Investigating the audit fee structure of local authorities in England and Wales

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Abstract—The purpose of this paper is to model and test the audit fee structure of local authorities in England and Wales, with particular interest in fees charged by the Big 4 and other private sector auditors. The Audit Commission, a national public body under Parliament, regulates local government audits in England and Wales. The Audit Commission sets audit standards, appoints the auditors, and establishes a formula to determine standard audit fees. Constrained by the standard audit fees, each local authority and its auditor negotiate the actual audit fees. The majority of audits are conducted by district auditors (public sector employees under the Audit Commission), although about 25% of local authorities are audited by one of six private auditors (including three of the Big 4). Regression results for financial year 2000/01 have high explanatory power and work well to explain fee differences. Model relationships are somewhat different from US counterparts (which is the context of most of the audit economics literature) and type of authority partially explains fee differences. OLS regression results indicate a Big 4 discount for local authority audits. Because of expected self-selection bias, the Heckman procedure is used to analyse the differences between private sector and public sector auditors, which indicates no selection bias for Big 4 firms, although bias is present for private firms as a whole and district auditors in some models. When fees are size-adjusted, results continue to show a Big 4 discount. The Big 4 discount was robust to other follow-up tests.

Key words: Audit fees; local government

1. Introduction

The objective of this paper is, for the first time, to model and test the audit fee structure of local authorities in England and Wales,[1] a setting in which dependence on central government may become less marked and governance more important, as one part of the greater accountability of public sector organisations in the 21st century. The Audit Commission, which is a national body under Parliament and the regulator of local authority audits in England and Wales,[2,3] sets audit standards for all local authorities and appoints the auditors for all local authorities. Most audits are conducted by district auditors (DAs), who are in-house audit providers of the Audit commission, operationally independent of the commission and, in particular, of the commission's regulatory functions.

The Audit Commission has the choice of auditor for all authorities and can use private sector audi-

tors. For the financial year 2000/01, the private audit firms included three of the Big 4 and three smaller firms that have a specialty in local authorities. The local authority negotiates the audit fee, based in part on a standard fee schedule set by the commission.[4]

Because of the involvement of the Audit Commission in auditor choice, self-selection bias becomes an issue. Self-selection is an agent behaviour problem. The usual interpretation in auditing is that clients determine whether or not to use

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[1] Northern Ireland has had a distinct form of local government and is not addressed in this paper. Local government in Scotland has similar features to local government in England and Wales, but there is a specific body for Scotland that regulates local government audits, which is also not addressed in this paper. Thus, our focus is with the local authorities in England and Wales, whose audits were regulated by one body, the Audit Commission.

[2] The Audit Commission for Local Authorities and the National Health Service in England and Wales, while it was created by law and is answerable to Parliament, is not part of central government. Central government does appoint members of the Commission but the officers of the commission are not civil servants. The technical term in the UK for bodies such as this is 'non-departmental public body', meaning that while the government and Parliament have important roles to play in such bodies, the bodies are not part of any central government department. The Audit Commission does not allow charging for non-audit fees.

[3] There were four public audit agencies in the UK at the time the empirical work in this paper was carried out. In addition to the Audit Commission, these were the National Audit Office, the Northern Ireland Audit Office, and Audit Scotland and the Accounts Commission for Scotland. The National Audit Office is responsible for central government audits. The remaining agencies are regional regulators of local authorities.

[4] The standard fee is explained in Section 2.

a Big 4 auditor. Because clients self-select the auditor, client observations are not randomly allocated across auditor categories. The commission selects the auditor on some non-random basis (e.g. geographic reasons). In addition, private audit firms may select out of the job. Thus, self-selection still exists and the result is a non-random assignment of auditors.

A Heckman two-stage procedure is used to try to control for the consequences of self-selection. Following the model introduced by Chaney et al. (2004) for commercial audits, this paper represents the first use of the Heckman approach for governmental audit fee models. A separate selection equation (first stage) is used to construct a selection-bias control factor, Lambda, designed to reflect all unmeasured characteristics related to auditor choice. In the second stage, Lambda is added as an additional independent variable in the fee model. A significant Lambda indicates a self-selection bias, which can be further analysed.

The standard audit fee is set by the Audit Commission, based on the type of local authority.[5] However, the actual financial audit fee, the amount paid directly for the financial audit, is negotiated between the auditor and the local authority. The total audit fee, which includes the fees for all other audit-related charges, is expected to be within 30% of the standard audit fee (Audit Commission, 2000). The commission recognises that fees may be outside this range under some circumstances, but seeks explanations when this occurs.

Although the economic relationships for audits of UK local authorities have not previously been tested, the audit economics literature associated with US local governments is extensive.[6] However, the regulatory environments associated with UK local authority audits differ from the US context, most markedly in that US cities and counties have considerable autonomy in operations and the audit process. Consequently, audit relationships may be substantially different and our understanding of important regulatory and efficiency relationships may be incomplete. In the UK, we have now seen research (for example, Clatworthy et al., 2002; Basioudis and Ellwood, 2005) on that other area of the Audit Commission's ambit, namely the National Health Service (NHS), but local authorities are fundamentally different bodies from those in the NHS because of the central role played by directly-elected local politicians in local government.

This paper focuses on: (1) actual financial audit fees and total audit fees charged for financial year 2000/01, (2) the relative fee premium (or discount) by comparing the total audit fee divided by the standard audit fee, and (3) evaluating actual financial audit fees, total audit fees and fee premium (or discount) by auditor type. Actual financial audit fees are analysed because they are closely related to US audit fees. The total audit fees are examined since they are used by the Audit Commission to evaluate actual financial audit fees to standard fees. The fee premium (or discount) is the difference from the regulatory benchmark and functions as a separate test of relative fees. If local authority audits in England and Wales followed the results found in US studies, Big 4 firms would charge a higher premium than either district auditors or smaller private firms. However, univariate and multivariate results show a net fee discount for Big 4 firms.

This paper contributes to the literature in three ways. (1) A model of audit fees in local authorities in England and Wales is introduced. While this model is of interest in its own right, it has added interest given that the context of much of the audit economics literature (based in the US) is different, as is the context of the parallel work in the UK on the NHS. The environment associated with the Audit Commission is described in detail. (2) We focus on Big 4 audit fees, because a fee discount is found relative to district auditors. The fee discount holds up in most robustness checks and Big 4 premiums are not found in any of our models. (3) Two particular self-selection issues are examined arising from the facts that the Audit Commission selects the auditor and that, while district auditors must conduct audits to which they are assigned by the commission, the private sector auditors need not do so.

The remainder of the paper is divided into the following sections. The next section describes the audit process associated with local authorities in England and Wales, emphasising how the audit fee is determined. Section 3 reviews model development, specifically how to explain the audit fee structure. Section 4 describes the sample of local authorities in England and Wales used for empirical analysis and describes the statistical methods used. Section 5 reviews the empirical results. Section 6 includes sensitivity checks. The last section concludes the paper.

2. Local authorities and audit fees

The Audit Commission database has 409 multi-function local authorities in England and Wales (at 1 April 2000), each of which is the responsibility of locally elected politicians. The law requires an external auditor to be appointed for each local authority and determines the auditor's responsibilities and powers (Audit Commission Act 1998, Local Government Act 1999). The Audit Commission

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[5] A fuller explanation is given in Section 2.

