ANTICOMPETITIVE BEHAVIOUR IN THE AUDIT SERVICES MARKET BY THE BIG AUDIT FIRMS: EVIDENCE OVER TIME

Harjinder Singh*

Abstract

This study investigates the existence of anticompetitive behaviour and cartel pricing by the Big4 international providers of auditing services (resulting from the halving in the number of such providers from the Big8 to Big4).This study uses both a composite and dis-aggregated measure for auditor attributes (namely, auditor reputation, industry specialisation, provision of non-audit services and auditor tenure) and regresses the derived measure against changes in audit fees for the periods 2001 to 2003, 2003 to 2005 and 2001 to 2005 for a total sample of 600 firm-year observations.Main results from longitudinal multivariate analysis indicate that there is no significant association between the four auditor attributes utilised in this study with changes in audit fees over the observation window. This study finds no evidence of anti-competitive behaviour and cartel pricing by Big4 auditors resulting from increased audit market concentration. This has implications in relation to the need to consider legislation to reduce the power and influence of the Big4 audit firms and this subsequently has flow-on implications for the management of firms.

Keywords: Audit Fees, Auditor Attributes, Anticompetitive Behavior and Big4

** Curtin University, GPO Box U1987, Bentley 6845, Perth, Western Australia*
Tel: +61 (08) 9266 7904
Fax: + 61 (08) 9266 7196
E-mail: h.singh@curtin.edu.au

1. Introduction

The significant reduction in the number of international providers of auditing services (that is, the *Big8* to *Big6* to *Big5* to *Big4*)[1] since 1989 has important implications for the competitiveness of auditing services and on the quantum of audit fees[2] charged by auditors (Hamilton et al., 2008). The halving of audit services providers since 1989 has raised serious questions about whether audit markets remain competitive or if there is anticompetitive behavior and, therefore, cartel pricing by the *Big4* auditors (Hamilton et al., 2008, Simon, 1995). Increased audit market concentration, globally and in Australia, together with the *Big4* auditors' focus in servicing large clients, therefore, raises concerns of a lessening of competition in the audit marketplace (Chan & Li, 2008, Hamilton et al., 2008).

In the early years of the new millennium, a number of major accounting frauds generating huge media attention erupted around the world (for example, Enron and WorldCom in the United States of America (USA), Parlamat in Europe and HIH in Australia). In the wake of the high profile scandals, regulatory changes were made worldwide to improve the quality of corporate governance practices (Joint Committee on Public Accounts and Audit, 2002, National Association of Corporate Directors, 1996, Securities and Exchange Commission, 2000). The USA's General Accounting Office (*GAO*) characterizes international audit providers (namely *Big4* auditors) as an oligopoly consisting of a few businesses with significant risks of becoming even more concentrated (Koehn & Del Vecchio, 2004). Furthermore, the *GAO* believes that since none of the *Big4* has expertise in every industry, some market segments are actually dominated by just one or two of the *Big4* firms. Audit fees reported by the *Big4* have

[1] Initially the *Big8* accounting firms were: Arthur Andersen & Co.; Arthur Young & Co.; Coopers & Lybrand; Deloitte Haskins & Sells; Ernst & Winney; Peat Marwick Mitchell; Price Waterhouse; and Touche Ross. Subsequent to two major mergers in 1989, the *Big8* firms were reduced to the *Big6*. This resulted from the merger between Ernst & Winney and Arthur Young & Co. to become Ernst & Young and Deloitte Haskins & Sells with Touche Ross to become Deloitte Touche Ross. As a result of another merger in 1998 between Coopers & Lybrand and Price Waterhouse to form PriceWaterhouseCoopers, the *Big6* was reduced to the *Big5*. Finally, the dissolution of Arthur Andersen & Co. in 2002 as a result of the Enron aftermath reduced the *Big5* to the *Big4*.

[2] The term audit fee/s is used in this study to refer only to the external audit fee paid by firms to the firm's external auditor for the provision of external attestation services. All non-audit fees, therefore, are excluded when the term 'audit fee' is used in this study.

increased from 25% to 33% in the USA as a result of the *Big4* assisting clients with complying with *SOX 2002* requirements. In addition, there are ominous indications that audit fees will continue to rise in the short-term (Koehn & Del Vecchio, 2004).[3] The increase in the domination by the *Big4*, therefore, potentially has an adverse flow-on effect on the nature of the audit market and the quantum of audit fees in Australia.

Contractual relationships between an auditor and an auditee are generally of a medium to long term nature rather than a single year. Thus, auditor attributes may influence changes in audit fees across time thus making longitudinal empirical analysis useful when examining the relationship between auditor attributes and audit fees.[4] The influence of auditor attributes, therefore, provides additional intrigue to the topic of audit fees since the auditor charges the quantum of the audit fee. The high profile corporate scandals of early 2000, combined with the demise of Arthur Andersen, have renewed interest in the relationship between auditor attributes and audit fees (Abbott et al., 2003, Beatty, 1993, Becker et al., 1998, Krishnan, 2003, Palmrose, 1986a, Zhou & Elder, 2002). Despite the development of a wealth of knowledge on the determinants of audit fees, greater understanding is still needed because regulators and corporate governance reformists around the world continually seek to make adjustments/changes to regulations surrounding the auditing environment in an effort to ensure that corporate failures are minimized. Examining the influence of auditor attributes on changes in audit fees across time can provide valuable insights into the long-term impact of regulations governing auditors. The identification of audit fee determinants in the past literature has generally been of a cross-sectional nature or spanning a two to three-year examination period (Carcello et al., 2002, Felix et al., 2001, Karim & Moizer, 1996, Naser & Nuseibeh, 2007, Sankaraguruswamy & Whisenant, 2003, Thinggaard & Kiertzner, 2008). To the best knowledge of the researchers, empirical literature published to date into audit fee modeling has as yet not adopted a five-year or more time-series analysis nor utilised a comprehensive range of auditor attributes in examining audit fees

Since Simunic's (1980) seminal study, a common methodology has developed for identifying the determinants of audit fees. A regression estimation model is normally derived (on a cross-sectional basis) by regressing audit fees against a number of measures (both within and outside a firm) hypothesized to relate in some way to audit fees (for example, Chan et al., 1993, Ettredge & Greenberg, 1990, Gonthier-Besacier & Schatt, 2007, Hay et al., 2006, Ho & Ng, 1996, Karim & Moizer, 1996, Naser & Nuseibeh, 2007, Taffler & Ramalingam, 1982, Ward et al., 1994). If the coefficients on the independent variables are significant, the hypothesized relationships are deemed to exist. Simunic's (1980) approach has resulted in the population of explanatory variables explaining audit fees growing significantly in the subsequent literature.

There are, however, gaps in the literature in relation to examining auditor attributes from a composite perspective and using a longitudinal time horizon. An important gap with unanswered questions, relates to the existence of anticompetitive behavior and, therefore, cartel pricing by the remaining *Big4* audit firms. The public debate on the matter of auditor concentration and the possibility of cartel pricing and anticompetitive behavior in Australia by the *Big4* has resulted in the Australian Competition and Consumer Commission (*ACCC*) examining the issue and agreeing that the international accounting firms mergers raises concerns for competition in the Australian audit market (ACCC 1999). The national concern about reduced audit competition, therefore, makes this study and its results important.

A study encompassing the Australian audit and business environment using a longitudinal focus is also of significance. Specifically, new corporate governance regulations introduced in Australia following the implementation of *CLERP 9* pertaining to auditors may have considerable influence on audit fees. A feature of this study is that this study will provide insights into whether changes to regulations governing auditors under *CLERP 9* influenced auditor attribute/audit fee insights. Such insights will aid in determining what impact future changes to corporate governance regulations in Australia may have on auditors, auditees and audit fees. Apart from examining audit fees on a cross-sectional basis, the prior empirical literature has evaluated auditor attributes only in isolation (that is, individually). There is also no published research which has evaluated important auditor attributes on an aggregate basis (and across time). The aggregated/holistic basis adopted by this study will, therefore, evaluate (four)

[3] Audit fees are expected to continue to rise post-2005 as a result of ongoing assistance to firms (by the *Big4*) in complying with post - *SOX 2002* regulations and, to a lesser extent, as a result of the oligopolistic nature of the *Big4* (which is partially the subject of interest of this study).

[4] For example, auditor tenure is cited as a prominent auditor attribute that may influence audit fees (Beck et al., 1998a, DeBerg et al., 1991, DeFond & Subramanyam, 1998, Simon & Francis, 1988). It is generally maintained that the longer an auditor services an auditee, the resulting familiarity by the auditor with the auditee's operations and accounting system will increase prompting a reduction in audit fees (Beck et al., 1998a, DeFond & Subramanyam, 1998, Simon & Francis, 1988). If an auditor deems that extended tenure is detrimental to their (the auditor's) interests, auditors may strategically seek short appointments. Similarly, if the auditee is continuously switching auditors and/or renegotiating engagements on an on-going basis, audit fees may remain persistently high.

important auditor attributes simultaneously across a five-year observation window when examining the impact on audit fees.

Overall, the primary objective of this study is to provide a comprehensive analysis of the association between four pivotal auditor attributes (that is, auditor reputation, industry specialization, provision of non-audit services (that is, independence) and auditor tenure) and changes in audit fees paid by Australian publicly listed firms. Though studies of auditor attributes and audit fees are not unique, prior research usually focus on auditor attributes in isolation (Choi et al., 2005, Craswell et al., 1995, Davis et al., 1993, Francis, 1984, Simon & Francis, 1988). The novelty of this study is it considers the influence of key auditor attributes in unison, and the association, if any, with changes in audit fees. Specifically, this study will investigate the influence of four pivotal auditor attributes in aggregate (and on a dis-aggregate basis) with changes in audit fees. This objective is original as prior auditor attribute/audit fee research concentrates on associations within a single time period without considering changes in audit fees across time. The longitudinal aspect is important because changes in auditor attributes and the associated impact on audit fees, if any, provides important evidence on the extent to which auditor attributes truly impact on changes in audit fees and on the long-term impact on regulations governing the conduct of audits.[5] This study's main research question, therefore, is ascertain if auditor attributes are associated with changes in audit fees paid by Australian publicly listed firms.

Examining changes in audit fees for the periods 2001 to 2003, 2003 to 2005 and 2001 to 2005 for 200 firms per year, findings from this study conclusively indicate that changes in audit fee is not driven by supply-side features of an audit engagement (that is, auditor attributes) but rather is determined by demand-side features such as auditee size, complexity and risk. Given that results indicate that changes in audit fees are not determined by supply-side features, this study finds no evidence to suggest the existence of cartel pricing and anticompetitive conduct by *Big4* auditors.

The remainder of this study is organized as follows: Section Two provides the background and hypotheses to this study and Section Three details the research methodology. Section Four outlines the descriptive and univariate statistics whilst Section Five reports both main results and robustness tests. Finally, Section Six concludes with the results from this study.

[5] In addition, Australia is also an ideal environment to undertake this study as there has been no research undertaken examining a composite score representing auditor attributes (nor on a longitudinal basis) and the impact on audit fees.

2.1 Background and Hypotheses Development

An auditor in Australia undertakes his duties and responsibilities within the confines of rules and regulations.[6] The *Australian Corporations Act 2001* (*Corporations Act*) establishes the accountability process in which the directors of a firm are held responsible for the preparation and presentation of financial reports, with an independent audit function appointed by shareholders reporting on the prepared financial reports (Gay & Simnett, 2007). Australian firms are also regulated pursuant to the *Corporations Act.* Other relevant rules and regulations include the *ASX* Corporate Governance Council's *Principles of Good Corporate Governance and Best Practice Recommendations* (*ASX CGC 2003*), accounting standards which have the force of law and the Australian government's *CLERP* and the Australian Securities (*ASX*) Exchange Listing Rules.

