

# Audit Quality and Auditor Size: An Evaluation of Reputation and Deep Pockets Hypotheses

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## 1. INTRODUCTION

There is now a great deal of evidence that large audit firms provide higher quality audits and offer greater credibility to clients' financial statements than small audit firms. The stock market reacts more favourably when a company switches to a large auditor rather than to a small auditor (Nichols and Smith, 1983; and Eichenseher et al., 1989); large audit firms give more accurate signals of financial distress in their audit opinions (Lennox, 1999); companies with higher agency costs are more likely to hire large audit firms (Francis and Wilson, 1988; Johnson and Lys, 1990; DeFond, 1992; and Firth and Smith, 1992); large audit firms charge higher fees than small audit firms (Simunic and Stein, 1987; Beatty, 1989; Chan et al., 1993; and Craswell et al., 1995); and companies involved in IPOs experience less under-pricing when they hire large audit firms (Balvers et al., 1988; and Firth and Smith, 1992). Two explanations for the positive correlation between auditor size and audit quality have been provided by theoretical research – these relate to auditors' reputations and the depth of auditors'

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pockets.<sup>1</sup> This paper's contribution is to provide empirical evidence that distinguishes between these hypotheses.

DeAngelo (1981) has argued that large auditors have more incentive to issue accurate reports because they have more valuable reputations. When it becomes known that an auditor has negligently issued an inaccurate report, the auditor could suffer a loss of rent through fewer clients or lower fees. If large auditors have higher client-specific rents than small auditors, the loss of rent is greater for a criticised large auditor than a criticised small auditor. Therefore, large auditors should have more incentive to issue accurate reports. An alternative hypothesis is that auditors with more wealth at risk from litigation have more incentive to issue accurate reports (Dye, 1993). Since large auditors have deeper pockets, they should have more incentive to be accurate.

This paper empirically tests the predictions of these two hypotheses. In the absence of a deep pockets effect, the reputation hypothesis implies that large auditors are more accurate because they have more incentive to avoid reputation-damaging criticism. Therefore, one should find that large auditors receive less criticism (and litigation) than small auditors and that criticised auditors suffer reductions in demand compared to similar uncriticised auditors. In contrast, the findings suggest that large auditors are more prone to litigation and that criticised auditors do not suffer reductions in demand. This casts significant doubt on the empirical validity of the reputation hypothesis.

In contrast, the deep pockets hypothesis is consistent with litigation being positively correlated with auditor size. Intuitively, large auditors' deep pockets give them more incentive to issue accurate reports and increase the likelihood of litigation, conditional on an audit failure occurring. Moreover, the deep pockets hypothesis explains why there is little evidence for reputation effects. The reputation hypothesis presumes that there is some reliable signal of auditor accuracy, such as litigation. In the deep pockets model, litigation is a poor signal of accuracy for two reasons. First, auditors are only sued for issuing reports that are insufficiently conservative (type I errors); they are never sued for being too conservative (type II errors). Therefore, litigation does not signal auditors' type II error rates. Secondly, large auditors are more accurate than small auditors

but are also more likely to be sued when a type I error occurs because they are more prone to deep pockets court actions. Therefore, litigation is a poor signal of auditors' type I error rates.

Section 2 sets out a deep pockets model which examines the relationships between auditors' wealths, audit accuracy and litigation. The model illustrates important differences between the predictions of the deep pockets and reputation hypotheses. Section 3 then tests these differences empirically.

## 2. THE DEEP POCKETS MODEL

This section presents a model in which auditors have different wealth levels. The framework is similar to Dye (1993) where wealthier auditors have more incentive to issue accurate reports because they suffer larger litigation penalties. Auditor  $j$  has wealth,  $W_j$  ( $j \in (L, S)$ ,  $L$  denotes a large auditor and  $S$  a small auditor). The assumption that large auditors have more wealth at risk from litigation ( $W_L > W_S$ ) reflects the joint and several liability regime for audit firms, and means that large auditors have more incentive to issue accurate reports.

The model differs from previous deep pockets research by endogenising the litigation decision. Auditors' wealths affect not only the size of the litigation penalty, but also the probability that an inaccurate report results in a litigation suit. As in the reputation hypothesis, the deep pockets model predicts a positive relationship between auditor size and auditor accuracy. However, in contrast to the reputation hypothesis the deep pockets hypothesis allows a positive relationship between auditor size and litigation.

The time line of the model is shown in Figure 1. First, nature determines the company's future cashflows which are only observed after an investment costing  $I$ . The company has cashflows of  $\Pi_N$  with probability  $p$ , and  $\Pi_F$  with probability  $1 - p$ , where  $0 < p < 1$  and  $\Pi_N > I > \Pi_F$ .  $N$  denotes a non-failing company (a company with positive going-concern value), whilst  $F$  denotes a failing company (negative going-concern value). Prior to the investment, the company is offered for sale to outside investors who do not observe the company's type but do observe

Figure 1

$t = 1$	$t = 2$	$t = 3$	$t = 4$	$t = 5$
Nature determines the company's future cashflows	The initial owner hires a large or small auditor	The auditor sets a fee and decides how much effort to exert	The company is sold to the new owner	Nature determines the new owner's litigation costs, and the new owner decides whether to sue the auditor

the audit report and the auditor's wealth.<sup>2</sup> Perfect competition is assumed amongst potential new investors so that the company's selling price is equal to expected cashflows minus the required investment,  $I$ .

After the initial move by nature, the incumbent owner decides whether to hire a large or small auditor. It is assumed that the owner does not observe the company's type although the probability of corporate failure ( $p$ ) is common knowledge. The fee agreed between the incumbent owner and the profit-maximising auditor is determined by perfect competition in the audit market.<sup>3</sup>

Following the auditor hiring decision, auditor  $j$  chooses effort  $e_j$ , where  $e^* \leq e_j \leq 1$ . By definition, the minimum effort choice ( $e^*$ ) occurs when the audit report does not signal information about the company's type. It is assumed that the auditor does not observe the company's type prior to the effort decision, otherwise there would be no need for the auditor to exert effort. Exerting effort imposes a non-pecuniary cost  $C(e_j)$  on the auditor, where  $C'(e_j) > 0$ ,  $C''(e_j) > 0$ ,  $C(e^*) = 0$  and  $C(1) = +\infty$ .<sup>4</sup> The assumption that effort is privately observable and costly to the auditor introduces a moral hazard problem – the threat of litigation (rather than loss of reputation) is what deters the auditor from shirking. Audit quality is measured in terms of type I and II errors. A type I error occurs if a failing company ( $F$ ) is given a report of ' $N$ '; a type II error occurs if a non-failing company ( $N$ ) is given a report of ' $F$ '. The audit report is assumed to be accurate with probability  $e_j$ :

$$\text{Prob} ['F' | F, e_j] = \text{Prob} ['N' | N, e_j] = e_j.$$

Consistent with empirical evidence, it is assumed that auditors can only be sued for committing type I errors (see Table 1 and St. Pierre and Andersen, 1984).<sup>5</sup>

After the auditor's effort decision (and audit report), the company is sold by the incumbent owner to a new investor. The company's selling price depends on the audit opinion ('F' or 'N'), auditor effort ( $e_j$ ), and the cost of the investment,  $I$ .<sup>6</sup> Given a report of 'N' by auditor  $j$ , the company's selling price is zero if the investment cost exceeds the company's expected cashflow; otherwise, the selling price is equal to the difference between expected cashflow and the cost of the investment. Given a report of 'N' by auditor  $j$ , the company's selling price is therefore equal to:

$$\max \left\{ 0, \frac{pe_j\Pi_N + (1-p)(1-e_j)\Pi_F}{pe_j + (1-p)(1-e_j)} - I \right\}. \quad (1)$$

Given a report of 'F' by auditor  $j$ , the company's selling price is equal to:

$$\max \left\{ 0, \frac{p(1-e_j)\Pi_N + (1-p)e_j\Pi_F}{p(1-e_j) + (1-p)e_j} - I \right\}. \quad (2)$$

It is easily shown that the company's selling price is weakly increasing (decreasing) in  $e_j$  given a report of 'N' ('F'). Intuitively, audit reports are more accurate signals of financial health, the more effort that auditors exert.