[6] See, for example, Baber et al. (1987), Rubin (1988), Copley et al. (1994), Ward et al. (1994), Copley et al. (1995), Deis and Giroux (1996), Elder et al. (1999), and McLelland and Giroux (2000).

was created by law in 1983 and its members are appointed by central government (Giroux et al., 2002:12–14). The commission has the statutory role to regulate local authority audits, a role that explicitly includes setting the standards to which the auditors are required to work and monitoring and evaluating the auditors' work against those standards. These requirements include compliance with professional auditing standards.

In addition to this regulatory role, the commission appoints the external auditor to each of the 409 local authorities. There are two pools of external auditors from which the Audit Commission chooses. The first pool comprises in-house auditors, who are known as district auditors, and are public officials. The second pool comprises private sector auditors including, but not restricted to, the Big 4 firms. Traditionally, about 70% of the auditors appointed are district auditors, the balance being private sector auditors. For the financial year 2000/01, district auditors conducted 303 audits (74.1%), while the private sector audited 106 (25.9%) local authorities.

For the financial year 2000/01, the Audit Commission introduced a uniform method for setting audit fees for all local authorities.[7] This method requires that the outputs of each audit are set by the commission and agreed with each auditor. The actual audit fee is determined by each authority and each authority's auditor but is circumscribed by a standard fee determined by the commission. The standard fee represents the judgment of the commission of the expected audit costs, based on authority type and relative spending levels, adjusted for cost-of-living differences. The new approach was designed 'to encourage auditor innovation and efficiency improvements' (Audit Commission, 2000:2).

Auditors conduct their work in accordance with the requirements of the *Code of Audit Practice*, published by the Audit Commission and approved by Parliament. Auditors must also take account of any supplementary guidance or instructions issued by the commission.

The commission requires the following outputs

from each financial audit:

- A certificate that the audit of the accounts has been completed in accordance with statutory requirements;
- An opinion on the financial statements (and other opinions, as required);
- A statutory report on the audit of what is known as a 'best value performance plan' (when appropriate);
- A report dealing with matters that the auditor considers to be in the public interest (which is required by law in exceptional cases);
- Oral and/or written reports or memoranda to officers of the local authority and, when appropriate, politicians of the local authority on the results of, or matters arising from, specific aspects of auditors' work (when appropriate);
- An annual audit letter addressed to the audited body.

Auditors perform other audit-related procedures for additional fees, including value for money work, grant claims from central government and various statutory reports. The most common audit-related work includes:

- Programmed reviews of the financial aspects of the audited body's corporate governance arrangements;
- Programmed reviews of aspects of performance management, including the audited body's arrangements to secure economy, efficiency and effectiveness in its use of resources, which may include national 'value for money' studies, follow-up work and local 'value for money' studies;[8]
- The arrangements for collecting, recording and publishing performance indicators (when applicable);
- The audit of 'best value' performance plans.

All financial years are 1 April to 31 March, and the standard fee is set for work to be done in the period from 1 November within the financial year being audited to 31 October in the following year. Because some of this work relates to periods other than the financial year, these other periods are also detailed. In setting this scale, the commission explicitly justifies the effects on audit fees paid by local authorities, fees received by the commission's own staff, fees received by private sector auditors, and the commission's own finances, typically in terms of percentage changes from previous years and comparisons with percentage changes in associated professional services.

The standard fee is a function of total annual gross expenditure of each local authority (but includes turnover on the fund that deals with public housing and on the pension fund, when applicable). It is derived from the local authority's con-

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[7] The new system had gradually been used for some authorities since 1995/96 but was only applied to all in 2000/01. Under the former system, the audit fee was determined by the commission in setting hourly rates, differentiated according to the type of local authority being audited. Total audit fees paid were, therefore, the product of actual audit hours and the relevant hourly rates.

[8] 'Value for Money' is the comprehensive term to refer both to economy and efficiency audits and to effectiveness audits. Auditors have a duty to do such work for their clients (known as 'local value for money studies'). The Audit Commission also has the duty to carry out such work, not for each local authority taken separately, but for local governments as a whole (known as 'national value for money studies'); auditors also contribute to these national value for money studies.

solidated income and expenditure account for the financial year being audited (Audit Commission, 2000). The standard fee function (STANDARD FEE) is:

STANDARD FEE =
[(total annual gross expenditure * x%) + £y]

Type of local authority	x%	£y
London boroughs	0.0350	110,000
Metropolitan councils – outside London	0.0320	95,000
County councils	0.0175	95,000
Unitary authorities	0.0410	95,000
District councils	0.0875	35,000

To take a specific example, the city of Birmingham, which is the biggest authority in our sample, had total annual gross expenditures of £1,786.1m for 2000/01. Birmingham is a metropolitan council; therefore, the calculation of STANDARD FEE is: [(£1,786.1m x 0.00032) + £95,000] = £666,552. TOTAL FEE for Birmingham was £632,000 (BASE FEE of £573,000 + £59,000 in audit-related fees), or £34,552 below the standard fee. Birmingham was audited by a district auditor. Each local authority is expected to set its audit fee within +/– 30% of the relevant STANDARD FEE. In other words, the total audit fees charged to the local authority can vary from 70% to 130% of STANDARD FEE (with adjustments for specified areas). Auditors can charge an additional 6.5% of total fees in 'specified areas' based on higher perceived costs. These specified areas are in the south-east of England, where the cost of living is higher.[9]

3. Model development

The purpose of this paper is to evaluate the financial audit fees (BASE FEE) of local authorities in England and Wales, TOTAL FEE, and the relative fee premium or discount (FEE PREM), measured as TOTAL FEE / STANDARD FEE. TOTAL FEE includes all audit-related fees charged by the auditor. BASE FEE is associated with the six required financial audit outputs previously listed. TOTAL FEE includes the six required outputs plus additional sanctioned procedures such as 'value for money' (also previously listed). If TOTAL FEE is equal to the standard fee, FEE PREM=1. If the local authority pays a premium over the standard fee, FEE PREM>1; FEE PREM<1 if the local au-

thority negotiated an actual fee lower than the standard fee. FEE PREM should be within 30% of the standard fee. The Audit Commission investigates exceptions, which often can be justified by the particular local authority but which also can influence the local authority in setting future audit fees.

Both univariate and multivariate tests will be used to analyse FEE, TOTAL FEE, and FEE PREM. BASE FEE and TOTAL FEE are logged for correlation and multivariate analysis, due to skewness.

These three measures of audit fees are used because of the different perspective of the England and Wales local governmental audit market from that in the US. BASE FEE seems roughly consistent with audit fee calculations of US studies. However, the TOTAL FEE construct is relatively more important according to the Audit Commission. This measure captured all audit-related charges and this is the measure the commission uses to compare to standard fees.

3.1. Fee model constructs

Six constructs are used to capture audit fee characteristics: (1) auditor type, (2) auditor expertise, (3) client size, (4) measures of client complexity, including demographic characteristics, (5) audit risk factors and (6) local authority type. These are discussed below, along with the empirical surrogates used for analysis. The model is summarised in Table 1.

Of particular interest is the auditor category: district auditor (DA), one of the Big 4 accounting firms (BIG 4), or a non-Big 4 private firm with a local governmental specialty (SMALL). Dummy variables are used to identify BIG 4 and SMALL. The remaining variables serve as control measures.

