Competition, Cooperation and Regulatory Intervention Impacts on Independent School Fees

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Abstract

This paper examines the factors determining fee levels set by independent schools, focusing on the impact of competition, cooperation and regulatory intervention in the sector. Results indicate that, once account is taken of factors such as the extent of local competition between independent schools, the impact of the 2003-2005 Office of Fair Trading investigation into the fee-setting cartel on independent school fees becomes insignificant. Meanwhile, the extent of competition between independent schools has a significant effect on levels of boarding school fees. Results highlight the importance of considering pricing strategies of groups within a cartel.

Keywords: School Fees; Cartel; Competition Policy; Spatial Competition

JEL Classifications: D22; D43; I20; K21; L41

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1. Introduction

This paper examines the factors determining the fee levels set by independent secondary schools, focusing on the impacts of competition, cooperation and regulatory intervention in the sector. This is an important but much neglected topic in the literature. The independent school sector is an important part of the British education system with high quality graduates (Green et al. 2011) and parental decisions to send children to independent schools remaining popular (Independent Schools Council, 2015). Given this, it is surprising how little we know about the factors determining independent school fees. Below we shall first review the UK Independent School market to set out the context of the study. We then discuss the economic environment for independent schools with an emphasis on a recent investigation into the sector by The Office of Fair Trading (OFT).

1.1 The UK Independent School Market

The independent school sector in the UK stretches back as far as 1382 when William of Wykeham established Winchester College as a feeder school for New College, Oxford which he had set up in 1379. Students were first admitted to Winchester College in 1394. The establishment of further independent schools was initially relatively slow: Eton College was established in 1440, and in the 1550s St. Paul's Cathedral School, Merchant Taylors' School, Westminster School and Shrewsbury School were all formed (Turner, 2015). The fortunes of the independent school sector have been mixed in the ensuing centuries (Turner, 2015). However, at least until recently, the independent school sector strengthened its position in the market to educate children. The Independent Schools Council (ISC, 2015) indicates that in 2015 there were 1,267 independent schools across the UK, covering both primary (typically up to the age of eleven) and secondary education (typically up to the age of eighteen). These schools currently educate over half a million pupils per year, with the numbers of children being educated in the independent sector growing steadily from just over 300,000 in the past forty years, while the average size of an independent school has gradually increased in the past thirty years from over 300 to above 400 pupils. Approximately 74% of pupils currently attend co-educational independent schools, with approximately 86% of these pupils being day pupils as opposed to boarders. Currently, 8.5% of pupils are not British, with schools starting

to set up overseas campuses, there now being 44 such campuses, educating almost 25,000 pupils (ISC, 2015).

There have also been gradual but ultimately dramatic increases in UK independent school fees since the 1980s (Ryan and Sibieta, 2010), such that the rise of independent school fees in the 2000s was in excess of increases in either average family or the highest family income (Good Schools Guide 2013). See Figure 1 below for average fee levels in the most recent years 2002-2012. Generally, average real fees have been increasing over the ten-year period, although fees dipped in 2007, this being explored in the paper below.[i] Further, average day fees at schools that offer both day and boarding provisions are higher than at day schools, a feature highlighted by Starkie and Wise (2006) and borne out in the regression results below, while the average boarding fees at day and boarding schools are lower than the average fees at boarding only schools.

Figure 1 about here

1.2 The Independent School Cartel Case

Like firms in any industry, independent schools compete and cooperate with each other and the nature of competition and cooperation could have an impact on price (i.e. independent school fees). Back in 2003, fifty leading independent schools in the UK, including very high profile schools were exposed as potentially operating a fee-fixing cartel. The case was passed to The Office of Fair Trading (OFT), who concluded in 2005 that a fee setting cartel had existed in the 2001/2002 to 2003/2004 academic years. Further, the 'Sevenoaks' cartel had operated for longer, but the relevant UK 1998 Competition Act only came into force in 2000 and there was then an additional year during which firms were given the opportunity to change their behaviour prior to consideration of cartel behaviour by the competition authorities. See Appendix 1 for a list of the schools found guilty of taking part in the cartel.

A number of reasons can be offered to explain the stability of the cartel. One of the key factors often claimed to contribute to the stability of any cartel is a small number of firms, with similar cost conditions that the firms are knowledgeable about. Hence, it is notable that the fifty school UK independent school cartel survived for years, without schools leaving the cartel. This is particularly interesting, since following the introduction of the 1998 Competition Act, the first school whistle-blowing on other cartel members could expect full exemption from any penalties offered under the Act, and fines up to 10% of UK turnover for

a maximum of three years may be imposed.[ii] Of course, the continued successful operation of the cartel may reflect the schools' naivety that they were not breaking the law, either because they were not aware of changes to UK competition law in the late 1990s or from a misguided belief that the law did not apply to independent schools, typically with charity status assigned to them. Alternatively, Levenstein and Suslow (2006) highlight some long-lasting cartels involving large numbers of firms in a variety of industries, indicating that the success of cartels involving many firms may rest on the presence of industry associations or governmental support. This may at least partly explain the stability of the UK independent schools cartel as bursars are usually members of the Independent Schools' Bursars Association, and admitted that they met regularly and discussed fee levels, although it has been claimed that this was done rather in an attempt to restrict fee increases in the face of cost increases (Guardian 2005).

This paper aims to contribute to the limited economic literature on independent schools by providing an in-depth analysis of the nature of competition and cooperation between independent secondary schools, and the impact of regulatory intervention on levels of school fees covering both tuition and board. Specifically, an important question relates to the impact of the intervention by The OFT on independent school fees. The OFT produced a 2012 review of its investigation into the fee-fixing cartel that it instigated from 2003, concluding in 2005. According to The (2012) OFT report, as a result of The OFT investigation, fees at the schools that had been part of the fee-setting cartel had fallen significantly. However, the current research calls this result into question by extending The OFT (2012) research in a number of key ways. Crucially, the analysis below considers additional explanatory variables that may impact on fees including a range of measures of competition and cooperation that have typically not been adopted in the literature to date and also not adopted in the OFT (2012). First, the extent of local competition between independent schools is indicated by counting the number of independent schools within various distances around any individual school.[iii] Second, dummy variables are created, indicating formal and informal links between schools through common ownership and various affiliations. Finally, rather than relying solely on fixed effects panel data methods, a multi-level modelling approach is also adopted, again to capture the potential local nature of competition between independent schools. These advances give rise to a number of interesting results that highlight features of the nature of competition/cooperation in the UK independent school sector. Additionally, they reduce the impact of The OFT investigation on independent school fees, both day and boarding fees. In

addition to making an empirical contribution to the limited literature on economic analyses of the independent school sector, this study offers important lessons for competition authorities investigating cartels more generally.