*Definition*

The minimum level of audit effort ( $e^*$ ) occurs when the audit report has no information value – that is,  $e^*$  satisfies:

$$\frac{pe^*\Pi_N + (1-p)(1-e^*)\Pi_F}{pe^* + (1-p)(1-e^*)} = \frac{p(1-e^*)\Pi_N + (1-p)e^*\Pi_F}{p(1-e^*) + (1-p)e^*}.$$

Solving the above equation gives  $e^* = 0.5 (= 1 - e^*)$ . When the report has no information value, the company's expected selling price is:

$$\max \{ 0, p\Pi_N + (1-p)\Pi_F - I \}.$$

*Assumption 1*

$$\frac{pe_j\Pi_N + (1-p)(1-e_j)\Pi_F}{pe_j + (1-p)(1-e_j)} > \frac{p(1-e_j)\Pi_N + (1-p)e_j\Pi_F}{p(1-e_j) + (1-p)e_j}.$$

Assumption 1 means that attention is confined to equilibria where audit reports signal information about the company's type ( $e_j > e^*$ ,  $j = L, S$ ).

After the company is sold to the new owner, the investment ( $I$ ) is made and cashflows are realised. Having observed the company's cashflows, the new owner decides whether to sue the auditor – this assumption is realistic since most litigation claims occur following liquidation or take-over. It is assumed that there are two types of new owner and the types are only observed privately. A new owner with low litigation costs ( $K_L$ ) is more likely to sue and therefore poses a high litigation risk to the auditor; a new owner poses a low litigation risk if litigation costs are high ( $K_H$ ), where  $K_H > K_L > 0$ . The assumption of different litigation costs captures the fact that client characteristics other than financial health help to explain the amount of litigation incurred by auditors (Stice, 1991; Stice, 1993; and Hall and Renner, 1988). The new owner has low litigation costs with probability  $h$ , where  $h$  is determined by nature and both cost types exist in the population ( $0 < h < 1$ ).

Perfect competition in the audit market implies that the audit fee ( $F_j$ ) is equal to the cost of exerting effort ( $C(e_j)$ ) plus the auditor's expected litigation cost. The expected litigation cost depends on auditor wealth ( $W_j$ ) and the probability that the new owner chooses to sue. The probability of a litigation suit depends on the probability of corporate failure ( $1 - p$ ), auditor effort ( $e_j$ ), the new owner's litigation costs ( $K_H$  or  $K_L$ ), and wealth ( $W_j$ ).

The analysis begins by describing four mutually exclusive cases for the new owner's litigation costs and auditor wealth:

- (a)  $K_H > K_L > W_L > W_S$ ,
- (b)  $W_L > K_H > K_L > W_S$ ,
- (c)  $W_L > W_S > K_H > K_L$ ,
- (d)  $W_L > K_L > W_S > K_L$ .

Proposition 1 considers cases (a) and (b).<sup>7</sup>

*Proposition 1*

The set of equilibria in which  $K_H > K_L > W_L > W_S$ , or  $W_L > K_H > K_L > W_S$  violates Assumption 1.

The proof to Proposition 1 is very straightforward. When litigation costs exceed auditors' wealths ( $K_H > K_L > W_L > W_S$ ), neither the large nor small auditor face the threat of litigation and both types of auditor choose the minimum level of effort ( $e_L = e_S = e^*$ ). When litigation costs exceed the small auditor's wealth ( $W_L > K_H > K_L > W_S$ ), the small auditor faces no litigation threat and chooses the minimum level of effort ( $e_S = e^*$ ). Both cases violate Assumption 1, which requires the reports of large and small auditors to have some information value.

Previous deep pockets models have analysed equilibria in which auditors are always sued for committing type I errors (Dye, 1993; and Schwartz, 1997). Proposition 2 demonstrates that this is true in case (c) where litigation costs are less than auditor wealth.

*Proposition 2*

When  $W_L > W_S > K_H > K_L$ :

- Large auditors exert more effort than small auditors ( $e_L > e_S$ ) and issue more accurate reports.
- Large auditors are less likely to be sued than small auditors.
- Audit fees are  $F_j = C(e_j) + (1 - p)(1 - e_j)W_j$  ( $j = L, S$ )
- There exist equilibria in which only large auditors, only small auditors, or both types of auditor are hired.

To explain Proposition 2, consider auditor  $j$ 's profit-maximisation problem:

$$\max_{e_j} \pi_j = F_j - C(e_j) - (1 - p)(1 - e_j)W_j \quad (j = L, S). \quad (3)$$

Since the fee is set before the auditor's effort choice, the auditor takes the fee as given in (3), resulting in the first order condition,  $C'(e_j) = (1 - p)W_j$ . Since  $W_L > W_S$  and  $C''(e_j) > 0$ , it must be true that  $e_L > e_S$ . Therefore, large auditors' reports are more accurate than small auditors' reports and large auditors are less likely to be sued. In Proposition 2, the predictions of the reputation and deep pockets hypotheses are identical – large auditors are more accurate and incur less litigation than small auditors.

There are three factors affecting the difference between large and small auditors' fees ( $F_L$  and  $F_S$ ).

$$F_L = C(e_L) + (1 - p)(1 - e_L)W_L,$$

$$F_S = C(e_S) + (1 - p)(1 - e_S)W_S.$$

First, large auditors exert more effort and therefore have higher costs ( $C(e_L) > C(e_S)$ ). Secondly, large auditors have more wealth at risk ( $W_L > W_S$ ) and may therefore charge a higher insurance premium. These two effects mean that large auditors' fees tend to be higher than small auditors' fees. However, a third effect works in the opposite direction – since large auditors exert more effort, they are less likely to incur litigation and may therefore charge a lower insurance premium.

To explain why the audit market can consist of only large, only small or both types of auditor, it is necessary to consider the auditor hiring decision. When deciding whom to hire, the incumbent owner's expected payoff depends on the company's expected selling price minus the audit fee. The owner would prefer to hire the large auditor if he knew that the report would be 'N' since the large auditor's report is more credible and has a greater effect on the company's selling price. The owner would prefer to hire the small auditor if he knew that the report would be 'F', since the small auditor's report is less credible. When deciding who to hire, the initial owner does not know what the audit report will be and so is unsure whether to hire the large or small auditor. The initial owner's choice of auditor depends on the values for the exogenous parameters ( $p$ ,  $h$ ,  $I$ ,  $\Pi_F$ ,  $\Pi_N$ ,  $W_L$ ,  $W_S$ ,  $K_L$ ,  $K_S$ ) and the functional form of the cost function  $C(e_j)$ . In numerical examples, the Appendix describes three equilibria where only large auditors are hired, only small auditors are hired, or both types are hired.

