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Can school competition improve standards? The case of faith schools in England

Rebecca Allen[*], **Anna Vignoles**[†‡]

Abstract. This paper measures the extent to which the presence of religious state-funded secondary schools in England impacts on the educational experiences of pupils who attend neighbouring schools, whether through school effort induced by competition or changes in peer groups induced by sorting. National administrative data is used to estimate pupil test score growth models between the ages of 11 and 16, with instrumental variable methods employed to avoid confounding the direct causal effect of religious schools. It finds significant evidence that religious schools are associated with higher levels of pupil sorting across schools, but no evidence that competition from faith schools raises area-wide pupil attainment.

JEL classification: H11, I21, I28.

Keywords: school choice, school competition, educational outcomes.

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1 Introduction

The introduction of a quasi-market for school places has been central to government aims to improve standards in English schools for the past twenty years. However, opinions remain polarised on whether reforms intended to facilitate parental choice of school and school competition have successfully induced schools to increase effort focused on pupil achievement. This paper adds to the literature on choice and competition using English faith schools as an empirical test of the potential impact of one particular source of school competition.

Religious schools, maintained by the State, are an important feature of the English schooling system, educating 15 per cent of secondary-aged children. They are a legacy of the 1902 settlement between the Government and the Church of England (CofE) and Roman Catholic (RC) churches, as the principal providers of 19^{th} century schooling. Despite a steep decline in church attendance across all denominations and limited support for the principle of state-funded religious schooling in attitude surveys, there continues to be relatively high demand for places at religious secondary schools,[1] with institutional rigidities constraining the supply of places.

Religious secondary schools provide a potentially genuine and enhanced opportunity for some parents to choose between schools (without the cost of moving house) since they usually give priority in admissions based on religious affiliation of parents rather than solely proximity of home to school (although, as discussed later, proximity to faith school does play a role in admissions). Data show that faith schools do produce a large amount of sorting in local educational markets, thereby significantly reducing the proportion of pupils who attend their nearest secondary school (e.g. Allen, 2007).

This choice means that, in a system with spare capacity, religious schools do appear to present an enhanced competitive threat to neighbouring schools, who may respond by exerting effort in some way to attract local families to their school. However, for choice and competition to lead to higher achievement in schools, the incentives for head teachers and teachers need to be aligned such that all involved respond to competition by making efforts to 'raise standards', however that may be defined. These incentives structures may be weak where there is little scope for changes in capacity in the local educational market so that school survival is guaranteed regardless of quality. They will also be weak if parents judge schools based on league table position of overall

[1] For example, in 2006, 62% of respondents agreed with this question in a Populus poll: '*Faith schools are divisive because they prevent children from different religious backgrounds from getting to know and understand each other*'. In 2005, 64% of respondents agreed with this statement in an ICM poll: '*Schools should be for everyone regardless of religion and the government should not be funding faith schools of any kind*'.

achievement, rather than measures that take account of the quality of the school's intake. Under these circumstances, schools can best ensure they survive and prosper simply by concentrating their effort on securing an advantaged intake through the application of certain admissions policies and procedures (i.e. by cream-skimming more able or easier to teach pupils). This suggests that in the absence of strong regulation of admissions policies, a quasi-market for school places risks becoming quite stratified.

Empirical studies of competition between schools in England have not consistently found it to be correlated with higher standards in schools. In part this is due to the difficulty of distinguishing between high population density areas and school competition. Several studies do identify a correlation between structural measures of competition/population density and pupil achievement (or even growth in pupil achievement), but it is not possible to attribute causality to these findings (Bradley and Taylor, 2007; Bradley et al., 2001; Gibbons et al., 2008b). These types of correlations have not been consistently identified by all researchers: for example, Levačić (2004) fails to find this type of association in data from the late 1990s (although she does find a correlation between a headteacher's perception of competitive pressure and school performance in survey data). Gibbons et al. (2008a) study competition between primary schools, rather than secondary schools, and do find some positive effect of competition from religious primary schools that they use to suggest that schools such as faith schools that are autonomous to local authority control may have the means or motivation to respond to a competitive environment by improving standards.

In addition to this non-experimental literature, two quasi-experimental papers have attempted to estimate competition effects in England. Damon Clark (2007) uses a regression discontinuity design to exploit votes of parents who decided whether schools gained autonomy from local authorities in the early 1990s, finding that these Grant-Maintained schools did not appear to exert a greater competitive pressure on their neighbours than schools who lost the vote and remained under local authority control. Burgess and Slater (2006) use the administrative boundary change of 1988 in Berkshire to estimate the impact of changes to school competition on pupil progress, but also find no competition effect.

There are two papers estimating whole area effects of Catholic schools in the US and Canada that are directly comparable to this analysis. Hoxby (1994) uses the National Longitudinal Survey of Youth to estimate the effect of the presence of Catholic schools (which constitute over 80 per cent of the US private schooling market) on area-wide achievement. The supply of Catholic schools is instrumented using the current size of the Catholic population in the area. She finds that a 10 percentage point increase in Catholic school enrollment produces 0.9 additional years worth of educational

achievement, on average, and 6% higher wages for pupils graduating from high schools in the area. However, her choice of instrument is controversial, even though she is able to control for the religious affiliation of the family, because it requires us to assume that Catholic families who live in predominantly Catholic areas are no different from Catholic families who live in areas with few other Catholic families. Jepsen (2002), amongst others, contests this claim, and through re-analysis of the same data concludes that competition effects are small.

Canada's dual system of schooling is similar to that of England because Catholic schools are entirely state-funded on the same terms as secular schools. Card et al. (2008) estimate the effect of Catholic school enrolment share on pupil test score gains using a school fixed effects specification of test score growth between grades 3 and 6. They find small positive effects from competition in the area of Ontario, but have no means to isolate an exogenous source of variation in the supply of Catholic school places. This means that their estimation strategy relies on comparisons between areas with different fractions of Catholic families and different rates of growth of housing stock to identify cross-system effects. This again raises the concern expressed by Altonji et al. (2005) that the local religious composition of the population enters the education production function via some other mechanism. However, although Card et al. (2008) have no measure of the religion of the child's family, the identification assumptions would seem less onerous than Hoxby's because they use a (school) value-added specification combined with school and cohort dummies.

This paper uses national administrative data on a cross-section of half a million pupils to measure the extent to which the presence of religious schools 'spills' over to the educational experiences of pupils who attend neighbouring schools, whether through school effort induced by competition or changes in peer groups induced by sorting. The estimation strategy combines, and improves, methods proposed by Card et al. (2008) and Hoxby (1994) to identify these effects without the confounding influences of unmeasured pupil characteristics. Pupil growth in achievement from age 11 to age 16 is modelled as a function of share of pupils in the area who attend religious schools, using a wide range of pupil and area controls. In addition, instrumental variable methods are employed to avoid confounding the causal effect of religious schools on educational attainment with direct effects of religious families on educational success, or with growth in religious schools caused by ineffective local Community (state-maintained secular) schools. The historic characteristics of an area – early 20^{th} century levels of religious affiliation – are used to predict the modern-day supply of Catholic school places, thus isolating a source of variation that is exogenous to current demand for religious school places. This is an estimation approach that has also been proposed for the US by Cohen-Zada (2009).