2. Literature Review

As highlighted in Section 1 above, there is only a very limited literature on independent school fees. Below we shall first provide a summary of the OFT (2012) report which forms the basis of our analysis. We then proceed to a brief discussion of the existing economic analyses of the Independent School Sector.

2.1 The Office of Fair Trading (2012) Report

The OFT (2012) report uses a difference in differences approach considering factors impacting on independent senior school fees, considering schools that were part of the Sevenoaks cartel as well as seemingly comparable independent schools that were not within the cartel. The analysis considers the impact of the cartel on fees through the use of data during the period of the cartel 2001-2004 considered by the competition authorities, and data from the 2004-2005 academic year onwards when the cartel had been discovered and was being investigated.[iv] The analysis rests on the assumptions that following detection, cartel members were likely to change their pricing strategy such that significant changes in prices may be identified at least gradually if not immediately, with similar changes in prices not being expected if the cartel had not been detected. Separate panel data, fixed effects regressions are reported for logged real day fees and real boarding fees. The fixed effects model used by The OFT (2012) took the following form:

$$log(Fee_{it}) = \beta_0 + \beta_1 Board\%_{it} + \beta_2 FTRank_{it} + \beta_3 log(Size_{it}) + \beta_4 Year_t + \gamma Postintervention_t + \delta Infringe * Post_{it} + S_i + \epsilon_{it}$$

Where:

Fee_{it}	School fee for school *i* in year *t*
$Board\%_{it}$	Percentage of boarders in school *i* in year *t*
$FTRank_{it}$	FT ranking for school *i* in year *t*

$Size_{it}$	Number of pupils in school *i* in year *t*
$Postintervention_t$	Dummy variable equal to unity in years after the start of the OFT investigation, i.e. the 2004/5 academic year onwards
$Infringe * Post_{it}$	Dummy variable equal to unity if a school was a cartel member and the observation relates to the post OFT investigation period
S_i	Dummy variable for school *i*
ε_{it}	Disturbance term follows the normal distribution with zero mean and constant variance.

Results indicated that both logged real day and boarding fees increased after the cartel was detected, with this fee increase significant at a 1% significance level. However, crucially, the coefficient on Infringe*Post, the difference in differences (DiD) variable, was found to be negative and significant, typically at a 5% significance level, indicating that while across the senior, independent school sector there was a tendency for fees to increase, following detection of the cartel, fees of the participating cartel members fell. However, the number of explanatory variables included in The OFT (2012) report is limited. In particular, it fails to take into account the nature of competition and possible cooperation between independent secondary schools, which may lead to biased estimates of the DiD variable, thus limiting the validity of the findings. This is addressed in the analysis below.

2.2 Economic Analyses of the Independent School Sector

Economic analyses of fee-setting by UK independent schools remain relatively scarce with the exceptions of Starkie and Wise (2006) who consider factors determining day fees, but not fees for boarding students, and The OFT (2012) report mentioned above. Other economic analyses of the independent school sector also remain few. Recent research from the Institute for Fiscal Studies examines factors impacting demand for independent school places (Blow et al., 2010; Blundell et al., 2010; Dearden and Sibieta, 2010). Graddy and Stevens (2005) consider the factors contributing to independent schools' success in A-level examinations, the most common final school examinations taken by school pupils around the age of eighteen.[v] Meanwhile, work by Green et al. (2011) into the wage benefit of attending an independent school in Britain builds on previous analyses by Dolton and Vignoles (2000); Dearden et al. (2002); Naylor et al. (2002).

3. Data and Econometric Methodology

3.1 Data and Variables Used

Annual independent school data across ten academic years (2002/2003 to 2011/2012) were obtained from two sources: The Good Schools Guide (GSG) and The Financial Times (FT) Independent Schools Guide. While The FT Guide includes information on a much larger number of schools, The GSG was used to decide the schools included in the final sample. This is because the aim is to estimate the impact of the fee-setting cartel on fees charged, and the schools in the cartel were all high profile schools, enjoying reputations for the quality of their provisions. Consequently, the fee-setting behaviour of these schools should be compared with that of schools as comparable as possible. As such, The GSG can be argued to provide a good indication of schools to be included in the sample, with supplementary data for these schools being taken from The FT Guide. Note that specialist music, dance and arts schools were excluded from the dataset. While The OFT included these schools in its statistical analyses, they have been removed from the dataset as not only is it expected that to some degree additional factors may affect fee levels, but also because the UK Government's Music and Dance Scheme provides means-tested funding to cover the cost of at least partial tuition fees. All schools in the final analysis offer education from eleven or thirteen to eighteen, but some schools have junior departments in addition. Attention focuses on the levels of secondary or senior school fees, rather than fees for sixteen to eighteen year olds, which sometimes differ slightly.

The GSG provides data on annual day and boarding fees, the numbers of pupils, 6^{th} form pupils, boarders and any religious affiliation of the school where appropriate. Similar data are provided in The FT Guide, so data were compared across both publications to confirm consistency. In addition, The FT provides information on the rankings awarded to schools by The FT, the average standard of students on entry into any sixth form and exit from it in terms of points associated with GCSE and A level examination results, the average number of A level subjects studied and the percentage of boys in any school.

There was a concern that neither The FT Guide nor The GSG updated day and boarding fees every year, with the publications reporting similar fees, but with numerous instances of fees remaining constant for two or three successive years in one publication, while fees in the other publication rose.[vi] Consequently, new day and boarding fees dependent variables were created by taking the maximum value of the reported fee of either publication for any year.

This method gives rise to day and boarding fees variables with much more regular fee increases. Appendix 2 provides an example of the method used. Fee variables were then adjusted for inflation, using the all-item Consumer Price Index (CPI), 2005=100. Additional information on school fee descriptive statistics can be found in Appendix 3, alongside descriptive statistics for explanatory variables used.

