PRICING OF AUDIT SERVICES IN THE UK
1991 – 1995

Christopher Kam Man Pong

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Declaration

This thesis has been composed by the candidate and is based on candidate's own work. The thesis does not include work submitted for any other degree or qualification. Some of the materials contained in the thesis have already been published in an academic journal. The article was submitted with both supervisors' approval. With the permission of the publisher, a copy of the paper is attached as an appendix to this thesis.

Christopher K.M Pong 31st August 2000

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Abstract

This dissertation examines the supply of external audit services in the UK during the period from 1991 to 1995. The increasing dominance of the audit services market by a small number of international firms has been a matter of public concern in recent decades. Fears have been expressed about the implications of greater concentration in the supply of audit services. These fears include: the creation and strengthening of oligopolistic structures, the resulting potential for price fixing arrangements, a reduction in consumer choice, an escalation in conflicts of interest for auditors; and, the potential failure of self-regulation of the audit profession. In addition, the pricing practices of audit firms, exemplified by the charging of large firm premiums and low-balling, have reinforced public anxiety about the professionalism of auditors.

These developments in the audit services market and the issues surrounding them provided the backdrop to this study and defined its major objectives. The latter are threefold. First, to examine the extent of concentration in the audit services market during the period from 1991 to 1995 (in the wake of the mergers between Ernst & Whinney and Arthur Young, and between Coopers & Lybrand and Deloitte, Haskins & Sells). Second, to analyse changes in the level of audit prices during the relevant period. Third, to provide a theoretical framework to explain audit prices in a competitive environment. The investigation of these three related subjects rested substantially on a statistical analysis of data on audit fees. This data was collected from a variety of sources including Datastream and FT Extel.

The major findings of the study are as follows. The analysis of the structure of the audit services market revealed that there was a small increase in concentration during the five year period. It was discovered that it was caused by companies who switched from small audit firms to the [then] 'Big Six' audit firms, together with newly listed companies which chose a 'Big Six' auditor. It was these tendencies which accounted for the increase in the market share achieved by the 'Big Six'. The result was that by 1995, 75% of the fully listed and USM companies were audited by the 'Big Six'. Contrary to expectations, the increased concentration observed in the supply of audit services did not appear to translate into oligopolistic pricing behaviour among large audit firms. Over the five-year period studied, there was, on average, a 9% decrease in inflation-adjusted audit fees. In accord with the third objective of the dissertation, a theoretical framework was developed which attempted to explain the differences in the prices charged by audit firms according to factors such as audit quality, specialisation, and audit firm size. Empirical tests were performed which give partial support to the theory and confirm its utility for future investigations of fee setting in the audit services market.

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Abbreviations

AA Arthur Andersen

BH BDO Binder Hamlyn

Big Five Arthur Andersen, Ernst & Young, KPMG, PricewaterhouseCoopers, Deloitte & Touche

Big Six Arthur Andersen, Coopers & Lybrand, Ernst & Young, KPMG, Price Waterhouse, Touche Ross

Big Eight Arthur Andersen, Arthur Young, Coopers & Lybrand, Deloitte, Haskins & Sells, Ernst & Whinney, KPMG, Price Waterhouse, Touche Ross

CL Coopers & Lybrand

DHS Deloitte, Haskins & Sells

EY Ernst & Young

GT Grant Thornton

PW Price Waterhouse

TR Touche Ross

PKF Pannell Kerr Forster

PwC PricewaterhouseCoopers

RR Robson Rhodes

SH Stoy Hayward

Chapter 1

Introduction

Auditing is an area which has been subject to considerable public scrutiny in recent years. Following business collapses such as Polly Peck International and Maxwell Communications Corporation in the 1990s, there has been growing concern about the effectiveness of auditing. Questions have been raised over the issues of regulation of auditors and auditors' independence. Self-regulation of auditors, which has been the traditional form of accounting regulation in the UK, has not been well received by the public. The form of auditing regulation has always been a discussion topic. For example, in November 1998, the Department of Trade and Industry issued a consultation document entitled "A Framework of Independent Regulation for the Accountancy Profession". Labour MP Austin Mitchell attacked the framework which he characterised as "mafia regulating the mafia" (accountingweb, 14 June 2000).

Public concern about the auditing profession is based on a number of features of the profession. One of them is the market dominance by a few large international firms. In the UK audit services market, Moizer and Turley (1987) identified nine dominant audit firms in 1972. Mergers between audit firms resulted in domination by the so called "Big Eight". They were, namely, Arthur Andersen ("AA"), Arthur Young ("AY"), Coopers & Lybrand ("CL"), Deloitte, Haskins & Sells ("DHS"), Ernst & Whinney ("EW"), KPMG, Price Waterhouse ("PW") and Touche Ross ("TR"). Then came the two mega mergers between AY and EW in 1989 and between CL and DHS in 1990. The merged firms respectively were known as Ernst & Young ("EY") and Coopers & Lybrand. As a result, the Big Eight was reduced to the "Big Six". Further amalgamation in July 1998 between Coopers & Lybrand and Price Waterhouse to form PricewaterhouseCoopers ("PwC") resulted in the domination of the "Big Five". There has also been merger talk between EY and KPMG although this subsequently collapsed. Pong (1998) noted that if the merger had gone ahead, the market share by the four firms, AA, EY-KPMG, PwC and TR, would have increased to 76% as measured by the total number of audits and 93% as measured by the total audit fees. The implications for the audit services market of greater concentration include the creation and strengthening of an oligopolistic structure, the resulting potential for price fixing arrangements, a reduction in consumer choice, an escalation in conflicts of interest for auditors and a potential failure of self-regulation.

Some audit pricing characteristics, in addition to high market concentration for audit services, reinforce public concern about auditors' professionalism. For example, it is generally considered that the big audit firms charge higher audit prices than smaller audit firms. Critics of the profession will see this audit fee premium as a monopoly rent for the large firms. Low-balling is also a well known audit firm pricing practice. It refers to the situation where an auditor tenders an initial fee which is below the existing audit fee and also usually below projected cost in the hope of winning an audit. The problem with this competitive pricing strategy is that the auditor needs to generate enough income from the client in future years to compensate for the initial costs of low-balling. When conflicts between the auditor and the client arise, the auditor may compromise in order to secure his/her future audit income. In recent years, it has come to the attention of the public that a major source of income for the audit firms is from their consultancy business. This again may result in an auditors' independence being questioned. When conflict arises between auditors and their client in the course of their audits, audit partners may succumb to pressure to secure future consultancy services from the client.

This dissertation is designed to make an additional contribution to research studies on the supply of audit services. It investigates concentration in the audit market and some pricing behaviour during the period from 1991 to 1995. This period was chosen as a continuation of the work by Beattie and Fearnley (1994), who looked at concentration changes from 1987 to 1991, a period during which there was substantial increase in audit services market concentration. However, the work extends beyond mere replication of the Beattie and Fearnley (1994) research. In addition, it looks at some audit pricing behaviour and at price changes during a period when there was an increase in auditor concentration. Furthermore, it attempts to provide an economic analysis of audit firm pricing strategies.

The layout of the dissertation is as follows. Chapter 2 surveys research studies on concentration in the audit services market and the pricing of audit services. It highlights the contributions and weaknesses of the literature as a basis for future research work. First, it considers research studies on concentration changes in the UK and the reasons for these changes. Second, it outlines an audit pricing process framework where existing audit pricing literature could be properly placed. It then proposes directions for some future research.

Chapter 3[1] analyses concentration changes during the period from 1991 to 1995. By analysing auditor concentration from 1991 to 1995 and examining the impact of auditor changes on concentration, it extends the UK work of both Beattie and Fearnley (1994) and Peel (1997). Auditor changes

[1]A version of Chapter 3 has been published as Pong (1999). See Appendix A.

during this five year period are analysed into those involving a switch from a small firm to a Big Six firm (and vice versa), and those involving a switch within the Big Six. This analysis is of particular importance as evidence of numerous client changes among the Big Six would throw some light on the nature of competition in the already highly concentrated audit market. This chapter then provides an analysis of auditor concentration within industry groups. Restrictions in the choice of auditors within an industry group would indicate a heightened potential conflict of interest for auditors who provide both audit and management consultancy service to two or more competing companies. In addition, it investigates the incidence of audit specialists by applying a market share test within each sector. Specialist auditor has become a dominant force in the supply of sectoral audits and as such has a potential to extend considerable influence over audit pricing within that sector. This chapter finally assesses the most commonly used methods of concentration measures in prior studies. These methods all involve the selection of an audit market (population of companies), a measure of market power, and a concentration index; factors which are often neglected in the interpretation of the results of concentration studies.

Chapter 4 analyses some audit firms pricing characteristics and provides some insight into their competitive behaviour. It investigates the change in audit fees during the period from 1991 to 1995, a period of increasing concentration in the UK audit market. Compared to earlier studies, the main contributions of this chapter are that first, it uses data which covers a wide range of industry sectors and audit firms. This data sample is much larger and more contemporary than that of previous studies. Second, it analyses the changes made in audit fees by individual Big Six firms, medium sized firms and small firms within the UK. This analysis gives visibility to pricing behaviour at a micro level and so improves our understanding of the audit market operation.

Chapter 5 develops and tests a theory of competitive behaviour by auditors which explains differences in audit prices among audit firms in terms of audit quality, specialisation, auditor size and changes in the audit services market concentration. The basis of the theory is that both the size of an audit firm and its specialist knowledge of typologies of auditee are important dimensions of competitiveness in the audit services market. Both of these characteristics give supply side benefits to the audit firm through respectively economies of scale and uniqueness in service provision. An audit firm with competitive advantage based on these characteristics can increase its market dominance and/or can earn higher than normal industry economic profits.

Finally, Chapter 6 concludes the dissertation by summarising the research findings and results of Chapter 2 to Chapter 5, and by pointing to a future research agenda for which this dissertation provides a foundation.

Chapter 2

Literature Review

Yardley, Kauffman, Cairney and Albrecht (1992) surveyed research studies on the supply of audit services. They structured their review around a framework adopted from the industrial economics literature and based on the premise that market structure affects company behaviour (for example, pricing policy) which in turn affects company performance (Clark, 1985; Martin, 1994; Scherer and Ross, 1990; Tirole, 1994). Although business economists have substantially developed these ideas in an extensive literature, its application to the audit services market has been very limited. The reason for this is that most of the relevant audit firm information[1] is not available to researchers. Audit firms, which are traditionally partnerships[2], are not required by the law to produce publicly available financial statements. Thus, given limited data availability, empirical research on the audit services market, as Yardley et al. (1992) identified, has related mainly to

[1]Recently, some audit firms such as KPMG and Ernst & Young have made their audited financial statements publicly available.

[2]The provision that audit firms can be incorporated under the Companies Act 1989 came into effect in October 1991.

auditor concentration (audit market structure) and pricing of audit services (audit firm behaviour) rather than to the performance of the suppliers (audit firms). The study of the relationships between market structure, firm behaviour and firm performance, which have been the subject of many economic research studies, has been non-existent for the audit market. This chapter will review the literature which does exist on audit markets. First, it will cover the literature on audit market structure, that is, concentration studies and second, it will review the literature on auditor pricing behaviour. Finally, it will look at the literature on the link between these two aspects of audit service supply.

2.1 Audit Market Structure

2.1.1 Audits of Listed Companies

Market structure is often depicted in a concentration measure. The degree of supplier concentration of the audit services market is the extent to which a relatively small number of audit firms account for a significant proportion of the total audit work carried out. The level of supplier concentration is of interest because it can be an important determinant of audit firms' market behaviour - a theme in the literature of the theory of industrial organisation. A high degree of concentration may result in an oligopolistic market where supply is dominated by a small number of large firms. The larger firms within an oligopolistic market may collude and this behaviour will result in a social welfare loss (Clark, 1985; Martin, 1994; Scherer and Ross, 1990). An example of audit firm collusion was found in Italy. The Big Six[3] were fined a total of US$2.3m by the competition authority for anti-market practices which occurred between 1991 and 1998. The firms admitted that they consistently distorted competition in the Italian accounting services market, in particular by "standardising and co-ordinating to win clients" (Financial Times, 14/12/1998, Accountancy International, 03/2000).

Yardley et al. (1992) have summarised the many studies of auditor concentration in the US (for example Burton and Roberts, 1967; Zeff and Fossum, 1967; Rhode, Whitsell and Kelly, 1974; Schiff and Fried, 1976; Dopuch and Simunic, 1980; Eichenseher and Danos, 1981; Danos and Eichenseher, 1982; Tomczyk and Read, 1989; Tonge and Wootton, 1991). In the UK, studies of auditor concentration have been less common. The major studies are Briston and Kedslie (1985), Moizer and Turley (1987, 1989), Beattie and Fearnley (1994) and Peel (1997). Results of concentration studies in the UK (Briston and Kedslie, 1985; Moizer and Turley, 1987; Beattie and Fearnley, 1994; Peel, 1997) are summarised in Table 2.1. The concentration measure in Table 2.1 was based on audit firms with the largest number of clients. For example, C_6 showed the percentage of companies audited by the six largest audit firms. Although the concentration ratios (C_4, C_6, C_8 and C_{20}) in 1972

[3] Arthur Andersen, Coopers & Lybrand, Ernst & Young, KPMG, Price Waterhouse and Touche Ross.

Table 2.1 Auditor Concentration 1968–1995

Study	Sample	Year	C_4	C_6	C_8	C_{20}
Briston and Kedslie (1985)	All domestic listed	1968	0.207	0.250	0.287	0.389
Moizer and Turley (1987)	FT500 index	1972	0.369	0.442	0.501	N/A
Briston and Kedslie (1985)	All domestic listed	1978	0.326	0.406	0.462	0.657
Moizer and Turley (1987)	FT500 index	1982	0.421	0.539	0.626	N/A
Beattie and Fearnley (1994)	All domestic listed (inc. USM)	1987	0.434	0.546	0.643	0.828
Beattie and Fearnley (1994)	All domestic listed (inc. USM)	1991	0.589	0.723	0.793	0.900
Peel (1997)	All domestic listed	1995	n/a	0.782	n/a	n/a

Sources:
Beattie and Fearnley (1994, Table 1),
Moizer and Turley (1987, Tables 1 and 2) and
Peel (1997, Table 2)
C_n means percentage of companies audited by the n largest firms

were higher than those of 1978[4], the results indicated a pattern of increasing concentration from 1968 (C_6: 25%) to 1995 (C_6: 78%). The reduction in the total number of auditors in the domestic listed companies audit services market, from 1109 in 1968 (Briston and Kedslie, 1985) to 166 in 1991 (Beattie and Fearnley, 1994), provided additional evidence of increasing auditor concentration. The studies have also reported that market leadership was stable: membership of the groupings of the largest audit firms had not changed (Table 2.2). These findings provided evidence that there was likely to be increasing disparity in size between large and small firms (Pong and Turley, 1997).

There were three factors underlying the increase in auditor concentration: audit firm mergers, voluntary realignments and the auditor distribu-

[4]The observed higher concentration ratios were due to smaller sample sizes used in Moizer and Turley (1987).

Table 2.2 Top UK Audit Firms in 1972–1995

Ranking	1972	1982	1987	1991	1995
1	PW	DHS	PMM	PMM	KPMG
2	CL	EW	DHS	CL	CL
3	DHS	PW	PW	EY	EY
4	PMM	PMM	EW	PW	PW
5	EW	CL	AY	TR	TR
6	TM	TM	TR	BH	AA
7	TBM	TR	BH	AA	n/a
8	TR	AYCM	CL	GT	n/a
9	AYCM	AA	GT	RR	n/a

Sources:
Beattie and Fearnley (1994, Table 3),
Moizer and Turley (1987, Tables 1 and 2) and
Peel (1997, Table 2)
AA: Arthur Andersen; AY: Arthur Young; AYCM: Arthur Young McClelland Moore; BH: Binder Hamlyn; CL: Coopers & Lybrand; DHS: Deloitte, Haskins & Sells; EW: Ernst & Whinney; EY: Ernst & Young; GT: Grant Thornton; PMM: Peat Marwick Mitchell; RR: Robson Rhodes; TBM: Turquands Barton Mayhew; TM: Thomson McLintock; TR: Touche Ross

tion of newly listed companies (Beattie and Fearnley, 1994). Merging of audit firms, in particular the mergers between the Big Eight firms, was the main reason. Examples of mergers during the period included Peat Marwick Mitchell's merger with Thompson McLintock in 1987, followed by Ernst & Whinney with Arthur Young in 1989. In 1990, Coopers and Lybrand merged with Deloitte Haskins & Sells, Kidsons with Hodgson Impey, and Spicer & Oppenheim with Touche Ross (Boys, 1989a,b,c,d,e,f,g,h,i,j,k,l, 1990).

Although auditor switching was another reason for the increase in auditor concentration, it occured infrequently and was not therefore a major factor. Pong and Whittington (1994) noted that during the ten year period from

1981 to 1988, on average, the probability of any audit in any year being in the hands of a new auditor was only slightly over 2%. For the years from 1988 to 1991, the frequency of auditor switching increased slightly and ranged from 3.8% to 6.1% (Beattie and Fearnley, 1994). There was evidence, that on balance, more companies switched from hiring a small audit firm to hiring a Big Six firm than vice versa.

Finally, the distribution of audits of newly listed companies tended to favour the Big Six. Indeed, there was some evidence which suggested that the Big Six monopolise new listings:

> the big six firms acts as accountants to 85% of the new issues on the London Stock Market .. the four leading firms - KPMG, Coopers & Lybrand, Ernst & Young, and Price Waterhouse - alone accounted for over two-thirds of the 180 companies that gained a listing in 1994 (Accountancy Age 02/03/95).

Moizer (1997, 68–69) noted two economic theories which could explain why companies making an initial pubic offering would choose a Big Six auditor:

> According to signalling theory, when companies make IPOs [initial public offerings], the issuer has private information about the company's future prospect that is unavailable to prospective investors. One way that entrepreneurs can signal their private information about future earnings is their choice of auditors . . . The monitoring costs theory is based on the limited information available to prospective investors to assess the validity of the entrepreneur's claims. Since IPOs tend to be made by small companies with limited operating histories, investors must rely heavily on the content of the entrepreneur's self-disclosures in order to evaluate the performance and future prospects of the company. The monitoring costs theory implies that different levels of audit quality would be demanded by companies depending on their ownership structure and financial leverage. When agency costs are high, management and the underwriters are likely to desire a higher quality

> audit in order to add more credibility to the financial statements and to the prospectus. Financial statement credibility, which is enhanced by association with a reputable auditor, reduces monitoring costs.

The change in auditor concentration has led to a situation where "audit services have reached the limit of a tight oligopoly, which is characterised by few rivals, stable market shares and medium-to-high entry barriers" (Beattie and Fearnley, 1994, 308). In 1995, the Big Six controlled more than nine out of ten of the top 500 company audits (Accountancy Age 02/02/1995). Although there was clear evidence of increasing audit market concentration, it was less clear whether the increased market concentration had any effect on the nature of competition in the audit services market. For example, two reports commissioned by the European Commission have both concluded that audit service markets in Europe were not anti-competitive and that audit firms were not behaving in a way which was contrary to the public interest, despite the high market shares of individual suppliers (NERA (National Economic Research Associate), 1992; Buijink, Maijoor, Meuwissen and van Witteloostujn, 1996).

2.1.2 Industry and City Markets

In addition to audits of quoted companies, Peel (1997) examined auditor concentration ratios across the unquoted and private companies. He noted that although some of the auditor rankings varied across the three different plc sub-markets (quoted, unquoted and private), the relative rankings in relation to the whole plc (quoted and unquoted) and private plc sub-markets was identical - that was, KPMG, followed by Coopers & Lybrand, Ernst & Young, Price Waterhouse, Touche Ross and Arthur Andersen. Company size was found to be a key determinant of supplier concentration. Peel (1997) suggested that the observed variations in Big Six market shares across different plc sub-markets and size ranges might be indicative of product differentiation and audit specialisation.

Moizer and Turley (1989) analysed changes in auditor concentration ratios for different client industries from 1972 to 1982. They found that the market share held by the largest four audit firms varied across different client industries. For example, in 1982, the largest four audit firms in the oil industry sector had complete market domination in the provision of audit services. However, the largest four audit firms in the building and construction sector had only a 45% market share. Variations of auditor concentration across different client industries could suggest the existence of audit specialists within industries. Craswell et al. (1995) analysed auditor industry specialisations for all 23 Australian Stock Exchange industry classifications. They determined auditor specialisation by first considering the overall number of companies - a minimum of 30 companies per industry was a precondition for industry specialisation. Then, a threshold of 10% of market share based on either the number of clients in the industry or the percentage of total audit fees in the industry was required in the industries for a specific accounting firm to be designated an industry specialist. Based on their definitions of audit specialist, they identified, for example, that Arthur Young, Coopers & Lybrand and Peat Marwick were specialists in gold mining audits; Deloitte, Haskins & Sells and Price Waterhouse in building materials and Touche Ross in investment and financial services.

Francis, Stokes and Anderson (1999) investigated a geographical variant of market leadership. They found that, in Australia, the national audit market leader might not be the city-specific market leader. They demonstrated that a city-level unit of analysis was useful by re-examining the 1989 mergers creating Ernst & Young and Deloitte Touche. They concluded that the primary effect of the Ernst & Young merger was to increase market shares in cities in which the pre-merger firms (Ernst & Whinney and Arthur Young) already had significant market shares. This resulted in an increase in the number of cities in which the merged firm achieved top ranking. In contrast, the primary effect of the Deloitte Touche merger (between Deloitte, Haskins & Sells and Touche Ross) was an expansion of the number of city-level markets in which the merged firm had significant (though not leading) market shares.

2.1.3 Methodological Issues in Measuring Concentration

Yardley et al. (1992) identified several limitations in previous US studies. First, there was a definitional problem concerning the scope of the audit services market. For example, some studies only considered the top 500 industrial companies listed in the Fortune Directory (Dopuch and Simunic, 1980) while others used all companies listed on the New York Stock Exchange (Tonge and Wootton, 1991). There was also a similar definitional problem in relation to industrial classifications. Second, there was the difficulty of identifying and formulating surrogates for auditor size. Lacking audit fees information in the U.S., total assets or sales of auditees were used to measure size of auditors. Third, early studies were unable to disaggregate group audit fees into amounts paid to holding company auditors and subsidiary company auditors. Fourth, the choice of a concentration index was not explained.

The definitional problem concerning the audit services market has also been relevant to various studies in the UK. Measuring the concentration of the audit services market first requires a definition of the market. For example, organisations may purchase audit services voluntarily or because of a statutory requirement and, strictly speaking, when calculating auditor concentration, both types of audit should be included. However, information for voluntary audits is not publicly available. Researchers might thus have to limit the study of auditor concentration to cover only the supply of statutory audits to public listed companies. In this regard, Beattie and Fearnley (1994) included all the fully listed and USM companies. Some researchers narrowed the market size further by selecting only a limited number of largest listed companies. For example, Moizer and Turley (1989) used the FT500. Limitations of the market in this way introduces some arbitrariness to the research. Recently, however, Peel (1997) examined auditor concentration ratios across all corporate sub-markets, that is, the quoted and unquoted plcs, and private companies. Thus the major UK studies are based on different market delineation. When comparing their results, this difference must be taken into account.

The second and fourth of Yardley et al. (1992)'s limitations were discussed by Moizer and Turley (1987). In the case of the former, they observed that the main measures used to calculate the level of concentration in the past have been the number of audits (Briston and Kedslie, 1985; Beattie and Fearnley, 1994) and the level of audit fees (Moizer and Turley, 1989). Audit fee income was considered by them to be the most appropriate measure of the size of the market as this represents a good measure of the output of the auditor. Since larger companies would tend to have larger fees, a measure based on number of audits will understate the real value of the firms' market shares (Moizer and Turley, 1987). A measure based on the number of audits does, however, facilitate analysis of shifts in concentration due to auditor changes and it is also consistent with the regulatory regime developed by the three Chartered Institutes[5], which focuses on the absolute number of listed clients of each audit firm (Beattie and Fearnley, 1994).

[5]The Institute of Chartered Accountants in England and Wales, The Institute of Chartered Accountants in Ireland and The Institute of Chartered Accountants of Scotland.

Moizer and Turley (1989) also looked at the effects of different concentration indices. They measured auditor concentration in terms of market share by the largest firms (C_n) and by the Herfindahl index (H):

$$C_n = \frac{\sum_1^n S_i}{\sum_1^k S_i} \tag{2.1}$$

$$H = \frac{\sum_1^k S_i^2}{(\sum_1^k S_i)^2} \tag{2.2}$$

where k is the total number of audit firms in the market, n is the number of largest firms and S_i is the size of audit firm i.

Concentration index C_n measures market share by the largest n firms. Since a concentration index aims to summarise the number and size distribution of competitors within an industry, H is better than C_n, as C_n only takes into account market share by the n largest firms and thus ignores the rest of the firms in the market. In addition, there are some further desirable properties of a concentration index[6]. Although the Herfindahl index satisfies the requirements of all these desirable properties while C_n does not, C_n is still widely used because it is simple to calculate and its meaning is easy to understand. However, many studies have found these alternative concentration measures to be highly correlated.

[6]See Chakravarty (1995), Chapter 1.

2.2 Pricing of Audit Services

In 1980, the Journal of Accounting Research published a seminar article entitled "The Pricing of Audit Services: Theory and Evidence" by Professor Dan Simunic. This article has been a stimulus for a stream of international academic research in the area including Francis (1984), Francis and Stokes (1986), Craswell et al. (1995) in Australia; Firth (1985) in New Zealand; Taylor and Baker (1978), Chan, Ezzamel and Gwilliam (1993), Pong and Whittington (1994), Gregory and Collier (1996) in the UK; Palmrose (1986a,b), Francis and Simon (1987), Simon and Francis (1988) and Gist (1992) in the US. Research on the topic of pricing has examined a variety of issues including: the competitiveness of the audit services market; economies of scale of the big accountancy firms; product differentiation and audit specialisation of audit firms; and the practice of low-balling by firms to solicit new clients.

Before reviewing the literature on pricing of audit services, an attempt is first made to describe a process of audit pricing. Such a process is not found in the literature, but is a useful way to locate and categorise the relevant literature and to provide insights into areas of potential research. This section then proceeds to summarise the specific issues arising from the pricing of audit services. These comprise audit fee models, large audit firm premium, non-audit fees and low-balling.

2.2.1 The Pricing Process

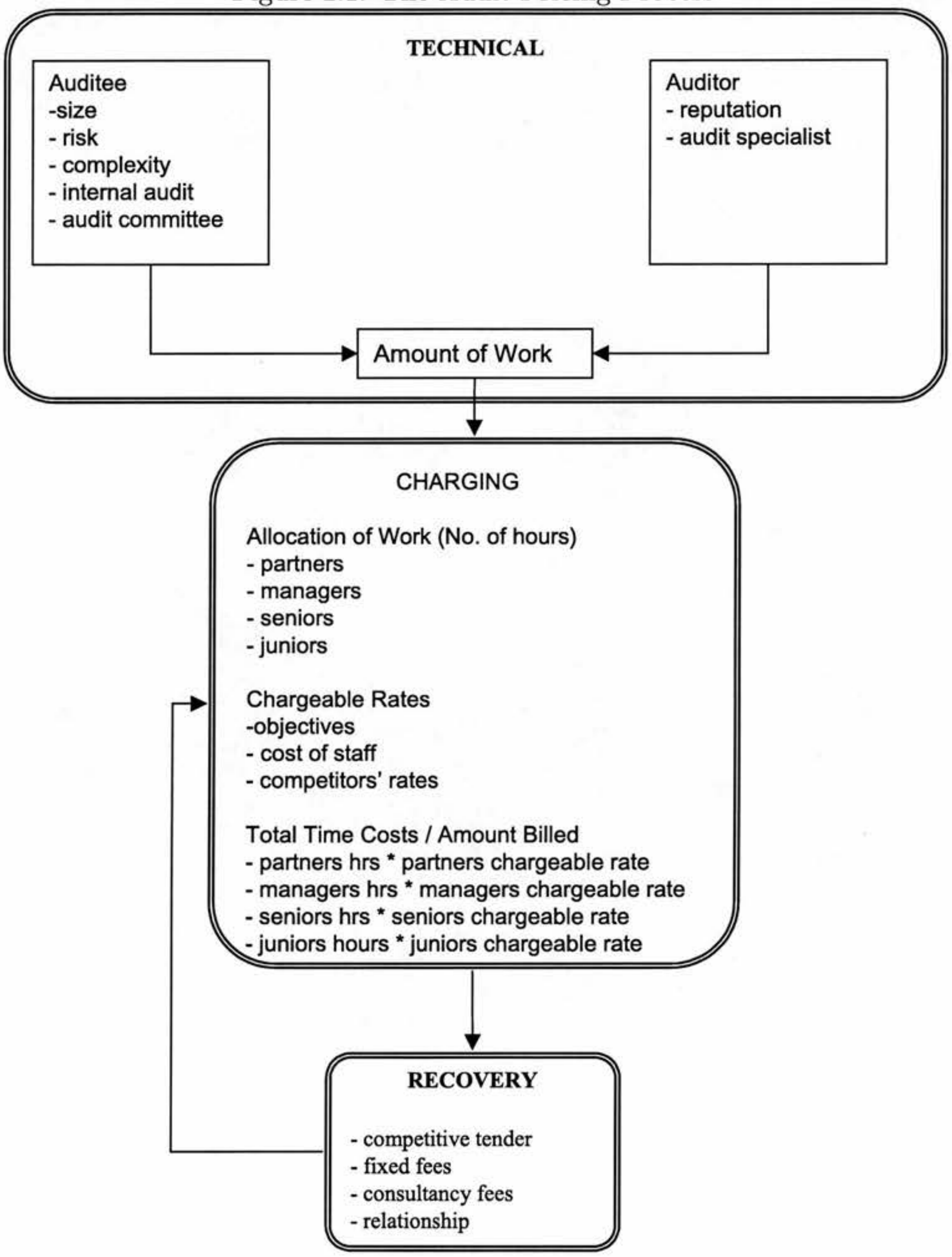
This section attempts to describe the process of pricing of audit services. Through the exercise of locating previous research studies within the process, it highlights areas of neglected research. Casual empiricism suggests that the setting of an audit price can be conveniently divided into three processes (Figure 2.1): technical, charging and recovery.

Technical Process

An auditor determines the amount of required audit work according to the characteristics of the auditee, for example, the size, complexity and risk of the auditee. The larger the size and complexity of an auditee, the higher the amount of audit work required (although clearly there will be economies of scale for larger clients). Similarly, if a company business is risky, the auditor will need to seek additional assurance before forming an opinion on the auditee's financial statements (Simunic, 1980; Francis and Simon, 1987; Chan et al., 1993; Cullinan, 1997).

The amount of audit work required depends on the extent of help that an auditor can get from an auditee. An auditee which has established an internal audit department and/or audit committee may help to reduce the amount of audit work carried out by the external auditors. For example, an internal audit department of an auditee may help the auditor by providing useful breakdowns and schedules of transactions. This reduces the amount

Figure 2.1: The Audit Pricing Process



of audit effort required by the auditor. In other words, to a certain extent, external audit work can be substituted by internal audit work[7]. Another effect on the amount of audit work required is the setting up of audit committees within an auditee. Audit committees are given the responsibility for reviewing the financial statements and the accounting principles and practices underlying them, liaising with the external and internal auditors, and reviewing the effectiveness of internal controls. For the external auditors, reporting to an audit committee will enhance the external auditors' independence since the external auditors can communicate directly with those directors who are not actively engaged in the management of a company (Collier, 1997). Audit committees are usually composed of non-executive directors in addition to executive directors. Unlike the executive directors, the non-executive directors are not remunerated on the basis of the performance of the company and do not have the same incentive as the executive directors to mislead shareholders by inflating financial performance[8].

[7]If the price of external audit decreases, an auditee may purchase more external audit services to replace internal audit staff, and vice versa (Simunic, 1980).

[8]However, it can be argued that audit committees would increase the amount of audit fees paid by companies. This is because audit committees are appointed by shareholders to monitor the performance of the directors. One monitoring measure is to ensure that the financial statements are prepared from a sound accounting system. Audit committees may prefer more vigorous checks on the system and may therefore, purchase additional audit work from their auditors. This extra demand on audit services lead to higher fees paid to auditors. This issue is testable empirically.

Charging Process

The work will then be allocated to staff of appropriate experience. Commonly among audit firms, staff are categorised into partners, managers, seniors and juniors (O'Keefe, Simunic and Stein, 1994). Different firms may use a different mix of staff for the same job because of differences in audit methods and techniques. Within firms, a change in audit method over time may also result in a change in the use of staff mix. In practice, the staff categories used may well depend on staff availability at the time of audit.

The translation of the amount of audit work into hours of work is complicated. Often, a staff time budget is set in the audit planning stage when the audit partner or manager has some idea of the amount of fees to be received for the job[9].

Normally, each category of staff charges the client at a pre-determined hourly rate. This will include allowances for overhead costs and profit margins. There has been suggestion that in the UK, the chargeable rate of a staff member is approximately 2 times of the cost of that staff member[10]. Not much is known about the pricing objectives of audit firms and how the chargeable rates are determined[11]. However, it is reasonable to assume that

[9]Lower fees as a result of the competitive pressure in the audit services market may sometimes result in an unreasonable budget which may threaten audit quality (Kelley and Margheim, 1990; Otley and Pierce, 1996).

[10]Based on a conversation with Professor Ian Percy, University of Aberdeen and chairman of the Accounts Commission in Scotland (former senior partner of Grant Thornton and president of the Institute of Chartered Accountants of Scotland).

[11]Pricing objectives in British manufacturing industry can be found in Shipley (1981).

the chargeable rate is likely to be decided by partners who will take into account factors additional to the cost of staff like the objectives of the firm, for example, profit maximisation, the level of non-direct labour costs and the rates of competitors.

