

AUDIT MARKET INVESTIGATION

Price concentration analysis

Summary

1. This paper outlines the reasons why the CC does not propose to proceed with a price-concentration analysis (PCA) in the market for audit services. There is a substantial academic literature in this area, mainly using US data but with some work on UK data also. Having reviewed this literature and considered the evidence available to us from other sources (such as surveys), we do not believe that the current UK audit market is a good 'fit' for a PCA. That is, given the data and the context, we see no path to developing an analytical framework capable of providing firm conclusions about the *causal* relationship between changes in concentration and changes in audit fees. This is for two main reasons: (a) doubts about whether the problem of 'endogenous competition measures' can be adequately resolved, and (b) the difficulty of defining a sufficient number of distinct audit markets.

Introduction

2. The purpose of this working paper is to explain the CC's reasons for not proceeding with an econometric PCA in this case. We do not argue that a PCA or related approach can never be usefully applied to any audit market. Indeed we provide an example of a published US study which is able to overcome the above problems by looking at the effect on municipal audits of changes in regulations at the state level.¹ Rather we argue that it is difficult to translate such methodologies into the UK context.

¹ See paragraph 1.22.

3. The general objective of a PCA is to investigate how concentration is related to market power, ie the ability of firms to price above cost. To this end, there needs to be a number of independent product or geographic markets in the supply of relevant goods or services where concentration varies sufficiently while other parameters remain relatively constant or can be accounted for with reasonable accuracy.²
4. In this case we are interested in investigating the relationship in the supply of audit services between audit fees and market concentration: in particular, whether there is evidence that higher concentration in the supply of audit services to some or all FTSE 350 and Top Track 100 companies has resulted in these companies paying higher audit fees, controlling for other factors that may explain differences in observed audit fees.
5. An analysis of this type was prepared for the Department of Trade and Industry and the Financial Reporting Council by Oxera in 2006. The impact of concentration on audit fees has also been the subject of a number of academic studies. A short review of these studies is at [Annex A](#). We note that some studies concluded that higher concentration had been associated with higher audit fees. In 2006, Pricewaterhouse Coopers LLP (PwC) prepared a critique of the Oxera study. PwC said that the FAME data used by Oxera was not reliable and that the specification of the model failed to adequately control for endogeneity and omitted variable bias.
6. In 2012 Deloitte LLP (Deloitte) published its own critique of the Oxera study, and of a subsequent update to that study produced by the Office of Fair Trading.³ Like PwC, the Deloitte paper criticized the quality of the FAME data used by Oxera. Deloitte also raised further methodological problems with the Oxera approach.

² Beckert and Mazzarotto (2010).

³ Deloitte, *Audit pricing analysis*, 27 February 2012. Another price-concentration analysis was prepared by London School of Economics researchers on behalf of BDO Stoy Hayward LLP. See Kittsteiner and Selvaggi (2008).

7. The structure of this paper is as follows: first, we explain the specification of a PCA that we considered and the data that is available to us; we then set out the conceptual and practical problems that we would have faced had we decided to proceed with such an analysis; and finally, we give the reasons why we decided not to proceed with this analysis.
8. We conclude that a PCA analysis would be unlikely to give sufficiently robust findings for the CC to be able draw conclusions from this analysis on the relationship between fees and concentration in the supply of audit services.

Model specification and data

9. Building on previous studies, we considered estimating the relationship

$$audit\ fee_{it} = const + \alpha CM_{st} + [\beta audit\ fee_{it-1}] + \gamma x_{it} + \delta sector + \kappa capm + \lambda year + \varepsilon_{it}$$

with i indexing the audited company, t the year and s the sector; CM is the concentration measure, $capm$ index designation (dummies).⁴ Sector and year denote the dummies for sector and year. x is a vector of other explanatory factors that affect the audit fee. We also considered the inclusion of the lagged audit fee, $audit\ fee_{it-1}$.

10. Concentration is typically measured with a Herfindahl-Hirschmann Index (HHI), based on auditors' revenue shares within each sector-index designation combination, in each year. In any given year, this measure is constant for all auditees in the same sector and index designation.

⁴ 'Index designation' refers to the distinction between FTSE 100, FTSE 250, other listed and private companies. In the first instance, the 'index designation' indicator variables refer to the distinction between listed and non-listed companies, but can be allowed to vary with index membership (distinguishing FTSE 100 from FTSE 250 and other listed companies). Hence, depending on the context, 'index designation' in the following might also be used to denote a combination of listing status and index membership.

11. The data gathered during this investigation is discussed in the working paper ‘Data sets in the market inquiry for statutory audit services’.⁵ The key points to note are that we have a data set of around 800 companies identified as being a FTSE 350 and/or Top Track 100 company in one or more years over the six-year period 2005 to 2011. For each client, for each year in which they were audited, we have information on the auditor and the fees for audit and non-audit services, as well as client characteristics such as sector, index designation, and financial performance. This data comes from the publicly available FAME data set, and from parties’ responses to our data request. The data has a panel structure, in that each client typically appears multiple times—once for each year in which it was audited.

Potential problems

12. In this section, we set out certain conceptual and practical difficulties that we identified in estimating, via the model in paragraph 9, the causal effect of concentration on the audit fee. In particular:

- (a) the limited number of candidate product markets within the supply of audit services to FTSE 350 and Top Track 100 companies across which we could explore the effect of variation in market concentration;
- (b) insufficient variability in concentration over time; and
- (c) further complexity and data limitations associated with addressing potential endogeneity in the concentration measures.

13. We deal with each of these below. We first present a broad overview of two key methodological problems—endogenous competition measures and market definition—couched in econometric terms. We then discuss particular complicating

⁵ http://www.competition-commission.org.uk/assets/competitioncommission/docs/2011/statutory-audit-services/datasets_in_the_market_investigation_for_statutory_audit_services.pdf

features of the present application in more detail, with reference to survey data and other evidence.

Endogeneity in the competition measure

14. In the model in paragraph 9, in order to infer that the coefficient α on CM_{st} represents the causal effect of competition on audit fees, it is necessary to assume that CM_{st} is uncorrelated with the random error ε_{it} . That is, it is necessary to assume that there is no unobserved factor which simultaneously affects both the level of competition in a sector-index designation, and the level of audit fees. If such factors exist, then they confound any inference about the causal effect of CM_{st} on audit fees. An observed correlation between the two variables could arise not from a causal link, but simply because both are simultaneously influenced by unobservable factors captured in the error term ε_{it} . This is known as the problem of 'endogenous competition measures'. It is standard practice in price-concentration analyses to address this problem.

15. Here, as in many other contexts, it is plausible that confounding unobserved factors of the type referred to in the previous paragraph are in fact present. For example, our analysis may not measure all the factors which affect the cost of performing an audit. Unmeasured influences on costs would then be present in the error term ε_{it} . Clearly such cost factors might affect audit fees. However, they could also affect the level of competition in a sector-index designation, by making entry into that specialization less profitable. Therefore unmeasured cost factors could produce a correlation between ε_{it} and CM_{st} , in violation of the necessary assumption referred to previously.

16. Several approaches to this problem are available in the present context. The first is to assume that any confounding unobservable factors comprise solely things that are specific to a given sector (and fixed across time), specific to a given index designation (and fixed across time), or specific to a given year (and fixed across index

designations and sectors). That is, we assume that the unobservable factors are picked up by a set of 'sector effects', 'index designation effects', and 'year effects'. Such effects are already included in the model of paragraph 9 (in the form of dummy variables), so under this assumption the analysis can proceed without any amendments.

17. Given the underlying assumption, this approach works by taking within-sector differences in auditing concentration between FTSE 350 and Top Track 100 companies, comparing these to within-sector differences in average audit fees, and seeing if the two differences are correlated. It assumes that the within-sector differences in any unmeasured 'confounding factors' are constant across sectors.
18. While not entirely unreasonable, the plausibility of this assumption is certainly open to speculation. It seems possible that the change in unmeasured auditing costs as we move from Top Track 100 to FTSE 350 companies might be steeper in some sectors than in others.⁶ If so, then the cross-sector variation in this unobserved change could explain the cross-sector variation in differences of both concentration and audit fees. In that case the endogeneity problem has not been solved, because the underlying assumption was incorrect.
19. Without specialist knowledge of auditing practices in each sector, it is difficult to debate further the merits of this assumption. Therefore we choose to avoid this approach, and move on to consider other ways of possibly solving the endogeneity problem. (Even if this approach were to be pursued, it would still run into other problems discussed below, such as those of market definition.)

⁶ By 'steeper', we mean 'greater in percentage terms'.