As The OFT 2012 results are the starting point for the current analysis, initially the same explanatory variables were used. The percentage of boarders (*FTBoard%*) is included as schools with greater boarding provision may feel under pressure to offer better and more extensive facilities which in turn require higher levels of fees. Thus we expect a positive relationship between *FTBoard%* and school fees. Similarly, better ranked schools (*FTRank*) may achieve these rankings partly because of investments made that may require higher levels of fees to fund. However, as better ranked schools take lower values of rankings, we expect a negative coefficient on *FTRank*. The size of school (*Size*), measured by the number of pupils may impact on fee levels positively or negatively, as larger schools may face economies or diseconomies of scale. As in The OFT (2012) report, a dummy variable (*Infringe*) is used to indicate whether a school was part of the Sevenoaks fee-setting cartel to examine the impact of the cartel on fees. A dummy variable (*Postintervention*) was created to indicate the 2004/2005 academic year onwards from which time the original OFT investigation may have had a significant impact on fees. An interaction variable between *Infringe* and *Postintervention* could then be created (*Infringe*Post*) to provide a difference in differences estimator (*DiD*) to indicate the impact of The OFT investigation specifically on the Sevenoaks cartel member school fees.

In addition to the explanatory variables considered by The OFT (2012) report, an explanatory variable was created to test whether there was any impact on independent schools' fee setting strategies during the period in which The OFT was investigating the schools, in addition to after the conclusion of the investigation. Hence, a dummy variable (*OFTThreat*) is included in the regressions taking the value unity during the 2004/2005 and 2005/2006 academic years.[vii] This explanatory variable is included to reflect the possibility that schools may have decided 'to make hay while the sun shines', increasing fees while the investigation proceeded, fearing their ability to continue to do so after the investigation had ended. Alternatively, it is possible that schools could limit fee increases while under investigation. Elliott and Wei (2010) concluded that store card interest rates fell significantly while the industry was subject to a market investigation by The UK Competition Commission from

2004 to 2006. A further DiD variable was created by multiplying the *Infringe* and *OFTThreat* variables, in an attempt to identify an effect of The OFT investigation, specifically on member schools of the Sevenoaks cartel, during the investigation period.

Further explanatory variables of competition and cooperation were also created. The GSG provides postcodes for schools. Geocodes were obtained based on this information and used to draw circular areas around any school, so that counts of the number of competing independent schools in an area each year could be obtained to give measures of the extent of competition between independent schools in any area (*Competition*). For day fees, total yearly counts of each independent day school and independent school offering day and boarding provision within one and ten mile radii were obtained.[viii] In terms of boarding fees, for each independent boarding school and 'day and boarding school', total yearly counts of boarding schools and 'day and boarding' schools within twenty five mile and fifty mile radii were obtained. The assumption, to be tested statistically, was that a greater number of schools in an area would indicate a more competitive environment and so be expected to lead to downward pressure on fees. This is expected for day fees, but also for boarding fees as Starkie and Wise (2006) highlight the increasing provision for weekly boarding at schools that offer boarding provision, such that pupils can return home at weekends. Traditionally, local competitive pressures would be less relevant to boarding schools as students may board at a school a substantial distance from their homes, but the increased popularity of weekly boarding may enhance competition between schools in areas broader than those considered for day schools. Squared competition variables were also created to test whether the relationship between the number of competing independent schools in an area and school fees was potentially non-linear.

There are a number of school groupings in the British independent school sector that may result in cooperation across schools, so dummy variables were also created to identify these. These groups encompass schools under common ownership such as the Cognita; GEMS; Woodard and United Church Schools Trust (UCST) groups of schools, and looser school affiliations such as The Eton Group; The Rugby Group; The Yorkshire Boarding School Group (YBSG); and the Girls' Day School Trust (GDST). Dummy variables were also created to indicate schools sharing the same religious affiliations.[ix] The expectation is that schools under common ownership may be expected to have more similar fee levels, but that in the absence of collusion, holding all else constant, other school groupings are unlikely to impact on fee levels set.

School data were supplemented with annual population (*Population*) and local real mean income (*Income*) data for the county in which any school is located, from The Office for National Statistics. Annual fee and income levels were converted into real values again using the all-item Consumer Price Index, 2005=100.

Consequently, a much richer set of explanatory variables have been collated to model factors impacting on independent school fees than used previously. This reflects the broader remit of the current research that intends to consider multiple facets of competition and potential cooperation between independent schools, whereas The OFT (2012) evaluation necessarily focused on the impact of its investigation into independent school fee levels since The OFT case was concluded.

3.2 Methodology

The initial, baseline model estimated is a fixed effects model, comparable to that used by The OFT (2012). To extend The OFT analysis we employ more recent data for an unbalanced panel of schools and introduce additional explanatory variables including competition, regulatory threat, school grouping, and schools' religious affiliation variables.

We then use multi-level mixed effects (MLME) models that take into account the hierarchical data structure in which schools nest within regions. Although in preliminary OLS regressions we considered the impact of two regional-level variables, i.e. income and population, on tuition fees (both day and boarding fees), other regional-specific but unobservable processes might also impact on fees and should be addressed in the modelling. Failing to allow for this within-region correlation could result in biased results and incorrect inferences, and ultimately in spurious results. Hence, results from mixed effects models are reported below but, for comparison purposes, OLS regression results are presented in Appendix 4.[x] Recent advances in multilevel modelling enable the formulation of models that account for the random variation at group or regional levels (Clarke et al. 2015; Jones, 1991). Such models avoid the aggregation problem by permitting the response variable (y) to vary from region to region. In our analysis, we consider a two-level hierarchical model of tuition fees within regions, setting schools at level 1 and regions at level 2. The model specifies the relationship between a dependent variable (y) and independent variables (X, a vector of level 1 school characteristics, and Z, a vector of level 2 school region-level variables) as follows:

$$y_{ij} = \alpha + \mu_j + \beta' x_{ij} + \gamma' z_j + \varepsilon_{ij}$$

where the subscript *i* refers to an individual school in region *j*. The region is defined in terms of geographical area, here a county. Random elements are captured by μ_j and ε_{ij}. The above model can also be estimated as a fixed-effects (FE) model by including regional and school dummies (Clarke et al. 2015). However, including a set of dummies would prevent the testing of the significance of such variables as those indicating the cartel, school groupings and school religious affiliations, which are also captured by dummy variables.

In our case, *individual school characteristics* (Level 1) include: *log(Size)*; *Infringe* (i.e. whether the school was found guilty of membership in the Sevenoaks cartel); *FTBoard%* and *FTRank*. *Characteristics of school regions* (Level 2) include *log(Income)* and *log(Population)*.