Recovery Process

An auditor will review actual client charges in comparison with the cost of the total staff time spent on the job. The amount of this cost actually recovered depends on a number of factors. Sometimes, a fixed fee has been agreed in advance during a competitive bid. At times, an auditor may charge a lower than cost fee in order gain market share. This includes strategic entry to new market niches. Such behaviour is known as low-balling (DeAngelo, 1981; Simon and Francis, 1988; Magee and Tseng, 1990). The amount of recovery may also depend on the relationship of the auditor with the auditee; the qualities of the particular engagement partner such as negotiating skills, ability to sell and build a relationship with the auditee; and the ability of the auditee to pay. Finally, there have been allegations that auditors may consider charging a lower price in the expectation of higher consultancy fee income from the same client. The effect of consultancy services on audit fee income has been studied in Simunic (1980), Palmrose (1986b) and Ezzamel, Gwilliam and Holland (1996). These research studies are summarised in Section 2.2.5 (page 46).

Although there are several important steps in the pricing process, traditionally, studies have looked at the pricing of auditing services as a single process. Most investigate the relationship between the auditee / auditor characteristics and recovered audit fees. More recently, however, researchers in the US have benefitted from the help of some audit firms which have provided data on staff time spent on audit assignments (Davis, Ricchiute and Trompeter, 1993; O'Keefe et al., 1994). These studies provide insights into the technical process of pricing by giving visibility to the amount of audit work for any given set of auditee characteristics.

The rest of this chapter reviews the specific issues which have been addressed in the audit fee pricing literature: audit fee models, Big Eight premium (technical process), non-audit services and low-balling (recovery process).

2.2.2 Audit Fee Models

Assuming that the auditee and auditor were jointly and severally liable to financial statement users for losses attributable to defects in the audited financial statements, Simunic (1980) argued that in a competitive market, an auditor would charge a fee which equals to the total costs of producing the audit. The total costs were composed of two parts: the actual costs of audit work and the auditors' share of potential losses by users attributable to defects in the audited financial statements. Simunic hypothesised that potential losses could be proxied by size and complexity of the auditee and that the auditors' sharing ratio of losses could be surrogated by the profitability of the auditee. Subsequent studies, e.g. Chan et al. (1993), attempted to identify other proxies for the potential losses and the sharing ratio, but the classification of the proxies into the two categories was not specified.

A commonly used audit fee model has the following basic form:

$$\log F_i = \alpha + \delta S_i + \sum_{j=1}^{k} \beta_j C_{i,j} + \sum_{j=k+1}^{l} \beta_j A_{i,j} + e_i \tag{2.3}$$

where F_i is the amount audit fees paid by company i

S_i is the size of company i

$C_{i,j}$ is characteristic j of company i

$A_{i,j}$ is characteristic j of company i's auditor and audit engagement

α is a constant

δ, β_j are coefficients

e_i is the error term

While variable S_i is a measure of the size characteristic of a company, variables $C_{i,j}$ are measures of the complexity and risk dimensions of a company so far as the auditor is concerned. It is believed that an increase in the size, complexity or risk of a company will lead to an increase in the amount of audit work and therefore to an increase in audit fees. These auditee characteristics are normally proxied by a variety of accounting variables.

Commonly used proxies include total assets for size; number of subsidiaries, stock to total assets and debtors to total assets for complexity; and profitability for risk. Reasons for using the proxies can be found in Chan et al. (1993) which is based on interviews with partners in four Big Eight firms. Nevertheless, some proxies can be ambiguous, for example, profitability is often used to proxy risk of a company, but it might also be a surrogate for the willingness of a company to pay audit fees and risk may, on occasion, be negatively correlated with profitability where poor performance threatens survival.

Variables $A_{i,j}$ proxy the characteristics of a company auditor and the particular audit engagement. They are used especially for the detection of specific dimensions of the auditor. For example, a Big Six variable to see whether the Big Six charge a premium, a specialist variable to see whether audit specialists charge higher fees and a change of auditors to see whether there is price cut in the initial engagement.

The form of model used is of interest. Simunic (1980) used asset deflated audit fees as the dependent variable, and thus implicitly assumed interaction between size and other independent variables:

$$F_i = S_i^{\delta}(\alpha + \sum_{j=1}^{k} \beta_j C_{i,j} + \sum_{j=k+1}^{l} \beta_j A_{i,j}) \tag{2.4}$$

Using ordinary least squares, Simunic (1980) first measured δ by regressing $\log F_i$ against $\log S_i$. Then, he used the asset deflated audit fees as the dependent variable and estimated the α and βs.

Subsequent studies including Francis (1984), Francis and Stokes (1986), Palmrose (1986a), Chan et al. (1993) etc, used a logarithm form (the 'logarithm form') directly:

$$F_i = S_i^{\delta} exp^{(\alpha + \sum_{j=1}^{k} \beta_j C_{i,j} + \sum_{j=k+1}^{l} \beta_j A_{i,j})} \tag{2.5}$$

Pong and Whittington (1994) made two changes to the model: first, instead of using an exponential form, they preferred a quadratic equation involving S_i and S_i^2. Compared to the logarithm model, they considered that the quadratic model provided model flexibility and extracted more information from the data. In addition, they proposed that interaction should be allowed for all variables (the 'quadratic interaction model'). O'Keefe et al. (1994) also suggested that previous models were not reasonable because the elasticity of fees[12] with respect to size should change with changes in other characteristics. Therefore, they used the following (the 'logarithm interaction model'):

$$F_i = \exp^{\alpha} S_i^{(\delta + \sum_{j=1}^{k} \beta_j C_{i,j} + \sum_{j=k+1}^{l} \beta_j A_{i,j})} \tag{2.6}$$

However, they concluded that their empirical results were not sensitive to the choice of functional form used.

[12]In O'Keefe et al. (1994), number of audit hours was used as the dependent variable.

Copley, Gaver and Gaver (1994, 1995) argued that a simultaneous equation model should be used because ignoring the simultaneous endogeneity of audit fees and audit attributes engenders problems of parameter identification and estimation bias, which prevents meaningful interpretation of variable coefficients (the 'simultaneous equation model'). Copley et al. (1995) considered the demand for auditor reputation as a function of exogenous client characteristics and marginal audit fees. They considered that the price (marginal fees) at which an audit firm is willing to supply is a function of exogenous client and audit firm characteristics, and auditor reputation[13].

These studies suggest a need to document the results obtained by each of the four methods: the logarithm model, the quadratic interaction model, the logarithm interaction model and the simultaneous model. When the models are applied to the same set of data, comparison would become possible. This has never been explicitly disclosed in publications although O'Keefe et al. (1994) mentioned that the results of their study were not sensitive to the choice of model used. They did not, however, present the results of their sensitivity analysis. If O'Keefe et al. (1994)'s claim is generally held then the choice of model is unimportant and a model which appeals to intuition is perhaps the best choice.

Since different industry characteristics might have impact on audit prices,

[13]Auditor reputation is not observable and Copley et al. (1995) suggested two methods to construct auditor reputation - one based on the number of clients and the other is based on classification of firms into Big Six and non-Big Six. However, marginal fees is also not observable and they arbitrarily set fees as a function of auditor reputation and client size.

it has been suggested that analysing audit fee models for specific industries could provide a richer understanding of the determinants of audit fees (Cullinan, 1997). Finally, models looking at the change in fees over time should also deserve attention. Using a derivative form of the logarithm model, Maher, Tiessen, Colson and Broman (1992) looked at changes in fees. Unlike the logarithm model which explains about 80% of the variance of the data, the derivative form has an adjusted R-square of 0.31 only. The determinants of fee change are likely to be complex and thus not readily susceptible to general, aggregate study. This is highlighted by Hay and Morris (1991, 171) who noted that "often overlooked is the fact that the factors determining the level at which price is set and the factors determining whether and by how much it will be altered may be very different, thus requiring different types of analysis and generating different pictures of how prices are determined".

2.2.3 Big Six Premium

Empirical study of product differentiation in the audit services market can be difficult because the quality of an audit is not observable. Studies beginning in the 1980s have therfore attempted to find out indirectly about the nature and degree of product differentiation between the Big Eight (then Big Six and now Big Five) and non-Big Eight. These studies include Simunic (1980), Francis (1984), Palmrose (1986a), Francis and Stokes (1986), Francis and Simon (1987) among others. All the studies incorporated a dummy variable into an audit fee model to distinguish Big Eight and non-Big Eight. Moizer (1997, 67–68) suggested that a Big Eight premium could be justified by the following considerations: a higher quality Big Eight audit; a Big Eight name attached to the financial statements; a higher chance of getting claims fully settled from Big Eight if the audit goes wrong; and an oligopoly price charged by the Big Eight.

Simunic (1980) tested the competitiveness of the audit services market and found that the big audit firms did not charge fees higher than that of small audit firms. He concluded that the hypothesis that price competition prevails throughout the market for audits of publicly held companies could not be rejected.

Three assumptions were made in Simunic (1980) to analyse competition, product differentiation and economies of scale in the large auditee market. First, the small auditees market was competitive. Second, if economies of scale existed, it would be applicable to all production, not just related to specific market segments. Third, product differentiation, if it existed, should be observable in both large and small auditee markets. Table 2.3 summarises the analytical framework of Simunic (1980).

However, Francis and Stokes (1986) noted that Simunic's analytical framework suffered from the fact that product differentiation, as reflected by higher Big Eight prices, may be confounded by the presence of Big Eight economies of scale (e.g. scenarios [3], [6], and [9]) or of diseconomies of scale

Table 2.3 Simunic (1980) Framework

Large auditees	Small Auditees		
	$B8 > \overline{B8}$	$B8 = \overline{B8}$	$B8 < \overline{B8}$
$B8 > \overline{B8}$	[1]C,P[a]	[2]M[b]	[3]M,S[c]
$B8 = \overline{B8}$	[4]C,P,D[d]	[5]C[e]	[6]M,S[c]
$B8 < \overline{B8}$	[7]C,P,D[d]	[8]C,D[f]	[9]C,S[g]

Sources: reproduced from Francis and Stokes (1986, Table 1)

$B8$ = Big Eight audit prices
$\overline{B8}$ = non-Big Eight audit prices
C = competitive pricing among large auditees
M = monopolistic pricing for large auditees
P = Big Eight product differentiation
S = Big Eight economies of scale
D = non-Big Eight dis-economies of scale

[a] $B8 > \overline{B8}$ in both market segments indicates that pricing is competitive throughout the market, and because $B8 > \overline{B8}$, the higher price indicates B8 product differentiation throughout the market.

[b] since prices are the same in the small market segment and $B8 > \overline{B8}$ in the large segment, B8 monopolistic pricing exists in the large segment of the market.

[c] $B8 < \overline{B8}$ in the small segment indicates that scale economies exist for large producers throughout the market, but because $B8 \geq \overline{B8}$ in the large segment, B8 monopolistic pricing exists in the large segment.

[d] $B8 > \overline{B8}$ in the small segment indicates B8 product differentiation throughout the market, but since $B8 \leq \overline{B8}$ in the large segment, the $\overline{B8}$ have diseconomies of scale (higher prices) in the large segment.

[e] $B8 = \overline{B8}$ in both market segments indicates a competitive structure with no product differentiation or scale economies.

[f] $B8 = \overline{B8}$ in the small segment indicates competition throughout the market and $B8 < \overline{B8}$ in the large segment indicates the $\overline{B8}$ have diseconomies of scale (higher prices) in the large segment.

[g] $B8 < \overline{B8}$ both segments indicates competitive pricing throughout the market and because $B8 < \overline{B8}$ scale economies favour large producers throughout the market.

for non-Big Eight firms in the audits of large auditees (e.g. scenarios [4], [7], and [8]) (Francis and Stokes, 1986, 384). Other assumptions made by Simunic (1980) were also subject to challenge. For example, the definition of a large auditee market was questioned. Also, if two auditee markets existed, why could economies of scale and product differentiation exist in one market but not in the other.

Using Australian companies' data, Francis (1984) found that the Big

Eight had significantly higher audit prices than non-Big Eight firms. The result held for both large and small auditee markets. Francis and Stokes (1986) attempted to reconcile the differences between Simunic (1980) and Francis (1984). They suggested that the difference in definitions of small and large auditees might explain the differences in the results of the two studies. They therefore used the largest 96 and smallest 96 publicly traded non-finance companies to represent respectively the large and small auditee markets. The study reported that although there was a Big Eight premium for the small auditees sample, the premium was not found in the large auditees sample. Similarly, Palmrose (1986a) reported that there was a Big Eight premium for the small auditees but not for the large auditees. Francis and Simon (1987) further investigated the small auditee market and reported that a Big Eight premium existed and that the premium existed with respect to both second-tier national firms and local/regional firms.

To conclude, results in the US have been mixed. In the UK, Chan et al. (1993), Pong and Whittington (1994) and Gregory and Collier (1996) reported the existence of a Big Eight premium, but no differentiation was made between large and small auditees in these studies. In reviewing the international audit firm premium in twelve countries, Moizer (1997) noted that a top tier fee premium of between 16% and 37% existed. The relevant research studies in various countries including Australia, the UK and the US are summarised in Table 2.4.

Table 2.4 Summary of Audit Fee Premium Studies

Country	Study	Top Tier Fee Premium	Other Premiums(P)/ Discounts(D)
Australia	Francis (1984)	16.5%	None
Australia	Craswell et al. (1995)	30.0%	Industry specialist(P)
Bangladesh	Karim and Moizer (1996)	20.2%	None
Canada	Chung and Linsay (1988)	None	Price Waterhouse(P)
Canada	Anderson and Zéghal (1994)	Small auditees	Clarkson Gordon(P),Peat Marwick(P),Touche Ross(D)
Hong Kong	Simon, Teo and Trompeter (1992)	31.0%	None
Hong Kong	Lee (1996)	None	None
India	Simon, Ramanan and Dugar (1986)	Yes	None
Malaysia	Simon et al. (1992)	None	None
New Zealand	Firth (1985, 1993)	4.0%	Price Waterhouse(P)
New Zealand	Johnson, Walker and Westergaard (1995)	24.0%	None
Norway	Firth (1996)	None	Arthur Andersen(P)
Singapore	Simon et al. (1992)	26.0%	None
South Africa	Simon (1995)	None	Deloitte Touche(P), Ernst & Young(P)
UK	Chan et al. (1993)	36.0%	London Office(P)
UK	Brinn, Peel and Roberts (1994)	Yes	London Office(P)
UK	Pong and Whittington (1994)	24.0%	Big Eight complex auditees(D)
US	Simunic (1980)	No	Price Waterhouse(P)
US	Palmrose (1986a)	17.0%	None
US	Simon and Francis (1988)	16.0%	None
US	Balachandran and Simon (1993)	Not examined	Price Waterhouse(P), Deloitte, Haskins &Sells(P),Peat Marwick(D)

Reproduced from Moizer (1997, Table 1)

A review of research on the Big Six premium suggests at least two possible research extensions. First, studies which investigate competitiveness of the audit services market rely on an unscientific division of the large and small auditees markets, mostly based on total assets or turnover of the auditees. The division is important because interpretation of results is based on the assumption that the small auditees market is competitive. However, it is apparent that the audit market for companies below a certain size may not necessarily be competitive. This market can still be dominated by a group of large firms. One neglected method of division is the use of concentration indices which are often employed in business and economics studies of market competitiveness. Unless there is evidence that the defined small audit market is not highly concentrated, the assumption that it is competitive is of some dubiety. Second, another aspect of audit premium studies is their concentration on the price difference between the Big Six and the non-Big Six. The categorisation of firms in the audit market deserves more attention because the Big Six have dominated the audit market of listed companies. There might be audit pricing variations among the Big Six. There has also been some casual empirical observation that they do charge fees differently. For example, Accountancy Age (17/11/94) noted that Savoy Hotel paid Coopers & Lybrand audit fees of £211,000 when City Centre Restaurants only paid Ernst & Young £52,000, when their level of sales was very similar.

2.2.4 Industry Audit Specialists

Palmrose (1986a) and Craswell et al. (1995) examined the Big Eight premium and suggested that it was due to industry specialisation in addition to the influence of the Big Eight brand name. Both studies assumed that an auditor was a specialist in an industry if the auditor had achieved a certain market share in that industry. The market share in Palmrose (1986a) was based on total turnover of the clients of the auditor, while the market share in Craswell et al. (1995) was based on either the number of clients in the industry or the percentage of total audit fee income in the industry.

Palmrose (1986a) introduced the idea of the audit specialist into the audit fee model. Her study showed that specialist auditors did not charge higher fees than non-specialist auditors. Craswell et al. (1995) studied brand name reputation and industry specialisation by the Big Eight auditors. They tested, first, that specialist Big Eight auditors would have higher audit fees than non-specialist Big Eight auditors and second, that Big Eight auditors would have higher audit fees than non-Big Eight auditors. They showed that, on average, industry specialist Big Eight auditors earned a 34% premium over non-specialist Big Eight auditors, and that the Big Eight brand name premium over non-Big Eight auditors averaged around 30%.

Palmrose (1986a), Simunic (1980) and Gist (1992) reported a negative relationship between regulated industries and fees. Gist (1992) argued that the observed results might be due to scale economies and/or specialisation effects which accrue to audit firms in dealing with the regulatory complexities faced by clients[14].

2.2.5 Consultancy Services

Consultancy services income represents a substantial proportion of the total income of an accountancy firm. Ezzamel et al. (1996) reported that income earned by audit firms from non-audit work for quoted clients averaged nearly 90% of the levels of audit fee earnings in 1992/93. Accountancy Age (08/06/1995) noted that in 1994/95, five of the Big Six had tax and consultancy fee income higher than audit and accounting fee income. This raises one potential problem. Auditors' independence may be compromised for economic returns as auditors may concede to disagreements in order that they can continue to provide consultancy services to the client. This is undesirable as it can reduce the quality of auditing. Thus, there has been a suggestion that auditors should not provide both auditing and consultancy services to a client. The counter argument is that provision of both services increases audit efficiency. For example, information acquired from consultancy services may enhance the production efficiency of an audit. However, if the resulting cost savings are retained in whole, or in part, by the auditor they benefit from the accrual of an economic rent, this may create incentives

[14]However, he also argued that since regulation demanded greater auditor expertise, one would expect that auditors would price in order to recover their investment incurred in generating that expertise. Therefore, a positive relationship should be observed.

for the auditor to compromise with its client (Simunic, 1984).

Simunic (1984) argued that companies chose a mix of audit services and a standard for their internal control to produce financial statements of good quality and do so to minimise the overall cost. Given the same quality of financial statements, the additional purchase of audit services reduces the amount spent on maintaining the standard of internal controls, and vice versa. His study reported that the purchase of management advisory services from the auditor is associated with a significant increase in the audit fees. He explained that this result would arise if the production of auditing generated knowledge useful for management advisory services or if the production of such services reduced the marginal cost of auditing and audit demand was relatively elastic. Simon (1985) and Ezzamel et al. (1996) reported similar results. Palmrose (1986b) also provided evidence of a positive relationship between fees for audit services and non-audit services. However, this relationship was observed whether the non-audit services are supplied by the incumbent auditing firm or by another public accounting firm. She suggested that non-audit services purchasers might require more audit effort, and results of Davis et al. (1993) were consistent with the suggestion.

Beck, Frecka and Solomon (1988, 62) noted that market participants were aware of the incentive effects associated with management advisory services involvement on auditors' independence. The signalling value of the audit would thus be attenuated and there would be an increase in agency cost. Recognising this problem, audit committees (managers) will restrict auditors' management advisory services involvement in order to reduce the agency costs that would be imposed upon the firm. Whether there has been a decrease in management advisory services by auditors can be tested empirically in the UK. Companies are now required by law to disclose the amount of consultancy fees paid to their auditors. This provides a further research opportunity.

2.2.6 Price cutting in initial audits

Low balling occurs when an auditor tenders an initial fee which is below projected cost in the hope of winning an audit. This is believed to prejudice auditor independence, since the auditor needs to retain the audit for several years to recover the full costs incurred in the setting up and conducting the audit under a low balling regime. However, it is not immediately obvious that, having incurred an initial fixed cost, the auditor should be in a worse competitive situation than in the absence of such costs, since any competitor for the audit would incur similar costs.

Medium sized audit firms have been consistent critics of the Big 6 practice of low balling. Tim Richmond of Pannell Kerr Forster said that "our clients regularly receive phone calls from other firms willing to do the work for a lot less than we do" (quoted in Financial Times 16/05/91), and Jim

Gemmell of Clark Whitehill Association said that "without a doubt low balling does exist, although it is marginally better than it was" (quoted in Accountancy Age 09/11/95). BDO Stoy Hayward's loss of Royal Automobile Club to Price Waterhouse and the subsequent row prompted an inquiry by the ICAEW. A working party was set up and headed by an independent outsider, Miss Elizabeth Llewellyn-Smith, principal of St. Hilda's College, Oxford. It found no evidence at all that large audit clients were damaged by competitive pricing (Financial Times 09/11/95). However, John Wosner of Pannell Kerr Forster disagreed and considered that "given the timescale the working party could not explore the question of the independence of the audit and the provision of other services" (quoted in Accountancy Age 09/11/95).

The results of Llewellyn-Smith were consistent with those of DeAngelo (1981) who demonstrated that low balling did not impair independence, rather it was a competitive response to the expectation of future quasi-rents to incumbent auditors. DeAngelo (1981) maintained that there was an inherent auditor independence problem that arose from audit start-up costs which gave incumbent auditors a technological advantage over competitors. The auditee also needed to incur cost if it switched to another auditor. The technological advantage of the auditor and the switching costs of the auditee provided opportunity for the auditor to earn future quasi-rents. The future quasi-rents, in turn, induced low balling. One problem inherent in this situation was that new auditors, once hired, had an incentive to retain their incumbency in order to realise future quasi-rents and this might lessen their independence. However, based on this argument, low balling for the initial audit can be seen to represent a competitive response to future rents accruing to incumbents. Low balling did not cause future rents to occur. Magee and Tseng (1990) also showed that the value of incumbency to an auditor presented a threat to independence only under limited circumstances.

However, theoretical arguments based on a psychological perspective can be advanced to show that the auditor might feel unduly dependent on the support of the management of the auditee firm where low balling has been used to obtain an audit. Simon and Francis (1988) stated that

> "in the audit context of price cutting, a considerable investment is made to obtain a new client. So the prior decision to discount the audit fee could motivate the auditor's desire to not lose the client, even in the presence of serious auditor-client disagreements. This desire to not lose the new client, because of the prior investment commitment [although it is a sunk cost and should not be relevant], could lead to an additional auditor independence problem during the period of investment recovery, over and above normal independence problems."

Francis (1984) tested for price cutting behaviour by audit firms in the first year of audit engagement. He found no evidence of such behaviour. However, in contrast, Francis and Simon (1987) did find that initial engagements were priced significantly lower than continuing engagements. Further investigation in Simon and Francis (1988) demonstrated the existence of a significant fee reduction in the initial engagement year. It averaged 24% of normal fee levels for ongoing engagements. An average fee reduction of 15% for each of the next two years was also evident, but by the fourth year of the new auditor, the fee had increased to normal levels of continuing engagements. Gregory and Collier (1996) found that within a period of three years from a change of auditor, there was a significant audit fee reduction (22%). Whilst some fee reduction (9%) was also observed for four to five years after the change, the results were not statistically different from zero and therefore, were consistent with the results of Simon and Francis (1988). Ettredge and Greenberg (1990) and Pong and Whittington (1994) also identified a tendency for new auditors to charge less, on average, than incumbent auditors.

Craswell and Francis (1999) noted there were competing theories of initial engagement audit pricing. DeAngelo (1981) predicted that initial engagement discounts in all fee setting decisions would occur while Dye (1991) specifically predicted that discounting would not occur in settings where audit fees were publicly disclosed. Results of Craswell and Francis (1999) supported Dye's argument. They found no fee discounting in Australia, where audit fees were publicly disclosed, except when the initial engagement was an upgrade in audit quality from non-Big Eight to Big Eight auditor. They argued that the observed initial audit fee discount for upgrades to Big Eight auditors was consistent with the economic theory of discount pricing of higher-priced, higher-quality experience goods. This is done as an inducement to purchase where information asymmetry exists between buyer and seller regarding product or service quality. However, in the UK where audit fees were also publicly disclosed, Gregory and Collier (1996) found initial fee reduction for companies changing from one Big Six to another Big Six auditor.

2.3 Market Structure and Pricing

Pearson and Trompeter (1994) looked at the effect of auditor concentration on audit pricing. They collected data on 140 life and health companies, and 101 property and casualty insurance companies over a period of five years. An auditor concentration variable - the market shares of the three largest providers of audit services within an industry, was added to the standard audit fee model. They reported that audit fees were negatively related to industry concentration. The result was contrary to their expectation that high concentration would be associated with reduced price competition. However, they noted two possible limitations in their study: first, only two industries were examined and second, the sample period covered a relatively short time period, during which the concentration ratios exhibited only limited variability in each industry.

Doogar and Easley (1998) developed a theoretical model of undifferentiated price competition which closely predicted audit market concentration in the US. They argued that relative incremental costs of the same audit job across audit firms was the only supply consideration in a price competition situation. They then provided an incremental cost function based on several disputable assumptions. First, audit firms were assumed to produce audits using a two-factor Cobb-Douglas technology with one fixed (partners) and one variable (staff) input. The total endowment of partners could not be varied in the short run. Second, the demand for staff and the optimal leverage (that is, staff-to-partner ratio) were endogenously determined by the firm's cost minimisation objective. Third, auditors clients were assumed to choose auditors based solely on price, quality differentiation was assumed to play no role in the market. Fourth, firms were assumed to use a constant returns to scale technology that exhibits diseconomies of scale in the short run when the supply of one factor of production is constrained.

Based on their incremental cost function, they simulated an audit market. Their found that the market shares for the Big Six in the simulated audit market were statistically indistinguishable from actual market shares for the Big Six. The simulation procedure was as follows (Doogar and Easley, 1998, 239):

> When the market opens all firms have empty client rosters. In each round an unassigned client is randomly selected for assignment. Each audit firm bid its incremental cost and the client is assigned to the lowest bidder. After all jobs are assigned, we check to see whether there are any dissatisfied clients. A client is dissatisfied when the incumbent auditor's incremental cost is higher than the incremental cost of at least one rival for the same job. ... As long as there is a dissatisfied client in the market, we calculate the dissatisfaction score and move the client to the auditor with the lowest incremental cost of auditing that client. ... When a dissatisfied client moves from one

> auditor to another, the firms that gain or lose a client experience a change in their sum job sizes. We then recalculate all incremental costs for all clients and identify a new most dissatisfied client, until no client remains dissatisfied.

There is considerable scope for further research in this area. Research results so far have suggested that the supply side of the market for audit services takes the form of an oligopoly[15] : it has a core of six dominant firms and a competitive fringe. Although there has been a substantial amount of economic literature on oligopoly pricing theories[16], the theories have not been applied to studies of the audit services market. For example, two economic models may be relevant to the pricing of audit services: the Bertrand model and the dominant-firm model.

In neo-classical non-collusive oligopoly models, companies may compete with each other by changing either the quantity of goods produced or the selling price of the goods. Cournot's model analyses the former while the Bertrand model looks at the latter. In the case of the audit services market, the Cournot model is not applicable. This is because an audit firm cannot produce an audit before it is appointed by a company. That is, sales take place before production. Audit firms, therefore, cannot compete by varying the quantity of audit services to be produced. Rather, they compete on the

[15] Oligopoly lies between monopoly and perfect competitive market. Scherer and Ross (1990, 17) noted that "although pure monopoly ends and oligopoly begins when the number of sellers rises from one to two, it is difficult to specify exactly where oligopoly shades into a competitive market structure. The key to the distinction is subjective - whether or not the sellers consider themselves conscious ..."

[16] See Shapiro (1989) for a review of oligopoly pricing theories.

price of audit services.

Equilibrium in the Bertrand model is quite different from equilibrium in the Cournot model. While the Cournot model emphasises the market structure as the critical element in determining market performance, the Bertrand model predicts competitive market performance if as few as two producers supply a standardised product. However, if the assumption of product standardisation is relaxed, price-setting models highlight the degree of product differentiation as a determinant of market performance (Martin, 1994, 38–39). Such pricing models may be worth pursuing in the study of audit services market as each of the Big Five has its own audit methods which may result in differentiated audit quality both amongst them and between them and other smaller audit firms.

Under the dominant-firm model, there is a dominant company or a cartel of companies with a competitive fringe or the followers. The dominant firm model is thus applicable to the study of audit services market in which there is a core of Big Five with a fringe of medium and small audit firms. Followers are viewed as price takers. Each rival firm is assumed to be so small relative to market demand that it views changes in its output as having no effect on price.

If the dominant firm does not have a cost advantage over the fringe and it charges a price above the cost, the fringe will expand and the market share of the dominant firm will decrease in the long run. In order to maintain its position and charge a price higher than the minimum cost, barriers of entry are important to the dominant firm. Some forms of barriers to entry include absolute cost advantage, e.g. superior patented production methods, talented management, scale of economies, product differentiation and sunk costs (Scherer and Ross, 1990, 360).

In addition to the two economic models, Porter (1998a,b) and Besanko, Dranove and Shanley (2000) provided an economics of strategy perspective which was relevant to auditing research. They argued that competitive advantage was achievable only if a firm could create more economic value than its rivals could. They defined value-creation as the difference between the value that resided in the product (quality) and the value of the inputs that were sacrificed to make that product (cost). Firms with cost and/or quality advantages could develop strategies to achieve a gain in market share and/or a higher profit margin. This perspective is relevant to the audit market because it is considered that large audit firms have a cost advantage and that there are audit specialists who provide higher quality audit products.

2.4 Conclusion

A review of the literature in audit market structure showed that there has been substantial increase in concentration in the audit services market, especially in the late 1980s. This change in market structure potentially facilitates cartel collusion which can lead to higher audit prices. A review of the literature in pricing of audit services, however, detected some contradictory signals. First, there is the competitive behaviour of initial engagement price cuts. Second, premium fees charge by large and/or specialist audit firms may represent monopoly rents, although they may also represent higher quality audits offered by these firms. These developments in the audit services market and the issues surrounding them thus provided the backdrop to this dissertation. The rest of this dissertation is to achieve three objectives. First, in the wake of the mergers between Ernst & Whinney and Arthur Young in 1989 and between Coopers & Lybrand and Deloitte, Haskins & Sells in 1990, it examines the extent of concentration in the audit services market during the period from 1991 to 1995. Second, it analyses changes in the level of audit prices during the period. Results will provide some indication on the competitiveness in the audit services market. Finally, using an economic strategy perspective, it provides a theoretical framework to explain audit prices (including large audit firm premiums and specialist premium) in a competitive environment.

In addition, by reviewing the literature on the process of audit services pricing, a perspective is provided on where research has been concentrated and where it has been neglected. Consequently, this chapter provides a framework for future research in the area. It has also summarised the results of research studies concerning some specific issues in the pricing of audit services. These comprise, the form of audit fee models, Big Six premium, non-audit services fees, low-balling and market concentration of audit services. From this analysis, research (some of which will be dealt with in this dissertation) along the following lines is proposed:

1. Research studies have concentrated on the relationship between the technical process and the amount of fees recovered. Research studies should also look at the inter-relationships between the technical, the charging and the recovery process. This will provide a better understanding of audit prices[17].

2. Various empirical audit fee models have been used and a study to compare the results obtained from these different models is desirable. This will enable us to compare results of different studies.

3. Investigating product differentiation and the economies of scale within the audit services market (as in Simunic, 1980) requires an analysis of the differences between the large and the small auditee markets. There is an assumption that the small auditee market is competitive. Yet, the definition of the small auditee market used in research studies has been arbitrary, usually based on assets or turnover of auditees. In fact, what is important is the degree of competition which is poorly proxied by size. Market concentration is a much better proxy for competitivenss.

[17]The Big Six firms have been contacted to participate in this research but all of them have declined the invitation.

4. Attention should be paid to the pricing differences among the Big 6, in addition to the differences between the Big Six and small audit firms. Similarly, market concentration by individual firms should be researched. This is because the audit services market is dominated by the Big Six.

5. The effect of audit committees on audit and consultancy fees should be investigated, as should the practice of low-balling in the 1990s. The increasing competitiveness of the audit services market over time should show an overall real decrease in audit fees and evidence should be gathered on this point.

6. The recent publication of annual financial statements and reports by some audit firms in the UK has provided data which should enable empirical research into the audit services market. At present, empirical tests following the developments in the economic literature on industrial organisation are not possible because of the lack of information about audit firms.

Chapter 3

Auditor Concentration 1991–1995

3.1 Introduction

The recent merger between Coopers & Lybrand and Price Waterhouse on the 1 July 1998 to become PricewaterhouseCoopers is the latest manifestation of the trend towards higher concentration in the supply of audit services market[1]. A number of concerns derive from the degree of concentration[2] which would result from large firm mergers. The implications of greater concentration for the audit services market include the strengthening of an oligopolistic supply with consequent enhanced potential for price fixing arrangements, reduction in consumer choice, and an escalation in conflicts of interest. The last issue derives from an increasing number of instances where an audit firm provides consultancy services to auditees. A special case of

[1]There was also merger talk between Ernst & Young and KPMG but it subsequently collapsed.

[2]Concentration in an industry refers to the extent to which economic activity is controlled by large firms.

this arises where the same audit firm is consultant to two or more competing client companies. Here the problem emerges as to how a company can ensure that its auditors will not release useful information to its competitors in return for consultancy fees. For example, Christopher Pearce, finance director of Rentokil Initial and head of the FD's One Hundred Group, confirmed the fears of audit firm clients when he expressed the view that the proposed merger between Coopers & Lybrand and Price Waterhouse "reduces competition and increases the potential for conflict of interest" (quoted in Accountancy Age, 25/09/97).

Concentration is conventionally regarded as a significant dimension of market structure because it plays an important role in determining market power and hence business behaviour and performance (Clark, 1985; Martin, 1994; Scherer and Ross, 1990; Tirole, 1994). High concentration in an industry increases the likelihood of the formation of a cartel comprising an association of firms which agrees, perhaps tacitly, to co-ordinate production and pricing to increase the joint and individual profits of its members by restricting output. However, concentration resulting from mergers may also permit the achievement of economies of scale due to increases in firm size. It has been argued that these efficiency gains can be related to a concentration formula. Thus, concentration on the supply side has the potential to influence the volume, price, variety and quality of audit services.

