**University of Alberta**

Three Essays in Audit Quality

by

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## DEDICATION

To my parents, Lisheng Zhang and Jufen Sheng, who always want me to become an educated person and to my mentor Dr. Jennifer Kao who made this happen! Also to my loving spouse and best friend forever, Hector Cheung, who has been a great supporter!

# ABSTRACT

This thesis presents three essays on audit quality tied up by a common thread: the implication of closeness in auditor-client relationship on audit quality and beyond. In Chapter II, I investigate the implications of close auditor-client relationships arising as time passes on clients' operating decisions. I find long auditor tenure constrains clients' discretion in accrual reporting, which in turn prompts firms to resort to real activity management if they are under pressure to achieve earnings targets. For a given length of auditor tenure, the presence of auditor industry expertise does not affect the association between tenure and clients' engagement in real activity management. These findings highlight an unintended consequence of long auditor tenure and therefore contribute to the on-going debate concerning the merits and shortcomings of mandatory audit firm rotation. In Chapter III and IV, we examine the implications of close auditor-client relationships arising from economic bonding on audit quality reflected from clients' accrual reporting and auditors' going-concern decisions. In Chapter III, we find a significantly positive association between fee dependence and abnormal accruals prior to the passage of the Sarbanes-Oxley Act (hereafter SOX), but not in the post-SOX period, suggesting that SOX has enhanced non Big-4's ability to withstand client pressure arising from fee dependence. These results suggest strong economic bonding between auditors and clients may impair audit quality among smaller auditors, and tightening auditors' external litigation exposures enhances small auditors' abilities to withstand client pressure. In Chapter IV, we find that even for firms that are most targeted by SOX, auditors do not allow economic bonding to affect

their going-concern decisions in either the pre- or the post-SOX period. These findings thus suggest potential litigation risks faced by auditors in the event of failures to warn the public about their clients' severe financial distress prior to bankruptcy are high enough to deter auditors from compromising their independence in formulating going-concern decisions. In conclusion, audit quality is affected by closeness in the auditor-client relationship and regulatory intervene may be needed depending on specific setting in terms of auditor type and auditing decisions.

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# CHAPTER 1

## INTRODUCTION

A wave of highly publicized accounting scandals in early 2000's has drawn attention to the failure of external monitoring mechanisms including financial analysts, independent directors and esp. external auditors. Enron's cozy relationship with its auditor, Arthur Andersen, in years leading to its collapse has shown that a close auditor-client relationship can bias judgment and undermine professional scepticism during the auditing process. An overarching theme of the thesis is closeness in an auditor-client relationship and in particular how such closeness may affect the reporting objectivity of auditors. Of many factors that can contribute to an auditor-client relationship, two are studied in this thesis, namely, auditor tenure and economic bonding between an auditor and her clients. Another objective of the thesis is to address the question of whether regulatory interventions, such as the Sarbanes-Oxley Act of 2002 (hereafter SOX), are effective in enhancing auditor independence.

Long auditor tenure can impair auditor's judgment (Mautz and Sharaf 1961). Regulators have cited mandatory auditor rotation as a possible solution over the years (SOX 2002; SEC 1994; AICPA 1978). Pursuant to Section 207 of SOX, the U.S. General Accounting Office studied the effects of requiring periodic audit firm rotation and concluded in November 2003 that its benefits were not certain. Recent auditing literature has focused on the impact of long auditor tenure on audit quality, as proxied by accrual reporting, and largely concluded that audit quality improves with auditor tenure (Myers, Myers and Omer 2003; Johnson, Khurana and Reynold 2002). Chapter 2 extends this line of research to study the potential consequence of long auditor tenure on the extent of real activity management, a prospect not considered in either past regulatory deliberations or prior academic literature. Chapter 2 also examines the role that audit industry specialization may play in affecting the association between auditor tenure and real activity management. Results indicate that long auditor tenure is associated with abnormally large real activity management and that auditors' industry expertise does not appear to affect such association. While long auditor tenure allows auditors to accumulate sufficient firm-specific knowledge to detect and constrain aggressive accrual reporting, the ensuing increase in real activity management can lower firm values in the long run. By highlighting a further consequence of long auditor tenure, Chapter 2 contributes to the debate concerning the merits and shortcomings of mandating audit firm rotation.

When a significant portion of an auditor's total revenues derives from certain clients the resulting economic bonding may draw an auditor closer to her client (Simunic 1984), prompting auditors to allow that client with more accounting flexibility (DeAngelo 1981). To reduce economic bonding, Titles I and XI of SOX raise auditors' expected litigation costs and professional sanctions in the event of audit failures. Chapter 3 examines the effects of these provisions on the association between fee dependence and abnormal accruals, particularly among non Big-4 auditors. Results indicate that non Big-4 auditors yield to client pressure regarding accrual reporting in the loose (pre-SOX) regulatory regime, but not so during the stringent (post-SOX) regime. Further analysis indicates that the third-tier non Big-4 auditors are more affected by client pressure in the less litigious (pre-SOX) regime, compared to the second-tier non Big-4 auditors. However, both groups of auditors exhibit a similar ability to withstand client pressure when their exposures to litigation risks are high in the post-SOX period. By comparison, Big-4 auditors are able to maintain independence over accrual reporting in both the pre- and the post-SOX periods. Chapter 3 contributes to the fee dependence literature by drawing attention to non Big-4 auditors, who have played an increasingly important role in the audit market since early 2000s.