In many US audit fee studies of commercial clients, a premium for a Big 4 auditor was found, usually associated with the reputation effect (e.g. Copley et al., 1995). As summarised by Ireland and Lennox (2002), Big N (Big 8 down to Big 4, depending on the time of the studies) fee premiums were found in Australia, New Zealand, UK, Hong Kong, Singapore and India. However, no fee premiums were found in Malaysia, Norway, the Netherlands and South Africa.

Limited literature also suggests that private sector auditors (Big 4 and smaller firms) charge higher fees for local governmental audits (e.g. Rubin 1992). However, in the England and Wales local government context, it has been suggested that there is a district auditor premium. This reflects the fact that DA is motivated by gross turnover, whereas the firms are motivated by profit. That is, DAs are likely to perform more audited-related procedures than BIG 4 or SMALL. So an audited body that has a DA as its auditor pays a marginally higher fee but gets more work for it.[10] Basioudis

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[9] The 'specified areas', for which there is the 6.5% premium, are local authorities within the counties of Kent, Surrey, Sussex, Hampshire, Isle of Wight, Berkshire, Oxfordshire, Buckinghamshire, Bedfordshire, Hertfordshire, Cambridgeshire and Essex.

[10] This insight is provided by staff members of the Audit Commission.

Table 1
The audit fee model

Construct / Empirical surrogate	BASE FEE	TOTAL FEE	FEE PREM
Auditor type*			
Small private firm (SMALL)	?	?	?
Big 4 (BIG 4)	?	?	?
Auditor expertise			
Number of local authority clients (CLIENTS)	?	?	?
Client size			
Log of population (LPOP)	+	+	+
Demographic characteristics			
Log of population density (LPOPDEN)	+	+	+
Log of average income (LAVGINC)	?	?	?
Audit/credit risk			
Financial viability (FV)	–	–	–
Surplus/deficit (SURDEF)	–	–	–
Debt per 1,000 population (DEBT)	+	+	+
Authority type			
County council	?	?	?
District council	?	?	?
Unitary authority	?	?	?
London borough	?	?	?

*Note: There are three audit types: district auditor (DA), one of the Big 4 accounting firms (BIG 4), or a non-Big 4 private firm with a local governmental specialty (SMALL). Dummy variables are used to identify BIG 4 and SMALL (relative to DA).

and Ellwood (2005) tested the audit fee structure of 369 NHS trusts. They predicted a fee premium for Big 4 firms. Regression models indicated significant Big 4 fee premiums; however, when individual firms were tested only one firm recorded a significant premium. No Big 4 premium existed when total fees (including non-audit fees) was the dependent variable. Clatworthy et al. (2002) also tested audit fees for National Health Service trusts. Neither Big 6 nor mid-tier private firms were significant. Consequently, there is evidence from a similar audit market to conclude that a Big 4 premium is not likely.

Following Mayhew and Wilkins (2003), the number of authority clients (CLIENTS) is used as a measure of industry market share. Deis and Giroux (1996) use the number of local governmental clients as a measure of reputation. Mayhew and Wilkins (2003) view auditor specialisation as measured by market share as a differentiation strategy, providing economies of scale and industry-specific expertise. Higher audit quality, higher client satisfaction and lower audit costs are expected with this differentiation strategy. Mayhew and Wilkins (2003) found a fee premium when specific auditors dominate market share, but a relative fee discount for audit industry specialisation but not domination. The auditor can (1) pass on the

lower costs due to economies of scale through lower pricing or (2) retain the cost savings and charge a premium price. Therefore, no sign is predicted.

Client size should be associated with audit complexity. Population is used to capture relative size. The log of population (LPOP) is used in the multivariate analysis to control for skewness. Following Bamber et al. (1993) and McLelland and Giroux (2000), a positive sign is expected.

Two demographic measures of client complexity are population density and average income. Population density (POPDEN) is used to capture relative 'urbanness' and financial complexity. The Gonzales and Mehay (1985) model used population density to control for economies of density, as public spending may relate to land area rather than population size (Giroux and Shields, 1993). Most of the major urban areas have only one local authority; most of the rural areas have two (a county council plus one other geographically smaller local authority) so that the public services provided are divided between the two. Therefore, most local authorities in major urban areas provide more services than local authorities do in rural areas. Also, certain public services are associated with urban areas, such as transport. A positive coefficient is predicted. Average income (AVGINC) cap-

tures the relative wealth of a local authority. Income levels are usually associated with greater financial health in US studies (e.g. Deis and Giroux, 1996). However, only limited revenues are generated from the local property tax base for authorities in England and Wales. Most revenues come from central government and these public monies tend to be 'dependence-based', that is, relatively more funding is given to poorer authorities. No sign is predicted for AVGINC. The logs of population density (LPOPDEN) and average income (LAVGINC) are used for multivariate analysis to control for skewness.

The audit firms may focus on audit and credit risk to determine fees, a possible factor for audit pricing differences. However, risk measures may differ from US counterparts because of institutional and other differences. Two variables are used as potential empirical surrogates for audit risk in this environment: financial viability (FV) (Giroux and McLelland, 2003) and surplus/deficit (SURDEF) (McLelland and Giroux, 2000). Debt per capita (DEBT) is used to proxy for credit risk (Baber et al., 1987; Ward et al., 1994; Copley et al., 1995).

Financial viability is defined as general fund balance / net revenue expenditures and is used as an indicator of relative equity. A low measure can signal fiscal stress, increasing audit risk. A negative sign is expected. On average, authorities have a net equity position (FV) of 0.3% of net revenue expenditures (CIPFA, 2001). Surplus/deficit (SURDEF) is the general fund surplus or deficit, stated in pounds (£). Running a deficit should indicate increasing financial risk. However, only 91 authorities (22.2%) had a surplus in 2001 (CIPFA, 2001). A negative sign is predicted; however, since authorities can budget for a deficit only if a positive fund balance exists to cover the deficit, this variable may be less important than FV.

Debt levels are measured as the total borrowing of the authorities including bank overdrafts. DEBT is scaled by population per thousand. The most common debt variable measured in US studies is municipal debt. Since the interest is 'tax-free' to lenders, the interest rates are lower to municipal borrowers and debt levels tend to be relatively large. There is no 'tax benefit' to local authorities in England and Wales. Most debt comes from bank lending and borrowing from the Public Works Loan Board, a central government agency. Despite the institutional differences, the interpretation is the same. Higher debt levels are associated with greater credit risk and a positive sign is expected.

Local authorities are multi-function entities administered by politicians elected locally, with limited power to tax and borrow. There are five categories of authorities in this analysis: county councils, district councils, London boroughs, unitary authorities, and metropolitan councils.

Because each category has unique characteristics, dummy variables are used to capture locally-specific information. In 1974 there was a major reorganisation of local authorities and piecemeal changes since then.

London boroughs and metropolitan councils are located in major urban areas, each providing all the major services associated with local authorities in England and Wales. Each unitary authority also provides all major services. While every unitary authority may not necessarily be in a major urban area, each will have a significant town at its heart. London boroughs, metropolitan councils and unitary authorities tend to have larger populations and higher population densities.

County councils and district councils conduct the major local authority services for a given geographical area. Within any given county area, there will be one county council and many contiguous district councils. The county council will typically provide services such as education for the whole area (and therefore across the jurisdictions of many district councils), while services such as refuse collection are provided separately by each district council. County councils are often rural and usually have low population densities; district councils usually have smaller populations, but population densities can vary.