Much of the research in audit fee markets (Felix et al., 2001, Hay et al., 2006) has followed the seminal work by Simunic (1980) and investigated a number of firm and auditor attributes associated with audit fee variation such as firm size, firm complexity, firm risk, audit firm and audit engagement characteristics. Such attributes have consistently be found to influence audit fees across various studies, sample sizes and countries (Hay et al., 2006). This study adopts a similar approach, using a number of attributes to proxy for audit work undertaken by the auditor. Given the gaps in the literature in relation to examining auditor attributes from a composite perspective and using a longitudinal time horizon, the results from this study will provide answers to important unanswered questions about the existence of anticompetitive behavior and, therefore, cartel pricing by the *Big4* audit firms. This study investigates both the existence and extent of competitive audit pricing in the Australian audit services market during a five-year time frame to determine if there is any evidence of cartel pricing and, therefore, anticompetitive behavior by the *Big4* during this period. Since increased supplier concentration by itself is not sufficient evidence of cartel pricing and, therefore, anticompetitive behavior,

[6] The audit function provides independent assurance to a reader on the integrity and fairness of a firm's presented financial information (Becker et al., 1998, Casterella et al., 2004, Collier & Gregory, 1996, Simunic, 1980, Simunic, 1984). The audit function is squarely premised on agency theory (that is, when one or more principals engage others as agents to perform a service on behalf of the principals, a principal-agent relationship arises) (Jensen & Meckling, 1976). As a result of the reservations about the reliability of information produced by agents, principals require mechanisms (an external audit is one important example) to reduce potential conflicts and align the interests of agents with their (principal's) own interests.

this study will adopt (initially) Simunic's (1980) seminal audit pricing model to investigate audit market competition. Apart from examining audit fees only on a cross-sectional basis, the prior empirical literature has evaluated auditor attributes only in isolation (that is, individually) and there is also no published research which has evaluated important auditor attributes on an aggregate basis (and across time). The aggregated/holistic basis adopted by this study will, therefore, evaluate (four) important auditor attributes simultaneously across a five-year observation window when examining the impact on audit fees.

2.2 Key Auditor Attributes and Impact on Audit Fees

This study examines the influence of four pivotal auditor attributes on changes in the audit fees. The four attributes of interest are: (1) audit quality (as defined by *Big4* versus non-*Big4* status); (2) auditor industry specialization; (3) independence (as defined by the provision of non-audit services); and (4) auditor tenure. The four auditor attributes were selected as the attributes are frequently cited in the extant literature as having a significant influence on audit fees (Abbott & Parker, 2001, Beatty, 1989, Beck et al., 1998b, Carcello & Nagy, 2004, Craswell et al., 1995, DeAngelo, 1981, Hoitash et al., 2007). Hypotheses related to the four auditor attributes are individually developed in the following sub-sections.

2.2.1 Audit quality: Big Firm auditor

Higher audit fees are expected when an auditor is recognized to be of a superior quality. The literature postulates that a Big Firm auditor brings a higher level of quality (in the form of better audit planning, risk assessment, formulation of audit procedures, collection of audit evidence, audit reporting, reduction of mistakes) to the audit engagement and, therefore, will charge a higher audit fee as a result of this quality/product differentiation. Generally, researchers have used a dummy variable for auditing firms classified as being either a *Big8/6/5/4* as a proxy for superior audit quality (Simon, 1995, Simunic, 1980). The empirical literature has generally produced mixed results on whether a Big Firm auditor does charge a higher audit fee as a result of the higher level of quality from the Big Firm auditor. Simunic (1980) was the first researcher to investigate and confirm that the existence of a Big Firm auditor increases audit fees. Research post-Simunic (1980) has almost always used a Big Firm variable to either assess or control for audit fee variation. A significant portion of the literature suggests that the existence of Big Firm auditors does have a significantly positive relationship with audit fees (Chan et al., 1993, Choi et al., 2005, Francis, 1984, Francis & Stokes, 1986, Johnson et al., 1995, Karim & Moizer, 1996, Palmrose, 1986a). However, a number of studies have also indicated no significant relationship between a Big Firm auditor and the quantum of audit fees paid by firms (Al-Harshani, 2008, Hoitash et al., 2007). The absence of a statistically significant relationship between the existence of a Big Firm auditor and audit fees suggests that the Big Firm auditor may be selected not on the basis of quality differentiation (to non-Big Firm auditors) but perhaps due to economic bonding (Hoitash et al., 2007), market pressures (Chaney et al., 2004) or the desire by a firm to signal the firm's quality to the market. Given the overwhelming support in the prior literature for the association between a Big Firm auditor and audit fees paid by a firm, the following hypothesis is proposed to test the extent of the association between a *Big4* auditor and variation in audit fees:

H_1:An auditee engaging a Big4 auditor will have higher changes in audit fees paid across time than an auditee engaging a non-Big4 auditor.

2.2.2 Auditor industry: Specialization

Auditors with industry specializations and who make investments in developing a reputation for performing quality audits in particular industries are especially concerned about preserving reputational capital and avoiding reputational damage through litigation exposure (Lim & Tan, 2008). Similarly, at the audit firm level, audit firms that make strategic choices and invest organizational resources in developing intellectual capital in particular industries, have greater concerns about reputation preservation. These audit firms, therefore, less likely to submit to client pressures (Lim & Tan, 2008). Consistent with this argument, prior research has shown that industry-specialist auditors are much more likely to: (a) comply with auditing standards (O'Keefe et al., 1994); (b) have clients that are less likely to be associated with regulatory enforcement actions (Carcello & Nagy, 2004); and (c) have clients with lower discretionary accruals (Balsam et al., 2003, Krishnan, 2003). Prior literature has also shown that auditors with industry specializations have superior knowledge and performance relative to non-specialists (Owhoso et al., 2002, Solomon et al., 1999). The literature clearly suggests that industry-specialist auditors (versus non-industry specialist auditors) have the background knowledge to more effectively perform the audit of a client from a specialized industry and, thereby, increase audit quality. As a result of this investment in time, resources and knowledge by auditors, the auditors are more likely to seek compensation from an auditee in the form of higher audit fees. The following hypothesis, therefore, is proposed to test the extent of the association between an industry specialist auditor and variation in audit fees:

H_2:An auditee engaging an industry specialist auditor will have higher changes in audit fees across

time than an auditee engaging a non-industry specialist auditor.

2.2.3 Independence: Non-audit services

Non-audit services provided by the external auditor can result in an increase in audit fees due to two reasons. First, such services may lead to changes within an auditee which will then require additional auditing by the incumbent auditor (Davis et al., 1993). Second, the auditee may have no choice but to pay a higher audit fee as a result of becoming economically dependent on such non-audit services by the auditor (Palmrose, 1986b). On the other hand, it has been argued that the provision of non-audit services can lead to lower audit fees as a result of cross- of fees (or synergies) between audit and non-audit services (Simunic, 1984). Palmrose (1986b) was the first researcher to provide evidence of a positive relationship between fees for audit services and fees for three other categories of non-audit services (that is, accounting-related MAS, non-accounting MAS and taxation). The positive relationship between audit fees and non-audit fees rested on the premise of joint-supply benefits where the firm perceived (rightly or not) that the firm was better off with the joint supply of audit and non-audit services. Subsequent research examining the audit fees and non-audit fees relationship also found similar support for the joint-supply theory (Dunmore & Shao, 2006, Felix et al., 2001, Hoitash et al., 2007, Lee et al., 2003). Also, Simunic (1984) provided evidence that a firm which employed the same external auditor in the provision of both external audit and non-audit services paid a significantly lower audit fee to the auditor. He (Simunic 1984) suggests that the provision of auditing and non-auditing services to an auditee may result in knowledge advantages/spillovers that allow cost savings to be passed on to the auditee in the form a lower audit fee. However, given the proclivity in the prior literature toward a positive relationship between non-audit services and audit fees, the following hypothesis is proposed to test the extent of the association between non-audit fees and variation in audit fees:

H_3:An auditee paying higher non-audit fees to the auditor across time will also have higher changes in audit fees than an auditee paying lower non-audit service fees to the incumbent auditor across time.

2.2.4 Auditor tenure

The length of the relationship between the external auditor and auditee is thought to have an impact on the quantum of audit fees charged by the auditor. Auditors who have longer ties with auditees will, in all likelihood, have greater familiarity with the auditee, the auditee's accounting systems, financial records and related internal controls. Given that this familiarity reduces auditee complexity and audit risk, the auditor requires less effort annually to understand the auditee's operations and this, in turn, may translate to a lower audit fee. However, auditees with longer ties to auditors may, instead, pay higher audit fees due to the economic bonding argument suggested by Palmrose (1986b) or, as a result of the increasing familiarity with the external auditor, choose not to change auditors. Simunic (1980) believed that the greater the length of relationship between the auditor and auditee, the greater the knowledge and understanding the auditor would have of the firm's operations and accounting system. He (Simunic 1984) believed that this translated into less audit work and, therefore, audit fee. Surprisingly, Simunic's (1980) results indicated that there was no significant relationship in auditor tenure explaining variation of audit fees. One possible reason for this (suggested by Simunic (1980)) may be that the auditor may not be passing 'cost-savings' derived from the reduced audit work to the auditee. Subsequent studies examining auditor tenure (in terms of length of years, new auditor or change of auditor) have produced mixed results. A number of studies show no real significant association between auditor tenure and audit fees (Antle et al., 2006, Johnson et al., 1995) but a greater number of studies have shown a positive relationship between auditor tenure and audit fees (Felix et al., 2001, Ghosh & Moon, 2005, Hoitash et al., 2007). Given that the prior empirical literature principally supports a positive relationship between auditor tenure and audit fees, the following hypothesis is proposed to test the extent of the association between auditor tenure and variation in audit fees:

H_4:An auditee engaging an auditor with a longer tenure period will have higher changes in audit fees across time than an auditee engaging an auditor with a shorter tenure period.

3.1 Research Methodology

The initial sample comprises all Australian publicly listed firms registered on the *ASX* continuously across the observation window of 2001, 2003 and 2005 calendar years. Consistent with prior empirical research, financial institutions, banks and stock brokerages are excluded.[7] Firms that are not continuously listed across 2001, 2003 and 2005 on *ASX* are also excluded in order to avoid undue influences of unexpected rise in share price. In addition, consistent with Clifford and Evans (1997), unit trusts and foreign firms domiciled outside Australia were excluded because their (unit trusts and foreign firms domiciled outside Australia) financial statements are not always prepared in accordance with the normal disclosure requirements for other firms listed on the *ASX*. From this initial pool, 100 firms are selected from the top firms (by market capitalization) on the *ASX* as at reporting dates in 2001. Since one of

[7] This is consistent with Simunic (1980).

the major drivers of firm performance is the need to maximize shareholder value (Gewald & Gellrich, 2007, Lee, 1979), this measure is best reflected by the market capitalization of a firm. Admittedly, the use of market capitalization as a criterion to select a sample has limitations in terms of generalizability. To overcome this limitation and to increase the generalisability of this study, a further 100 firms (per year) will be selected using a stratified-random approach.[8] Each calendar year (that is, 1 January to 31 December) within the observation period is considered an individual firm-year for firms included in the sample. Data is collected for each firm selected from each firm-year covered in this study. The resulting sample will provide approximately 600 firm-year observations for use as data points in the subsequent testing.

Data for this study are obtained from archival data in the form of listed firm annual reports.[9] Listed firms were selected since listed entities provide readily available information in an appropriate useable form. Australian Accounting Standards Board 101 (specifically, paragraphs 126.1 and 126.2) requires a detailed breakdown of all fees charged by a firm's auditor in Australia.[10] The *Annual Reports Collection* (Connect 4 Pty Ltd) was used to collect the data to construct all the measures for the variables used in this study. As a key component of this study is a longitudinal analysis, the time period for observation will be the 2001, 2003 and 2005 calendar years. This time frame is selected as the time frame will transcend key periods in the financial accounting and corporate governance landscape in Australia such as the adoption of International Financial Reporting Standards (*IFRS*), implementation of *CLERP 9* recommendations and the *ASX CGC's* 2003 recommendations. The time-frame is also selected to collect the timeliest information available. However, in order to avoid the volatility in the market arising from the credit-crunch in 2007 to 2009 (which had emerged by second quarter, 2007), the period 2007 to 2009 have been excluded from the time frame (Gamble, 2008). The time frame selected, therefore, will facilitate answering a number of this study's important research questions. Data for the dependent variable, audit fees (*AF*) will be obtained from the annual reports of firms sampled.[11] This variable will be deflated by auditee size (principally total assets ($ASSETS_{t-1}$)) to control for cross-sectional differences associated with larger firms paying higher audit fees purely due to firm size. Traditionally, in the audit fee modeling literature, data for audit fees normally requires transformation due to issues with linearity (Hair et al., 1995, Simunic, 1980). Ordinarily, a logarithm transformation is necessary to ensure a better linear fit and the subsequent Ordinary Least Squares (OLS) regression testing can then be undertaken with confidence. Alternatively, another way to ensure linearity is to deflate audit fees by auditee size so that any variation in audit fees as a result of auditor attributes is unlikely to be due to auditee-size effects.[12] The latter is the approach taken by this study.