The paper is set out as follows. The next section sets out an institutional and concep-

tual framework, which describe how faith and non-faith schools compete for pupils in England and why the level of competition is likely to be related to faith school capacity. The estimation strategy for identifying area-wide pupil achievement effects is then described and assumptions necessary for successful identification are set-out. The data sources are summarised and the results are estimated and discussed. Results are presented in three sections: (1) the competitive effect of faith schools on area-wide achievement; (2) the competitive effect of Catholic schools on area-wide achievement; and (3) the effect of faith schools on pupil sorting into schools and neighbourhoods.

2 Institutional and conceptual framework

This section describes the nature of secondary school provision in England, including the institutional arrangements for school choice. We show how we are able to distinguish between the size of local religious populations and competition from religious schools. Our framework for doing so it quite distinct from similar papers studying faith school competition in the US and Canada, for two reasons. Firstly, geographical variation in the supply of faith schools in England is essentially determined by historical patterns of population migration rather than modern-day levels of demand. Secondly, school choice in England is extremely complex, but we use a simple model of household choice to argue that competition for pupils is raised in all areas with significant faith school supply, regardless of the relative size of the local religious population.

2.1 The supply of faith schools

There is wide variation in the levels of religious schooling provision in England and the physical location of these schools was essentially fixed by the 1960s. This means that supply largely reflects the historical patterns of religious affiliation in particular areas. Overall, seventeen percent of the 3108 secondary schools in England have a religious denomination, but this figure is zero in some areas and as high as 31% in others. The vast majority of these religious schools are Roman Catholic (11%) or Church of England (5%), with both their involvements in schooling pre-dating the large scale establishment of state-controlled board schools following the 1870 Education Act. However, the major expansion in religious schooling actually took place a little later and can best be described as a late 19^{th} century expansion, then a financially-induced stagnation to 1950, followed by a final moderate growth (principally in RC schools) in the 1950s and 1960s. Indeed it was the threat of state-controlled board schools

displacing the need for church schools that produced a massive expansion in religious schooling in the 15 years following the 1870 Education Act, with CofE schools increasing from 6,382 to 11,864 and RC schools from 350 to 892 (Gardner et al., 2005).

Financial difficulties for the churches in the first half of the 20th century forced them to relinquish some control over their schools through a series of Education Acts whereby state financial support was exchanged for greater regulation and control. However, the churches retained 'Voluntary Aided' (VA) status in almost all their secondary schools, giving them majority representation on the governing body and therefore control over the employment of staff, buildings and repairs, and school admissions (Gay and Greenough, 2000). A second short period of church schooling expansion took place in the 1950s and 1960s, with the Catholic church making extensive use of government loans to triple their schooling provision. Expansion in the Anglican secondary school sector was very modest, with their share of pupils increasing from around 4% in 1950 to 5% in 2000.

The final decades of the 20th century saw very little change in the supply of faith schools in England due to financial constraints and the requirement for schools to apply for permission to change capacity numbers. Similarly, few faith schools closed over this period, because current (and almost all capital) school expenditure has been met by the State since 1944. Thus, the 2005 levels of faith schooling provision are largely unrelated to current levels of demand. This means that the CofE and RC churches are able to maintain a relatively high level of involvement in education through state financial support, despite a collapse in the size of the church-going population across England. On a typical Sunday in 2005, just six percent of the population attended church, with under two percent in each of the CofE and RC denominations (Brierley, 2006). Regular church attendance is an important measure of religious affiliation, even though congregations now have little need to raise funds for local schools, because it is the primary means by which faith schools decide whether to admit pupils to their school. However, as we discuss in the next section, this may not be closely related to levels of demand for faith schooling, not least because levels of religious identification by parents is consistently higher than levels of church-going in surveys. For example, in the Longitudinal Study of Young People in England (LSYPE) 47% and 12% of parents with secondary aged children reported a CofE and RC affiliation, respectively (Allen and West, 2009a).

2.2 Choosing between the faith and secular sectors

Admissions to secondary schools in England takes place for most pupils at the age of 11. Parents are able to apply for a number (between 3 and 6) of state-maintained

secondary schools and places are then allocated based on published oversubscription criteria. Most secondary schools use catchment areas or proximity to school as their principal allocation criteria. Almost all schools in the religious sector both decide and administer their own admission criteria, although they must adhere to a school admissions code which restricts their ability to select on non-religious criteria (at the time these pupils started secondary school the schools were only required to 'have regard to' a code). They use a wide range of rules (see West et al., 2004, for details), but the general pattern is that they prioritise their own religious denomination (e.g. Catholic families at RC schools), followed by related religious groups (e.g. other Christian families at RC schools), followed by any other religious families (e.g. Muslim families at RC schools), followed by non-religious families based on proximity to school. Hence these schools can be seen as similar to local authority community schools in that proximity to the school is likely to play a role in admission but with additional requirements on religiosity that are binding only for over subscribed faith schools.

Because the process is administered by schools there is a wide range of practices in the application of these admission rules, meaning the clear identification of Catholic, Anglican and non-religious families is not possible. For example, levels of religiosity applied by the school may vary from the presence of a religious marriage certificate, baptismal certificate, letter from a Priest attesting involvement in church, years and regularity of worship at the particular church, to commitment to faith displayed in a an interview.[2] The stringency of these religiosity requirements is closely related to the level of demand for places at the school, which is determined by the characteristics and preferences of local families, as described below.

Models of school choice assume that families choose a school from a well-defined choice set with the goal of maximising a utility function that balances school desirability against the cost of achieving a place at the school, given a fixed household budget (e.g. Epple and Romano, 1998; Nechyba, 2000). In the basic type of model in this literature, a family with after-tax income y and child of initial ability b can choose a school with peer group θ only by moving to a house with annualised rental payments p. The household then derives utility from non-schooling consumption $(y - p)$ and the child's final educational achievement a:[3]

$$U(b, y) = u(y - p, a(\theta, b))$$

However, the utility function of a family is highly complex when applied to the English context, not least because of the uncertainty associated with a school allocation

[2]Interviews with parents or children are no longer allowed under the current admissions code, but were permissible at the time this cohort of pupils started secondary school.

[3]funding of schools and local taxes can be ignored in the English context.

system where 'preferences', rather than choices, are made by families. Setting aside this issue of uncertainty regarding choices, we need to make the following adjustments to the utility function in order to explain the role religious schools play in this choice process. We now assume that a household with underlying religious characteristics η would optimise in a more complex manner:

1. families will have to choose a house that allows them to fulfil the schools admissions criteria, but also minimises disutility from home-school travel, d. It is critical to assume that they have a non-optimising starting location due to myopia, modelled as an idiosyncratic preference for one location, ω. Without this, models fail to predict relatively high levels of social integration in schools;
2. in the case of faith schools, families may experience a utility, r, from the school's religious ethos, which will vary according to their own underlying religious characteristics, η;
3. families will experience a disutility, c, from acquiring the correct religious adherence requirements to meet a religious schools criteria. This disutility will depend on the family's own underlying religious characteristics, with less religious families experiencing a greater disutility from activities such as church attendance. It will also be a function of the stringency of the schools admissions criteria due to local levels of under- or over-demand for faith school places, D.

$$U(b, y, \eta) = u(y - p, a(\theta, b), d, \omega, r(\eta), c(\eta, D))$$

Central to our conceptualisation of faith and secular school choice is our argument that potentially large numbers of families can choose between the faith and secular sectors. The underlying religious characteristics of the family are critical in determining both their likelihood of valuing a faith education and securing a place. However, a family with no religious characteristics may engage in active choice if the returns to securing a faith school place in terms of peer group and ethos outweigh the costs of doing so. These costs would be very high for a non-Catholic family in an area such as Manchester or Liverpool since there remains a large Catholic population, and thus admissions criteria demand high levels of proof of religious adherence. By contrast, Birmingham has large numbers of Catholic schools for historical reasons but a small Catholic population today, so the cost of meeting Catholic school admissions criteria are very low (and faith schools act more like community schools in that geographical proximity is the main criteria for admission).