Chapter 4 turns to the question of whether SOX has altered the association between economic bonding and audit quality, as proxied by an auditors' propensity to issue going-concern opinion. Results indicate that economic bonding is unrelated with the incidence of going-concern reservation, either before or after the passage of SOX. A key contribution of Chapter 4 is to propose a research methodology that classifies financially distressed firms into those most affected versus least affected by SOX. Unlike the usual overall analysis employed in the fee dependence literature, this more refined analysis is intended to isolate the effects of reduced non-audit services (Title II of SOX), increased litigation costs (Titles I and XI of SOX) or both on auditor independence. The rapid growth in non-audit services throughout the 1990s and early 2000s was widely believed by regulators and commentators to have contributed to auditors' lax attitudes towards accounting irregularities committed by their clients. Chapter 4 suggests that such causal inferences may not be well supported since limiting the scope of non-audit services has not improved auditor independence.

Taken together, Chapters 3 and 4 point out the importance of assessing the efficacy of SOX, not only for subsets of auditors but also for different auditor decisions. While Chapter 3 shows that SOX has significantly lowered abnormal accruals and enhanced auditor independence for non-Big 4 auditors in the post-SOX period, no comparable evidence is found in regard to auditors' going-concern decisions in Chapter 4. These results are not surprising given that failures by auditors to warn the public about severe financial distress faced by their clients are viewed as a more serious violation of auditor independence than failures to detect within-GAAP earnings management through a varying extent of accounting accruals. For that reason, auditors may be more inclined to compromise their independence with respect to accrual reporting than issuance of going-concern opinions.

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# CHAPTER 2

## Auditor Tenure, Industry Specialization and Real Activity Management

### 2.1 INTRODUCTION

Following the collapse of Enron and the subsequent demise of its auditor Arthur Andersen, regulators have expressed concerns about the impact of long auditor tenure on audit quality and called for research into whether mandatory audit firm rotation would reduce the incidence of audit failures. Since then, several recent studies have shown that long-term involvement of the same auditor serves to constrain her clients' use of abnormal accruals and hence yields higher audit quality (Gul, Fung and Jaggi 2009; Myers, Myers and Omer 2003; Johnson, Khurana and Reynold 2002). However, the impact of long auditor tenure may extend beyond improved financial reporting quality, a prospect not considered in regulatory deliberations or the aforementioned studies. For example, firms under pressure to meet or beat earnings targets may resort to real activity management when their accounting flexibility is limited by external auditors. Unlike the use of accounting discretion to manage reported earnings, real activity management can lead to a decline in the subsequent periods' operating performance and lower firm value in the long run (Gunny 2009).

The primary objective of this study is to examine the association between auditor tenure and the extent of real activity management given the constraint an external audit places on accrual management. Ewert and Wagenhofer (2005) demonstrate analytically that tougher enforcement of accounting standards can force firms into managing real activities, as opposed to accounting numbers. To the extent that long auditor tenure implies high audit quality over accrual reporting, their theory suggests that the length of auditor tenure may lead to an increased use of real activity management. Real activity management, if prevalent, represents sub-optimal operating decisions which can prove costly to the firm as well as to the society as a whole. This line of enquiry is intended to contribute to the on-going debate concerning the merits and shortcomings of mandatory audit firm rotation and to highlight a not well-understood impact of regulatory focus on the association between auditor tenure and accounting-based earnings management.

A secondary objective of this study is to investigate whether auditor industry specialization would mitigate the auditor-tenure induced substitution between accounting-based earnings management and real activity management. A recent study by Gul et al. (2009) shows that the involvement of industry specialists can moderate the association between auditor tenure and accrual management, especially at the early stage of the auditing engagement when client-specific knowledge is lacking. If the mitigating effect extends to real activity management, then it can weaken the association between auditor tenure and real activity management for the subset of firms audited by industry specialists, implying that a one-size-fits-all regulation over mandatory audit firm rotation may impose differential costs on firms.

The sample consists of 9,329 firm-year observations with complete annual financial and audit-related data between 1990 and 2006, of which 1,238 (8,091) retained an industry specialist (non-specialist) as their auditors. In the main analysis, each firm-year observation is required to meet or beat at least one of the following two earnings benchmarks: positive earnings or positive earnings growth. Following prior studies, I proxy for abnormal real activity management (labeled *RM* hereafter) using a measure comprised of abnormal cash flows from operations, abnormal discretionary expenses and abnormal production costs (Cohen, Dey and Lys 2008; Roychowdhury 2006); and accounting-based earnings management using absolute abnormal accruals (labeled *ABS_DA* hereafter) estimated based on the forward-looking version of the modified Jones model (Dechow, Richardson and Tuna 2003).

Initially, I employ an ordinary-least-square (OLS) research design that regresses abnormal real activity management on auditor tenure (labeled *TENURE* hereafter), industry specialization (labeled *SPEC* hereafter) and an interaction term involving *TENURE* and *SPEC*, along with a set of control variables. Results indicate that auditor tenure is positively associated with abnormal real activity management but unrelated with auditors' industry expertise and that having a specialist auditor does not alter the association between *TENURE* and *RM*. Conducting a separate analysis for subsets of firms audited by industry specialists and non-specialists indicates that the observed positive association between *TENURE* and *RM* is present only for the non-specialist subsample. However, the coefficient estimates on *TENURE* are not statistically different between the specialist and the non-specialist subsamples.