20. A second approach to the endogeneity problem would employ an ‘instrumental variables’ method of dealing with confounding unobservables. Instrumental variables (or simply ‘instruments’) are auxiliary variables which are used to ‘filter out’ the unwanted correlation between the unobservables in ε_{it} and the competition measure CM_{st} . To fulfil this role, these auxiliary variables should be (a) correlated with CM_{st} , but (b) uncorrelated with ε_{it} . Since ε_{it} is by definition not observable, the latter property is maintained at least in part as an assumption, rather than an observed property of the data.
21. Unfortunately, in the present context there are no obvious candidates for suitable instruments—it is hard to think of observable variables which might shift around concentration in a sector-index designation without having a direct effect on audit fees. Echoing this, in our reading of the extensive academic literature on the determinants of audit fees, we came across almost no studies which used this method to deal with endogenous competition measures. Therefore we set aside this approach as being infeasible in the present context.
22. In other jurisdictions and/or for other types of audit it may be possible to find instruments for competition. Certain types of regulatory change can function in this way, changing competition without otherwise having a direct effect on audit fees. An example is the study of US municipal audits by Jensen and Payne (2005), who studied how fees changed in states which relaxed restrictions on competition for such audits.⁷ It is not clear how to find and exploit similar ‘natural experiments’ in the UK

⁷ In this case the instrument for competition is whether a given state relaxed its regulations.

context. Any such regulatory change would need to be something which affected some sectors but not others, but which did not have any direct effect on audit fees.⁸

23. A third approach to endogeneity recognizes the point made in paragraph 18—that confounding unobservables may vary between index designations in a sector in arbitrary ways. For example, in some sectors there may be not much difference between unobserved costs as we move from the Top Track 100 to the FTSE 350, while in other sectors there may be a large change. To allow for such arbitrary unobserved influences, the approach amends the model in paragraph 9 by extending the sector and index designation effects ('*sector*' and '*capm*') to include a dummy variable for every distinct *combination* of sector and index designation. Thus if we have 30 sectors and 2 index designations, where the original model uses $30 + 2 = 32$ dummy variables to capture sector and index designation effects, the amended model would use $30 \times 2 = 60$ dummy variables.
24. The new dummies are assumed to be fixed over time, and 'soak up' any time-constant factors (both observed and unobserved) that characterize a given sector-index designation combination. They therefore go a long way toward accounting for unobservables that may simultaneously determine concentration and audit fees.
25. In econometrics this is known as a 'fixed effects' approach to endogeneity. It is one of the approaches employed, for example, in Deloitte's (2012) recent analysis of audit pricing. It is also employed in Kittsteiner and Selvaggi (2008).

⁸ In econometric terms, the approach of Jensen and Payne is a 'difference-in-differences' methodology. That is, fees at a 'treatment group' of auditees, affected by the change in regulations, are compared with those at a 'control group' of firms, unaffected by such changes. We understand that instances of regulatory changes which affect *all* auditees are not uncommon in the UK, but these are not good candidates for a 'difference-in-differences' methodology, because of the lack of a control group for comparison.

26. A problem with this approach is that it leaves us less variation in the data with which to study the effect of concentration on fees. The original model (with fewer dummy variables) allows us to use differences in concentration between index designations in the same sector. Including the additional dummy variables takes away this source of variation. The estimate of the coefficient α on CM_{st} is now driven solely by inter-temporal changes in fees and concentration. That is, within a given sector and index designation, the estimate measures the correlation between changes over time in CM_{st} , and changes over time in audit fees.⁹
27. While there will certainly be variation over time in CM_{st} , it is not clear how much of this variation represents meaningful changes in concentration. Given that clients rarely switch auditors, one would expect that in many sectors CM_{st} would be fairly stable over time. What variation there is from year to year arises in part from, for example, differences in the rate of change in audit fees for different clients in the same sector.¹⁰ (And some variation will arise just from random fluctuations in the error with which audit fees are measured.) It is unclear whether such changes constitute genuine shifts in concentration, of the kind which might be argued to have a *causal* effect on audit fees.
28. This is an illustration of a problem common to all fixed-effects models. When the fixed effects (ie the additional dummy variables) are included, the signal-to-noise ratio in the explanatory variable (CM_{st} in this case) may drop substantially. This

⁹ More precisely, it measures the correlation in the deviations of CM and fees from their respective averages over time within each sector-index designation.

¹⁰ This assumes that CM_{st} is calculated from an HHI in revenue shares, a typical approach in the literature.

biases the econometrics against finding a significant effect of this variable on audit fees.¹¹

29. Historically there will have been some major shifts in concentration over time as a result of the consolidation of audit firms. The cross-sector average effect of such consolidations on audit fees will be captured by the year dummies in our model, and will therefore be indistinguishable from simultaneous changes in the regulatory environment. Nevertheless there will be sector-specific deviations from this average effect, which provide a source of intertemporal variation with which to study effects on audit fees. However, the last major such consolidation was the Andersen event around 2002, so the data would need to extend back beyond that date in order to use variation of this type.¹²
30. In summary, while this third approach has some merit as a solution for endogeneity, it essentially throws out all the cross-sectional variation in the concentration measure and focuses just on intertemporal variation. We are not confident that the data, when handicapped with this restriction, would enable us to get an accurate estimate of the causal effect of concentration on fees.

The problem of market definition and the number of markets

31. As noted previously, the competition measure CM_{st} is typically defined as an HHI index based on auditors' revenue shares within a market. Key to this construction is the definition of a 'market', a term which can have different usages in different

¹¹ In the literature this is referred to as 'attenuation bias'. Deloitte (2012) found no effect of concentration on audit fees in its fixed-effect model. While this could mean that there is truly no fee-concentration relationship, it could also reflect the attenuation problem referred to in the text.

¹² The data for Deloitte's study starts in 2002, the same year that Deloitte acquired or merged with the UK assets of Arthur Andersen. Therefore it would seem that its data is not able to capture the before-and-after concentration effects of the Andersen event. A PCA study on UK data which spans both the pre- and post-Andersen periods is Kittsteiner and Selvaggi (2008). Over the whole period of their data (1998–2006), those authors find a positive correlation between fees and concentration for listed firms, but a negative correlation for private firms. This contradictory finding for private and listed firms is not very conducive to drawing a firm conclusion about the effect of increased concentration on fees.

contexts. Here we use the term to refer specifically to the set of clients over which revenue shares are calculated, for input into the HHI calculation.

32. In some other applications, eg retail, market definition is a fairly straightforward matter of identifying distinct towns and conurbations within which consumers are likely to confine their purchase activity.
33. Things are less clear-cut in the present application, where we cannot use spatial differentiation among sellers to define markets. The approach adopted in the literature on audit fees is to define a market as a combination of an industrial sector and an index designation. While pragmatic, this approach is not without shortcomings.
34. An important question is how narrowly to define industrial sectors. This involves a trade-off. Key to understanding this trade-off is to note that the basic model compares company-level outcomes (audit fees) with a market-level explainer (concentration—see paragraph 10). In econometric terms this represents measurement of a micro response (company-specific fee) to an aggregate (or ‘group’) variable (market concentration). A recent literature points out some difficulties in these measurement problems when there are only a small number of groups over which to calculate the aggregate variable. These difficulties relate specifically to the calculation of the standard error (ie the statistical significance) of the average effect of the group variable. The essential problem is that when the number of groups is small, it may no longer be possible to employ the regular large-sample theory which underpins statistical significance in most current econometric applications.¹³

¹³ See Donald and Lang (2007) and Wooldridge (2006).

35. To illustrate the trade-off, consider two extremes of market definition. First, suppose that industrial sectors are narrowly defined, giving us perhaps 30 such sectors. While not especially large, this number of markets may be of a magnitude sufficient to at least ameliorate some of the statistical problems referred to in the previous paragraph.
36. While a narrow market definition therefore has some apparent statistical virtues, it is not clear that this construction accords with the evidence on how customers and auditors view audit markets, discussed below in paragraph 45ff. That discussion suggests that there are substantial opportunities for auditors to compete across industrial sectors. If that is true, then restricting the HHI calculation to a single narrow sector results in an incorrect measure of the true extent of competition facing a given auditee. That is, there would be an 'omitted variable bias' in the model of paragraph 9, resulting from a failure to measure potential competition from sectors related to that of the auditee.
37. Consider then a second extreme of market definition, using highly aggregated industrial sectors. For example, suppose that we used just two sectors: 'Banking and Other Financial Services', and 'All Other Industries'. This broad classification makes it less likely that the resulting concentration measures exclude market shares of auditors who could have genuinely competed for a given company's audit.
38. At this level of aggregation, the number of groups over which audit fees are compared is obviously very small. In that case the statistical issues mentioned in paragraph 34 need to be explicitly addressed. For example, one would need to consider

whether it is feasible to employ some of the methods and assumptions mentioned in Donald and Lang (2007).¹⁴

39. Notwithstanding these statistical considerations, an additional concern arises when very broad sectors are used. The potential problem of endogenous competition measures discussed earlier becomes more serious. This is because sectors now comprise many heterogeneous firms, and therefore aggregate many heterogeneous 'confounding unobservables' (eg unobserved cost factors). It therefore becomes more difficult to analyse the circumstances under which these unobservables will or will not be correlated with the concentration measure.
40. For example, suppose that it is found that, when moving from the Top Track 100 to the FTSE 350 categories, concentration and fees both increase by more in 'Banking and Other Financial Services' than in the 'All Other' sector. Given the great variety of firms included in the 'All Other' category, it would be difficult to maintain that this could not have been caused by some quirk of how the mix of firms in 'All Other—Top Track 100' differs from that in 'All Other—FTSE 350', driving both the change in concentration and the change in fees.
41. Earlier we discussed fixed effects as a potential solution to these endogeneity problems. We also noted that this approach places a higher burden on the data because it only uses intertemporal variation in fees and concentration measures. With very broad industrial sectors this burden will be increased—the broader the sector, the more likely it is that the HHI shows little variation over time.