Our model also suggests that the relationship between the presence of faith schools and the need for families to move house to access their school of choice may not be clear-cut. Faith schools do appear to provide a genuine alternative school choice that is less closely tied to residential location, but they may not lower residential sorting for

one or more of three possible reasons. Firstly, households choose neighbourhoods for a variety of reasons unrelated to schools, including desirability of local amenities and similarity of neighbours (we model this as the idiosyncratic preference for a particular area, ω). Thus, even in the absence of the schooling imperative, wealthy families tend to congregate in particular neighbourhoods. Secondly, in practice proximity plays a major role in admission to faith schools too, often acting a tie-breaker between families with similar religious characteristics in over-subscribed faith schools. We could therefore argue that faith schools are similar to neighbourhood schools with the additional hurdle of parents needing to prove their religiosity. Thirdly, even without any aspect of proximity entering the faith school's admissions criteria, households would want to locate close to their school of choice in order to minimise journey times and costs.

The model described suggests that the propensity of households to actively choose between faith and secular schools will depend on the family's religious characteristics and the supply of faith school places in an area, relative to demand. We do have some indications that parents can and do choose between faith and non-faith schools because there is movement between these two sectors as the transition from primary to secondary school takes place. Table 1 shows that transitions between the CofE and non-religious sectors are very high in both directions. By contrast, a large majority of children who are in RC secondary schools also attended RC primary schools. The reverse is also true. This may partly be due to the similar size and geographical location of the RC primary and secondary sectors; to the use of feeder school admissions criteria in the RC sector, which act as a barrier to entry from secular primary schools; or may reflect a stronger preference for a religious education amongst Catholics than Anglicans. The implication of this is that the competitive threat posed by the presence of Catholic schools may be lower than for other religious schools.

The notion that faith and non-faith schools are viable alternatives for both religious and non-religious families is also supported by the survey data on the religious affiliation of parents of secondary-aged children in faith schools. In the LSYPE, only two-thirds of the parents of children in Roman Catholic secondary schools reported that they were Catholic (6% said they had no religion at all). Similarly, about two-thirds of parents with children in CofE secondary schools reported that they were Anglican, with 12% reporting no religion (Allen and West, 2009b).

2.3 School responses to the threat of faith school choice

We have argued that the level of competition that faith schools present to secular schools should be a function of the number of families who are actively choosing between these sectors, but that this is not a simple function of the size of the local

religious population. This makes our conceptual model of faith school competition different to one that might be appropriate in Canada or the US and we have therefore emphasised the importance of faith school supply rather than demand in determining the level of competition. Active choice by local families between the faith and secular sectors is a necessary, but not a sufficient, condition for competition to raise standards. Given that school funding is directly related to pupil numbers it is reasonable to suggest that non-faith schools will respond to competition from faith schools by attempting to improve the perceived quality of their school. This competitive threat will be particularly strong where the pupils they risk losing are the more able or more desirable to teach.

In England, the publication of league tables means that academic quality is largely judged by the school's performance in GCSE exams, whether 'raw' or conditional on entry attainment of pupils. The school's incentive to improve perceived school quality will be great if the parents who are considering the religious sector would be responsive to a change in the school's perceived quality, whether academic or otherwise. This would be the case where parents value academic results or reputational information very highly, relative to other characteristics such as distance to home or religious ethos. It will also be greater where schools are more closely matched in terms of pupil achievement in public examinations so that marginal increases in teacher or school effort are capable of changing school league table positions.

In this paper we are testing whether competition induces schools to increase effort directed at improving the test scores of pupils. Examples of this behaviour includes encouraging an academic ethos, monitoring teacher performance through test data, altering the teacher recruitment strategy, focusing effort on pupils with a high capacity to make progress, and so on. However, where parents use school league table position to measure perceived quality (or value peer qualities for other reasons), schools are also incentivised to engage in activities that improve the quality of the peer group intake, but would not manifest themselves in higher area-wide educational achievement even if competition were genuinely significant.

Schools can increase the quality of their peer intake by (1) improving the socio-economic profile of applicants; (2) altering the published over-subscription criteria (known as overt cream-skimming); and (3) adjusting the interpretation of these criteria (known as covert cream-skimming). Examples of these cream-skimming activities would be using advice in a prospectus to discourage particular families from applying; introducing an academic test for a subset of places; or interpreting 'religious adherence' to favour families in a particular parish or those who assist with the running of the church (West et al., 2004). The one-third of secondary schools that control their own admissions process (almost all religious schools and a similar number of foundation secular schools) can legally attempt all three types of activities, but community

schools are restricted to marketing activities.

Of course, stratification of schooling markets may simply happen if more advantaged parents are more likely to choose a faith school. Thus, although this paper measures the effect of faith school competition on levels of pupil sorting it does not explain why it arises or make causal claims regarding cream-skimming. Moreover, although sorting and test scores may appear to be distinct outcomes of school competition, they are actually inextricably linked in the long-run. This is because if competition from faith schools causes the local market to stratify, this may eventually dampen incentives to focus effort on improving test scores, since this effort would have little effect on the ranking of local schools in league tables.

3 Method

3.1 Competition effects on area-wide achievement

This section describes the pupil estimation strategy to identify area-wide effects of religious schools on achievement. This paper assumes the education production function for child i in school j in area k can be represented as:

$$Y_{ijk} = \gamma_0 + \gamma_1\theta_{jk} + \gamma_2 C_{jk} + \gamma_3 R_{jk} + \gamma_4 U_{jk} + \gamma_5 x_{ijk} + \epsilon_{ijk}$$

That is, test achievement for child i, Y_{ijk}, is a function of the school cohort's peer group, θ_{jk}, the school's effort induced by competitive pressure, C_{jk}, any effectiveness associated with the school having a religious denomination, R_{jk}, all other school effort not related to competition, U_{jk}, and the measured, x_{ijk}, and unmeasured, ϵ_{ijk}, characteristics of the child. The measured characteristics of the child include achievement in a range of academic tests prior to starting secondary school.

The presence of religious schools has the potential to:

1. change efficiency via the presence of a school that may be differentially effective as a result of its religious status, R_{jk}, and via competition effects, as measured by C_{jk}, for any schools;
2. change the relative sizes of schools, which affects mean area-wide achievement if differentially effective schools grow and shrink;
3. produce student sorting effects that change the peer groups, as measured by θ_{jk}, at each school.