To more formally address the questions of whether accounting-based earnings management affects both the association between auditor tenure and real activity management and any moderating effect that industry specialization may have on such association, I next employ a two-stage-least-square (2SLS) research design. Specifically, I regress absolute abnormal accruals on *TENURE* and *SPEC* in the first-stage and abnormal real activity management on *SPEC* and the predicted value of *ABS_DA* in the second-stage. Results indicate that *TENURE* is negatively associated with *ABS_DA* and that the predicted value of *ABS_DA* generated from the first-stage is negatively related to *RM* in the second-stage. These results suggest that auditors possessing superior client-specific knowledge due to the length of their appointment can effectively constrain their clients' accounting-based earnings management. The reduced accounting flexibility in turn likely motivates clients to bypass the external auditors' scrutiny by managing their earnings through non-accounting channels, such as real operating activities. Partitioning the sample along the audit industry specialization dimension, I once again find that the association between *TENURE* and *RM* is statistically similar across firms audited by industry specialists and those audited by non-specialists. This result is consistent with that obtained using OLS regressions and suggests that industry specialization does not mitigate the extent of real activities management.

All the results reported in the study continue to hold when firms are required to meet or beat only one of the earnings benchmarks and if alternative definitions of *TENURE* and *SPEC* are employed. Finally, extending both the OLS and 2SLS regression analyses to the subset of 5,739 (3,590) firm-year observations with income-increasing (income-decreasing) abnormal accruals also does not alter any of the results qualitatively speaking.

The remainder of the paper is organized as follows: Section 2.2 reviews relevant literature and develops the hypotheses for the study; Section 2.3 discusses the OLS and 2SLS research designs, along with variable definitions and measurements; Section 2.4 describes the data and sample selection procedure; Section 2.5 presents the main empirical findings; Section 2.6 present results from robustness checks, followed by concluding remarks in Section 2.7.

## 2.2 LITERATURE REVIEW

### *2.2.1 Alternative Earnings Management Strategies*

A failure to meet or beat various earnings benchmarks can lower stock prices and adversely affect management compensation (Graham, Harvey and Rajgopal 2005; Mastunaga and Park 2001; Barth, Elliott and Finn 1999), giving rise to incentives to manage earnings through either the choice of within-GAAP accounting methods and estimates or changes to a firm's underlying operating activities (Graham et al. 2005; Healy and Wahlen 1999; Bartov 1993). The former approach affects reported earnings across time periods but not cash flows. By comparison, the latter method has potential implications for not just current period cash flows, but also a firm's future prospects.

### *2.2.2 Link between Auditor Tenure and Real Activity Management*

External auditors play an important role in mitigating agency costs by constraining the manager's ability to exercise accounting discretion and report overly aggressive or conservative accounting numbers. Long auditor tenure may create a level of closeness that impairs audit objectivity, prompting auditors to permit greater accounting flexibility over financial reporting. Reflecting this concern, the U.S. Congress considered the possibility of mandating audit firm rotation through Section 207 of the Sarbanes-Oxley Act of 2002. The U.S. General Accounting Office studied potential effects of such a pronouncement and concluded in November 2003 that its benefits were not certain and that more experience with the effects of SOX's other requirements was needed. Some researchers however argue that conceptually auditor independence may be impaired even in the early part of auditor tenure, because the initial low-balling encourages auditors to accommodate their clients so as to extract future quasi-rents (Summer 1998; Dye 1991). Moreover, client-specific knowledge is generally acquired with the passage of time (Lapre, Mukkerjee and Van 2000; Glaser and Bassok 1989; Glaser and Chi 1988) and auditors are expected to gain a better understanding of client risks as their tenure lengthens (Solomon, Shields and Whittington 1999; Knapp 1991; Beck, Frecka and Solomon 1988). A lack of knowledge about clients' business operations, accounting systems and internal control when auditors are first appointed may therefore limit their ability to detect material accounting errors and irregularities (Carcello and Nagy 2004; Palmrose 1986).

Several empirical studies have taken a closer look at the association between auditor tenure and audit quality in recent years and largely concluded that audit quality improves with auditor tenure. Myers et al. (2003) and Johnson et al. (2002), for example, find that firms audited by the same auditor for an extended period of time tend to have lower absolute discretionary accruals and current accruals. In a related vein, Gosh and Moon (2005) and Mansi, Maxwell and Miller (2004) show that auditors are perceived to be of high quality if their tenure is long.[1]

The extant literature, however, has not explored a possible link between auditor tenure and real activity management, reflecting a general perception that auditors are not in a position to challenge their clients' real operating activities taken in the normal course of business (Graham et al. 2005) and that departures from the "norm" are unlikely to adversely affect auditors' reputation or subject them to litigations. While it is true that external auditors cannot influence real activities directly, they can nonetheless do so indirectly through their audit strategy over accounting discretion exercised by their clients. If auditors opt to severely constrain accounting flexibility, then firms under pressure to achieve earnings targets may have little choice but to resort to real activity management.