3.2 Measurement of the Independent Variables

The independent variables of interest are a number of selected auditor attributes; namely auditor quality, industry specialization, independence and tenure). Data for the independent variables is gathered from the annual reports of 200 Australian publicly listed firms in Australia (as at the respective reporting dates) for the 2001, 2003 and 2005 calendar years.[13]

3.2.1 Auditor quality (BIG4)

Large international Big Firms normally receive a fee premium for services consistent with the existence of a quality-differentiated audit. A Big Firm auditor brings a higher level of quality to the engagement and, therefore, will charge a higher audit fee as a result of this quality/product differentiation. For auditor quality, the proxy *BIG4* is used in this study. In terms of measurement, therefore, an auditee *i* is scored one (1) if in time period *t* the engaged auditor is a *BIG4* auditor. Otherwise the auditee *i* in time period *t* is scored zero (0).

3.2.2 Auditor industry specialization (SPECIALIST)

Auditors with industry specializations have superior industry knowledge and, therefore, performance compared to non-industry specialist auditors and re-

[8] This will be done by industry in order to capture an appropriate cross-section of all the industries on the *ASX*. Additionally, the firms will be the same for each of the three years examined. This has adverse implications in relation to the independence of samples and this is discussed in Section 6.

[9] Archival data was selected due to: the inherent limitations of survey research (Baxter & Pragasam, 1999); the ready access of annual reports from a variety of electronic databases (that is, the use of data does not suffer from non-response bias); and objective measures for all the variables of interest in this study can be obtained from data in annual reports.

[10] This is consistent with the provisions of *CLERP*.

[11] Annual reports of firms are also viewed as a better source of data for audit fees since it is the source document prepared by the firm compared to other databases such as *Who Audits Australia?* database (Craswell et al., 1995).

[12] This approach is also supported by the prior literature (Frankel et al., 2002).

[13] Any issue in relation to the potential problem with how the annual report year-ends fits within each respective calendar years is overcome by the fact that alterative years of 2001, 2003 and 2005 are selected.

coup the superior performance in the form of higher audit fees from the auditee (Balsam et al., 2003, DeFond et al., 2000, Zhou & Elder, 2002). Auditee sales are used to estimate the industry market share of the auditors. Specifically, the sum of all sales for a particular auditor in each industry is totaled and constitutes the numerator. The denominator is the sales of all clients in all industries summed over all audit firms (this will include both *Big4* auditors and other audit firms auditing within the industry) (The operationalizing of SPECIALIST is consistent with (Lim & Tan, 2008). In order to estimate the industry market share in a given industry for a particular year in Australia, all nine main industries in the Standard & Poors July 2002 Global Industry Classification Standard will be utilized. Firms in the financial industry are excluded as explained in Section 3.1). Consistent with prior literature (Craswell et al., 1995, Lim & Tan, 2008), an auditor with a 20% market share of a given industry is defined as an industry specialist for that industry. Thus, for *SPECIALIST*, an auditee *i* in industry *k* is scored one (1) if in time period *t* an auditor defined as an industry specialist in industry *k* is engaged; otherwise auditee *i* is scored zero (0).

3.2.3 Non-audit fees (CNON-AUDIT)

In order to capture the extent of the economic bonding between the auditor and auditee, this study focuses on non-audit fees represented by a dichotomous variable titled *CNON-AUDIT*. Specifically, for *CNON-AUDIT* firm *i* is scored one (1) for time period *t* if the ratio of non-audit fees to total fees is less than 0.25 (Palmrose, 1986b). Otherwise, auditee *i* is scored zero (0).

3.2.4 Auditor tenure (CTENURE)

The auditor tenure variable is operationalised by reference to the length of time (in years) during which the current auditor has been the principal auditor for the auditee. For *CTENURE*, an auditee *i* in time period *t* is scored one (1) if the number of years the incumbent auditor *j* has been the principal auditor is three (3) or more years (Felix et al., 2001). Otherwise, auditee *i* is scored zero (0).

3.2.5 Composite auditor attributes (AA)

To determine the combined influence of the four key auditor attributes on changes in audit fees across time, a composite score based on the four proxy measures for auditor quality, industry specialization, provision of non-audit services and length of tenure is developed. This composite score is denoted *AA*. Thus, the *AA* score for auditee *i* in time period *t* is equal to $\sum$ ($BIG4_{it}$, $SPECIALIST_{it}$, $CNON\text{-}AUDIT_{it}$, and $CTENURE_{it}$). Additionally, audit fee models used in prior research have included a variety of variables to control for cross-sectional differences associated with firm size, firm complexity, firm risk et cetera (Boo & Sharma, 2008, Lee & Mande, 2005, Maher et al., 1992, Naser & Nuseibeh, 2007). The regression models used in the prior research have provided significant explanatory power and been robust across countries, industries and time periods and, therefore, have been used as a basis for selecting the control variables utilised in this study.

3.3 Statistical Tests and Models

This study uses OLS multiple regression to analyses the relationship between the selected auditor attributes and audit fees. The hypotheses of this study will be tested formally through this multivariate technique; specifically, by using a number longitudinal OLS regression models.

3.3.1 Regression model

Given that this study is longitudinal in nature, changes in audit fees over this study period will be investigated. The overall models to be used, therefore, are defined in *Equations 1* and *2* (For brevity, year indicator variables have not been included in Equation 3 (Lim & Tan, 2008)):

$$\Delta AF_{it}=\beta_0 + \beta_1 AA_{it} + \beta_2 SRSUBSID_{it} + \beta_3 LNNBS_{it} + \beta_4 ROA_{it} + \beta_5 CURRENT_{it} + \beta_6 PERNEXBD_{it} + \beta_7 BODMEET_{it} + \beta_8 FINEXPAC_{it} + \beta_9 INDUSTRY_{it} + \varepsilon_{it} \quad (1)$$

$$\Delta AF_{it}=\beta_0 + \beta_1 BIG4_{it} + \beta_2 SPECIALIST_{it} + \beta_3 CNON\text{-}AUDIT_{it} + \beta_4 CTENURE_{it} + \beta_5 SRSUBSID_{it} + \beta_6 LNNBS_{it} + \beta_7 ROA_{it} + \beta_8 CURRENT_{it} + \beta_9 PERNEXBD_{it} + \beta_{10} BODMEET_{it} + \beta_{11} FINEXPAC_{it} + \beta_{12} INDUSTRY_{it} + \varepsilon_{it} \quad (2)$$

Where:

ΔAF_{it} = Change in amount of audit fees paid by firm *i* at time period *t* deflated by opening total assets of auditee *i*; and

$BIG4_{it}$ = Auditee *i* in time period *t* is scored one (1) if the incumbent auditor *j* in time period *t* is a *Big4* audit firm; otherwise auditee *i* in time period *t* is scored zero (0).

$SPECIALIST_{it}$ = Auditee *i* in time period *t* is scored one (1) if the incumbent auditor *j* in time period *t* is an industry specialist in industry *k*; otherwise auditee *i* in time period *t*

		is scored zero (0).
$CNON\text{-}AUDIT_{it}$	=	Auditee *i* in time period *t* is scored one (1) if the ratio of non-audit fees to total fees paid to the incumbent auditor *j* in time period *t* is less than 0.25; otherwise auditee *i* in time period *t* is scored zero (0);
$CTENURE_{it}$	=	Auditee *i* in time period *t* is scored one (1) if number of years the incumbent auditor *j* till time period *t* has been engaged as the principal auditor is 3 years or more; otherwise auditee *i* in time period *t* is scored zero (0).
$SRSUBSID_{it}$	=	Square root of number of subsidiaries for firm *i* at time period *t*.
$LNNBS_{it}$	=	Natural log of 1 plus number of business segments for firm *i* at time period *t*.
ROA_{it}	=	Earnings before interest and tax divided by total assets for firm *i* at time period *t*.
$CURRENT_{it}$	=	Current assets divided by current liabilities for firm *i* at time period *t*.
$PERNEXBD_{it}$	=	The percentage of non-executive directors on the board of directors for firm *i* at time period *t*.
$BODMEET_{it}$	=	The number of board of directors meetings held during the year for firm *i* at time period *t*.
$FINEXPAC_{it}$	=	A dummy variable given the value of 1 if the audit committee consists of at least one financial expert during the year for firm *i* at time period *t*.
$INDUSTRY_{it}$	=	$ENERGY_{it}$ + $MATERIALS_{it}$ + $INDUSTRIALS_{it}$ + $CONSUMERDISC_{it}$ + $CONSUMERSTAP_{it}$ + $HEALTHCARE_{it}$ + $INFORMATION\ TECHNOLOGY_{it}$ + $TELECOMMUNICATIONS_{it}$ + $UTILITIES_{it}$
$ENERGY_{it}$	=	A dummy variable given the value of 1 if the company is in the energy industry and 0 if otherwise in 2001.
$MATERIALS_{it}$	=	A dummy variable given the value of 1 if the company is in the materials industry and 0 if otherwise in 2001.
$INDUSTRIALS_{it}$	=	A dummy variable given the value of 1 if the company is in the industrials industry and 0 if otherwise in 2001.
$CONSUMERDISC_{it}$	=	A dummy variable given the value of 1 if the company is in the consumer discretionary industry and 0 if otherwise in 2001.
$CONSUMERSTAP_{it}$	=	A dummy variable given the value of 1 if the company is in the consumer staples industry and 0 if otherwise in 2001.
$HEALTHCARE_{it}$	=	A dummy variable given the value of 1 if the company is in the health-care industry and 0 if otherwise in 2001.
$INFORMATION\ TECHNOLOGY_{it}$	=	A dummy variable given the value of 1 if the company is in the information technology industry and 0 if otherwise in 2001.
$TELECOMM\ UNICATIONS_{it}$	=	A dummy variable given the value of 1 if the company is in the telecommunications industry and 0 if otherwise in 2001.
$UTILITIES_{it}$	=	A dummy variable given the value of 1 if the company is in the utilities industry and 0 if otherwise in 2001.
β	=	Coefficients on variables 0 through 12.
ε_{it}	=	The error term.

4. Descriptive Statistics and Univariate Analysis

Table 1 Panel A outlines the sample selection process. The final usable sample for this study consists of 200 firms per calendar year for 2001, 2003 and 2005. Initially, 100 of the 200 firms selected in 2001 were chosen because the firms are listed at the top of the *ASX* based on market capitalization. The remaining 100 firms for 2001 are selected from the rest of the *ASX* randomly by industry.[14] When finalizing the initial sample of 200 firms for 2001, a number of exclusions are necessary in keeping with the established prior literature. From the resulting pool of 706 firms, 100 firms are selected based on market capitalization and the remaining 100 firms randomly selected on the basis of industry. For purposes of brevity and convenience of reference, the 100 firms selected based on market capitalization are referred to as the *ASX T100* sub-sample and the remaining 100 firms randomly selected based on industry are referred to as *ASX RI 100* sub-sample.

[14] After obtaining the final sample of 200 firms for 2001, the same firms are also selected for 2003 and 2005 resulting in a total final usable sample of 600 firms.