It is difficult to separately measure these three effects since many characteristics of the child that affect their educational achievement are unmeasured in the National Pupil

Database (NPD). Instead, the overall aggregate effect of the presence of religious schools is the principal parameter of interest in this chapter. This paper identifies these area-wide effects of religious schools using a value-added model of pupil achievement at Key Stage 4 tests at age 16, conditional on Key Stage 2 (KS2 – secondary school entry at age 11) test scores across three subjects. It identifies whether steeper test score trajectories are associated with a greater presence of religious schools in the area. Pupil and area variables that might influence the growth trajectory are used as controls, including denominational church-going and other religious affiliation levels in the county. The key identifying assumption is that variation in the supply of religious schools (not explained by variation in the current size of the religious population) has no direct effect on test score gains of the students in the county, except via the competition mechanisms described above.

In the basic pupil-level model, the achievement of the child, Y_{ijk}, at KS4, is modelled as a function of the area proportion of pupils in religious schools, $\%religsch_k$, the observed characteristics of the area (W_k) and the pupil (X_{ijk}). $\%religsch_k$, a measure of religious school supply rather than demand, is the proxy for the level of cross-system competitive pressure due to religious schools. This makes our estimation strategy distinct from Hoxby (1994) and Card et al. (2008) who use the size of the local religious population.

$$Y_{ijk} = \%religsch_k.\delta_1 + W_k.\delta_6 + X_{ijk}.\delta_7 + \epsilon_{ijk} \tag{1}$$

In the second specification, an identifier for whether the school is religious ($relig_{jk}$) and school-level variables measuring the school peer group and other characteristics (Z_{jk}) are added in an attempt to explain part of the pupil test score growth trajectory. This should have the effect of removing the direct effect of attending a religious school or a school with a particular peer group from the model, and thus the coefficient on $\%religsch_k$ reflects a more pure competition effect. However, there is potentially a bias on these school coefficients, since they also capture average test score growth at the school that is due to systematic pupil sorting on unmeasured characteristics in the area. This might be an appropriate specification for isolating a competition effect if any unmeasured pupil characteristics at religious schools arise directly from the religiosity of their families. However, if the unobserved characteristics arise from a social selection effect whereby the more affluent pupils on a street attend a religious school and the less affluent attend a non-religious school, but average street characteristics are assigned to the pupil postcodes, this would lead to a downward bias on $\%religsch_k$.

$$Y_{ijk} = \%religsch_k.\delta_1 + religsch_{jk}.\delta_4 + Z_{jk}.\delta_5 + W_k.\delta_6 + X_{ijk}.\delta_7 + \epsilon_{ijk} \tag{2}$$

Clearly proximity may remain important, even for parents including faith schools in

their choice set. It may therefore be the case that schools close to a faith school experience greater competition effects. In the third specification, therefore, the competition effect of religious schools on non-religious schools is decomposed into an effect on non-religious schools for whom a religious school is one of the three nearest secondary schools ($closereligsch_{jk}$), and those for whom there are no religious schools nearby in the county and so are likely to be under less competitive pressure. The purpose of this specification is to reduce the risk of type II errors posed by measuring competition levels over the large ancient county. However, there will be a sorting of pupils on unmeasured characteristics within counties, and if this sorting is in some way correlated with the geographical supply of religious schools, coefficients in this specification will be biased.

$$Y_{ijk} = \%religsch_k.\delta_1 + \%religsch_k.closereligsch_{jk}\delta_2 + \%religsch_k.religsch_{jk}.\delta_3 + religsch_{jk}.\delta_4 + Z_{jk}.\delta_5 + W_k.\delta_6 + X_{ijk}.\delta_7 + \epsilon_{ijk.t} \quad (3)$$

In order for the estimation of whole area effects to be valid, the presence of religious schools should not cause pupils to sort *across* areas. The models are estimated using ancient (1851) counties as the areal unit of analysis because this is the area for which the historical instrument is available. There are 39 ancient counties in England, meaning they are much larger areas than the 150 modern local authorities. This increases the likelihood of the validity of the assumption that historic counties are contained markets without families re-locating across counties based on school types and quality. However, this is at the expense of possible aggregation bias on the measurement of exposure to religious schools.

Twenty-four equations are estimated in total: these three specifications are repeated across the four subject outcomes described in the data section for religious school competition, and this is repeated for Catholic school competition only. Competition from Catholic schools are of separate interest for two reasons. First, they represent two-thirds of all religious secondary schools, and are a more homogenous body of schools than the group of all religious secondary schools. So, it is possible that they exert a more consistent type of competitive effect on their neighbours. We have no reasons to believe that the effect of Catholic schools is likely to be similar to the effect of other faith schools. However, many Catholic schools will not be a realistic choice for the majority of parents because the religiosity requirements tend to be more onerous and fewer families are able to claim some sort of relationship with the Roman Catholic Church, than they are with the established Church of England. The second reason is that it is only possible to find instrumental variables that provide an exogenous source of variation in Catholic schools, so estimation of the spillover effect of these schools is estimated including, and excluding, an IV for comparability.

3.2 Instrumenting Catholic school supply

There may be an endogeneity problem because the supply of places at religious schools is believed to be partially related to current demand for religious schools, which is in turn related to the current religious population in the county and the quality of neighbouring Community schools. For example, if Catholic schools expand in response to poor quality Community schools, this would lead to a downward bias on $\%RCsch$. On the other hand, if Catholic schools expand to accommodate a larger Catholic population in the county and if high-religiosity families have characteristics that mean their children are academically successful (regardless of school attended), this would lead to an upward bias on $\%RCsch$.

This paper uses a source of variation in the supply of Catholic schools from survey data on the historic sizes of the religious populations in England. As discussed earlier, the Catholic population in England grew rapidly during the 19$^{\text{th}}$ century as a result of Catholic emancipation and Irish immigration, which explains the high concentration of Catholic schools in the West Midlands, the North-West of England and London. Figure 1 shows that Catholics became more geographically dispersed across ancient counties from the mid-19$^{\text{th}}$ to the mid-20$^{\text{th}}$ century, but the correlation between Catholic population share in 1851 and 2005 is still relatively high at 0.58. Ideally we would also want to identify a source of variation in the supply of Church of England schools, but it is not possible to use the historic dispersion of Anglicans since they were relatively evenly distributed across England. The analysis in Kelly (1978) suggests that the decision by diocese to remain VA or move to VC status was largely arbitrary, but this potential instrument could not be applied to the secondary schooling sector where almost all schools are VA.

It can be shown that the geographical distribution of historic Catholic populations predicts $\%RCsch$, conditional on the current RC population and other county control variables, i.e.:

$$\%RCsch_k = \alpha_0 + \alpha_1 \%RC1931_k + \alpha_2 \%RC2005_k + Z_k.\alpha_3 + v_k \tag{4}$$

The F-value on the instrument for this first-stage is 20.81. The instrument is applied to the variable $\%RCsch_k$ as a first stage to the main pupil fixed effects specification, as set out in equation 1. The size of the Catholic population by ancient county between 1851 and 1961 is sourced from survey data. It makes relatively little difference to the results which year of data is used to predict $\%RCsch$. The size of the RC population in 1931 ($\%RC1931$) is chosen as an instrument because it is strongly correlated and it immediately precedes the opening of most RC secondary schools.