4. Results

4.1 Main Results

Table 1 reports the results of the baseline regressions, comparable to those reported by The OFT (2012). To ensure comparability, fixed effects regressions are used with results reported for two dependent variables: (logged) real day and boarding fees. The results indicate that schools found guilty of being party to the fee-setting cartel (*Infringe*) had higher fees during the academic years 2002/2003 to 2011/2012 that are covered by this dataset, and that independent school fees have increased significantly since the original OFT investigation (*Postintervention*). However, the coefficients on the difference in differences (DiD) estimators are never significantly different from zero, suggesting that since The OFT investigation there has been no significant impact on the levels of fees set by schools involved in the fee-setting cartel. This is in contrast to the results of The OFT (2012) analysis. The OFT (2012) results indicate the real fees have increased to a greater extent than the results in Table 1 suggest, and more importantly, the coefficient on the DiD estimator is negative and significantly different from zero at the 5% level. A possible explanation for these differences is that the current dataset covers an additional four years of data, and from Figure 1 it can be seen that for the sample of schools included in the current dataset, average real fees decreased in the final year of the data. However, these results are only preliminary, and additional explanatory variables need to be included to obtain a clearer view of the

factors determining independent school fees, as well as to ensure against omitted variable bias.

Table 1 about here

Table 2 reports results that include additional explanatory variables that may influence independent school fees. The first two specifications, specifications (2.1) and (2.2) in the table are for day fees and specifications (2.3) and (2.4) are for boarding fees. In different specifications, different measures of the *Competition* variable are employed to depict possible local market competitive effects. In specifications (2.1) and (2.2), *Competition* is measured by the number of competing independent schools offering day pupil provision in either a 1 mile or 10 mile radius, respectively. In specifications (2.3) and (2.4), *Competition* is measured by the number of competing independent schools offering boarding provision in either a 25 mile or 50 mile radius, respectively. Population and Income are included with the anticipation that if these variables have any impact on independent school fees, then the effect may be expected to be positive. Possible impacts on independent school fees while The OFT cartel investigation was ongoing are portrayed through the inclusion of the *OFTThreat* and *Infringe*OFTThreat* variables. Finally, dummy variables are included to identify both formal and potential informal school groupings that may have similar fee setting strategies.

Table 2 about here

As in the baseline regressions, *Size* is not found to have any significant impact on fees set, although schools with greater proportions of boarding pupils are now found to set higher fees. This is expected as the schools are likely to need to invest in a greater range of facilities for their pupils. The FT ranking of a school continues to have no impact on day fees although now better FT ranked schools are associated with significantly higher boarding fees, which again may reflect the facilities at schools with boarding provision.

As in the baseline regressions, schools that were part of the Sevenoaks cartel are found to have significantly higher day and boarding fees, always at the 1% significance level. However, once we control for a greater range of explanatory variables in Table 2, we find that there is no significant impact of The OFT investigation on fees across the sector in the post investigation period as the coefficients on *Postintervention* are no longer statistically significant. Similarly, focusing on cartel members, their day fees are not significantly

different in the post OFT intervention period, although their boarding fees are found to be significantly lower, at a 5% significance level.

The OFT (2012) report did not specifically consider any impacts on fees while The OFT investigation was ongoing but the results in Table 2 indicate that while The OFT investigation took place the independent school sector increased fees significantly, the coefficient on *OFTThreat* always being positive and significantly different from zero at a 1% significance level. This may reflect the schools' fear that their ability to increases fees after the completion of The OFT investigation would be curtailed, but alternatively may reflect the buoyancy of the independent school sector and the UK economy in the mid-2000s, the statistical analysis unable to distinguish between these possible explanations. Nevertheless, it appears that cartel member schools reduced day but not boarding fees slightly during the period of the investigation as the coefficient associated with the *Infringe*OFTThreat* variable is negative, although admittedly only at a 10% significance level, in the day fee regressions. Consequently, while The OFT investigation was ongoing there was a difference in the fee setting strategies of cartel versus non-cartel members, with only cartel members restricting fee increases. Similarly, we find that, while there is no significant impact of The OFT investigation on fees across the sector in the post investigation period because coefficients on *Postintervention* are statically insignificant, focusing only on the Sevenoaks cartel members, these schools have significantly reduced their boarding fees given the significant values associated with *Infringe*Post* (DiD).

The extent of competition is not found to have any effect on day fees, considering the number of competing independent schools offering day pupil provision in either a 1 mile or 10 mile radius in specifications (2.1) and (2.2). We speculate that this may be because, particularly outside the capital city, there are often so few schools competing to attract day pupils within these radii. However, the standard competition result emerges in the boarding school sector, with competition between greater numbers of schools offering boarding provision being associated with significantly lower boarding fees (at a 1% significance level), regardless of whether the number of schools within a 25 mile or 50 mile radius is considered. Fees are, unsurprisingly, found to be significantly greater in counties with higher real, mean income levels.

The remaining dummy variables are included to capture the impact of potential competition and cooperation between independent schools on school fees by considering schools under

common ownership (the Woodard and UCST school groups), looser school affiliations (the Eton, Rugby, YBSG and GDST groups) and possible school affiliations that may arise when schools share a religious affiliation.[xi] The results indicate that considering these alliances of schools and schools under common ownership differences in fee-setting strategies emerge. For example, the Eton group of schools have significantly greater day and boarding fee levels compared to other schools, while the Rugby group of schools has significantly higher day fees, but not boarding fees compared to other schools in the dataset. Seventeen out of the eighteen Rugby group of schools were found to be part of the Sevenoaks cartel, while five of the twelve members of The Eton group were not identified as part of the cartel.[xii] Hence, these results suggest that within the cartel subgroups of schools may have had significantly different fee setting strategies, and that while the statistical results indicate that the fifty school who were found to have participated in the cartel have significantly higher fee levels, other factors may also have a significant effect on fee levels set and participation in the cartel was insufficient to ensure similar fee levels and increases. More generally, in terms of implications for competition policy investigations, results indicate that when large numbers of cartel members are identified, it is worthwhile investigating whether there are subgroups within the cartel that share more similar pricing strategies than for the cartel as a whole.[xiii]

4.2 Robustness Checks

A number of robustness checks were performed. First, the regressions were rerun with a balanced panel of schools that remain in The GSG and The FT throughout the data period. This reduces the sample size considerably to 1,080 school-year observations for schools offering day pupil provision and 530 school-year observations for schools offering boarding provision. Results are reassuringly comparable to those reported above, with key results reported in Table 3a below.[xiv] In particular, as in the results reported in Table 2, but in contrast to the baseline regressions of Table 1, the coefficients on the *Postintervention* dummy variable are always insignificantly different from zero, and this is also always true of the coefficients on the DiD variable (*Infringe*Post),* reducing confidence in the evidence above that The OFT investigation had at least some effect in terms of reducing boarding school fees. Again it is found that during The OFT investigation day and boarding fees across the sector rose significantly, at a 1% significance level, while it is found that cartel member schools did not increase either day or boarding fees during this period as the coefficients on the DiD *Infringe*OFTThreat* variable are now always insignificantly different from zero.