Using a much larger and more recent data sample, this chapter seeks through an investigation of the UK audit market concentration to provide further contributions to the UK audit market literature:

1. It updates the findings of earlier studies. By analysing auditor concentration from 1991 to 1995, it extends the UK work of both Beattie and Fearnley (1994) and Peel (1997).

2. It examines the impact of auditor changes on concentration. Auditor changes during this five year period are analysed into those involving a switch from a small firm to a Big Six firm (and vice versa), and those involving a switch within Big Six. The analysis of auditor change among the Big Six is also much more detailed than that of previous studies (Beattie and Fearnley, 1994; Moizer and Turley, 1989). This aspect of the analysis is of particular importance as evidence of numerous client changes among the Big Six would throw some light on the nature of competition in the already highly concentrated audit market and could cast doubt on the idea of cartel formation by the Big Six.

3. It attempts to be innovative in its analysis of auditor concentration within industry groups (Zeff and Fossum, 1967; Danos and Eichenseher, 1982; Eichenseher and Danos, 1981; Moizer and Turley, 1989). Restriction in choice of auditors within industry group would indicate a heightened potential conflict of interest for auditors who provide both audit and a management consultancy service to two or more

competing companies.

4. Another important issue related to auditor concentration within industry groups is that of the audit specialist. It can be argued that '[if] auditors develop industry specialisation by increasing their clienteles, specialists could also achieve production economies and become efficient, lower-cost producers of audits' (Craswell et al., 1995, 301). Thus, the specialist becomes a dominant force in the supply of sectoral audits and as such has a potential to extend considerable influence over audit pricing within that sector. This chapter investigates the incidence of audit specialists by applying a market share test within each sector. This method has been used in many of previous studies including Craswell et al. (1995) and Palmrose (1986a), but has not been applied to current UK data.

5. This chapter assesses the most commonly used methods of concentration measures in prior studies. These methods all involve the selection of an audit market (population of companies), a measure of market power, and a concentration index. Methods chosen by researchers may therefore differ considerably and consequently the results of research studies may lack comparability (Moizer and Turley, 1987). However, this issue is often neglected in the interpretation of the results of concentration studies.

3.2 Data and Method

The data used in this study consisted of fully listed and USM companies (with the exclusion of investments trusts) for the years from 1991 to 1995. Information on company auditors was extracted manually from the *Hambro Company Guide*[3], November issues 1991 to 1995. Financial information on companies - total assets and audit fees, were downloaded from Datastream.

Table 3.1 provides summary statistics of the five year data set. Casual observation of the summary statistics suggests that there was an increase in auditor concentration during the five year period. In 1991, there were 119 firms providing audit services to 1211 companies. The comparative figures in 1995 were 106 firms and 1401 companies. Audit fees paid varied among the companies, from below £1000 to £9 million. Interestingly, the average audit fee per company has decreased over the five year period, from £295,000 in 1991 to £275,000 in 1995 while the average size of company has increased from £825 million in 1991 to £955 million in 1995.

Data collection proceeded as follows. Accounting data from Datastream was obtained on a calendar year basis (based on accounting year end date). This created the potential for a cut-off problem when the data was matched with auditor information in the *Hambro Company Guide* (November issue)

[3]According to the company guide, information was compiled from prime sources and drawn mainly from the company's own reports and accounts, and each entry was submitted for verification to the company concerned prior to publication.

Table 3.1 Summary Statistics

Year	1991	1992	1993	1994	1995
Sample Size	1,211	1,222	1,237	1,320	1,401
Number of Auditors	119	116	113	110	106
Audit Fees (£'000)					
Mean	295	299	300	279	275
Standard Deviation	653	682	698	647	666
Minimum	1	2	2	2	0
Maximum	7,400	8,000	9,000	8,000	8,000
Total Assets(£'000)					
Mean	825,206	874,907	954,985	930,910	955,039
Standard Deviation	5,910,634	6,485,236	7,395,138	7,272,258	7,946,593
Minimum	230	115	216	348	532
Maximum	128,540,000	143,216,000	163,116,000	159,363,000	166,347,000

based on the latest published accounts[4]. However, there was only a small number of auditor changes in each of the years under investigation, and so overall auditor concentration measures were not significantly affected. Not all the companies listed in the Hambro Company Guide were available in Datastream and therefore, the resulting population size for each of the years has been reduced (Table 3.1)[5]. There was no merger between the Big Six audit firms during 1991 to 1995. During the period, there were a few

[4]Such a problem would occur, for example, when a company had year end date 31st December and had an auditor change during the year. The Hambro Company Guide would only give auditor information as at November of that year and thus, would not have the new auditor information.

[5]This was because Datastream did not have information on all the dead companies. This might understate the actual numbers of newly listed and delisted companies during the five year period.

smaller audit firms mergers including Baker Tilly and Longcrofts, Moore Stephens and Overton Salt, and Finnie and Stoy Hayward in 1992; Brewers and Coopers Lancaster, and Chantrey Velloacott in 1993; and BDO Binder Hamlyn[6] and Stoy Hayward in 1995.

Using the five year data set, concentration ratios were calculated for the years from 1991 to 1995. Audit fee income and number of audit engagements were used as proxies for size and market power of audit firms. Degree of concentration was measured by C_4 and C_6, market share by the largest four and six firms respectively. Market share held by each of the top 15 firms was also computed for each year. The change in auditor concentration during the five year period was then analysed and classified according to its causes (company switching auditor, newly listed companies and companies removed from stock exchange). Using audit fee income as the size measure, Herfindahl indices were also computed for each of the five years in order to look at the effect of choice of concentration indices on concentration measures. Restricting the study to the 1995 data set, auditor concentration within industry group was also calculated.

Finally, the effect of population size on auditor concentration was investigated as follows. The 1995 data sample was sorted in descending order of size of companies. Auditor concentration indices were first computed for a

[6]Only part of BDO Binder Hamlyn merged with Stoy Hayward to form BDO Stoy Hayward. The remaining practice, continued as Binder Hamlyn, subsequently merged with Arthur Andersen.

population with only the largest company. Next, the population size was increased by adding the immediate largest company and auditor concentration indices were re-computed based on the new population size. The process was repeated until the population included 1401 companies. This was done to examine the effect of choice of sample on results of concentration studies, particularly in cases where the sample used is based on a proportion of the largest companies.

3.3 Results

3.3.1 Auditor Concentration 1991 - 95

Table 3.2 shows the market shares, by audit fees and number of audits respectively, of the top 15 audit firms in the UK in each of the years from 1991 to 1995. Results suggested that there was a core of 4 firms (CL, KPMG, EY and PW) who each consistently possessed an individual market share in excess of 10% and who together had more than 50% of the audit market. Moreover, their individual and total shares had steadily increased over the period. By 1995, these four firms earned 79% of total audit fees and audited 60% of the companies. KPMG had the largest share of the number of audits (20%) while CL had the largest share of total audit fees (23%). These four firms were followed by AA and TR who had a lesser, but substantial market presence. They received 13% of total audit fees and audited 15% of the companies. The Big Six were surrounded by a fringe of smaller firms who

Table 3.2 Auditor Concentration 1991 to 1995 - Top 15 Audit Firms

	Market Share (No. of Audits)					Market Share (Audit Fees)				
Year	1991	1992	1993	1994	1995	1991	1992	1993	1994	1995
Sample Size	1211	1222	1237	1320	1401	1211	1222	1237	1320	1401
	%	%	%	%	%	%	%	%	%	%
Coopers & Lybrand	14.86	15.96	15.89	16.25	15.35	21.80	21.93	22.05	23.27	23.29
KPMG	18.33	18.78	20.49	20.80	20.24	21.41	21.14	23.14	21.99	22.22
Ernst & Young	11.85	11.13	10.75	11.55	11.63	16.98	17.12	17.47	17.10	18.14
Price Waterhouse	11.48	11.74	11.68	12.08	12.46	16.96	18.80	17.11	17.03	15.70
Touche Ross	8.38	8.31	8.57	8.79	9.24	7.34	7.22	6.74	7.71	7.01
Arthur Andersen	4.95	4.95	4.77	5.00	6.00	4.11	4.26	4.41	4.50	5.53
Binder Hamlyn	5.12	5.16	5.34	4.70	3.82	2.65	2.51	2.52	2.27	1.60
Pannell Kerr Forster	1.65	1.96	1.70	1.89	1.71	1.44	1.16	0.97	0.85	0.82
Grant Thornton	3.26	2.86	2.67	2.42	3.14	0.90	0.71	0.68	0.61	0.77
BDO Stoy Hayward	2.48	2.78	2.75	2.42	3.39	0.56	0.58	0.60	0.56	0.72
Kidsons Impey	0.95	0.86	0.69	0.80	0.68	0.88	0.53	0.49	0.56	0.59
Moores Rowland	0.78	0.86	0.77	0.72	0.82	0.50	—	—	—	0.52
Clark Whitehill	—	0.74	0.81	0.68	0.57	0.55	0.58	0.62	0.54	0.44
Robson Rhodes	1.98	1.80	1.62	1.59	1.43	0.46	0.36	0.31	0.31	0.34
Moore Stephens	—	0.74	—	—	—	—	0.35	0.33	0.34	0.32
Neville Russell	0.66	—	0.73	0.68	0.50	—	—	—	—	—
Jayson Newman	—	—	—	—	—	0.34	0.30	0.31	0.26	—
Hacker Young	0.83	—	—	—	—	—	—	—	—	—
C_4	56.52	57.61	58.81	60.68	59.68	77.15	78.99	79.77	79.39	79.35
C_6	70.02	71.08	72.72	74.47	74.92	88.60	90.47	90.92	91.60	91.89

with the exception of Binder Hamlyn ("BH") individually received less than 1% of the total audit fees. However, together these firms earned 8% of total audit fees and audited 25% of the companies in 1995.

Concentration measures C_4 and C_6, based upon both audit fees or number of audits, confirmed that there has been a slight increase in auditor concentration from 1991 to 1995. Over the five year period, the increase in C_6 was about 3% (1991:89%, 1995:92%) when audit fee was used as the size measure while the increase was about 5% (1991:70%, 1995:75%) when the number of audits was used. These results can be compared directly to earlier studies and prove to be consistent with the findings of Beattie and Fearnley (1994) and Peel (1997).

3.3.2 Auditor Switches and Their Impact on Concentration

There were 69.5 (6.1%), 32 (2.7%), 63 (5.2%) and 50 (3.9%) cases of voluntary auditor switching for the years from 1991/92 to 1994/95 respectively. Underlying drivers for auditor changes were identified in Beattie and Fearnley (1995, 1998a,b). Auditor changes which may influence market concentration are analysed in Table 3.3. Between 1991 and 1995, the results show that the switch from a small to a Big Six auditor accounted for 41%[7] of auditor change (41%[8] for the period from 1987 to 1991 in Beattie and Fearnley (1994)). KPMG out-performed the rest of Big Six by successfully taking over 25.5 company audits from small audit firms during this five year period. The other Big Six firms, TR, CL, PW, EY and AA, obtained 17.5, 16.5, 16.5, 8.5, 4 clients from smaller firms respectively. However, the switch from a Big Six to a small firm, in total only accounted for an average of only 13%[9] of the total number of auditor changes (8%[10]. in Beattie and Fearnley (1994)). The Big Six lost 28 audits to small firms. The net gain for the Big Six from small firms therefore comprised of 28% of the total auditor change,

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7 $\frac{29+13.5+25+21}{214.5}$

8 $\frac{145}{146+205}$ (based on Table 7 of Beattie and Fearnley (1994))

9 $\frac{12+3.5+7.5+5}{214.5}$

10 $\frac{27}{146+205}$ (based on Table 7 of Beattie and Fearnley (1994))

Table 3.3 Change of Auditors 1992–1995

			AA	CL	TR	EY	KPMG	PW	Big Six	Others	New	Removed
New Auditors	1994–95	AA	—	0.0	0.0	1.0	2.5	0.0	3.5	0.5	14.0	3.0
		CL	0.0	—	0.0	0.0	0.0	0.0	0.0	3.5	8.0	6.0
		TR	0.0	1.0	—	1.5	1.0	0.0	3.5	7.0	10.0	6.0
		EY	0.0	1.0	0.0	—	1.0	1.0	3.0	0.5	15.5	4.0
		KPMG	0.0	1.0	0.0	0.0	—	1.0	2.0	4.5	17.0	8.0
		PW	0.0	1.0	1.0	1.0	1.0	—	4.0	5.0	11.0	3.0
		Big Six	0.0	4.0	1.0	3.5	5.5	2.0	16.0	21.0	75.5	30.0
		Others	2.0	1.0	0.0	1.0	1.0	0.0	5.0	8.0	47.5	12.0
		Total	2.0	5.0	1.0	4.5	6.5	2.0	21.0	29.0	123.0	42.0

			AA	CL	TR	EY	KPMG	PW	Big Six	Others	New	Removed
New Auditors	1993–94	AA	—	1.0	0.0	0.0	0.5	0.0	1.5	0.0	9.5	2.0
		CL	1.0	—	0.0	0.0	2.0	0.0	3.0	2.5	24.0	5.0
		TR	0.0	1.0	—	1.0	3.0	2.0	7.0	5.0	5.0	5.0
		EY	0.0	1.0	1.0	—	1.0	0.0	3.0	4.0	18.5	2.0
		KPMG	1.0	0.0	1.0	0.0	—	1.5	3.5	7.0	25.0	5.0
		PW	0.0	1.0	0.0	2.0	1.0	—	4.0	6.5	16.0	6.0
		Big Six	2.0	4.0	2.0	3.0	7.5	3.5	22.0	25.0	98.0	25.0
		Others	0.0	2.5	0.0	1.0	2.0	2.0	7.5	8.5	20.0	10.0
		Total	2.0	6.5	2.0	4.0	9.5	5.5	29.5	33.5	118.0	35.0

			AA	CL	TR	EY	KPMG	PW	Big Six	Others	New	Removed
New Auditors	1992–93	AA	—	0.0	0.0	0.0	0.0	0.0	0.0	0.5	5.0	2.0
		CL	0.0	—	0.0	1.0	0.0	0.0	1.0	2.5	7.0	6.5
		TR	1.0	1.0	—	0.0	0.0	0.0	2.0	4.0	2.5	3.0
		EY	0.0	0.0	0.0	—	0.0	0.0	0.0	0.0	3.0	4.0
		KPMG	0.0	1.0	1.0	1.0	—	1.0	4.0	4.0	20.0	3.0
		PW	2.0	0.0	0.0	0.0	1.0	—	3.0	2.5	2.5	5.0
		Big Six	3.0	2.0	1.0	2.0	1.0	1.0	10.0	13.5	40.0	23.5
		Others	2.0	0.5	0.0	0.0	0.0	1.0	3.5	5.0	13.0	14.5
		Total	5.0	2.5	1.0	2.0	1.0	2.0	13.5	18.5	53.0	38.0

			AA	CL	TR	EY	KPMG	PW	Big Six	Others	New	Removed
New Auditors	1991–92	AA	—	0.0	0.0	0.0	0.0	0.0	0.0	3.0	5.5	5.0
		CL	0.0	—	0.0	3.0	0.0	3.5	6.5	8.0	14.0	8.5
		TR	0.0	0.0	—	0.5	1.0	0.0	1.5	1.5	8.0	5.0
		EY	0.0	0.0	0.0	—	0.0	1.0	1.0	4.0	3.0	10.0
		KPMG	1.0	1.0	0.0	1.0	—	1.5	4.5	10.0	13.0	15.0
		PW	1.0	1.0	3.0	0.0	0.0	—	5.0	2.5	8.0	5.0
		Big Six	2.0	2.0	3.0	4.5	1.0	6.0	18.5	29.0	51.5	48.5
		Others	1.0	3.0	3.0	1.0	4.0	0.0	12.0	10.0	22.5	14.5
		Total	3.0	5.0	6.0	5.5	5.0	6.0	30.5	39.0	74.0	63.0

i.e, a net gain of 60.5 audits.

Switching auditors within the Big Six accounted for 31%[11] of the total auditor change (35%[12] in Beattie and Fearnley (1994)). Table 3.3 shows that during the five year period, AA won 5 audits from and lost 7 to other Big Six, a net loss of 2 audits. EY, CL and KPMG also had a net loss of 6, 1.5 and 1 respectively. PW and TR had a net gain of 3.5 and 7 respectively. Therefore, although switching auditors among the Big Six accounted for 31% of the total auditor change, the actual net gain or loss for each of the firms was small.

The Big Six also gained most of the audits of newly listed companies. They were auditors of 75.5 out of 123 (61%) newly listed companies in 1994/95 (Table 3.3) while the comparable figures were 70%, 75% and 83% for the years from 1991/92 to 1993/94. Indeed, over the five year period, the Big Six gained 265 of the 368 new audits.

While the Big Six gained from new entrants to the Stock Exchange, they also lost from company departures. Of the 178 companies leaving the Stock Exchange, the Big Six were auditors of 127 companies. This 71% (127/178) ratio is similar to the audit market concentration ratio C6 based on number of audits (average 73% from 1991 to 1995). Therefore, there is no evidence to support any casual relationship between auditor size and

[11] $\frac{18.5+10+22+16}{214.5}$

[12] $\frac{124}{146+205}$ (based on Table 7 of Beattie and Fearnley (1994))

companies removed from the Stock Exchange.

In summary, during the years from 1991 to 1995, a marginal increase in concentration was apparent. C_6 has increased from 89% to 92% based on audit fees measure and from 70% to 75% based on number of audits measure. The rate of increase in concentration had slowed from that observed in the period from 1987 to 1991 (when C6 increases from 55% to 72%). This change was largely due to the effect of mergers of large audit firms in the late 1980s. The smaller more recent increment in auditor concentration was mainly due to companies switching from a small auditor to the Big Six (net gain of 60.5 audits) and newly listed companies having a preference for a Big Six auditor (average 72%). The increase in market share (based on number of audits) by the Big Six, namely, KPMG, PW, TR, CL, AA and EY was 1.91%, 0.99%, 0.86%, 0.49%, 1.05%, and -0.22% respectively. Relative net gains in number of audits by the Big Six were as follows:

Companies switching from small firms :	KPMG > TR > PW > CL > EY > AA
Companies switching between Big Six :	TR > PW > KPMG > CL > AA > EY
Newly listed companies choosing a Big Six:	KPMG > CL > EY > PW > AA > TR

3.3.3 Auditor Concentration by Industry Sector

Aggregate market concentration provides no direct indication of the nature of concentration in specific sectors. Table 3.4 summarises the market share

Table 3.4 Market Share of the Big Six by Industry Sector

Market Share by Audit Fees	Market Share by Number of Audits: 100%	90 – 99%	80 – 89%	70 – 79%	60 – 69%	50 – 59%
100%	Oil, Integrated (100, 100, 1) Tobacco (100, 100, 1) Gas Distribution (100, 100, 1) Banks, Retail (100, 100, 4) Bank, Merchant (100, 100, 2)					
90 - 99%		Paper & Printing (97, 91, 10) Chemicals (97, 91, 6) Electricity (94, 94, 6)	Insurance (98, 85, 8) Oil Exploration (95, 86, 7) Household Goods (95, 83, 12) Retailer, Food (94, 80, 10) Diversified Industrials (93, 85, 9) Engineering (90, 81, 25)	Pharmaceuticals (99, 77, 7) Water (98, 71, 8) Life Assurance (96, 75, 3) Vehicle (97, 75, 10) Health Care (94, 79, 12) Transport (93, 79, 12) Food Producers (93, 70, 17) Media (92, 77, 19) Retailers, General (92, 74, 15) Distributors (90, 79, 15)	Spirits & Wines (97, 67, 5) Extractive Industries (94, 64, 6) Leisure & Hotels (92, 68, 14)	
80 - 89%				Telecommunications (89, 79, 5) Building & Construction (88, 72, 24) Building Materials & Merchants (87, 77, 17) Support Services (86, 70, 25)	Electronic & Electrical Equipment (87,66, 20) Textile & Apparel (83, 65, 20) Other Services & Business (81, 67, 13)	Breweries (88,58,10)
70 - 79%					Property (78, 69, 30)	
60 - 69%					Other Financial (63, 63, 19)	

Note: numbers in brackets represent respectively market share by audit fees, market share by number of audits and total number of auditors in the sector of the Big Six by industry sector during the year 1995. It shows that the Big Six had complete dominance over five industry sectors: gas distribution, oil (integrated), merchant and retail banks, and tobacco. They also had over 90% of the market share, both in terms of audits fees and number of audits, in the chemicals, electricity and paper, packaging and printing sectors. Indeed with the exception of the breweries, other financial and property sectors, the Big Six had 80% or above in terms of audit fees and 60% or above in terms of number of audits in all industry sectors. This analysis thus indicates that in many of the industry sectors, concentration is extremely high. It can, however, be argued that this high concentration has been the result of companies choosing the 'best' auditor in the field. Moreover, in many sectors, choice of auditors remained reasonable as Table 3.4 shows that, out of the 37 industry sectors, there were 21 industry sectors that had at least 10 different audit firms.

Craswell, Francis and Taylor (1995) examined the effect of audit specialists on the level of audit fees[13]. They revealed that on average an industry specialist Big Eight firm (now Big Six) earned a 34% premium over non-specialist Big Eight auditors. Based on data for 1995, Table 3.5 shows industry market share by auditors. When the 10% market share threshold was used to denote audit specialisation, the four largest firms CL, KPMG,

[13]They determined auditor specialisation according to a threshold of 10% of market share based on either the number of clients in the industry or the percentage of total fees in the industry. However, they noted that the 10% market share threshold was arbitrary and when the threshold was changed to 20%, no statistically significant specialist premium was found.

Table 3.5 Audit Specialisation – Market Share of Fee Income by Sector

Industry	No. of Companies	No. of Auditors	Total Fees £'000	Market Share x (Audit Fees)			Market Share x (Number of Audits)		
				$10\% \le x < 20\%$	$20\% \le x < 30\%$	$30\% \le x$	$10\% \le x < 20\%$	$20\% \le x < 30\%$	$30\% \le x$
Extractive Industries	11	6	4,592	KPMG	—	CL	CL, KPMG, PW	GT	—
Oil, Integrated	2	1	10,600	—	—	EY	—	—	EY
Oil Exploration & Production	21	7	2,224	TR	—	EY, KPMG	—	EY	KPMG
Building & Construction	70	24	10,026	CL, TR	—	KPMG	CL, PW	KPMG	—
Building Materials & Merchants	64	17	22,144	EY, KPMG	CL	PW	CL, EY, PW	KPMG	—
Chemicals	32	6	14,813	AA, CL	PW	KPMG	EY	PW	KPMG
Diversified Industrials	26	9	29,198	CL, KPMG	—	EY	EY, KPMG, PW, TR	CL	—
Electronic & Electrical Equipment	75	20	17,454	AA, CL, EY	—	TR	AA, EY, KPMG, TR	—	—
Engineering	132	25	39,707	PW, CL	—	KPMG	CL, EY, PW	—	KPMG
Engineering, Vehicle	22	10	8,069	AA	CL, KPMG, EY	—	AA, EY	KPMG	—
Chapter, Packaging & Printing	43	10	11,527	—	CL, EY, KPMG	—	CL, EY, PW, TR	KPMG	—
Textiles & Apparel	62	20	8,284	EY	TR	PW	EY, KPMG	PW	—
Breweries	24	10	3,319	—	—	EY	GT	EY, PW	—
Spirits, Wines & Ciders	9	5	7,203	—	—	KPMG, PW	BH	CL, GT, KPMG, PW	—
Food Producers	45	17	22,350	AA, EY, KPMG	—	CL	CL, EY, KPMG, PW	—	—
Household Goods	33	12	4,609	CL, KPMG, TR	—	PW	AA, CL, PW	KPMG	—
Health Care	39	12	5,143	CL, KPMG	—	EY	EY, PW	CL, KPMG	—
Pharmaceuticals	13	7	7,796	—	CL, PW	KPMG	CL, PW	EY, KPMG	—
Tobacco	1	1	6,000	—	—	CL	—	—	CL
Distributors	76	15	11,073	KPMG	—	CL	CL, EY, KPMG, PW, TR	—	—
Leisure & Hotels	62	14	13,397	CL, KPMG, PW	—	EY	CL, KPMG, PW, SH, TR	—	—
Media	73	19	20,975	AA, EY, KPMG, PW	CL	—	AA, CL, PW, TR	KPMG	—
Retailers, Food	20	10	2,409	PW	CL, EY, KPMG	—	PW	EY	KPMG
Retailers, General	66	15	11,922	PW, TR	KPMG	CL	CL, KPMG, PW	—	—
Support Services	93	25	13,596	—	CL, PW, TR	—	CL, EY, PW, TR	—	—
Transport	28	12	6,397	—	PW	EY	KPMG, PW	—	EY
Other Services & Business	24	13	2,961	KPMG	—	AA	EY, TR	KPMG	—
Electricity	17	6	3,266	EY, TR	KPMG	CL	EY, KPMG, PW, TR	CL	—
Gas Distribution	1	1	1,500	—	—	PW	—	—	PW
Telecommunications	7	5	5,192	BT	—	CL, KPMG	BT, TR	KPMG	CL
Water	17	8	3,526	—	—	CL, PW	AA, SC	PW, CL	—
Banks, Retail	5	4	16,114	CL	PW	KPMG	—	CL, EY, PW	KPMG
Banks, Merchant	5	2	2,551	—	—	CL	—	TR	CL
Insurance	20	8	18,225	KPMG, PW	—	CL	KPMG, NR, PW	TR, CL	—
Life Assurance	4	3	3,393	—	—	PW	—	CK, KPMG	PW
Other Financial	44	19	7,020	AA	CL, MR	—	EY, KPMG	CL	—
Property	115	30	7,880	—	CL, TR	KPMG	CL, TR	KPMG	—

Note: BH:Binder Hamlyn; BT: Baker Tilly; CK: Clement Keys; GT: Grant Thornton; MR: Moores Rowland; NR: Neville Russell; SC: Saffery Champness; SH: BDO Stoy Hayward

EY and PW were identified as specialists of all industries. However, when the threshold was raised to 30%, only one audit specialist emerged in most of the industries. For example, CL and PW were audit specialists of 16 industry sectors. The newly merged PricewaterhouseCoopers would be audit specialists of 29 industry sectors[14].

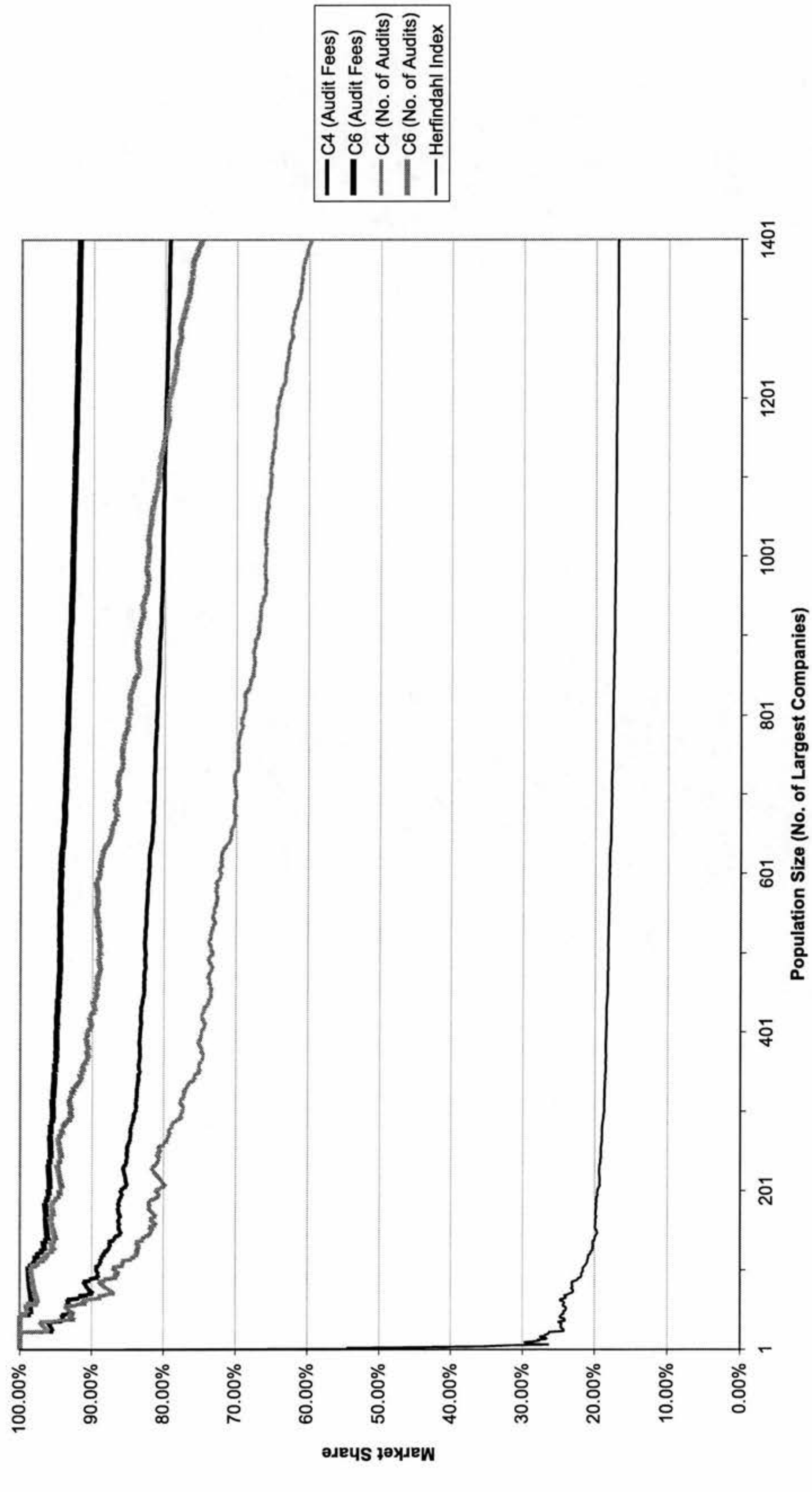
3.4 Effects of Population Size, Size Measure and Concentration Index

3.4.1 Population Size

Figure 3.1 shows the effect of population size of companies on concentration ratio. On an audit fees basis, C_4 and C_6 dropped slowly as the population size increased. The effect, however, was small - when the population was the 500 largest companies, C_4 was 82.58% and C_6 was 94.48% and when the population was 1400 largest companies, C_4 was 79.36% and C_6 was 91.90%. As expected, the reduction was much larger when the number of audits was used as the size measure. On this basis, when the population was the 500 largest companies, C_4 was 73.20% and C_6 was 88.90%, compared to that of 59.71% and 74.96% when the population was the 1400 largest companies. These results suggest that when audit fee was used as the size measure, a population of the largest 500 companies produces a concentration ratio which would be a reasonable estimate of that for all listed companies.

[14]The merged firm would become audit specialists in the sectors of building construction, chemicals, diversified industrials, engineering, food retailers, health care, media, paper, packaging and printing, pharmaceuticals, retail banks and support services.

Figure 3.1 Effects of Population Size, Size Measure and Concentration Index



The results are due to large companies tending to appoint a Big Six and also large auditees paying higher audit fees. Consequently, when the sample size increases, C_4 or C_6 should decrease because smaller companies are more likely to appoint a non Big-Six firm. This effect would be modified somewhat when fees rather than number of audits were used as a basis for the concentration ratios as smaller companies typically pay smaller audit fees. Since larger audits will always comprise a greater proportion of the total population of fees, a fees based measure will show greater consistency between sample sizes than a measure based on the number of audits.

To investigate the effect of company size on auditor concentration, the sample was ranked according to size and was divided into 14 groups. Each of the first 13 groups had 100 companies and the 14th group had 101 companies. For each of the 14 groups, market share by the Big Six (C_{BigSix}), based on either number of audits or audit fees, was calculated. By stratifying the sample on companies of comparable size, Table 3.6 confirms that C_{BigSix} based on number of audits was similar to C_{BigSix} based on audit fees. On average, C_{BigSix} based on audit fees was about 4% higher than C_{BigSix} based on number of audits. This finding is consistent with the proposition that, given the size and complexity of a company, a Big Six auditor would charge the company higher audit fees than those charged by smaller audit firms. As expected, the auditor concentration of the first group, which consisted of the largest 100 companies, was very high. The C_{BigSix} was about 98% based

Table 3.6 1995 Auditor Concentration per 100 Companies

	BIG SIX		
	Number	Fees	Difference
0 – 100	98.50%	98.77%	0.27%
101 – 200	90.50%	88.14%	-2.36%
201 – 300	90.00%	91.61%	1.66%
301 – 400	84.00%	89.00%	5.00%
401 – 500	81.50%	85.12%	3.62%
501 – 600	89.50%	92.34%	2.84%
601 – 700	68.00%	76.59%	8.59%
701 – 800	76.00%	80.01%	4.01%
801 – 900	72.50%	77.63%	5.13%
901 – 1000	71.00%	72.02%	1.02%
1001 – 1100	66.50%	72.95%	6.45%
1101 – 1200	63.00%	65.75%	2.75%
1201 – 1300	55.50%	60.59%	5.09%
1301 - 1401	39.11%	46.49%	7.38%

on either audit fees or number of audits. C_{BigSix} for each of the next five groups of 100 companies were also high, varying from 81% to 90% based on number of audits and from 85% to 92% based on audit fees. The next five groups showed a slightly smaller C_{BigSix} while the last 3 groups, comprising the smallest 301 companies, had a significant decrease in C_{BigSix} varying from 39% to 66%.

3.4.2 Size Measure

Figure 3.1 shows the difference in concentration ratios when different size measures were used. When the population was the 500 largest companies and the size measure was audit fees, C_4 was 82.58%. This percentage remained fairly stable as the population of companies increased. For the same population size but using the number of audits as the size measure, C_4 was 73.20%, a difference of about 9%. However, when the population was increased to include 1400 largest companies, C_4 was 79.36% based on audit fees and 59.67% based on number of audits, a difference of 20%. These results suggest that when interpreting concentration ratios it is necessary to take into account the size measure used.