¹⁴ Two such possible assumptions are that the random errors are homoscedastic and normally distributed, and that the number of auditees in each sector (group) is large.

42. Since these two extreme approaches each have substantial drawbacks, the question remains as to whether there is some acceptable middle ground. Given the discussion below of survey and other evidence, it would seem that the number of sectors probably could not exceed ten without raising questions as to whether concentration measures unnecessarily excluded revenue shares in related sectors. (See paragraph 36 above.)
43. With fewer than ten sectors, the issues of small group numbers raised in Donald and Lang (2007) need to be explicitly considered. Those authors provide inferential procedures for two special cases: (a) when there is a large number of observations in each group, and (b) when the number of observations in each group is identical and the random errors ε_{it} are assumed to be normal and homoscedastic. Unfortunately neither of these fits the present application.
44. It therefore remains unclear how to define markets in a way that simultaneously mitigates the problem of endogenous competition measures, and also allows the correct calculation of statistical significances. As market definition is fundamental to the model, the validity of the empirical exercise is called into question.

Further comments on market definition

45. As discussed above, the problem of market definition is addressed in the academic literature and the studies by Oxera (2006) by proxying the 'true' markets with markets based on company sector. It is said that such a 'market definition' could be justified by the need for particular expertise to audit companies in certain sectors and other characteristics which mean that they have more complex audit requirements. Oxera stated that only a few sectors were specifically identified by interviewees as not

having any specific complex requirements, namely basic manufacturing, manufacturing of clothes and consumer goods, and property.¹⁵

46. The European Commission's Directorate General of Competition (DG Comp) defined markets for audit services in its merger reviews in 1998 (Price Waterhouse/Coopers & Lybrand (PwC & L)) and 2002 (Deloitte & Touche/Arthur Andersen (DT & AA)) based on criteria other than industry sectors. In particular, DG Comp concluded that auditor services fell into the following product markets:
- (a) audit and accounting services to quoted and large companies (using the index designation and company turnover to delineate 'large');
 - (b) audit and accounting services to small and medium-sized companies; and
 - (c) several other non-audit services.
47. DG Comp did not exclude the possible existence of narrower markets for the provision of audit and accounting services in some sectors, in particular the banking and insurance sectors, but concluded that these did not constitute separate relevant product markets for the purposes of assessing the PwC & L merger and did not consider narrower markets in DT & AA.¹⁶
48. We considered whether candidate markets might be defined by reference to the characteristics of the company being audited. Relevant characteristics could include the size of the company, sector in which it operates, whether it is a listed or private company, the complexity of the organization structure and the extent of its international operations. The supply of audit services to companies with particular characteristics, for example banks and financial institutions, would comprise a separate market if audit firms that do not have experience of auditing such

¹⁵ Oxera 2006, section 4.2.2.

¹⁶ See the decision on Case No *IV/M.1016 (PwC & L)*, paragraphs 20 & 22/3 & 49, and the decision on *COMP/M.2810 (DT & AA)*, paragraphs 21–25 & 33/4.

companies would not be considered by these companies to be potential substitutes for the audit firms that do. This in turn would depend on how quickly and easily an audit firm that does not have the required sector experience would be able to build or acquire the credibility to compete for this business.

49. We can gain some information on the client-based substitutability of audit firms from the following: the customer survey; the case studies; and the responses to the Market and Financial Questionnaire (MFQ). The relevant results are set out below.

Customer survey

50. In the customer survey we asked questions about which auditor the respondent would consider if its current auditor would cease trading, where relevant, why it would consider only Big 4 auditors and whether there were any reasons why choice would be limited within the Big 4.¹⁷
51. The survey methodology and results are summarized in the working paper 'Competition Commission survey results'.¹⁸ For FTSE 350 companies, the key results are:
- (a) Both Finance Directors (FDs) and Audit Committee Chairs (ACCs) predominately listed Big 4 firms when asked which auditors they would consider if their current auditor ceased trading. Overall 23 per cent of both FDs and ACCs said that their company would formally consider a non-Big-4 firm.¹⁹
- (b) For those FDs and ACCs who identified only Big 4 firms, the most frequently mentioned reason for this was the size and geographic coverage of the Big 4 audit firms (59 per cent and 69 per cent respectively). Sector knowledge and

¹⁷ CC survey, questions C9, C10 & C11.

¹⁸ www.competition-commission.org.uk/assets/competitioncommission/docs/2011/statutory-audit-services/survey_results_wp.pdf

¹⁹ See 'Competition Commission survey results', paragraph 63.

experience (27 per cent and 45 per cent), reputation (23 per cent and 11 per cent), better calibre/trained staff (15 per cent and 19 per cent) and size and complexity of the audit (16 per cent and 20 per cent) were other frequently mentioned reasons.²⁰

(c) 60 per cent of these FDs and 65 per cent of these ACCs also said that there were no factors limiting choice between Big 4 firms. For those who said that there were, the most frequently mentioned factor is the provision of non-audit services.²¹

52. Generally sample size is not sufficient for an analysis of these results by industry sector or other characteristics of the company such as size or scale of international operations.

Case studies

53. In the case studies we spoke to the FD (or equivalent) and ACC for each company and engagement partner from the company's auditor. We discussed with them their views on the capabilities of Mid Tier firms in providing audit services to FTSE 350 companies and whether in their current position they would consider appointing a Mid Tier firm. We also asked for their views on the choice they have within the Big 4 firms.

54. With regard to Mid Tier firms, the key results are:

(a) For three of the ten case study companies, both the ACC and the CFO said that they would consider a non-Big-4 audit firm.²² Of these, Company E and Company

²⁰ See 'Competition Commission survey results', Table 19.

²¹ See 'Competition Commission survey results', Table 20.

²² See [case study Company E](#), paragraphs 23 & 54, [case study Company J](#), paragraphs 17 & 46, and [case study Company I](#), paragraphs 23 & 52.

J were mainly UK based (Company J was audited by a non-Big-4 firm), whereas Company I had European operations.

- (b) Three of the companies would not consider, or had not considered, a Mid Tier firm:²³ Company H, Company D and Company B had relatively small audit fees (under £[~~3~~]), but geographically diverse businesses.
- (c) Company F had an audit fee of £80,000 to £90,000. It was previously audited by a Mid Tier firm and had invited the firm to participate in the recent tender. The current auditor was a Big 4 firm and both the FD and ACC had concerns about using a Mid Tier firm in the future.²⁴
- (d) The investors we spoke to (BlackRock and L&G) were broadly happy for any of the Big 4 firms plus other internationally recognized auditors to provide audit services to FTSE 350 companies, except for particularly large companies.²⁵
- (e) For companies with large global operations, the need for consistency and quality across locations was given as a reason as to why they felt limited to using a Big 4 firm. The companies wanted their auditors in each territory to have relevant sector and FTSE experience. There was a concern that Mid Tier firms did not have the required geographic coverage or the ability to ensure quality in those locations where they did undertake work.²⁶

55. The case studies also provided further evidence on the barriers faced by Mid Tier firms to supplying audit services to FTSE 350 companies. As above, some of the points would apply to all FTSE 350 companies (for example, the perception that the quality of staff is better in Big 4 firms, pressure from shareholders to appoint a Big 4 firm, and the market perceptions that the Big 4 firms are more capable and provide a better-quality product), and some applied to particular FTSE 350 companies (for

²³ See [case study Company B](#), paragraph 44, [case study Company D](#), paragraph 28, [case study Company H](#), paragraph 22.

²⁴ See [case study Company F](#), paragraphs 26 & 54.

²⁵ See [BlackRock case study](#), paragraphs 15 & 17, and [Legal & General case study](#), paragraph 15.

²⁶ For example, see [case study Company A](#), paragraph 64, [case study Company B](#), paragraphs 44 & 45, and [case study Company H](#), paragraph 31.

example, the high audit risk of auditing large FTSE 100 companies and the international capability required by global companies).

56. With regard to choice between the Big 4 firms, three of the seven companies that said they would consider only a Big 4 firm said that realistically their options were limited to less than four firms. Of these:
- (a) Company G said that it would not use one Big 4 firm. Ernst & Young LLP (EY) provided significant non-audit services but was not considered a significant player in the global bank audit market.²⁷
 - (b) The CFO of Company C said that he could instruct most of the Big 4 firms (some were perceived to be stronger than others, given the company's specific requirements),²⁸ although the ACC thought that all the Big 4 firms could compete for the audit.²⁹

Responses to the MFQ

57. We asked the six largest audit firms to provide an assessment of their ability to compete to carry out audits for FTSE 350, other listed and Top Track companies. In particular, we asked them (a) which FTSE 350 companies they could currently not audit, (b) which sectors they are and are not active in, (c) whether they would be able to expand into those sectors where they are currently not active and (d) specific challenges and systematic differences between audits of companies by index designation and size (distinguishing FTSE 350, FTSE SmallCap, large non-listed companies).

Sector

58. All Big 4 auditors said that they organized their activities to a greater or lesser extent according to sectors: Deloitte used eight industry groups; EY used [✂] sectors which

²⁷ See [case study Company G](#), paragraph 72.

²⁸ See [case study Company C](#), paragraph 34.