Table1. Sample Selection and Industry Breakdown

Panel A: Sample Selection		
Number of Firms Listed on the *ASX* as at 1 January, 2001		2 128
Exclusions:		
Financial Institutions	338	
Trusts and Investments	23	
Foreign Incorporated Firms	67	
Firms not Continuously Listed	994	(1 422)
Sample Pool for Random Selection		706
Firms by Market Capitalization	100	
Random Selection of Remaining Firms by Industry	100	
Final Useable Sample (2001)		200
Over observation window		*3
Total sample size		600

Panel B: Sample Firm Breakdown by Industry in 2001	No. of Firms	% of Sample
ASX Industry		
Energy	23	11.50
Materials	34	17.00
Industrials	33	16.50
Consumer Discretionary	33	16.50
Consumer Staples	20	10.00
Health Care	24	12.00
Information Technology	13	6.50
Telecommunications	12	6.00
Utilities	8	4.00
Total	200	100

Table 2. Descriptive Statistics – Continuous Variables

Panel A: *ASX T100 sub-sample* (n = 100)	**Mean**	**Standard deviation**	**25th percentile**	**Median (50th percentile)**	**75th percentile**
AF/ASSETS_01	0.0011	0.0016	0.0003	0.0006	0.0012
AF/ASSETS_03	0.0012	0.0017	0.0003	0.0007	0.0013
AF/ASSETS_05	0.0017	0.0032	0.0003	0.0009	0.0015
SUBSID_01	53.6700	82.6900	14.2500	34.0000	62.5000
SUBSID_03	57.0300	87.9800	15.2500	36.0000	66.5000
SUBSID_05	60.2000	91.4900	16.5000	37.0000	71.5000
NBS_01	2.7000	1.7400	1.0000	2.0000	4.0000
NBS_03	2.7300	1.8400	1.0000	2.0000	4.0000
NBS_05	2.8100	1.8700	1.0000	2.0000	4.0000
ROA_01	0.0463	0.1356	0.0344	0.0554	0.0804
ROA_03	0.0652	0.1171	0.0476	0.0617	0.0982
ROA_05	0.0697	0.1013	0.0477	0.0777	0.0956
CURRENT_01	2.8003	13.2465	0.9650	1.2650	1.6600
CURRENT_03	1.9923	03.0108	1.0525	1.3750	1.8150
CURRENT_05	8.5353	68.6507	1.0000	1.2900	1.7900
PERNEXBD_01	0.4106	0.1832	0.2550	0.3825	0.5950
PERNEXBD_03	0.4831	0.2156	0.3000	0.4500	0.7000
PERNEXBD_05	0.5360	0.2389	0.3333	0.5000	0.7778
BODMEET_01	11.2800	4.1300	8.0000	10.0000	15.0000
BODMEET_03	12.5900	4.5200	9.0000	11.0000	17.0000
BODMEET_05	13.5100	4.9800	9.2500	12.0000	18.0000

Panel B: *ASX RI 100 sub-sample* (n = 100)	**Mean**	**Standard deviation**	**25th percentile**	**Median (50th percentile)**	**75th percentile**
AF/ASSETS_01	0.0078	0.0127	0.0013	0.0029	0.0089
AF/ASSETS_03	0.0082	0.0136	0.0014	0.0033	0.0082
AF/ASSETS_05	0.0056	0.0124	0.0014	0.0031	0.0061
SUBSID_01	8.4700	14.5200	3.0000	5.0000	8.7500
SUBSID_03	8.8300	15.4600	3.0000	5.0000	8.7500
SUBSID_05	7.7300	12.7100	2.0000	5.0000	8.0000
NBS_01	2.1400	1.1900	1.0000	2.0000	3.0000
NBS_03	2.1700	1.2100	1.0000	2.0000	3.0000
NBS_05	2.1500	1.1700	1.0000	2.0000	3.0000
ROA_01	-0.3276	0.9336	-0.3338	-0.0476	0.0654
ROA_03	-0.2335	0.5340	-0.3380	-0.0895	0.0501
ROA_05	-0.1655	0.5513	-0.2557	-0.0266	0.0705
CURRENT_01	9.3400	23.7353	1.1250	1.8500	4.9500
CURRENT_03	3.9222	7.4418	1.0500	1.7200	3.1050
CURRENT_05	4.8371	7.0646	1.1975	1.8600	5.0900
PERNEXBD_01	0.4885	0.1871	0.3825	0.5100	0.6120
PERNEXBD_03	0.5747	0.2201	0.4500	0.6000	0.7200
PERNEXBD_05	0.6394	0.2448	0.5000	0.6833	0.8000
BODMEET_01	8.6400	3.9300	6.0000	9.0000	11.0000
BODMEET_03	9.7200	4.1100	7.0000	9.0000	12.0000
BODMEET_05	10.1500	4.3500	7.0000	10.0000	13.0000

Where:

AF/ASSETS_01 = The amount of audit fees paid by the firm in 2001 deflated by total assets; *AF/ASSETS_03* = The amount of audit fees paid by the firm in 2003 deflated by total assets; *AF/ASSETS_05* = The amount of audit fees paid by the firm in 2005 deflated by total assets; *SUBSID_01* = Total number of subsidiaries for firm in 2001; *SUBSID_03* = Total number of subsidiaries for firm in 2003; *SUBSID_05* = Total number of subsidiaries for firm in 2005; *NBS_01* = Number of business segments for firm in 2001; *NBS_03* = Number of business segments for firm in 2003; *NBS_05* = Number of business segments for firm in 2005; *ROA_01* = Earnings before interest and tax divided by total assets for firm in 2001; *ROA_03* = Earnings before interest and tax divided by total assets for firm in 2003; *ROA_05* = Earnings before interest and tax divided by total assets for firm in 2005; *CURRENT_01* = Current assets divided by current liabilities for firm in 2001; *CURRENT_03* = Current assets divided by current liabilities for firm in 2003; and *CURRENT_05* = Current assets divided by current liabilities for firm in 2005; *PERNEXBD_01* = The percentage of non-executive directors on the board of directors for firm in 2001; *PERNEXBD_03* = The percentage of non-executive directors on the board of directors for firm in 2003; *PERNEXBD_05* = The percentage of non-executive directors on the board of directors for firm in 2005; *BODMEET_01* = The number of board of directors meetings held during the year for firm in 2001; *BODMEET_03* = The number of board of directors meetings held during the year for firm in 2003; *BODMEET_05* = The number of board of directors meetings held during the year for firm in 2005.

Table 3. Descriptive Statistics – Dichotomous Variables

Panel A: *ASX T100 sub-sample*	**2001**	**2003**	**2005**
$BIG4_{it}$			
Auditee *i* in time period *t* is scored one (1) if the incumbent auditor *j* in time period *t* is a *Big4* audit firm; otherwise auditee *i* in time period *t* is scored zero (0).	92	92	92
Auditee *i* in time period *t* is not audited by a *Big4* auditor.	8	8	8
Total	100	100	100
$SPECIALIST_{it}$			
Auditee i in time period *t* is scored one (1) if the incumbent auditor j in time period *t* is an industry specialist in industry *k*; otherwise auditee *i* in time period *t* is scored zero (0).	50	54	57
Auditee *i* in time period *t* is not audited by an industry specialist in industry *k*	50	46	43
Total	100	100	100
$CNON\text{-}AUDIT_{it}$			
Auditee *i* in time period *t* is scored one (1) if the ratio of non-audit fees to total fees paid to the incumbent auditor *j* in time period t is less than 0.25; otherwise auditee *i* in time period *t* is scored zero (0).	51	51	51
Auditee *i* in time period *t* pays more than 0.25 of the ratio of non-audit fees to total fees to the incumbent auditor.	49	49	49
Total	100	100	100

$CTENURE_{it}$			
Auditee *i* in time period *t* is scored one (1) if number of years the incumbent auditor *j* till time period *t* has been engaged as the principal auditor is 3 years or more; otherwise auditee *i* in time period *t* is scored zero (0).	87	90	99
Auditee i in time period *t* has engaged the incumbent auditor for less than three years.	13	10	1
Total	100	100	100
∑ ($BIG4_{it}$, $SPECIALIST_{it}$, $CNON\text{-}AUDIT_{it}$, $CTENURE_{it}$). A composite dichotomous score based on the four proxy measures for auditor attributes: *Big4*, industry specialization, provision of non-audit services and length of tenure is developed that is, AA_{it}			
Number of firms scoring 0	0	0	0
Number of firms scoring 1	3	1	2
Number of firms scoring 2	34	33	38
Number of firms scoring 3	43	44	19
Number of firms scoring 4	20	22	41
Total	100	100	100
$FINEXPAC_{it}$			
A dummy variable given the value of 1 if the audit committee consists of at least one financial expert during the year for firm *i* at time period *t.* otherwise auditee *i* in time period *t* is scored zero (0).	72	82	89
The audit committee does not consist of at least one financial expert during the year for firm *i* at time period *t*.	28	18	11
Total	100	100	100
Panel B: *ASX RI 100 sub-sample*	**2001**	**2003**	**2005**
$BIG4_{it}$			
Auditee i in time period t is scored one (1) if the incumbent auditor *j* in time period *t* is a *Big4* audit firm; otherwise auditee *i* in time period *t* is scored zero (0).	47	47	45
Auditee *i* in time period *t* is not audited by a *Big4* auditor.	53	53	55
Total	100	100	100
$SPECIALIST_{it}$			
Auditee i in time period *t* is scored one (1) if the incumbent auditor *j* in time period *t* is an industry specialist in industry *k*; otherwise auditee *i* in time period *t* is scored zero (0).	46	49	54
Auditee *i* in time period *t* is not audited by an industry specialist in industry *k*	54	51	46
Total	100	100	100
$CNON\text{-}AUDIT_{it}$			
Auditee *i* in time period *t* is scored one (1) if the ratio of non-audit fees to total fees paid to the incumbent auditor *j* in time period *t* is less than 0.25; otherwise auditee *i* in time period *t* is scored zero (0).	45	43	39
Auditee *i* in time period *t* pays more than 0.25 of the ratio of non-audit fees to total fees to the incumbent auditor.	55	57	61
Total	100	100	100
$CTENURE_{it}$			
Auditee *i* in time period *t* is scored one (1) if number of years the incumbent auditor *j* till time period *t* has been engaged as the principal auditor is 3 years or more; otherwise auditee *i* in time period *t* is scored zero (0).	86	90	95
Auditee *i* in time period *t* has engaged the incumbent auditor for less than three years.	14	10	5
Total	100	100	100
∑ ($BIG4_{it}$, $SPECIALIST_{it}$, $CNON\text{-}AUDIT_{it}$, $CTENURE_{it}$). A composite dichotomous score based on the four proxy measures for auditor attributes: *Big4*, industry specialization, provision of non-audit services and length of tenure is developed that is, AA_{it}			
Number of firms scoring 0	2	2	1
Number of firms scoring 1	20	16	19
Number of firms scoring 2	38	42	41
Number of firms scoring 3	32	31	24
Number of firms scoring 4	8	9	15
Total	100	100	100
$FINEXPAC_{it}$			
A dummy variable given the value of 1 if the audit committee consists of at least one financial expert during the year for firm *i* at time period *t.* otherwise auditee *i* in time period *t* is scored zero (0).	53	62	64
The audit committee does not consist of at least one financial expert during the year for firm *i* at time period *t*.	47	38	36
Total	100	100	100

Table 1 Panel B presents the industry breakdown of the sample firms. Materials, industrials and consumer discretionary sectors collectively represent the highest proportion (that is, 50%) of the final sample of 200 firms in 2001. This spread is also proportionally representative of the *ASX* market as a whole. [15] Tables 2 and 3 provide descriptive statistics for both the continuous and dichotomous variables used in this study.

T-tests are also completed for the dichotomous variables collected in this study. An overall review of Table 4 shows a number of significant relationships in 2001. In relation to the independent variables examined in this study, audit fees deflated by total assets have a statistically significant association with a *Big4* auditor (in this case, $BIG4_{it}$ with a p-value<0.05). The association suggests that firms employing a *Big4* auditor pay a significantly different quantum of audit fees compared to firms which do not utilize a *Big4* auditor in 2001. This can be explained on the basis of the *Big4* auditor's greater expertise, experience and resources (Choi et al., 2008, Ferguson & Stokes, 2002, Iyer & Iyer, 1996, Willenborg, 2002).

Table 4 also reports that industry variables also have a significant association with the dependent variable, audit fees deflated by total assets. Specifically, firms in the consumer staples (in this case, $CONSUMERSTAP_{it}$ with a p-value<0.01), industrials (in this case, $INDUSTRIALS_{it}$ with a p-value<0.01), information technology (in this case, $INFORMATION\ TECHNOLOGY_{it}$ with a p-value<0.05) and telecommunications (in this case, $TELECOMMUNICATIONS_{it}$ with a p-value<0.05) industries all pay a statistically different quantum of audit fees to firms in other industries in 2001. It is also noteworthy from Table 4 that the presence of a financial expert on a firm's audit committee (in this case, $FINEXPAC_{it}$) does not, on a univariate basis, have any statistically significant association with the amount of audit fees paid by a firm in 2001. With respect to the t-tests results for the financial years 2003 and 2005, two main observations can be made. First, in relation to both $BIG4_{it}$ and $SPECIALIST_{it}$ in 2003, the p-value for both variables diminishes in terms of statistical significance compared to 2001 but increases in terms of significance in 2005 (compared to 2003). Second, the statistical significance of both $CNON\text{-}AUDIT_{it}$ and $CTENURE_{it}$ with audit fees deflated by total assets diminishes in terms of strength of the association in 2003 and 2005 (compared to 2001).