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[1] There is, however, an exception to these findings. Davis, Soo and Trompeter (2002) report that the magnitude of absolute discretionary accruals increases with auditor tenure. The discrepancy between their results with the others' could be caused by their choice of sample selection and sample period. Davis et al.'s sample is restricted to firms with SIC code that is less than 6000 and their sample period is between fiscal year 1980 and 1998.

Zang (2007) concludes that these two earnings management approaches are substitutes. Ewert and Wagenhofer (2005) also put forth theoretical arguments for large real activity management in the face of high accounting standards and strong enforcements (also see Demski 2004). Finally, Cohen et al. (2008) report that after the passage of the Sarbanes-Oxley Act there is less accounting-based earnings management but more real activity management. Drawing on these insights, I expect that the regulatory focus on curtailing the manipulation of accounting earnings through provision of accruals may force managers to undertake real activity management. The above discussion leads to the first hypothesis for the study (stated in the alternate):

> **$H_{1a}$**: *Ceteris paribus*, long auditor tenure contributes to a client's incentive to undertake real activity management by constraining the extent of accounting-based earnings management.

### *2.2.3 Auditor Industry Specialization, Auditor Tenure and Real Activity Management*

Parallel to the literature on the association between auditor tenure and audit quality is research looking into the effect of industry specialization on audit quality. It is argued that audit specialists can better detect accounting-based earnings management than non-specialists (see Gramling and Stone 2001 for a survey), because specialists are more likely to provide quality-differentiated services (Titman and Trueman 1986), comply with auditing standards (O'Keefe, Kin and Gaver 1994) and/or acquire an in-depth understanding of risks and complexities associated with their clients' industry (Maletta and Wright 1996).

Consistent with this argument, Owhoso, Messier and Lynch (2002) report that auditors can readily spot accounting errors made by clients in industries that they specialize, but less so for errors committed by clients outside their specialization. Similarly, Krishnan (2003) and Balsam, Krishnan and Yang (2003) find that clients audited by industry specialists report smaller discretionary accruals than those audited by non-specialists.

Recently, Gul et al. (2009) combines these two lines of research to study the joint impact of auditor tenure and industry specialization on accrual reporting. They find that the well-documented inverse relation between abnormal accruals and auditor tenure is only present for the subset of firms audited by non-specialists. Long auditor tenure does not appear to improve audit quality when external auditors are also known as experts in their clients' industry. Presumably, the extent of accounting discretion is already severely limited by audit specialization in this case. An implication of Gul et al.'s findings is that, for a similar length of auditor tenure, clients of non-industry specialists with long tenure are more likely to substitute real activity management for accounting-based earnings management, compared to specialists' clients. The above discussion leads to the second hypothesis for the study (stated in the alternate):[2]

---

[2] A concurrent study by Yu (2008) examines the association between industry specialization and real activity management and finds that firms audited by industry specialists are more likely to engage in real activity management. There are several major differences between Yu (2008) and this study. First, she does not consider auditor tenure. Second, she does not speak to the question of whether industry specialization may mitigate the auditor-tenure induced substitution effect between accounting-based earnings management and real activities management. Third, she works with firms that just meet analyst forecasts. These firms arguably may provide guidance for analyst forecasts using expectation management, rather than (or in addition to) accruals and real activity management (Matsumoto 2002).

**$H_{2a}$**: *Ceteris paribus*, audit industry specialization mitigates the auditor-tenure induced substitution effect between accounting-based earnings management and real activities management.

## 2.3 RESEARCH DESIGN

To address the research questions of the study, I conduct two sets of analysis: First, ordinary-least-square (OLS) regressions to establish the association between auditor tenure and real activity management and to show whether industry specialization has a moderating effect on such association in settings where accounting-based earnings management is abstracted away (Section 2.3.1). Second, two-stage-least-squares (2SLS) regressions to study the impact of accounting-based earnings management on the association identified above based on OLS (Section 2.3.2).

### *2.3.1 Ordinary-Least-Squares Regressions (OLS)*

I employ the following OLS regression model, estimated using the sample pooled over the 17-year (1990-2006, discussed in Section 2.4):[3]

$$\begin{aligned} RM_{i,t} = {} & \alpha_0 + \alpha_1 TENURE_{i,t} + \alpha_2 SPEC_{i,t} + \alpha_3 TENURE_{i,t} \bullet SPEC_{i,t} \\ & + \alpha_4 SIZE_{i,t} + \alpha_5 ROA_{i,t} + \alpha_6 BTM_{i,t} + \alpha_7 LIFECYCLE_{i,t} + \alpha_8 HF_{i,t} \\ & + INDUSTRY\_DUMMIES + YEAR\_DUMMIES + \varepsilon \end{aligned} \tag{2-1}$$

I do not include a measure of abnormal accruals on the right-hand-side of Equation (2-1) to avoid multicollinearity problems because, as reported in Table

[3] I also estimate Equation (2-1) by year to mitigate cross-sectional correlation in the regression error terms. In this case, the coefficients are given by the means of time-series coefficients and the *t*-statistics are calculated based on the time-series standard errors of the estimated coefficients. Results (untabulated) are qualitatively unchanged and hence are not discussed in the text.