²⁹ See [case study Company C](#), paragraph 66.

were managed on a global basis; KPMG UK's (KPMG's) FTSE 100 and FTSE 250 clients were spread across 12 and 13 sectors respectively;³⁰ and PwC 30. However, in relation to an analysis of current KPMG FTSE 350 clients by ICB sector, KPMG also stated that it did not use any standard sector classifications to manage its business and that no specific sector classification was fully informative of client characteristics nor an audit firm's ability to compete for clients in that sector.

59. One sector which appeared to be 'protected' from competition to some extent was financial services companies. An audit firm, its staff and close relatives of staff involved in audits cannot bank with institutions they audit and cannot hold investments in those companies. Tendering and supplying audits to financial services companies (banks and insurance companies) which are not already clients may therefore require the rearrangement of corporate finances, insurance arrangements and pension plans as well as changes in the personal finance arrangements of staff and their relatives to avoid 'reverse conflicts' arising from financial ties.³¹ However, EY stated that it could change existing financial business relationships in order to tender for audits of financial services companies whose services it was currently using.
60. In addition to the financial sector being specific due to independence rules, this and some other sectors appear to require particularly complex audits. PwC said that banking, mining and utilities were among the sectors that required the most complex audit services. EY said that regulated sectors had specific compliance and reporting requirements which added additional complexity.

³⁰ KPMG analysis in [response to the issues statement](#), Figures 5 & 6.

³¹ Deloitte explained that the necessary changes would lead to a longer 'lead time' for tenders for audits of financial services companies it had significant business with. PwC said that it would not tender for audits of three financial institutions because of the services it supplied to PwC. KPMG could not audit three financial institutions and one insurance company without major rearrangements, which might even prove impossible.

61. PwC also said that all the largest firms could offer a competitive audit service if opportunities should arise, even for companies in the most complex sectors, albeit that some might have a stronger offering than others based upon recent experience. PwC explained that the time and cost of acquiring the necessary capability credibly to offer statutory audit services within an industry sector would not be prohibitive for any of the four largest audit firms in relation to any particular industry sector.
62. Generally, each of the Big 4 firms stated that they were able to provide audit services to companies in all industry sectors. PwC stated that it was active in all industry sectors and considered itself able to provide audit services for any sector or size of company because skills required to audit large companies would be to some extent transferable, and specialist knowledge needed, but not available locally, could be obtained by seconding partners and staff from within its international network. Moreover, sector expertise might also be available within PwC since it may audit smaller or non-listed companies in the same sector or UK subsidiaries of companies in the relevant sector where the lead firm was another member of the network. Similarly, Deloitte said that it was active in all industry sectors and would see itself well placed to provide audit services to any of the FTSE 350 companies regardless of size and sector. Regarding the relatively long list of 57 FTSE 100 and 60 FTSE 250 companies which it could currently not audit (this list being compiled assuming a theoretical immediate start date of an audit for the current financial year), Deloitte pointed out that it would be able to do so in almost all cases from the start of the following year—the typical start date for tenders—since impediments to independence might have fallen away or arrangements could be changed in time to be able to accept if the tender would be won, such as transition relief afforded to incoming auditors as prescribed in paragraph 172 of Ethical Standard 5. KPMG said that given transferability of specialist knowledge between audits in different sectors (eg tobacco and alcoholic beverages) and its wide presence across sectors, it would be able to

and interested in supplying audit services to companies in all sectors including those where it was not currently active. EY said much the same.

Index designation and size

63. Big 4 firms said that whilst the complexity of an audit was not directly linked to the size of the audited company, factors contributing to the complexity of the audit appeared to feature more strongly in larger clients. In particular, they said that the audits of FTSE 350 companies were typically more complex than those for FTSE SmallCap and non-listed companies, because as a general rule large listed companies had wider geographical interests and more complex financial arrangements, business models and IT systems, and required additional audit committee meetings, compliance with additional regulatory frameworks, interim reporting and shorter reporting deadlines. As a result, large listed company audits typically required larger audit teams which included more staff with specialist knowledge and which were often partly located overseas. In addition, Deloitte used additional internal quality control mechanisms to account for the higher risk and higher market profile of the FTSE 350 companies. PwC also said that the assurance provided by an audit report was particularly important for large FTSE companies because of the necessary and inevitable distance between the broader body of shareholders (owners) and the management.

Conclusion

64. Based on the above, it appears to us that whilst it may be possible to define separate candidate markets for FTSE 350 and Top Track 100 companies and for a small number of sectors where the auditor requires particular expertise, the number of candidate markets would be small and certainly in single figures.

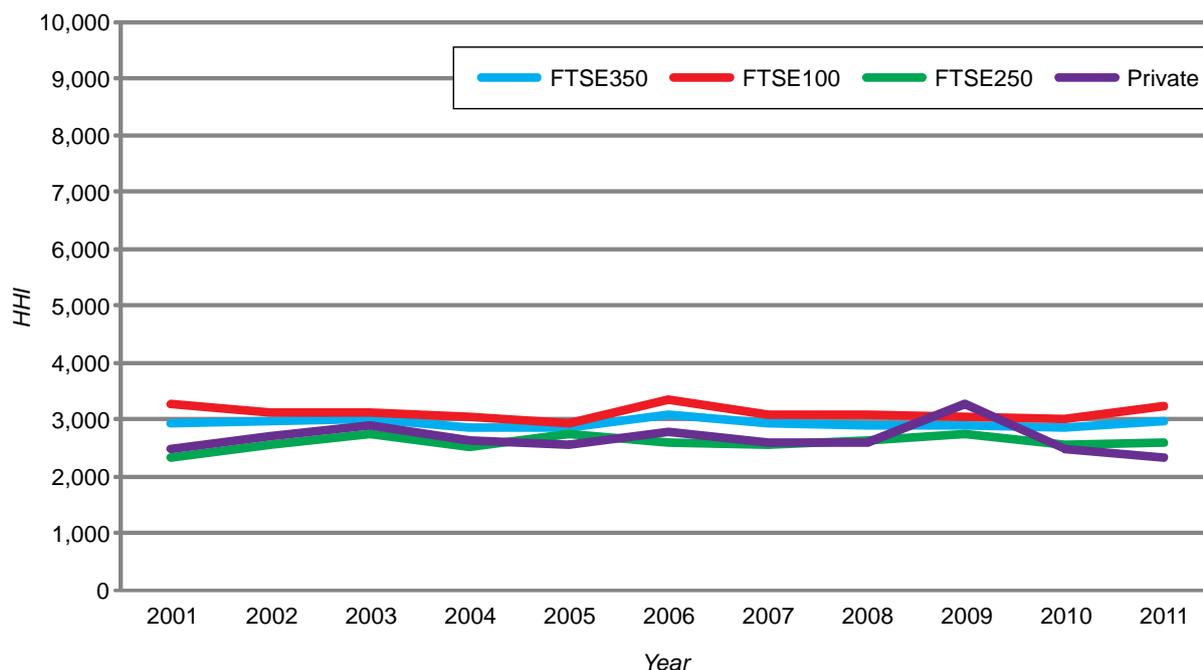
Lack of variation in the data

65. To investigate the relationship between audit fees and concentration would require variation in the data, in particular in concentration between index designations within each sector, and/or over time for each sector-index designation.³²
66. We looked at concentration measured by HHI for the following potential candidate markets defined by sectors and index designations:
- (a) FTSE 100, FTSE 250, FTSE 350 and private companies;
 - (b) FTSE 100, FTSE 250, FTSE 350 and private by sector; and
 - (c) FTSE 100, FTSE 250, FTSE 350 and private companies excluding banking, insurance and financial service companies.
67. Figure 1 below shows the annual HHI for FTSE 100, FTSE 250, FTSE 350 and private companies. [Annex B](#), Table 1, reports the HHI figures underlying Figure 1.

³² Hereafter and in the annexes we use 'index designation' as shorthand to refer to a combination of listed/non-listed status and, in the case of listed firms, index membership. Simply for convenience of terminology, FTSE 100 and FTSE 250 firms are regarded as different 'index designations' in a narrow sense, both belonging in a broader sense to the FTSE 350 'index designation'.