3.2. Robustness checks

Self-selection bias is a major concern associated with audit fee models, especially when Big 4 auditors are present. Selection bias 'refers to the bias in the estimates obtained by following the usual procedures of estimation that ignore the non-randomness of the samples' (Maddala, 1991: 797). A Big 4 audit fee premium is a typical empirical finding and associated with a brand name auditor providing a higher quality audit (DeAngelo, 1981; Copley et al., 1995). Each client determines whether or not to use a Big 4 auditor, resulting in a self-selection problem. As stated by Chaney et al. (2004: 53): '[I]t is probable that firms self-select into Big 5 and non-Big 5 auditees based on firm characteristics, private information, and other unobservable characteristics.' OLS models not correcting for self-selection produce biased and inconsistent coefficients. The error term in the OLS model will be systematically associated with type of auditor. The Heckman procedure is used to correct for self-selection.

James Heckman introduced his correction for self-selection bias in the 1970s to deal with individual decisions about labour-force participation and hours worked (e.g. Heckman, 1979 or Heckman and Smith, 1995). It has been used in accounting and recently in the audit fee literature to control for selection of Big N firms. Ireland and Lennox (2002) tested UK audit fees, using

Heckman to compare Big 5 to non-Big 5 firms. A selection bias was discovered based on a significant inverse Mills ratio (Lambda), which translated into a Big 5 audit fee premium of 53.4% (compared to 19.2% without measuring selection bias).

Copley and Douthett (2002) used Heckman's simultaneous equation two-step estimation to analyse auditor choice (including audit fees) associated with US initial public offerings. Client firms initiating IPOs were more likely to select a Big N auditor if they had higher risk characteristics. Chaney et al. (2004) found a Big 5 audit premium on a sample of UK private firms. They found both intercept and slope coefficients significant, indicating that Big 5 firms have different fee structures than non-Big 5 firms. McMeeking et al. (2006) looked at why Big N firms earned a fee premium for big UK firms, over a long time period (1985–2002). They used Heckman's as part of their sensitivity analysis, which indicated that larger firms with more overseas subsidiaries or more non-audit services were more likely to hire Big N firms. Lambda was significant only for large client firms. Omer et al. (2006) considered auditor-provided tax services for 2002–2003, using an abnormal audit fee more to determine unexpected audit fees. Disclosure of tax fees was voluntary and Heckman's was used to control for the voluntary nature of tax fee disclosure (i.e., disclosure of tax fee was self-selected in this time period). The extant literature using Heckman's indicates a Big N fee premium larger than expected based on OLS regression. However, our analysis focuses on a unique environment and a different self-selection bias.

The auditor selection process for UK local authorities is different relative to the extant US literature, with the Audit Commission making the final auditor choices. Self-selection is still an econometric problem but is based on unobserved characteristics of the Audit Commission and potential auditors. A key point is that the private auditors can decline audits, while district auditors cannot. An objective of the Audit Commission is to have three potential auditors for each authority; i.e., the regional district auditor's office and two private firms (Audit Commission, undated). Consequently, the selection incentives differ from other environments.

Since the Audit Commission assigns the auditor, there are two possible biases. Whether the commission picks a DA presumably depends on various factors, but it may select Big 4 and other private auditors on a non-random basis, such as for

geographic reasons. This is the first potential bias. The private audit firms may select out of the audit job, also resulting in a non-random assignment of auditors.

It is not clear that a fee premium or discount is expected for Big 4 auditors of local authorities. However, certain Big 4 characteristics are expected. Big 4 firms base their product differentiation strategies on personnel training, key technological advantages, and other efficiency-related characteristics (Mayhew and Wilkins, 2003). Following Chaney et al. (2004), it is hypothesised that Big 4 firms have higher fixed costs related to technology and other efficiencies, but potentially lower variable costs. Chaney et al. (2004) expect that this should result in a larger intercept for Big 4 firms, while the slope coefficient should be smaller.

Client size is the primary driver for audit fees. Consequently, a size variable is included as an independent variable to control for size; we use local authority population in this case. Despite this variable, size may still be a biasing factor in the model. For example, in most audit fee studies Big 4 auditors are associated with larger clients. That is true in this case. The average authority size for BIG 4 is 251,245, compared to 180,954 for district auditors and 136,544 for small firms.

Because of the systematic differences in size, the error term will be directly related to size of the clients, which violates the OLS assumption of homoskedasticity. To correct for this violation, another set of regressions was run with fees scaled by population, which provides more reliable t-statistics. The remaining independent variables are the same. An alternative test uses rank transformations for fees and population.

4. Sample and method

The sample is based on the data files of the Audit Commission, which includes 409 multi-function local authorities.[11] Information on audit fees and related data comes from the commission files. Financial information on the local authorities comes from the Chartered Institute of Public Finance and Accountancy (CIPFA, 2001). Income data is taken from Inland Revenue Statistics (Reade, 2000).

The initial testing of the audit fee models uses OLS regression. The dependent variables are (1) FEE, (2) TOTAL FEE and (3) FEE PREM. The major independent variables are dummy variables for SMALL and BIG 4, to discern if these are significantly different from fees charged by the district auditors. Diagnostic tests include tests for normality of residuals, extreme values, multicolinearity and homoskedasticity. Extreme values were detected in various models and deleted from the sample for multivariable analysis. Extensive heteroskedasticity was discovered and White's

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[11] This sample of 409 authorities includes the Corporation of London, which is a business district officially listed with a population of a few thousand. This observation was dropped from the empirical analysis.

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correction was used to restate t-values in the regression models.

To correct for self-selection bias, the Heckman (1979) two-stage procedure is used for the TOTAL FEE model. In the first stage, a probit model is used as an auditor choice model, using the dummy variable BIG 4.[12] The independent variables proxy for client attributes associated with the selection process. The variables are: LPOP, LPOPDEN, LAVGINC, county council, district council, unitary authority, London borough, and CLIENTS. First stage results are presented in Table 6. The predicted values from the probit models are transformed into the inverse Mills Ratios (Lambdas), probability functions of the selection decision. Lambda is the self-selection variable used in stage two.

The second stage is OLS regression, split by BIG 4/district auditor (and private/district auditor), with and without Lambda. With the exception of Lambda, the model is the same as described above. The coefficients for the Lambdas are the estimates from the residuals of the auditor choice models. (See Chaney et al., 2004: 54–58 for a more detailed discussion of the Heckman two-stage procedure.) Second stage results are summarised for the BIG 4 model using TOTAL FEE.

OLS results were rerun where the dependent variables were (1) log of FEE per 1,000 population and (2) log of TOTAL FEE per 1,000 population. Interestingly, there were no diagnostic problems with these models.

5. Results

5.1. Univariate analysis

Table 2 summarises means and distribution characteristics (standard deviation, minimum and maximum) of the variables of interest. Base audit fee averaged £118,000, or £759 per 1,000 population. The total fee (which included non-recurring charges for statutory reports, fees for best value plans, and audits of grant claims from the central government) was £146,232 or about 24% above the base audit fee. The average standard fee set by the Audit Commission was £126,794, 17.8% below the total fee, on average. The relative discounted or premium fee ranged from 71.9% to 253.5% (with 100% meaning total fee was identical to the standard fee).