Table 3a about here

Secondly, the regressions above were repeated, with the data restricted to the early years of data, specifically with the 2007-2008 academic year being the final year of data. This was to control for any impact of the financial crisis and following recession that may have impacted upon parents' ability to pay for independent schooling, and any resulting impact on schools' fee setting strategies. Again, results are comparable to those reported in Tables 2 and 3a above, with key results reported in Table 3b. Once more, there was no significant effect of The OFT investigation on the school fees set by members of the Sevenoaks cartel after the investigation had been completed, and little effect while it took place. Meanwhile during the investigation day and boarding fees increased significantly across the sector except in cartel member schools. However, one consistent difference in the results emerges, namely that immediately after The OFT investigation had been concluded, fees across the independent schools sector generally were significantly lower. This is despite the conclusion above that there was little change in the fee setting strategies of the members of the Sevenoaks cartel, and the financial crisis was yet to occur. As such, the results are in keeping with the dip in day and boarding fees seen across the independent schools sector in 2007 in Figure 1 above. This suggests that after the conclusion of The OFT investigation there was an initial negative impact generally on independent school fees across the sector, but that this effect has dissipated over time, as can be seen in the results from the full sample period above.

Table 3b about here

A number of additional robustness checks were performed.[xv] Regressions were rerun, including squared competition variables to test whether the relationship between competition and school fees was potentially non-linear but the coefficients on the squared competition variables were consistently insignificantly different from zero. Regressions were also rerun using an alternative dummy variable that took the value of unity in the 2003/2004; 2004/2005 and 2005/2006 academic years as an alternative indicator of the period when The OFT investigation took place with no substantial effect on the statistical results. Regressions were also re-estimated using the FT rather than the GSG religious affiliation dummy variables. The results were, unsurprisingly, very similar given that both publications obtain this information directly from the schools.

Finally, propensity matching, probit regressions were run using the most recent (2011/2012) academic year of data to check the result that consistently emerges above - members of the

former Sevenoaks cartel have higher fees than other schools. The method allows this result to be tested comparing Sevenoaks schools with other schools in the dataset that are as similarly matched as possible, addressing concerns raised in White (2006). We first estimated the propensity score by running probit regressions of the treatment dummy (being a member of the Sevenoaks cartel) on the following six variables: *log(Size)*; percentage of boarders; competition; *log(Income)*; *log(Population)*. Balancing tests confirmed that the propensity score specification satisfies the balancing property. Based on the propensity score, we matched the treated schools with similar non-treated schools using three matching procedures, namely the nearest neighbour matching, radius matching and kernel matching methods and estimated the average treatment effect on the treated schools (ATT). All estimations were carried out with bootstrapped standard errors with 500 replications while imposing a common support condition in the matching algorithm. Results in Table 4 below indicate that regardless of matching method used and whether a 1 or 10 mile radius around a school offering day pupil provision was used to calculate the number of relevant competing independent schools, members of the former Sevenoaks cartel still had significantly higher day fees in the 2011/2012 academic year. However, there is less evidence that former Sevenoaks cartel members still had higher boarding fees in this year, with this result only emerging when the radius matching method was used.

Table 4 about here

5. Conclusions

This paper considers factors that determine independent school fees, with a particular focus on the impact of competition, cooperation and regulatory intervention, i.e. The Office of Fair Trading (OFT) investigation into fifty leading schools that concluded in 2005 that a fee-setting cartel had operated. A number of consistent results emerge. Members of the Sevenoaks cartel have consistently set higher fees than other independent schools, but little impact of The OFT investigation on cartel member fees can be identified either during the investigation or after its conclusion. This contrasts with the conclusions of The OFT (2012) report into the effects of its 2003-2005 investigation, and can be explained by the use of a broader set of explanatory variables to ensure that results do not suffer from omitted variable bias, and the use of mixed effects, multi-level regressions that capture more accurately the local or regional nature of competition between independent schools. The conclusion that The

OFT investigation had little effect on the fee setting strategies of the cartel member schools lends some support to the claim of these schools that the intention of the cartel was not to raise fees and hence there was no reason to change fee setting strategies either during The OFT case or after it had been completed. Any effects of The OFT investigation across the independent schools sector only appear to have been temporary reductions in day and boarding fees after the close of the case, these quickly dissipating. However, note that independent schools (but not members of the cartel being investigated) were found to increase fees significantly during the period when The OFT was investigating the case. Although fifty schools were found to have participated in the cartel, there are also additional alliances of independent schools in Britain. Significant differences in the fee-setting strategies of these school alliances have been identified. This suggests that competition authorities should take explicit account of sub-groups within any identified cartel when estimating the price effects of a cartel and also the impact of any regulatory intervention.

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Appendix 1

Table A1 below lists schools found guilty by The Office of Fair Trading of participating in the Sevenoaks cartel, so named as Sevenoaks School collated and distributed fee information between cartel members.

Table A1: Sevenoaks Cartel Members

Ampleforth College	Mill Hill School
Bedford School	Oakham School
Benenden School	Oundle School ~
Bradfield College ~	Radley College ~
Bromsgrove School	Repton School ~
Bryanston School #	Royal Hospital School
Canford School	Rugby School ~
Charterhouse School ~	St. Edward's School, Oxford ~
Cheltenham College ~	St. Leonards-Mayfield School
Cheltenham Ladies College	Sedbergh School *
Clifton College ~	Sevenoaks School
Cranleigh School	Sherborne School #
Dauntsey's School	Shrewsbury School ~
Downe House School	Stowe School ~
Eastbourne College	Strathallan School
Epsom College	Tonbridge School #
Eton College #	Truro School *
Gresham's School	Uppingham School ~
Haileybury School ~	Wellington College ~
Harrow School ~	Wells Cathedral School
King's School Canterbury #	Westminster School #
Lancing College	Winchester College ~
Malvern College ~	Woldingham School
Marlborough College #	Worth School
Millfield School	Wycombe Abbey

* indicates a school that participated in the cartel for only two out of the three academic years. # indicates a member of the Eton group of schools; ~ indicates a member of the Rugby group of schools.