FIGURE 1

Annual HHI figures by index designation

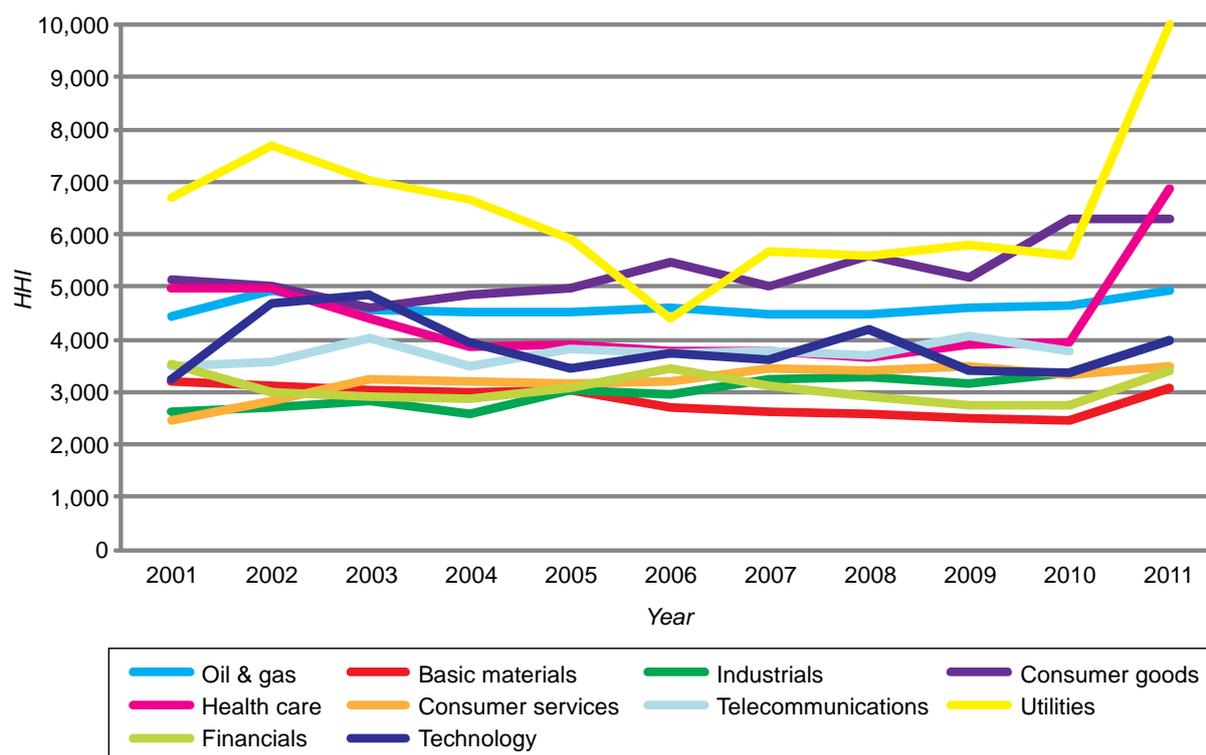


Source: CC.

68. Figure 1 illustrates that concentration within each index designation has remained relatively constant over time. We observe more variation across index designations, but the level is still low. [Annex B](#), Figure 1, shows the annual HHI for FTSE 100, FTSE 250, FTSE 350 and private index designations excluding banking, insurance and financial services companies. Compared with Figure 1 above, we observe slightly more variation across index designations but a similarly low level of variation within index designation over time.
69. In the case of the fixed-effects model discussed earlier, we would rely on the variation in concentration for each sector-index designation over the six years for which we have data. Figure 2 below shows the annual HHI within each sector for FTSE350 companies. [Annex B](#), Figures 2 to 4, show the annual HHI within each sector for FTSE 100, FTSE 250 and private companies. [Annex B](#), Table 3, reports the HHI figures underlying Figure 2 below and [Annex B](#), Figures 2, 3 and 4.

FIGURE 2

Annual HHI figures by sector for FTSE 350 companies



Source: CC.

70. In Figure 2 we observe more variation across sectors, but for the majority of sectors we observe limited variation over time. Figures 4 to 6 show more variation within sector over time, particularly among FTSE 250 and private companies. Although variation in HHI over time appears higher when looking at sector-index designations, we must consider the question of the appropriateness of defining a market based on sector (see paragraphs 45 to 64).

71. We must also consider the meaningfulness of the observed changes in concentration (see paragraph 27). For some sector-index designations, the number of companies is small and the auditor switching rate is low. Changes in concentration might therefore be driven by a company moving into or out of an index designation and different rates of change of audit fees rather than a genuine shift in capital market concentration.

72. The evidence above demonstrates limited variation in index designation concentration over time. Among FTSE 350 companies we also observe limited variation in concentration over time for a number of sectors. This reduces the feasibility of a fixed-effects approach (see paragraph 26).

Potential importance of the past audit fee in explaining the current audit fee

73. Some studies found that the previous audit fee is an important driver of the present audit fee. Deloitte suggested that this was because it was used as a starting point in negotiations.

74. However, apart from possible ‘inertia’ in the audit fee, the lagged audit fee may also capture the effect of unobservable factors not included in the specification. Since the unobservable factors will be likely to affect the previous audit fee and market concentration in the previous period in the same way as in the present period, the previous audit fee may be a good proxy for unobservable factors affecting both the fee and concentration which cannot be directly included in the specification. For that reason, the previous audit fee might appear significant only in specifications which omit one or more (possibly unobservable) explanatory variables. By the same token, inclusion might prove to be unnecessary if we can control sufficiently for all factors that affect the audit fee (so that their effects are no longer captured by the lagged audit fee).

75. The inclusion of the previous audit fee in the specification also introduces an additional source of endogeneity if the unobservable factors are not fully controlled for.^{33,34} Again suitable regression techniques have to be used to account for this

³³ As we explain in paragraphs 14–30 above, we do not expect to be able to mitigate the problem of omitted unobservable factors completely.

³⁴ Since the past audit fee is partly explained by the unobservable factors (those not accounted for by dummies) which are included in the error term, the previous audit fee is necessarily correlated with the present error term which includes the same unobservable factors, ie it is endogenous in the specification. Moreover, if we use a fixed effects approach to take care of time-invariant, company-specific unobservables, we effectively demean the variables and thereby introduce correlation between the

(cont)

endogeneity.³⁵ It is worth noting that the relevant literature on dynamic panel data methods is quite recent and that it would require some time to devise the appropriate model.³⁶

Initial views

76. The preceding discussion indicates that, while a PCA exercise can certainly be performed with the available data, any conclusions drawn from it would need to be heavily qualified. This is chiefly because of (a) the need to address the potential for endogeneity in the concentration measures, and (b) the difficulty of defining a sufficient number of markets that are truly distinct in terms of audit competition. In consequence, the CC at this stage does not propose to proceed with a PCA, although the data on audit fees will continue to be analysed in other work streams.

transformed dependent variable and the transformed error; see, for example, Baltagi (2005, Chapter 8), or Wooldridge (2002, p256).

³⁵ Since previous studies which included the lagged audit fee in the model typically did not appropriately account for this problem, the reported results and statistical tests are flawed. This includes Oxera 2006 and PwC's 2006 critique of Oxera. This flaw was pointed out in Deloitte's 2012 study.

³⁶ Arellano and Bond (1991). Blundell and Bond (1998).

Summary of literature on PCA in supply of audit services

Introduction

1. In this annex we give a short review on previous studies of the relationship between fees and competition in supply of audit services.

Oxera (2006)

2. Oxera sought to test the impact of industry concentration and auditor market share on fees. The model specification was as follows:

$$Audit_fee_{it} = const + \alpha \cdot Audit_fee_{it-1} + \vec{\beta} \cdot Year_dummies + \delta \cdot Turnover_{it} + \phi \cdot Auditor_market_share_{it} + \lambda \cdot HHI_{it} + \vec{\xi} \cdot International_turnover_{it} + \vec{\psi} \cdot Switches_{it} + \gamma \cdot Sector_dummies + \mu \cdot Market_type_dummies + v \cdot Mergers_{it} + \varepsilon_{it} \quad (1)$$

Where \rightarrow indicates that the variable is a vector and the subscript it denotes an observation for audited company i in year t .

Variable	Description
$Audit_fee_{it}$	Audit fee (log) paid by the company to the auditor at 1995 prices (NB this will include both the statutory audit and audit-related services)
$Audit_fee_{it-1}$	Audit fee (log) in the previous year at 1995 prices. This is included because fees for any given year are often closely related to the agreed audit fee for the last year (and amended for any new factors during the negotiation).
$Turnover_{it}$	Turnover (log) at 1995 prices. This controls for the size of the company and therefore the required size and scale of the audit.
$Auditor_market_share_{it}$	Market share (log) of the company in total audit fees in a given sector in a given year, reported as a ratio
HHI_{it}	Sum of the squared audit firms' market shares (log) in a given sector in a given year
$International_turnover_{it}$	Ratio (log) of the company's international turnover to total turnover for 2004 (constant across years). This controls for the additional costs arising from the company's international presence outside the UK.
$Switches_{it}$	Cumulative sum of the number of times the company changed auditor from 1996 to the year of observation. This controls for the impact of changes of auditor on the average audit fee.
$Sector_dummies$	12 sector dummies were included and were constant across the years
$Market_type_dummies$	The type of listing market where the company's shares are traded, eg FTSE 350, Small Cap, unlisted (constant across the years)
$Mergers_{it}$	Cumulative sum of the number of times the company's turnover has increased by more than 40% in any given year between 1996 and the year of observations. This controls for the impact of M&A involving the audited company, as mergers often increase the scale of the audit.

3. The data set was constructed using the FAME database. Companies were included if they appeared in the FTSE 350 index, the FTSE Small Cap index or the FTSE

Fledgling index in 2004.³⁷ The 100 largest private companies (by turnover) were also included. The final data set included 739 companies covering the years 1995 to 2004.

4. Oxera found a statistically significant coefficient for both auditor market share and HHI, suggesting that high concentration has been associated with high audit fees.