Fifty-one authorities (12.5%) charged fees less

than standard, although all were above the 70% expected minimum. The remaining 357 authorities (87.5%) charged a premium, with 89 (21.8%) above the 130% expected maximum. Fourteen of these extreme premium firms had fees above 150%; that is, over 50% above the standard fees. The commission investigates the authorities paying more than the 30% premium. The most common explanations for higher fees were (1) high audit risk and/or (2) the statistical calculations on which the standard fees were based were inappropriate. In most cases, the commission was satisfied with the explanation. For example, Watford District Council had the highest fee premium at 153.5% above the standard fee. The explanation was that this was a high-risk audit and a disclaimer audit opinion issued, which was accepted by the Audit Commission. Also, 25.1% of Watford's total fees was for other audit services, above the 19.2% average for the sample. Watford was one of the extreme values deleted from the regression analysis.

Population averaged 192,000, with a substantial range of 25,000 to 3.3 million. Mean population density was 12.6 persons per hectare, again with a substantial range (0.2–137.1). Because of the skewness of these two variables, they were logged for the multivariate analysis.

Financial viability (FV) measures the relative equity position to spending (fund balance to total expenditures). A higher FV suggests lower audit risk. On average, FV was slightly positive (0.3%), but ranged from a negative 12.9% to 4.5%. The average authority has a small deficit of £1,223, but with a substantial range of £26,466 deficit to £7,203 surplus. Deficits were found in 287 (70.2%). This is a potential indicator of audit risk for the majority of authorities.

Panel B of Table 2 describes fee data by auditor category. Big 4 audits were more expensive on average at £132,306, almost 15% above the average district duditor fee. However, the average fee per 1,000 was the lowest for the Big 4 at £690 per 1,000 population. Both standard fees and total fees had the same relationships by auditor type. The average fee premium was the lowest for BIG 4 audits at 112.6% (that is, the Big 4 audit premium was 12.6% above standard fees on average). The average fee premium for DA was 119.1% (19.1% above standard). A t-test was run (Satterthwaite method for unequal variances) comparing DA with private sector auditors. District audit fees were significantly higher only for fee per thousand and fee premium.

Local authorities are analysed in Table 3, cross-classified by auditor category in Panel A and by means for the continuous independent variables in Panel B. The majority of the local authorities are district councils (58.3%), but these also have the smallest populations, averaging less than 100,000.

[12] Two models are run. The first comparison is Big 4 to district auditors and the second, private to district auditors. In the first model, SMALL firms are deleted. However, an important consideration is the distinction of district auditors to all private firms. Consequently, this second approach also is used. Heckman also was run for the BASE FEE and FEE PREM models. However, no independent variables were significant including Lambda in the FEE PREM model. Only the TOTAL FEE using BIG 4 is tabulated.

Table 2
Descriptive analysis

Panel A: Continuous variables used for analysis

Variable*	Mean	Standard deviation	Minimum	Maximum
Base audit fee	£118,003	£90,383	£30,000	£623,774
Fee per thousand	£758.6	£410.1	£87.2	£3403.0
Total fee	£146,232	£98,141	£45,000	£679,927
Standard fee	£126,794	£85,585	£42,359	£666,524
Fee premium	117.8%	.183	71.9%	253.5%
Population	192,015	246,618	25,000	3,332,800
Population density	12.58	19.05	0.20	137.10
Average income	£20,320	£5,767	£12,900	£86,500
Number of clients	58.6	24.1	4	85
Financial viability	0.3%	0.005	−0.129	0.045
Surplus/deficit	£(1,223)	£3,121	£(26,466)	£7,203
Debt per thousand	£128.7	£140.8	0	£982.7

Panel B: Audit Fees by auditor category

Variable	District auditor	Small private auditor	Big 4 auditor	T-value
Base fee	£116,238	£93,563	£132,306	−0.71
Fee per thousand	778	746	690	1.67**
Total fee	£145,833	£110,554	£159,435	−0.20
Standard fee	£124,500	£97,232	£144,824	−0.98
Fee premium	119.1%	120.1%	112.6%	2.36**

* Actual audit fee, fee per 1,000 population, total fee, standard fee, and average income are stated in £, population density is persons per hectare, number of clients is number of authority audit clients by auditor, financial viability is the ratio of general fund balance to total expenditures, surplus/deficit is general fund revenues minus expenditures stated in £, and debt per capita is total debt per 1,000 population stated in £.
** Significant at 0.05 (t-test using the Satterthwaithe method, comparing district auditors to private auditors).

There are only 34 county councils (8.3%), but these have the largest populations on average. Big 4 firms audited a much larger percentage of county councils (38%), London boroughs (31%), and metropolitan councils (25%). These categories tend to have larger and wealthier populations.

Population density varied from 2.6 for county councils to 60.2 for London boroughs. Only district councils reported relatively large financial viability, at 0.5% of net revenue expenditures. All authority types reported an average general fund deficit, over £4,000 at Metropolitan Councils. DEBT also varied by category, from £71 at to £338 at London Boroughs.

Table 4 presents a Pearson's correlation matrix for the variables in the regression models. As expected, BASE FEE and TOTAL FEE are both significantly correlated with POP and POPDEN, but FEE PREM is negatively correlated with POP. Smaller authorities tend to pay larger fee premium percentages. Neither SMALL nor BIG 4 is correlated with BASE FEE or TOTAL FEE, although BIG 4 is negatively correlated with FEE PREM. All authority types are correlated (either positively or negatively) with both BASE FEE and TOTAL

FEE. Both BASE FEE and TOTAL FEE are positively correlated with CLIENTS and DEBT and negatively correlated with financial viability and surplus/deficit. FEE PREM is correlated (either positively or negatively) with two of the authority types. FEE PREM also is positively correlated with financial viability and surplus/deficit. Generally, the correlation results were similar between BASE FEE and TOTAL FEE, but quite different for FEE PREM.[13] Across the independent variables, there are some significant correlations; however, variance inflation factors used in the regression models are all below 10, a common rule of thumb to indicate no multicollinearity problems (Gujarati, 1995).

5.2. OLS regression analysis

Regression results are summarised in Table 5. Separate OLS results are presented for BASE FEE, TOTAL FEE and FEE PREM. Observations

[13] Since STANDARD FEE is a linear function of total expenditures, it is likely that actual audit fees are relatively lower as size increases. That is, audit fees are not expected to rise as fast as total expenditures. The result is consistent with opposite signs for FEE PREM.

Table 3
The types of local authorities in England and Wales

Panel A: Sample frequency by auditor category

Authority type	District auditor	Small private auditor	Big four auditor	Total
County council	20 (58.8%)	1 (2.9%)	13 (38.2%)	34 (8.3%)
District council	183 (76.9%)	18 (7.6%)	37 (15.6%)	238 (58.3%)
London borough	22 (68.8%)	0 (0)	10 (31.3%)	32 (7.8%)
Metropolitan council	25 (69.4%)	2 (5.6%)	9 (25.0%)	36 (8.8%)
Unitary authority	53 (77.9%)	4 (5.9%)	11 (16.2%)	68 (16.7%)
Total	303 (74.3%)	25 (6.1%)	80 (19.6%)	408* (100%)

*Chi-square for auditor type by authority type = 16.48, significant at 0.05

Panel B: Means for continuous independent variables by authority type

Authority type	POP	POP DEN	AVG INC	FV	SUR (DEF)	DEBT
County council	677,174	2.56	20,476	0.00001	£(964)	£133.0
District council	95,538	6.19	20,473	0.00523	£(609)	£70.8
London borough	224,850	60.24	27,456	0.00004	£(2,333)	£338.0
Metropolitan council	309,122	19.99	17,303	0.00003	£(4,008)	£243.1
Unitary authority	209,654	13.62	17,944	0.00007	£(1,577)	£178.4

** POP DEN=population density; AVG INC= average income; FV=financial viability; SURDEF=surplus/deficit; DEBT=debt per 1,000 population.

were lost from the full sample due to missing data and extreme values which were deleted. The final sample sizes were 380 for BASE FEE and TOTAL FEE, and 381 for FEE PREM. Regression diagnostics included variance inflation factors to test for multicollinearity, studentised residuals to test for extreme values, and the Glejser test for het-

eroskedasticity. Extreme values were detected and eliminated and White's correction run because of detected heteroskedasticy. All variance inflation factors except district council were below five, suggesting no multicollinearity problems. district council consistently had VIFs about 6.5, moderately problematic but not a variable that could be eliminated or transformed.