Appendix 2

Table A2 below uses data from one representative (anonymised) school to illustrate the concern that neither The Good Schools Guide (GSG) nor The Financial Times (FT) necessarily always received and reported annual fee updates. Hence, new day and boarding fees variables were created, using the maximum relevant day or boarding fee value as reported in either publication in any year.

Table A2: School Fees Variable Details

Year	Day Fees GSG	Day Fees FT	Boarding Fees GSG	Boarding Fees FT	Maximum Day Fees	Maximum Boarding Fees
2003	14085	14085	18780	18780	14085	18780
2004	15420	15420	20550	20550	15420	20550
2005	16335	16335	21780	21780	16335	21780
2006	16995	16995	22980	22980	16995	22980
2007	16995	16995	22980	22980	16995	22980
2008	18915	16995	25575	22980	18915	25575
2009	19860	19860	26850	26850	19860	26850
2010	19860	19900	27390	26800	19900	27390
2011	20400	19900	28125	27400	20400	28125
2012	21015	20400	28965	28100	21015	28965

Note: All values in £ sterling, before adjusting for inflation.

Appendix 3

Table A3a: School Fee Descriptive Statistics

Year	Day Schools	Boarding Schools	Day and Boarding	
			Day	Boarding
2003	7720 (1357) 84	20194 (475) 8	11475 (2498) 114	17421 (2179) 114
2004	8296 (1392) 88	21754 (662) 8	12191 (2691) 114	18565 (2395) 114
2005	8772 (1495) 100	22694 (608) 8	12522 (2885) 126	19465 (2892) 126
2006	9107 (1592) 117	23469 (576) 8	12846 (2869) 137	19872 (2460) 137
2007	8897 (1533) 118	23392 (1756) 8	12562 (2828) 141	19469 (2337) 141
2008	9574 (1701) 128	24439 (1758) 6	13352 (3152) 153	20987 (2526) 153
2009	9908 (1751) 131	25961 (2132) 8	13887 (3108) 162	21651 (2511) 162
2010	10022 (1892) 136	26330 (2252) 9	13991 (3124) 168	21904 (2617) 168
2011	10103 (1938) 143	26329 (2147) 9	14043 (3199) 176	21946 (2586) 176
2012	9912 (1693) 143	26027 (2056) 8	13941 (3155) 174	21794 (2603) 174

Notes: In each cell, the first value is the mean value of real school fees for the relevant category of school, with the standard deviation of these fees in parentheses. Below these values is a count of the number of schools in the sample in each cell.

Table A3b: Continuous Explanatory Variable Descriptive Statistics

Variable	Mean	Standard Deviation
log(Size)	6.337	0.436
FTboard%	0.237	0.300
log(Income)	10.124	0.207
log(Population)	7.055	1.088
Competition (1 mile)	0.530	0.856
Competition (10 miles)	8.348	11.881
Competition (25 miles)	10.279	7.935
Competition (50 miles)	32.092	19.429

Appendix 4

Table A4: OLS Regression Results

	log(Real Day Fees)		*log(Real Boarding Fees)*	
log(Size)	-0.03647***	-0.0355***	0.0366***	0.0364***
	[0.0085]	[0.0087]	[0.0101]	[0.0102]
FTboard%	0.6199***	0.6176***	0.2817***	0.2813***
	[0.0187]	[0.0195]	[0.0130]	[0.0131]
Infringe	0.0950***	0.0940***	0.0241**	0.0257**
	[0.0178]	[0.0175]	[0.0107]	[0.0107]
Postintervention	0.0001	0.0043	0.0158	0.0215**
	[0.0101]	[0.0101]	[0.0106]	[0.0106]
*Infringe*Post (DiD)*	-0.0099	-0.0104	-0.0135	-0.0143
	[0.0168]	[0.0164]	[0.0102]	[0.0102]
FTrank	0.0120***	0.0097***	-0.0012	-0.0007
	[0.0031]	[0.0030]	[0.0026]	[0.0026]
Year	0.0274***	0.0267***	0.0274***	0.0265***
	[0.0016]	[0.0016]	[0.0015]	[0.0016]
log(Income)	0.4819***	0.4042***	0.1876***	0.1065***
	[0.0138]	[0.0186]	[0.0222]	[0.0239]
log(Population)	0.0025	-0.0089***	-0.0101***	-0.0067*
	[0.0027]	[0.0032]	[0.0039]	[0.0039]
Competition (1 mile)	0.0198***			
	[0.0035]			
Competition (10 miles)		0.0027***		
		[0.0004]		
Competition (25 miles)			-0.0011**	
			[0.0005]	
Competition (50 miles)				0.0005**
				[0.0002]
OFTThreat	0.0281***	0.0284***	0.0297***	0.0297***
	[0.0077]	[0.0077]	[0.0089]	[0.0089]
*Infringe*OFTThreat*	-0.0146	-0.0125	-0.0023	-0.0015
	[0.0191]	[0.0187]	[0.0113]	[0.0113]
Church of England	0.0370***	0.0349***	0.0195**	0.0217***
	[0.0074]	[0.0075]	[0.0083]	[0.0082]
Roman Catholic	-0.0428***	-0.0487***	0.0025	-0.0011
	[0.0138]	[0.0138]	[0.0094]	[0.0097]
Methodist	0.0756***	0.0750***	-0.0125	-0.0046
	[0.0219]	[0.0227]	[0.0130]	[0.0130]
Quaker	0.0567***	0.0567***	0.0618***	0.0644***
	[0.0198]	[0.0195]	[0.0132]	[0.0127]
Eton	0.1578***	0.1378***	0.0810***	0.0766***
	[0.0108]	[0.0113]	[0.0119]	[0.0120]
Rugby	0.0067	0.0156	-0.0165**	-0.0152*
	[0.0152]	[0.0149]	[0.0080]	[0.0079]
YBSG	-0.0620**	-0.0514*	-0.0600***	-0.0485***
	[0.0258]	[0.0273]	[0.0113]	[0.0124]
GDST	-0.1061***	-0.1182***	-0.1094***	-0.1249***
	[0.0067]	[0.0064]	[0.0196]	[0.0198]
UCST	-0.0562***	-0.0421***	0.0460**	0.0536**
	[0.0122]	[0.0132]	[0.0215]	[0.0220]
Woodard	0.0561***	0.0596***	0.0250***	0.0221**
	[0.0212]	[0.0203]	[0.0087]	[0.0088]
N	2363	2363	1316	1316
R^2	0.773	0.774	0.634	0.634
adj. R^2	0.771	0.772	0.628	0.628