Pearson listwise correlation coefficients (untabulated) for both the continuous and dichotomous variables used in this study for each of the years-ending 2001, 2003 and 2005 highlight a number of observations. First, it is clear that the independent variable of this study, audit fees deflated by total assets is significantly correlated with one of the four auditor attributes examined in this study (namely, the existence of a *Big4* auditor (in this case, *BIG4_01*)). Second, audit fees deflated by total assets are significantly correlated with proxies that measure firm complexity (in this case, square root of the number of subsidiaries (*SRSUBSID_01*) and firm risk (in this case, *ROA_01*). This is unsurprising given that the published prior literature into audit fee determinants demonstrated the significant link between firm complexity, firm risk and audit fees.[16] Finally, the quantum of audit fees paid by a firm is sensitive to one of the three corporate governance variables in this study (namely the number of board of directors meetings held during 2001 (*BODMEET_01*)).

5.1 Multivariate Analysis – Multiple Regressions

Table 5 documents the results of OLS regression using a composite score of auditor attributes (that is, AA_{it}) as an explanatory variable in analyzing changes in audit fees (that is, $AF_{it}/ASSETS_{it}$) at three points in time: the change from 2001 from 2003; the change from 2003 from 2005; and the overall change from 2001 from 2005. The results from Table 5 Columns 1 and 2 suggest that the coefficient on AA_{it} (the independent variable) is positive and statistically insignificant for the period 2001 to 2003. A review of Table 5 also shows that the coefficient on AA_{it} remains positive throughout 2003 to 2005 (see Column 3) and 2001 to 2005 (see Column 5). The statistical significance of the relationship between AA_{it} and the change in $AF_{it}/ASSETS_{it}$ becomes stronger over the observation window (the p-value changes from 0.6061 for the period 2001 to 2003 (see Column 2) to 0.5135 for the period 2003 to 2005 (Columns 4) and 0.4585 for the period 2001 to 2005 (Columns 6)). Nevertheless, the relationship is not significant at conventional levels.

[15] Therefore, each industry contains sufficient observations to control for industry effects in the subsequent multivariate analysis.

[16] Given that the independent variable in this study, audit fees, is deflated by total assets (a firm size proxy), it is not necessary to include any firm size proxies in the subsequent main regressions.

Table 4. Independent Samples T-test - Changes to Mean of Audit Fees Deflated by Assets to Dichotomous Variables

	2001				**2003**				**2005**			
	Yes ($\bar{x}$)	No ($\bar{x}$)	t-statistic	p-value	Yes ($\bar{x}$)	No ($\bar{x}$)	t-statistic	p-value	Yes ($\bar{x}$)	No ($\bar{x}$)	t-statistic	p-value
Independent Variables												
$BIG4_{it}$	0.0033	0.0071	2.3115	0.0231	0.0036	0.0073	-2.1694	0.0326	0.0026	0.0060	-2.4286	0.0161
$SPECIALIST_{it}$	0.0036	0.0052	1.1947	0.2336	0.0045	0.0049	-0.2719	0.7860	0.0043	0.0028	1.1372	0.2568
$CNON\text{-}AUDIT_{it}$	0.0039	0.0049	0.7821	0.4351	0.0043	0.0051	-0.5640	0.5734	0.0033	0.0039	-0.4455	0.6565
$CTENURE_{it}$	0.0042	0.0061	0.7533	0.4572	0.0048	0.0042	0.2504	0.8025	0.0037	0.0031	0.1468	0.8835
Corporate Governance Variables												
$FINEXPAC_{it}$	0.0041	0.0050	0.6098	0.5427	0.0107	0.0057	-0.8618	0.3898	0.0027	0.0068	-1.6076	0.1146
Industry Variables												
$ENERGY_{it}$ [17]	0.0064	0.0042	-1.0459	0.2969	0.0070	0.0044	1.1848	0.2375	0.0088	0.0030	1.1149	0.2768
$MATERIALS_{it}$	0.0033	0.0047	0.7363	0.4624	0.0036	0.0049	-0.6757	0.5000	0.0018	0.0040	-1.2622	0.2084
$INDUSTRIALS_{it}$	0.0016	0.0050	3.8446	0.0002	0.0018	0.0053	-3.7609	0.0002	0.0024	0.0039	-0.8273	0.4091
$CONSUMERDISC_{it}$	0.0025	0.0048	1.2896	0.1987	0.0027	0.0051	-1.2448	0.2147	0.0022	0.0039	-1.0083	0.3145
$CONSUMERSTAP_{it}$	0.0015	0.0048	3.9674	0.0001	0.0016	0.0050	-3.8866	0.0001	0.0022	0.0038	-0.7130	0.4767
$HEALTH\ CARE_{it}$	0.0058	0.0042	-0.7718	0.4412	0.0064	0.0045	0.8411	0.4013	0.0033	0.0037	-0.2015	0.8405
$INFORMATION\ TECHNOLOGY_{it}$	0.0125	0.0039	-2.1780	0.0489	0.0136	0.0041	2.2066	0.0464	0.0067	0.0034	1.2353	0.2182
$TELECOMMUNICATIONS_{it}$	0.0099	0.0041	-2.0406	0.0426	0.0087	0.0044	1.3837	0.1680	0.0064	0.0035	1.0871	0.2873
$UTILITIES_{it}$	0.0049	0.0044	-0.1515	0.8797	0.0048	0.0047	0.0236	0.9812	0.0031	0.0037	-0.1640	0.8699

Where:

$BIG4_{it}$ = Auditee *i* in time period *t* is scored one (1) if the incumbent auditor *j* in time period *t* is a *Big4* audit firm; otherwise auditee *i* in time period *t* is scored zero (0); $SPECIALIST_{it}$ = Auditee *i* in time period *t* is scored one (1) if the incumbent auditor *j* in time period *t* is an industry specialist in industry *k*; otherwise auditee *i* in time period *t* is scored zero (0); $CNON\text{-}AUDIT_{it}$ = Auditee *i* in time period *t* is scored one (1) if the ratio of non-audit fees to total fees paid to the incumbent auditor *j* in time period *t* is less than 0.25; otherwise auditee *i* in time period *t* is scored zero (0); $CTENURE_{it}$ = Auditee *i* in time period *t* is scored one (1) if number of years the incumbent auditor *j* till time period *t* has been engaged as the principal auditor is 3 years or more; otherwise auditee *i* in time period *t* is scored zero (0); $FINEXPAC_{it}$ = A dummy variable given the value of 1 if the audit committee consists of at least one financial expert during the year for firm *i* at time period *t*; $ENERGY_{it}$ = A dummy variable given the value of 1 if the firm is in the energy industry and 0 if otherwise; $MATERIALS_{it}$ = A dummy variable given the value of 1 if the firm is in the materials industry and 0 if otherwise; $INDUSTRIALS_{it}$ = A dummy variable given the value of 1 if the firm is in the industrials industry and 0 if otherwise; $CONSUMERDISC_{it}$ = A dummy variable given the value of 1 if the firm is in the consumer discretionary industry and 0 if otherwise; $CONSUMERSTAP_{it}$ = A dummy variable given the value of 1 if the firm is in the consumer staples industry and 0 if otherwise; $HEALTH\ CARE_{it}$ = A dummy variable given the value of 1 if the firm is in the health-care industry and 0 if otherwise; $INFORMATION\ TECHNOLOGY_{it}$ = A dummy variable given the value of 1 if the firm is in the information technology industry and 0 if otherwise; $TELECOMMUNICATIONS_{it}$ = A dummy variable given the value of 1 if the firm is in the telecommunications industry and 0 if otherwise; $UTILITIES_{it}$ = A dummy variable given the value of 1 if the firm is in the utilities industry and 0 if otherwise.

[17] For purposes of brevity, all industry variables in this study relate to firm *i* at time period *t* although not expressly stated in the legend to each table.

Table 5. AA_{it} (Composite Score) - OLS Regression Results Change in Audit Fees over 2001 to 2003, 2003 to 2005 and 2001 to 2005

	Change from 2001 to 2003 (n=200)		**Change from 2003 to 2005 (n=200)**		**Change from 2001 to 2005 (n=200)**	
	Coeff	p-value	Coeff	p-value	Coeff	p-value
Constant	0.0011	0.6035	0.0036	0.4795	0.0041	0.4230
Independent Variable						
AA_{it}	0.0001	0.6061	0.0006	0.5135	0.0007	0.4585
Control Variables - *Firm Complexity Variables*						
$SRSUBSID_{it}$	0.0000	0.8913	0.0001	0.7050	0.0001	0.7623
$LNNBS_{it}$	-0.0001	0.5750	0.0000	0.9863	-0.0001	0.9720
Control Variables - *Firm Risk Variables*						
ROA_{it}	-0.0009	0.0167	0.0052	0.0281	0.0047	0.0448
$CURRENT_{it}$	0.0000	0.9028	0.0000	0.8724	0.0000	0.8139
Control Variables - *Corporate Governance Variables*						
$PERNEXBD_{it}$	-0.0006	0.3946	-0.0051	0.1721	-0.0056	0.1383
$BODMEET_{it}$	0.0000	0.6391	-0.0001	0.4462	-0.0001	0.4361
$FINEXPAC_{it}$	0.0001	0.7542	-0.0012	0.5866	-0.0013	0.5585
Control Variables - *Industry Variables*						
$ENERGY_{it}$	-0.0001	0.9665	0.0022	0.5490	0.0029	0.4211
$MATERIALS_{it}$	-0.0006	0.7841	-0.0015	0.6260	-0.0013	0.6569
$INDUSTRIALS_{it}$	-0.0007	0.7298	-0.0016	0.7050	-0.0014	0.6999
$CONSUMERDISC_{it}$	-0.0006	0.7630	-0.0013	0.6708	-0.0012	0.6935
$CONSUMERSTAP_{it}$	-0.0007	0.7409	0.0005	0.8825	0.0005	0.8775
$HEALTH\ CARE_{it}$	-0.0006	0.7696	-0.0024	0.4817	-0.0021	0.5291
$INFORMATION\ TECHNOLOGY_{it}$	-0.0001	0.9799	-0.0043	0.3005	-0.0036	0.3868
$TELECOMM\ UNICATIONS_{it}$	-0.0020	0.3350	-0.0004	0.9164	-0.0019	0.6453
$UTILITIES_{it}$	-0.0010	0.6413	-0.0002	0.9642	-0.0006	0.9013
F-statistic (p-value)	1.2174	0.2545	1.0329	0.4241	1.0025	0.4561
Adjusted R^2	0.0182		0.0026		0.0002	

Where:

$AA_{it} = \sum (BIG4_{it}, SPECIALIST_{it}, CNON\text{-}AUDIT_{it}, CTENURE_{it})$. A composite dichotomous score based on the four proxy measures for auditor attributes: *Big4*, industry specialisation, provision of non-audit services and length of tenure; $SRSUBSID_{it}$ = Square root of number of subsidiaries for firm *i* at time period *t*; $LNNBS_{it}$ = Natural logarithmic of 1 plus number of business segments for firm *i* at time period *t*; ROA_{it} = Earnings before interest and tax divided by total assets for firm *i* at time period *t*; $CURRENT_{it}$ = Current assets divided by current liabilities for firm *i* at time period *t*; $PERNEXBD_{it}$ = The percentage of non-executive directors on the board of directors for firm *i* at time period *t*; $BODMEET_{it}$ = The number of board of directors meetings held during the year for firm *i* at time period *t*; $FINEXPAC_{it}$ = A dummy variable given the value of 1 if the audit committee consists of at least one financial expert during the year for firm *i* at time period *t*; $ENERGY_{it}$ = A dummy variable given the value of 1 if the firm is in the energy industry and 0 if otherwise; $MATERIALS_{it}$ = A dummy variable given the value of 1 if the firm is in the materials industry and 0 if otherwise; $INDUSTRIALS_{it}$ = A dummy variable given the value of 1 if the firm is in the industrials industry and 0 if otherwise; $CONSUMERDISC_{it}$ = A dummy variable given the value of 1 if the firm is in the consumer discretionary industry and 0 if otherwise; $CONSUMERSTAP_{it}$ = A dummy variable given the value of 1 if the firm is in the consumer staples industry and 0 if otherwise; $HEALTH\ CARE_{it}$ = A dummy variable given the value of 1 if the firm is in the health-care industry and 0 if otherwise; $INFORMATION\ TECHNOLOGY_{it}$ = A dummy variable given the value of 1 if the firm is in the information technology industry and 0 if otherwise; $TELECOMMUNICATIONS_{it}$ = A dummy variable given the value of 1 if the firm is in the telecommunications industry and 0 if otherwise; $UTILITIES_{it}$ = A dummy variable given the value of 1 if the firm is in the utilities industry and 0 if otherwise.