The BASE FEE model is significant, with an adjusted R^2 of 90.1%. LPOP and LPOPDEN are positive and significant as expected, while LAVGINC is negative and significant. The negative sign can be interpreted as an indicator of increased audit risk to local authorities as income levels rise. BIG 4 is negative and significant. Similar to the univariate findings, BIG 4 audits are associated with lower audit fees, when compared with district auditors. In most comparable settings 'brand name' audits typically have a higher price (Rubin 1988).[14] SMALL firm audit fees, on the other

[14] It may be that the close relationship between district auditors and the commission has an effect on audit fees. The argument is that DAs have an incentive to charge higher fees, since the Audit Commission benefits financially from the fees charged. The commission states that a fee premium exists for district auditors, because they perform additional duties beyond the private audit firms. As stated by an Audit Commission executive: 'It is perhaps not surprising that the "brand name" of the Big 4 does not attract a price premium, as the audited bodies are not purchasing the brand! It is the commission that buys the brand, and appoints the auditor.' However, Basioudis and Ellwood (2005) found a BIG 4 premium for NHS entities, where auditors also are selected by the Audit Commission.

Table 4
Correlation matrix (Pearson's)

	BASE FEE	TOTAL FEE	FEE PREM	POP	POP DEN	AVG INC	SMALL	BIG 4
TOTAL FEE	98.6*	–						
FEEPREM	0.1	0.0	–					
POP	74.0*	74.6*	-25.3*	–				
POPDEN	53.7*	54.7*	-4.7	32.5*	–			
AVGINC	-4.1	-4.1	6.5	6.7	14.5*	–		
SMALL	-3.0	-7.7	-0.3	-4.8	1.0	13.2*	–	
BIG 4	7.5	7.7	-15.0*	16.2*	10.7**	12.2**	NM	–
DA	-5.2	-2.8	11.9**	-12.1**	-10.3**	-18.3*	NM	NM
County council	27.4*	26.0*	-10.9**	64.0*	-18.4*	3.2	-4.0	14.1*
District council	-90.2*	-91.0*	20.2*	-70.1*	-39.6*	7.5	7.1	-12.1**
Unitary authority	39.1*	39.9*	-9.6	8.0	9.1	-22.6*	-0.4	-3.9
London borough	41.1*	42.8*	-1.5	19.0*	49.4*	34.9*	-7.5	8.6**
CLIENTS	-12.5**	-9.9**	1.7	-5.9	-1.6	-2.8	-52.0*	-51.3*
FV	-54.1*	-54.1*	14.0*	-47.5*	-29.3*	12.9**	0.1	-4.6
SURDEF	-26.0*	-26.6*	18.3*	-21.3*	-27.0*	-1.2	4.2	-7.5
DEBT	55.5*	56.1*	-5.4	29.0*	42.1	7.5	1.2	1.8

	DA	County council	District council	Unitary authority	London borough	CLIENTS	FV	SURDEF
County council	-10.6**	–						
District council	7.1	NM	–					
Unitary authority	3.8	NM	NM	–				
London borough	-3.7	NM	NM	NM	–			
CLIENTS	75.1*	0.6	14.2*	-18.8*	3.3	–		
FV	4.2	-20.0*	52.6*	-25.6*	-19.2*	10.6**	–	
SURDEF	4.5	2.6	24.3*	-4.5	-10.6**	0.4	12.9**	–
DEBT	-2.3	1.2	-50.4*	14.3*	45.0*	-9.4	-30.6*	-19.9*

(logs used for FEE, TOTFEE, FEE PREM, POP, POPDEN and AVGINC; NM = not meaningful)
* Significant at 0.01; ** Significant at 0.05
** FEE PREM=audit fee premium; POP=population; POP DEN=population density; AVGINC=average income; SMALL=non-Big 4 private audit firm; BIG 4=Big 4 audit firm; DA=district auditor; CLIENTS=number of local authority clients; FV=financial viability; SURDEF=surplus/deficit; DEBT=debt per 1,000 population.

Table 5
Regression analysis with coefficient (t-value)
(extreme values eliminated, White's correction)

	Predicted sign	Log (BASE FEE)	Log (TOTAL FEE)	FEE PREM
LPOP	+	0.315 (10.10)*	0.309 (12.63)*	-0.075 (-3.36)*
LPOPDEN	+	0.060 (5.25)*	0.046 (5.16)*	0.017 (2.13)**
LAVGINC	?	-0.151 (-2.54)**	-0.124 (-2.66)*	0.065 (1.53)
SMALL	?	0.005 (0.08)	-0.120 (-2.29)**	-0.097 (-2.01)**
BIG 4	?	-0.149 (-3.66)*	-0.117 (-3.66)*	-0.123 (-4.19)*
County council	?	-0.339 (-5.10)*	-0.337 (-6.49)*	0.074 (1.55)
District council	?	-0.864 (-15.23)*	-0.737 (-16.55)*	-0.028 (-0.68)
Unitary authority	?	-0.030 (-0.58)	-0.006 (-0.16)	-0.035 (-0.95)
London borough	?	0.111 (1.79)	0.111 (2.25)**	-0.034 (-0.77)
CLIENTS	?	-0.001 (-1.82)**	-0.001 (-2.02)**	-0.002 (-3.01)*
FV	–	-1.828 (-0.66)	-0.648 (-0.30)	2.417 (1.21)
SURDEF	–	-0.000 (0.15)	0.000 (0.19)	0.000 (2.62)**
DEBT	+	0.000 (3.19)*	0.000 (4.27)*	-0.000 (-0.78)
Intercept		11.879	11.838	1.026
Adj. R^2		90.1%	92.2%	11.5%
F Value		267.6*	345.5*	4.8*
n		380	380	381

* Significant at 0.01; **Significant at 0.05
** FEE PREM=fee premium; LPOP=log of population; LPOPDEN=log of population density; LAVGINC=log of average income; SMALL=non-Big 4 audit firm; BIG 4=Big 4 audit firm; CLIENTS=number of local authority clients; FV=financial viability; SURDEF=surplus/deficit; DEBT=debt per 1,000 population.

hand, are not significantly different to district audit fees. Four authority types are compared with metropolitan districts; county councils and district councils have significantly lower fees relative to metropolitan districts. County and District generally are rural, suggesting relatively lower fees for rural authorities. CLIENTS is negative and significant, indicating that industry specialisation results in lower fees, an economies of scale interpretation. Neither financial viability nor surplus deficit is significant. DEBT is positive and significant, indicative of a higher fee associated with increased credit risk.

