Price-concentration analysis in the Audit Market Investigation

Note prepared for the Competition Commission by Oxera and Dr Walter Beckert

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1 Introduction

This note is a response to the working paper ‘Price concentration analysis’,¹ produced by the Competition Commission (CC) in the context of its Audit Market Investigation. It has been prepared by Oxera in conjunction with Dr Walter Beckert, Birkbeck College and Associate at Oxera.

The CC working paper argues that, in light of two empirical challenges, the 'UK Audit Market is [not] a good fit for a PCA'. These challenges result from (a) 'endogenous competition measures'; and (b) 'the difficulty of defining a sufficient number of distinct audit markets'. It is understood that earlier concerns regarding the reliability of the available data have now been resolved, after significant effort by the CC and the parties.

Oxera shares the CC’s concerns regarding the empirical challenges facing price-concentration analysis (PCA) in this market. However, these concerns do not necessarily preclude any benefit being derived from conducting PCA. The objective of this note is to aid the CC’s decision regarding the relative value of the existing PCA studies and its own potential study. Three topics are addressed:

– existing econometric evidence;
– empirical challenges identified by the CC;
– alternative econometric approaches.

These topics are discussed in turn below, together with some specific comments regarding the Oxera (2006) paper.

2 Existing econometric evidence

The CC refers to eight existing PCA studies relating to the provision of audit services. The majority of these studies consider the UK audit market, although across differing time periods. Two critiques of an existing study (Oxera 2006) are also referred to. The CC has not yet articulated its opinion of the quality or reliability of this existing body of econometric evidence.

As pointed out by the CC, the empirical challenges facing PCA in the current investigation have, at least to some degree, been faced by the majority of previous studies. Most prominently, these issues have been debated following the Oxera (2006) study. While it is unlikely that any study—or, indeed, any specific econometric model as part of a single study—entirely circumvents the econometric challenges present here, it also seems unlikely that all findings from the existing econometric studies would be entirely undermined. A more detailed review of the existing econometric studies than is currently provided may provide a useful picture of likely price-concentration relationships.

Depending on how the CC interprets the existing econometric evidence, Oxera suggests two different courses of action. If the findings from the existing econometric evidence provide a sufficiently reliable picture, the empirical challenges faced in the current context may be such that little incremental insight can be gained from undertaking a further PCA study. In this case, however, a non-econometric analysis of the data available to the CC—for example, analysis of trends, comparisons of averages, graphical and correlation analysis—may provide value by relating the existing econometric evidence to the current context. This approach might not offer conclusive evidence, but it may enable reasonable inferences to be drawn as to the likely causal price-concentration relationship in the current UK audit market.

If, however, the findings from the existing econometric evidence are thought to be questionable and/or ambiguous, then a further piece of econometric evidence, even in light of the empirical challenges, may still offer incremental value. The results of such an analysis may, in practice, be the best available evidence on the relevant price-concentration relationship. Moreover, such an analysis may address potential deficiencies in the existing econometric evidence—for example, by using the improved CC dataset.

3 Empirical challenges

Oxera is in agreement with the CC that the empirical challenges are concerning. These concerns were discussed directly with the CC on January 17th. Despite these concerns, however, there may be ways to mitigate the impact of such challenges. On this basis, PCA remains feasible and potentially informative, albeit less conclusive than in other applications. The comments below provide suggestions as to how such challenges may be dealt with.

Endogeneity bias

The CC argues that endogeneity bias may occur. The primary example given by the CC relates to omitted variable bias, through which an unobserved or omitted variable (cost) may exhibit a causal influence on price and on market concentration. Other sources of

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endogeneity may occur through price and concentration being simultaneously determined (i.e., two-way causation). Oxera does not dispute the limitations that endogeneity bias can place on estimated relationships. However, understanding the nature of the bias—its sign and size—warrants specific consideration.

Omitted variable bias of the type described by the CC is a function of three factors: (1) the causal impact of the omitted variable on price; (2) the causal impact of the omitted variable on market concentration; and (3) the variation in the omitted variable. Both (1) and (2) must be economically substantive, and there must be sufficient variation in the omitted variable for the bias to materialise.