3.4.3 Concentration Indices

Using audit fees as size measure, the Herfindahl index increased slightly from 15.92% in 1991 to 16.97% in 1995. As a basis for assessment, Herfindahl value of 16.67% is equivalent to having a market composed of only 6 firms of equal size. Moizer and Turley (1989) noted that the Herfindahl index for FT500 was 9.6% in 1982. The marked increase in the value of the index from 1982 to 1991 was due to mergers between the Big Eight firms. Figure 3.1 shows the effects of the company population size on the computation of Herfindahl index. When the population size had risen above 300, the index became fairly steady.

3.5 Conclusion

This study has examined the issue of auditor concentration in the U.K. during the period from 1991 to 1995. Based on 1401 companies (fully listed and USM companies excluding investment trusts) in 1995, it demonstrates that the audit market was dominated by the four largest firms, namely, CL, KPMG, PW and EY. These four firms held 60% of the total number of audits and collectively earned 79% of the total audit fees. Two other auditors AA and TR had smaller but significant market shares while the remainder of audit firms in the market were relatively small. These results suggest that the audit market was oligopolistic. The study also reveals that there was only a relatively small increase in concentration (5% when measured by number of audits and 3% when measured by audit fees) and this represents a marked reduction in the rate of increase in concentration compared with that observed in prior years in the UK. This change arose because there were no mergers between large audit firms in the period of study. Thus, companies switching from small audit firms to the Big Six and newly listed companies choosing a Big Six auditor accounted for the increased concentrated occurring from 1991 to 1995.

At a sectoral level, the Big Six had complete dominance over 5 industry sectors and a highly dominant position in 29 others. The results do indicate that in many of the industry sectors, auditor choice may well be effectively restricted. However, it can be argued that although auditor concentration was high at an industry level, there was still competition among audit firms, firstly because switching between the Big Six firms represented 28% of the total auditor change during the five year period and secondly, because in 21 out of the 36 industries used in this study, choice of auditors existed to the extent that there were 10 or more auditors active in the sector.

The analysis undertaken also examined the effects of population size, size measure and concentration indices on the results of concentration studies. There was evidence that the Big Six had relatively more audits of larger companies. For example, they had 98% of the audits of the top 100 companies, 87% of next largest 500 companies, 71% of the next largest 500 companies and only 53% of the smallest 301 companies. This confirmed the general belief that large companies tend to appoint a Big Six auditor. The study shows that the basis of measuring concentration can affect results. Where the basis is audit fees, they are not sensitive to population size. In contrast, when the number of audits is the basis of measurement, population size does significantly affect the concentration measure. Finally, both C_n and Herfindahl concentration indices gave consistent results on auditor concentration.

Chapter 4

Audit Pricing Behaviour

In an oligopolistic market, if firms decide to collude (even implicitly through a tacit price leadership scheme) there is a resulting social welfare loss deriving from their non-competitive output and pricing policies[1]. However, collusion is not necessarily inevitable under this type of market structure, as even a few large firms may compete vigorously rather than collude. Oligopoly pricing is complex, and no single theory is as yet applicable to all oligopolistic industries. However, as a generalisation, Clark (1985, 66) concluded that "high market concentration, stable market conditions, homogenous demand and cost conditions, [and] full information ... tend to facilitate oligopolistic co-ordination". This chapter is concerned with pricing behaviour in the UK audit services market where a key feature has been the domination by a few large audit firms over the last 20 years. As we saw in Chapter 3, the extent of this domination has increased steadily during this period as a result of

[1] For a discussion of welfare economics of competition and oligopoly, see Scherer and Ross (1990, 15–55).

mergers between large audit firms, large firms taking over small firms and also auditees switching to large firms. This change in auditor concentration has led to the situation that the market for "audit services has reached the limit of a tight oligopoly, which is characterised by few rivals, stable market shares and medium-to-high entry barriers" (Beattie and Fearnley, 1994, 308). The recent merger between CL and PW has created a 'Big Five' and has further increased auditor concentration (Pong, 1998). As a consequence of these trends the buyers of audit services face the increasing potential of cartel formation and price collusion among a smaller number of large audit firms.

While increases in the total market share of a few large firms creates the circumstances in which price competition may be weakened, this is eventually dependent on how the large firms decide to behave and a contrary view of the effect of market concentration on auditor pricing policies may also be taken. Large firms, due to economies of scale, may actually become more efficient and pass on some of the benefits of this to the customer in the form of no or restricted fee increases or even lower-priced audits. Although greater efficiency has been the stated motivation for some of the mergers between accounting firms, their impact on the audit market and audit pricing has not been explicitly identified. For example, PricewaterhouseCoopers recently emphasised, as the primary motive for its merger, improved client service by stating that:

> "[its] merger offers clients access to substantially greater resources worldwide, with faster deployment of specialists. It also provides enormous scope and scale in critically important emerging markets, as well as faster deployment of new products and services through more efficient management of a larger investment pool. Finally, ... increase investment in technology and knowledge management ensures clients access to leading-edge solutions" (PricewaterhouseCoopers, News Release, 01/07/1998).

Iyer and Iyer (1996) did not find any significant increase in audit fees in the UK following the mergers between Arthur Young and Ernst & Whinney, and between Coopers & Lybrand and Deloitte, Haskins & Sell in the late 1980s. They concluded that these mergers did not lower competition in the audit services market. Tonge and Wootton (1991) also concluded that mergers within the big audit firms might produce more competition in the audit market for companies listed on the New York Stock Exchange, American Stock Exchange and national Over the Counter Market. They argued that, although the number of major competitors amongst auditors had fallen, those remaining would have the comparable resources needed to compete effectively. Further support for this perspective on the audit market came from Pearson and Trompeter (1994). They found that the level of audit fees was lower in more highly concentrated audit markets, and this, they suggested, was due to more intense price competition among fewer, more powerful participants. Although audit firm mergers have resulted in an increase in audit services market concentration, there have been some indications of strong price competition among audit firms. For example, there were allegations that low balling has been prevalent (see pages 48 and

49).

US experience also suggests that price competition remains an important feature of the audit services market. Maher et al. (1992) noted a moderate inflation adjusted decrease in audit fees paid by 78 publicly traded US companies during the years from 1977 to 1981. Similarly, Sanders, Allen and Korte (1995) noted a real decrease in audit fees for US public sector audits during the period from 1985 to 1989.

4.1 Study Objectives

Answering the question of how the changing structure of the supply side of the audit services market affects competition is not straightforward. The answer depends on how firms react to circumstances and although fewer large firms make price collusion easier there is no guarantee that they will decide to act in this way. Analysis of their pricing behaviour is, however, one source of evidence which provides some insight into their competitive behaviour. The purpose of this study is to examine one consequence of their competitive behaviour i.e., audit fees. It investigates the change in audit fees during the period from 1991 to 1995, a period of increasing concentration in the UK audit market. The key characteristics of this study which distinguish it from prior research and delineate its additional contribution to the audit services market literature are as follows:

1. It uses data from 708 UK listed companies, covering a wide range of industry sectors and audit firms. This data sample is much larger and more contemporary than that of previous studies. For example, Maher et al. (1992) (which found a moderate decrease in audit fees from 1977 to 1981) used only 78 US publicly traded companies and they did not represent a random sample. Iyer and Iyer (1996) (which did not find changes in audit fees in the UK following large audit firm mergers) used only 270 UK listed companies and all of these selected had a Big Six auditor.

2. This study is the first to analyse the changes made in audit fees by individual Big Six firms, medium sized firms and small firms. This analysis gives visibility to pricing behaviour at a micro level and so improves our understanding of the audit market operation. Controlling for variations in pricing among firms also improves the methodology used in Iyer and Iyer (1996) which considered pricing of the Big Six as a group. In addition, allegations of low balling (as outlined above) suggest that the Big Six initially at least offer the audit clients of medium sized firms a substantially lower price for their audits. If these allegations were true, medium sized firms are likely to respond by cutting the price of their audits to match the Big Six offers to their existing clients. Examining medium sized firm pricing will therefore help shed some light on this issue.

3. Earlier studies looked at the change in audit fees only after a 5 year period. While this study also encompasses a five year period, it investigates the change in audit fees on an annual basis. This additional refinement offers the opportunity to provide a clearer picture of the pricing strategy patterns of audit firms.

4. This study allows the analysis of audit fee changes by auditee size and this provides evidence on the question of whether or not the Big Six have different pricing strategies for large and small clients.

Thus, this study examines several important dimensions of auditor pricing behaviour which have never previously been researched and also provides more extensive, more contemporary and more robust evidence on trends in UK audit fees than that available from prior research.

The rest of the chapter will be structured as follows: section 4.2 describes the technique used to identify changes in audit fees. Section 4.3 describes the data sample used in the study. Section 4.4 provides a summary of results of analyses of audit fee changes by auditors and by auditees. Section 4.5 discusses some methodological issues and the robustness of results. Section 4.6 concludes the study.

4.2 Methods

Analysis of changes in fees was performed on data at both an aggregate and an individual audit firm level. Movement in audit fees at a macro level are one indication of the competitiveness of the audit services market and when studied at the level of the individual firm (or firm group) may give some insight into the micro pricing strategies adopted to cope with the competitive situation faced by each firm (or type of firm) operating in the market.

To account for changes in audit fees additional to those attributable to general inflation, general retail price indices (monthly) were used to correct reported audit fees for inflation during the years from 1991 to 1995. Audit fees paid by a company were adjusted to the January 1991 general price level according to the company's month of accounting year end. Change in inflation adjusted fees may be symptomatic of audit firms trying to extract more value from customers (fee increases) or sacrificing individual fee value (fee decreases) to increase market share and make longer term gains. However, fee movement may also result from increasing or decreasing regulation (by both the state and self-regulatory bodies) governing the amount of audit work or from innovations in audit process which enhance auditor efficiency or from the growth in auditee size, complexity and risk, and from changes in its ability to pay. It is possible to systematically control for change in company size, complexity and risk of auditees by utilising an audit fee model. Chan et al. (1993) discussed in detail various possible determinants of audit fees. Table 4.1 summaries their discussions on the audit fee determinants and their suggestions on the proxies[2] for the determinants. As a result of data availability, this study has only used some of the proxies listed in Table 4.1: turnover[3] for auditee size; inventory to total assets ratio, debtors to total assets ratio and number of subsidiaries for complexity; return on equity and profit before tax[4] for ability to pay; year end dummy variable for timing of audit; Big 6 dummy variable for auditor size. In addition, since Ezzamel et al. (1996) found a statistically significant positive association between fees for audit and non-audit services, a non-audit services fees variable was included in the analysis.

The relationship between audit fees and the their determinants is assumed to be in the form of a 'logarithm' model, the most commonly used audit fee model (Simunic, 1980; Chan et al., 1993; Iyer and Iyer, 1996, etc.) in this type of research studies:

$$logF_{i,t} = a_0 + a_1 logS_{i,t} + a_2 DA_{i,t} + a_3 IA_{i,t} + a_4 Sub_{i,t}$$

[2]Other proxies have been used in audit fees research studies such as Simunic (1980), Francis (1984), Francis and Stokes (1986), Palmrose (1986a,b), Francis and Simon (1987) and Craswell et al. (1995). For example, number of foreign subsidiaries to total number of subsidiaries ratio for complexity and a dummy variable (equals to 1 if a company made a loss in the past 3 years) for ability to pay.

[3]Preliminary analysis showed that the correlation coefficient between turnover and audit fees was higher than that between total assets and audit fees. Therefore, turnover was used as proxy for auditee size.

[4]This proxy variable for ability to pay was found statistically significant in Pong and Whittington (1994).

Table 4.1 Chan, Ezzamel and Gwilliam (1993) on Audit Fee Determinants

Audit Fees Determinants	**Proxies for Statistical Analysis**
Auditee Size: Larger company takes longer to audit	Total assets, turnover
Auditee Complexity: A reflection of the nature of the business of the auditee, its location, the quality of internal control, the proportion of unusual transactions etc. - Some assets are prone to errors - Diversified business, lines of business - Group companies	 Inventory/total assets, debtors/total assets Herfindahl index Number of subsidiaries
Audit Risk: Extend and scope of audit testing are determined by the perceived risk of audit failure (e.g. audit risk models). It reflects the nature of the business of the enterprise and also the control environment instituted by the enterprise	Gearing, liquidity, beta, unsystematic risk
Ability to pay: Financial pressure keeps overhead costs low	Return on shareholders' equity
Ownership control: Companies with a diverse ownership structure require a more extensive and higher quality audit over and above that necessary to fulfil the minimum statutory requirements	Directors' beneficial and non-beneficial shareholdings and all disclosed shareholdings in excess of 5%
Timing: - Auditors charge more during peak season - Time taken for audit to complete	 Dummy variable, Dec & Mar = 1, otherwise = 0 Audit delay
Audit Location: Audit staff costs are significantly higher in the south east than in other UK regions	Dummy variable, London = 1, otherwise = 0
Auditor Size: Big Six firms charge premium fees	Dummy variable, Big Six firm = 1, otherwise = 0

Note:
Chan et al. (1993) did not find all the coefficients of the proxy variables were statistically different from 0. Their final proposed model included only turnover, return on shareholders' equity, number of subsidiaries, Herfindahl index, audit delay, ownership control, location and auditor size.

$$+a_5 Gear_{i,t} + a_6 RoE_{i,t} + a_7 PbT_{i,t} + a_8 YE_{i,t}$$

$$+a_9 NAF_{i,t} + a_{10} B_{i,t} + e_{i,t} \tag{4.1}$$

where for auditee i at time t,

$logF_{i,t}$	= natural logarithm of inflation adjusted audit fees
$logS_{i,t}$	= natural logarithm of inflation adjusted turnover
$DA_{i,t}$	= debtor to total assets ratio
$IA_{i,t}$	= inventory to total assets ratio
$Sub_{i,t}$	= number of subsidiaries
$Gear_{i,t}$	= gearing ratio
$RoE_{i,t}$	= return on equity ratio
$PbT_{i,t}$	= inflation adjusted profit before taxation
$YE_{i,t}$	= year end dummy (= 1 if year ends in December or March, = 0 otherwise)
$NAF_{i,t}$	= inflation adjusted non-audit services fees
$B_{i,t}$	= Big Six dummy (= 1 if auditor was a Big Six, = 0 otherwise)
$e_{i,t}$	= error term
a_0	= constant term
$a_1 \dots a_{10}$	= coefficients

Using data at time t, coefficients $a_0 \dots a_{10}$ are estimated. Based on the estimated parameters ($\hat{a}_0 \dots \hat{a}_{10}$), the model is used to predict fees for the same auditees sample at time t+1 using data at time t+1. Intuitively, if company i's auditor has not changed its pricing bases, $\hat{F}_{t+1}$ is the amount of audit fees that company i has to pay at time t+1 given its size, complexity and risk:

$$\begin{aligned} log\hat{F}_{i,t+1} &= \hat{a}_0 + \hat{a}_1 logS_{i,t+1} + \hat{a}_2 DA_{i,t+1} + \hat{a}_3 IA_{i,t+1} \\ &\quad + \hat{a}_4 Sub_{i,t+1} + \hat{a}_5 Gear_{i,t+1} + \hat{a}_6 RoE_{i,t+1} \\ &\quad + \hat{a}_7 PbT_{i,t+1} + \hat{a}_8 YE_{i,t+1} + \hat{a}_9 NAF_{i,t+1} \\ &\quad + \hat{a}_{10} B_{i,t+1} \end{aligned} \tag{4.2}$$

A difference α_i[5] between actual $log(F_{i,t+1})$ and predicted $log(\hat{F}_{i,t+1})$ at time t+1 represents a change in inflation adjusted fees for auditee i. The null and alternative hypotheses are thus:

$$\begin{aligned} H_0: \quad \alpha_i &= 0 \\ H_1: \quad \alpha_i &\neq 0 \end{aligned}$$

If a systematic α_i exists among all auditees, the average percentage change in inflation adjusted fees $\frac{F_{t+1}-\hat{F}_{t+1}}{\hat{F}_{t+1}}$ can be calculated as follows:

$$logF_{t+1} - log\hat{F}_{t+1} = \alpha$$

[5] At time t+1, $F_{i,t+1}$ is also given by the equation:

$$\begin{aligned} logF_{i,t+1} &= b_0 + b_1 logS_{i,t+1} + b_2 DA_{i,t+1} + b_3 IA_{i,t+1} \\ &\quad + b_4 Sub_{i,t+1} + b_5 Gear_{i,t+1} + b_6 RoE_{i,t+1} \\ &\quad + b_7 PbT_{i,t+1} + b_8 YE_{i,t+1} + b_9 NAF_{i,t+1} \\ &\quad + b_{10} B_{i,t+1} + e_{i,t+1} \end{aligned}$$

Therefore, change in the log(fees) α_i is:

$$\begin{aligned} \alpha_i &= (b_0 - \hat{a}_0) + (b_1 - \hat{a}_1) logS_{i,t+1} + (b_2 - \hat{a}_2) DA_{i,t+1} \\ &\quad + \cdots \\ &\quad + (b_{10} - \hat{a}_{10}) B_{i,t+1} + e_{i,t+1} \end{aligned}$$

$$\frac{\hat{F}_{t+1} + \Delta F_{t+1}}{\hat{F}_{t+1}} = exp^{\alpha}$$
$$\frac{\Delta F_{t+1}}{\hat{F}_{t+1}} = exp^{\alpha} - 1$$

where $\Delta F_{t+1} = F_{t+1} - \hat{F}_{t+1}$

$\alpha = (\sum_{i=1}^{n} \alpha_i)/n$

4.3 Sample

The data used was initially based on all fully listed and USM companies (except investments trusts) for the years from 1991 to 1995. The final sample was arrived at on the basis of the following criteria. First, a company would be included only if all the necessary information about the company during the years from 1991 to 1995 was available. Information on company auditors was extracted manually from the *Hambro Company Guide*[6], November issues 1991 to 1995. Information on the number of subsidiaries was also extracted manually from the *Stock Exchange Yearbook*. The number of companies collected was 1211, 1222, 1237, 1320 and 1401 for the years from 1991 to 1995 respectively. Financial information of the companies - audit fees, total assets, total sales, stock, debtors, profit before tax, return on equity and gearing ratio, was downloaded from Datastream; non-audit services fees[7] were manually collected from FT Extel. These accounting items

[6]According to the company guide, information was compiled from prime sources and drawn mainly from the company's own reports and accounts, and each entry was submitted for verification to the company concerned before publication.

[7]As noted in Ezzamel et al. (1996), there is a lack of clarity with regard to disclosure of non-UK audit services fees. The exemption of disclosure of non-audit services provided

and ratios were available on only 907 companies. Second, companies which had auditor change during the 5 year period were removed. The sample size was then reduced to 721 companies which operated with the same auditor during the whole 5 year period. This latter adjustment was to avoid the impact of low-balling[8] on our analysis. However, it should be noted that by including only companies that operated with the same auditor over the five years, a survivorship bias might be introduced into the sample. Third, in order to facilitate analysis by audit firm, companies in the sample that had joint auditors were removed. Fourth, since there were only 5 financial and property companies in the resulting sample, they were not considered to be representative of the sector and were therefore removed. The details of the resulting sample of 708 companies is summarised in table 4.2.

The Big Six were auditors of 78% of the 708 companies. Their share was divided as follows: KPMG 147 (21%); CL 112 (16%); PW 100 (14%); EY 97 (14%); TR 62 (9%); and AA 32 (4%). Medium sized audit firms[9] which comprised BDO Binder Hamlyn, Grant Thornton, Stoy Hayward, Robson Rhodes and Pannell Kerr Forster had 89 (12%) of the audits. 46 auditors shared the remaining 10% (69 audits) of the audits and they were categorised as small firms.

for overseas subsidiaries may lead to a misleading result on the effect of non-audit services fees on group audit fees.

[8]Impact of low balling might still be present, albeit smaller, two years after a change of auditors (Gregory and Collier, 1996).

[9]The classification was arbitrary. A firm, other than the Big Six, was medium sized if it had 10 or more audits of the 708.

Table 4.2 Data Sample

Industry	KPMG	CL	PW	EY	TR	AA	Medium	Small	Total
Extractive & Oil	9	2	0	5	2	0	1	1	20
Building	17	16	11	9	8	3	5	14	83
Chemicals	6	3	5	2	0	1	3	0	20
Diversified	4	6	3	3	2	0	3	0	21
Electronic & Electrical	7	5	0	2	6	8	7	6	41
Engineering	36	11	14	15	6	3	10	10	105
Paper, Packaging & Printing	6	4	4	5	3	0	2	1	25
Textiles & Apparel	5	3	13	7	1	2	7	9	47
Breweries, Spirits	3	2	6	6	0	0	6	1	24
Food Producers	5	6	5	3	1	1	5	1	27
Household Goods	3	3	3	2	3	1	0	3	18
Health Care & Pharmaceuticals	5	4	1	6	1	1	2	1	21
Tobacco	0	1	0	0	0	0	0	0	1
Distributors	7	5	4	3	8	4	8	2	41
Leisure and Hotels	7	4	3	2	1	2	10	2	31
Media	9	8	5	4	3	3	3	5	40
Retailers	12	10	8	7	4	2	8	4	55
Support Services & Other Services	4	9	6	10	7	1	6	5	48
Transport	0	1	3	4	2	0	1	4	15
Electricity, Gas, Telecommunications & Water	2	9	6	2	4	0	2	0	25
Total	147	112	100	97	62	32	89	69	708

Notes:

CL: Coopers & Lybrand, PW: Price Waterhouse, EY: Ernst & Young, TR: Touche Ross, AA: Arthur Andersen

Medium sized firms include BDO Binder Hamlyn, Grant Thornton, Stoy Hayward, Robson Rhodes and Pannell Kerr Forster

46 small audit firms constituted the small firm group

4.4 Results

4.4.1 Summary Statistics

Table 4.3 provides some summary statistics on the data sample. During the period from 1991 to 1995, the mean inflation adjusted audit fee dropped by 4% from £341,238 to £327,903. The average size of companies, as measured by inflation adjusted turnover, went up by 12% from £585 million to £653 million. Thus, there was some evidence that, overall, audit fees have dropped during the five year period.

Given that, first, over a five year period, there can be 4 possible fee changes for an auditee and, second, in each year, there can be 3 directional changes in audit fees (increase, decrease or none) for an auditee, there could be 15 possible combinations of audit fee change pattern for an auditee (see first row of Table 4.4 on page 99). Table 4.4 also lists the total number of auditees in each of the possible nominal[10] fee change combinations. 74 (10%) companies had the maximum of 4 consecutive nominal annual increases, 14 (2%) companies had the maximum of 4 consecutive nominal annual decreases and 13 (2%) companies did not have any fee change over the period. However, most companies had 2 increases and 2 decreases (135; 19%), or 3 increases and 1 decrease (140; 20%). Of the total 2,832 audits for 708 companies from 1992 to 1995, there were annual nominal fee increases in 1,454 (51%) audits, decreases in 894 (32%) audits and no change

[10] Not adjusted for inflation.

Table 4.3 Summary Statistics

Year	Variables	Mean	Standard Deviation	Minimum	Maximum
1991	Fees	341.238	719.500	1.927	7,100.070
	Total assets	591,838.000	2,211,690.000	471.264	30,503,400.000
	Turnover	585,267.000	2,145,830.000	176.542	39,594,400.000
	Profit before tax	45,374.300	180,518.000	-102,820.000	3,046,920.000
	No. of subsidiaries	13.774	17.721	0.000	181.000
	Return on equity	11.892	42.455	-470.820	599.870
	Gearing	36.748	96.066	-97.970	1,963.520
	Inventory / total assets	0.188	0.152	0.000	0.925
	Debtors / total assets	0.250	0.131	0.007	0.761
1992	Fees	341.511	724.897	1.861	7,482.760
	Total assets	622,756.000	2,394,310.000	519.311	32,540,600.000
	Turnover	591,572.000	2,196,400.000	82.310	40,513,500.000
	Profit before tax	36,660.700	185,896.000	-1,123,350.000	2,926,880.000
	No. of subsidiaries	13.521	16.649	0.000	162.000
	Return on equity	-0.703	314.243	-8,266.660	500.200
	Gearing	36.646	76.805	-229.900	1,547.780
	Inventory / total assets	0.185	0.155	0.000	0.910
	Debtors / total assets	0.245	0.130	0.007	0.913
1993	Fees	338.485	729.461	1.836	8,257.930
	Total assets	634,830.000	2,447,560.000	331.809	36,034,800.000
	Turnover	621,649.000	2,338,350.000	240.397	43,725,700.000
	Non- audit fees	214.258	601.131	0.000	10,093.000
	Profit before tax	42,145.600	160,837.000	-422,989.000	1,843,180.000
	No. of subsidiaries	13.672	17.207	0.000	162.000
	Return on equity	14.079	83.344	-428.800	1,876.420
	Gearing	34.958	80.484	-252.590	1,498.270
	Inventory / total assets	0.179	0.152	0.000	0.901
	Debtors / total assets	0.251	0.136	0.009	0.997
1994	Fees	329.712	684.393	1.793	7,134.250
	Total assets	642,851.000	2,392,730.000	544.293	35,657,900.000
	Turnover	628,185.000	2,270,340.000	25.583	41,258,200.000
	Non- audit fees	223.311	598.224	0.000	7,134.250
	Profit before tax	50,581.000	198,275.000	-204,931.000	2,518,110.000
	No. of subsidiaries	13.970	17.824	0.000	168.000
	Return on equity	18.731	225.277	-1,013.780	5,830.240
	Gearing	32.731	68.406	-548.180	1,240.810
	Inventory / total assets	0.182	0.157	0.000	0.913
	Debtors / total assets	0.254	0.138	0.008	0.900
1995	Fees	327.903	692.071	1.738	6,911.750
	Total assets	673,915.000	2,504,250.000	616.691	39,071,200.000
	Turnover	652,799.000	2,354,630.000	557.628	43,371,200.000
	Non- audit fees	205.283	542.100	0.000	6,911.750
	Profit before tax	55,066.200	200,306.000	-222,926.000	2,349,780.000
	No. of subsidiaries	13.494	17.022	0.000	168.000
	Return on equity	13.777	108.758	-2,469.330	841.830
	Gearing	31.793	61.738	-862.770	584.640
	Inventory / total assets	0.185	0.160	0.000	0.926
	Debtors / total assets	0.256	0.139	0.012	0.857

Notes:

Fees, total assets, non-audit fees, profit before tax are in £'000s and in January 1991 prices

Complete information on non-audit fees was only available in FT Extel from 1993

There were 708 observations for each of the 5 years

Table 4.4 Number of Auditees in Each Nominal Fee Change Combination

Number of +ve and -ve Changes	4nc	0 +ve				1 +ve				2 +ve			3 +ve		4 +ve	Total no. of Companies	Total Possible No. of Changes		
		1 -ve & 3 nc	2 -ve & 2 nc	3 -ve & 1 nc	4 -ve & 0 nc	0 -ve & 3 nc	1 -ve & 2 nc	2 -ve & 1 nc	3 -ve & 0 nc	0 -ve & 2 nc	1 -ve & 1 nc	2 -ve & 0 nc	0 -ve & 1 nc	1 -ve & 0 nc	0 -ve & 0 nc		-ve	+ve	nc
KPMG	2	5	3	2	4	4	7	6	15	8	11	26	7	34	13	147	194	297	97
CL	3	2	1	2	0	7	2	7	12	5	12	19	9	21	10	112	133	230	85
PW	1	4	1	1	4	6	5	4	2	5	10	15	8	23	11	100	107	214	79
EY	2	3	2	0	1	1	4	4	13	2	10	21	6	18	10	97	132	200	56
TR	1	2	0	3	3	1	3	2	7	3	3	9	4	16	5	62	88	123	37
AA	0	1	0	1	0	0	1	3	3	1	4	4	2	6	6	32	38	73	17
Big Six	9	17	7	9	12	19	22	26	52	24	50	94	36	118	55	550	692	1137	371
BH	1	0	0	1	2	2	2	0	3	0	2	10	0	3	1	27	47	44	17
GT	0	2	0	1	0	0	1	0	1	1	1	4	3	4	4	22	22	51	15
SH	0	0	0	0	0	0	1	1	0	2	0	6	0	3	3	16	18	39	7
RR	1	1	0	3	0	0	0	0	1	0	2	4	0	1	1	14	24	20	12
PKF	0	1	0	0	0	0	0	0	3	0	1	4	1	0	0	10	19	16	5
Medium Firms	2	4	0	5	2	2	4	1	8	3	6	28	4	11	9	89	130	170	56
Small Firms	2	3	2	0	1	3	2	2	5	5	7	13	4	11	10	69	72	147	57
Total	13	24	9	14	14	24	28	29	65	32	63	135	44	140	74	708	894	1454	484

Notes:

nc : no change in fees; -ve : decrease in fees; +ve : increase in fees

CL: Coopers & Lybrand, PW: Price Waterhouse, EY: Ernst & Young, TR: Touche Ross, AA: Arthur Andersen

BH: BDO Binder Hamlyn, GT: Grant Thornton, SH: Stoy Hayward, RR: Robson Rhodes, PKF: Pannell Kerr Forster in 484 (17%) audits. The ratio of fee increases, decreases and no change was similar when the sample was analysed according to audit firm groups. Respective proportions for the Big Six were: 52%:31%:17%; medium sized firms 48%:36%:16%; and small firms 53%:26%:21%.

Some marked differences were apparent when the analysis was performed on inflation adjusted audit fees. None of the audits had fees unchanged from the previous year. As a result, there were only 5 combinations of audit fee change patterns over the five year period. Table 4.5 shows that 32% of the companies had 2 annual inflated adjusted fee increases and 2 annual inflation adjusted fee decreases. This ratio was also consistent when the companies were grouped according to Big Six (31%), medium sized (37%) and small audit firms (32%). During the five year period, 52 (7%) companies had the maximum of 4 consecutive annual inflation adjusted fee increases and 84 (12%) companies had the maximum of 4 consecutive annual decreases. Of the 52 companies that had 4 fee increases, 24 companies had each of the increases 5% or above in real terms. The auditors of these 24 companies were EY (Weir, Euromoney Publications, Boxmore International, Cranswick Mill), CL (Mersey Docks), PW (Rugby Group, Halma, Porvair, Pentecost Hicking), KPMG (Rolls Royce, EIS Group, Appollo Metals, Protean, Selectv), TR (Vodafone, Serco Group), AA (Verson International Group, Abbott Mead Vickers, Horace Small Apparel, Tunstall Group), Grant Thornton (Airtours), Gerald Edelman (Essex Furniture), Crane & Partners (Scott

Table 4.5 Number of of Auditees in Each Inflation Adjusted Fee Change Combination

Number of + ve and -ve Changes	4 -ve	1 +ve & 3 -ve	2 +ve & 2 -ve	3 +ve & 1 -ve	4 +ve	Total Number of Companies	Total Number of Changes	
							-ve	+ve
KPMG	18	39	51	29	10	147	320	268
CL	8	37	34	28	5	112	239	209
PW	14	20	41	18	7	100	216	184
EY	11	30	24	26	6	97	208	180
TR	9	19	14	17	3	62	138	110
AA	2	11	7	7	5	32	62	66
Big Six	62	156	171	125	36	550	1183	1017
BH	4	7	12	3	1	27	64	44
GT	4	2	6	7	3	22	41	47
SH	0	4	7	2	3	16	28	36
RR	5	3	4	1	1	14	38	18
PKF	1	4	4	1	0	10	25	15
Medium Firms	14	20	33	14	8	89	196	160
Small Firms	8	17	22	14	8	69	141	135
Total	84	193	226	153	52	708	1520	1312

Notes:
nc : no change in fees; -ve : decrease in fees; +ve : increase in fees
CL: Coopers & Lybrand, PW: Price Waterhouse, EY: Ernst & Young, TR: Touche Ross,AA: Arthur Andersen,BH: BDO Binder Hamlyn, GT: Grant Thornton, SH: Stoy Hayward, RR: Robson Rhodes, PKF: Pannell Kerr Forster

Pickford) and BDO Binder Hamlyn (Huntleigh Technology). Among the 84 companies that had 4 annual fee decreases, 10 companies had each of the decreases 5% or above in real terms. The auditors of these 10 companies were EY (Saltire), PW (Fenner, Forte, Goodhead Group, Torday & Carlisle) KPMG (GEI International, PEX), TR (BAA, Goode Durrant) and BDO Binder Hamlyn (First Technology).

Of the total 2,832 audits, there was inflation adjusted fee increase in 1,312 (46%) audits and decreases in 1,520 (54%) audits. Thus, overall, there was evidence of a decrease in inflation adjusted fees over the five year period. The ratio of cases of fee increase to fee decrease was similar when the sample was analysed by auditor categories (Big Six: 46%:54%; medium sized firms: 45%:55%; small firms: 49%:51%). Within the Big Six, each of KPMG, CL, PW, EY and TR lowered audit fees in approximately 54% of their audits. AA was the only member of the Big Six which raised fees in the majority (52%) of its audits. Among the medium sized audit firms, BDO Binder Hamlyn, Robson Rhodes and Pannell Kerr Forster lowered fees in the majority of their audits (59%, 68% and 63% respectively). In contrast, Grant Thornton and Stoy Hayward increased fees in the majority of their audits (53% and 56% respectively).

4.4.2 Determinants of Audit Fees

Table 4.6 presents the results of preliminary logarithm audit fee model estimation. When annual analysis was performed for each of the five years, the model explained between 84% to 86% of the variations in audit fees. The coefficient of the variables logarithm of sales was positive as expected and was statistically different from 0 at the 5% level ('statistically significant'). This result was consistent in each of the five year period. Therefore, audit fees had increased as size of companies increased.