A further review of Table 5 Columns 1 and 2 indicates that the coefficient on return on assets (ROA_{it}) is negative but significant (p-value<0.05) for the period 2001 to 2003. The significance of the relationship between ROA_{it} and the change in $AF_{it}/ASSETS_{it}$, however, reduces for the period 2003 to 2005 (see Column 4) (p-value<0.05) and for the period 2001 to 2005 (see Column 6) (p-value<0.05). The coefficient on ROA_{it} also becomes positive for the period 2003 to 2005 (see Column 3) and for the period 2001 to 2005 (see Column 5). None of the corporate governance and industry variables suggest any significant statistical association with the change in $AF_{it}/ASSETS_{it}$. The regression models run to

examine the association between the independent variables and dependent variables have an adjusted R^2 ranging from 0.0182 (change in $AF_{it}/ASSETS_{it}$ from 2001 to 2003 (see Columns 1/2), 0.0026 (change in $AF_{it}/ASSETS_{it}$ from 2003 to 2005 (see Columns 3/4) to 0.0002 (change in $AF_{it}/ASSETS_{it}$ from 2001 to 2005 (see Columns 5/6)). Specifically, for the period 2001 to 2003, the variables entered into the regression model explain only 1.82% of the change in the variation in the dependent variable, $AF_{it}/ASSETS_{it}$ with the goodness-of-fit (that is, adjusted R^2) falling even further in the subsequent periods of 2003 to 2005 and 2001 to 2005.

Table 6 documents the results of OLS regression using an auditor attribute measure (that is, $BIG4_{it}$) as an explanatory variable in analyzing changes in audit fees (that is, $AF_{it}/ASSETS_{it}$) at three points in time: the change from 2001 from 2003; the change from 2003 from 2005; and the change from 2001 from 2005. Results from Table 6 Columns 1 and 2 suggest that the coefficient on $BIG4_{it}$ (the independent variable) is positive and statistically insignificant for the period 2001 to 2003. A review of Table 6 also shows that the coefficient on $BIG4_{it}$ remains positive throughout 2003 to 2005 (see Column 3) and 2001 to 2005 (see Column 5) and the statistical significance of the relationship between $BIG4_{it}$ and the change in $AF_{it}/ASSETS_{it}$ becomes weaker over the observation window (the p-value changes from 0.4583 for the period 2001 to 2003 (see Column 2) to 0.8100 for the period 2003 to 2005 (see Column 4) and 0.7828 (see Column 6) for the period 2001 to 2005). Nevertheless, the relationship is not significant at conventional levels.

Table 6. $BIG4_{it}$ (Individual Score) - OLS Regression Results Change in Audit Fees over 2001 to 2003, 2003 to 2005 and 2001 to 2005

	Change from 2001 to 2003 (n=200)		**Change from 2003 to 2005 (n=200)**		**Change from 2001 to 2005 (n=200)**	
	Coeff	p-value	Coeff	p-value	Coeff	p-value
Constant	0.0011	0.5808	0.0007	0.8616	0.0005	0.9142
Independent Variable						
$BIG4_{it}$	0.0002	0.4583	0.0005	0.8100	0.0006	0.7828
Control Variables - *Firm Complexity Variables*						
$SRSUBSID_{it}$	0.0000	0.9844	0.0001	0.6377	0.0001	0.6982
$LNNBS_{it}$	-0.0001	0.5776	0.0001	0.9410	0.0001	0.9680
Control Variables - *Firm Risk Variables*						
ROA_{it}	-0.0009	0.0139	0.0057	0.0158	0.0052	0.0272
$CURRENT_{it}$	0.0000	0.9278	0.0000	0.8690	0.0000	0.8236
Control Variables - *Corporate Governance Variables*						
$PERNEXBD_{it}$	-0.0006	0.3621	0.0007	0.8423	0.0018	0.6343
$BODMEET_{it}$	0.0000	0.5800	-0.0001	0.5867	-0.0001	0.5856
$FINEXPAC_{it}$	0.0001	0.6923	-0.0012	0.6235	-0.0015	0.5386
Control Variables - *Industry Variables*						
$ENERGY_{it}$	0.0000	0.9835	0.0017	0.6416	0.0024	0.5071
$MATERIALS_{it}$	-0.0005	0.8039	-0.0018	0.5468	-0.0018	0.5608
$INDUSTRIALS_{it}$	-0.0006	0.7559	-0.0020	0.5052	-0.0025	0.5066
$CONSUMERDISC_{it}$	-0.0005	0.7866	-0.0012	0.6920	-0.0011	0.7255
$CONSUMERSTAP_{it}$	-0.0006	0.7713	0.0001	0.9674	0.0001	0.9783
$HEALTH\ CARE_{it}$	-0.0006	0.7714	-0.0024	0.4706	-0.0022	0.5122
$INFORMATION\ TECHNOLOGY_{it}$	0.0000	0.9997	-0.0045	0.2893	-0.0038	0.3691
$TELECOMM\ UNICATIONS_{it}$	-0.0020	0.3400	-0.0008	0.8573	-0.0023	0.5903
$UTILITIES_{it}$	-0.0009	0.6551	-0.0008	0.8691	-0.0013	0.7962
F-statistic (p-value)	1.2361	0.2404	0.8707	0.6037	0.8220	0.6596
Adjusted R^2	0.0198		-0.0105		-0.0145	

Where:

$BIG4_{it}$ = Auditee i in time period t is scored one (1) if the incumbent auditor j in time period t is a *Big4* audit firm; otherwise auditee i in time period t is scored zero (0); $SRSUBSID_{it}$ = Square root of number of subsidiaries for firm i at time period t; $LNNBS_{it}$ = Natural logarithmic of 1 plus number of business segments for firm i at time period t; ROA_{it} = Earnings before interest and tax divided by total assets for firm i at time period t; $CURRENT_{it}$ = Current assets divided by current liabilities for firm i at time period t; $PERNEXBD_{it}$ = The percentage of non-executive directors on the board of directors for firm i at time period t; $BODMEET_{it}$ = The number of board of directors meetings held during the year for firm i at time period t; $FINEXPAC_{it}$ = A dummy variable given the value of 1 if the audit committee consists of at

least one financial expert during the year for firm *i* at time period *t*; $ENERGY_{it}$ = A dummy variable given the value of 1 if the firm is in the energy industry and 0 if otherwise; $MATERIALS_{it}$ = A dummy variable given the value of 1 if the firm is in the materials industry and 0 if otherwise; $INDUSTRIALS_{it}$ = A dummy variable given the value of 1 if the firm is in the industrials industry and 0 if otherwise; $CONSUMERDISC_{it}$ = A dummy variable given the value of 1 if the firm is in the consumer discretionary industry and 0 if otherwise; $CONSUMERSTAP_{it}$ = A dummy variable given the value of 1 if the firm is in the consumer staples industry and 0 if otherwise; $HEALTH\ CARE_{it}$ = A dummy variable given the value of 1 if the firm is in the health-care industry and 0 if otherwise; $INFORMATION\ TECHNOLOGY_{it}$ = A dummy variable given the value of 1 if the firm is in the information technology industry and 0 if otherwise; $TELECOMMUNICATIONS_{it}$ = A dummy variable given the value of 1 if the firm is in the telecommunications industry and 0 if otherwise; $UTILITIES_{it}$ = A dummy variable given the value of 1 if the firm is in the utilities industry and 0 if otherwise.

A further review of Table 6 Columns 1 and 2 indicates that the coefficient on return on assets (ROA_{it}) is negative but significant (p-value<0.05) for the period 2001 to 2003. The significance of the relationship between ROA_{it} and the change in $AF_{it}/ASSETS_{it}$, however, reduces marginally for the period 2003 to 2005 (see Column 4) (p-value<0.05) and for the period 2001 to 2005 (see Column 6) (p-value<0.05). The coefficient on ROA_{it} also becomes positive for the period 2003 to 2005 (see Column 3) and for the period 2001 to 2005 (see Column 5). None of the corporate governance and industry variables suggest any significant statistical association with the change in $AF_{it}/ASSETS_{it}$ over the observation period. The regression models run to examine the association between the independent variables and dependent variables have an adjusted R^2 ranging from 0.0198 (change in $AF_{it}/ASSETS_{it}$ from 2001 to 2003 (see Columns 1/2)), -0.0105 (change in $AF_{it}/ASSETS_{it}$ from 2003 to 2005 (see Column 3/4)) to -0.0145 (change in $AF_{it}/ASSETS_{it}$ from 2001 to 2005 (see Column 5/6)). Specifically, for the period 2001 to 2003, the variables entered into the regression model explain only 1.98% of the change in the variation in the dependent variable, $AF_{it}/ASSETS_{it}$ with the goodness-of-fit (that is, adjusted R^2) falling even further in the subsequent periods of 2003 to 2005 and 2001 to 2005.

Table 7 documents the results of OLS regression using an auditor attribute measure (that is, $SPECIALIST_{it}$) as an explanatory variable in analyzing changes in audit fees (that is, $AF_{it}/ASSETS_{it}$) at three points in time: the change from 2001 from 2003; the change from 2003 from 2005; and the change from 2001 from 2005. The results from Table 7 Column 1 and 2 suggest that the coefficient on $SPECIALIST_{it}$ (the independent variable) is positive and statistically insignificant for the period 2001 to 2003. A review of Table 7 also shows that the coefficient on $SPECIALIST_{it}$ remains positive throughout 2003 to 2005 (see Column 3) and 2001 to 2005 (see Column 5) and the statistical significance of the relationship between $SPECIALIST_{it}$ and the change in $AF_{it}/ASSETS_{it}$ becomes stronger over the observation window (the p-value changes from 0.7602 for the period 2001 to 2003 (see Column 2) to 0.1882 for the period 2003 to 2005 (see Column 4) and 0.1574 for the period 2001 to 2005 (see Column 6)). Nevertheless, the relationship is not significant at conventional levels.

Table 7. $SPECIALIST_{it}$ (Individual Score) - OLS Regression Results Change in Audit Fees over 2001 to 2003, 2003 to 2005 and 2001 to 2005

	Change from 2001 to 2003 (n=200)		**Change from 2003 to 2005 (n=200)**		**Change from 2001 to 2005 (n=200)**	
	Coeff	p-value	Coeff	p-value	Coeff	p-value
Constant	0.0013	0.5293	0.0036	0.4311	0.0041	0.3601
Independent Variable						
$SPECIALIST_{it}$	0.0001	0.7602	0.0024	0.1882	0.0025	0.1574
Control Variables - *Firm Complexity Variables*						
$SRSUBSID_{it}$	0.0000	0.8671	0.0001	0.6317	0.0001	0.6803
$LNNBS_{it}$	-0.0002	0.5448	0.0000	0.9804	0.0000	0.9762
Control Variables - *Firm Risk Variables*						
ROA_{it}	-0.0008	0.0184	0.0052	0.0253	0.0047	0.0401
$CURRENT_{it}$	0.0000	0.9158	0.0000	0.8051	0.0000	0.7432
Control Variables - *Corporate Governance Variables*						
$PERNEXBD_{it}$	-0.0006	0.3619	-0.0049	0.1947	-0.0053	0.1575
$BODMEET_{it}$	0.0000	0.6654	-0.0001	0.4869	-0.0001	0.4804
$FINEXPAC_{it}$	0.0001	0.7436	-0.0012	0.5882	-0.0013	0.5616
Control Variables - *Industry Variables*						
$ENERGY_{it}$	-0.0001	0.9535	0.0020	0.5710	0.0027	0.4421
$MATERIALS_{it}$	-0.0006	0.7719	-0.0015	0.6105	-0.0014	0.6378
$INDUSTRIALS_{it}$	-0.0007	0.7249	-0.0017	0.6020	-0.0015	0.6150

$CONSUMERDISC_{it}$	-0.0007	0.7498	-0.0017	0.5745	-0.0016	0.5880
$CONSUMERSTAP_{it}$	-0.0007	0.7254	0.0004	0.9030	0.0004	0.9031
$HEALTH\ CARE_{it}$	-0.0006	0.7635	-0.0027	0.4272	-0.0024	0.4680
$INFORMATION\ TECHNOLOGY_{it}$	-0.0001	0.9588	-0.0045	0.2756	-0.0038	0.3550
$TELECOMM\ UNICATIONS_{it}$	-0.0020	0.3283	-0.0005	0.8996	-0.0020	0.6276
$UTILITIES_{it}$	-0.0010	0.6263	-0.0005	0.9164	-0.0009	0.8469
F-statistic (p-value)	1.2061	0.2634	1.1224	0.3372	1.1017	0.3563
Adjusted R^2	0.0173		0.0097		0.0081	