Proposition 3 considers case (d) where, conditional on a type I error occurring, the large auditor is always sued whilst the small auditor is only sued by new owners who have low litigation costs.

*Proposition 3*

When  $W_L > K_H > W_S > K_L$ :

- Large auditors exert more effort than small auditors ( $e_L > e_S$ ) and issue more accurate reports.



- *Large auditors' fees are  $F_L = C(e_L) + (1 - p)(1 - e_L)W_L$ .*
- *Small auditors' fees are  $F_S = C(e_S) + (1 - p)h(1 - e_S)W_S$ .*
- *Equilibria exist in which only large auditors, only small auditors, or both types of auditor are hired.*
- *There is an ambiguous relationship between auditor size and litigation.*

The intuitions for the relationships between auditor size, auditor accuracy, audit fees and auditor hiring are exactly the same as in Proposition 2. The profit maximisation problems for large and small auditors are:

$$\begin{aligned} \max_{e_L} \pi_L &= F_L - C(e_L) - (1 - p)(1 - e_L)W_L \\ \max_{e_S} \pi_S &= F_S - C(e_S) - (1 - p)h(1 - e_S)W_S e_S. \end{aligned}$$

The large auditor exerts effort such that  $C'(e_L) = (1 - p)W_L$ , whilst the small auditor exerts effort such that  $C'(e_S) = h(1 - p)W_S$ . The large auditor chooses to exert more effort ( $e_L > e_S$ ) and large auditors' reports are more accurate.

The key insight of Proposition 3 is that the relationship between auditor size and litigation is ambiguous despite the superior accuracy of large auditors. In Proposition 2, large auditors are less likely to be sued because they are more accurate,  $(1 - p)(1 - e_L) < (1 - p)(1 - e_S)$ . In Proposition 3, there is a second effect – large auditors are more prone to deep pockets actions. Given that a type I error occurs, large auditors are always sued whilst small auditors are only sued with probability  $h$ . Therefore, the large auditor is sued with probability  $(1 - p)(1 - e_L)$  whilst the small auditor is sued with probability  $h(1 - p)(1 - e_S)$ . The Appendix provides two numerical examples where large auditors are less likely to be sued because of their superior accuracy ( $(1 - p)(1 - e_L) < h(1 - p)(1 - e_S)$ ), and where large auditors are more likely to be sued because they are more prone to deep pockets actions ( $(1 - p)(1 - e_L) > h(1 - p)(1 - e_S)$ ).

The deep pockets model is important because it identifies two differences between the predictions of the reputation and deep pockets hypotheses. First, the reputation hypothesis predicts that large auditors are less likely to be sued because of their superior accuracy. In contrast, the deep pockets hypothesis predicts that large auditors may be more prone to litigation. Secondly, the

reputation hypothesis predicts that signals of auditor accuracy, such as litigation and auditor criticism, affect the demand for audit services. The validity of this prediction depends on whether these signals are strongly correlated with auditor accuracy. The deep pockets hypothesis predicts that litigation against audit firms is not a strong signal of accuracy for two reasons. First, auditors are only sued for type I errors and so litigation does not signal auditors' type II error rates. Secondly, deep pockets make a large auditor more prone to litigation conditional on a type I error occurring – therefore, litigation is a poor signal of auditors' type I error rates. The next section tests the predictions of the reputation and deep pockets hypotheses by examining the relationship between auditor size and litigation, and by comparing the market shares of criticised and uncriticised auditors.

### 3. THE EMPIRICAL EVIDENCE

There are two key findings in this section. First, large auditors are more likely to be sued (and criticised) – this contradicts the reputation hypothesis but is consistent with the deep pockets hypothesis. Secondly, the evidence does not suggest that auditors suffered falls in demand as a result of criticism – this is also contrary to the reputation hypothesis, but is consistent with the deep pockets hypothesis.

The population consists of all UK publicly quoted companies between 1987–94. Data were collected on each company's auditor, audit report, audit fee, shareholdings and assets from annual reports kept on microfiche at Warwick University. The sample was selected on the basis of microfiche availability and consists of 1,036 companies.<sup>8</sup> There were 123 companies in the sample that entered administration, liquidation or receivership – the frequency of failure averaged 1.3% per annum which was approximately equal to the population frequency (Morris, 1997).

Next, a search was made of the *Financial Times*, the *Economist*, *Accountancy Age* magazine and Department of Trade and Industry (DTI) investigations for news items in which auditors received criticism. These criticisms are listed in Table 1. Auditors were most susceptible to criticism when one of two events occurred.

**Table 1**  
**Criticisms of UK Audit Firms (1988–94)**

<i>Auditor</i>	<i>Date</i>	<i>News</i>	
<i>Stoy</i>	19:02:90	The bankrupt AT Trust served Stoy with writ for audit.	
	<i>Hayward</i>	23:12:90	ICAEW announced investigation into audit of bankrupt Levitt Group.
		22:11:90	Stoy criticised by shareholders for its audits of Polly Peck and Astra Holdings.
	10:01:91	Labour Party criticised Stoy for its audit of the Levitt Group.	
	08:04:91	Amber Day decided not to retain Stoy as its auditor because of concern shown by some City institutions over Stoy's audits of Polly Peck, Sock Shop, Levitt Group and Homes Assured.	
	29:04:93	Stoy served with writ for its audit of Polly Peck.	
	18:06:93	Stoy criticised in DTI investigation of Astra Holdings.	
	21:06:93	Stoy served with writ in connection with audit of Beverley Group (formerly known as Petrocon).	
	30:11:93	Financial Reporting Review Panel criticised the accounts of Chrysalis which were unqualified.	
	14:05:94	Stoy served with writ for audit of Astra Holdings.	
<i>Ernst and Young</i>	27:07:88	Ruberoid served writ for £8.9m against Ernst and Whinney for audit of Camrex.	
	22:10:88	Arthur Young paid £12m in settlement to the Bank of England for its audit of Johnson Matthey Bank.	
	27:10:88	Arthur Young criticised by DTI over audit of Milbury Plc.	
	30:06:89	Stoddard Sekers considered legal action against Arthur Young for its audit of Sekers International, with which it had merged.	
	02:03:89	Arthur Young criticised by shareholders and creditors over its audit of Sound Diffusion.	
	04:08:89	Arthur Young admitted that two sets of accounts for Budgens (1986 and 1987) which it had audited were incorrect.	
	19:10:89	Ernst and Young faced legal action from a Lloyd's syndicate for its audit of Warrilow.	
	30:11:89	Arthur Young and Ernst and Whinney received a writ for their work on Sound Diffusion.	
	29:08:90	Arthur Young criticised by DTI for its audit of Alexander Howden Holdings.	
	01:05:91	Arthur Young and Ernst and Whinney criticised by DTI for its audit of Sound Diffusion.	
	06:07:91	BCCI was liquidated – speculation begins over the role of Ernst and Young.	
	24:07:91	Arthur Young criticised by DTI for its audit of Rotaprint.	
	12:09:91	Arthur Young served with writ for its audit of Magnet.	
	18:02:92	Arthur Young fined £100,000 by Joint Disciplinary Scheme for its work on Milbury.	
	07:03:92	Ernst and Young (and Price Waterhouse) received writ from the liquidators of BCCI for £7.5 bn.	
	25:04:92	Joint Disciplinary Scheme announced investigation into Ernst and Young for its audit of BCCI.	
	01:10:92	Claim made by Walker Greenbank for £15m against Arthur Young regarding the acquisition of Alkar.	
	18:02:93	Ernst and Young criticised by DTI regarding its work on Edencorp Leisure.	
19:06:94	Magnet made a claim against its auditor Arthur Young for £50m.		