2.3 later on, this variable is highly correlated with many of the model variables. Definitions and measurements of all the model variables in this and subsequent equations are discussed below and summarized in Appendix 2-I.[4]

The dependent variable *RM* in Equations (2-1) is a measure of real activity management comprised of abnormal activities in sales, discretionary expenditures and production. These three components of *RM* are estimated cross-sectionally for all the two-digit SIC industry-year groups with at least 15 observations using the following expectation models (Dechow, Kothari and Watts 1998):[5]

$$CFO_{i,t} / A_{i,t-1} = \beta_0 + \beta_1(1/A_{i,t-1}) + \beta_2(S_{i,t}/A_{i,t-1}) + \beta_3(\Delta S_{i,t}/A_{i,t-1}) + \varepsilon_{i,t} \quad (2\text{-}2)$$

$$EXP_{i,t} / A_{i,t-1} = \gamma_0 + \gamma_1(1/A_{i,t-1}) + \gamma_2(S_{i,t-1}/A_{i,t-1}) + \varepsilon_{i,t} \quad (2\text{-}3)$$

$$\begin{aligned} PROD_{i,t} / A_{i,t-1} = {} & \eta_0 + \eta_1(1/A_{i,t-1}) + \eta_2(S_{i,t}/A_{i,t-1}) \\ & + \eta_3(\Delta S_{i,t}/A_{i,t-1}) + \eta_4(\Delta S_{i,t-1}/A_{i,t-1}) + \varepsilon_{i,t} \end{aligned} \quad (2\text{-}4)$$

In the above equations, $CFO_{i,t}$ denotes cash flows from operations; $A_{i,t-1}$ lagged total assets; $S_{i,t}$ net sales; $\Delta S_{i,t}$ changes in net sales from fiscal year t-1 to fiscal year t; $EXP_{i,t}$ selling, general and administrative expenses; $S_{i,t-1}$ lagged net sales; and $PROD_{i,t}$ is the sum of COGS and $\Delta Inventory$. The residual terms from Equations (2-2)-(2-4) represent the abnormal level of these three types of real activities (labeled *DCFO, DDISEXP* and *DPROD*, respectively). For each firm,

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[4] Throughout the text, the subscript *i* denotes an audit client and the subscript *t* denotes the current fiscal year. All the regression variables are winsorized at the top and bottom one percentile of their respective distributions.

[5] Panel A of Appendix 2-II summarizes the estimation results for expectation models (2-2)-(2-4). Almost all the estimated coefficients have signs consistent with those documented in Roychowdhury (2006).

the value of *RM* is defined as the sum of standardized variables *DCFO, DDISEXP* and *DPROD* (Cohen et al. 2008).[6] A large value of *RM* implies a high probability that firms have discounted prices, reduced discretionary expenditures and/or over produced.

Equation (2-1) has two test variables: First, auditor tenure (*TENURE*), defined as the number of years an auditor is retained by the firm.[7] A significantly positive coefficient on *TENURE* implies that auditor tenure is positively associated with clients' real activity management. Second, the interaction term $TENURE_t \bullet SPEC_t$, capturing the effect auditor industry specialization has on the association between auditor tenure and real activity management. A significantly negative coefficient on $TENURE_t \bullet SPEC_t$ suggests that industry expertise would mitigate the association between auditor tenure and real activity management.

Equation (2-1) also includes six control variables found to have influenced the level of abnormal accruals in prior studies: Audit industry specialization (*SPEC*), coded as one if an audit firm is the largest audit-service provider in the industry and its industry market share exceeds that of the second-ranked provider by at least 10% (Mayhew and Wilkins 2003); and zero otherwise.[8] I restrict

[6] Following Zang (2007), I multiply *DCFO* and *DDISEXP* by negative one such that higher values indicate a higher level of abnormal transactions.

[7] *TENURE* is calculated based on Item *AU* from COMPUSTAT, truncated as of 1974 due to data availability. Following Gul et al. (2009) and Myers et al. (2003), I consider audit firm mergers as a continuation of prior auditors. For example, when Arthur Young and Ernst & Whiney merged into Ernst & Young in 1989, Arthur Young's clients that stayed with Ernst & Young are viewed as not having changed their auditors.

[8] For every two-digit SIC code with at least 20 clients, the auditor's industry market share is computed using the population of available observations from COMPUSTAT each year. Clients' sales revenues, rather than actual audit fees, are used as the basis in this calculation because public

industry specialists to the Big-N auditors, because audit quality and the perception of audit quality have been shown to differ for firms audited by Big-N versus non Big-N auditors (Francis, Maydew and Sparks 1999; Becker, DeFond, Jiambalvo and Subramanyam 1998). Client size (*SIZE*), defined as the logarithmic transformation of the average total assets (Dechow and Dichev 2002). Return on assets (*ROA*), defined as earnings before extraordinary items deflated by average total assets (Kothari, Leone and Wasley 2005). Book-to-market ratio (*BTM*), defined as the book value of equity divided by market value of equity (Jones 1991). A firm's life cycle (*LIFECYCLE*), defined as the sum of standardized measures of sale growth, capital expenditure, firm age and net-capital transaction (Hribar and Yehuda 2008). The degree of market competition (*HF*), measured as the sum of the squared share of each firm in total sales of the industry (Chhaochharia, Grinstein, Grullon and Michaely 2009; Kallapur, Sankaraguruswamy and Zang 2008).