Take the example of the omission of a cost variable. While price–cost relationships are, of course, fundamental to many economic markets, these relationships can take various forms. Under certain circumstances, the omitted variable bias caused by the omission of a cost variable may not be substantial. Examples include:

- if prices are not set with short-term cost variations in mind (e.g., because most costs are fixed, or are difficult to track or allocate to a particular audit);
- because costs have not varied substantially over time (or followed only a broad trend);
- because concentration is not substantially affected by costs. 4

Qualitative evidence available to the CC may help to evaluate the sign and size of any omitted variable bias due to costs, and thus determine how severe the bias may be. Equally, an assessment of the cost data that is available to the CC would be useful, particularly with regard to the extent to which this may serve as a covariate, reliable proxy or instrument.

In terms of endogeneity arising from other sources, such as a simultaneous relationship between prices and market concentration or via other omitted variables, this is not a theory that the CC has fully articulated. In both examples, however, there are some immediate hurdles: variation in prices seems likely to exceed variation in market concentration, an observation that is consistent with the causal impact of price on competition being limited; and there has been extensive discussion and treatment of potential omitted variables in existing econometric studies. 5

**Market definition**

In addition to endogeneity bias, the CC also expresses concern about the use of PCA when the market is inappropriately defined—for example, as too narrow or too broad. Oxera agrees with the CC’s general concern regarding this issue. It is understood that the CC considers the broader market definition, in line with the European Commission’s findings, to be preferable. In relation to that broader definition, Oxera offers the following comments.

- To the extent that there are problems with the estimated standard errors, this would not necessarily preclude identification of a causal effect. Identifying a causal effect of reasonable economic magnitude, but at a lower level of statistical significance than might be achieved in other circumstances, can still provide a useful contribution to the available evidence. This issue itself would therefore not necessarily undermine an econometric study.

- Measurement error may exist in the competition variable, and this may cause attenuation bias. Additionally, Oxera notes that this may be exacerbated by the use of

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4 Oxera notes that, if both price and concentration are strongly determined by costs, then, holding other factors constant, this is inconsistent with the observation that concentration is relatively constant through time while prices vary substantially through time.

5 See, for example, Oxera (2006); Deloitte (2012), ‘Audit pricing analysis’, submission to the Competition Commission, February 27th; and Oxera (2012), ‘Comments on Deloitte’s audit pricing analysis’, note prepared for BDO and the Competition Commission, May 24th.
panel estimators. However, empirical techniques are available to account for this type of bias. Moreover, the effects of such bias are expected to lead to an underestimate of the causal parameter relating market concentration to price—this could be taken into account when interpreting the results of a PCA. As with the previous issue, this would therefore not undermine an econometric study.

– The limited time variation in the market concentration measure preferred by the CC (HHI) is likely to remain an issue that is difficult to overcome, but Oxera would suggest that other concentration measures are considered, including, for example, the number of suppliers. A careful interpretation of the results of an econometric study can take these factors into account.

In relation to the prospect of more narrow market definitions, it is understood that these might not constitute entirely separate economic markets. However, taking the example of industry sectors, it is thought that there is still value in considering an analysis on this basis, since the distinction does have relevance for the services provided, even if it is not as a separate economic market. An empirical analysis of both narrow and broad definitions can allow this particular issue to be considered in more detail—the findings of which may well be informative.

Notwithstanding the choice of market definition—narrow or broad—Oxera would reiterate the importance of contrasting the potential of a new study against the value of existing studies, as discussed in the previous section.

4 Alternative econometric approaches

The CC focuses on the use of econometrics to detect the relationship between market concentration and price. There are, however, alternative relationships that econometrics might usefully be employed to identify. These alternatives may not be subject to the same limitations that are discussed above. Below are some initial suggestions for alternative econometric analyses that the CC may want to consider in more detail; Oxera would be happy to discuss these ideas further.

– Treatment effect analysis. A potential alternative source of identifying variation may stem from audits in the financial services (banking and insurance) sector being subject to the exogenous regulatory constraint that the auditor and its employees are prevented from having any personal commercial relations with the auditee. This sector (product market) might be considered a treatment group (in which, for exogenous, institutional reasons, the number of competitors is lower and hence the product market concentration is higher), with all other sectors considered the control group. An alternative candidate treatment group might constitute the specialised large audits that mid-tier firms say they cannot currently perform.