The TOTAL FEE model was run to determine if the additional audit-related fees have a different impact than the original BASE FEE decision. While we did not expect a differential impact (because all the audit work is required by the commission), we did test for corroboration. The results are similar to the BASE FEE model, suggesting

Table 6
Probit analysis of auditor selection with coefficient (chi-square)
(extreme values eliminated) – first-stage of Heckman's procedure
Private auditors
Dependent variable is Big 4 dummy

Independent variable	Coefficient	Chi-square
LPOP	0.484	(2.82)
LPOPDEN	-0.410	(11.45)*
LAVGINC	-1.880	(5.66)**
County council	-1.576	(4.82)**
District council	0.186	(0.10)
Unitary authority	2.209	(13.79)*
London borough	-0.476	(0.48)
CLIENTS	0.104	(80.10)*
Intercept	11.938	(2.51)
n	380	

* Significant at 0.01; **Significant at 0.05
*** LPOP=log of population; LPOPDEN=log of population density; LAVGINC=log of average income; CLIENTS=number of local authority clients.

that there are no significant incentives to charge lower audit fees to receive additional audit-related work. The Audit Commission has strict rules forbidding non-audit work, which they identify as a 'regime constraint'. Adjusted R^2 is 92.2%. The only differences in the TOTAL FEE model are: (1) SMALL is negative and significant, indicating that total fees are significantly lower than for District auditors and (2) London boroughs are positive and significant, suggesting higher audit costs.

The FEE PREM model has an adjusted R^2 of 11.5%, much lower than the two previous models. The results differ from the other two models, as expected given the correlation results in Table 4. This model attempts to explain the differences between the total fee and Audit Commission's standard fee. LPOP is negative and significant, LPOPDEN is positive and significant, and LAVGINC is insignificant. Fee premiums are relatively higher for smaller, less crowded authorities. Standard fees are a linear function of expenditures and the negative sign suggests that audit fees rise with size at a lower than linear rate. Both SMALL and BIG4 are negative and significant, suggesting that on average the private firms

receive relatively lower fee premiums. None of the authority types is significant, indicating that the relative premium is independent of type of authority. CLIENTS is negative and significant. The results for CLIENTS are robust across the models, indicating the importance of economies of scale for audit fee pricing. SURDEF is positive and significant, an unexpected result. This suggests that audit fees rise for higher surpluses. Both FV and DEBT are insignificant.[15]

6. Sensitivity checks

6.1. Heckman's two-stage procedure

Table 6 presents the stage one results, based on probit analysis.

Stage-one is a probit analysis where the dependent variable is a dummy variable where 1=Big 4 firm and 0=DA. The independent variables are the OLS variables that are consistently significant (LPOP, LPOPDEN, LAVGINC, CLIENTS, and the four authority dummies). All but LPOP, district council and London boroughs are significant.[16]

The second stage (Table 7) compares audit fees for Big 4 firms compared to District auditors using Log of TOTAL FEE as the dependent variable. The 75 authorities using Big 4 auditors are compared with the 281 using DA. The OLS results for both BIG 4 and DA compared with the overall results in Table 5, are somewhat different. Several variables are not significant for BIG 4 (LPOPDEN, LAVGINC, London boroughs, and CLIENTS) and DA (LAVGINC and London Boroughs) that were significant in the overall (Table 5) analysis. However, the overall explanatory power as measured by adjusted R^2 was similar at 91.5% and 93.1% for BIG 4 and DA

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[15] An alternative analysis to explain relative fee premium is to use TOTAL FEE minus STANDARD FEE as a fee premium measure. (Since negative signs are common, the variable cannot be logged.) In this model, the adjusted R^2 is only 25.7% and LOGPOP is insignificant. SMALL, BIG 4 and CLIENTS are negative and significant, while all authority types are also negative and significant. In other words, the same basic auditor-related results hold in this context.

[16] The Heckman analysis was also run using BIG 4 compared to DA based on BASE FEES and private firms (BIG 4 plus SMALL) compared to DA using both TOTAL FEES and BASE FEES.

Table 7
Regression analysis with coefficient (t-value); dependent variable is log of TOTAL FEE
Big 4 to district auditor comparison, based on Heckman's two-stage procedure

Variable	Big 4 OLS	Big 4 Two-stage	District auditors OLS	District auditors Two-stage
LPOP	0.293 (4.39)*	0.380 (4.20)*	0.305 (11.43)*	0.480 (6.40)*
LPOPDEN	−0.002 (−0.06)	−0.048 (−1.44)	0.052 (5.25)*	−0.109 (−1.67)
LAVGINC	−0.146 (−1.49)	−0.434 (−1.92)	−0.063 (−1.10)	−0.734 (−2.67)**
County council	−0.304 (−2.50)**	−0.528 (−2.65)**	−0.356 (−5.93)*	−0.980 (−3.82)*
District council	−0.707 (−6.34)*	−0.657 (−5.65)*	−0.738 (−14.49)*	−0.656 (−10.88)*
Unitary authority	−0.075 (−0.73)	0.329 (1.59)	−0.020 (−0.43)	1.049 (2.44)**
London borough	0.1630 (1.24)	0.172 (1.59)	0.085 (1.48)	0.224 (2.81)*
CLIENTS	−0.001 (−0.61)	0.018 (1.49)	−0.002 (−3.13)*	0.041 (2.37)**
FV	−13.412 (−1.25)	−10.934 (−1.01)	−0.179 (−0.08)	−0.410 (−0.18)
SURDEF	−0.000 (−0.01)	−0.000 (−0.18)	−0.000 (−0.39)	−0.000 (−0.65)
DEBT	0.001 (2.03)**	0.001 (1.94)**	0.000 (4.67)*	0.000 (4.80)*
Lambda (λ)		−0.203 (−1.41)		−0.482 (−2.50)**
Intercept	11.992 (12.28)*	13.508 (9.34)*	11.305 (20.96)*	15.583 (8.68)*
Adj. R²	91.5%	91.7%	93.1%	93.0%
F Value	73.6*	68.7*	330.8*	309.7*
n	75	75	281	281

* Significant at0 .01; **Significant at 0.05; λ = Inverse Mill's Ratio
*** FEE PREM=fee premium; LPOP=log of population; LPOPDEN=log of population density; LAVGINC=log of average income; SMALL=non-Big 4 audit firm; BIG 4=Big 4 audit firm; CLIENTS=number of local authority clients; FV=financial viability; SURDEF=surplus/deficit; DEBT=debt per thousand population.

respectively.

The second-stage approach shows some model differences in Table 7. If self-selection is present, it may manifest itself in the change in coefficients as well as the intercept between the OLS and two-stage models. The Big 4 two-stage results are similar to OLS results. The second-stage Big 4 model has four significant variables, LPOP, county councils, district councils, and DEBT. All variables are significant for DA, except FV and SURDEF. CLIENTS switches signs to positive, a results suggesting a fee premium for increased specialisation. Adjusted R² is similar for both Big 4 (at 91.7%) and DA (93.0%) and when compared with OLS results. The intercepts are roughly similar between OLS and two-stage for both Big 4 and district auditors, indicating no systematic shift when a self-selection correction is applied.

