to remedy the market defects.

#### **Introducing Incentives**

Our results suggest that schools as a body get little or no financial benefit from expansion; nor do headteachers through their salary. Each of these could be addressed.

For schools, the key factor is to let the expanding school reap any reward from economies of scale, rather than have them clawed back by the LA. A simple way of doing this would be a true regime of per-pupil funding. There are moves in this direction as the policy landscape shifts in the education market. The fact that half of secondary schools are now Academies, or on their way to becoming so, means that the most obvious point at which money could be siphoned back is removed for many schools. As noted, the system is moving towards a national funding formula and transparent per-pupil funding, but it is not there yet. The problems of reaching such an end-point are discussed in DfE (2012), and it is clear that this is hard to achieve in practice. If the present interim school funding arrangement still does not allow schools to keep the benefit of expansion, then some more explicit and separate reward could be contemplated. For example, the central EFA would fund a per-pupil bonus for discrete capacity expansion in high-performing schools for the first five years. Obviously all of these terms would require careful definition to minimise gaming. Finally, the admirable goal of a comprehensible funding system, so that schools can model their likely funding stream consequent upon an expansion, will also improve the current system.

For headteachers, it would seem to be more straightforward. Headteachers of high-performing schools successfully overseeing a capacity expansion for five years would receive a substantial one-off bonus, centrally paid by the EFA. Again, we would want to define "successfully" to mean no substantial decline in performance.

Two additional points can be made. Both of these proposals aim to make an explicit and significant link between expansion and rewards to counter the inertia and historical dependence in the system. Second, and related, there needs to be a clearer communication of a desire to see high-performing

schools take on more pupils. The money speaks to this, but money is not everything for some headteachers and schools, and an explicit clearly articulated policy goal alongside the rewards would help to empower headteachers.

We are not aware of any research on this kind of mechanism in countries with similar education markets to the UK. Consequently, if any of these ideas were of interest, such schemes would need to be piloted very thoroughly first.

### **Constraints**

For most of the period we studied, access to capital funding was not a major constraint for many schools. The devolved formula funding gave schools capital to spend at their discretion. Should we ever return to a relative abundance of capital, we recommend that a clear distinction be drawn between refurbishment and expansion, and that funds be earmarked for expansion in many cases. For example, capital could be made contingent on a commitment to expansion among schools which could demonstrate a clear over-demand for places. However, this seems a distant prospect at the moment, and capital shortage seems likely to be a constraint for some time to come. Alongside the introduction of one of the expansion reward schemes proposed above, the capital would have to be made available, and it seems likely that this would be a cost-effective alternative to the construction of brand new schools. Again, the central point is that schools and headteachers need to believe that it is worthwhile for the school to expand.

A second potential constraint we investigated was a deterioration in pupil performance from expansion. This is a difficult question to deal with as the link between pupil characteristics and distance is fundamental in a system where proximity is a key criterion to resolve over-subscription. Of course, there are other strong reasons why the admission system could be changed – we have argued elsewhere for the use of lotteries in urban areas. But this is a much more radical and systemic change to the schooling system than we have discussed above, and is not going to happen primarily to remove this constraint. We need to bear in mind that our results suggest that for many schools this is in fact not a major problem.

One potential constraint on expansion that we have not been able to investigate for lack of data is the problem of the simple lack of physical space and related planning regulations. The physical space problem is in the end simply a question of money – how much it would cost to buy the land adjoining the school – and so is the same point as the deployment of the capital budget. This may be an issue in some cases, but the estate expense has also been an issue for some Free Schools.

### **Expansion by encouraging federations and chains.**

The theoretical discussion in section 2 noted that one way in which expansion occurs in the private sector is through the take-over of other facilities instead of simple expansion of the firm's existing facilities. In this context, school federations and school chains offer one way for high-performing schools to generate more places. DfE (undated) provides a list of the potential benefits and risks of membership of a federation or a chain.

Hill *et al.* (2012) provides an extremely positive and glowing account of Academy chains as a way of transmitting methods and values from one set of schools to others in order to turn around low-performing schools.

Academy chains are currently very small, although growing quickly, and it seems likely that their attention will be focused on turning around the lowest performing schools. Their expansion objectives may be different. For example, they may have fixed costs that they would like to spread over a number of schools; the Chain CEO may have wider motives to spread the 'brand'. They are unlikely to be a major factor in the lives of the bulk of schools which are performing in a satisfactory manner, but no more. In these cases, the looser federations are relevant. These partnerships may involve the better-performing school giving advice and support to the others. Many headteachers may relish this opportunity to help other headteachers. Others may find it a diversion of their effort and time, and in any case none are likely to put as much effort into another school as into their own (particularly if the other is local and so in principle a rival). Policy needs to find a way to engage more deeply the head of the high-performing school; for that person to act as if the other school was an extension of their own, but without a formal take-over. There are a number of possibilities here, which could combine financial rewards and more reputational devices. For example, the name of the advising headteacher could be publicly linked to the low-performing school to increase their personal stake in its progress; or the advising school or head could share in the financial rewards of the other school as it improved its performance.

An alternative is to encourage good schools to open up new 'satellite' schools, which could be managed by the same governing body or Academy Trust. This is a cross between the Academy sponsorship model (focusing on existing schools) and Free Schools (brand new schools). This possibility links directly to our earlier discussion about how good restaurants tend to open up completely new branches rather than expanding the original restaurant.

In summary, we believe that there is some scope to act on incentives for expansion working within the current system, and that there is also scope to use policy tools to strengthen the commitment of high-performing schools to their less well-performing neighbours through federations.



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