Kittsteiner and Selvaggi (2008)

5. LSE Enterprise published a study in 2008 which suggested that increases in the joint market share held by the largest four auditors in 2002 to 2006 (post Arthur Andersen) were strongly correlated with higher audit fees paid by UK-listed clients. It also found a fee premium being charged by the largest auditors and that switching auditor was associated with a significant fee reduction, though this did not persist over time. The study also used the FAME database for the period 1998 to 2006 and the data set included 5,764 publicly listed and 3,052 private companies with an annual turnover of at least £1 million each year.
6. The main difference between this and the Oxera study is that it attempted to control for the riskiness and complexity of the audit by including a number of financial control variables, including: whether the company made losses; current assets divided by current liabilities; tangibility ratio (fixed assets divided by total assets); short-term leverage; and trade debtors dividing by operating profits. It did not control for mergers or switching. Explanatory variables included concentration measures (C4/C5 and HHI), a dummy to indicate whether or not the auditor is a Big N firm and a dummy to indicate whether or not the company switched auditor. The study did not use the market share variable constructed by Oxera.

³⁷ Companies listed on the Alternative Investment Market (AIM) were excluded because reliable data over a sufficiently long period was not available for enough observations.

US Government Accounting Office (2008)

7. This is a study of US public companies. The database was compiled by Audit Analytics, an online intelligence service that provides information on audit fees and other financial information for public companies. The data included more than 12,000 companies over the period 2000 to 2006. The econometric model took the following form:

$$y_{it} = \theta + X_{it}\beta + Z_i\delta + \varepsilon_{it} \quad (2)$$

8. The dependent variable was the audit fee paid by the company and X and Z represented controls that are respectively time variant and invariant. The primary variables of interest are two industry concentration variables: the share of the market held by the company's auditor in a given year (in a given industry); and the HHI for the industry sector. Industries were defined by two-digit NAICS codes, which gave 23 industries. Both concentration variables were based on the total audit fees collected. The control variables are:
- (a) Dummy variables: company experienced a loss; going concern issue raised; restatement was filed; non-timely filing was made; company completed SOX section 404 review; company's internal controls were found inadequate; company's financial year ends during the busy season (December); audit firm audits 10 per cent or more of all company clients in a particular industry sector (controls for auditor's expertise); company paid audit-related fees to a second auditor; Mid Tier auditor; audit firm specific dummies for top eight firms; and years, region and industry.
 - (b) Assets of the audited company (to control for size).
 - (c) Audit fees relative to total fees paid by all clients audited by the auditor in a given industry (to control for client influence).
 - (d) Number of switches over the 2000 to 2006 period.

9. The market share coefficient was found to be statistically significant.

McMeeking et al (2007)

10. McMeeking et al (2007) looked at the impact of audit firm mergers on audit fees paid by 7,255 companies listed on the London Stock Exchange in the period 1985 to 2002. This covered the period where the 'Big 8' became the 'Big 4'. The variables of interest in this case were dummy variables associated with merging firms. For example, to capture audit fee variation for the PwC & L merger, the following equation was estimated for clients of these firms:

$$LAF_i = \alpha_0 + \beta_1 PWpre_i + \beta_2 PostPWC_i + \beta_3 PWCmerge_i + \beta_4 Controls_i + \varepsilon_i \quad (3)$$

where LAF is the log audit fee and PWpre was set equal to 1 if the observation was prior to the merger and the auditor at that time was Price Waterhouse. PostPWC was set equal to 1 for a post-merger observation. PWCmerge was set equal to 1 if the observation was after the merger and the original auditor was Price Waterhouse. β_1 captures any premium that Price Waterhouse earned prior to the merger, β_2 the post-merger premium paid by continuing Coopers and Lybrand clients and β_3 any incremental post-merger premium of Price Waterhouse clients.

11. The controls used included some additional variables to those used by Oxera and LSE Enterprise to control for complexity (domestic and foreign subsidiaries ratios) and risk (eg return on investment). Company data was collected by a Standard and Poor's database and audit data was collated from a number of sources including Datastream International and Thomson Analytics Worldscope. Subsidiary data was collected from the International Stock Exchange Yearbook and published annual reports.
12. The study found the effects of mergers on fees to be mixed; fees tended to increase after mergers in 1989/90 but on average fell after the Coopers–Lybrand merger in

1997. The merger between Deloitte and Andersen in 2002 did not appear to materially affect audit fees at the time of the study. The overall conclusion was that companies are likely to pay higher fees if their auditor merges with a larger counterpart. The paper also found significant fee discounting in the 1980s but this was not sustained in the following decade.

Ding and Jia (2012)

13. Ding and Jia (2012) assessed the impact of the PwC & L merger and looked at audit quality as well as fees. The following model was estimated to investigate the change in audit fees before and after the merger for both Big N and non-Big-N auditors:

$$\text{Logfee}_{it} = \lambda_{0t} + \lambda_1 \text{after}_{it} + \lambda_i \text{control}_{it} + \varepsilon_{it} \quad (4)$$

14. The control variables included: assets (to control for size); ratio of debt to total assets (leverage); total current assets divided by total current liabilities (current ratio); quick assets divided by total current liabilities (risk); and net income divided by total assets (performance). The time dummy 'after' takes a value of one in the post-merger period.
15. Data was collected from COMPUSTAT Global for publicly listed firms in the UK during the period 1995 and 2001 (except for the event year 1998).
16. The results showed a statistically significant increase in audit fees for Big N clients in the post-merger period, although the authors found no significant difference between the audit fees charged by non-Big-N auditors in pre-merger and post-merger periods. The study also concluded that Big N audit quality (measured by earnings quality) improved in the post-merger period compared with non-Big-N auditors.

Simunic (1980)

17. In order to test the competitiveness of the US audit industry, the paper distinguished between price and quantity differences in the audit³⁸ and proposed that an auditor's cost function comprised both direct production costs and expected future losses that might arise as a result of the audit (eg litigation costs). Because these are not observable, the author used client attributes. The paper estimated the following equation:

$$\frac{FEE}{ASSETS} = b_0 + b_1SUBS + b_2DIVERS + b_3FORGN + b_4RECV + b_5INV + b_6PROFIT + b_7LOSS + b_8SUBJ + b_9TIME + b_{10}AUDITOR + \hat{\mu} \quad (5)$$

18. The following are control variables for differences in loss exposure: 'SUBS' are the number of consolidated subsidiaries; 'DIVERS' is the number of two-digit SIC industries in which the company operates (less one); 'FORGN' is foreign assets divided by total assets; 'RECV' is accounts, loans and notes receivable divided by total assets; 'INV' is inventories divided by total assets. The following are control variables for differences in the assessed loss-sharing ratio: 'PROFITS' is net income divided by total assets; 'LOSS' is a dummy variable to indicate a company loss in the previous three years; 'SUBJ' is a dummy to indicate a qualified audit opinion. 'TIME' is the number of years the company has used the auditor and controls for differences in auditor production functions. Lastly, 'AUDITOR' is a dummy to indicate whether the auditor is a Big 8 firm.
19. The paper was not able to reject the hypothesis that price competition prevails in the market for audits of public companies, suggesting that observed differences in Big 8 concentration across the market is irrelevant.

³⁸ 'Quantity' refers to the quantity of resources utilised during the audit.

Ireland and Lennox (2002)

20. The studies reviewed thus far used single-equation models for their analysis. Some studies have used a simultaneous equation or two-stage approach to control for potential endogeneity. Ireland and Lennox (2002) noted that a number of earlier studies sought to test the existence of a 'Big N' premium with equations like the following:

$$AF_i = \beta_{0t} + \beta_1 X_i + \beta_2 Z_i + \beta_3 AUD_i + \mu_i \quad (6)$$

where AF is the audit fee. X are client characteristics, Z are auditor characteristics other than size and AUD is a dummy to indicate whether the auditor is one of the Big N. However, the estimate of β_3 is likely to be biased because clients choose whether to appoint a large or Mid Tier firm (ie the auditor is not exogenous). In order to control for this, the authors employ a two-step Heckman procedure by estimating a probit auditor selection model and then using the results to control for the selection bias on audit fees.

21. The study includes the following variables in both the auditor selection and audit fee models: assets; turnover; number of business areas in which the company operates (defined by the number of industries); number of domestic subsidiaries; number of overseas subsidiaries; gearing; a loss dummy; and a dummy if the company's year end is during the busy period (between 1 December and 31 March). The following variables are included in the auditor selection models only: number of non-executive directors divided by the number of directors;³⁹ dummy to indicate whether the influential director is affiliated with a large audit firm; and dummy to indicate whether the influential director is affiliated with a small audit firm. A dummy to indicate whether the audit office is located in London is included in the audit fee model but not the auditor appointment model.

³⁹ Non-executive directors are hypothesized to have stronger preferences for high-quality firms, which the authors equate with larger firms. Also it is suggested that companies with a high demand for monitoring may have greater incentives to appoint non-executive directors and hire large audit firms.

22. The data was taken from the annual reports of 1,543 companies registered with a UK stock exchange that have year ends between 1 March 1997 and 28 February 1998. The PwC Corporate Register is used to identify company auditors, audit office locations, company directors and corporate affiliations with audit firms. The study concludes that the premium earned by large audit firms is significant and more than twice as large when selectivity bias is taken into account.
23. A similar methodological approach is followed by Chaney et al (2004) with regard to audit pricing for private firms, but in this case the study finds no evidence of a Big 5 premium when self-selection bias is controlled for.