The claim of this identification approach is that the county-level controls are sufficient

to meet the excludability restriction. These include the current proportion of Catholic church attendees in the area, and this is a crucial control variable given the absence of religious affiliation of the family in the pupil-level data (and therefore an inability to control for direct family religiosity effects). Unlike the data used by US researchers, there is not a good source of religious adherence by family, and in any case it is not clear how valid a family's self-response to this question is likely to be. As has been pointed out by others, families who send their children to religious schools may be more likely to claim religious adherence than those who do not, which would in itself be a source of bias (Neal, 1997). A full set of socio-demographic indicators are also included to avoid confounding correlations between the type of areas (i.e. industrial and urban) that Catholics historically lived and the demographic characteristics of these areas that persist today.

3.3 Competition effects on pupil sorting

In highly competitive schooling markets all schools may be incentivised to improve their perceived quality by attempting to improve the ability and social characteristics of their pupil intake, since this is the most direct route to raise their league table position. Therefore, the final part of our analysis tests for the presence of systematic patterns of sorting in areas where faith schools are present. One can of course measure pupil sorting along a number of pupil characteristics, and ideally we would like to measure pupil sorting by family socio-economic background, but there are no direct measures of parental socio-economic status in the English administrative schools data. We therefore have to rely on the rather crude Free School Meal indicator to measure socio-economic sorting (see Hobbs and Vignoles, 2009, for a critique of this measure). We also explore sorting by the prior achievement of the pupils, measured as the top and bottom 25% of the distribution in Key Stage 2 tests at the end of primary school. We call these prior achievement measures 'top ability' and 'low ability' for shorthand in this paper. Given the correlation between achievement at 11 and household deprivation, we infer that patterns of ability and social sorting are likely to be similar.

We start by looking at how children from the same primary school or neighbourhood are dispersed to secondary school by modelling the chances (log-odds) of attending a faith school as a function of the child's own characteristics, with fixed effects ensuring comparisons to other children in the same primary school or neighbourhood. A primary school contains an average of 41 children and the neighbourhood is measured as a lower super output area with an average of 18 children in this cohort.

We also measure the extent to which faith schools sit at the top of their local schooling hierarchies in terms of pupil prior achievement and FSM status. We do this simply

comparing each school's intake composition to that of their nearest nine schools, thereby creating a unique local 10 school competition space for each school. The number of competitor schools that we choose to place in this competition space is clearly arbitrary, and in theory we could use patterns of local movements of children to produce competition spaces that reflect actual processes. However, all of these more sophisticated measures are necessarily endogenous to current school characteristics and qualities and we would prefer to use a measure that abstracts from these. Finally, we look at whether faith schools are associated with higher levels of pupil sorting across schools in an area, measured using the index of Dissimilarity (D).[4]

4 Data

Data for this paper are principally drawn from the National Pupil Database of school leavers at age 16 in 2005. This is an administrative database of all pupils in maintained schools from 2002 onwards that allows basic annual pupil background information to be matched to test score data at ages 7, 11, 14 and 16. Only limited data on the 7% of the pupil population who are in private schools is recorded, so these pupils are excluded from the analysis that follows. Furthermore, there is no prior attainment measures on the small number of children who were in private schools at age 10 that did not participate in Key Stage tests. Table 2 summarises key pupil variables.

Four outcome measures of pupil achievement at age 16 (Key Stage 4) are reported in this paper. The pupil's best exam result in each of GCSE English, maths and science is recorded on a scale of 0 (U grade) to 8 (A* grade). In addition a total subject score is calculated as the best 8 grades at GCSE, and transformed to a z-score for ease of interpretation.

Pupil attainment prior to entry into secondary school at age 11 is calculated separately for tests in maths, English and science (Key Stage 2). The actual marks received on papers are reassigned to fractional level equivalents, providing a relatively fine measure of prior attainment. A standard set of pupil control variables including sex, ethnicity, mother tongue, free schools meals eligibility and special educational needs are included. NPD is supplemented with census data on the level of deprivation within the child's street, and 57 ACORN indicators of household type (see Webber and Butler, 2007, for a description and analysis of the validity of these ACORN indicators). In a small number of specifications in this study, variables are included to indicate the type of school the child attends.

[4]D measures half the sum of the absolute differences in school shares of top ability and non-top ability pupils (Duncan and Duncan, 1955).

The ancient county level variables are sourced from several surveys and summarised in Table 3. First, a large range of pupil-level characteristics are aggregated up to the ancient county level. Second, indicators of levels of Christian church attendance by religious denomination are included from the 2005 English Church Census (see Brierley, 2006). These are intended to control for the alternative pathways by which church-going families impact on pupil achievement. Third, the proportions of the population identifying themselves as belonging to each main religious group are included from the 2001 Census of Population.

5 Results

5.1 All religious schools and achievement effects

This section analyses the results from the pupil value-added achievement model of the area-wide effect of religious schools. The total effect of all religious schools is analysed separately from the effect of Catholic schools. These first results are shown in Table 4. Results for all four subjects are discussed simultaneously.

The first specification shows that areas with more faith schools make no greater educational progress in secondary school in any of the four subject areas tested. The finding can be interpreted as unbiased estimates of these whole area effects of faith schools provided there is not sorting across areas based on unmeasured characteristics that are correlated with $\%religsch$. It represents the total effect of competition from religious schools, including any differential effectiveness of religious schools.

Specification two attempts to separate religious school effectiveness from a competition effect by adding a faith school dummy as an explanatory variable. Inclusion of this variable leaves the finding of no competition effect unchanged. Interpretation of the competition variable coefficient is now more complex because if religious schools cause within-area sorting based on unmeasured characteristics, the coefficient on the competition effect is biased downwards. According to this specification, test score growth in every subject is superior in religious schools and the magnitude of estimates is consistent at around one-tenth of a GCSE grade in each subject and 5% of a standard deviation in the all subjects regression. These positive coefficients on faith school 'effectiveness' are usually found in OLS regressions using administrative datasets with relatively few pupil controls and are commonly interpreted by policy-makers and journalists as a signal that faith schools are 'good' schools (e.g. Department for Education and Skills, 2007). It is not, of course, possible to make this type of claim since within-area sorting on unmeasured pupil characteristics (such as family income and social background) and school type effectiveness are confounded

in such models. However, we suggest that if faith schools actually were more effective than non-faith schools, we should have seen a consistently positive coefficient on the %religsch variable in the first specification (attenuation bias might make it statistically insignificant but should not produce the incorrectly signed coefficients seen in half the specifications). Thus, we take these regressions as evidence that increasing the number of faith school places is unlikely to raise overall pupil achievement. The only other possible explanation, given the zero area-wide effect and positive faith school coefficient, is that faith schools are more effective but that they cause non-faith schools in the area to become less effective (for example, through the re-sorting of peer compositions or by attracting the best teachers in the local labour market). This seems a less likely explanation than the former, but the sorting effects of faith schools are discussed further in section 5.3.

The third specification separates the effect of being a non-religious school located in a county with many religious schools in general from the effect of actually having one of these schools close by (nearest three schools) with no statistically significant effects found, suggesting that the previous null findings were not likely attributable to aggregation bias. We also test for aggregation bias by re-estimating the first specification with the faith school proportion measured at smaller levels of aggregation, such as the local authority and 10 school competition space, but never find positive and significant competition effects.