The coefficient of the complexity variable, that is, number of subsidiaries was also positive and statistically significant in each of the five years in the period. Therefore, audit fees had increased as the complexity of companies

Table 4.6 Preliminary Model Estimation

	Independent Variables	Coefficient	t-statistic	(P-value)	Adjusted R2
1991	Constant	-1.569	-7.300	(0.000)*	0.839
	Log(Turnover)	0.515	23.997	(0.000)*	
	Inventory / total assets	-0.254	-2.053	(0.040)*	
	Debtors / total assets	0.238	1.389	(0.165)	
	No. of subsidiaries	0.021	6.591	(0.000)*	
	Gearing	0.001	2.209	(0.027)	
	Return on equity	-0.001	-1.304	(0.192)	
	Profit before tax	0.000	2.143	(0.032)*	
	Busy season	0.049	1.187	(0.235)	
	Big-6	0.113	2.344	(0.019)*	
1992	Constant	-1.656	-7.975	(0.000)*	0.836
	Log(Turnover)	0.525	26.274	(0.000)*	
	Inventory / total assets	-0.310	-2.417	(0.016)*	
	Debtors / total assets	0.248	1.394	(0.163)	
	No. of subsidiaries	0.021	7.686	(0.000)*	
	Gearing	0.001	2.365	(0.018)*	
	Return on equity	-0.000	-5.396	(0.000)*	
	Profit before tax	0.000	1.343	(0.179)	
	Busy season	0.001	0.023	(0.982)	
	Big-6	0.126	2.559	(0.011)*	
1993	Constant	-1.746	-9.015	(0.000)*	0.849
	Log(Turnover)	0.523	26.815	(0.000)*	
	Inventory / total assets	-0.361	-2.582	(0.010)*	
	Debtors / total assets	0.499	3.022	(0.003)*	
	No. of subsidiaries	0.020	8.172	(0.000)*	
	Gearing	0.001	1.944	(0.052)	
	Return on equity	0.001	2.983	(0.003)*	
	Profit before tax	0.000	0.776	(0.438)	
	Busy season	0.002	0.056	(0.955)	
	Big-6	0.140	3.162	(0.002)*	
	Non-audit fees	0.000	1.671	(0.095)	
1994	Constant	-1.799	-7.041	(0.000)*	0.849
	Log(Turnover)	0.521	22.377	(0.000)*	
	Inventory / total assets	-0.418	-3.471	(0.001)*	
	Debtors / total assets	0.662	3.894	(0.000)*	
	No. of subsidiaries	0.018	8.031	(0.000)*	
	Gearing	0.001	1.389	(0.165)	
	Return on equity	-0.000	-0.760	(0.447)	
	Profit before tax	0.000	0.363	(0.717)	
	Busy season	0.028	0.672	(0.502)	
	Big-6	0.174	3.830	(0.000)*	
	Non-audit fees	0.000	2.974	(0.003)*	
1995	Constant	-1.839	-9.292	(0.000)*	0.859
	Log(Turnover)	0.520	26.838	(0.000)*	
	Inventory / total assets	-0.365	-3.205	(0.001)*	
	Debtors / total assets	0.505	3.403	(0.001)*	
	No. of subsidiaries	0.020	7.868	(0.000)*	
	Gearing	0.002	3.282	(0.001)*	
	Return on equity	-0.000	-0.692	(0.489)	
	Profit before tax	0.000	1.473	(0.141)	
	Busy season	0.037	0.918	(0.359)	
	Big-6	0.159	3.638	(0.000)*	
	Non-audit fees	0.000	1.701	(0.089)	

Notes:
Results were based on 708 observations
t-statistics were calculated based on White (1980)
* indicates statistically significantly different from 0 at 5% level

increased. Results of the other two complexity variables were less conclusive. The coefficient of the variable debtors to total assets was positive but it was only statistically significant in 1993, 1994 and 1995. Although the coefficient of the variable inventory to total assets ratio was statistically significant in all years, it was negative. This is contrary to the belief that higher quantities of inventory increase audit complexity and hence increase audit fees. It suggests either that this variable might not have been an appropriate proxy for complexity or that the absolute value of stock might not influence audit work significantly (perhaps as a result of the use of sampling technique).

There was also some evidence to suggest that audit fees were determined by auditee risk, as measured by the gearing ratio in the estimation model. The coefficient of the variable gearing ratio was positive but was only statistically significant in 1991, 1992 and 1995. There was no strong evidence to suggest that audit firms charged fees according to profitability of auditees. Although the coefficient of the variable profit before tax was positive in each of the five year analysis, it was statistically significant only in 1991. The coefficient of the variable return on equity ratio was negative in 1991, 1992, 1994 and 1995, suggesting that this may be a better proxy for risk but was only statistically significant in 1992 and 1993. The coefficient of the busy season variable was not statistically significant in any of the annual analysis.

The coefficient of the dummy Big Six variable was positive and statistically significant in each annual analysis. Hence there was evidence of the existence of a Big Six premium. As complete information on non-audit services fees was only available from 1993, this variable was incorporated into the fee model and was analysed in 1993, 1994 and 1995. There was only weak evidence that higher non-audit services fees will lead to higher audit fees. The coefficient on the variable non-audit services fees was positive in 1993, 1994 and 1995 but was statistically significant only in 1994.

Based on the results of preliminary model analysis, the model was revised and was simplified for further analysis. The variables inventory to total assets ratio, debtors to total assets ratio, profit before tax and busy season were removed from the model. The results of regression analysis are presented in Table 4.7. The explanatory power of the model was almost the same as that of the previous model. The adjusted R-square was still between 84% to 86%. Results on the individual variables were also similar to that of the previous model.

4.4.3 Audit Fee Changes 1991 - 95 by Auditors

Table 4.8 (page 107) summarises the results of analysis of audit fee change based on the logarithm model. When the whole data sample of 708 companies was analysed, results revealed that there was a 9.0% decrease in inflation adjusted fees during the five year period. It was statistically different from 0 at the 5% level. Annual analysis indicated that there was fee reduction in 1992/93 (4.6%), 1993/94 (2.9%) and 1994/95 (3.7%). The decrease in

Table 4.7 Simplified Model

	Independent Variables	Coefficient	t-statistic	(P-value)	Adjusted R2
1991	Constant	-1.719	-8.963	(0.000)*	0.836
	Log(Turnover)	0.533	26.743	(0.000)*	
	No. of subsidiaries	0.021	6.722	(0.000)*	
	Gearing	0.006	2.141	(0.032)*	
	Return on equity	-0.001	-1.303	(0.193)	
	Big-6	0.112	2.333	(0.020)*	
1992	Constant	-1.715	-9.041	(0.000)*	0.834
	Log(Turnover)	0.531	27.358	(0.000)*	
	No. of subsidiaries	0.021	7.782	(0.000)*	
	Gearing	0.001	2.403	(0.016)*	
	Return on equity	0.000	-5.592	(0.000)*	
	Big-6	0.128	2.622	(0.009)*	
1993	Constant	-1.658	-8.521	(0.000)*	0.846
	Log(Turnover)	0.520	26.112	(0.000)*	
	No. of subsidiaries	0.021	8.181	(0.000)*	
	Gearing	0.001	1.989	(0.047)*	
	Return on equity	0.001	3.234	(0.001)*	
	Big-6	0.142	3.241	(0.001)*	
	Non-audit fees	0.000	2.108	(0.035)*	
1994	Constant	-1.655	-7.226	(0.000)*	0.843
	Log(Turnover)	0.517	23.322	(0.000)*	
	No. of subsidiaries	0.018	8.085	(0.000)*	
	Gearing	0.001	1.513	(0.130)	
	Return on equity	-0.000	-0.978	(0.328)	
	Big-6	0.185	4.108	(0.000)*	
	Non-audit fees	0.000	3.167	(0.002)*	
1995	Constant	-1.793	-9.175	(0.000)*	0.855
	Log(Turnover)	0.523	26.610	(0.000)*	
	No. of subsidiaries	0.020	7.945	(0.000)*	
	Gearing	0.002	3.221	(0.001)*	
	Return on equity	-0.000	-0.511	(0.610)	
	Big-6	0.158	3.649	(0.000)*	
	Non-audit fees	0.000	2.366	(0.018)*	

Notes:

Results were based on 708 observations

t-statistics were calculated based on White (1980)

indicates statistically significantly different from 0 at 5% level

Table 4.8 Audit Fee Changes based on Logarithm Model

Sample (No. of Observations)		Fee Change (%)		Sample (No. of Observations)		Fee Change (%)	
	1991/95	-9.019	(-4.678)**		1991/95	-7.783	(-1.617)
Whole	1991/92	0.437	(0.175)	CL	1991/92	-2.703	(-0.536)
Sample	1992/93	-4.578	(-2.292)**	(112)	1992/93	-4.596	(-0.829)
(708)	1993/94	-2.947	(-1.435)		1993/94	1.023	(0.177)
	1994/95	-3.660	(-1.907)*		1994/95	0.362	(0.073)
	1991/95	-8.197	(-3.258)**		1991/95	-7.493	(-1.477)
Big	1991/92	-1.974	(-0.427)	PW	1991/92	0.975	(0.180)
Six	1992/93	-4.303	(-1.813)*	(100)	1992/93	7.481	(0.599)
(553)	1993/94	-2.330	(-0.975)		1993/94	-5.130	(-0.599)
	1994/95	-3.970	(-1.782)*		1994/95	-5.799	(-1.185)
	1991/95	-9.904	(-1.639)		1991/95	-9.252	(-1.466)
Medium	1991/92	-0.758	(-0.136)	EY	1991/92	-6.334	(-0.513)
Firms	1992/93	-4.109	(-0.885)	(97)	1992/93	-6.233	(-1.053)
(89)	1993/94	-0.103	(-1.725)*		1993/94	0.501	(0.089)
	1994/95	-2.355	(-0.498)		1994/95	1.878	(0.217)
	1991/95	5.024	(0.594)		1991/95	-9.136	(-1.309)
Small	1991/92	7.306	(1.174)	TR	1991/92	2.312	(0.291)
Firms	1992/93	-4.045	(-0.783)	(62)	1992/93	-5.048	(-0.867)
(69)	1993/94	-1.504	(-0.263)		1993/94	-1.251	(-0.180)
	1994/95	-0.101	(-1.829)*		1994/95	-8.733	(-1.337)
	1991/95	-7.891	(-2.033)**		1991/95	0.638	(0.263)
KPMG	1991/92	2.358	(0.556)	AA	1991/92	-0.373	(-0.044)
(147)	1992/93	-2.664	(-0.641)	(32)	1992/93	-2.198	(-0.274)
	1993/94	-5.204	(-1.247)		1993/94	1.781	(0.203)
	1994/95	2.879	(0.717)		1994/95	-14.831	(-1.584)

Notes:
Dependent variable: log(Fees)
Independent variables: log(Sales), number of subsidiaries, gearing ratio, return on equity, Big-6 dummy variable and non-audit fees (for 1993/94 and 1994/95)
t-statistics are in parenthesis
* indicates statistically significant at 10% level
** indicates statistically significant at 5% level
CL: Coopers & Lybrand, PW: Price Waterhouse, EY: Ernst & Young, TR: Touche Ross, AA: Arthur Andersen
Medium sized firms include BDO Binder Hamlyn, Grant Thornton, Stoyward Hayward, Robson Rhodes and Pannell Kerr Forster
46 small audit firms constituted the small firm group

1992/93 was 'statistically significant' different from 0 at 5% level and the decrease in 1994/95 was significant at 10% level. The was a small increase (0.4%) in 1991/92 but it was not statistically significant.

Results were similar when the analysis was confined to Big Six firms. There was an overall 8.2% decrease in audit fees during the five year period, while the annual decreases were 2.0%, 4.3%, 2.3%, and 4.0%. Only the 1992/93 and 1994/95 results were statistically significant at 10% level. Analysis of individual Big Six firms indicated that only KPMG had statistically significant overall inflation adjusted fee decreases of 7.9%. There was weak evidence that CL, PW, EY and TR had overall inflation adjusted fee decreases of 7.8%, 7.5%, 9.3% and 9.1% respectively. None of the four firms had statistically significant annual changes in audit and the annual results did not reveal any fee change pattern over time. AA did not have any statistically significant change in fees over the five year period. If anything, there was a inflation adjusted fee reduction in 1994/95.

Medium sized audit firms had weak evidence of inflation adjusted fee reduction of 9.9% over the five year period. When annual change in fees of this group of auditors was analysed, all were negative. However, only the result in 1993/94 was statistically significant at 10% level. Compared to the results of the Big Six, there was perhaps some evidence to support the notion of a medium firm reaction to the threat of low balling practice by the Big Six. Finally, small audit firms revealed an overall 5.0% increase in fees but was not statistically significant at 10% level. The annual change in 1991/92 was positive and annual changes in 1992/93, 1993/94, 1994/95 were negative. However, the only statistically significant result in 1994 indicated a minimal 0.1% reduction in fees.

Overall, the UK audit market experienced a 9.0% reduction in inflation adjusted fees over the five year period. The change for the Big Six was -8.2%; medium sized firms -9.9% and small firms +5.0%. However, results of the medium sized and small firms were not statistically significant. Statistically significant fee reduction occurred in year 1992/93 and 1994/95 (4.6% and 3.7%). Since the Big Six held slightly more than three quarters of the audits in the data sample, their behaviour accounted for most of this pricing. KPMG showed an average of 7.9% reduction in inflation adjusted audit fees over the five year period but no statistically significant change was found in the pricing policy of AA, CL, EY, PW and TR. Weak evidence of overall fee reduction by CL, EY, PW and TR was found.

Results of Tables 4.6 (page 103) and 4.7 (page 106) indicated that there was a Big Six premium in each of the five year period. Replacing the single Big Six dummy variable in the logarithm model by six individual Big Six dummy variables, results indicated that only CL, EY and KPMG charged premium fees (Table 4.9). The coefficients of the individual Big Six dummy variables for CL, EY and KPMG were positive and statistically significant at 5% level for each of the five years. The results showed that, on average, audit

Table 4.9 Individual Big Six Premium

Coefficient					
	1991	1992	1993	1994	1995
AA	0.111	0.117	0.146	0.220**	0.132
CL	0.205**	0.182**	0.170*	0.229**	0.256**
EY	0.161**	0.189**	0.188*	0.253**	0.231**
KPMG	0.121**	0.140**	0.170*	0.183**	0.160**
PW	0.030	0.048	0.071	0.116*	0.073
TR	-0.013	0.043	0.066	0.097	0.019
Individual Big Six Premium (relative to non-Big Six firms)					
	1991	1992	1993	1994	1995
AA	11.714%	12.361%	15.675%	24.589%	14.081%
CL	22.779%	19.924%	18.560%	25.716%	29.118%
EY	17.439%	20.846%	20.650%	28.778%	25.972%
KPMG	12.833%	14.990%	18.496%	20.109%	17.404%
PW	3.087%	4.935%	7.349%	12.355%	7.528%
TR	-1.327%	4.425%	6.798%	10.195%	1.939%

Notes:
* indicates statistically significant at 10% level
** indicates statistically significant at 5% level
CL: Coopers & Lybrand, PW: Price Waterhouse, EY: Ernst & Young, TR: Touche Ross, AA: Arthur Andersen
Individual Big Six premium (relative to non-Big Six firms)
$= exp^{\text{Coefficient of Individual Big Six Dummy Variable}} - 1$

prices of CL were between 19% to 29% higher than audit prices of non-Big Six firms. Audit prices of EY and KPMG were, respectively, between 17% to 26% and 13% to 20% higher. Although there were annual changes in the premium fees for each of the three firms, the changes were not statistically significant. There was weak evidence that AA, PW and TR also charged premium fees. The coefficients of the individual Big Six dummy variables were all positive except for TR in 1991. However, only in 1994 that the coefficients for AA and PW were statistically significant.

Table 4.10 Pricing of Big Six Audits by Auditees Size (Total Assets)

	Auditee Size X (£'000)	No. of Auditees	% Change	t-statistics
1st Quartile	$X \geq 572,700$	137	-9.164	-1.700*
2nd Quartile	$572,700 > X \geq 117,123$	138	0.175	-0.361
3rd Quartile	$117,123 > X \geq 33,432$	138	-7.274	-1.407
4th Quartile	$33,432 > X$	137	-5.207	-1.504

* statistically significant at 10% level

4.4.4 Audit Fee Changes 1991 - 95 by Auditees Size

Table 4.10 summarises audit fee change for four groups of Big Six auditees. On the basis of their size, as measured by total assets, the 550 Big Six auditees in the sample were divided into 4 quartile groups. Although all four groups experienced a reduction in audit fees, only the audit fee change in the first quartile group was statistically significant at 10% level. The first quartile group, represented by companies with total assets equal to or above £572 million, had an overall fee reduction of 9.2%. Reductions of 7.3% and 5.2% were observed for the third and fourth quartile group respectively. The second quartile group had a very small increase of 0.2%. One possible explanation for the observed largest price cuts for the largest auditees is because they are the highest prestige clients.

4.5 Methodology Issues

4.5.1 Multicollinearity and Heteroscedasticity

Belsley, Kuh and Welsch (1980) test was performed to detect problem of multicollinearity between the independent variables. Results[11] of annual analyses did not suggest problem of multicollinearity existed.

In the analysis, standard ordinary least squares (OLS) procedure led to an unacceptable degree of heteroscedasticity (as indicated by the Breusch and Pagan (1979) test). Therefore, the White (1980) method was used. The heteroscedasticity-consistent estimator of the variance-covariance matrix of the OLS estimator, due to White (1980), is recommended whenever OLS estimates are being used for inference in a situation in which heteroscedasticity is suspected but the researcher is not able to find an adequate transformation to purge the data of this heteroscedasticity (Kennedy, 1998, 133).

4.5.2 Audit Fees Quadratic Model

Other functional forms of audit fees have been used in research studies. One example is the quadratic model used in Pong and Whittington (1994). They argued that it is unnecessary to make the size variable (e.g turnover) logarithmic in order to capture economies of scale in auditing from the perspective of the auditee, that is, large audits may cost less, per unit of assets

[11] Maddala (1992) considers that measures of multicollinearity are all of limited use from practical point of view and that they are all merely complaints that things are not ideal.

or transactions audited, than do small audits. They chose a quadratic form because it adds a degree of flexibility to the estimation process and the Pong and Whittington (1994) quadratic form is therefore used to detect audit fee changes during the period 1991 to 1995:

$$\begin{aligned} F_{i,t} &= b_0 + b_1 S_{i,t} + b_2 S_{i,t}^2 + b_3 W_{i,t} + b_4 W_{i,t}^2 \\ &\quad + b_5 Sub_{i,t} + b_6 Sub_{i,t} W_{i,t} + b_7 B_{i,t} \\ &\quad + b_8 B_{i,t} Sub_{i,t} W_{i,t} + b_9 NAF_{i,t} + e_{i,t} \end{aligned} \tag{4.3}$$

where for auditee i at time t,

$F_{i,t}$ = inflation adjusted audit fees

$S_{i,t}$ = inflation adjusted turnover

$W_{i,t}$ = inflation adjusted (debtors + inventory)

$Sub_{i,t}$ = number of subsidiaries

$B_{i,t}$ = Big Six dummy (= 1 if auditor was a Big Six, = 0 otherwise)

$NAF_{i,t}$ = inflation adjusted non-audit services fees

$e_{i,t}$ = error term

b_0 = constant term

$b_1 \dots b_9$ = coefficients

Model parameters ($b_0 \dots b_9$), which are estimated using data at time t, are substituted into the model to predict $\hat{F}_{i,t+1}$ at time t+1. If a systematic

ΔF_{t+1}, defined as $\Delta F_{t+1} = F_{t+1} - \hat{F}_{t+1}$, exists, there is a change in inflation adjusted fees.

Table 4.11 summarises the results of the quadratic model. Overall, the results were consistent with that of the logarithm model: (1) there was a statistically significant overall decrease in inflation adjusted fees during the five year period. The decrease was relatively smaller, at 7.0% compared to 9.0%, when the logarithm model was used. No annual statistically significant change was observed. (2) the reduction of fees was also mainly caused by the impact of the Big Six (6.5% of this decrease). (3) although KPMG still showed an overall fee reduction, it was not statistically significant. PW and AA now showed statistically significant reduction in fees. Weak evidence of fee reduction was still observed for CL and TR. (4) although medium sized firms revealed a statistically significant fee reduction over the five year period, it was only 0.2%. (5) no change in fees for the small firms over the five year period could be detected. However, a statistically significant reduction of 8.5% was observed in 1994/95.

Table 4.11 Audit Fee Changes based on Quadratic Model

Sample (No. of Observations)		Fee Change (%)		Sample (No. of Observations)		Fee Change (%)	
Whole Sample (708)	1991/95	-7.015	(2.206)**	CL (112)	1991/95	-8.719	(-1.205)
	1991/92	0.261	(0.077)		1991/92	-2.277	(-0.318)
	1992/93	-0.807	(-0.226)		1992/93	-1.067	(-0.152)
	1993/94	-5.079	(-1.530)		1993/94	-5.097	(-0.782)
	1994/95	-2.553	(-0.748)		1994/95	-1.708	(-0.287)
Big Six (553)	1991/95	-6.546	(-1.945)**	PW (100)	1991/95	-16.811	(-3.164)**
	1991/92	0.455	(0.127)		1991/92	-1.278	(-0.197)
	1992/93	-0.795	(-0.211)		1992/93	-3.676	(-0.572)
	1993/94	-4.845	(-1.383)		1993/94	-9.475	(-1.792)*
	1994/95	-2.542	(-0.706)		1994/95	-7.417	(-1.352)
Medium Firms (89)	1991/95	-0.187	(-2.329)**	EY (97)	1991/95	5.117	(0.665)
	1991/92	-10.002	(-1.167)		1991/92	5.425	(1.014)
	1992/93	-1.427	(-0.214)		1992/93	-2.418	(-0.355)
	1993/94	-17.721	(-1.113)		1993/94	-3.389	(-0.582)
	1994/95	-2.281	(0.300)		1994/95	4.449	(0.531)
Small Firms (69)	1991/95	-3.256	(-0.425)	TR (62)	1991/95	-7.232	(-1.341)
	1991/92	7.166	(1.071)		1991/92	8.485	(1.154)
	1992/93	-0.586	(-0.133)		1992/93	-7.326	(-1.505)
	1993/94	-2.801	(-0.721)		1993/94	1.750	(0.272)
	1994/95	-8.555	(-2.047)**		1994/95	-8.633	(-1.209)
KPMG (147)	1991/95	-6.893	(-1.180)	AA (32)	1991/95	-12.793	(-2.072)**
	1991/92	0.638	(0.104)		1991/92	2.894	(0.334)
	1992/93	-0.246	(-0.036)		1992/93	-4.093	(-0.393)
	1993/94	-7.337	(-1.135)		1993/94	-10.077	(0.971)
	1994/95	-3.495	(-0.569)		1994/95	-0.768	(-0.158)

Notes:
t-statistics are in parenthesis
* indicates statistically significant at 10% level
** indicates statistically significant at 5% level
CL: Coopers & Lybrand, PW: Price Waterhouse, EY: Ernst & Young, TR: Touche Ross, AA: Arthur Andersen
Medium sized firms include BDO Binder Hamlyn, Grant Thornton, Stoyward Hayward, Robson Rhodes and Pannell Kerr Forster
46 small audit firms constituted the small firm group

4.5.3 Tests for Parameters Changes over Time

One commonly used test for parameters changes is based on Chow (1960)[12] and Table 4.12 presents the results of its application to this case. When the Chow test is performed on the whole data sample, the result indicated that there were structural changes in the fee model parameters between 1991 and 1995. When the data sample was subdivided into Big Six, medium firms and small firms, the results of the analysis on Big Six and medium firms also showed structural changes in the fee model parameters between 1991 and 1995. Annual analysis of the Big Six showed that the changes occurred in 1991/92. None of the annual analysis of the medium firms indicated any structural difference. Among the Big Six, only Ernst and Young had structural changes in audit pricing between 1991 and 1995.

It has to be noted that the Chow test has deficiencies. First, the test rejects the null hypothesis more often than it should (Kennedy, 1998). Second,

[12] At time t, $logF_{i,t}$ is given by:

$$\begin{aligned} logF_{i,t} &= a_0 + a_1 logS_{i,t} + a_2 DA_{i,t} + a_3 IA_{i,t} \\ &\quad + a_4 Sub_{i,t} + a_5 Gear_{i,t} + a_6 RoE_{i,t} \\ &\quad + a_7 PbT_{i,t} + a_8 YE_{i,t} + a_9 NAF_{i,t} \\ &\quad + a_{10} B_{i,t} + e_{i,t} \end{aligned} \tag{4.4}$$

At time t+1, $logF_{i,t+1}$ is given by:

$$\begin{aligned} logF_{i,t+1} &= b_0 + b_1 logS_{i,t+1} + b_2 DA_{i,t+1} + b_3 IA_{i,t+1} \\ &\quad + b_4 Sub_{i,t+1} + b_5 Gear_{i,t+1} + b_6 RoE_{i,t+1} \\ &\quad + b_7 PbT_{i,t+1} + b_8 YE_{i,t+1} + b_9 NAF_{i,t+1} \\ &\quad + b_{10} B_{i,t+1} + e_{i,t+1} \end{aligned} \tag{4.5}$$

Therefore, null and alternative hypotheses for testing parameters change are:
H_0 : $a_k = b_k$ for all k
H_1 : $a_k \neq b_k$ for at least one k

Table 4.12 Pricing of Audit Fees - Structural Change

Sample (No. of Observations)		Chow Statistic	Parameter Change	Sample (No. of Observations)		Chow Statistic	Parameter Change
Whole Sample (708)	1991/95	3.846**	G(+), R(+)	CL (112)	1991/95	0.593	
	1991/92	1.033			1991/92	0.352	
	1992/93	1.488			1992/93	0.529	
	1993/94	1.399			1993/94	0.657	
	1994/95	1.172			1994/95	0.458	
Big Six (553)	1991/95	6.087**	G(+), R(+)	PW (100)	1991/95	1.157	
	1991/92	3.297*	R(+)		1991/92	0.158	
	1992/93	1.144			1992/93	1.523	
	1993/94	1.862			1993/94	0.841	
	1994/95	0.657			1994/95	0.282	
Medium Firms (89)	1991/95	3.716**	G(-), NS(-)	EY (97)	1991/95	3.386 **	G(+)
	1991/92	1.931			1991/92	0.179	
	1992/93	0.761			1992/93	0.329	
	1993/94	1.250			1993/94	0.292	
	1994/95	1.071			1994/95	1.717	
Small Firms (69)	1991/95	1.622		TR (62)	1991/95	1.321	
	1991/92	0.611			1991/92	0.955	
	1992/93	1.092			1992/93	0.194	
	1993/94	0.330			1993/94	0.480	
	1994/95	1.246			1994/95	0.470	
KPMG (147)	1991/95	0.839		AA (32)	1991/95	1.600	
	1991/92	0.181			1991/92	0.264	
	1992/93	0.056			1992/93	0.283	
	1993/94	0.491			1993/94	0.851	
	1994/95	0.530			1994/95	1.131	

Notes:
* indicates statistically significant at 10% level
** indicates statistically significant at 5% level
(+) indicates increase in coefficient magnitude which was statistically significant at 5% level
(-) indicates decrease in coefficient magnitude which was statistically significant at 5% level
G stands for variable gearing
R stands for variable return on equity
NS stands for variable number of subsidiaries
CL: Coopers & Lybrand, PW: Price Waterhouse, EY: Ernst & Young, TR: Touche Ross, AA: Arthur Andersen
Medium sized firms include BDO Binder Hamlyn, Grant Thornton, Stoy Hayward, Robson Rhodes and Pannell Kerr Forster
46 small audit firms constituted the small firm group

it detects simply some unspecified change in parameter values. This might be a change in the intercept, in one of the slope parameters or both. Third, one of the assumptions made by the Chow test is that the disturbances of the individual regression are independently distributed. This assumption may not be valid in the audit market. Cases where a Chow test revealed a statistical significant structural change (at 10%) were investigated further. The dummy variables technique was used to test for shifts in each particular parameter between time t and t+1. An ordinary least squares regression was performed on pooled data samples at time t and t+1. Any structural change will be indicated by the coefficients ($b_0 \ldots b_{10}$) on the dummy variables.

$$\begin{aligned} logF_{i,t} &= a_0 + a_1 logS_i + a_2 Sub_i + a_3 Gear_i \\ &\quad + a_4 RoE_i + a_5 NAF_i + a_6 B_i \\ &\quad + b_0 D_{t+1} + b_1 logS_i D_{t+1} + b_2 Sub_i D_{t+1} + b_3 Gear_i D_{t+1} \\ &\quad + b_4 RoE_i D_{t+1} + b_5 NAF_i D_{t+1} + b_6 B_i D_{t+1} + e_i \qquad (4.6) \end{aligned}$$

$logF_i$ = natural logarithm of inflation adjusted audit fees

$logS_i$ = natural logarithm of inflation adjusted turnover

Sub_i = number of subsidiaries

$Gear_i$ = gearing ratio

RoE_i = return on equity ratio

NAF_i = inflation adjusted non-audit services fees

B_i = Big Six dummy (= 1 if auditor was a Big Six, = 0 otherwise)

D_{t+1} = dummy variable (= 1 when time t+1, = 0 otherwise)

e_i = error term

a_0 = constant term

$a_1 \dots a_6$ = coefficients

$b_0 \dots b_6$ = coefficients

Table 4.12 presents the results of the dummy variables test. When the whole sample was analysed for 1991/95, the coefficient magnitudes of the variables return on equity and gearing had increased. A similar increase in the coefficient magnitude of the variable gearing ratio was also observed for EY. However, in the case of medium sized audit firms, the coefficient magnitudes of the variables gearing ratio and number of subsidiaries had decreased.

4.5.4 Fixed and Random Effects Models

So far, the chapter has only considered static audit fee models with cross-sectional auditees data having been used to estimate the models. However, it is also possible to incorporate time effects to produce a dynamic model. The general form of a dynamic model is:

$$F_{ipt} = \alpha_{ipt} + \beta_{ipt} X_{ipt} + e_{ipt} \tag{4.7}$$

where F_{ipt} = inflation adjusted audit fees paid by auditee p to auditor i at time t

α_{ipt} = constant term for auditor i, auditee p at time t

X_{ipt} = determinants of audit fees

β_{ipt} = vector of coefficients

e_{ipt} = error term

Assuming that an audit firm does not have differential pricing policies among its auditees at any point in time, we may simplify the above to:

$$F_{ipt} = \alpha_{it} + \beta_{ipt}X_{ipt} + e_{ipt} \tag{4.8}$$

This model can be estimated using a set of panel data, that is, a set of pooled cross-sectional time-series data. However, the standard ordinary least squares technique may not be applicable because its assumption that the error covariance terms are zero is unlikely to be valid. In particular, we would expect that fees charged by auditor i to auditee p at time t may affect auditor i's decision on the amount of fees to be charged to auditee p at time t+1. In other words, covariance of e_{ipt} and e_{ipt+1} is not equal to 0. A time series analysis technique may be applied to solve the problem. However, the dataset used in this chapter covers only a 5 year period and this is not sufficient for time series model estimation. Therefore, two commonly used panel data models have been used: a two way fixed effects model and a random effects model (Greene, 1997, 1998). The fixed effects model is a classical regression model involving dummy variables:

$$\begin{aligned} logF_{i,t} &= a_0 + \alpha_i + \gamma_t + a_1 logS_{i,t} + a_2 Sub_{i,t} \\ &\quad + a_3 Gear_{i,t} + a_4 RoE_{i,t} + a_5 NAF_{i,t} + e_{i,t} \end{aligned} \tag{4.9}$$

where for auditee i at time t

$logF_{i,t}$	= natural logarithm of inflation adjusted audit fees
$logS_{i,t}$	= natural logarithm of inflation adjusted turnover
$Sub_{i,t}$	= number of subsidiaries
$Gear_{i,t}$	= gearing ratio
$RoE_{i,t}$	= return on equity ratio
$NAF_{i,t}$	= inflation adjusted non-audit services fees
$e_{i,t}$	= error term
α_i	= constant auditor i effect
γ_t	= constant time t effect
a_0	= constant term
$a_1 \ldots a_5$	= coefficients

The random effects model is a generalised least squares model of the following form:

$$\begin{aligned} logF_{i,t} &= a_0 + a_1 logS_{i,t} + a_2 Sub_{i,t} + a_3 Gear_{i,t} \\ &\quad + a_4 RoE_{i,t} + a_5 NAF_{i,t} + e_{i,t} + u_i + w_t \end{aligned} \tag{4.10}$$

where $E[u_i] = 0, \quad Var[u_i] = \sigma_i^2, \quad cov[u_i, e_{i,t}] = 0$

$$E[w_t] = 0, \quad Var[w_t] = \sigma_t^2, \quad cov[w_t, e_{i,t}] = 0$$

Results of the two way fixed and random effects models are summarised in Table 4.13. The two way (group and time) fixed effects model had an adjusted R-square of 84.13%. The model test showed that the group and time effects were important explanatory factors of audit fees and its results were in favour of the fixed effects model to random effects model (Hausman test). Confirming our results in earlier sections, the results of the two way fixed effect model indicated that Big Six charged higher fees than medium sized and small firms. In addition, the results revealed that fees in 1992 were higher than the average fees of the five year period and that fees in 1995 were lower than the average fees.

4.5.5 Other Issues

As earlier researchers (Maher et al., 1992; Iyer and Iyer, 1996; Sanders et al., 1995) have observed, since the true functional form of the audit fee model is not known, any result obtained from using these audit fee models is confounded by the potential omitted variables bias. For example, the models in this study did not include client participation in audits, the effectiveness of internal control system, the economic condition of particular audit firm offices and the quality of audits. Other limitations of this study are its

Table 4.13 Fixed and Random Effects Models

Estimated Fixed Effects	Coefficient	t-statistic
Group		
Big Six	0.033	6.31*
Medium Sized Firms	-0.072	-2.89*
Small Firms	-0.170	-5.87*
Time		
1991	0.032	1.76
1992	0.051	2.77*
1993	0.003	0.19
1994	-0.023	-1.25
1995	-0.064	-3.47*

Model Test	Test	Test statistic
Model(1) vs Model(2)	F Test	9.428*
Model(1) vs Model(3)	F Test	4.894*
Model(1) vs Model(4)	Hausman	1.780

Notes:
Model(1): Fixed group and time effects model
Model(2): Model without group or time effects
Model(3): Fixed group effects model
Model(4): Random effects model
* Statistically significant at 5% level

inability to isolate the increase in fees due to changes in the regulatory environment and the fact that while it identifies changes in inflation adjusted audit fees, it does not provide direct explanations for these changes.