**Table 1 (Continued)**

<i>Auditor</i>	<i>Date</i>	<i>News</i>
<i>Price Waterhouse</i>	07:04:88	UniChem made official complaint over a report PW prepared for its audit client Macarthy in its bid for UniChem.
	02:05:90	PW accused in court of misleading Guinness directors.
	12:04:91	PW reached out of court settlement with Pifco for negligence in its audit of Salton – amount undisclosed.
	06:07:91	BCCI was liquidated – speculation begins over the role of Price Waterhouse.
	07:03:92	Price Waterhouse (and Ernst and Young) received writ from the liquidators of BCCI for £7.5bn.
	29:01:94	Financial Reporting Review Panel criticised the accounts of Intercare which were not qualified by Price Waterhouse.
	01:02:94	Joint Disciplinary Scheme reprimanded Price Waterhouse for failing to reveal a fraud it had uncovered 14 years previously during an audit of Bryanston Finance.
	<i>Touche Ross</i>	25:10:88
19:10:89		Spicer and Oppenheim faced legal action from a Lloyd's syndicate for its audit of Warrilow.
20:03:91		Spicer and Pegler criticised by DTI for its work on Aldermanbury Trust.
25:02:92		Joint Disciplinary Scheme re-opened Barlow Clowes investigation (the previous investigation was suspended following a request from the Serious Fraud Office).
16:10:92		Financial Reporting Review Panel forced Trafalgar House to amend its 1991 accounts which were not qualified by Touche Ross.
03:11:92		The Treasury and liquidators issued a writ against Touche Ross for Barlow Clowes.
21:07:94		Spicers criticised by DTI over its work on Atlantic Computers.
<i>KPMG Peat Marwick</i>	18:11:89	Ferranti served writ against Peat Marwick.
	13:09:90	Peat Marwick criticised for its audit of the N.U.M.'s accounts.
	10:04:91	Riva Group sued KPMG for negligence over its acquisition of Hugin Sweda.
	13:08:91	Peat Marwick paid out £40m in settlement to Ferranti.
	17:09:92	KPMG served with writ for its audits of HS Weavers.
	22:12:92	Adam & Co. announced they are considering legal action against KPMG.
	23:09:93	KPMG criticised by DTI for its work on London United Investments.
	30:11:93	Financial Reporting Review Panel argued that Chrysalis' accounts audited by KPMG in 1992 were contrary to <i>SSAPI</i> .
	23:12:93	KPMG sued over its valuation of Medway Ports.
<i>Coopers &amp; Lybrand</i>	26:01:89	Coopers issued with a writ for 1.96m pounds for its audit of Espley Trust.
	08:04:89	Laird Group dismissed Coopers after finding errors in the accounts of Metro-Cammell Weymann.
	18:05:89	Deloitte Haskins criticised following its overvaluation of stocks and work-in-progress held by E&L Instruments.

**Table 1 (Continued)**

<i>Auditor</i>	<i>Date</i>	<i>News</i>
	08:05:91	TGI dismissed Coopers following incorrect profit figures in the accounts of Tannoy Audix which were audited by Coopers.
	12:12:91	Coopers criticised for its role as auditor in Maxwell Communications.
	04:01:93	Guardian Royal Exchange issued a writ against Coopers in relation to its 1986–8 audits.
	11:08:93	Financial Reporting Review Panel criticised accounts of Royal Bank which were not qualified by Coopers.
	27:09:93	Financial Reporting Review Panel criticised accounts of Control Techniques which were not qualified by Coopers.
	21:07:94	Deloitte criticised by DTI for work on Atlantic Computers.
<i>Arthur Anderson</i>	11:03:88	UK government sued Arthur Anderson in US courts over its audit of DeLorean Motor Company.
	12:09:91	Arthur Anderson served with writ for its audit of Magnet.
	23:02:93	Financial Reporting Review Panel criticised the accounts of Eurotherm which were not qualified by Arthur Anderson.
<i>Pannell Kerr Forster</i>	11:07:91	Pannell Kerr Forster paid £1.63m in settlement to Beaverco Kerr for its audit of Body Sculpture.
	29:01:92	Financial Reporting Review Panel criticised the annual report of Williams Holdings, which contravened SSAP3 yet Pannell Kerr Forster gave no qualification.
<i>Binder Hamlyn</i>	29:07:92	ADT issued a writ for £146m against Binder in connection with the takeover of Britannic Security.
<i>Grant Thornton</i>	01:02:90	Platignum served a writ against Grant Thornton for its profit forecast.
<i>Moore Rowland</i>	31:07:91	SEET issued a writ against Moore Rowland in connection with past acquisition of Homemaker Shops.

First, auditors were criticised for not giving adequate warnings of bankruptcy. Secondly, auditors were criticised following takeovers – the auditors of target companies were sometimes criticised by acquirers who believed they had paid too much as a result of over-stated accounts.

Table 2 summarises the criticisms, the number of clients, average client size, and the number of failing clients by audit firm. The evidence shows that large auditors received much more criticism and litigation than small auditors. Large auditors also audited larger companies than small auditors and audited more companies. This suggests that it is important to control for client numbers and client size when investigating the relationship between auditor size and litigation. Ernst and Young and Stoy Hayward were the most heavily criticised audit firms. Whilst a

**Table 2**

Number of Criticisms, Number of Clients, Average Client Size and Number of Corporate Failures

<i>AUDITOR</i>	<i>CRITICISMS</i>			<i>CLIENTS</i>	<i>ASSETS</i>	<i>FAILURES</i>
	TOTAL	DTI	WRITS			
KPMG Peat Marwick	9	1	5	238	305,308	17
Coopers and Lybrand	9	1	2	185	724,530	20
Ernst and Young	13	4	7	127	669,603	9
Price Waterhouse	6	0	2	116	465,768	13
Touche Ross	5	2	2	104	191,718	11
Arthur Anderson	3	0	2	58	158,138	8
Binder Hamlyn	1	0	1	70	90,254	11
Stoy Hayward	7	1	4	40	53,579	9
Grant Thornton	1	0	1	38	44,486	6
Pannell Kerr Forster	2	0	1	29	75,656	0
Robson Rhodes	0	0	0	23	28,720	1
Kidsons Impey	0	0	0	13	194,816	1
Hacker Young	0	0	0	13	23,649	3
Moores Rowland	1	0	1	11	25,119	1
Clark Whitehill	0	0	0	10	496,273	0
Neville Russell	0	0	0	9	18,211	0
Baker Tilly	0	0	0	5	152,494	0
Very small audit firms <sup>1</sup>	0	0	0	1.25	28,925	0.11

*Notes:*

CRITICISMS ≡ Number of criticisms cited in Table 1 for each auditor.