Where:

$SPECIALIST_{it}$ = Auditee *i* in time period *t* is scored one (1) if the incumbent auditor *j* in time period *t* is an industry specialist in industry *k*; otherwise auditee *i* in time period *t* is scored zero (0); $SRSUBSID_{it}$ = Square root of number of subsidiaries for firm *i* at time period *t*; $LNNBS_{it}$ = Natural logarithmic of 1 plus number of business segments for firm *i* at time period *t*; ROA_{it} = Earnings before interest and tax divided by total assets for firm *i* at time period *t*; $CURRENT_{it}$ = Current assets divided by current liabilities for firm *i* at time period *t*; $PERNEXBD_{it}$ = The percentage of non-executive directors on the board of directors for firm *i* at time period *t*; $BODMEET_{it}$ = The number of board of directors meetings held during the year for firm *i* at time period *t*; $FINEXPAC_{it}$ = A dummy variable given the value of 1 if the audit committee consists of at least one financial expert during the year for firm *i* at time period *t*; $ENERGY_{it}$ = A dummy variable given the value of 1 if the firm is in the energy industry and 0 if otherwise; $MATERIALS_{it}$ = A dummy variable given the value of 1 if the firm is in the materials industry and 0 if otherwise; $INDUSTRIALS_{it}$ = A dummy variable given the value of 1 if the firm is in the industrials industry and 0 if otherwise; $CONSUMERDISC_{it}$ = A dummy variable given the value of 1 if the firm is in the consumer discretionary industry and 0 if otherwise; $CONSUMERSTAP_{it}$ = A dummy variable given the value of 1 if the firm is in the consumer staples industry and 0 if otherwise; $HEALTH\ CARE_{it}$ = A dummy variable given the value of 1 if the firm is in the health-care industry and 0 if otherwise; $INFORMATION\ TECHNOLOGY_{it}$ = A dummy variable given the value of 1 if the firm is in the information technology industry and 0 if otherwise; $TELECOMMUNICATIONS_{it}$ = A dummy variable given the value of 1 if the firm is in the telecommunications industry and 0 if otherwise; $UTILITIES_{it}$ = A dummy variable given the value of 1 if the firm is in the utilities industry and 0 if otherwise.

A further review of Table 7 Columns 1 and 2 indicates that the coefficient on return on assets (ROA_{it}) is negative but significant (p-value<0.05) for the period 2001 to 2003. The significance of the relationship between ROA_{it} and the change in $AF_{it}/ASSETS_{it}$, however, reduces marginally for the period 2003 to 2005 (see Column 4) (p-value<0.05) and for the period 2001 to 2005 (see Column 6) (p-value<0.05). The coefficient on ROA_{it} also becomes positive for the period 2003 to 2005 (see Column 3) and for the period 2001 to 2005 (see Column 5). None of the corporate governance and industry variables suggest any significant statistical association with the change in $AF_{it}/ASSETS_{it}$ over the observation period. The regression models run to examine the association between the independent variables and dependent variables have an adjusted R^2 ranging from 0.0173 (change in $AF_{it}/ASSETS_{it}$ from 2001 to 2003 (see Columns 1/2)), 0.0097 (change in $AF_{it}/ASSETS_{it}$ from 2003 to 2005 (see Columns 3/4)) to 0.0081 (change in $AF_{it}/ASSETS_{it}$ from 2001 to 2005 (see Columns 5/6)). Specifically, for the period 2001 to 2003, the variables entered into the regression model explain only 1.73% of the change in the variation in the dependent variable, $AF_{it}/ASSETS_{it}$ with the goodness-of-fit (that is, adjusted R^2) falling even further in the subsequent periods of 2003 to 2005 and 2001 to 2005.

Table 8 documents the results of OLS regression using an auditor attribute measure (that is, $CNON\text{-}AUDIT_{it}$) as an explanatory variable in analyzing changes in audit fees (that is, $AF_{it}/ASSETS_{it}$) at three points in time: the change from 2001 from 2003; the change from 2003 from 2005; and the change from 2001 from 2005. The results from Table 8 Columns 1 and 2 suggest that the coefficient on $CNON\text{-}AUDIT_{it}$ (the independent variable) is positive and statistically insignificant for the period 2001 to 2003. A review of Table 8 also shows that the coefficient on $CNON\text{-}AUDIT_{it}$ remains positive throughout 2003 to 2005 (see Column 3) and 2001 to 2005 (see Column 5) and the statistical significance of the relationship between $CNON\text{-}AUDIT_{it}$ and the change in $AF_{it}/ASSETS_{it}$ becomes weaker for the period 2003 to 2005 (the p-value changes from 0.7815 for the period 2001 to 2003 (see Column 2) to 0.9103 for the period 2003 to 2005 (see Column 4) before becoming stronger for the period 2001 to 2005 (see Column 6) (p-value=0.8885). Nevertheless, the relationship is not significant at conventional levels.

Table 8. *CNON-AUDIT*$_{it}$ (Individual Score) - OLS Regression Results Change in Audit Fees over 2001 to 2003, 2003 to 2005 and 2001 to 2005

	Change from 2001 to 2003 (n=200)		**Change from 2003 to 2005 (n=200)**		**Change from 2001 to 2005 (n=200)**	
	Coeff	p-value	Coeff	p-value	Coeff	p-value
Constant	0.0012	0.5729	0.0052	0.2524	0.0058	0.1958
Independent Variable						
CNON-AUDIT$_{it}$	0.0001	0.7815	0.0002	0.9103	0.0002	0.8885
Control Variables - *Firm Complexity Variables*						
SRSUBSID$_{it}$	0.0000	0.8304	0.0001	0.6814	0.0001	0.7339
LNNBS$_{it}$	-0.0001	0.5705	0.0000	0.9877	-0.0001	0.9433
Control Variables - *Firm Risk Variables*						
ROA$_{it}$	-0.0009	0.0166	0.0054	0.0193	0.0050	0.0306
CURRENT$_{it}$	0.0000	0.8877	0.0000	0.8876	0.0000	0.8319
Control Variables - *Corporate Governance Variables*						
PERNEXBD$_{it}$	-0.0006	0.3739	-0.0054	0.1543	-0.0058	0.1217
BODMEET$_{it}$	0.0000	0.6527	-0.0001	0.4627	-0.0001	0.4548
FINEXPAC$_{it}$	0.0001	0.7361	-0.0012	0.6072	-0.0012	0.5808
Control Variables - *Industry Variables*						
ENERGY$_{it}$	0.000	0.9898	0.0020	0.5691	0.0028	0.4412
MATERIALS$_{it}$	-0.0005	0.8210	-0.0016	0.5940	-0.0015	0.6205
INDUSTRIALS$_{it}$	-0.0006	0.7774	-0.0019	0.5990	-0.0020	0.6200
CONSUMERDISC$_{it}$	-0.0005	0.7902	-0.0013	0.6597	-0.0012	0.6807
CONSUMERSTAP$_{it}$	-0.0006	0.7817	0.0003	0.9338	0.0003	0.9350
HEALTH CARE$_{it}$	-0.0005	0.8038	-0.0023	0.4958	-0.0020	0.5462
INFORMATION TECHNOLOGY$_{it}$	0.0000	0.9981	-0.0044	0.2954	-0.0036	0.3800
TELECOMM UNICATIONS$_{it}$	-0.0019	0.3468	-0.0005	0.9082	-0.0020	0.6371
UTILITIES$_{it}$	-0.0009	0.6651	-0.0005	0.9220	-0.0009	0.8547
F-statistic (p-value)	1.2050	0.2642	1.0046	0.4539	0.9664	0.4953
Adjusted R^2	0.0172		0.0004		-0.0027	

Where:

CNON-AUDIT$_{it}$ = Auditee *i* in time period *t* is scored one (1) if the ratio of non-audit fees to total fees paid to the incumbent auditor *j* in time period *t* is less than 0.25; otherwise auditee *i* in time period *t* is scored zero (0); *SRSUBSID*$_{it}$ = Square root of number of subsidiaries for firm *i* at time period *t*; *LNNBS*$_{it}$ = Natural logarithmic of 1 plus number of business segments for firm *i* at time period *t*; *ROA*$_{it}$ = Earnings before interest and tax divided by total assets for firm *i* at time period *t*; *CURRENT*$_{it}$ = Current assets divided by current liabilities for firm *i* at time period *t*; *PERNEXBD*$_{it}$ = The percentage of non-executive directors on the board of directors for firm *i* at time period *t*; *BODMEET*$_{it}$ = The number of board of directors meetings held during the year for firm *i* at time period *t*; *FINEXPAC*$_{it}$ = A dummy variable given the value of 1 if the audit committee consists of at least one financial expert during the year for firm *i* at time period *t*; *ENERGY*$_{it}$ = A dummy variable given the value of 1 if the firm is in the energy industry and 0 if otherwise; *MATERIALS*$_{it}$ = A dummy variable given the value of 1 if the firm is in the materials industry and 0 if otherwise; *INDUSTRIALS*$_{it}$ = A dummy variable given the value of 1 if the firm is in the industrials industry and 0 if otherwise; *CONSUMERDISC*$_{it}$ = A dummy variable given the value of 1 if the firm is in the consumer discretionary industry and 0 if otherwise; *CONSUMERSTAP*$_{it}$ = A dummy variable given the value of 1 if the firm is in the consumer staples industry and 0 if otherwise; *HEALTH CARE*$_{it}$ = A dummy variable given the value of 1 if the firm is in the health-care industry and 0 if otherwise; *INFORMATION TECHNOLOGY*$_{it}$ = A dummy variable given the value of 1 if the firm is in the information technology industry and 0 if otherwise; *TELECOMMUNICATIONS*$_{it}$ = A dummy variable given the value of 1 if the firm is in the telecommunications industry and 0 if otherwise; *UTILITIES*$_{it}$ = A dummy variable given the value of 1 if the firm is in the utilities industry and 0 if otherwise.

A further review of Table 8 Columns 1 and 2 indicates that the coefficient on return on assets (*ROA*$_{it}$) is negative but significant (p-value<0.05) for the period 2001 to 2003. The significance of the relationship between *ROA*$_{it}$ and the change in *AF*$_{it}$*/ASSETS*$_{it}$, however, reduces for the period 2003 to 2005 (see Column 4) (p-value<0.05) and for the period 2001 to 2005 (see Column 6) (p-value<0.05). The coefficient on *ROA*$_{it}$ also becomes positive for the period 2003 to 2005 (see Column 3) and for the period 2001 to 2005 (see Column 5). None of the corporate governance and industry variables suggest any significant statistical association with the change in *AF*$_{it}$*/ASSETS*$_{it}$ over the observation period. The

regression models run to examine the association between the independent variables and dependent variables have an adjusted R^2 ranging from 0.0172 (change in $AF_{it}/ASSETS_{it}$ from 2001 to 2003 (see columns 1/2)), 0.0004 (change in $AF_{it}/ASSETS_{it}$ from 2003 to 2005 (see Columns 3/4)) to -0.0027 (change in $AF_{it}/ASSETS_{it}$ from 2001 to 2005 (see Columns 5/6)). Specifically, for the period 2001 to 2003, the variables entered into the regression model explain only 1.72% of the change in the variation in the dependent variable, $AF_{it}/ASSETS_{it}$ with the goodness-of-fit (that is, adjusted R^2) falling even further in the subsequent periods of 2003 to 2005 and 2001 to 2005.

Table 9 documents the results of OLS regression using an auditor attribute measure (that is, $CTENURE_{it}$) as an explanatory variable in analyzing changes in audit fees (that is, $AF_{it}/ASSETS_{it}$) at three points in time: the change from 2001 from 2003; the change from 2003 from 2005; and the change from 2001 from 2005. The results from Table 9 Columns 1 and 2 suggest that the coefficient on $CTENURE_{it}$ (the independent variable) is negative and statistically insignificant for the period 2001 to 2003. A review of Table 9 also shows that the coefficient on $CTENURE_{it}$ remains negative throughout 2003 to 2005 (see Column 3) and 2001 to 2005 (see Column 5) and the statistical significance of the relationship between $CTENURE_{it}$ and the change in $AF_{it}/ASSETS_{it}$ becomes stronger (the p-value changes from 0.5850 for the period 2001 to 2003 (see Column 2) to 0.2892 for the period 2003 to 2005 (see Column 4) and 0.2856 for the period 2001 to 2005 (see Column 6). Nevertheless, the relationship is not significant at conventional levels.