4.6 Summary, Observations and Conclusion

This chapter has reported a variety of new empirical evidence about audit firm behaviour in the UK audit services market for quoted companies. The evidence is based on audit price data for the period 1991-95. In summary it has shown that,

1. a wide variety of audit fee change patterns for individual auditees was

apparent although some experienced either consistent increases and decreases.

2. a majority of audits had a real term fee reduction and total audit fees fell markedly, in real terms, over the period.

3. fees in 1992 were higher and fees in 1995 were lower than the average fees during the five year period.

4. the pattern of real audit fee reduction was distributed differently over the period for different audit firms.

5. there were some strong evidence that a few Big Six firms (KPMG, PW and AA) had significant fee reduction over the period and weak evidence for the others (CL, EY, TR).

6. there was weak evidence that medium sized auditors reduced their audit fees but small audit firms maintained their fee levels.

7. there was strong evidence that CL, EY and KPMG charged premium fees but weak evidence for AA, PW and TR. There was no change in premium fees for each of the Big Six firms over the five year period.

8. audit fee reduction in the largest group of Big Six auditees was markedly more than that evident among smaller clients.

9. alternative audit fee change models are generally mutually supportive in the results produced when applied to this data.

These findings provide more information than has hitherto been available on audit pricing behaviour in the UK. They result from a primarily descriptive analysis which has been designed to enhance visibility on what has happened in the audit services market as opposed to the ascertainment of why firms price as they have. Consequently the study represents only a first, but important, step towards explaining and gaining a further understanding of how firms have priced their audit services. However, it does also provide a basis for some significant observations about the operation of the market and some suggestions for future research.

The marked reduction in real audit fee income over the period is consistent with the existence of a price competitive market. Alternative explanations include an improvement in audit firm efficiency which was, at least in part, passed on to clients. The fact that benefits may have been passed on to clients does, in fact, provide more support for the price competitiveness of the market. It is also possible that the fee reduction reflects a deterioration in the quality of audit service provided. Researching these options would assist in the determination of the reasons underlying audit price movement but would require the use of evidence which may be difficult to obtain. For example an analysis of the costs and revenues (profitability) of audit work would shed some light on audit efficiency while future litigation or retrospective interviewing of those party to the audit process would be needed to assess audit quality changes. The availability of this type of data to independent researchers is doubtful. However, disclosure of financial performance of audit firms may eventually provide some further data which can be used by researchers seeking to explain audit price variations.

The audit price data presented reveals a variety and a complexity in the pricing behaviour of audit firms. Although on average audit prices fell there were price pattern differences apparent in individual years, across audit firms and in respect of client companies. Even the Big Six exhibited no uniformity in their audit pricing. However, some analysis of the timing of audit price changes by the Big Six over a longer period than that used in this study might be merited to determine whether a long-term price leadership pattern can be determined. Also the variability in client treatment provides evidence which, on investigation, would provide valuable insights into audit firm pricing decisions. Those clients receiving consecutive price reduction give an analytical benchmark for the comparison of the opposite treatment of other clients by the audit firm. Investigation of the respective characteristics and circumstances of these clients could provide indications of factors to which the level of audit fee is sensitive. For example, contrasts in the circumstances of the individual auditor client relationship may become apparent as important determinants of audit fee. Moreover, the higher price reductions enjoyed by larger Big Six clients may be indicative of greater price competition in this segment of the market. It may also be that the prestige and consultancy opportunities offered by large clients are influential in this distinction.

In conclusion, the findings of this study do, to some extent, ameliorate the worries of those audit service purchasers who are concerned that the increasing market dominance of a few big firms has led to a reduction in price competition. However, while the 1991-95 picture does suggest that price competition remained healthy, there is a need to undertake a longer period study which allow audit market behaviour to be researched in the context of different economic conditions and over a time scale when significant increases in market concentration are apparent.

Chapter 5

Size, Specialisation and Market Share

Earlier, we saw that while there was a slight increase in audit services market concentration during the years from 1991 to 1995, audit prices charged by the large and medium sized audit firms have fallen. However, we also noticed that, in Chapter 4 (Table 4.9 on page 110), Big Six firms were charging premium fees and that these fees (as measured relative to non-Big Six audit prices) were increasing over this period. Moizer (1997, 67–68) suggested that reasons for auditee companies paying a Big Six premium include: a higher quality Big Six audit; a Big Six name attached to the financial statements; a higher chance of getting claims from the Big Six if the audit went wrong; and an oligopoly price charged by the Big Six. In addition, Craswell et al. (1995) argued that the development of both brand name reputation and industry specialisation by the large international audit firms was costly and therefore these firms charged higher audit fees. Their argument was based on economic theories of product differentiation which suggest that higher product prices in competitive markets are consistent with positive returns to investments in brand reputation and higher quality products (Shapiro, 1989). In the audit services market, demand for brand reputation and higher quality audits could, from an economic perspective, be explained in terms of agency and contracting costs. The relationship between the shareholders and management of a company is a typical principal agent setting. Management, who run the company, are contractual agents of the shareholders. As principals, shareholders are motivated to monitor the performance of the managers who have an asymmetric balance (in their favour) of local information about the firm's operations and opportunities (through the divorce of ownership and control). When the goals of managers and shareholders are not congruent, the managers might sacrifice shareholders' interests. The use of an auditor may enhance the effectiveness of monitoring activity by reducing the agent's pursuit of self-interest and if this benefit exceeds the cost of the audit then auditing can be of financial benefit to the principal. The better the quality of an audit, the higher will be the cost savings through reduced agency costs.

However, Craswell et al. (1995, 301) noted that because auditors developed industry specialisation by increasing their clienteles, specialists could also achieve production economies and therefore, became more efficient, lower-cost producers of audits. Without presenting their reasoning, they believed that the required return on investment in industry expertise would dominate potential economies of production and lead to higher audit fees. This reasoning may be questioned as the avoidance of any price premium by the specialist reduces the threat of regulatory intervention and avoids attracting new entrants while allowing the specialist to benefit from their lower cost base. Craswell et al. (1995) found that on average, industry specialist Big 8 auditors earned a 34% premium over nonspecialist Big Eight auditors, and the Big Eight brand name premium over non-Big Eight auditors averages around 30%. Although Craswell et al. (1995) identified a specialist premium when specialists were determined according to a 10% market share threshold, the premium was not found when the threshold was increased to 20%. They concluded that given the arbitrariness of any market share rule, they could not rule out the possibility of spurious results in their study (p.318). It should also be noted that Palmrose (1986a) also tested fee premium for specialist auditors. Her study showed that specialist auditors did not charge higher fees than non-specialist auditors. Thus, there is little conclusive evidence on the impact of audit specialisation on audit prices. The purpose of this Chapter is to develop an alternative theory that explains differences in audit prices charged by audit firms in terms of audit quality, specialisation, auditor size and changes in the audit services market concentration. This alternative theory argues that auditors achieving production economics may not pass on the benefit to the auditees in terms of lower price audits. The basis of the theory is that both the size of an audit firm and its specialist knowledge of typologies of auditee are important dimensions of competitiveness in the audit services market. Both of these characteristics give supply side benefits to the audit firm through, respectively, economies of scale and uniqueness in service provision. An audit firm with competitive advantage based on these characteristics can increase its market dominance and/or can earn higher than normal industry economic profits.

Besanko et al. (2000, 389) argued that competitive advantage is achievable only if a firm can create more economic value than its rivals can. They defined value-creation as the difference between the value that resided in the product (quality) and the value of the inputs that were sacrificed to make that product (cost). An audit firm can therefore economically outperform other firms in the audit services market by having lower costs of production for a given quality of services output or by having a higher and differentiated quality of product for a given cost (and exploit this through a higher price) or both. Two routes can be taken to achieve these gains. First, by increasing in size, a firm can achieve cost advantage through economies of scale and scope. Second, by developing audit expertise knowledge, a firm can provide superior audit quality services. Quality advantage is more readily attained in the context of complex audits because specific and specialised knowledge is more relevant to this type of audits. Moreover, a quality advantage may accumulate through experience gained in these audits. Routine audits offer less opportunity for this advantage. As we shall see later, firms with both cost and quality advantages can develop strategies to achieve a gain in market share and/or a higher profit margin.

The rest of the chapter will be structured as follows: section 5.1 provides an economic analysis of the impact of the size of an audit firm and its specialist knowledge on its pricing behaviour and on audit services market concentration. Hypotheses are then derived for empirical testing. Sections 5.2 and 5.3 provide methods to identify complex industries and audit specialists. Section 5.4 describes the data sample and audit fee models used in the study. Section 5.5 provides a summary of results of analyses. Section 5.6 discusses some methodological issues and the robustness of the results. Section 5.7 concludes the study.

5.1 Theory Development

The analysis of Besanko et al. (2000, 416) can be applied to audit firms in respect of their pricing policies in the audit services market. To facilitate the analysis, a number of assumptions have been made in respect of the formulation of audit firm pricing strategies in a market context. The following sub-section lists the assumptions made and provides some discussion of their nature and applicability to the existing auditee market.

5.1.1 Assumptions

Market Competitiveness

It is assumed that audit firms are competing with one another on price and/or quality of products and that they do not collude. In addition, audit firms are only expected to survive if they can make long run normal returns.

Number of Competitors

To simplify analysis, *it is assumed that there are only four types of audit firms in an audit services market*: L^* (large and specialist firm), S^* (small and specialist firm), L (large firm) and S (small firm).

Number of Audit Sub-Markets

To simplify analysis, *it is assumed that there are only two types of auditees - complex and non-complex.* In the non-complex auditees market, there are no audit specialists. In other words, there are only L (large audit firms) and S (small audit firms). This is because there is no requirement for special auditing knowledge in order to conduct the audits of the auditee companies. Also, as no special skills are required to perform the audits, the differences in respect of the quality of audit firm products are small.

Price Elasticity of Demand

High (low) price elasticity of demand is associated with weak (strong) horizontal product differentiation[1] . Horizontal differentiation is likely to be strong when there are many product attributes that consumers weigh in assessing overall benefit, and consumers disagree about the desirability of those attributes. *It is assumed in this study that price elasticity of demand for audit services is low.* This is because although price is an important factor for the choice of auditors, the findings of Beattie and Fearnley (1995, 1998a,b) suggest that there is strong horizontal differentiation in audit services. Beattie and Fearnley (1995) identified 29 important auditor characteristics which could be grouped under the following headings:

1. integrity and technical competence
2. acceptability to third parties such as bankers and regulators
3. value for money
4. ability to provide non-audit services
5. specialist industry knowledge and
6. geographic proximity.

[1]A product is horizontally differentiated when some consumers prefer it to competing products (holding price constant).

Further research by Beattie and Fearnley (1998b) into the choice of audit firms found that auditees have different preferences over different auditor characteristics.

Size and Cost Advantage

Provided they have not exceeded optimal size, large firms are able to achieve lower average cost than small firms because of their ability to achieve economies of scale and scope. This advantage is obtained by spreading their fixed costs over a large client base and by increasing production efficiency through specialist learning and cumulative experience. Therefore, for a given auditee where complexity is not a consideration, firms L^* and L are able to produce the audit for the auditee at a cost (C_{L^*} and C_L respectively) that is lower than the cost of the same audit produced by firms S^* and S (C_{S^*} and C_S respectively). That is, $C_{L^*} = C_L < C_{S^*} = C_S$.

Audit Specialisation and Audit Quality

Audit risk for an auditor is usually defined in terms of the probability that the auditor provides an incorrect opinion on some significant aspect of the audit combined with the likelihood that this mistake is found out. Recent business failures suggest that audit risk may be extensive with all auditors responsible, to some degree, for their assessment of the going concern character of a client business.

Audit risk is auditor specific. Different auditors might have different perceptions of audit risk in respect of the same audit assignment. The level of audit risk perceived by an auditor is dependent on the degree of relevant auditing knowledge that the auditor possesses and the auditee complexity. Auditors with superior auditing knowledge have a better understanding of their clients operations and a better ability to recognise and assess riskiness than auditors with less auditing knowledge. In essence, through superior audit knowledge, they can provide a higher quality of audit and thereby reduce audit risk.

Thus knowledge or expertise underlies the concept of audit quality. Bédard and Chi (1993) reviewed various expertise studies and identified a number of expert features. First, experts know more about their domain than do non-experts. Second, experts demonstrate a better organisation of knowledge. They have stronger links between concepts and more procedural knowledge associated with those concepts. Third, experts perform better than non-experts because experts have developed better problem solving skills and they demonstrate greater ability to represent problems successfully. Moreover, they develop a problem solving schemata and can also more readily and accurately distinguish between relevant and irrelevant information. Thus, auditing knowledge does not necessarily enable the auditors to reduce the amount of audit work. It may lead to the recognition that more work is needed. Auditing knowledge enhances the relevance of work done by allowing a more effective targeting of audit work to high audit risk areas. It allows audit work to be more accurately focussed and so reduces redundancy and waste.

Therefore, *for a given auditee complexity, the quality of the audit* (Q_{L^*} *and* Q_{S^*}*) produced by specialist firms (*L^* *and* S^* *respectively) is higher than the quality of the audit (* Q_L *and* Q_S*) produced by non-specialist firms (L and S respectively). That is,* $Q_{L^*} = Q_{S^*} > Q_L = Q_S$*. We assume here that specialists maintain a quality advantage and do not trade off between quality and cost (that is,* L^* *and* S^* *will not produce a lower quality product at a lower cost). Thus,* $L^*(S^*)$ *will not have cost advantage over* $L(S)$*.* This is possible in the audit market because first, firms may want to go for a good quality brand name image and second, lowering its quality of audit for the sake of competition when it can achieve higher quality may appear rather unprofessional.

Cost and Quality Advantages

Some firms are able to achieve both cost and quality advantage. Porter (1998a) argued that higher quality products often cost more to produce. However, Besanko et al. (2000) disagreed and considered that "the conditions under which the pursuit of a benefit [quality] advantage may be consistent with achieving a superior cost position arise frequently enough, so that we cannot conclude that benefit and cost advantage are generally incompatible". They noted that "firms that appeared to have achieved benefit [quality] advantages in their industries also tended to operate newer plants, had significantly better-than-average capacity utilization, and had direct costs per unit that were significantly lower than the industry average. Firms that appeared to have achieved cost advantages also scored highly on measures of relative differentiation, such as product quality, and advertising and promotion expenses" (Besanko et al., 2000, 423). This is certainly true in the audit services market; the large firms (especially the Big Five) are audit experts in most industries. This is translated into a quality advantage deriving from an accumulation of auditing knowledge through the provision of audit and consultancy services to a large number and variety of companies. This superior knowledge enables these auditors to focus on the high risk audit areas. The ability to identify high risk areas means that there is less chance that the auditor will form an incorrect opinion. The audit quality is thus better.

5.1.2 Audit Pricing Strategies in the Non-Complex Auditees Market

In the non-complex auditees market, we have assumed that there are no audit specialists. Therefore, as size does not, in itself, influence audit quality, firms do not compete on the basis of the quality of audits ($Q_L = Q_S$). Instead, they will compete on price. Firms with a lower cost of production can afford to offer audits at lower prices (and still make comparable returns to other auditors) to entice the customers of their competitors. This is possible because large firms (L) enjoy cost advantages.

It is reasonable to assume that the price (P_S) charged for an audit product by small firm, S, equals to the cost of producing the service C_S (which incorporates a normal return). Indeed, S will continue to operate only if it can earn at least normal profit in the long run. How much L charges depends on the price elasticity of demand for audit services. Since we have assumed that the price elasticity of demand for audit services is low, purchasers of audit services are not sensitive to price changes. A price cut by L will not take away many customers from S. Under this circumstance, the best strategy for L is to maintain its price parity with S. This results in the following relationships: $C_L < P_L = P_S = C_S$. By maintaining price parity, L is able to earn above a normal return, that is, a higher profit return than S ("margin strategy"). This is because $(P_L - C_L) > (P_S - C_S)$.

5.1.3 Audit Pricing Strategies in Complex Auditees Market

Since there are four possible types of players in the market (L^*, S^*, L and S), there are 6 possible competitive combinations: (1) L^* vs S^*, (2) L^* vs L, (3) L^* vs S, (4) S^* vs L, (5) S^* vs S and (6) L vs S. Each are considered in turn below.

Strategy of L^* against S^*

Since both L^* and S^* are specialist firms, they produce similar audit quality products. They therefore may compete on price. Since L^* enjoys cost advantage relative to S^*, the strategies used by L^* will be the same as that discussed in Section 5.1.2 (Audit Pricing Strategies in Non-Complex Auditees Market):

$$C_{S^*} = P_{S^*} = P_{L^*} > C_{L^*} \quad \text{price parity, margin strategy} \tag{5.1}$$

Strategy of L^* against L

Since L^* does not have cost advantage over L, it will not underprice L. Since it is assumed that the price elasticity of demand is low, L^* can choose a mixed strategy. Due to its specialist reputation it can charge the price set by L plus a premium which is of a size below the maximum premium that the auditees are willing to pay for the superior quality. Thus, L^* will (i) exploit advantage through higher profit margins ("margin strategy") and (ii) gain market share as long as the premium price is lower than the maximum premium ("share strategy").

$$P_{L^*} > C_{L^*} = C_L = P_L \quad \text{price hike, mixed strategy} \tag{5.2}$$

Strategies of L^* against S

L^* has both cost and benefit advantage over S. If the price elasticity of demand is low, L^* can choose a mixed strategy. This is to charge the price set by S plus a premium price which is of a size below the maximum premium that auditees are willing to pay for the superior quality. Thus, L^* will (i) exploit advantage through higher profit margins ("margin strategy") and (ii) gain market share as long as the premium price is lower than the maximum premium ("share strategy").

$$P_{L^*} > C_S = P_S > C_{L^*} \quad \text{price hike, mixed strategy} \tag{5.3}$$

Strategies of L against S

Since both L and S produce same audit quality products, they will only compete on price. Since L enjoys cost advantage relative to S and price elasticity is low, the strategy used by L will be the same as that discussed in Section 5.1.2 (Audit Pricing Strategies in Non-Complex Auditees Market):

$$C_S = P_S = P_L > C_L \quad \text{price parity, margin strategy} \tag{5.4}$$

Strategies of L against S^*

L has cost advantage over S^* but S^* has quality advantage over L. Under this circumstance, it is likely that L will lower its price to compensate for its quality disadvantage.

$$C_{S^*} = P_{S^*} > P_L \geq C_L \quad \text{price cut} \tag{5.5}$$

Table 5.1 Audit Firm Strategies

Type of Industries	Case	Craswell et al. (1995)	Alternative Theory
Non-Complex Industries	L vs S	$P_L > P_S$	$P_L = P_S$ (price parity, margin strategy)
Complex Industries	L^* vs S^*	$P_{L^*} > P_{S^*}$	$P_{L^*} = P_{S^*}$ (price parity, margin strategy)
	L^* vs L	$P_{L^*} > P_L$	$P_{L^*} > P_L$ (price hike, mixed strategy)
	L^* vs S	$P_{L^*} > P_S$	$P_{L^*} > P_S$ (price hike, mixed strategy)
	L vs S^*	no predictable result	$P_L < P_{S^*}$
	L vs S	$P_L > P_S$	$P_L = P_S$ (price parity, margin strategy)
	S^* vs S	$P_{S^*} > P_S$	$P_{S^*} > P_S$ (price hike, mixed strategy)

L^*: large and specialist firm, S^*: small and specialist firm, L: large firm, S: small firm

Strategies of S^* against S

Since S^* does not have cost advantage over S, it cannot underprice S. Since it is assumed that the price elasticity of demand is low, S^* can choose a mixed strategy. As a specialist firm, it can charge the price set by S plus a premium set at a level below the maximum premium that auditees are willing to pay for the superior quality. Thus, S^* will (i) exploit advantage through higher profit margins ("margin strategy") and (ii) gain market share as long as the premium price is lower than the maximum premium ("share strategy").

$$P_{S^*} > C_{S^*} = P_S = C_S \quad \text{price hike, mixed strategy} \tag{5.6}$$

Table 5.1 summarises the hypotheses (H1 to H7) developed in this section and provides a comparison with the recent work of Craswell et al. (1995):

H1 In non-complex industries with no specialist auditors, large firms will charge the same audit fees as small audit firms.

H2 In complex industries, large specialist auditors will charge the same audit fees as small specialist auditors.

H3 In complex industries, large specialist auditors will charge higher audit fees than large auditors.

H4 In complex industries, large specialist auditors will have higher audit fees than small auditors

H5 In complex industries, large auditors will charge lower audit fees than small specialist auditors.

H6 In complex industries, large auditors will charge same audit fees as small auditors.

H7 In complex industries, small specialist auditors will charge higher audit fees than small auditors.

5.2 Complex Industry Identification

As a precursor to testing the above hypotheses, this section attempts to find a basis on which auditee complexity can be specified and thereby identified. The methods used for this task are based firstly on the relevant research literature and secondly on information obtained by the author in research interviews with six senior auditors[2].

Auditee complexity is intrinsic and internal to the business concerned and is an important factor determining the amount and the specialised nature of the audit work which is required to be undertaken. Factors affecting complexity include the nature of the business of the auditee, its location, the quality of its internal control and the proportion of unusual transactions in which it participates (Chan et al., 1993). The interviewees focussed on the nature of the business and its organisational structure as the major factors determining audit complexity. Their responses also suggested that although there were variations in terms of audit complexity within an industry, complexity was largely determined by the type of industry.

5.2.1 Nature of Business

Length of business operating cycle

In general, it was felt that the audit task was easier in business with a shorter operating cycle (interviewees B, E and F). A business that has a long operating cycle is likely to build up a higher volume of stocks for which the risk of obsolescence is greater. More audit assurance will therefore be needed on the

[2]To maintain confidentiality, the auditors are labelled with letters A to F. One interviewee is a full time member and the other five interviewees are/were part-time members of the Audit Practices Board. Five of them are now senior audit partners in Big 5 firms. The interviewees were chosen on the basis of their experience and position which indicated that they would have a deep understanding of the audit services market. The interviews were conducted in a semi-structured manner. Only two interviewees approved that the interviews be taped.

value of this type of stock. Businesses with long operating cycles may also involve additional more complex accounting estimates in valuing its stock and work-in-progress. See, for example, SSAP 9 "Accounting for Stocks and Work in Progress" for construction companies involved in long term contract work and SSAP 13 "Accounting for research and development" for pharmaceutical companies which invest heavily in researching and developing new products. These companies may prefer to have audit specialists to carry out their annual audits (interviewee A). This is because complying with these accounting standards is particularly difficult as they involve the valuation of assets and liabilities on the basis of very complex and often subjective accounting judgement by auditee personnel (interviewees B & D). This category of industrial complexity category therefore includes major sectors such as oil, building and construction, health care and pharmaceuticals.

Volatility

For an auditor, additional and more complex work is needed to provide audit assurance where clients operate in a sector characterised by relatively high volatility in technology or market dynamics. Examples of this type of business include internet, telecommunications, media, computing and electronics (interviewees B and D). Volatile industries therefore include those that involve in fast moving technology and a high speed of innovation (interviewee E). Interviewees D and F emphasised that changes between clients and the marketplace were particularly crucial. For instance, IBM was very successful at the mainframe market in the early 1980s but the business went into rapid recession with a significant economic impact for the company. One possible reason was that IBM did not foresee the importance of the personal computer as a change agent in the market. Rapid changes are also observed in product technology of complex financing techniques. There are new developments of financial arrangements and information technology has provided the opportunity to have such developments implemented quickly. Sometimes, management cannot cope with the pace of this change and cannot even understand what is going on (interviewee C). Businesses therefore become vulnerable to errors and irregularities. Interviewee D also noted that changes within a client could also lead to an increase in audit complexity. For example, a company undergoing reconstruction may increase the complexity of an audit assignment. A reconstruction may lead to new organisational structure and systems which auditors have to make sure are designed and operated properly. This industry complexity category includes telecommunications and financial institutions such as banks and insurance.

Legal requirements

Legislative requirements in addition to those universally required by the Companies Acts increase audit complexity. Financial institutions, for example, have to comply with the requirements of the Financial Services Act

1986 (interviewees A and E). A thorough understanding of the requirements of this Act is necessary but involves considerable experience and technical knowledge. Many audit staff may therefore require additional training before they can carry out audits of financial institutions. To cope with these specialised audits, some audit firms have created and developed teams dedicated to the audit of financial institutions. Auditee complexity may also increase if the auditee engages in a business which is regulated in the form of quotas by the government. The oil business is an example. Oil company auditors have to verify that their clients do not exceed their sales quota. This dimension of complexity is to be found in electricity, gas, telecommunications, and banks and other financial institutions.

5.2.2 Organisational Location, Structure and Integrity

Company geographical location and organisational structure are also important factors in determining both the amount and complexity of audit work. Audit clients who operate in global capital markets provide a greater challenge to the auditor because first, the auditor has to verify extensive international trading between the clients' overseas branches and second, this type of auditee may have operations in "risky" countries (interviewees D & E). "Risky" countries include many Asian and Eastern European countries (interviewees A and B). Moreover, companies operating in these countries may have questionable or illegal activities.

Integrity of management is an important factor in deciding the level of audit assurance required. Good management control is particularly important in complex industries as it helps to reduce the amount of audit work and/or helps the auditors to focus their work on risky areas. Different levels of management skill will result in different levels of audit risk. For example, the audit of complex industries can be helped by high quality, ethical and competent management behaviour (interviewees C and F). However, some industries (for example, construction and property) tend to attract "rotten" management (interviewees A and F) and in these sectors particular care and consideration is required by the auditor. Management experience is also important. The risk of an entity is increased if its management have entered into industrial sectors in which they have no prior experience (interviewees B and F). Again extra audit vigilance is needed in these circumstances.

5.2.3 Identification of Complex Industries

In earlier research work Craswell et al. (1995) arbitrarily classified that an industry as being complex (industries with specialist auditors) if it had 30 or more observations, and if one or more individual audit firm had a market share greater than or equal to 10%. However, this appears to be a method of identifying audit specialists rather than complex industries. The analysis contained in this Chapter is based on the view that the operations and nature of business are more important in deciding whether an industry is complex.

Therefore, in order to identify complex industries, the following procedures have been adopted. First, 81 industries, as identified by the Stock Exchange in 1991, were arranged into 20 industry groups. The grouping of industries was judgemental and was based on, as far as possible, the nature and operations of the type of business. Then, the four complex industry criteria were applied as discussed (length of business operating cycle, volatility in technology and industry dynamics, legal requirements, and organisational structure and integrity of management) to identify complex industries. The 6 complex industries were contracting and construction, pharmaceuticals, utilities, financial institutions, property and extractive industries (Table 5.2).

5.3 Audit Specialists

Bédard and Chi (1993) classify auditing knowledge into five categories: general auditing; functional area; accounting issues; specific industry and general business. By accumulating auditing knowledge, auditors become experts who have the ability, acquired by practice, to perform to a high standard in a particular task domain. The key for acquiring expertise is practice. The more audit clients an auditor has in an industrial sector, the more knowledge it will have about that industry and the greater the level of quality it can efficiently provide in its specialist audit services.

However, practice alone, is not sufficient to achieve expert status. The number, range and difficulty of problems faced, and the way personnel are

Table 5.2 Identification of Complex Industries

Industry	Long Operating Cycle	Volatile Technology	Regulated Industries	Organisational Structure & Management
Building materials & merchants				
Contracting & construction	√			√
Electrical, electronic & engineering				
Motor, engineering				
Broadcasting, media				
Household & office equipment				
Breweries, wines & spirits				
Hotels & leisure				
Food manufacturers				
Paper, packaging & printing				
Departmental stores				
Textile & apparel				
Pharmaceuticals	√			
Wholesalers & distributors				
Industrial conglomerates				
Utilities		√	√	
Financial institutions		√	√	
Property				√
Extractive industries	√		√	
Others				

able to learn from each problem are also important. Experience of these types of problems can come from audit involvement over time and with a number of specialist clients. Audit firms can also accumulate auditing knowledge through the provision of consultancy and tax services. Moreover, knowledge relevant to audit work for a company in an industry can also be gained through work (whether audit or consultancy services) undertaken in other industries. Knowledge does not only spill-over between firms and within an industry but also across industries. Some audit knowledge is quite independent of industry; it can be generic.

Craswell et al. (1995) determined auditor specialisation according to a threshold of 10% of market share based on either the number of clients in the industry or the percentage of total fees in the industry. They noted that this 10% rule is arbitrary. In this study, based on 1179 listed companies in the UK in 1991, auditors with more than 10% market share are shown in Table 5.3. Both the number of clients and the percentage of total fees earned are important in deciding audit specialists. Therefore, in this chapter, audit specialist is determined according to a threshold of 10% of market share based on both the number of clients in the industry and the percentage of total fees in the industry (Table 5.4 on page 153). Based on this 10% threshold, analysis showed that none of the medium sized or small audit firms were audit specialists in any of the industries. Of the Big Six firms, Arthur Andersen was not a specialist in any of the industries while Touche Ross was only a specialist in 3 of the 20 industries. As a result of the absence of small specialist audit firms, only hypotheses (1), (3), (4) and (6) developed in Section 5.1 could be tested.

5.4 Data and Model Specification

5.4.1 Audit Fee Model

Chan et al. (1993) discussed in detail various possible determinants of audit fees (See Chapter 4 Table 4.1 on page 91). As a result of data availability, this study has only used some of the proxies listed in the Table: turnover for

Table 5.3 Market Share by Industry Group

Industry	Number of Companies	Number of Auditors	Total Fees £'000	$\geq$ 10% Market Share (Audit Fees)	$\geq$ 10% Market Share (Number of Audits)
Building materials & merchants	71	19	33,482	PW (11), KPMG (17), CL (18), EY (36)	CL (18), EY (20), KPMG (20)
Contracting & construction	67	26	10,752	CL (15), TR (17), KPMG (43)	CL (13), TR (13), KPMG (24)
Electrical, electronic & engineering	235	38	61,228	CL (11), PW (11), TR (16), KPMG (29)	PW (10), EY (11), CL (13), KPMG (22)
Motor, engineering	12	9	7,371	EY (28), CL (29), KPMG (39)	CL (17), EY (17), KPMG (17)
Broadcasting, media	61	14	12,866	PW (10), CL (11), TR (13), AA (20), KPMG (31)	PW (13), CL (18), KPMG (26)
Household & office equipment	16	9	6,828	KPMG (20), PW (27), CL (34)	EY (13), PW (13), TR (19), KPMG (25)
Breweries, wines & spirits	26	9	11,101	PW (23), EY (34), KPMG (37)	KPMG (12), GT (15), PW (23), EY (27)
Hotels & leisure	45	19	11,436	PW (15), KPMG (19), EY (40)	CL (13), KPMG (18)
Food manufacturers	37	13	18,949	PW (11), KPMG (12), CL (41)	KPMG (11), EY (16), PW (16), CL (19)
Paper, packaging & printing	49	13	19,452	KPMG (12), EY (14), PW (26), CL (34)	TR (12), CL (14), KPMG (14), PW (16), EY (20)
Departmental stores	48	14	10,528	TR (13), PW (16), KPMG (16), CL (35)	PW (13), KPMG (15), CL (27)
Textile & apparel	70	23	7,849	EY (12), TR (27), PW (30)	CL (10), EY (11), KPMG (11), PW (19)
Pharmaceuticals	47	13	21,537	CL (14), PW (25), KPMG (37)	EY (13), PW (13), CL (19), KPMG (28)
Wholesalers & distributors	70	20	15,384	KPMG (10), PW (12), TR (13), EY (18), CL (33)	CL (10), PW (10), KPMG (13), EY (16), TR (16)
Industrial conglomerates	18	9	13,949	CL (11), PW (22), KPMG (24), EY (36)	GT (11), KPMG (11), EY (17), PW (17), CL (22)
Utilities	24	7	3,206	PW (28), CL (47)	BH (13), TR (13), PW (25), CL (34)
Financial institutions	85	25	40,826	KPMG (17), CL (30), PW (33)	PW (10), TR (13), KPMG (19), CL (20)
Property	83	23	6,579	BH (11), AA (11), CL (11), TR (19), KPMG (27)	CL (11), TR (13), KPMG (20)
Extractive industries	32	9	17,655	PW (10), CL (23), EY (61)	EY (25), KPMG (28)
Others	83	23	13,723	CL (55)	PW (11), BH (12), CL (13), KPMG (13)

Notes:

Based on 1179 companies in 1991

Percentage of market share in brackets

AA: Arthur Andersen, BH: BDO Binder Hamlyn, CL: Coopers & Lybrand, EY: Ernst & Young, GT: Grant Thornton, PW: Price Waterhouse, TR: Touche Ross

Table 5.4 Auditor Specialists

Industry	Number of Clients	Specialists	Number of Clients: Specialist	Number of Clients: Big Six
Building materials & merchants	71	CL, EY, KPMG	40	53
Contracting & construction	66	CL, KPMG, TR	33	44
Electrical, electronic & engineering	232	CL, KPMG, PW	104	165
Motor, engineering	12	CL, EY, KPMG	6	9
Broadcasting, media	61	CL, KPMG	21	47
Household & office equipment	15	KPMG, PW	5	11
Breweries, wines & spirits	26	EY, KPMG, PW	16	18
Hotels & leisure	45	KPMG	8	23
Food manufacturers	37	CL, KPMG, PW	17	25
Paper, packaging & printing	48	CL, EY, KPMG, PW	31	38
Departmental stores	48	CL, KPMG, PW	26	35
Textile & apparel	70	EY, PW	21	44
Pharmaceuticals	46	CL, KPMG, PW	27	36
Wholesalers & distributors	68	CL, EY, KPMG, PW, TR	45	49
Industrial conglomerates	18	CL, EY, KPMG, PW	12	14
Utilities	24	CL, PW	14	20
Financial institutions	26	CL, KPMG, PW	11	14
Property	4	CL, KPMG, TR	2	2
Extractive industries	30	EY	3	28
Others	80	CL	8	47

Notes:
Based on 1179 companies in 1991
Audit specialist is determined according to a threshold of 10% of market share based on both the number of clients in the industry and the percentage of total fees in the industry
CL: Coopers & Lybrand, EY: Ernst & Young, PW: Price Waterhouse, TR: Touche Ross

auditee size; inventory to total assets ratio, debtors to total assets ratio and number of subsidiaries for complexity; return on equity and profit before tax for ability to pay; year end dummy variable for timing of audit; Big Six dummy variable for auditor size. Preliminary analysis reduced the model to this form:

$$\begin{aligned} logF_{i,t} &= a_0 + a_1 logS_{i,t} + a_2 Sub_{i,t} + a_3 Gear_{i,t} \\ &\quad + a_4 RoE_{i,t} + a_5 Auditor + e_{i,t} \end{aligned} \tag{5.7}$$

where for auditee i at time t,

$logF_{i,t}$ = natural logarithm of audit fees

$logS_{i,t}$ = natural logarithm of turnover

$Sub_{i,t}$ = number of subsidiaries

$Gear_{i,t}$ = gearing ratio

$RoE_{i,t}$ = return on equity ratio

$Auditor_{i,t}$ = auditor dummy (= 1 if auditor was a Big Six or a specialist, = 0 otherwise)

$e_{i,t}$ = error term

a_0 = constant term

$a_1 \ldots a_5$ = coefficients

Estimations based on the above model can be used to calculate the Big Six and specialist premium:

$$= exp^{\text{Coefficient of Big Six (specialist) variable}} - 1 \tag{5.8}$$

5.4.2 Data Sample

The data used was initially based on all fully listed and USM companies (except investments trusts) in the UK in 1991. The final sample was arrived at on the basis of the following criteria. First, a company would be included only if all the necessary information about the company was available. Information on company auditors was extracted manually from the

Hambro Company Guide, November issues 1991. Information on the number of subsidiaries was also extracted manually from the Stock Exchange Yearbook. Financial information of the companies - audit fees, total assets, total sales, stock, debtors, profit before tax, return on equity and gearing ratio, was downloaded from Datastream. In order to facilitate analysis by audit firm, companies in the sample that had joint auditors were removed. The resulting sample consisted of 1027 companies.