TOTAL ≡ Total number of criticisms (cases mentioned in more than one news item were only counted once).

DTI ≡ Number of criticisms by DTI.

WRITS ≡ Number of writs and liability settlements.

ASSETS ≡ Average asset size of clients.

CLIENTS ≡ Number of clients audited between 1987-94.

FAILURES ≡ Number of clients that entered liquidation, administration or receivership between 1987-94.

<sup>1</sup> An audit firm falls into this category if it audited fewer than five of the quoted companies in the data – there are 122 such audit firms. The CLIENTS, ASSETS and FAILURES values are averaged over these 122 firms.

relatively large proportion of Stoy Hayward's clients (22.5%) were failing companies, the same was not true for Ernst and Young (7.1%). Thus, there does not appear to be a straightforward relationship between client portfolios and the amount of criticism incurred by auditors.

If the reputation hypothesis is valid, one would expect to find a negative relationship between auditor size and litigation. If the deep pockets hypothesis is important, the relationship between

auditor size and litigation is ambiguous. Unfortunately, it is difficult to investigate the relationship between auditor size and litigation, because many disputes appear to be settled in undisclosed out-of-court agreements. To address this problem, two dependent variables are used as proxies for litigation. In Table 3, models 1 and 2 use the number of disclosed writs and litigation settlements ( $WRIT_j$ ); models 3 and 4 use the total number of criticisms ( $CRIT_j$ ) as a proxy for disclosed and undisclosed litigation.<sup>9</sup> Client size is controlled for by including a variable equal to the average asset size of auditor  $j$ 's clients ( $ASSETS_j$ ). Differences in client portfolios might also explain the amount of litigation – in particular, audit firms with aggressive marketing strategies may be less likely to suffer falls in demand, but may also have clients that are more likely to sue. Hence, the number of failing companies as a proportion of total audited clients ( $FAILS_j$ ) is included to capture differences in litigation risk across auditors' client portfolios. Finally, dummy variables ( $SH_j$  and  $EY_j$ ) are included to capture the fact that Stoy Hayward and Ernst and Young were most heavily criticised.

The results show a highly significant positive association between auditor size ( $BIGSIX_j$ ) and both measures of litigation ( $WRIT_j$  and  $CRIT_j$ ) – this result was found to be robust for different model specifications.<sup>10</sup> The strong positive relationship between auditor size and litigation shows that large auditors were more prone to litigation despite their superior accuracy.<sup>11</sup> This is consistent with the deep pockets hypothesis, but inconsistent with the reputation hypothesis. The coefficients on average client size ( $ASSETS_j$ ) were insignificant indicating that it is auditor size rather than company size that determines the amount of litigation. The insignificant coefficients on  $FAILS_j$  show that differences in client portfolios do not explain the amount of litigation incurred. Finally, models 1 and 3 confirm that Stoy Hayward ( $SH_j$ ) and Ernst and Young ( $EY_j$ ) were much more likely to receive criticism than other audit firms.

If the reputation hypothesis is valid, one would expect to find that criticised auditors suffered declines in demand.<sup>12</sup> Arguably, the most serious criticisms involved Polly Peck, Astra Holdings (both audited by Stoy Hayward) and BCCI (audited by Price Waterhouse and Ernst and Young).<sup>13</sup> Taking into account the number, severity and timing of these criticisms, one can make

**Table 3**

Model Explaining the Amount of Litigation Incurred by Auditors  
(*t*-statistics in parentheses)

	<i>Model 1</i>	<i>Model 2</i>	<i>Model 3</i>	<i>Model 4</i>
<i>Dependent Variable</i>	WRIT <sub><i>j</i></sub>	WRIT <sub><i>j</i></sub>	CRIT <sub><i>j</i></sub>	CRIT <sub><i>j</i></sub>
<i>Explanatory Variables</i>				
FAILS <sub><i>j</i></sub>	0.012e-02 (0.157)	0.232e-02 (0.932)	0.006e-02 (0.064)	0.382e-02 (0.925)
ASSETS <sub><i>j</i></sub>	-0.571e-08 (-1.128)	0.827e-08 (0.670)	0.377e-08 (0.854)	2.200e-08 (1.428)
BIGSIX <sub><i>j</i></sub>	0.021 (5.435)	0.022 (4.495)	0.045 (13.702)	0.045 (6.815)
SH <sub><i>j</i></sub>	0.099 (122.568)	-	0.173 (191.359)	-
EY <sub><i>j</i></sub>	0.044 (13.810)	-	0.054 (22.166)	-
CONSTANT	0.001 (1.802)	0.002 (1.498)	0.001 (1.557)	0.002 (1.312)
R <sup>2</sup>	0.590	0.152	0.781	0.274

*Notes:*

Number of observations = 139.

$$\text{WRIT}_j = \frac{\text{Number of Writs and Liability Settlements}}{\text{Number of Clients}}$$

$$\text{CRIT}_j = \frac{\text{Number of Individual Criticisms}}{\text{Number of Clients}}$$

$$\text{FAILS}_j = \frac{\text{Number of Failing Clients}}{\text{Number of Clients}}$$

ASSETS<sub>*j*</sub> = Average asset size of clients for auditor *j*.

BIGSIX<sub>*j*</sub> = 1 if auditor *j* was one of the Big Six; = 0 otherwise.

SH<sub>*j*</sub> = 1 if auditor *j* was Stoy Hayward; = 0 otherwise.

EY<sub>*j*</sub> = 1 if auditor *j* was Ernst and Young; = 0 otherwise.

A standard regression model was found to suffer from heteroscedasticity and outlier problems – therefore, robust regression was used to estimate consistent standard errors.

three predictions which relate to the market shares of criticised and uncriticised auditors.<sup>14</sup>

1. Stoy Hayward received more criticism than other medium-sized auditors between 1990–94. One therefore expects that Stoy Hayward lost more clients than similar uncriticised auditors and/or suffered lower growth in audit fees between 1990–94.



Moreover, Stoy Hayward received much more criticism after 1990 than it did before 1990. One therefore expects that Stoy Hayward lost more clients and/or had lower growth in audit fees between 1991–94 than between 1988–90.

2. Ernst and Young received more criticism than other large auditors between 1988–94. One therefore expects that Ernst and Young lost more clients and/or had lower growth in audit fees compared to other large auditors.

3. The BCCI affair created serious criticism of Ernst and Young and Price Waterhouse between 1991–93. One therefore expects that Ernst and Young and Price Waterhouse lost more clients and/or had lower growth in audit fees between 1991–93 than between 1988–90. One also expects that between 1991–93, Ernst and Young and Price Waterhouse lost more clients and/or had lower growth in audit fees compared to other large auditors.

Table 4 shows average audit fees and auditors' net gains (+) and losses (–) of clients. The evidence indicates that large auditors gained more quoted clients than small auditors. This is consistent with the view that large auditors were believed to be more accurate despite being more prone to criticism. In addition, the early 1990s witnessed a slowdown in the growth of audit fees, particularly for small and medium-sized audit firms.