Table 9. $CTENURE_{it}$ (Individual Score) - OLS Regression Results Change in Audit Fees over 2001 to 2003, 2003 to 2005 and 2001 to 2005

	Change from 2001 to 2003 (n=200)		**Change from 2003 to 2005 (n=200)**		**Change from 2001 to 2005 (n=200)**	
	Coeff	p-value	Coeff	p-value	Coeff	p-value
Constant	0.0015	0.4801	0.0109	0.1122	0.0116	0.0898
Independent Variable						
$CTENURE_{it}$	-0.0002	0.5850	-0.0056	0.2892	-0.0056	0.2856
Control Variables - *Firm Complexity Variables*						
$SRSUBSID_{it}$	0.0000	0.8620	0.0001	0.6795	0.0001	0.7337
$LNNBS_{it}$	-0.0002	0.5471	0.0000	0.9978	-0.0001	0.9517
Control Variables - *Firm Risk Variables*						
ROA_{it}	-0.0009	0.0156	0.0061	0.0110	0.0056	0.0177
$CURRENT_{it}$	0.0000	0.8996	0.0000	0.8826	0.0000	0.8249
Control Variables - *Corporate Governance Variables*						
$PERNEXBD_{it}$	-0.0006	0.3276	-0.0056	0.1340	-0.0061	0.1042
$BODMEET_{it}$	0.0000	0.6578	-0.0001	0.4416	-0.0002	0.4337
$FINEXPAC_{it}$	0.0001	0.7156	-0.0011	0.6121	-0.0012	0.5869
Control Variables - *Industry Variables*						
$ENERGY_{it}$	0.0000	0.9907	0.0023	0.5228	0.0030	0.4005
$MATERIALS_{it}$	-0.0005	0.8125	-0.0017	0.5638	-0.0016	0.5884
$INDUSTRIALS_{it}$	-0.0006	0.7714	-0.0019	0.5602	-0.0015	0.0013
$CONSUMERDISC_{it}$	-0.0006	0.7833	-0.0014	0.6498	-0.0013	0.6709
$CONSUMERSTAP_{it}$	-0.0006	0.7726	0.0002	0.9631	0.0001	0.9661
$HEALTH\ CARE_{it}$	-0.0005	0.7997	-0.0020	0.5474	-0.0017	0.5999
$INFORMATION\ TECHNOLOGY_{it}$	0.0000	0.9887	-0.0039	0.3520	-0.0032	0.4462
$TELECOMM\ UNICATIONS_{it}$	-0.0020	0.3389	-0.0006	0.8925	-0.0021	0.6225
$UTILITIES_{it}$	-0.0009	0.6628	-0.0002	0.9666	-0.0006	0.8971
F-statistic (p-value)	1.2195	0.2529	1.0806	0.3764	1.0428	0.4140
Adjusted R^2	0.0184		0.0064		0.0034	

Where:

$CTENURE_{it}$ = Auditee *i* in time period *t* is scored one (1) if number of years the incumbent auditor *j* till time period *t* has been engaged as the principal auditor is 3 years or more; otherwise auditee *i* in time period *t* is scored zero (0); $SRSUBSID_{it}$ = Square root of number of subsidiaries for firm *i* at time period *t*; $LNNBS_{it}$ = Natural logarithmic of 1 plus number of business segments for firm *i* at time period *t*; ROA_{it} = Earnings before interest and tax divided by total assets for firm *i* at time period *t*; $CURRENT_{it}$ = Current assets divided by current liabilities for firm *i* at time period *t*; $PERNEXBD_{it}$ = The percentage of non-executive directors on the board of directors for firm *i* at time period *t*; $BODMEET_{it}$ = The number of board of directors meetings held during the year for firm *i* at time period *t*; $FINEXPAC_{it}$ =

A dummy variable given the value of 1 if the audit committee consists of at least one financial expert during the year for firm *i* at time period *t*; $ENERGY_{it}$ = A dummy variable given the value of 1 if the firm is in the energy industry and 0 if otherwise; $MATERIALS_{it}$ = A dummy variable given the value of 1 if the firm is in the materials industry and 0 if otherwise; $INDUSTRIALS_{it}$ = A dummy variable given the value of 1 if the firm is in the industrials industry and 0 if otherwise; $CONSUMERDISC_{it}$ = A dummy variable given the value of 1 if the firm is in the consumer discretionary industry and 0 if otherwise; $CONSUMERSTAP_{it}$ = A dummy variable given the value of 1 if the firm is in the consumer staples industry and 0 if otherwise; $HEALTH\ CARE_{it}$ = A dummy variable given the value of 1 if the firm is in the health-care industry and 0 if otherwise; $INFORMATION\ TECHNOLOGY_{it}$ = A dummy variable given the value of 1 if the firm is in the information technology industry and 0 if otherwise; $TELECOMMUNICATIONS_{it}$ = A dummy variable given the value of 1 if the firm is in the telecommunications industry and 0 if otherwise; $UTILITIES_{it}$ = A dummy variable given the value of 1 if the firm is in the utilities industry and 0 if otherwise.

A further review of Table 9 Columns 1 and 2 indicates that the coefficient on return on assets (ROA_{it}) is negative but significant (p-value<0.05) for the period 2001 to 2003. The significance of the relationship between ROA_{it} and the change in $AF_{it}/ASSETS_{it}$, however, increases for the period 2003 to 2005 (see Column 4) (p-value<0.05) before becoming weaker for the period 2001 to 2005 (see Column 6) (p-value<0.05). The coefficient on ROA_{it} also becomes positive for the period 2003 to 2005 (see Column 3) and for the period 2001 to 2005 (see Column 5). None of the corporate governance and industry variables suggest any significant statistical association with the change in $AF_{it}/ASSETS_{it}$ over the observation period. The regression models run to examine the association between the independent variables and dependent variables have an adjusted R^2 ranging from 0.0184 (change in $AF_{it}/ASSETS_{it}$ from 2001 to 2003 (see Columns 1/2)), 0.0064 (change in $AF_{it}/ASSETS_{it}$ from 2003 to 2005 (see Columns 3/4)) to 0.0034 (change in $AF_{it}/ASSETS_{it}$ from 2001 to 2005 (see Columns 5/6)). Specifically, for the period 2001 to 2003, the variables entered into the regression model explain only 1.84% of the change in the variation in the dependent variable, $AF_{it}/ASSETS_{it}$ with the goodness-of-fit (that is, adjusted R^2) falling even further in the subsequent periods of 2003 to 2005 and 2001 to 2005.

Findings from this study, therefore, conclusively indicate that audit fee variation is not driven by the auditor attributes examined in this study. Rather, results suggest that auditee characteristics are a greater predictor of audit fee variation.

5.2 Robustness and Sensitivity Analysis

Robustness and sensitivity tests were undertaken to validate the robustness of the main findings. Initially, the sample is partitioned by the following four auditee characteristics of: firm size, firm complexity, firm risk and industry.[18] Subsequently, the sample was partitioned again by three corporate governance features: non-executive board of director's members, number of board of directors meetings annually and the presence of a financial expert on the audit committee. Partitioning the sample is undertaken to determine if the main regression results are influenced by either auditee or corporate governance features. Additionally, the main regression model as defined in *Equation 1* is amended to include an alternative measure of audit fees. Specifically, a new variable, the natural logarithm of the audit fees paid to the external auditor for the provision of external audit services for firm *i* at time period *t* (AF_{it}) is utilised as the dependent variable (and, therefore, the natural logarithm of total assets for firm *i* at time period *t* ($ASSETS_{it}$) is introduced into the regression model as an additional control variable). The alternative measure of audit fees is derived to determine if the main regression results in Chapter Six are influenced by the choice of the measure of audit fees used (that is, $AF_{it}/ASSETS_{it}$). Additionally, alternative measures for the control variables utilised in the main results were formulated and regression results re-run.

Overall, robustness and sensitivity analysis suggest that the main findings of this study are robust to auditee characteristics, corporate governance features, alternative measures of audit fees and control variables.

6. Conclusions

This study investigated both the existence and extent of competitive audit pricing in the Australian audit services market during a five-year time frame to determine if there is any evidence of cartel pricing and, hence, anti-competitive behavior by the *Big4*.[19] The longitudinal analysis of this study yielded important insights into the association between four pivotal auditor attributes (that is, auditor brand name, industry specialization, provision of non-audit services and tenure) and the quantum of audit fees

[18] The following approach was utilised when partitioning the sample: (1) for each individual year (that is, 2001, 2003 and 2005), the relevant split point for the auditee characteristics is identified (that is, median); (2) the sample is then partitioned per individual year based on the identified split point; (3) the individual year-based split points are re-combined into a pooled sample of 600 observations; and (4) the robustness and sensitivity tests are then run using the pooled sample.

[19] The public debate on the matter of auditor concentration and the possibility of cartel pricing and anticompetitive behavior in Australia by the *Big4* has resulted in the *ACCC* examining the issue and agreeing that the international accounting firms mergers raises concerns for competition in the Australian audit market (ACCC 1999).

paid by Australian publicly listed firms. An investigation into the auditor attributes - audit fee linkage is of regulatory, professional and capital market investor interest with significant concerns having been expressed about the growing possibility of cartel auditing pricing within the Australian audit services market and the resulting prospect of anticompetitive behavior by large accounting practices, particularly the *Big4* auditors. Findings from this study conclusively indicate that audit fee variation is not driven by supply-side features of an audit engagement (that is, auditor attributes) but rather is determined by demand-side features such as auditee size, complexity and risk. Given that results indicate that audit fee variation is not determined by supply-side features, this study finds no evidence to suggest the existence of cartel pricing and anticompetitive conduct by *Big4* auditors.

Results from this study make various important contributions: First, the results suggest that the four pivotal auditor attributes examined in this study are not significantly associated with variation in audit fees. This provides direct empirical evidence refuting concerns about the existence/charging of cartel pricing and anticompetitive behavior by auditors who provide such services nationally and internationally (that is, the *Big4* auditors). Results, therefore, have important consequences for scholars, auditors, auditee/management operations and for the efficient and effective operation of capital markets. Second, by examining a number of composite auditor attributes and audit fees (both on an aggregated and dis-aggregated basis) and by focusing on the supply side of the demand for auditing, this study provides a much deeper understanding of an important monitoring mechanism (that is, auditing) and the extent to which supply-side features impact audit fees. Third, given that the results suggest that the four pivotal auditor attributes examined in this study are not significantly associated with variation in audit fees, regulators, scholars, and auditors can utilize the results to investigate/regulate other key corporate governance mechanisms which may play a more effective role in promoting increased audit quality and, therefore, improving the integrity of a firm's financial reporting process. The results of this study, therefore, have real economic consequences for regulators, scholars, and auditors. Fourth, given that this study captured a cross-section of industries, results shed light on the existence of an industry-effect on the quantum of audit fees charged by auditors, for example, whether certain industries are more expensive to audit than others. Results reveal that firms in the energy, information technology and telecommunications industries pay a statistically higher amount of audit fees than other industries.[20] This result is contrary to the prior literature (Balsam et al. 2003; DeFond et al. 2000; Gerrard et al. 1994; Willenborg 2002) but the difference can be explained by the fact that post-2005, external auditors (particularly the *Big4*) have changed their (auditor's) audit strategy with clients and adopted a 'balance sheet' approach to an audit engagement as opposed to the prior approach which was 'profit and loss' based. The change in auditor's approach has necessitated a more rigorous approach to balance sheet items (compared to profit and loss items) thus increasing the associated audit fee.[21]

While this study has a number of strengths, it is not without limitations. For instance, audit quality is a multi-dimensional, complex construct that can be determined by a number of auditor attributes. This study only examined four specific auditor attributes. Another limitation was the fact that this study used data from only one country, namely Australia. This single-nation focus potentially limits the ability to generalize study's empirical results to other domestic and institutional settings. A further limitation was that in order to test the hypotheses, data for all of the variables used in this study were collected from annual reports. Such an approach to data collection potentially limits the amount and type of data that can be collected. The scope, objectives and findings of this study opens avenues for further research. At a minimum, future research can begin by addressing the limitations identified above.

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[20] In accordance with prior literature, firms in the financial industry are excluded from the sample and hence, this study (Felix et al., 2001, Gonthier-Besacier & Schatt, 2007, Singh & Newby, 2010).

[21] Firms in the telecommunication services and utilities industry have relatively large assets and were therefore thought easier to audit prior to 2005 compared to firms with extensive receivables and inventories such as manufacturers (Gerrard et al., 1994, Simunic, 1980).

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