5.2 Catholic schools and achievement effects

Table 5 shows the same set of regressions for Catholic schools only. Because these constitute two-thirds of all religious secondary schools the results are very similar, but are presented with the addition of the instrumental variable specification. Again, there is no consistent evidence here for a competition effect from the presence of Catholic schools in an area. Indeed, the four OLS specifications for English all show a negative association between $\%RCsch$ and GCSE achievement that is significant at the 5% level.

The IV specification instruments $\%RCsch$ using $\%RC1931$. It finds no statistically significant effects of attending a secondary school in an area with many Catholic schools. This is a Local Average Treatment Effect (LATE) estimate for the effect of Catholic school presence that resulted from large historical Catholic populations, relative to today. We think the LATE may be quite different to the average treatment effect because it identifies competition effects in areas where there is now a significant oversupply of Catholic schools, relative to the size of the Catholic population, and so the Catholic schooling sector may be less likely to achieve an advantaged intake, and is therefore less desirable to parents. This would mean that non-Catholic schools may

not perceive the competitive threat from this sector to be particularly high. Also, areas with historically high levels of Catholics compared to current levels (e.g. London and the West Midlands) have continued to be areas where new immigrants have entered the country and settled, and so schools in these areas may face disadvantages and challenges that are captured in the LATE estimates.

5.3 Sorting effects

To fully understand why the competitive threat from faith schools does not appear to produce higher pupil achievement we need to clarify the sorting role they play in their local school market. One possible explanation is that the presence of faith schools in an area is actually muting the effect of competition. This could happen if the school system in a particular area becomes so highly stratified in terms of pupil intakes, that schools cannot significantly influence their position in the league table simply by marginal increases in teacher or school effort. Here therefore, we explore this issue further by considering whether the degree of pupil sorting is positively associated with the proportion of faith school places in an area. As described in the method section, we present three sets of descriptive data and for reasons of space we only report the results for faith schools as a whole because the results for Catholic schools alone are very similar.

Table 6 reports the odds of child attending a faith school, given their own background characteristics. Three logit estimations are presented that compare pupils to (i) the overall English cohort; (ii) those who went to the same primary school; (iii) those who live within the same neighbourhood. The table shows that FSM children are only a little less likely to attend a faith school than non-FSM children overall, but that they are much less likely to attend then non-FSM children who live in the same neighbourhood or who attended the same primary school. These differences result because faith schools are more concentrated in urban areas with many deprived children living locally, yet the odds that a local FSM child attends a faith school is three-quarters that of a non-FSM child. Similarly, a child with a KS2 test score one standard deviation above the average has a 1.4 times increased odds of attending a faith school compared to an average child in the same primary schools.

Other coefficients are roughly as expected: almost all asian ethnicity groups are much less likely to attend faiths schools compared to the White British population whereas black pupils and other ethnic groups are more likely to attend (mirroring their greater propensity to attend church). Children who have a statement of special educational needs appear significantly more likely to attend a faith school, which may reflect the enshrined right to freely choose a school within the school admissions code. By contrast, children with special education needs but no statement have no

such advantage.

While these estimates do indicate clear and consistent patterns of sorting of pupils into faith and secular secondary schools we are limited in the extent to which we can attribute causation to these estimates. For example, we cannot tell whether this sorting is a product of different parental preferences expressed on the admissions form, or different patterns of acceptance at faith schools due to the differential capacity of households to meet religious adherence criteria (and in any case, as discussed earlier, separating these two effects may not be meaningful). However, the advantage of within-primary school and neighbourhood effects is that the children under comparison are far more likely to have similar opportunities to attend faith schools, should the parents wish to attempt to meet admissions criteria. The logical consequence of the data on localised sorting presented in Table 6 is that faith schools should have a greater propensity to sit at the top of their local schooling hierarchy in terms of student composition. Figure 2 calculates the proportion of pupils who scored in the top quartile on primary school exit tests and produces a rank for every single school (from one = most advantaged to ten) compared to the composition of their nearest nine competitor schools. It shows that half of all faith schools are placed near the top of a local schooling hierarchy and very few are at or near the bottom. We can reject the possibility that these correlations between school type and hierarchical position arise from differences in neighbourhood composition because replication of the method for residential allocation data produces charts consistent with randomly generated data.

The pie charts imply that faith schools are associated with a greater extent of pupil sorting across schools. Broadly, we find this to be true when we consider Local Authority and Ancient County levels of aggregation. For example, as shown in Figure 3 below, a higher proportion of pupils in faith schools in a Local Authority (X axis) is positively correlated with the degree of ability segregation ($\rho = 0.5$). The outlier local authorities with very high levels of segregation are those with grammar schools. In other words, even across more aggregated spaces, the presence of faith schools is positively associated with the degree of pupil sorting in those spaces.

6 Discussion

Religious secondary schools impact on all other schools in the area because they enable genuine choice of school for a group of parents, which produces a high degree of sorting in the local educational market. This paper has examined whether this sorting spills over to the educational achievement of pupils who attend neighbouring schools, whether through school effort induced by competition for pupils, or changes in peer

groups induced by sorting. Since religious secondary schools have been a long-term historical feature of the educational landscape in England, any competition effects identified might help inform policy-makers as to the long-term effects of enabling choice and competition, which may be very different to short-run responses by schools to market changes.

The paper combined two estimation strategies previously used in the literature to attempt to identify these effects without the confounding influences of unmeasured pupil characteristics. The pupil value-added achievement models relied on the supply of religious schools in an area being uncorrelated with average unmeasured pupil characteristics that might independently enter the production function. This is not a particularly onerous assumption given the rich prior attainment data and institutional rigidities constraining the supply of faith schools. The addition of the instrumental variable required the levels of the Catholic population in 1931 to be excludable from the education production function, once the modern-day religious and social characteristics of the county were accounted for.

Overall, the regressions fail to find a consistently positive (or negative) effect of religious schools on overall area-wide educational performance, thus adding another 'null' finding to the rather inconclusive literature on school competition in England. As an aside to our main purpose of identifying and measuring competition effects, we claim this adds to evidence that the apparent 'effectiveness' of faith schools is due to within-area sorting based on unmeasured pupil characteristics, since they do not raise overall area-wide achievement (e.g. Gibbons and Silva, 2006).

There are three possible explanations for the lack of a consistent positive competition effect as the result of religious schools being present in an area. The first possibility is that religious and non-religious schools do not actually compete for pupils. In other words, high levels of pupil mobility and sorting in an area is not sufficient to suggest that competition between schools for pupils is actually taking place. This would be true if they essentially operate in separate markets, with each sector recruiting from different primary schools. There is limited evidence in support of this hypothesis in the case of Catholic schools, which use feeder school admissions criteria to segment the market, but not for other religious schools.

The second explanation is that headteachers in non-religious schools do feel genuinely threatened by the presence of local religious schools, but they do not (or cannot) respond to this threat. The most likely reason for this is that they do not possess the means to significantly influence effort exerted on the part of their classroom teachers so the threat does not translate into improve GCSE performance (i.e. there is a principal-agent problem). Alternatively, they may find that, although the number and quality of pupils at their schools is being affected by a religious school's presence, given little spare capacity in the system their school's position is sustainable so no

effort response is necessary for survival.