The evidence does not support the first prediction – Stoy Hayward did not suffer greater losses compared to similar uncriticised auditors. Stoy Hayward had a net loss of 1 client (2.5% of its clients) between 1990–94, whilst other medium-sized auditors had average losses of 1.7 clients (6.9% of their clients). Between 1990–94, audit fees fell by 23.0% for Stoy Hayward – for other medium-sized auditors fees rose by 3% (excluding Kidsons Impey, audit fees for other medium-sized auditors fell by 11.6%).<sup>15</sup> Thus, Stoy Hayward did not suffer as many client losses as similar uncriticised auditors but did suffer a greater decline in fees. Stoy Hayward did not appear to suffer larger losses between 1991–94 as a result of criticisms received after 1990. Stoy Hayward's client loss was worse between 1991–94 than it had been between 1988–89 – however, the same was true for four of the other seven medium-sized auditors (Grant Thornton, Panell Kerr Forster, Kidsons Impey and Hacker Young). Between 1988–89, Stoy Hayward gained two clients (5% of its clients) and had a 26.1% increase in fees – between 1991–94 Stoy Hayward

**Table 4**

Changes in Clients (+/-) and Average Audit Fees (£000's) (1988-94)

<i>Big-Six Auditors</i>		1988	1989	1990	1991	1992	1993	1994
KPMG Peat Marwick: Clients		+3	-1	+2	+2	+4	+3	+3
	Average audit fees	255.6	284.8	308.8	315.8	346.5	373.5	350.9
Coopers & Lybrand: Clients		+3	+4	+1	0	+5	+5	-1
	Average audit fees	383.9	430.0	450.0	444.8	464.1	452.0	462.3
Ernst & Young: Clients		+1	+3	-3	+2	-1	-2	+8
	Average audit fees	407.6	426.1	475.5	490.7	526.5	558.4	546.3
Price Waterhouse: Clients		+4	+3	+6	0	0	+4	+1
	Average audit fees	292.9	327.5	322.6	348.6	391.7	379.6	370.8
Touche Ross: Clients		+4	0	-2	-1	+1	+2	+1
	Average audit fees	214.5	231.9	254.3	249.1	241.0	199.3	203.5
Arthur Anderson: Clients		+5	+1	+1	+1	+1	+1	+1
	Average audit fees	197.2	223.7	263.6	251.0	273.2	263.3	266.3
Total: Clients		+20	+10	+5	+4	+10	+13	+13
	Average audit fees	304.6	334.4	358.4	364.4	388.8	391.3	385.8
<i>Medium-Sized Auditors</i>		1988	1989	1990	1991	1992	1993	1994
Binder Hamlyn: Clients		-3	-3	+3	0	+2	-2	0
	Average audit fees	93.6	108.1	118.0	138.6	123.4	133.4	138.6
Stoy Hayward: Clients		+1	+1	+1	0	-2	+1	-1
	Average audit fees	83.6	105.4	94.6	93.1	78.7	78.3	72.8
Grant Thornton: Clients		0	+1	0	+1	-2	-2	-2
	Average audit fees	70.8	88.0	102.4	94.5	91.7	91.7	78.6
Pannell Kerr Forster: Clients		+1	+1	-2	+2	0	-2	-2
	Average audit fees	156.0	187.9	209.7	202.0	167.5	167.3	133.7
Robson Rhodes: Clients		0	-1	0	0	0	-1	0
	Average audit fees	49.9	51.3	61.2	63.3	61.4	61.1	62.8
Kidsons Impey: Clients		-1	+1	+1	-2	0	0	-1
	Average audit fees	238.1	282.8	271.0	410.0	456.8	544.7	707.7
Hacker Young: Clients		-1	+1	-1	0	0	-2	0
	Average audit fees	107.6	122.9	69.0	70.9	61.0	37.6	37.0
Moores Rowland: Clients		0	0	0	0	+1	0	0
	Average audit fees	54.5	69.5	81.8	84.4	63.4	61.1	65.2
Total: Clients		-3	+1	+2	+1	-1	-8	-6
	Average audit fees	99.7	119.7	123.9	132.4	121.7	126.8	123.7
<i>Small Auditors</i>		1988	1989	1990	1991	1992	1993	1994
All other auditors: Clients		-17	-11	-7	-5	-9	-5	-7
	Average audit fees	61.7	73.6	74.8	80.3	80.1	72.4	79.9

lost three clients (7.5% of its clients) and suffered a 21.2% fall in fees. Whilst Stoy Hayward's market share performance was much worse between 1991–94 than between 1988–89, the same was also true for other medium-sized auditors. Between 1988–89, other medium-sized auditors lost five clients (2.5% of their clients) and had a 19.0% increase in fees – between 1991–94 these auditors lost 13 clients (6.6%) and suffered a 3.9% fall in fees (excluding Kidsons Impey, other medium-sized auditors suffered a 15.7% fall in fees). Overall, the evidence does not indicate that Stoy Hayward experienced a larger fall in demand compared to similar uncriticised auditors.

The evidence is less clear for the second prediction – that Ernst and Young suffered greater losses than other large auditors. Between 1988–94, Ernst & Young gained eight clients (6.3% of its clients) whilst other large auditors had average gains of 13.4 clients (9.6% of their clients). Over the same period, fees rose 34.0% for Ernst & Young and 24.7% for other large auditors. This suggests that Ernst & Young did not gain as many clients as other large auditors because of an increase in fees.

Finally, the evidence does not support the third prediction – that Price Waterhouse and Ernst and Young suffered falls in demand as a result of the BCCI affair. Between 1991–93, Ernst & Young lost one client (0.8% of its clients) and had a 13.8% increase in fees, while Price Waterhouse gained four clients (3.4% of its clients) and experienced an 8.9% increase in fees. Over the same period, other large auditors gained an average of six clients (4.1% of their clients) whilst fees increased by 5.8%. The worse performance of Ernst & Young and Price Waterhouse in terms of client gains appears to have been offset by a relative increase in fees.<sup>16</sup>

To examine further the effects of criticism, a reputation variable ( $REP_{it}$ ) was included in a model of auditor switching. The most heavily criticised audit firms were Stoy Hayward (1990–94), Ernst & Young (1987–94) and Price Waterhouse (1991–93). For companies audited by these auditors in these time periods,  $REP_{it} = 1$ ; for other observations  $REP_{it} = 0$ .

Previous research indicates that companies are more likely to switch following qualified reports and that failing companies are more likely to switch (Chow and Rice, 1982; and Menon and Schwartz, 1985). Therefore, lagged audit reports ( $Q_{it-1}$ ) and

**Table 5**  
 Probit Model of Auditor Switching (1988–94)  
 (SW<sub>it</sub> is the dependent variable – z-statistics in parentheses)

<i>Explanatory Variables</i>	<i>Model 1</i>	<i>Model 2</i>	<i>Model 3</i>	<i>Model 4</i>
Q <sub>it-1</sub>	0.734 (5.414)	0.718 (5.386)	0.716 (5.480)	– –
FAILS <sub>it</sub>	0.457 (2.689)	0.556 (3.547)	0.571 (3.755)	– –
MGTSH <sub>it</sub>	0.342e-02 (2.202)	0.485e-02 (3.405)	– –	– –
MAJSH <sub>it</sub>	0.552e-02 (2.666)	0.812e-02 (4.274)	– –	– –
ASSETS <sub>it</sub>	–0.216e-06 (–1.852)	– –	– –	– –
REP <sub>it</sub>	–0.003 (–0.031)	0.001 (0.013)	–0.022 (–0.268)	–0.036 (–0.451)
CONSTANT	–1.939 (–30.824)	–2.024 (–35.942)	–1.820 (–53.614)	–1.771 (–55.072)

*Notes:*

Number of observations = 6,052.