Table 1: Baseline Regression Results

Dependent Variable	*log(Real Day Fees)*	*log(Real Boarding Fees)*
log(Size)	0.0086	0.0028
	(0.0101)	(0.0123)
FTBoard%	0.0615	0.0228
	(0.0378)	(0.0231)
Infringe	0.1699***	0.2074***
	(0.0237)	(0.0163)
Postintervention	0.0337***	0.0303***
	(0.0034)	(0.0052)
*Infringe*Post*	0.0024	-0.0080
(DiD)	(0.0069)	(0.0059)
FTRank	0.0016	-0.0031
	(0.0022)	(0.0026)
Year	0.0238***	0.0237***
	(0.0006)	(0.0007)
School dummies	Yes	Yes
N	2363	1316
Adjusted R^2	0.973	0.922

Notes:
1. Robust standard errors are provided in parentheses.
2. ***, ** and * indicate that the coefficient is significantly different from zero at the 1%, 5% and 10% levels, respectively.

Table 2: Main Regression Results of Mixed Effects Multi Level (MEML) Models

	log(Real Day Fees)		*log(Real Boarding Fees)*	
	(2.1)	(2.2)	(2.3)	(2.4)
log(Size)	-0.0038	-0.0040	0.0098	0.0087
	[0.0082]	[0.0082]	[0.0100]	[0.0100]
FTboard%	0.2148***	0.2138***	0.1144***	0.1115***
	[0.0204]	[0.0204]	[0.0180]	[0.0180]
Infringe	0.1773***	0.17709***	0.0675***	0.0694***
	[0.0293]	[0.0293]	[0.0199]	[0.0202]
Postintervention	-0.0024	-0.0023	0.0048	0.0046
	[0.0037]	[0.0038]	[0.0045]	[0.0045]
*Infringe*Post (DiD)*	0.0017	0.0014	-0.0115**	-0.0110**
	[0.0057]	[0.0057]	[0.0054]	[0.0054]
FTrank	0.0014	0.0014	-0.0043**	-0.0044**
	[0.0019]	[0.0019]	[0.0022]	[0.0022]
Year	0.0280***	0.0281***	0.0283***	0.0290***
	[0.0005]	[0.0006]	[0.0007]	[0.0008]
log(Income)	0.4288***	0.4302***	0.3392***	0.3507***
	[0.0247]	[0.0250]	[0.0279]	[0.0280]
log(Population)	0.0018	0.0017	-0.0062**	-0.0065**
	[0.0022]	[0.0022]	[0.0027]	[0.0027]
Competition (1 mile)	0.0031			
	[0.0038]			
Competition (10 miles)		-0.0001		
		[0.0005]		
Competition (25 miles)			-0.0025***	
			[0.0008]	
Competition (50 miles)				-0.0016***
				[0.0004]
OFTThreat	0.0278***	0.0280***	0.0297***	0.0301***
	[0.0024]	[0.0025]	[0.0032]	[0.0032]
*Infringe*OFTThreat*	-0.0104*	-0.0104*	-0.0001	-0.0002
	[0.0062]	[0.0062]	[0.0059]	[0.0059]
Church of England	0.0059	0.0056	0.0111	0.0124
	[0.0080]	[0.0080]	[0.0087]	[0.0086]
Roman Catholic	-0.0148	-0.0155	0.0090	0.0102
	[0.03105]	[0.0311]	[0.0248]	[0.0252]
Methodist	0.0508	0.0509	-0.0023	-0.0002
	[0.0554]	[0.0554]	[0.0363]	[0.0370]
Quaker	0.0320	0.0308	0.0134	0.0118
	[0.0525]	[0.0525]	[0.0352]	[0.0358]
Eton	0.1556***	0.15680***	0.0815**	0.0829**
	[0.0474]	[0.0475]	[0.0364]	[0.0370]
Rugby	0.1555***	0.1571***	0.0237	0.0257
	[0.0449]	[0.0449]	[0.0278]	[0.0283]
YBSG	0.1335	0.1374*	-0.0605	-0.0747
	[0.0830]	[0.0829]	[0.0513]	[0.0521]
GDST	-0.0894***	-0.0900***	-0.0898	-0.0888
	[0.0257]	[0.0257]	[0.0631]	[0.0643]

UCST	-0.0842	-0.0842	-0.0003	-0.0052
	[0.0582]	[0.0583]	[0.0526]	[0.0536]
Woodard	0.1719***	0.1718***	0.0524	0.0525
	[0.0574]	[0.0574]	[0.0395]	[0.0402]
N	2363	2363	1316	1316
LR test: MEML versus OLS	4006.18***	3995.59***	1634.23***	1642.72***

Notes:

1. Robust standard errors are provided in parentheses.
2. ***, ** and * indicate that the coefficient is significantly different from zero at the 1%, 5% and 10% levels, respectively.

Table 3a: Robustness Checks – Key Results from Balanced Panel Regressions

	log(Real Day Fees)		*log(Real Boarding Fees)*	
Competition variable measured in	*1 mile radius*	*10 mile Radius*	*25 mile radius*	*50 mile radius*
Infringe	0.2475***	0.2468***	0.0993***	0.0985***
	[0.0544]	[0.0544]	[0.0356]	[0.0362]
Postintervention	-0.0041	-0.0037	-0.0001	-0.0008
	[0.0053]	[0.0053]	[0.0077]	[0.0077]
*Infringe*Post (DiD)*	0.0022	0.0014	-0.0076	-0.0075
	[0.0080]	[0.0080]	[0.0091]	[0.0090]
OFTThreat	0.0281***	0.0283***	0.0343***	0.0343***
	[0.0035]	[0.0035]	[0.0055]	[0.0055]
*Infringe*OFTThreat*	-0.0120	-0.0120	-0.0019	-0.0018
	[0.0092]	[0.0091]	[0.0104]	[0.0103]
Additional Controls	*Yes*	*Yes*	*Yes*	*Yes*
N	1080	1080	530	530

Notes:
1. Robust standard errors are provided in parentheses.
2. ***, ** and * indicate that the coefficient is significantly different from zero at the 1%, 5% and 10% levels, respectively.