The final explanation is that competition is actually muted, rather than increased, by the presence of faith schools, because they allow the system to become stratified. This stratification then provides schools with a disincentive to focus effort on improving test scores because marginal changes in effort cannot affect a school's league table position. It is not possible to assert causation in this paper, but there is consistent positive correlation between the level of social and ability segregation and the number of religious or Catholic schools in an area.

This observation that many schooling systems have a tendency to become stratified in the long-run is one of the problems with operating a quasi-market. The nature of a school admissions code and the rigour of enforcement are crucial to determining the extent to which sorting happens, but cannot prevent residential sorting. Thus, it is possible that relatively recent competition reforms in countries such as the US and Sweden might have identifiable short-run competition effects, but if the system is also stratifying, efficiency is likely to fall again in the long-run.

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Table 1: Primary to secondary school transitions (%)

	Secondary school					
	None	Church of England	Roman Catholic	Other Christian	Other religious	Total
Primary school:						
None	66.82	2.71	1.64	0.48	0.05	71.70
Church of England	15.70	1.64	0.51	0.21	0.00	18.06
Roman Catholic	2.01	0.13	7.33	0.10	0.00	9.56
Other Christian	0.43	0.07	0.02	0.01	0.00	0.54
Other religious	0.03	0.00	0.00	0.00	0.11	0.14
Total	84.99	4.55	9.50	0.80	0.16	100.00

Transition data is available for 96.5% of the sample

Table 2: Key pupil-level control variables

	Mean	Std. Dev.	Min.	Max.
KS2 English score	4.381	0.848	0.000	6.000
KS2 maths score	4.380	0.876	0.000	6.000
KS2 science score	4.665	0.698	0.083	6.000
KS2 total z-score	0.006	0.993	−5.712	2.055
GCSE English score	4.572	1.852	0.000	8.000
GCSE maths score	4.307	1.949	0.000	8.000
GCSE science score	4.240	1.999	0.000	8.000
GCSE capped z-score	0.012	0.991	−2.758	2.367
FSM	12.9%			
SEN statement	2.4%			
SEN action or plus	13.3%			
English not mother tongue	7.4%			
Ethnicity white British	83.3%			
Postcode deprivation (IDACI)	0.208	0.174	0.003	0.993

Complete cases N=546,133. Controls also include sex, 14 age, 14 ethnicity and 57 ACORN indicators

Table 3: Proportion of pupils in religious schools by ancient county

	Mean	Std. Dev.	Min.	Max.
Proportion in religious schools	15.0%	7.4%	0.0%	30.9%
Proportion in CofE schools	4.5%	3.2%	0.0%	16.6%
Proportion in RC schools	9.5%	6.1%	0.0%	22.6%
County % Church attendance (2005)	6.2%	1.0%	3.8%	8.3%
County % CofE attendance (2005)	1.7%	0.4%	1.3%	2.8%
County % RC attendance (2005)	1.8%	0.7%	0.8%	3.0%
County % Christian (2001 census)	72.2%	6.1%	53.5%	83.6%
County % No religion (2001 census)	14.1%	2.6%	9.1%	18.5%

Weighted by ancient county size; N=39

Table 4: Pupil age 16 achievement models (religious schools)

All subjects z-score:	(1)	(2)	(3)
(δ_1) %religsch	0.140	0.068	0.036
	(0.119)	(0.115)	(0.122)
(δ_4) religsch	–	0.055***	0.050*
		(0.009)	(0.021)
(δ_3) %religsch.religsch	–	–	0.051
			(0.121)
(δ_2) %religsch.closereligsch	–	–	0.037
			(0.049)
R-sq	0.549	0.552	0.552
English score:	(1)	(2)	(3)
(δ_1) %religsch	−0.110	−0.267	−0.275
	(0.235)	(0.224)	(0.236)
(δ_4) religsch	–	0.112***	0.121**
		(0.017)	(0.042)
(δ_3) %religsch.religsch	–	–	−0.039
			(0.235)
(δ_2) %religsch.closereligsch	–	–	0.020
			(0.092)
R-sq	0.560	0.566	0.566
Maths score:	(1)	(2)	(3)
(δ_1) %religsch	−0.082	−0.214	−0.306
	(0.252)	(0.242)	(0.254)
(δ_4) religsch	–	0.081***	0.092
		(0.019)	(0.049)
(δ_3) %religsch.religsch	–	–	0.020
			(0.265)
(δ_2) %religsch.closereligsch	–	–	0.132
			(0.097)
R-sq	0.587	0.593	0.593
Science score:	(1)	(2)	(3)
(δ_1) %religsch	0.373	0.227	0.158
	(0.295)	(0.282)	(0.301)
(δ_4) religsch	–	0.089***	0.115*
		(0.021)	(0.050)
(δ_3) %religsch.religsch	–	–	−0.075
			(0.283)
(δ_2) %religsch.closereligsch	–	–	0.116
			(0.114)
R-sq	0.524	0.530	0.530

N(pupils)=545,968; N(schools)=3,103; N(county)=39.

Note: ***=sig. at 0.1%; **=sig. at 1%; *=sig. at 5%.

Table 5: Pupil fixed effects test score growth (Catholic schools)

All subjects z-score:	(1)	(IV)	(2)	(3)
(δ_1) %RCsch	0.021	−0.408	0.013	−0.034
	(0.251)	(0.370)	(0.242)	(0.250)
(δ_4) RCsch	–	–	0.051***	0.066**
			(0.010)	(0.021)
(δ_3) %RCsch.RCsch	–	–	–	−0.070
				(0.164)
(δ_2) %RCsch.closeRCsch	–	–	–	0.076
				(0.070)
R-sq	0.549	0.549	0.552	0.552
English score:	(1)	(IV)	(2)	(3)
(δ_1) %RCsch	−0.935*	−1.311	−0.960*	−0.977*
	(0.477)	(0.674)	(0.453)	(0.465)
(δ_4) RCsch	–	–	0.114***	0.139**
			(0.021)	(0.046)
(δ_3) %RCsch.RCsch	–	–	–	−0.168
				(0.336)
(δ_2) %RCsch.closeRCsch	–	–	–	0.046
				(0.129)
R-sq	0.560	0.560	0.566	0.566
Maths score:	(1)	(IV)	(2)	(3)
(δ_1) %RCsch	0.192	1.128	0.226	0.074
	(0.544)	(0.798)	(0.522)	(0.538)
(δ_4) RCsch	–	–	0.058*	0.108*
			(0.023)	(0.053)
(δ_3) %RCsch.RCsch	–	–	–	−0.238
				(0.389)
(δ_2) %RCsch.closeRCsch	–	–	–	0.244
				(0.138)
R-sq	0.587	0.587	0.593	0.593
Science score:	(1)	(IV)	(2)	(3)
(δ_1) %RCsch	−0.488	0.383	0.419	0.300
	(0.615)	(0.904)	(0.588)	(0.606)
(δ_4) RCsch	–	–	0.071**	0.119*
			(0.025)	(0.053)
(δ_3) %RCsch.RCsch	–	–	–	−0.260
				(0.400)
(δ_2) %RCsch.closeRCsch	–	–	–	0.201
				(0.158)
R-sq	0.524	0.524	0.530	0.530

N(pupils)=343,936; N(schools)=3,108; N(county)=39.

Note: ***=sig. at 0.1%; **=sig. at 1%; *=sig. at 5%.