SW<sub>it</sub> = 1 if company *i* experienced a change in auditor in year *t*; = 0 otherwise.

Q<sub>t-1</sub> = 1 if company *i* received a qualified report in year *t* – 1; = 0 otherwise.

FAILS<sub>it</sub> = 1 if company *i* received its final audit report in year *t* prior to entering bankruptcy; = 0 otherwise.

MGTSH<sub>it</sub> = The percentage of ordinary shareholdings held by the directors.

MAJSH<sub>it</sub> = The percentage of ordinary shareholdings held by other large shareholders.

ASSETS<sub>it</sub> = Asset size of company *i* in year *t*.

REP<sub>it</sub> = 1 if company *i* hired Stoy Hayward (1990–94), Ernst & Young (1987–94), or Price Waterhouse (1991–93) in year *t*; = 0 otherwise.

Directors' ordinary shareholdings are expressed as a percentage of issued ordinary share capital. Shareholding data were not collected for all observations because of the high cost of collecting this information. For companies that did not switch auditor over the study period, shareholding information was only collected for 1990 and is used as a proxy for the missing observations in other years. In practice, this is unlikely to cause measurement error problems since ownership patterns typically exhibit little variation over time. For companies that did switch, shareholding data were collected for all years because ownership patterns may be less stable for such companies.

Large shareholdings held by individuals, companies and trust funds were only disclosed in the accounts if they exceeded 5%. For each company, the sum of these excess shareholdings was calculated. For example, suppose that company *i* had the following large shareholders in year *t*

Individual A: 8% Individual B: 10% Individual C: 5.5%.

For this observation, MAJSH<sub>it</sub> would be calculated as follows:

MAJSH<sub>it</sub> = (8–5) + (10–5) + (5.5–5) = 8.5.

This measure avoided putting undue weight on observations with a lot of shareholdings only slightly in excess of 5%.

financial health ( $FAILS_{it}$ ) are included in the switching model. Event study evidence indicates that a switch may signal unfavourable news to investors (Fried and Schiff, 1981; and Eichen-seher et al., 1989). Agency theory implies that companies have more incentive to avoid signalling unfavourable news when agency costs are high (when there is a high degree of separation of ownership from control). Therefore, the shareholdings of directors ( $MGTSH_{it}$ ) and large investors ( $MAJSH_{it}$ ) are hypothesised to have a positive effect on auditor switching. The effect of company size is controlled for using companies' assets ( $ASSETS_{it}$ ).

Consistent with previous research, models 1–3 show that lagged reports ( $Q_{it-1}$ ) and financial health ( $FAILS_{it}$ ) were significant determinants of auditor switching. Failing companies were more likely to switch auditor than non-failing companies, and companies were more likely to switch after receiving qualified reports. The significant positive coefficients on the shareholding variables ( $MGTSH_{it}$  and  $MAJSH_{it}$ ) indicate that companies had more incentive to switch when directors' and other large shareholdings were high (when agency costs were low). Consistent with the analysis of Table 4, the coefficients on the reputation variable ( $REP_{it}$ ) were completely insignificant – the evidence does not support the view that there were significant reputation effects.<sup>17</sup>

#### 4. CONCLUSION

Analytical studies have developed reputation and deep pockets hypotheses to explain why large auditors are more accurate than small auditors. To try to distinguish between these hypotheses, this paper investigated the effects of criticism on the demand for audit services and the relationship between auditor size and litigation. The evidence appears to give stronger support to the deep pockets hypothesis in two ways. First, large auditors were more prone to litigation despite their superior accuracy – this is contrary to the reputation hypothesis, but is consistent with the deep pockets hypothesis. The main limitation of this finding is that most litigation cases are resolved privately, which makes it difficult to accurately test the relationship between auditor size and litigation. Secondly, criticised auditors did not suffer client losses or lower

fees compared to similar uncriticised auditors. This suggests that reputation does not explain the superior accuracy of large auditors.

The lack of evidence for reputation effects is unsurprising if the deep pockets hypothesis is valid, because the reputation hypothesis relies upon there being a reliable signal of auditor accuracy. In the deep pockets model, litigation is an unreliable signal of accuracy for two reasons. First, litigation does not signal auditors' type II error rates because auditors are never sued for issuing reports that are too conservative. Secondly, large auditors are more likely to incur litigation despite their superior accuracy – therefore, litigation is a noisy signal of auditors' type I error rates.

This paper's conclusion does not contradict the widely-held view that large audit firms have reputations for higher quality audits. If investors know that large auditors have deeper pockets, they would know that large auditors have more incentive to issue accurate reports – in this sense, large auditors have better reputations. However, it appears to be the threat of litigation rather than the loss of client-specific rents that drives the superior accuracy of large auditors.

## APPENDIX

### *The Incumbent Owner's Auditor Hiring Decision*

From (1) and (2), the incumbent owner's expected payoff from hiring auditor  $j$  is the company's expected selling price minus the audit fee:

$$\begin{aligned} & \max\{0, pe_j\Pi_N + (1 - p)(1 - e_j)\Pi_F - I[pe_j + (1 - p)(1 - e_j)]\} + \\ & \max\{0, p(1 - e_j)\Pi_N + (1 - p)e_j\Pi_F - I[p(1 - e_j) + (1 - p)e_j]\} - F_j. \end{aligned}$$

For Propositions 2 and 3, it is easy to find numerical examples in which the incumbent owner always hires the large auditor, always hires the small auditor, or is indifferent between hiring the small and large auditor. For example, consider the following cost function:

$$C(e_j) = (0.5 - e_j)/\ln(e_j).$$

It is easy to verify that for  $0.5 \leq e_j \leq 1$ , this cost function satisfies the assumptions  $C'(e_j) > 0$ ,  $C''(e_j) > 0$ ,  $C(0.5) = 0$  and  $C(1) = +\infty$ .

Consider case (c) where  $W_L > W_S > K_H > K_L$ .

In example (1), the incumbent owner's expected payoff is greater when the large auditor is hired.

Example (1):

$$\begin{array}{llllll}
 p = 0.9 & e_L = 0.9 & e_S = 0.6 & C(e_L) = 3.8 & C(e_S) = 0.2 & \\
 F_L = 8.9 & F_S = 1.8 & W_L = 505.8 & W_S = 39.0 & K_H = 20.0 & K_L = 15.0 \\
 I = 900 & \Pi_N = 1000 & \Pi_F = 500. & & & 
 \end{array}$$

In example (2), the incumbent owner’s expected payoff is greater when the small auditor is hired.