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6 This itself raises the question of whether a separate time-series analysis of the larger economic markets might be a useful alternative.
8 Considering changes in the number of suppliers per economic market may provide a more direct indication of the changes in market concentration resulting from entry or exit as compared to changes resulting from minor movements (potentially stemming from measurement error) in market shares (or, more precisely, prices and/or volumes).
9 See, for example, BDO LLP (2012), ‘Hearing with the Competition Commission: Investigation into the market for the supply of statutory audit services to large companies in the UK’, February, slide 5.
– **Big Four premium hypothesis.** Aside from the price-concentration relationship, econometrics may be suited to assessing other theories of harm and hypotheses. The Big Four premium is one example—this has been found in several past studies, including Oxera (2006). Finding and measuring the Big Four premium would shed light on the effects of the current market situation on market outcomes, and therefore is relevant for the CC’s assessment of its theories of harm. The focus of the current working paper is on the variation in prices paid by audited firms between different (candidate) economic markets and through time. Oxera understands, however, that the data also contains information on the provider of each firm’s audit—ie, for a given observation (audited firm and year combination), the data also records the identity of the firm that provided the audit services. This leaves open the possibility of investigating the variation in prices paid by audited firms between the providers of audit services, which may be used for identification and hypothesis testing of the Big Four effect described here.

5 Specific comments regarding Oxera (2006)

In addition to the discussion above, Oxera would like to comment on certain drafting points that stand out in the CC’s current working paper.

– In paragraph 6, in order to provide the full picture on who did what, the text should mention that Oxera responded to the Deloitte critique and pointed out several shortcomings in Deloitte’s alternative approach.

– Footnote 12 gives the Kittsteiner and Selvaggi (2008) study as an example of a study that covered a long-enough time period to include the pre-Andersen years. The footnote should mention that the Oxera (2006) study equally had such coverage.

– Furthermore, Oxera would question the CC’s comment in footnote 12 about the reliability of the Kittsteiner and Selvaggi (2008) study—it does not necessarily follow that one apparently contradictory finding in the study would be sufficient grounds for rejecting a study altogether (as noted above, the CC has not carried out a detailed review of each of the existing studies).

– Footnote 35 is inaccurate on two accounts. The second sentence should clarify that the Oxera (2006) report included the lagged variable on two of the four model specifications where audit fees were the dependent variable. The current text gives the impression that this was the case for all specifications presented by Oxera. Moreover, the footnote should mention that Oxera discussed the potential shortcomings of its econometric analysis, including the use of lagged variables, at the meeting between Oxera and the CC on January 17th 2012. The current text gives the wrong impression that it was Deloitte’s note published in April 2012 that identified the shortcomings.

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11 It can then be debated whether the Big Four premium is a reflection of market power, quality, reputation, or a combination of these factors, but establishing the premium as such is a relevant prior to this.  
12 This may be accomplished by (at least) two different modifications: (i) retaining the unit of observation as auditee and year pair, by including auditor dummies; or (ii) changing the unit of observation to auditor and year pair, and modelling average auditing fees for such units.  
13 The extent that market concentration has remained constant through time may then not be a challenge at all, since it would effectively imply that prices have not been affected by changes in market concentration (reducing the dimensionality of the problem).  
14 Oxera (2012), op. cit.
Concluding remarks

Oxera agrees that there are empirical challenges facing the application of PCA in the UK audit market. However, Oxera considers that a more detailed review of the existing econometric analysis may allow useful inferences to be drawn from that evidence. To the extent that that may not prove fruitful, Oxera would urge further consideration towards whether the challenges in the current context serve to preclude any incremental value being gained from a new study. To the extent that there is scope for value to be derived from a new PCA study, Oxera would recommend that it is pursued but coupled with a careful interpretation and weighting of the results. Furthermore, initial thoughts on two alternative econometric approaches are proposed. These approaches may contribute to the assessment of the price-concentration relationship, or alternative but related hypotheses.