Table 3b: Robustness Checks – Key Results from a Shortened Data Period

	log(Real Day Fees)		*log(Real Boarding Fees)*	
Competition variable measured in	*1 mile radius*	*10 mile radius*	*25 mile radius*	*50 mile radius*
Infringe	0.1796***	0.1793***	0.0664***	0.0659***
	[0.0324]	[0.0324]	[0.0229]	[0.0229]
Postintervention	-0.0129***	-0.0127***	-0.0171***	-0.0171***
	[0.0040]	[0.0040]	[0.0056]	[0.0056]
*Infringe*Post (DiD)*	-0.0010	-0.0013	-0.0042	-0.0043
	[0.0056]	[0.0056]	[0.0060]	[0.0060]
OFTThreat	0.0416***	0.0418***	0.0441***	0.0441***
	[0.0022]	[0.0022]	[0.0032]	[0.0032]
*Infringe*OFTThreat*	-0.0096*	-0.0097*	-0.0076	-0.0076
	[0.0055]	[0.0055]	[0.0059]	[0.0059]
Additional Controls	*Yes*	*Yes*	*Yes*	*Yes*
N	1116	1116	655	655

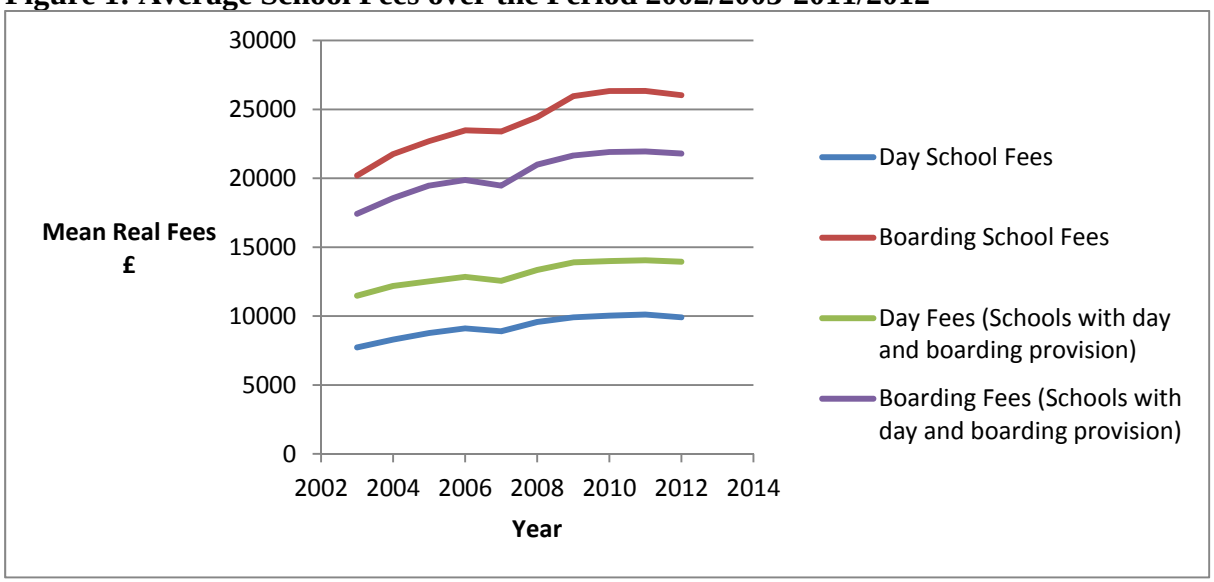
Notes:
1. Robust standard errors are provided in parentheses.
2. ***, ** and * indicate that the coefficient is significantly different from zero at the 1%, 5% and 10% levels, respectively.

Table 4: Propensity Matching Results

Competition variable measured in		*log(Real Day Fees)* *1 mile radius*	*10 mile radius*	*log(Real Boarding Fees)* *25 mile radius*	*50 mile radius*
Nearest neighbour matching	ATT	0.166*	0.241**	0.084	0.042
	t-statistic	1.658	2.311	1.191	0.615
Radius matching	ATT	0.271***	0.267***	0.089***	0.088***
	t-statistic	4.805	4.641	2.997	3.094
Kernel matching	ATT	0.177*	0.248**	0.059	0.052
	t-statistic	1.828	2.517	1.070	0.902

Notes: ***, ** and * indicate that the coefficient is significantly different from zero at the 1%, 5% and 10% levels, respectively.

Figure 1: Average School Fees over the Period 2002/2003-2011/2012



Source: The Good Schools Guide and The Financial Times Guide, various issues.

[i] This partly explains the decision to use a *Year* variable to capture the general upward trend in fee levels in recent years. However, this variable was also used to ensure comparability with The Office of Fair Trading (2012) analysis discussed below.

[ii] Nevertheless, Harrington Jr. and Chang (2012) highlight conditions under which leniency for whistle-blower schemes can increase as well as reduce the incidence of cartels.

[iii] McMillen et al. (2007) should be highlighted as an analysis of spatial competition in an education market, although that paper focuses on price competition in cross-sectional data for US private universities.

[iv] Fees for the academic year 2003/2004 are assumed to have been set prior to the cartel being exposed in 2003.

[v] In recent years some, predominantly, independent schools have submitted their pupils for the International Baccalaureate examination rather than A-level examinations which are more standardly used across the UK.

[vi] Note that the term boarding fees encompasses both the tuition and boarding components of fees.

[vii] Note that the 2003/2004 fees are likely to have been set before the start of The OFT investigation in 2003. Nevertheless, one of the robustness checks discussed in Section 4.2 below considers an alternative dummy variable that takes the value unity in the 2003/2004; 2004/2005 and 2005/2006 academic years.

[viii] One and ten mile radii were selected for day schools to approximate distances that may be easily commutable on foot and by car.

[ix] Dummy variables were not created for schools affiliated to non-Christian religions as there were so few of these schools in the dataset.

[x] The OLS results are typically very robust in terms of coefficient signs and significance levels even if the magnitudes of individual coefficients sometimes differ.

[xi] Dummy variables for schools under GEMS and Cognita ownership are not included as there was only one GEMS and one Cognita school in the final dataset. There are 7 Woodard; 6 UCST; 12 Eton; 18 Rugby; 5 YBSG; 22 GDST schools in the final dataset. School dummies are excluded because of the multicollinearity issue with school grouping dummies.

[xii] See Appendix 1 for details of the schools in the Eton and Rugby groups who were also part of the Sevenoaks cartel.

[xiii] Nevertheless, there appear to be no similarities in fee setting strategies that can be linked to schools that share any Christian religious affiliation.

[xiv] Full results are of course available on request and withheld only for the sake of brevity.

[xv] Results withheld for the sake of brevity but of course available on request.