Some comments

24. PwC referred us to a critique of the Oxera study which it prepared in 2006. PwC said that Oxera and other studies had used FAME data which is said to contain a number of data inaccuracies (see working paper 'Datasets in the Market Inquiry for Statutory Audit Services'.⁴⁰ In addition, PwC said that the Oxera study would suffer from endogeneity and omitted variable bias. In particular, in the Oxera model the audit firm's market share was used as an explanatory variable for audit fee, but these might be jointly determined. PwC said that the failure to control for the risk and complexity of an audit could result in biased estimates if the variables were correlated with the size of the auditor and market concentration.

⁴⁰ http://www.competition-commission.org.uk/assets/competitioncommission/docs/2011/statutory-audit-services/datasets_in_the_market_investigation_for_statutory_audit_services.pdf.

HHI calculations

The tables below give the annual HHI for FTSE 350, FTSE 100, FTSE 250 and private companies. We calculate the index for all companies within the index designations, all companies excluding banking, insurance and financial services and all companies by sector. The index is calculated using audit firm shares of audit fees.

TABLE 1 Annual HHI (derived from shares of audit fees) within index designation

<i>Index designation</i>	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
FTSE 350	2,941	2,954	2,999	2,872	2,872	3,079	2,917	2,910	2,909	2,859	2,963
FTSE 100	3,270	3,114	3,121	3,034	2,944	3,347	3,102	3,091	3,046	3,024	3,227
FTSE 250	2,345	2,568	2,732	2,525	2,734	2,579	2,565	2,638	2,729	2,566	2,604
Private	2,469	2,699	2,892	2,647	2,571	2,783	2,609	2,583	3,287	2,470	2,331

Source: CC.

TABLE 2 Annual HHI (derived from shares of audit fees) within index designation (excluding banking, insurance & financial services)

<i>Index designation</i>	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
FTSE 350	2,868	3,057	3,273	3,090	3,034	3,044	3,062	3,033	3,065	2,973	2,966
FTSE 100	3,384	3,316	3,547	3,381	3,179	3,402	3,413	3,351	3,317	3,241	3,333
FTSE 250	2,295	2,638	2,806	2,601	2,845	2,590	2,593	2,704	2,856	2,718	2,769
Private	2,258	2,787	2,983	2,512	2,457	2,831	2,680	2,645	3,610	2,741	2,749

Source: CC.

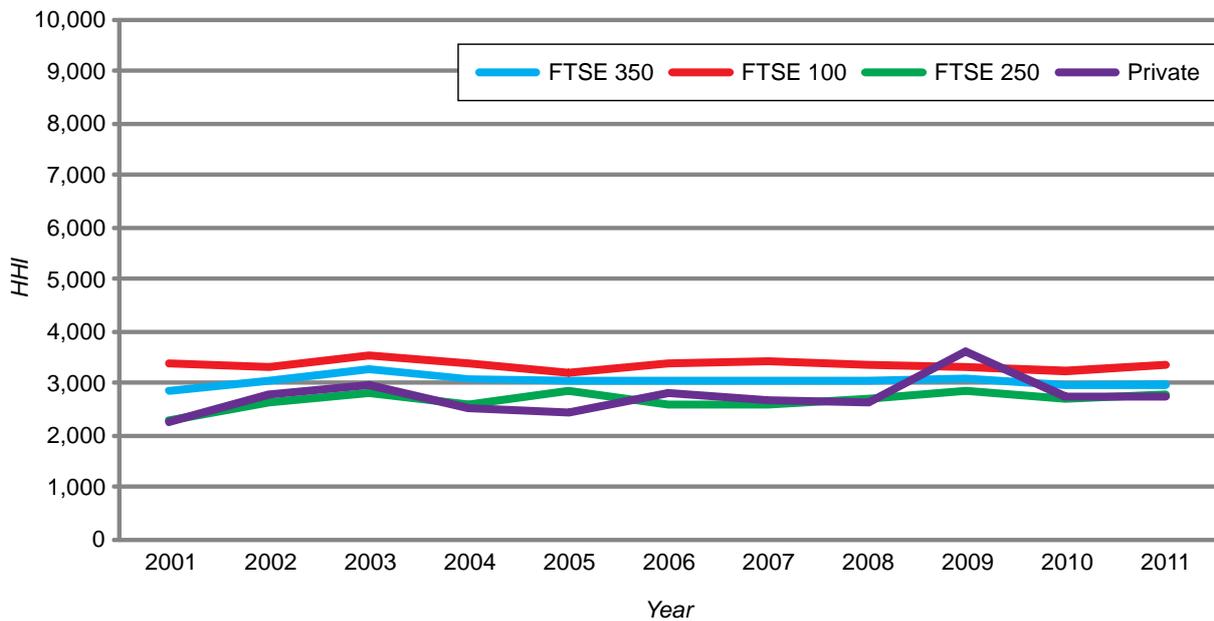
TABLE 3 Annual HHI (derived from shares of audit fees) within index designation by sector

<i>Sector, index designation</i>	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
<i>Oil & gas</i>											
FTSE350	4,427	4,923	4,566	4,529	4,508	4,602	4,490	4,490	4,610	4,634	4,952
FTSE100	4,926	5,352	5,094	5,075	5,115	5,001	4,930	4,699	4,772	4,784	5,001
FTSE250	5,339	3,383	4,287	4,504	3,388	3,192	2,802	3,154	4,111	3,860	7,832
Private	7,383	5,233	3,302	9,097	7,358	7,024	4,653	4,602	6,459	4,404	
<i>Basic materials</i>											
FTSE350	3,193	3,133	3,051	2,997	3,050	2,715	2,628	2,589	2,503	2,474	3,087
FTSE100	3,340	3,103	2,940	2,900	2,956	2,725	2,802	2,858	2,622	2,554	3,221
FTSE250	3,978	3,817	7,510	6,513	6,288	5,639	3,402	3,429	4,134	4,517	4,420
Private	4,762	3,465	3,375	2,858	3,708	3,415	5,249	4,761	4,851	4,723	7,054
<i>Industrials</i>											
FTSE350	2,632	2,687	2,826	2,567	3,051	2,963	3,230	3,280	3,146	3,360	3,995
FTSE100	4,521	2,769	3,042	2,891	3,942	4,024	5,093	4,769	4,587	4,527	5,184
FTSE250	2,062	2,672	2,837	2,595	3,056	3,254	3,200	3,311	3,154	3,072	3,810
Private	1,696	1,714	2,517	2,679	2,093	4,069	3,017	2,895	4,345	4,177	4,546
<i>Consumer goods</i>											
FTSE350	5,132	5,008	4,599	4,847	4,965	5,472	5,029	5,579	5,193	6,302	6,290
FTSE100	5,783	5,470	4,897	4,961	5,120	5,666	4,984	5,561	5,377	6,630	6,697
FTSE250	2,885	3,523	3,129	4,456	4,404	4,414	5,642	5,781	4,528	4,251	3,434
Private	3,666	3,451	2,927	3,109	2,441	2,185	2,097	2,188	2,271	2,315	4,543
<i>Health care</i>											
FTSE350	4,981	4,974	4,376	3,844	3,901	3,794	3,773	3,662	3,895	3,954	6,863
FTSE100	4,878	4,979	4,308	3,624	3,965	3,807	3,824	3,839	4,161	4,177	6,863
FTSE250	6,333	4,958	5,434	10,000	3,510	3,860	3,720	5,615	5,017	5,039	
Private	4,473	4,621	3,808	9,027	8,004	10,000	5,433	4,050	8,534	4,515	
<i>Consumer services</i>											
FTSE350	2,475	2,829	3,259	3,214	3,139	3,202	3,444	3,403	3,499	3,313	3,490
FTSE100	2,833	3,396	3,671	3,940	3,531	3,759	4,026	4,265	4,131	3,839	3,719
FTSE250	2,811	2,649	3,305	2,797	2,796	2,764	2,689	2,621	2,760	2,761	3,561
Private	2,336	3,395	3,123	2,873	3,105	3,366	3,607	3,477	3,572	3,742	7,198
<i>Telecommunications</i>											
FTSE350	3,491	3,566	4,011	3,485	3,811	3,735	3,765	3,691	4,085	3,771	
FTSE100	3,882	3,673	4,287	3,670	3,850	5,016	3,693	3,596	4,061	5,010	
FTSE250	4,581	10,000	6,139	7,260	5,000	3,976	7,390	5,326	10,000	4,748	
Private	5,789	6,049	6,024	9,782	10,000	10,000	8,844	10,000	10,000		
<i>Utilities</i>											
FTSE350	6,698	7,711	7,053	6,670	5,932	4,382	5,667	5,579	5,789	5,607	10,000
FTSE100	6,862	9,032	8,592	8,766	5,470	4,285	5,888	5,631	6,011	5,833	
FTSE250	6,538	3,395	3,537	3,672	8,302	7,112	3,660	5,612	3,657	3,668	10,000
Private		10,000	10,000	10,000	10,000	10,000	10,000	5,396	4,644	4,743	
<i>Financials</i>											
FTSE350	3,519	3,009	2,922	2,887	3,078	3,426	3,124	2,894	2,751	2,762	3,400
FTSE100	3,541	3,184	3,118	3,139	3,278	3,648	3,369	3,071	2,851	2,877	3,705
FTSE250	3,337	2,435	2,339	2,328	2,642	2,881	2,542	2,414	2,607	2,757	2,516
Private	3,714	3,970	3,083	6,206	4,343	4,227	3,277	3,209	3,069	2,728	7,286
<i>Technology</i>											
FTSE350	3,221	4,690	4,868	3,935	3,453	3,754	3,595	4,170	3,402	3,345	3,966
FTSE100	6,122	8,851	10,000	10,000	10,000	10,000	10,000	4,403	4,146	3,716	10,000
FTSE250	4,985	3,699	5,091	4,130	3,501	3,717	3,483	5,140	4,066	3,462	3,167
Private	6,320	6,756	2,575	3,468	2,982	3,064	2,957	2,638	2,742	2,926	8,388

Source: CC.