Table 6: Within-primary school/neighbourhood odds of attending a faith school

	No fixed effects			Primary schools			Neighbourhoods		
	Coef.	SE	Odds	Coef.	SE	Odds	Coef.	SE	Odds
FSM eligible	−0.04	0.01	0.96	−0.20	0.02	0.82	−0.29	0.01	0.75
KS2 z-score	0.29	0.01	1.34	0.20	0.01	1.22	0.31	0.01	1.37
SEN statemented	0.22	0.03	1.24	0.19	0.04	1.21	0.18	0.03	1.20
SEN action	0.04	0.01	1.04	−0.05	0.02	0.95	−0.02	0.01	0.98
Ethnicity asian	−0.53	0.03	0.59	−0.20	0.04	0.82	−0.73	0.03	0.48
Ethnicity black	1.00	0.02	2.72	0.68	0.03	1.98	0.57	0.03	1.77
Ethnicity other	0.70	0.02	2.01	0.33	0.03	1.39	0.56	0.02	1.74
Number of pupils		547,355			365,228			391,699	
Average group		-			40.5			17.5	

Table 7: Data appendix - Religious denomination of secondary schools

	N	%
None	2,577	82.9
Church of England	151	4.9
Roman Catholic	338	10.9
Jewish	7	0.2
Muslim	2	0.1
Seventh Day Adventist	1	0.0
Church of England/Roman Catholic	5	0.2
Roman Catholic/Church of England	2	0.1
Christian	23	0.7
Church of England/Christian	1	0.0
Sikh	1	0.0
Total	3,108	100.0

Figure 1: Changes in dispersion of Catholic population across England

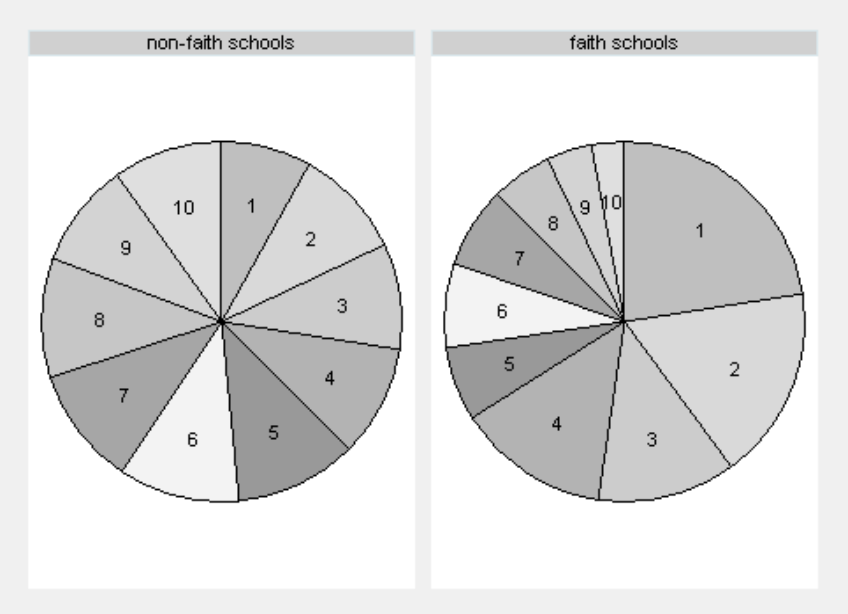

Figure 2: Position of non-faith versus faith schools in local schooling hierarchies (share of top ability pupils)

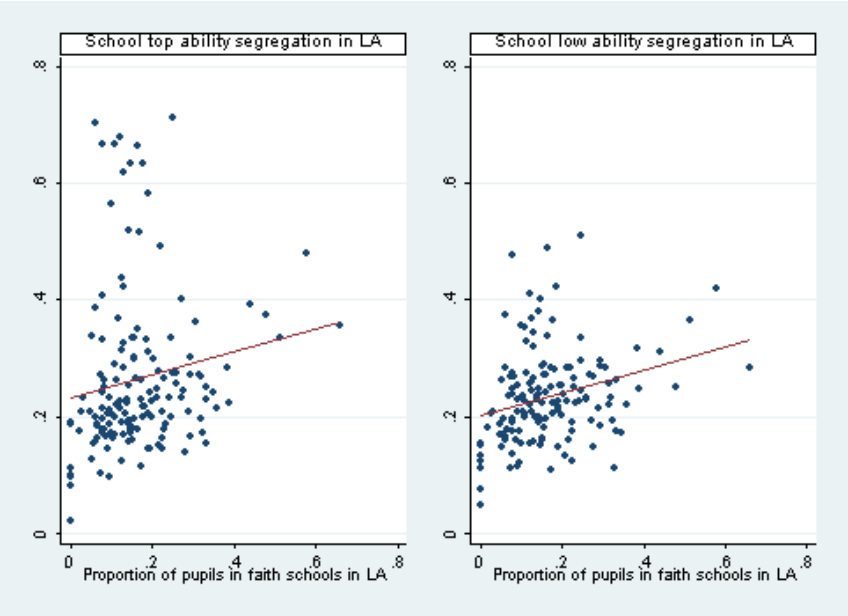

Figure 3: Ability segregation (D) of local authority schools compared to faith school share of pupils

Table 8: Data appendix - Key school-level control variables

	Mean	Std. Dev.	Min.	Max.
Religious school	15.0%			
Catholic school	9.5%			
Girls school	6.2%			
Boys school	4.4%			
School % FSM	14.1%	12.4%	0.0%	87.0%
School % English not mother tongue	8.5%	16.3%	0.0%	100.0%

N=3,103, weighted for school size

Table 9: Data appendix - Key county-level control variables

	Mean	Std. Dev.	Min.	Max.
County % FSM	13.3%	5.0%	2.2%	2.5%
County % SEN statement	2.4%	0.6%	0.5%	4.6%
County % asian Indian	2.2%	2.9%	0.0%	13.6%
County % asian Pakistani	2.3%	2.0%	0.0%	6.3%
County % asian Bangladeshi	0.9%	1.4%	0.0%	6.1%
County % black African	1.5%	2.5%	0.0%	8.9%
County % black Caribbean	1.5%	2.1%	0.0%	7.3%
County % white British	81.5%	13.9%	36.0%	97.8%
County % English not mother tongue	8.7%	9.4%	0.4%	41.4%
County % Church attendance	6.2%	1.0%	3.8%	8.3%
County % CofE attendance	1.7%	0.4%	1.3%	2.8%
County % RC attendance	1.8%	0.7%	0.8%	3.0%
County % Christian (2001 census)	72.2%	6.1%	53.5%	83.6%
County % Hindu (2001 census)	1.1%	1.7%	0.0%	7.1%
County % Muslim (2001 census)	3.3%	3.0%	0.0%	12.0%
County % Jewish (2001 census)	0.4%	0.6%	0.0%	2.3%
County % Sikh (2001 census)	0.7%	0.8%	0.0%	3.0%
County % No religion (2001 census)	14.1%	2.6%	9.1%	18.5%
County average KS2 score	4.471	0.049	4.345	4.637
County average deprivation (IDACI)	0.210	0.054	0.065	0.332
County average deprivation (IMD)	22.687	6.651	7.211	33.020

N=39, weighted for county size