### *2.3.2 Two-Stage-Least-Squares Regressions (2SLS)*

To formally test the predictions that an auditor's ability to constrain her clients' accrual management affects not just the association between auditor tenure and real activity management ($H_{1a}$) but also the moderating effects that industry specialization may have on such association ($H_{2a}$), I employ the following two-

disclosure of audit fees data only became mandatory in 2001.

stage least squares (2SLS) regressions, estimated using the entire sample pooled across 17-year (1990-2006).[9,10]

First-Stage Model

$$\begin{aligned} ABS\_DA_{i,t} = {} & \delta_0 + \delta_1 TENURE_{i,t} + \delta_2 SPEC_{i,t} + \delta_3 SIZE_{i,t} + \delta_4 ROA_{i,t} + \delta_5 BTM_{i,t} \\ & + \delta_6 LIFECYCLE_{i,t} + \delta_7 HF_{i,t} + INDUSTRY\_DUMMIES \\ & + YEAR\_DUMMIES + \varepsilon_{i,t} \end{aligned} \tag{2-5}$$

Second-Stage Model

$$\begin{aligned} RM_{i,t} = {} & \lambda_0 + \lambda_1 P\_ABS\_DA_{i,t} + \lambda_2 SPEC_{i,t} + \lambda_3 SIZE_{i,t} + \lambda_4 ROA_{i,t} + \lambda_5 BTM_{i,t} \\ & + \lambda_6 LIFECYCLE_{i,t} + \lambda_7 HF_{i,t} + INDUSTRY\_DUMMIES \\ & + YEAR\_DUMMIES + \varepsilon_{i,t} \end{aligned} \tag{2-6}$$

This 2SLS research design is motivated by prior studies, which show that accounting-based earnings management and real activity management are jointly determined (Hunt, Moyer and Shevlin 1996; Beatty, Chamberlain and Magliolo 1995).[11] It is also consistent with untabulated *Hausman* test results which reject the null of independence between absolute abnormal accruals and abnormal real activity transactions for my sample (*Chi-square* = 130.5, *Pr* < 0.01).

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[9] Again, estimating Equations (2-5)-(2-6) by year does not change any of the results qualitatively speaking.

[10] Equations (2-5)-(2-6) include the same set of model variables to allow a cleaner interpretation of the effect of *ABS_DA* on *RM* in the second-stage through *P_ABS_DA*. As a robustness check, I add three more control variables to the first-stage model: *LITIAGTION*, set equal to one if a firm operates in highly litigious industries and zero otherwise (Ashbaugh, LaFond and Mayhew 2003); *STD_NIBE*, measured as the standard deviation of a firm's net income before extraordinary item scaled by average assets over the rolling preceding 10-year period (Hribar and Nichols 2007); *LAG_NOA*, defined as the opening net operating assets deflated by average total assets (Barton and Simko 2002). All the results (untabulated) continue to hold.

[11] I assume that both methods of earnings management are carried out simultaneously (Pincus and Rajgopal 2002; Barton 2001; Gaver and Paterson 1999; Hunt et al. 1996; Beatty et al. 1995). By comparison, Zang (2007) suggests that real activity management is carried out before accrual management. But like this study, Zang uses annual data which do not allow her to draw inferences about the timing of earnings management within a fiscal year. In fact, Zang's findings that abnormal accruals and abnormal real activity transactions are highly clustered in the last fiscal quarter appear to be inconsistent with the sequential timing assumption.

All the variables in Equations (2-5)-(2-6) are as defined in Section 2.3.1, except for absolute abnormal accruals (*ABS_DA*) in the first-stage and the predicted absolute abnormal accruals (*P_ABS_DA*) in the second-stage. Following Dechow, Richardson and Tuna (2003), I use the forward-looking version of the modified Jones model to estimate the normal level of total accruals cross-sectionally each year for every two-digit SIC industry groups with at least 15 observations:[12]

$$\frac{TAC_{i,t}}{A_{i,t-1}} = \frac{\psi_0}{A_{i,t-1}} + \psi_1 \frac{(1+k)\Delta S_{i,t} - \Delta REC_{i,t}}{A_{i,t-1}} + \psi_2 \frac{PPE_{i,t}}{A_{i,t-1}} + \psi_3 \frac{TAC_{i,t-1}}{A_{i,t-2}} + \psi_4 \frac{\Delta S_{i,t+1}}{S_{i,t}} + \varepsilon_{i,t} \tag{2-7}$$

where $TAC_{i,t}$ denotes earnings before extraordinary items minus cash flows from operations; $A_{i,t-1}$ lagged total assets; $k$ the estimated slope coefficient from a regression of $\Delta REC$ on $\Delta Sale$ (i.e., $\Delta REC_{i,t} = a + k\Delta S_{i,t} + \varepsilon_{i,t}$) for each two-digit SIC industry-year group; $\Delta REC_{i,t}$ changes in trade account receivables; $PPE_{i,t}$ property, plant and equipment. The residual term from Equation (2-7) represents abnormal accruals used to proxy for accounting-based earnings management. Panel B of Appendix 2-II presents the estimation results for Equation (2-7).[13]

A significantly negative coefficient on *P_ABS_DA* in Equation (2-6) and a significantly negative coefficient estimate on *TENURE* in Equation (2-5) are

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[12] Results (untabulated) are qualitatively similar when I use the modified Jones model (Dechow, Sloan and Sweeney 1995) to estimate the normal level of total accruals.