FIGURE 1

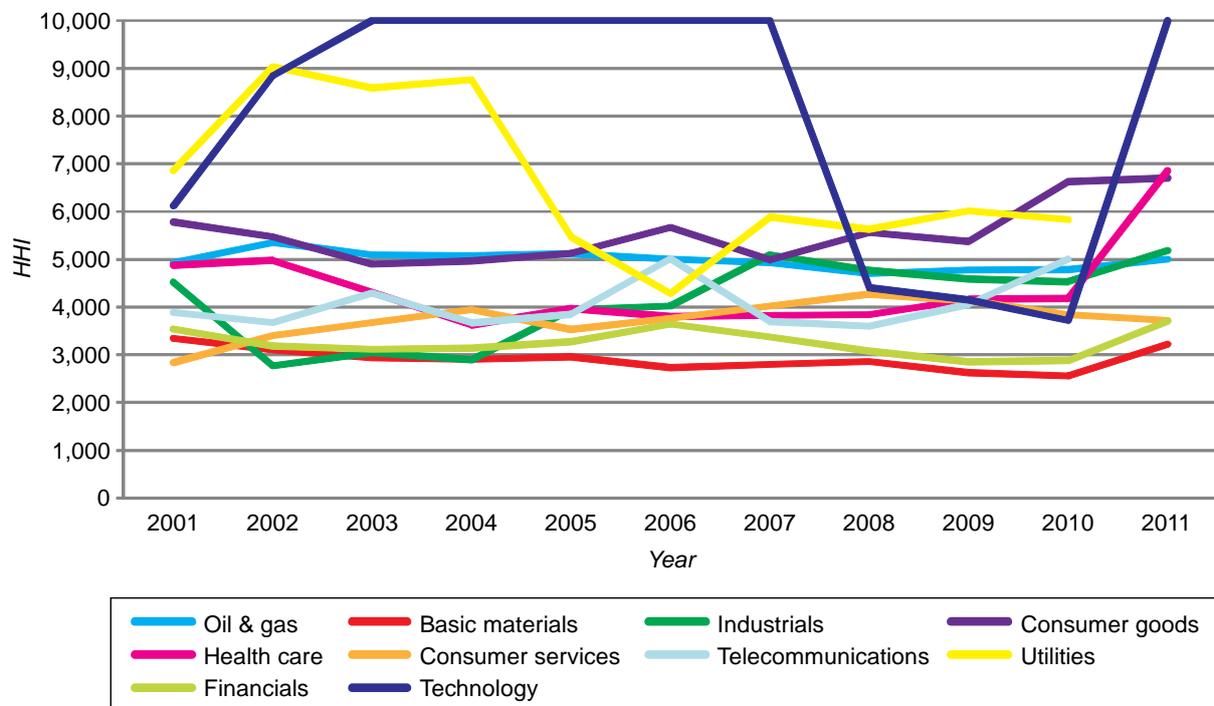
Annual HHI figures by index designation (excluding banking, insurance and financial services companies)



Source: CC.

FIGURE 2

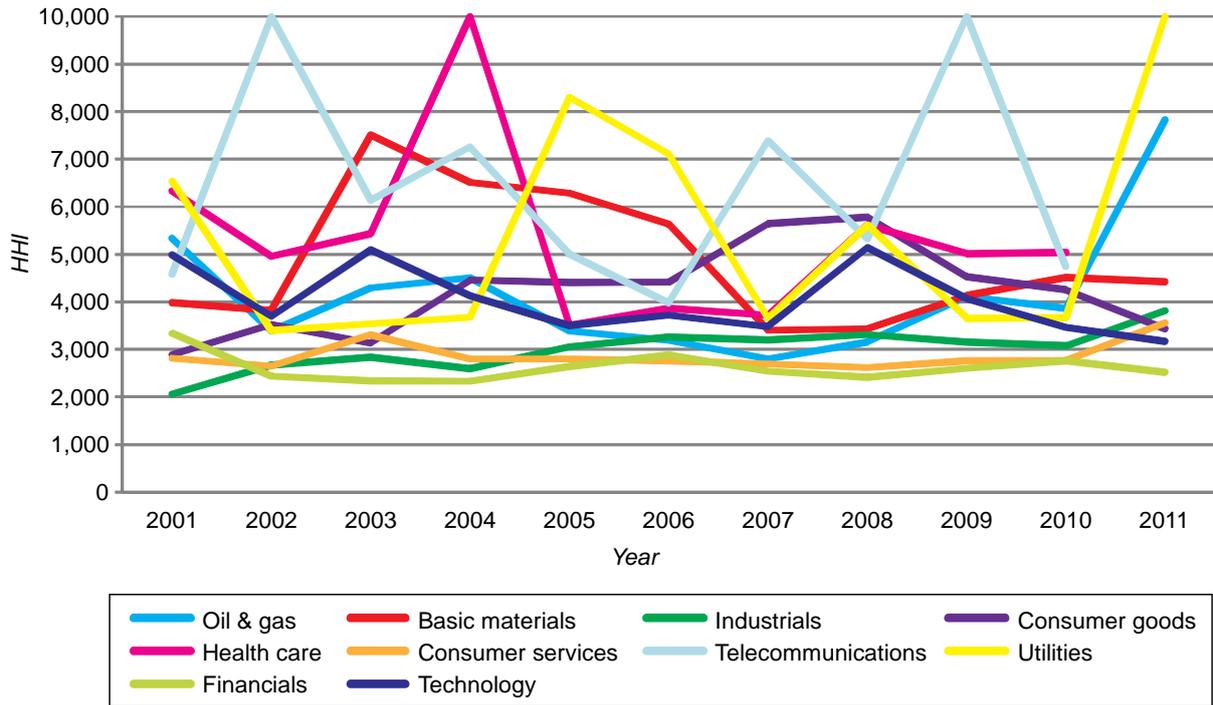
Annual HHI figures by sector for FTSE 100 companies



Source: CC

FIGURE 3

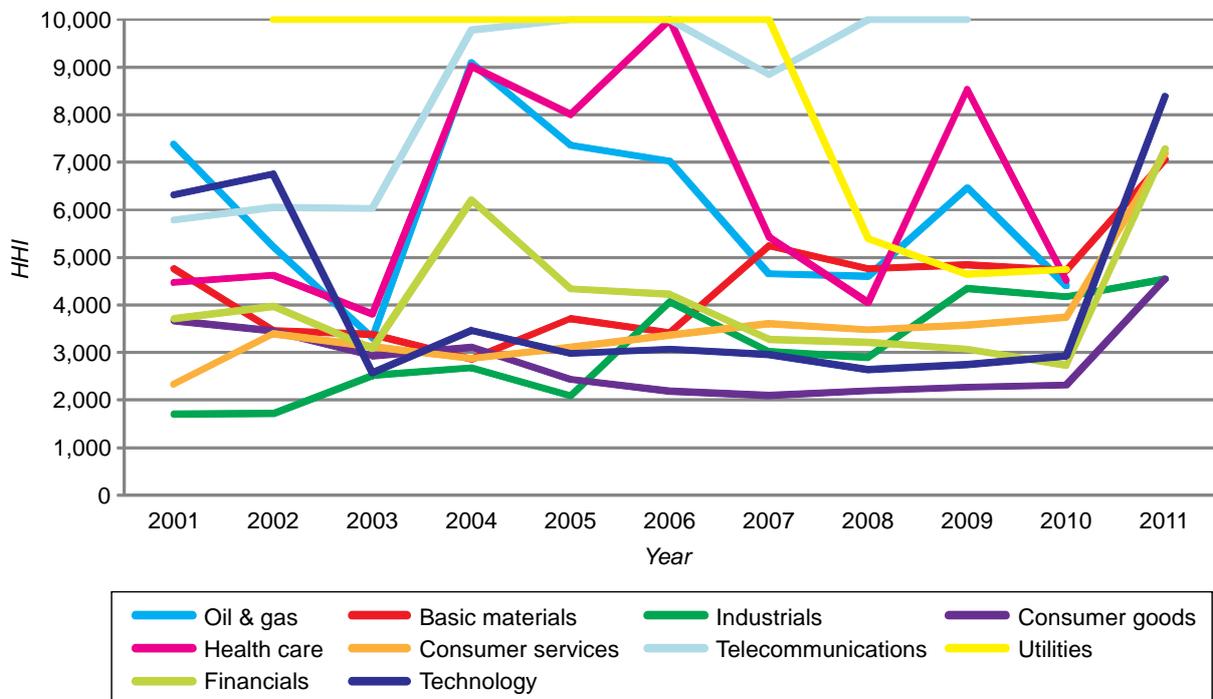
Annual HHI figures by sector for FTSE 250 companies



Source: CC.

FIGURE 4

Annual HHI figures by sector for private companies



Source: CC.

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