5.5 Results

As already mentioned, because of the absence of small specialist audit firms, only hypotheses (1), (3), (4) and (6) developed in Section 5.1 could be tested. Results of the regression analysis based hypotheses tests are presented in Table 5.5.

5.5.1 Test of Audit Price Difference between L and S in Non-Complex Industries

Hypothesis (1) predicts that in non-complex industries (in which there is no audit specialist), large firms will charge the same audit fees as small audit firms. However, the results of the regression analysis indicated that a large firm premium existed. The coefficient of the Big Six variable was positive and was statistically significantly different from 0 ('statistically significant') at 5% level. The Big Six parameter of 0.116 suggested that, on average, Big Six audit fees were 12% higher than those of non-Big Six auditors.

Table 5.5 Regression Results

		Coefficient	t-statistic	P-value	Adjusted R2
Non-complex Industries					
All companies (831)	Constant	-1.510	-6.845	0.000	0.835
	Log(Sales)	0.517	23.253	0.000	
	No. of subsidiaries	0.023	7.509	0.000	
	Gearing	0.001	1.821	0.069	
	Return on Equity	0.000	4.211	0.000	
	Big Six	0.116	2.865	0.004	
Complex Industries					
L^* vs L (144)	Constant	0.056	0.083	0.934	0.619
	Log(Sales)	0.383	6.009	0.000	
	No. of subsidiaries	0.024	2.997	0.003	
	Gearing	0.002	2.238	0.027	
	Return on Equity	0.000	-0.112	0.911	
	Specialist	-0.082	-0.571	0.569	
L^* vs S (146)	Constant	-0.052	-0.083	0.934	0.688
	Log(Sales)	0.353	5.344	0.000	
	No. of subsidiaries	0.026	2.855	0.005	
	Gearing	0.003	2.789	0.006	
	Return on Equity	0.000	1.028	0.306	
	Big Six & Specialist	0.314	2.471	0.015	
L vs S (102)	Constant	0.117	0.245	0.807	0.616
	Log(Sales)	0.336	6.932	0.000	
	No. of subsidiaries	0.034	3.301	0.001	
	Gearing	0.001	2.054	0.043	
	Return on Equity	0.000	-0.099	0.921	
	Big Six	0.385	2.839	0.006	

Notes:
L^* - Big Six specialist firm, L - Big Six firm, S - small firm
See table 5.2 for industry complexity classification
See Table 5.4 for audit specialist identification
Sample size in parenthesis

5.5.2 Test of Audit Price Difference between L^* and L in Complex Industries

Hypothesis (3) predicts that in complex industries, large specialist auditors will charge higher audit fees than large auditors. Results of the regression analysis showed that there was no price difference between L^* and L audits. The coefficient was not statistically significant at 5% level.

5.5.3 Test of Audit Price Difference between L^* and S in Complex Industries

Hypothesis (4) predicts that in complex industries, large specialist auditors will charge higher audit fees than small auditors. Results of the regression analysis supported this hypothesis. The coefficient of the Big Six specialist variable was positive and was statistically significant at 5% level. The Big Six specialist parameter of 0.314 suggested that, on average, Big Six specialist audit fees were 37% higher than those of non-Big Six auditors.

5.5.4 Test of Audit Price Difference between L and S in Complex Industries

Hypothesis (6) predicts that in complex industries, large auditors will charge the same audit fees as small auditors. However, results of regression analysis indicated that a large firm premium existed in the audit price of complex industries. The coefficient of the Big Six variable was positive and statistically significant at 5% level. The Big Six parameter of 0.385 suggests that,

Table 5.6 Regression Results – Non-Complex Industries

		Coefficient	t-statistic	P-value	Adjusted R2
	Constant	-1.670	-7.762	0.000	
	Log(Sales)	0.547	26.251	0.000	
L^* vs L	No. of subsidiaries	0.020	6.900	0.000	0.839
(578)	Gearing	0.001	2.161	0.031	
	Return on Equity	0.000	-1.235	0.217	
	Specialist	-0.053	-1.108	0.268	
	Constant	-1.443	-5.525	0.000	
	Log(Sales)	0.507	19.693	0.000	
L^* vs S	No. of subsidiaries	0.026	9.311	0.000	0.843
(622)	Gearing	0.001	0.936	0.349	
	Return on Equity	0.000	4.786	0.000	
	Big Six & Specialist	0.092	2.083	0.037	
	Constant	-1.274	-3.779	0.000	
	Log(Sales)	0.493	13.756	0.000	
L vs S	No. of subsidiaries	0.024	3.483	0.001	0.804
(462)	Gearing	0.000	1.203	0.230	
	Return on Equity	0.000	5.514	0.000	
	BIG6	0.163	3.231	0.001	

Notes:
L^* - Big Six specialist firm, L - Big Six firm, S - small firm
See table 5.2 for industry complexity classification
See Table 5.4 for audit specialist identification
Sample size in parenthesis

on average, Big Six audit fees were 47% higher than that of non-Big Six auditors.

Results of further analysis of the non-complex industries are presented in Table 5.6. In this further analysis, the non-complex industries were analysed as if they were complex industries. In other words, there were audit specialists in those non-complex industries. Results were similar to the results of the complex industry analysis. It was observed that (1) large specialist auditors charged same audit fees as large auditors, (2) large specialist auditors charged higher audit fees (10%) than small auditors, (3) large auditors also charged higher fees (18%) than small auditors.

Results therefore, suggested that regardless of industry complexity and audit specialisation, Big Six firms, on average, charged higher fees than non-Big Six firms. This Big Six premium has been observed in many research studies using data from different countries and different time periods. It is a widespread and enduring phenomenon. Moizer (1997) noted that audit fees research studies in 12 countries, namely, Australia, Bangladesh, Canada, Hong Kong, India, Malaysia, New Zealand, Norway, Singapore, South Africa, UK and US, have identified top tier audit firms fee premium varying between 16% to 37%. Craswell et al. (1995) considered that this general brand name premium represented positive returns to brand name development and maintenance.

Among Big Six firms, the results of this study indicated that there was no difference in fees charged by specialists and non-specialists. These results contradict the belief that, with perfect information, consumers (auditees) would have to pay more for higher quality (Scherer and Ross, 1990, 592) or indeed cast doubt on the idea that a quality advantage can be gained from specialisation. The results also contrast with the findings of Craswell et al. (1995) which identified a Big Six specialist premium. They concluded that an industry-specific premium existed because of positive returns to investment in industry specialisation by subsets of the Big Six above and beyond general brand name investments.

A possible explanation of the observed results relating to hypotheses (1), (3), (4) and (6) concerns the inability of auditees to differentiate Big Six from Big Six specialists. The inability of audit customers to differentiate the two is likely because audit quality is unobservable. Without sufficient information as to the quality of audits that auditors produce, auditees may well rely only on the Big Six brand name. The implication of this auditee action is that all Big Six firms, regardless of whether they are specialists or not, can in fact, price their audits on the basis that they are specialists. If the market believes that all Big Six firms are specialists, we can expect the following results. First, we shall not observe higher prices by large specialist audit firms relative to large audit firms as predicted under hypothesis (3). We shall not observe any difference. Second, we shall not observe that in complex industries, large auditors will charge same the audit fees as small auditors, as predicted under hypothesis (6). We shall, instead, predict that in complex industries, large firms will have higher audit fees than small auditors, that is, the same prediction as in competition between large specialist firms and small firms. The results obtained were consistent with this interpretation.

5.6 Methodology Issues

5.6.1 Replication of Craswell et al. (1995)

Craswell et al. (1995)'s classifications of complex industries and audit specialist were used to see if different results would be obtained. The classification was arbitrary. An industry was complex (industries with specialist auditors) if it had 30 or more observations, and if one or more individual audit firms had a market share greater than or equal to 10%. Auditor specialist was determined according to a threshold of 10% of market share based on either the number of clients in the industry or the percentage of total fees in the industry. Based on these criteria, only 5 of the 20 industries were classified as non-complex. They were motor engineering, household and office equipment, breweries, wines and spirits, industrial conglomerate and utilities.

For non-complex industries, it was found that large firms charged the same audit fees as small audit firms. No large firm premium was found. Although the coefficient of the Big Six variable was positive, it was not statistically significantly different from 0 at 5% level. Results for complex industries were consistent with the results previously obtained. In complex industries, (1) large specialist auditors charged same audit fees as large auditors, (2) large specialist auditors charged higher audit fees (16% more) than small auditors, and (3) large auditors also charged higher fees than small auditors (19%).

5.6.2 Alternative definition of audit specialists

Sensitivity analysis on definition of audit specialists used in this study was also tested. In Section 5.5, the results obtained were based on the classification of audit specialist determined according to a threshold of 10% of market share based on both the number of clients in the industry and the percentage of total fees in the industry. In order to test for result sensitiveness to the definition, a threshold of 20% was used. All results were similar to the obtained in Section 5.5 when the 10% threshold was used. For non-complex industries, it was found that large firms charged higher fees (12%) than small audit firms. In complex industries, (1) large specialist auditors charged same audit fees as large auditors, (2) large specialist auditors charged higher audit fees (40%) than small auditors and (3) large auditors also charged higher fees (39%) than small auditors.

5.6.3 Industry and market concentration effects on audit pricing

The results so far indicated that regardless of industry type, the Big Six charged higher prices than small firms and that there was no price difference between Big Six specialists and Big Six firms. Two questions are commonly asked about industry type and audit pricing. First, does the nature of an industry affect audit prices? Second, does auditor concentration within industry affect audit prices? The first question arises from the belief that the nature of an industry determines the complexity of it and hence the amount of audit work required. The second question arises from the concern that high auditor concentration within an industry leads to monopolistic pricing. Pearson and Trompeter (1994) looked at the effect of auditor concentration on audit pricing and reported that audit fees were negatively related to auditor concentration within industry. They noted two possible limitations in their study: first, only two industries were examined and second, the sample period covered a relatively short time period, during which the concentration ratios exhibited limited variability in each industry.

In order to answer the two questions, the following fixed effect panel data analysis technique was used:

$$\begin{aligned} logF_{i,t} &= \alpha_1 d_{1,i,t} + \alpha_2 d_{2,i,t} + \ldots + \alpha_k d_{k,i,t} + a_1 logS_{i,t} \\ &+ a_2 Sub_{i,t} + a_3 Gear_{i,t} + a_4 RoE_{i,t} + a_5 Con_{i,t} \\ &+ a_6 Specialist_{i,t} + a_7 BigSix_{i,t} + e_{i,t} \qquad (5.9) \end{aligned}$$

where for auditee i at time t,

$logF_{i,t}$ = natural logarithm of audit fees

$logS_{i,t}$ = natural logarithm of turnover

$Sub_{i,t}$ = number of subsidiaries

$Gear_{i,t}$ = gearing ratio

$RoE_{i,t}$ = return on equity ratio

$Con_{i,t}$ = auditor concentration within industry to which auditee i belongs

$BigSix_{i,t}$ = Big Six dummy (= 1 if auditor was a Big Six, = 0 otherwise)

$Specialist_{i,t}$ = specialist dummy (= 1 if auditor was a specialist, = 0 otherwise)

$e_{i,t}$ = error term

$a_1 \ldots a_7$ = coefficients

$\alpha_1 \ldots \alpha_k$ = coefficients

$d_{1,i,t} \ldots d_{k,i,t}$ = k industry groups dummies (=1 if auditee i belongs to industry k)

Results of the panel data analysis are summarised in Table 5.7. Consistent with our earlier findings, while a Big Six premium was observed, no specialist premium was found. The industry concentration variable, as measured by the Herfindahl index, did not have a statistically significant coefficient. This result suggested that industry concentration did not affect the amount of audit fees paid by the auditees. Thus, there was no evidence to support the proposition that high industry auditor concentration may lead to higher audit fees. Panel data analysis also revealed that industry group was an important determinant of audit fees.

5.6.4 Limitations

In developing audit firm competitive strategies, it was assumed that there are only four categories of firms: (large and specialist firm), (small and specialist firm), L (large firm) and S (small firm). The within category homogenous assumption may not be valid. For example, among the Big Six (large firm) group, Moizer (1997) noted that many research studies have shown that there were price differences among the Big Six. For example, Price Waterhouse was found to have a fee premium in the 1980s in the US, Canada and New Zealand. Deloitte & Touche and Ernst & Young had fee

Table 5.7 Effects of Industry Type and Concentration on Audit Prices

	Coefficient	t-statistic	Adjusted R^2
Log(Sales)	0.511	19.406*	
Number of subsidiaries	0.021	6.605*	
Gearing	0.000	2.381*	
Return on Equity	0.000	1.339	
Industry Concentration	0.004	0.014	
Big Six	0.122	2.261*	
Specialist	-0.015	-0.288	
Fixed Group Effect:			
Building materials & merchants	-1.329	-4.788*	
Contracting & construction	-1.688	-6.151*	
Electrical, electronic & engineering	-1.249	-4.922*	
Motor, engineering	-1.467	-5.519*	
Broadcasting, media	-1.416	-5.415*	0.822
Household & office equipment	-1.668	-5.612*	
Breweries, wines & spirits	-1.792	-6.000*	
Hotels & leisure	-1.017	-3.364*	
Food manufacturers	-1.056	-3.785*	
Paper, packaging & printing	-1.529	-5.222*	
Departmental stores	-1.361	-5.326*	
Textile & apparel	-1.630	-6.286*	
Pharmaceuticals	-1.333	-4.895*	
Wholesalers & distributors	-1.253	-4.534*	
Industrial conglomerates	-1.268	-4.794*	
Utilities	-1.256	-4.070*	
Financial institutions	-1.621	-5.130*	
Property	-2.138	-5.146*	
Extractive industries	-1.594	-5.143*	
Others	-2.284	-6.532*	

Notes:
* statistically significant at 5% level
Based on 1027 observations

premiums in South Africa and Arthur Andersen in Norway. In Chapter 4, we found a UK fee premium charged by Coopers & Lybrand, Ernst & Young and KPMG. No fee premium was found for audits of Arthur Andersen, Price Waterhouse and Touche Ross. In addition, two simplifications are made in developing the strategies. First, only one period strategy has been considered. Second, strategies are also considered on a one firm category to another firm category basis. More complex strategies could potentially be developed for one firm category to the other three categories in a multi-period context.

The empirical tests used in this study might have several weaknesses. First, classifications of industry complexity and audit specialist are subjective. However, the similar results obtained for complex and non-complex industries suggested that all industries should perhaps be considered as complex. Other definitions of audit specialists have been used in the study and the results were consistent. Second, since the true functional form of the audit fee model is not known, results obtained are subject to potential bias. Third, the pricing strategies developed in this Chapter have implications for auditor concentration. The test of changes in auditor concentration, however, requires a much longer period of data. Given small changes in the overall market auditor concentration from 1991 to 1995 as we saw in Chapter 3, it is unlikely that we would observe any significant change in auditor concentration within industry. Finally, it is possible that audit pricing is influenced by other (non-studied) factors, for example, the consultancy fee earnings and earnings potential of the auditor from the auditee.

5.7 Conclusions

This study has proposed that both the size of an audit firm and its specialist knowledge of typologies of auditee are important dimensions of competitiveness in the audit services market. Hypotheses were developed with regard to strategies employed by audit firms to increase its market dominance and/or to earn higher than normal industry economic profits. Empirical tests of the hypotheses reveals the following:

1. The industry factor was a determinant of audit fees.

2. Auditor concentration within an industry was not a determinant of audit fees. This result was different to that of Pearson and Trompeter (1994). They found that audit fees were negatively related to auditor concentration within industry.

3. Regardless of industry, there was no difference between the Big Six specialist and Big Six audit prices. This result was consistent with the results of Palmrose (1986) but contrasts with the results of Craswell et al. (1995) which provided some evidence of Big Six specialist premium.

4. Regardless of industry, audit prices of the Big Six firms were higher than that of small firms.

5. Regardless of industry, audit prices of the Big Six specialists were higher than that of small firms.

6. The observed results in this Chapter might be explained by the inability of auditees to differentiate specialists from non-specialists, that is, the auditees believed that all Big Six were specialists.

Nevertheless, this research represents only a first step in trying to explain why audit price differences existed among firms and why auditor concentration has been changing. As indicated in the limitations, further understanding can potentially be developed on diverse firm characteristics in a multi-period model. The tentative conclusion that the market is not able to distinguish audit quality suggests research should be carried out in several directions. First, do firms actually produce different audit quality products? Second, are there industry audit specialists? If there are audit specialists, how can the market identify specialists? Can the market provide a solution or the regulator should step in? I leave all these questions to future researchers.

Chapter 6

Conclusion

This dissertation has studied a number of aspects of the supply of audit services in the context of the UK audit market during the period from 1991 to 1995. This Chapter summarises the conclusions which may be drawn from the work undertaken and identifies further research opportunities.

6.1 Auditor Concentration

It has examined the issue of auditor concentration in the U.K. during the period. This examination has shown that in 1995 the Big Six held 75% of the total number of audits and collectively earned 92% of the total audit fees. The audit market was dominated by the four largest firms, namely, CL, KPMG, PW and EY. These four firms held 60% of the total number of audits and collectively earned 79% of the total audit fees. Two other auditors AA and TR had smaller but significant market shares while the remainder of audit firms in the market were relatively small. There was only a small increase in auditor concentration during the five year period, resulting from companies switching from small audit firms to Big Six and newly listed companies choosing a Big Six firm. There was evidence that the Big Six had relatively more audits of larger companies, thus confirming the general belief that large companies tend to appoint a Big Six auditor.

At a sectoral level, the Big Six had complete dominance over 5 industry sectors and a highly dominant position in 29 others. The results do indicate that in many of the industry sectors, auditor choice may well be effectively restricted. However, it can be argued that although auditor concentration was high at an industry level, there was still competition among audit firms. Evidence to support this notion is apparent firstly because switching between the Big Six firms represented 28% of the total auditor change during the five year period, secondly because in 21 out of the 36 industries used in this study, a reasonable choice of auditors existed to the extent that there were 10 or more auditors active in the sector and thirdly an analysis of the determinants of audit fees indicates that auditor concentration within an industry was not a determinant of audit fees.

The audit services market structure is constantly changing. Not only is there the consistent possibility of mega-mergers between the Big Five, but also the likelihood of more mergers between medium sized audit firms. Continual pressure for merger is underpinned by the fact that audit firms no longer operate on national level, they provide services to international clients. Thus, interpretation of the results of analysis at a national audit market level is rather restricted. A wider international perspective should be considered as a basis for audit market studies and research in this direction is to be encouraged. New developments are also apparent in the organisational structure of audit firms. For example, incorporation of audit firms as limited partnerships, addition of legal services provision and the splitting of audit firm business from other activities. These developments may have impact, yet to be seen, on the audit services market structure.

6.2 Audit Fees

This dissertation has also analysed changes in the audit fees of quoted public limited companies in the UK during the period from 1991 to 1995. Analysis of audit price change indicated that the audit market experienced a 9.0% reduction in inflation adjusted fees over this five year period. The results also provide evidence of overall fee reduction by each of the Big Six over the five year period. On closer examination, a mixture of fee increases, decreases and no changes were observed for auditees of the Big Six and for the groups of medium sized and small audit firms involved. These results, which pertain to a period when the Big Six held 75% of the total number of audits, provide some amelioration of the worries of purchasers of audit services that, in general, audit fees will rise in response to an increase in dominance by a few big firms. The marked reduction in real audit fee income over the period is consistent with the existence of a price competitive market. Alternative explanations include an improvement in audit firm efficiency which was, at least in part, passed on to clients. The fact that benefits may have been passed on to clients does, in fact, provide more support for the price competitiveness of the market. It is also possible, however, that the fee reduction reflects a deterioration in the quality of audit service provided. Researching these options would assist in the determination of the reasons underlying audit price movement but would require the use of evidence which may be difficult to obtain. For example, an analysis of the costs and revenues (profitability) of audit work would shed some light on audit efficiency while detailed evidence on future litigation or retrospective interviewing of those who are party to the audit process would be needed to assess audit quality changes. The availability of this type of data to independent researchers is doubtful. However, public disclosure of the financial performance of audit firms may eventually provide some further data which can be used by researchers seeking to explain audit price variations.

Evidence is also presented that the Big Six gave higher discounts to their larger auditees than they did to the smaller ones. The higher price reductions enjoyed by larger Big Six clients may be indicative of greater price competition in this segment of the market. It may also be that the prestige and consultancy opportunities offered by large firms are influential in this distinction.

The audit price data presented reveals a variety and a complexity in the pricing behaviour of audit firms. Although on average audit prices fell there were price pattern differences apparent in individual years, across audit firms and in respect of client companies. Even the Big Six exhibited no uniformity in their audit pricing. However, some analysis of the timing of audit price changes by the Big Six over a longer period than five years might be merited to determine whether a long-term price leadership pattern can be determined. Also the variability in client treatment provides evidence which, on investigation, would provide valuable insights into specific audit firm pricing decisions. Those clients receiving consecutive price reduction give an analytical benchmark for the comparison of the opposite treatment of other clients by the audit firm. Investigation of the respective characteristics and circumstances of these clients could provide indications of factors to which the level of audit fee is sensitive. For example, contrasts in the circumstances of the individual auditor client relationship may become apparent as important determinants of audit fee.

6.3 Dimensions of Audit Market Competitiveness

Finally, this dissertation has proposed that both the size of an audit firm and its specialist knowledge of typologies of auditee are important dimensions of competitiveness in the audit services market. Hypotheses were developed with regard to strategies employed by audit firms to increase their market dominance and/or to earn higher than normal industry economic profits. Empirical results were obtained as follows. First, regardless of industry, there was no difference between the Big Six specialist and Big Six audit prices. Second, regardless of industry, audit prices of the Big Six firms were higher than that of small firms. Third, regardless of industry, audit prices of the Big Six specialists were higher than that of small firms. Some of the results did not support the suggested hypotheses and this was indicative of the possibility that auditees are unable to differentiate audit specialists from non-specialists. They regard all Big Six as specialists. The results therefore suggest a possible market failure where state intervention may be desirable. This tentative conclusion that the market is not able to distinguish audit quality suggests further research should be carried out.

This research represents only a first step in trying to explain why audit price differences existed among firms and why auditor concentration has been changing. In developing audit firm competitive strategies, it was assumed that there are only four categories of firms: (large and specialist firm), (small and specialist firm), L (large firm) and S (small firm). This within category homogeneous assumption may not be valid. In addition, two simplifications are made in developing the strategies. First, only one period strategy has been considered. Second, strategies are also considered on a one firm category to another firm category basis. Third, it is possible that audit pricing is influenced by other (non-studied) factors, for example, the consultancy fee earnings and earnings potential of the auditor from the auditee. More complex strategies could potentially be developed for one firm category to the other three categories in a multi-period context.

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Auditor Concentration: A Replication and Extension for the UK Audit Market 1991–1995

Christopher K.M. Pong*

1. INTRODUCTION

The announcement of the planned mergers between Coopers & Lybrand and Price Waterhouse, and then between Ernst & Young and KPMG are the latest manifestations of the trend towards higher concentration in the supply of audit services market. Although the merger talk between Ernst & Young and KPMG has subsequently collapsed, Price Waterhouse and Coopers & Lybrand successfully merged on the 1 July, 1998, to become PriceWaterhouseCoopers. A number of concerns derive from the degree of concentration[1] which would result from large firm mergers. The implications of greater concentration for the audit services market include the strengthening of an oligopolistic supply with consequent enhanced potential for price fixing arrangements, reduction in consumer choice, and an escalation in conflicts of interest. The latter issue derives from increasing instances where an audit firm provides consultancy services to auditees. A special case of this arises where the same audit firm is consultant to two or more competing client companies. Then the problem emerges as to how a company can ensure that its auditors will not release useful information to its competitors in

*The author is a Lecturer and a ICAEW Fellow in the Department of Accounting and Business Method, University of Edinburgh. The help of Jonathan Crook, Gishan Dissanaike, Falconer Mitchell, Stephen Walker and an anonymous referee are gratefully acknowledged. (Paper received July 1998, revised and accepted November 1998)

Address for correspondence: Chris Pong, Department of Accounting and Business Method, University of Edinburgh, 50 George Square, Edinburgh EH8 9JY, UK.

return for consultancy fees. For example, Christopher Pearce, finance director of Rentokil Initial and head of the FD's One Hundred Group confirmed the fears of audit firm clients when he expressed the view that the proposed merger between Coopers & Lybrand and Price Waterhouse 'reduces competition and increases the potential for conflict of interest' (quoted in *Accountancy Age*, 25 September, 1997, p.1).

Concentration is conventionally regarded as a significant dimension of market structure because it plays an important role in determining market power and hence business behaviour and performance (Bain, 1951 and 1956). High concentration in an industry increases the likelihood of the formation of a cartel comprising an association of firms which agrees, perhaps tacitly, to co-ordinate production and pricing to increase the joint and individual profits of its members by restricting output. However, concentration resulting from mergers may also permit the achievement of economies of scale due to increases in firm size. It has been argued that these efficiency gains can be related to a concentration formula (Debreu, 1951; and Farrell, 1957). Thus, concentration on the supply side has the potential to influence the volume, price, variety and quality of audit services.

This paper seeks through an investigation of UK audit market concentration to achieve several objectives. First, by analysing auditor concentration from 1991 to 1995, it extends the UK work of both Beattie and Fearnley (1994) and Peel (1997). Second, it examines the impact of auditor changes on concentration. Auditor changes during this five year period are analysed into those involving a switch from a small firm to a Big Six firm (and vice versa), and those involving a switch within Big Six. The analysis of auditor change among the Big Six is also much more detailed than that of previous studies (Beattie and Fearnley, 1994; and Moizer and Turley, 1989). This aspect of the analysis is of particular importance as evidence of numerous client changes among the Big Six would throw some light on the nature of competition in the already highly concentrated audit market and could cast doubt on the idea of cartel formation by the Big Six. Third, the paper is also novel in its analysis of auditor concentration within industry groups (Zeff and Fossum, 1967; Danos and Eichenseher, 1980; Eichenseher and Danos, 1981; and Moizer and Turley, 1989). Restriction in choice of auditors within

industry group would indicate a heightened potential conflict of interest for auditors who provide both audit and a management consultancy service to two or more competing companies. Another important issue related to auditor concentration within industry groups is that of the audit specialist. It can be argued that:

> auditors develop industry specialisation by increasing their clienteles, specialists could also achieve production economies and become efficient, lower-cost producers of audits (Craswell, Francis and Taylor, 1995, p.301).

Thus, the specialist becomes a dominant force in the supply of sectoral audits and as such has a potential to extend considerable influence over audit pricing within that sector. This paper investigates the incidence of audit specialists by applying a market share test within each sector. This method has been used in many of previous studies including Craswell et al. (1995) and Palmrose (1986), but has not been applied to current UK data.

Finally, the paper assesses the most commonly used methods of concentration measures in prior studies. These methods all involve the selection of an audit market (population of companies), a measure of market power and a concentration index. Methods chosen by researchers may therefore differ considerably and consequently the results of research studies may lack comparability (Moizer and Turley, 1987). However, this issue is often neglected in the interpretation of the results of concentration studies.

2. LITERATURE REVIEW

Yardley, Kauffman, Cairney and Albrecht (1992) have summarised the many studies of auditor concentration in the US (e.g. Burton and Roberts, 1967; Zeff and Fossum, 1967; Rhode, Whitsell and Kelly, 1974; Schiff and Fried, 1976; Dopuch and Simunic, 1980; Eichenseher and Danos, 1981; Danos and Eichenseher, 1982; Tomczyk and Read, 1989; and Tonge and Wootton, 1991). In the UK, studies of auditor concentration have been less common. The major studies are Briston and Kedslie (1985), Moizer and Turley (1987 and 1989), Beattie and Fearnley (1994) and Peel (1997).

Yardley et al. identified several limitations in previous US studies. First, there was a definitional problem concerning the scope of the audit services market. For example, some studies only considered the top 500 industrial companies listed in the *Fortune Directory* (Dopuch and Simunic, 1980) while others used all companies listed on the New York Stock Exchange (Tonge and Wootton, 1991). There was also a similar definitional problem in relation to industrial classifications. Second, there was the difficulty of identifying and formulating surrogates for auditor size. Lacking audit fees information in the US, total assets or sales of auditees were used to measure size of auditors. Third, early studies were unable to disaggregate group audit fees into amounts paid to holding company auditors and subsidiary company auditors. Fourth, the choice of a concentration index was not explained.

The definitional problem concerning the audit services market has also been relevant to various studies in the UK. Measuring the concentration of the audit services market first requires a definition of the market. For example, organisations may purchase audit services voluntarily or because of a statutory requirement and strictly speaking, when calculating auditor concentration, both types of audit should be included. However, information for voluntary audits is not publicly available. Researchers might thus have to limit the study of auditor concentration to cover only the supply of statutory audits to public listed companies. In this regard, Beattie and Fearnley (1994) included all the fully listed and USM companies. Some researchers further narrowed the market size by selecting only a limited number of largest listed companies. For example, Moizer and Turley (1989) used the FT500. Limitations of the market in this way introduces some arbitrariness to the research. Recently, however, Peel (1997) examined auditor concentration ratios across all corporate sub-markets, that is, the quoted and unquoted plcs, and private companies. Thus the major UK studies are based on different market delineation, and when comparing their results this difference must be taken into account.

The second and fourth of Yardley et al.'s limitations were discussed by Moizer and Turley (1987 and 1989). In the case of the former, they observed that the main measures used to calculate the level of concentration in the past have been the number of audits (Briston and Kedslie, 1985; and Beattie and

Fearnley, 1994) and the level of audit fees (Moizer and Turley, 1989). Audit fee income was considered by them to be the most appropriate measure of the size of the market as this represents a good measure of the output of the auditor. However, since larger companies would tend to have larger fees, a measure based on number of audits will under-state the real value of the firms' market shares (Moizer and Turley, 1987). A measure based on the number of audits does, however, facilitate analysis of shifts in concentration due to auditor changes and it is also consistent with the regulatory regime developed by the three Chartered Institutes,[2] which focuses on the absolute number of listed clients of each audit firm (Beattie and Fearnley, 1994).

Moizer and Turley (1989) also looked at the effects of different concentration indices. They measured auditor concentration in terms of market share by the largest firms (C_n) and the Herfindahl index (H):

$$C_n = \frac{\sum_{1}^{n} S_i}{\sum_{1}^{k} S_i}$$

$$H = \frac{\sum_{1}^{k} S_i^2}{\left(\sum_{1}^{k} S_i\right)^2}$$

where k is the total number of audit firms in the market, n is the number of largest firms and S_i is the size of audit firm i. Concentration index C_n measures market share by the largest n firms. Since a concentration index aims to summarise the number and size distribution of competitors within an industry, H is better than C_n as C_n only takes into account market share by the n largest firms and thus ignores the rest of the firms in the market. In addition, there are some further desirable properties of a concentration index.[3] Although the Herfindahl index satisfies the requirements of all these desirable properties while C_n does not, C_n is still widely used because of its simplicity in calculation and its meaning is easy to understand. However, many studies have found these alternative concentration measures to be highly correlated.

Although prior UK studies of audit firm concentration have been based on slightly different measures and company population, they have shown a consistent pattern of increasing concentration over the period of the last twenty-five years or so (Table 1). There are three main ways in which the increases in concentration came about: mergers between audit firms have resulted in a higher combined market share; voluntary changes of auditor which have tended to favour larger firms; and newly listed companies which have tended to appoint a large firm of auditors (Moizer and Turley, 1989). Among these three reasons, audit firm merger was by far the most significant. Recent examples of significant mergers among major UK audit firms included Ernst & Whinney with Arthur Young in 1989, Coopers & Lybrand with Deloitte Haskins and Sells in 1990 and Spicer and Oppenheim with Touche Ross also in 1990. Auditor switching had a positive but minor effect on increasing concentration as its frequency was low. Beattie and Fearnley (1994) reported that, for the years 1988 to 1991, the annual rate of audit firm switching was only between 3.8% and 6.1%. However, where changes did take place, they favoured larger audit firms. For example, among listed companies, most switches involved a change from a non-Big Six to a Big Six firm (the Big Six firms comprise Arthur Andersen ('AA'), Coopers & Lybrand ('CL'), Ernst & Young ('EY'), KPMG, Price Waterhouse ('PW') and Touche Ross ('TR')). Overall, the change in concentration by 1991 has led to a situation where 'audit services has reached the limit of a tight oligopoly, which was characteristised by few rivals, stable market share and medium-to-high entry barriers' (Beattie and Fearnley, 1994, p. 308). The underlying reasons for the increase in market share by the Big Six included lower audit pricing, better quality of audit services, good marketing, and their ability to provide auxiliary services. Beattie and Fearnley (1994) reported that in 1991, 72.3% of all domestic listed and USM companies in the UK were audited by the Big Six and 90% by the top twenty audit firms. This study also reported that market leadership was stable, that is, client groupings of the largest audit firms was not changing.