Lambda is a residual calculation of the first-stage probit regression and represents those factors that 'help' self-select into BIG 4 or DA, but are not captured in the OLS model. In the BIG 4 model, Lambda is insignificant, indicating no self-selection bias. Lambda is negative and significant for DA, which indicates a selection bias. This suggests that local authorities that used a DA auditor could have had a more 'efficient' audit (that is, lower fee) by using a Big 4 firm. In summary, the results using the Inverse Mills Ratio provide no evidence of a direct BIG 4 self-selection bias, since Lambda was insignificant.[17]

6.2. Size-adjusted model and other robustness checks

To control for client size, OLS regressions are rerun where the audit fee dependent variables (BASE FEE and TOTAL FEE) are scaled by population (Simunic, 1980). The remaining independent variables are the same. Results are summarised in Table 8. Without LPOP as an independent variable, adjusted R^2 drops to 59.0% in the BASE FEE model and 59.8% in the TOTAL FEE model. Because of extreme values, sample size is 379 in the BASE FEE model and 383 in the TOTAL FEE model. After rerunning the model without the extreme values, there are no additional diagnostic problems (heteroskedasticity was present in the earlier regressions).

Results are roughly the same as in Table 5. BIG 4 is still negative and significant in the BASE FEE model, but insignificant in the TOTAL FEE (BIG 4 would be significant at the 0.1 level). SMALL is insignificant in both models. Some other differences are noted. LPOPDEN, CLIENTS, and surplus deficit are not significant in either model. Financial viability was positive and significant in both models, an unexpected result. In summary, the results are somewhat unsatisfactory. However, the key point is that BIG 4 results are robust in this analysis, still negative and significant.

Following Ireland and Lennox (2002), we used rank transformation to control for size as measured by population. BASE FEE, TOTAL FEE and population were transformed into ranks and the

regressions rerun, with the remaining variables the same (results are not tabulated). Results were similar to those in Table 5. The adjusted R^2 values were lower, 82.2% for BASE FEE and 84.0% for TOTAL FEE. Seven of the eight significant variables from Table 5 for BASE FEE were also significant with the same signs. The exception was financial viability, which was not significant at .05 (but significant a 0.1). Seven of the 10 variables for TOTAL FEE were significant with the same signs. In both models, BIG 4 was negative and significant.

To determine whether the results were driven by specific private auditors, the OLS models were rerun using dummy variables for each private auditor (three BIG 4 and three SMALL). (Results are not tabulated.) All private firm dummies were negative and significant for the TOTAL FEE model. However, one SMALL audit firm was positive and significant for the BASE FEE model (all others were negative and significant). This firm audited nine local authorities. Unlike the other audit firms, the base fees and total fees were identical (averaging £83,378 or £821 per 1,000 population). In other words, this auditor provided no additional audit work.

As an additional test, the regressions were run using nominal values for audit fees, size and demographic variable rather than their logged values (not shown). In the earlier models, the log values for fees, size and demographic data were used because of skewness and long tails. This may understate the impact of the dummy variables and other non-logged variables. White's consistent t-statistics were calculated according to heteroskedasticity in the model. The results were generally the same in the TOTAL FEE model, except that SMALL was insignificant (BIG 4 continued to be negative and significant). The local authority dummies were more highly significant than in the earlier models. However, in the BASE FEE model, both BIG 4 and SMALL were insignificant.

The regression models also were rerun by local authority size groups—above and below the average 120,000 in population (results not presented). The findings were essentially the same across both size groups and comparable to the full sample (except for excluding local authority types). In all models, BIG 4 was negative and significant. In summary, there is evidence in most models that the BIG 4 firms provide a discount, but no evidence that BIG 4 charge a premium in any of the models.

7. Conclusions

The purpose of this paper was to introduce a model of audit fees of local authorities in England and Wales, and test it. The regression results have high explanatory power and work well to explain fee differences. Descriptive analysis indicates that ac-

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[17] The Heckman results were somewhat different for the other models. When BIG 4 was compared to DA using BASE FEE, Lambda was insignificant for both BIG 4 and DA indicating no self-selection bias. However, when all private audit firms were compared with DA, Lambda was negative and significant for private firms for both definitions of audit fee; the Lambda for DA was significant and negative only for TOTAL FEE. This suggests that fees are selected to provide lower fees than provided by the other audit category. In other words, when private firms are chosen, this provides lower fees than if a DA was chosen. On the other hand, when DA was chosen (using the TOTAL FEE definition), these districts also received relatively lower fees. In summary, there is evidence for fee bias in some models, but no statistical evidence of a BIG 4 bias.

Table 8
Regression analysis with coefficient (t-value) (extreme values eliminated);
dependent variables: BASE FEE and TOTAL FEE divided by population

	Log (BASE FEE / POP)	Log (TOTAL FEE / POP)
LPOPDEN	−0.014 (0.85)	−0.024 (0.19)
LAVGINC	−0.388 (−4.48)*	−0.382 (−4.60)*
SMALL	−0.098 (0.98)	−0.055 (−0.57)
BIG 4	−0.132 (−2.15)**	−0.108 (−1.85)
County council	−0.981 (−11.11)*	−0.986 (−11.63)*
District council	−0.215 (−2.97)*	−0.079 (−1.13)
Unitary authority	0.266 (3.59)*	0.317 (4.44)*
London borough	0.458 (5.16)*	0.489 (5.72)*
CLIENTS	−0.001 (−0.53)	−0.001 (−0.73)
FV	9.673 (2.39)**	11.213 (2.88)*
SURDEF	0.000 (1.46)	0.000 (1.93)
DEBT	0.001 (4.18)*	0.001 (3.97)*
Intercept	10.432	10.598
Adj. R^2	59.0%	59.8%
F Value	46.3*	48.4*
n	379	383

* Significant at 0.01; **Significant at 0.05
*** FEE PREM=fee premium; LPOP=log of population; LPOPDEN=log of population density; LAVGINC=log
of average income; SMALL=non-Big 4 audit firm; BIG 4=Big 4 audit firm; CLIENTS=number of local
authority clients; FV=financial viability; SURDEF=surplus/deficit; DEBT=debt per 1,000 population.

tual audit fees are usually above the standard fees
set by the Audit Commission. Big 4 firms receive
lower fees on average than district auditors. Audit
fee differences were noted across local authority
categories, with London boroughs having the
highest fees, *ceteris paribus*. The actual fee premi-
um over the standard was significantly lower for
private audit firms.

Regression results provided basic information
on multivariate relationships. Population size,
population density, and number of clients were
consistently significant in the fee and total fee

models. Council types as measured by dummy
variables also were often significant. Population
was negative and significant in the fee premium
models.

Relative to existing literature, the most surpris-
ing finding was the negative coefficients for Big 4
audits, indicating lower fees than those for district
auditors. Heckman's two-stage procedure, which
was run as a robustness check because of the po-
tential self-selection problems, provided ambigu-
ous results, although the results generally indicate
that there is, indeed, an audit fee discount for

Big 4 audits.

Additional analysis needs to be conducted on local authority audits in England and Wales, especially related to audit quality, which is reviewed by the commission. The relationship between audit fees and audit quality seems especially important given the regulatory environment of the Audit Commission. Differences in audit quality may relate to auditor type. The models can be expanded to capture additional data and factors that may relate to audit economic relationships. Changes over time (the regulatory environment has been dynamic, with substantial changes made over the previous 20 years) may show significant differences. Time series analysis is encouraged to capture these changes.

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