[13] For comparison purpose, I also include estimation results based on the modified Jones model (Dechow et al. 1995) in Panel B of Appendix 2-II. The mean adjusted *R*-square of the forward-looking modified Jones model is higher than that of the modified Jones model, suggesting that the former yields smaller measurement errors. All the estimated coefficients are significant and have the same signs as those reported in Dechow et al. (2003).

consistent with the prediction of Hypothesis $H_{1a}$. Collectively, they imply that long auditor tenure is associated with a low level of accrual management, which in turn contributes to greater use of real activity management. To test whether the association between auditor tenure and real activity management would vary across the subset of firms audited by industry specialists versus non-specialists (Hypothesis $H_{2a}$), I partition the sample into two groups along the industry specialization dimension and replicate the 2SLS regressions (i.e., Equations (2-5)-(2-6)) within each sub-sample. The prediction of Hypothesis $H_{2a}$ is supported if the coefficient estimate on both *P_ABS_DA* and *TENURE* are significantly greater for clients of industry specialists than for those of non-specialists.

## 2.4 SAMPLE SELECTION

The initial sample consists of the entire population of COMPUSTAT over a 17-year (1990-2006) period. The start of the sample period, 1990, is chosen because the Statement of Cash Flows data did not became available until 1988 (Hribar and Collins 2002). The sample period starts two years later because one-year and two-year lagged data are used to construct regression variables. I impose the following filters: (1). Firms must not belong to financial (SIC 6000-6999) and regulated industries (SIC 4400-5000). (2). Firms must have sufficient financial information from COMPUSTAT to allow for the construction of regression variables. (3). Firms must meet or beat at least one of the following two earnings benchmarks: positive earnings or positive earnings growth.[14] The final sample consists of 9,329

[14] According to Degeorge, Patel and Zeckhauser (1999), managers are most concerned with

firm-year observations. Panel A of Table 2.1 summarizes the sample selection procedure.

Panel B of Table 2.1 presents the sample distribution by industry at the overall level. A disproportionately large number of firms come from Business, Manufacturing and Wholesale-Retailing industries, representing 20.58%, 20% and 12.99% of the sample, respectively. As is evident in Panel C of Table 2.1, the sample is largely evenly distributed across the 17-year sample period, especially between 1994 and 2002. There is however an above (below) average representation of sample firms in the last (first) four sample years, i.e., 2003-2006 (1990-1993).

[Insert Table 2.1 about Here]

## 2.5 EMPIRICAL RESULTS

### *2.5.1 Descriptive Statistics*

Panel A of Table 2.2 presents the overall descriptive statistics of all the continuous variables used in Equation (2-1), along with the descriptive statistics of absolute abnormal accruals from Equation (2-5). The mean auditor tenure (*TENURE*) is about 15 years. The mean absolute abnormal accruals (*ABS_DA*) are 5.13% of average total assets, suggesting that the magnitude of accrual

reporting positive earnings, followed by reporting increasing earnings and finally meeting/beating analyst forecasts. I do not consider the third benchmark for reasons discussed in Footnote 2. In addition, analyst forecasts are subject to frequent revisions and hence represent a moving target. Thus, it is difficult to ascertain the precise forecast viewed by managers as the benchmark for earnings management purposes (Gunny 2009).

management is economically significant.[15] The remaining variables appear to be normally distributed based on their summary statistics.

The corresponding descriptive statistics for the specialists (*SPEC = 1*) and non-specialists (*SPEC = 0*) subsamples appear in Panel B of Table 2.2. On average, the specialists' clients retain the same auditor longer than non-specialists' clients (i.e., *TENURE*, 18.0089 versus 15.4514) do. Both the mean and median of abnormal real activity transactions (*RM*) are not significantly different across these two subsamples (i.e., –0.3276 versus –0.3107; –0.1878 versus –0.2279, respectively). In contrast, the mean level of accrual management (*ABS_DA*) is significantly lower in the specialists subsample than in the non-specialists subsample (i.e., 4.69% versus 5.20% of average total assets), consistent with prior findings by Balsam et al. (2003) that industry specialists can more effectively constrain clients' use of accruals management than non-specialists. It appears that the specialists are more concerned with positive abnormal accruals than negative abnormal accruals as the results show that the mean (median) positive abnormal accruals is significantly lower among clients audited by specialists (0.05 versus 0.0577 for the mean and 0.0389 versus 0.0417 for the median). Meanwhile, I do not observe any significant differences in terms of the level of negative abnormal accruals across the two subsamples. In addition, clients audited by specialists are on average larger (i.e., *SIZE*, 7.3711 versus 6.4684), more mature (i.e., *LIFECYCLE*, 1.1732 versus 0.8187) and with less growth potential (i.e., *BTM*, 0.4664 versus 0.4966), and tend to operate in more

[15] As *RM* is calculated as the sum of standardized *DCFO*, *DDISEXP*, and *DPROD*, I do not directly address the raw value of its summary statistics presented in Panel A of Table 2.2.

concentrated industries (*HF*, 0.0837 versus 0.0678), compared to non-specialists clients.