As outlined in the introductory section, by using a much larger and more recent data sample, this paper provides a further

Table 1

UK Evidence on Supplier Concentration in Audit Services

Time	*Measure*	*Sample*	C_4	C_6	C_8	C_{20}
1968 (Briston and Kedslie, 1985)*	No. of audits	All domestic listed	0.207	0.250	0.287	0.389
1972 (Moizer and Turley, 1987)**	Audit fees	FT500 Share Index	0.470	0.599	0.660	n.a.
1978 (Briston and Kedslie, 1985)*	No. of audits	All domestic listed	0.326	0.406	0.462	0.657
1982 (Moizer and Turley, 1987)**	Audit fees	FT500 Share Index	0.544	0.692	0.794	n.a.
1984 (Briston and Kedslie, 1985)*	No. of audits	All domestic listed	0.375	0.489	0.572	0.758
1987 (Beattie and Fearnley, 1994)*	No. of audits	All domestic listed (incl. USM)	0.434	0.546	0.643	0.828
1991 (Beattie and Fearnley, 1994)*	No. of audits	All domestic listed (incl. USM)	0.589	0.723	0.793	0.900
1995 (Peel, 1997)***	No. of audits	All domestic listed	n.a.	0.782	n.a.	n.a.

Notes:
* Based on Beattie and Fearnley (1994), Table 8.
** Based on Moizer and Turley (1987), Tables 1 and 2.
*** Based on Peel (1997), Table 2.

contribution to the UK audit market literature by (a) updating the findings of earlier studies; (b) analysing in detail company switching audit firms; (c) analysing auditor concentration by industry groups; and (d) assessing the measurement methods most commonly used in concentration studies.

3. DATA AND METHOD

The data used in this study consisted of fully listed and USM companies (with the exclusion of investments trusts) for the years from 1991 to 1995. Information on company auditors was extracted manually from the *Hambro Company Guide*,[4] November issues 1991 to 1995. Financial information on companies – total assets and audit fees, were downloaded from Datastream.

Table 2 provides summary statistics of the five year data set. Casual observation of the summary statistics suggests that there was an increase in auditor concentration during the five year period. In 1991, there were 119 firms providing audit services to 1,211 companies. The comparative figures in 1995 were 106 firms

Table 2

Summary Statistics

	1991	*1992*	*1993*	*1994*	*1995*
Sample Size	1,211	1,222	1,237	1,320	1,401
Number of Auditors	119	116	113	110	106
Audit Fees (£'000)					
Mean	295	299	300	279	275
Standard Deviation	653	682	698	647	666
Minimum	1	2	2	2	0
Maximum	7,400	8,000	9,000	8,000	8,000
Total Assets (£'000)					
Mean	825,206	874,907	954,985	930,910	955,039
Standard Deviation	5,910,634	6,485,236	7,395,138	7,272,258	7,946,593
Minimum	230	115	216	348	532
Maximum	128,540,000	143,216,000	163,116,000	159,363,000	166,347,000

and 1,401 companies. Audit fees paid varied among the companies, from below £1,000 to £9 million. Interestingly, the average audit fee per company has decreased over the five year period, from £295,000 in 1991 to £275,000 in 1995 while the average size of company has increased from £825 million in 1991 to £955 million in 1995.

Data collection proceeded as follows. Accounting data from Datastream were collected on a calendar year basis (based on accounting year end date). While this created the potential for a cut-off problem when the data were matched with auditor information in the *Hambro Company Guide* (November issue) which was based on latest published accounts,[5] there was, in fact, only a small number of auditor changes in each of the years under investigation and thus, overall auditor concentration measures were not significantly affected. Not all the companies listed in the *Hambro Company Guide* were available in Datastream and therefore, the resulting population size for each of the years has been reduced (Table 2).[6] There was no merger between the Big Six audit firms during 1991 to 1995. During the period, there were a few smaller audit firms' mergers including Baker Tilly and Longcrofts, Moore Stephens and Overton Salt, and Finnie and Stoy Hayward in 1992; Brewers and Coopers Lancaster, and Chantrey Velloacott in 1993; and BDO Binder Hamlyn[7] and Stoy Hayward in 1995.

Using the five year data set, concentration ratios were calculated for the years from 1991 to 1995. Audit fee income and number of audit engagements were used as proxies for size and market power of audit firms. Degree of concentration was measured by C_4 and C_6, market share by the largest four and six firms respectively. Market share held by each of the top 15 firms was also computed for each year. The change in auditor concentration during the five year period was then analysed and classified according to its causes (company switching auditor, newly listed companies and companies removed from stock exchange). Using audit fee income as the size measure, Herfindahl indices were also computed for each of the five years in order to look at the effect of choice of concentration indices on concentration measures. Restricting the study to the 1995 data set, auditor concentration within industry group was also calculated.

Finally, the effect of population size on auditor concentration was investigated as follows. The 1995 data sample was sorted in descending order of size of companies. Auditor concentration indices were first computed for a population with only the largest company. Next, the population size was increased by adding the immediate largest company and auditor concentration indices were re-computed based on the new population size. The process was repeated until the population included 1,401 companies. This was done to examine the effect of choice of sample on results of concentration studies, particularly in cases where the sample used is based on a proportion of the largest companies.

4. RESULTS

(i) Auditor Concentration 1991–95

The left column and right column of Table 3 show the market shares, by audit fees and number of audits respectively, of the top 15 audit firms in the UK in each of the years from 1991 to 1995. Results suggested that there was a core of four firms (CL, KPMG, EY and PW) who each consistently possessed an individual market share in excess of 10% and who together had more than 50% of the audit market. Moreover, their individual and total shares had steadily increased over the period. By 1995, these four firms earned 79% of total audit fees and audited 60% of the companies. KPMG had the largest share of the number of audits (20%) while CL had the largest share of total audit fees (23%). These four firms were followed by AA and TR who had a lesser, but substantial market presence. They received 13% of total audit fees and audited 15% of the companies. The Big Six were surrounded by a fringe of smaller firms who with the exception of Binder Hamlyn ('BH') individually received less than 1% of the total audit fees. However, together these firms earned 8% of total audit fees and audited 25% of the companies in 1995.

Concentration measures C_4 and C_6, based upon both audit fees or number of audits, confirmed that there has been a slight increase in auditor concentration from 1991 to 1995. Over the five year period, the increase in C_6 was about 3% (1991:89%, 1995:92%) when audit fee was used as size measure while the

Table 3

Auditor Concentration 1991 to 1995 – Top 15 Audit Firms

	Market Share (No. of Audits)					*Market Share (Audit Fees)*				
Year	*1991*	*1992*	*1993*	*1994*	*1995*	*1991*	*1992*	*1993*	*1994*	*1995*
Sample Size	*1,211*	*1,222*	*1,237*	*1,320*	*1,401*	*1,211*	*1,222*	*1,237*	*1,320*	*1,401*
	%	%	%	%	%	%	%	%	%	%
Coopers & Lybrand	14.86	15.96	15.89	16.25	15.35	21.80	21.93	22.05	23.27	23.29
KPMG	18.33	18.78	20.49	20.80	20.24	21.41	21.14	23.14	21.99	22.22
Ernst & Young	11.85	11.13	10.75	11.55	11.63	16.98	17.12	17.47	17.10	18.14
Price Waterhouse	11.48	11.74	11.68	12.08	12.46	16.96	18.80	17.11	17.03	15.70
Touche Ross	8.38	8.31	8.57	8.79	9.24	7.34	7.22	6.74	7.71	7.01
Arther Andersen	4.95	4.95	4.77	5.00	6.00	4.11	4.26	4.41	4.50	5.53
Binder Hamlyn	5.12	5.16	5.34	4.70	3.82	2.65	2.51	2.52	2.27	1.60
Pannell Kerr Forster	1.65	1.96	1.70	1.89	1.71	1.44	1.16	0.97	0.85	0.82
Grant Thornton	3.26	2.86	2.67	2.42	3.14	0.90	0.71	0.68	0.61	0.77
BDO Stoy Hayward	2.48	2.78	2.75	2.42	3.39	0.56	0.58	0.60	0.56	0.72
Kidsons Impey	0.95	0.86	0.69	0.80	0.68	0.88	0.53	0.49	0.56	0.59
Moores Rowland	0.78	0.86	0.77	0.72	0.82	0.50	–	–	–	0.52
Clark Whitehill	–	0.74	0.81	0.68	0.57	0.55	0.58	0.62	0.54	0.44
Robson Rhodes	1.98	1.80	1.62	1.59	1.43	0.46	0.36	0.31	0.31	0.34
Moore Stephens	–	0.74	–	–	–	–	0.35	0.33	0.34	0.32
Neville Russell	0.66	–	0.73	0.68	0.50	–	–	–	–	–
Jayson Newman	–	–	–	–	–	0.34	0.30	0.31	0.26	–
Hacker Young	0.83	–	–	–	–	–	–	–	–	–
C_4	56.52	57.61	58.81	60.68	59.68	77.15	78.99	79.77	79.39	79.35
C_6	70.02	71.08	72.72	74.47	74.92	88.60	90.47	90.92	91.60	91.89

increase was about 5% (1991:70%, 1995:75%) when the number of audits was used. These results can be compared directly to earlier studies and prove to be consistent with the findings of Beattie and Fearnley (1994) and Peel (1997).

(ii) Auditor Switches and Their Impact on Concentration

There were 69.5 (6.1%), 32 (2.7%), 63 (5.2%) and 50 (3.9%) cases of voluntary auditor switching for the years from 1991/92 to 1994/95 respectively. Underlying drivers for auditor changes were identified in Beattie and Fearnley (1995 and 1998). Auditor changes which may influence market concentration is analysed in Table 4. Between 1991 and 1995, the results show that the switch from a small to a Big Six auditor accounted for 41%[8] of auditor change (41%[9] for the period from 1987 to 1991 in Beattie and Fearnley, 1994). KPMG out-performed the rest of Big Six by successfully taking over 25.5 company audits from small audit firms during this five year period. The other Big Six firms, TR, CL, PW, EY and AA, obtained 17.5, 16.5, 16.5, 8.5, 4 clients from smaller firms respectively. However, the switch from a Big Six to a small firm, in total only accounted for an average of only 13%[10] of the total number of auditor changes (8%[11] in Beattie and Fearnley, 1994). The Big Six lost 28 audits to small firms. The net gain for the Big Six from small firms therefore comprised of 28% of the total auditor change, i.e, a net gain of 60.5 audits.

Switching auditors within the Big Six accounted for 31%[12] of the total auditor change (35%[13] in Beattie and Fearnley, 1994). Table 5 shows that during the five year period, AA won 5 audits from and lost 7 to other Big Six, a net loss of 2 audits. EY, CL and KPMG also had a net loss of 6, 1.5 and 1 respectively. PW and TR had a net gain of 3.5 and 7 respectively. Therefore, although switching auditors among the Big Six accounted for 31% of the total auditor change, the actual net gain or loss for each of the firms was small.

The Big Six also gained most of the audits of newly listed companies. They were auditors of 75.5 out of 123 (61%) newly listed companies in 1994/95 (Table 5) while the comparable figures were 70%, 75% and 83% for the years from 1991/92 to 1993/94. Indeed, over the five year period, the Big Six gained 265 of the 368 new audits.

Table 4

Change of Auditors 1992–95

New Auditors

		AA	*CL*	*TR*	*EY*	*KPMG*	*PW*	*Big Six*	*Others*	*New*	*Removed*
1994–95	AA	–	0.0	0.0	1.0	2.5	0.0	3.5	0.5	14.0	3.0
	CL	0.0	–	0.0	0.0	0.0	0.0	0.0	3.5	8.0	6.0
	TR	0.0	1.0	–	1.5	1.0	0.0	3.5	7.0	10.0	6.0
	EY	0.0	1.0	0.0	–	1.0	1.0	3.0	0.5	15.5	4.0
	KPMG	0.0	1.0	0.0	0.0	–	1.0	2.0	4.5	17.0	8.0
	PW	0.0	1.0	1.0	1.0	1.0	–	4.0	5.0	11.0	3.0
	Big Six	0.0	4.0	1.0	3.5	5.5	2.0	[redacted]	[redacted]	75.5	30.0
	Others	2.0	1.0	0.0	1.0	1.0	0.0	[redacted]	[redacted]	47.5	12.0
	Total	2.0	5.0	1.0	4.5	6.5	2.0	21.0	29.0	123.0	42.0
1993–94	AA	–	1.0	0.0	0.0	0.5	0.0	1.5	0.0	9.5	2.0
	CL	1.0	–	0.0	0.0	2.0	0.0	3.0	2.5	24.0	5.0
	TR	0.0	1.0	–	1.0	3.0	2.0	7.0	5.0	5.0	5.0
	EY	0.0	1.0	1.0	–	1.0	0.0	3.0	4.0	18.5	2.0
	KPMG	1.0	0.0	1.0	0.0	–	1.5	3.5	7.0	25.0	5.0
	PW	0.0	1.0	0.0	2.0	1.0	–	4.0	6.5	16.0	6.0
	Big Six	2.0	4.0	2.0	3.0	7.5	3.5	[redacted]	[redacted]	98.0	25.0
	Others	0.0	2.5	0.0	1.0	2.0	2.0	[redacted]	[redacted]	20.0	10.0
	Total	2.0	6.5	2.0	4.0	9.5	5.5	29.5	33.5	118.0	35.0
1992–93	AA	–	0.0	0.0	0.0	0.0	0.0	0.0	0.5	5.0	2.0
	CL	0.0	–	0.0	1.0	0.0	0.0	1.0	2.5	7.0	6.5
	TR	1.0	1.0	–	0.0	0.0	0.0	2.0	4.0	2.5	3.0
	EY	0.0	0.0	0.0	–	0.0	0.0	0.0	0.0	3.0	4.0
	KPMG	0.0	1.0	1.0	1.0	–	1.0	4.0	4.0	20.0	3.0
	PW	2.0	0.0	0.0	0.0	1.0	–	3.0	2.5	2.5	5.0
	Big Six	3.0	2.0	1.0	2.0	1.0	1.0	[redacted]	[redacted]	40.0	23.5
	Others	2.0	0.5	0.0	0.0	0.0	1.0	[redacted]	[redacted]	13.0	14.5
	Total	5.0	2.5	1.0	2.0	1.0	2.0	13.5	18.5	53.0	38.0
1991–2	AA	–	0.0	0.0	0.0	0.0	0.0	0.0	3.0	5.5	5.0
	CL	0.0	–	0.0	3.0	0.0	3.5	6.5	8.0	14.0	8.5
	TR	0.0	0.0	–	0.5	1.0	0.0	1.5	1.5	8.0	5.0
	EY	0.0	0.0	0.0	–	0.0	1.0	1.0	4.0	3.0	10.0
	KPMG	1.0	1.0	0.0	1.0	–	1.5	4.5	10.0	13.0	15.0
	PW	1.0	1.0	3.0	0.0	0.0	–	5.0	2.5	8.0	5.0
	Big Six	2.0	2.0	3.0	4.5	1.0	6.0	[redacted]	[redacted]	51.5	48.5
	Others	1.0	3.0	3.0	1.0	4.0	0.0	[redacted]	[redacted]	22.5	14.5
	Total	3.0	5.0	6.0	5.5	5.0	6.0	30.5	39.0	74.0	63.0

Table 5

Market Share of the Big Six by Industry Sector

Market Share by Audit Fees	Market Share by Number of Audits: 100%	90–99%	80–89%	70–79%	60–69%	50–59%
100%	Oil, Integrated (100, 100, 1) Tobacco (100, 100, 1) Gas Distribution (100, 100, 1) Banks, Retail (100, 100, 4) Banks, Merchant (100, 100, 2)					
90–99%		Paper, Packaging & Printing (97, 91, 10) Chemicals (97, 91, 6) Electricity (94, 94, 6)	Insurance (98, 85, 8) Oil Exploration & Production (95, 86, 7) Household Goods (95, 83, 12) Retailer, Food (94, 80, 10) Diversified Industrials (93, 85, 9) Engineering (90, 81, 25)	Pharmaceuticals (99, 77, 7) Water (98, 71, 8) Life Assurance (96, 75, 3) Engineering, Vehicle (97, 75, 10) Health Care (94, 97, 12) Transport (93, 79, 12) Food Producers (93, 70, 17) Media (92, 77, 19) Retailers, General (92, 74, 15) Distributors (90, 79, 15)	Spirits, Wines, Ciders (97, 67, 5) Extractive Industries (94, 64, 6) Leisure & Hotels (92, 68, 14)	
80–89%				Telecommunications (89, 79, 5) Building & Construction (88, 72, 24) Building Materials & Merchants (87, 77, 17) Support Services (86, 70, 25)	Electronic & Electrical Equipment (87, 66, 20) Textile & Apparel (83, 65, 20) Other Services & Business (81, 67, 13)	Breweries (88, 58, 10)
80–79%					Peroperty (78, 69, 30)	
60–69%					Other Financial (63, 63, 19)	

Note.
Numbers in brackets represent respectively, market share by audit fees, market share by number of audits and total number of auditors in the sector.

While the Big Six gained from new entrants to the Stock Exchange, they also lost from company departures. Of the 178 companies leaving the Stock Exchange, the Big Six were auditors of 127 companies. This 71% (127/178) ratio is similar to the audit market concentration ratio C_6 based on number of audits (average 73% from 1991 to 1995). Therefore, there is no evidence to support any casual relationship between auditor size and companies removed from the Stock Exchange.

In summary, during the years from 1991 to 1995, a marginal increase in concentration was apparent. C_6 has increased from 89% to 92% based on audit fees measure and from 70% to 75% based on number of audits measure. The rate of increase in concentration had slowed from that observed in the period from 1987 to 1991 (when C_6 increases from 55% to 72%). This change was largely due to the effect of mergers of large audit firms in the late 1980s. The smaller more recent increment in auditor concentration was mainly due to companies switching from a small auditor to the Big Six (net gain of 60.5 audits) and newly listed companies having a preference for a Big Six auditor (average 72%). The increase in market share (based on number of audits) by the Big Six, namely, KPMG, PW, TR, CL, AA and EY was 1.91%, 0.99%, 0.86%, 0.49%, 1.05%, and −0.22% respectively. Relative net gains in number of audits by the Big Six were as follows:

Companies switching from small firms:	KPMG > TR > PW > CL > EY > AA
Companies switching between Big Six:	TR > PW > KPMG > CL > AA > EY
Newly listed companies choosing a Big Six:	KPMG > CL > EY > PW > AA > TR

(iii) Auditor Concentration by Industry Sector

Aggregate market concentration provides no direct indication of the nature of concentration in specific sectors. Table 5 summarises the market share of the Big Six by industry sector during the year 1995. It shows that the Big Six had complete dominance over five industry sectors: gas distribution, oil (integrated), merchant and retail banks, and tobacco. They also

had over 90% of the market share, both in terms of audit fees and number of audits, in the chemicals, electricity and paper, packaging and printing sectors. Indeed with the exception of the breweries, and other financial and property sectors, the Big Six had 80% or above in terms of audit fees and 60% or above in terms of number of audits in all industry sectors. This analysis thus indicates that in many of the industry sectors, concentration is extremely high. It can, however, be argued that this high concentration has been the result of companies choosing the 'best' auditor in the field. Moreover, in many sectors, choice of auditors remained reasonable as Table 5 shows that, out of the 37 industry sectors, there were 21 industry sectors that had at least 10 different audit firms.

Craswell, Francis and Taylor (1995) examined the effect of audit specialists on the level of audit fee.[14] They revealed that on average an industry specialist Big Eight firm (now Big Six) earned a 34% premium over non-specialist Big Eight auditors. Based on data for 1995, Table 6 shows industry market share by auditors. When the 10% market share threshold was used to denote audit specialisation, the four largest firms CL, KPMG, EY and PW were identified as specialists of all industries. However, when the threshold was raised to 30%, only one audit specialist emerged in most of the industries. For example, CL and PW were audit specialists of 16 industry sectors. The newly merged PriceWaterhouseCoopers would be audit specialists of 29 industry sector.[15]

(iv) Effects of Population Size, Size Measure and Concentration Index

(a) Population size

Figure 1 shows the effect of population size of companies on concentration ratio. On an audit fees basis, C_4 and C_6 dropped slowly as the population size increased. The effect, however, was small – when the population was the 500 largest companies, C_4 was 82.58% and C_6 was 94.48% and when the population was 1,400 largest companies, C_4 was 79.36% and C_6 was 91.90%. As expected, the reduction was much larger when the number of audits was used as the size measure. On this basis, when the population was the 500 largest companies, C_4 was 73.20% and C_6 was 88.90%, compared to that of 59.71% and 74.96% when the

Table 6

Auditor Specialisation – Market Share of Fee Income by Sector

Industry	No. of Companies	No. of Auditors	Total Fees £'000	Market Share (Audit Fees) ≥10% <20%	≥20% <30%	≥30%	Market Share (Number of Audits) ≥10% <20%	≥20% <30%	≥30%
Extractive Industries	11	6	4,592	KPMG	–	CL	CL, KPMG, PW	GT	–
Oil, Integrated	2	1	10,600	–	–	EY	–	–	EY
Oil Exploration & Production	21	7	2,224	TR	–	EY, KPMG	–	EY	KPMG
Building & Construction	70	24	10,026	CL, TR	–	KPMG	CL, PW	KPMG	–
Building Materials & Merchants	64	17	22,144	EY, KPMG	CL	PW	CL, EY, PW	KPMG	–
Chemicals	32	6	14,813	AA, CL	PW	KPMG	EY	PW	KPMG
Diversified Industrials	26	9	29,198	CL, KPMG	–	EY	EY, KPMG, PW, TR	CL	–
Electronic & Electrical Equipment	75	20	17,454	AA, CL, EY	–	TR	AA, EY, KPMG, TR	–	–
Engineering	132	25	39,707	PW, CL	–	KPMG	CL, EY, PW	–	KPMG
Engineering, Vehicle	22	10	8,069	AA	CL, KPMG, EY	–	AA, EY	KPMG	–
Paper, Packaging & Printing	43	10	11,527	–	CL, EY, KPMG	–	CL, EY, PW, TR	KPMG	–
Textiles & Apparel	62	20	8,284	EY	TR	PW	EY, KPMG	PW	–
Breweries	24	10	3,319	–	–	EY	GT	EY, PW	–
Spirits, Wines & Ciders	9	5	7,203	–	–	KPMG, PW	BH	CL, GT, KPMG, PW	–
Food Producers	45	17	22,350	AA, EY, KPMG	–	CL	CL, EY, KPMG, PW	–	–
Household Goods	33	12	4,609	CL, KPMG, TR	–	PW	AA, CL, PW	KPMG	–
Health Care	39	12	5,143	CL, KPMG	–	EY	EY, PW	CL, KPMG	–
Pharmaceuticals	13	7	7,796	–	CL, PW	KPMG	CL, PW	EY, KPMG	–
Tobacco	1	1	6,000	–	–	CL	–	–	CL
Distributors	76	15	11,073	KPMG	–	CL	CL, EY, KPMG, PW, TR	–	–
Leisure & Hotels	62	14	13,397	CL, KPMG, PW	–	EY	CL, KPMG, PW, SH, TR	–	–
Media	73	19	20,975	AA, EY, KPMG, PW	CL	–	AA, CL, PW, TR	KPMG	–
Retailers, Food	20	10	2,409	PW	CL, EY, KPMG	–	PW	EY	KPMG
Retailers, General	66	15	11,922	PW, TR	KPMG	CL	CL, KPMG, PW	–	–
Support Services	93	25	13,596	–	CL, PW, TR	–	CL, EY, PW, TR	–	–
Transport	28	12	6,397	–	PW	EY	KPMG, PW	–	EY
Other Services & Business	24	13	2,961	KPMG	–	AA	EY, TR	KPMG	–
Electricity	17	6	3,266	EY, TR	KPMG	CL	EY, KPMG, PW, TR	CL	–
Gas Distribution	1	1	1,500	–	–	PW	–	–	PW
Telecommunications	7	5	5,192	BT	–	CL, KPMG	BT, TR	KPMG	CL
Water	17	8	3,526	–	–	CL, PW	AA, SC	PW, CL	–
Banks, Retail	5	4	16,114	CL	PW	KPMG	–	CL, EY, PW	KPMG
Banks, Merchant	5	2	2,551	–	–	CL	–	TR	CL
Insurance	20	8	18,225	KPMG, PW	–	CL	KPMG, NR, PW	TR, CL	–
Life Assurance	4	3	3,393	–	–	PW	–	CK, KPMG	PW
Other Financial	44	19	7,020	AA	CL, MR	–	EY, KPMG	CL	–
Property	115	30	7,880	–	CL, TR	KPMG	CL, TR	KPMG	–

Note:
BH: Binder Hamlyn; BT: Baker Tilly; CK: Clement Keys; GT: Grant Thornton; MR: Moores Rowland; NR: Neville Russell; SC: Saffery Champness; SH: BDO Stoy Hayward.

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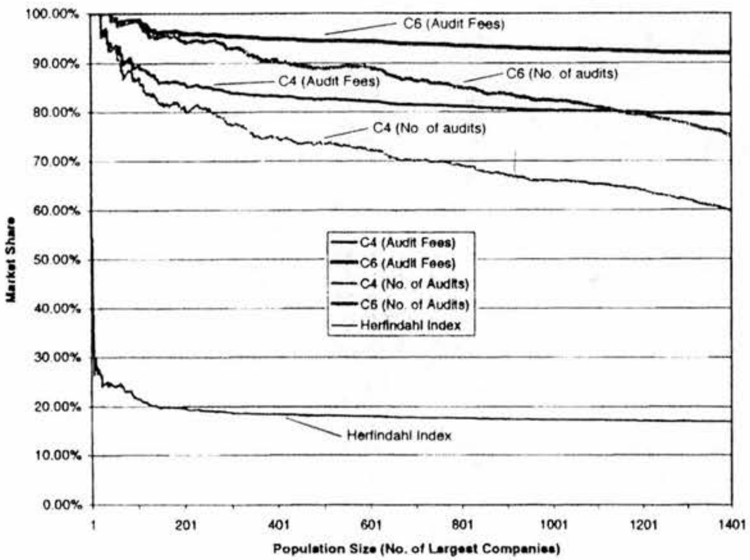
Figure 1

Effects of Population Size, Size Measure and Concentration Index



population was the 1,400 largest companies. These results suggest that when audit fee was used as the size measure, a population of the largest 500 companies produces a concentration ratio which would be a reasonable estimate of that for all listed companies.

The results are due to the fact that large companies tend to appoint a Big Six and also pay higher audit fees. Consequently, when the sample size increases, C_4 or C_6 should decrease because smaller companies are more likely to appoint a non Big Six firm. This effect would be modified somewhat when fees rather than number of audits were used as a basis for the concentration ratios as smaller companies typically pay smaller audit fees. Since larger audits will always comprise a greater proportion of the total population of fees, a fees based measure will show greater consistency between sample sizes than a measure based on the number of audits.

To investigate the effect of company size on auditor concentration, the sample was ranked according to size and

Table 7

1995 Auditor Concentration per 100 Companies

	Big Six		
	Number %	*Fees* %	*Difference* %
0–100	98.50	98.77	0.27
101–200	90.50	88.14	−2.36
201–300	90.00	91.61	1.66
301–400	84.00	89.00	5.00
401–500	81.50	85.12	3.62
501–600	89.50	92.34	2.84
601–700	68.00	76.59	8.59
701–800	76.00	80.01	4.01
801–900	72.50	77.63	5.13
901–1000	71.00	72.02	1.02
1001–1100	66.50	72.95	6.45
1101–1200	63.00	65.75	2.75
1201–1300	55.50	60.59	5.09
1301–1401	39.11	46.49	7.38

was divided into 14 groups. Each of the first 13 groups had 100 companies and the 14th group had 101 companies. For each of the 14 groups, market share by the Big Six ($C_{Big\ Six}$), based on either number of audits or audit fees, was calculated. By stratifying the sample on companies of comparable size, Table 7 confirms that $C_{Big\ Six}$ based on number of audits was similar to $C_{Big\ Six}$ based on audit fees. On average, $C_{Big\ Six}$ based on audit fees was about 4% higher than $C_{Big\ Six}$ based on number of audits. This finding is consistent with the proposition that, given the size and complexity of a company, a Big Six auditor would charge the company higher audit fees than those charged by smaller audit firms. As expected, the auditor concentration of the first group, which consisted of the largest 100 companies, was very high. The $C_{Big\ Six}$ was about 98% based on either audit fees or number of audits. $C_{Big\ Six}$ for each of the next five groups of 100 companies were also high, varying from 81% to 90% based on number of audits and from 85% to 92% based on audit fees. The next five groups showed a slightly smaller $C_{Big\ Six}$ while the last three groups, comprising the smallest 301 companies, had a significant decrease in $C_{Big\ Six}$ varying from 39% to 66%.

(b) Size measure

Figure 1 shows the difference in concentration ratios when different size measures were used. When the population was the 500 largest companies and the size measure was audit fees, C_4 was 82.58%. This percentage remained fairly stable as the population of companies increased. For the same population size but using the number of audits as the size measure, C_4 was 73.20%, a difference of about 9%. However, when the population was increased to include the 1,400 largest companies, C_4 was 79.36% based on audit fees and 59.67% based on number of audits, a difference of 20%. These results suggest that when interpreting concentration ratios it is necessary to take into account the size measure used.

(c) Concentration indices

Using audit fees as size measure, the Herfindahl index increased slightly from 15.92% in 1991 to 16.97% in 1995. As a basis for assessment, a Herfindahl value of 16.67% is equivalent to having a market composed of only six firms of equal size. Moizer and Turley (1989) noted that the Herfindahl index for FT500 was 9.6% in 1982. The marked increase in the value of the index from 1982 to 1991 was due to mergers between the Big Eight firms. Figure 1 shows the effects of the company population size on the computation of the Herfindahl index. When the population size rose above 300, the index became fairly steady.

5. CONCLUSION

This study has examined the issue of auditor concentration in the UK during the period from 1991 to 1995. Based on 1,401 companies (fully listed and USM companies excluding investment trusts) in 1995, it demonstrates that the audit market was dominated by the four largest firms, namely, CL, KPMG, PW and EY. These four firms held 60% of the total number of audits and collectively earned 79% of the total audit fees. Two other auditors AA and TR had smaller but significant market shares while the remainder of audit firms in the market were relatively small. These results suggest that the audit market was oligopolistic. The study also reveals that there was only a

relatively small increase in concentration (5% when measured by number of audits and 3% when measured by audit fees) and this represents a marked slowdown in the rate of increase in concentration observed in prior years in the UK. This change was because there were no mergers between large audit firms in the period of study. Thus, companies switching from small audit firms to the Big Six and newly listed companies choosing a Big Six auditor accounted for the increased concentration occurring from 1991 to 1995.

At a sectoral level, the Big Six had complete dominance over five industry sectors and a highly dominant position in 29 others. The results do indicate that in many of the industry sectors, auditor choice may well be effectively restricted. However, it can be argued that although auditor concentration was high at an industry level, there was still competition among audit firms, firstly because switching between the Big Six firms represented 28% of the total auditor change during the five year period and secondly, because in 21 out of the 36 industries used in this study, choice of auditors existed to the extent that there were 10 or more auditors active in the sector.

The analysis undertaken also examined the effects of population size, size measure and concentration indices on the results of concentration studies. There was evidence that the Big Six had relatively more audits of larger companies. For example, they had 98% of the audits of the top 100 companies, 87% of the next largest 500 companies, 71% of the next largest 500 companies and only 53% of the smallest 301 companies. This confirmed the general belief that large companies tend to appoint a Big Six auditor. The study shows that the basis of measuring concentration can affect results. Where the basis is audit fees, they are not sensitive to population size. In contrast, when the number of audits is the basis of measurement, population size does significantly affect the concentration measure. Finally, both C_n and Herfindahl concentration indices gave consistent results on auditor concentration.

NOTES

1 Concentration in an industry refers to the extent to which economic activity is controlled by large firms.

2 The Institute of Chartered Accountants in England and Wales, The Institute of Chartered Accountants in Ireland and The Institute of Chartered Accountants of Scotland.
3 See Chakravarty (1995, chapter 1).
4 According to the company guide, information was compiled from prime sources and drawn mainly from the company's own reports and accounts, and each entry was submitted for verification to the company concerned prior to publication.
5 Such problem would occur, for example, when a company had year end date of 31st December and had an auditor change during the year. The Hambro Company Guide would only give auditor information as at November of that year and thus, would not have the new auditor information.
6 This was because Datastream did not have information of all the dead companies. This might understate the actual numbers of newly listed and delisted companies during the five year period.
7 Only part of BDO Binder Hamlyn merged with Stoy Hayward to form BDO Stoy Hayward. The remaining practice, continued as Binder Hamlyn, subsequently merged with Arthur Andersen.
8 (29 + 13.5 + 25 + 21) / 214.5.
9 145 / (146 + 205), based on Table 7 of Beattie and Fearnley (1994).
10 (12 + 3.5 + 7.5 + 5) / 214.5.
11 27 / (146 + 205), based on Table 7 of Beattie and Fearnley (1994).
12 (18.5 + 10 + 22 + 16) / 214.5.
13 124 / (146 + 205), based on Table 7 of Beattie and Fearnley (1994).
14 They determined auditor specialisation according to a threshold of 10% of market share based on either the number of clients in the industry or the percentage of total fees in the industry. However, they noted that the 10% market share threshold was arbitrary and when the threshold was changed to 20%, no statistically significant specialist premium was found.
15 The merged firm would become audit specialists in the sectors of building construction, chemicals, diversified industrials, engineering, food retailers, health care, media, paper, packaging and printing, pharmaceuticals, retail banks and support services.

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