Example (2):

$$\begin{array}{llllll}
 p = 0.9 & e_L = 0.9 & e_S = 0.6 & C(e_L) = 3.8 & C(e_S) = 0.2 & \\
 F_L = 8.9 & F_S = 1.8 & W_L = 505.8 & W_S = 39.0 & K_H = 20.0 & K_L = 15.0 \\
 I = 700 & \Pi_N = 1000 & \Pi_F = 500. & & & 
 \end{array}$$

In example (3), the incumbent owner is indifferent between hiring the large and small auditor:

Example (3):

$$\begin{array}{llllll}
 p = 0.9 & e_L = 0.9 & e_S = 0.6 & C(e_L) = 3.8 & C(e_S) = 0.2 & \\
 F_L = 8.9 & F_S = 1.8 & W_L = 505.8 & W_S = 39.0 & K_H = 20.0 & K_L = 15.0 \\
 I = 789.5 & \Pi_N = 1000 & \Pi_F = 500. & & & 
 \end{array}$$

*The Relationship Between Auditor Size and Litigation in Proposition 3*

Using the above cost function, it is easy to find numerical examples in which the large (small) auditor incurs more litigation. In example (4), the incumbent owner is indifferent between hiring the large and small auditor and the large auditor incurs more litigation than the small auditor  $(1 - p)(1 - e_L) > h(1 - p)(1 - e_S)$ :

Example (4):

$$\begin{array}{llllll}
 p = 0.9 & e_L = 0.9 & e_S = 0.6 & C(e_L) = 3.8 & C(e_S) = 0.2 & \\
 F_L = 8.9 & F_S = 1.8 & W_L = 505.8 & W_S = 195.0 & K_H = 200 & K_L = 20 \\
 I = 789.5 & \Pi_N = 1000 & \Pi_F = 500 & h = 0.2 & & 
 \end{array}$$

Example (5):

In example (5), the incumbent owner is indifferent between hiring the large and small auditor and the large auditor incurs less litigation than the small auditor  $(1 - p)(1 - e_L) < h(1 - p)(1 - e_S)$ :

$$\begin{array}{llllll}
 p = 0.9 & e_L = 0.9 & e_S = 0.6 & C(e_L) = 3.8 & C(e_S) = 0.2 & \\
 F_L = 8.9 & F_S = 1.8 & W_L = 505.8 & W_S = 43.3 & K_H = 200 & K_L = 20 \\
 I = 789.5 & \Pi_N = 1000 & \Pi_F = 500 & h = 0.9. & & 
 \end{array}$$

## NOTES

- 1 *The Economist* writes (7 October, 1995), 'As partnerships, the large accountancies operate under the legal principle of joint and several liability. This means that when a company collapses, its auditors who not only have deep pockets, but cannot abscond, may be hit for the entire bill if they were negligent, even if other parties were careless too. Moreover, if the claim amounts to more than an auditing firm's capital, all of the firm's partners are liable right down to their bootstraps for the bill – even if they had nothing to do with the error.' Similarly, the *Financial Times* writes (4 July, 1996), 'The big audit firms can find themselves targeted for lawsuits because of their "deep pockets" – including their statutory insurance cover.'
- 2 If the company's type were perfectly observable, the investor would not wish to buy a failing company ( $I > \Pi_F$ ), but would wish to buy a non-failing company ( $I < \Pi_N$ ).
- 3 The key insights of the model are robust to relaxing this assumption.
- 4 Assuming that the cost of effort is non-pecuniary simplifies the analysis as it implies that effort does not affect auditor wealth.
- 5 This assumption raises the question why auditors would not choose to always shirk and report 'F'. Following previous studies, there are two justifications for assuming that such behaviour does not occur (Dye, 1993; and Acemoglu and Gietzmann, 1997). First, if auditors always shirk, audit reports would be completely uninformative and there would be no voluntary demand for audits. Secondly, an auditor might face a threat of litigation for reporting 'F' when the company is *N* and this would deter the auditor from always shirking (Dye, 1993). Finally, empirical evidence indicates that a company is more likely to switch its auditor after receiving an unfavourable report (Chow and Rice, 1982; Craswell, 1988; Citron and Taffler, 1992; and Krishnan and Stephens, 1995). This suggests that auditors have incentives to avoid always reporting 'F' because a low report could trigger a switch of auditor and a loss of rent.
- 6 Although audit effort is not directly observable, auditors' objective functions are common knowledge and therefore the equilibrium choices of audit effort can be inferred by potential investors.
- 7 The solution concept is that of a strategically stable sequential equilibrium (Fudenberg and Tirole, 1993). The equilibrium is strategically stable since all weakly and strongly dominated strategies are eliminated. The assessments of players are required to be sequentially rational and consistent which implies that beliefs and strategies can be regarded as limits of totally mixed strategies and beliefs. Updating of beliefs is carried out using Bayes' rule.
- 8 Using this sample, Lennox (1999) has shown that large auditors give more accurate signals of financial distress compared to small auditors. This finding is consistent with both the reputation and deep pockets hypotheses.
- 9 Microfiche copies of annual reports were unavailable for most of the companies cited in Table 1. This prevented a more detailed investigation of the causes of criticism.
- 10 Alternative definitions for the dependent variable gave very similar results – for example, the criticism variable ( $CRIT_i$ ) was re-weighted to take account of the possibility that DTI criticisms were more serious and more likely to result in litigation.



- 11 In contrast, Palmrose (1988) found a negative relationship between auditor size and litigation using US data for 1960–85. More recently, Stice (1991) found no significant relationship between auditor size and litigation for the US.
- 12 Two studies have tested the reputation hypothesis by investigating the effects of criticism on auditors' market shares (Firth, 1990; and Wilson and Grimlund (WG), 1990). Firth investigated the effect of criticisms by Department of Trade investigators against UK audit firms. However, there are reasons to believe that Firth's claims – that criticised auditors lost market share compared to uncriticised auditors – may be misleading. First, whilst criticised auditors lost more clients compared to 'control groups' of similar uncriticised auditors, there was no net loss of clients for the group of criticised auditors. The criticised auditors lost 11 clients but also gained 11 clients over the three year period following each criticism. Although the control groups of uncriticised auditors experienced net client gains, the uncriticised auditors left out of the control groups must have lost clients. Therefore, Firth's results may be sensitive to which uncriticised auditors were included in the control groups. Secondly, Firth did not find that criticised auditors received lower fees. Using US data, WG found that large and small audit firms lost market share following disciplinary actions carried out by the Securities and Exchange Commission (SEC). However, no comparison was made between criticised and uncriticised large auditors because of a lack of data. Although WG found that the market share performance of small criticised auditors was worse than that of small uncriticised auditors, it is unclear how robust these results were for different control groups and time periods. In contrast, this paper shows the number of clients gained/lost and audit fees received by each auditor in each year. Thus, one can be confident that the conclusions are not sensitive to control groups or time periods. Moreover, this study takes into account more sources of criticism and the severity of criticisms.
- 13 The allegations of audit failure in the case of BCCI were particularly serious, as shown by the size of the writ and the news coverage that the case created (occupying many more column inches than any other story).
- 14 This analysis is subject to the caveat that many factors may influence the effects of criticism – for example, the nature of the case, visibility, whether the criticism is perceived as being justified, etc.
- 15 Average audit fees for Kidsons Impey were higher and more volatile compared to other medium-sized auditors because of two outliers. In particular, Kidsons Impey audited BSG International and RMC Group between 1988–94 – audit fees for these two clients averaged more than £1,000,000 per year.
- 16 These results relate to the contemporaneous effects of criticism on the demand for auditors. No evidence was found for reputation effects when criticism was allowed to have lagged effects on auditor switching and audit fees – Table 4 shows that the conclusions are robust to alternative time horizons.
- 17 This conclusion is robust to alternative definitions of the reputation variable (i.e. to definitions which consider a subset of Stoy Hayward, Ernst and Young and Price Waterhouse and which consider alternative time periods).

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