[Insert Table 2.2 about Here]

Table 2.3 presents the Pearson/Spearman correlation matrix for variables in Equations (2-1), (2-5) and (2-6). The Spearman correlation coefficient between *TENURE* and *RM* is significantly positive ( $\rho_{TENURE,RM}$ = 0.02, significant at the 5% level), pointing to larger real activity management by clients who have engaged the same auditor for a longer period of time.[16] Consistent with my earlier conjecture in formulating H1a, *ABS_DA* is negatively associated with *TENURE* and *SPEC* ( $\rho_{(TENURE,ABS\_DA)} = -0.08$ ; $\rho_{(SPEC,ABS\_DA)} = -0.02$ ), suggesting either longer auditor tenure or auditor industry specialization helps to constrain clients' aggressive use of abnormal accruals (Balsam et al. 2003; Myers et al. 2003). In addition, the correlation between the levels of real activity management (*RM*) and accounting-based earnings management (*ABS_DA*) is significantly negative ( $\rho_{(RM,ABS\_DA)} = -0.08$, significant at 1% level), consistent with the substitutive relation between these two earnings management strategies suggested by Cohen et al. (2008) and Zang (2007). Taken together, the pair-wise correlations among *TENURE*, *RM*, and *ABS_DA* offer preliminary evidence of possible relation between auditor tenure and clients' engagement in real activity management due to the substitution between the two methods of earnings management ($H_{1a}$). Table 2.3 also suggests that *RM* is not correlated with *SPEC*. Hence, at the univariate

[16] The highest variance inflation factor for all regression models reported in this chapter is 3.39, well below the maximum acceptable value of 10 suggested by Gujarati (1995). Hence, multicollearity is not a concern.

level, there does not appear to be support for the prediction of $H_{2a}$. Pair-wise correlations among other variables are generally consistent with prior findings documented in the literature.[17]

[Insert Table 2.3 about Here]

### *2.5.2 Univariate Results*

Panel A of Table 2.4 presents the univariate comparisons of median values of *RM* and *ABS_DA* across terciles of auditor tenure for the full sample. The median years of auditor tenure range from a low of six years for the bottom-third subsample (tercile 1) to a high of 24 years for the top-third subsample (tercile 3). The median values of *RM* index increase from –0.2367 in tercile 1 to –0.1945 in terciles 3. Conversely, the median values of *ABS_DA* decrease from 0.0408 in tercile 1 to 0.0333 in tercile 3. Contrasting the median values in two extreme terciles, I find that tercile 3's median *RM* index (*ABS_DA*) is significantly higher (lower) than that in tercile 1, implying a substitutive relation between these two

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[17] The profitability measure *ROA* is negatively correlated with the *RM* index. But, it does not necessarily imply that real activity management has adverse economic consequences, because these variables are measured contemporaneously. To address this issue, I relate the *RM* index with *ROA* and *CFO* in the subsequent years to see if abnormally large real activities in Year *t* are associated with adverse firm performance later on. Following Zang (2007), I first sort sample firms into quintiles according to the values of *RM* index in Year *t* and then identify a performance-matched control firm for every sample firm in the top two quintiles using the following procedure: First, the control firm must belong to the same two-digit SIC industry as the sample firm. Second, the control firm's performance is closest to that of the sample firm with the difference in performance not in excess of 10%. Third, no firm can serve as a control firm for more than one sample firm in the same year. A firm's abnormal performance in Years *t*+1 to *t*+3 is given by the difference between its *ROA* (or *CFO*) and the corresponding *ROA* (or *CFO*) of the control firm. Untabulated results indicate that the median performance-matched *ROA* is –0.003 (–0.010), significant at the 5% (1%) level in Year *t*+1 (Year *t*+3) using a two-tailed test. Results are similar when firm performance is measured by *CFO*, with two of the three subsequent years again showing a significantly negative median performance-matched *CFO* (–0.004 and –0.007 for Years *t*+2 and *t*+3, respectively). These results suggest that attaining earnings targets through real activity management can prove counter-productive. More importantly, the *RM* index used in the study is capable of capturing the adverse consequences of such sub-optimal decision-making.

alternative earnings management strategies. These results provide preliminary indications that any association between tenure and real activity management may have come indirectly from auditors' abilities to constrain accrual management as predicted in Hypothesis $H_{1a}$.

Panel B (C) of Table 2.4 reports analogous tercile distributions of *RM* and *ABS_DA* for subsets of firms audited by industry specialists (non-specialists). In the specialists subsample, the median values of *RM* increase significantly from tercile 1 to tercile 2, but they do not differ between two extreme terciles of auditor tenure (Panel B). In contrast, the median value of *ABS_DA* is significantly lower in tercile 1, compared to tercile 3 (i.e., 0.0390 versus 0.0340) at the 5% level. These patterns largely extend to the non-specialists subsample (Panel C). While tercile 1 is associated with a significantly higher median value of *ABS_DA* than tercile 3 (i.e., 0.0405 versus 0.0334), the median values of *RM* index do not differ across terciles 1 and 3. To examine whether auditors' industry expertise helps compensate for a lack of client-specific knowledge during the early stage of the engagement, I compare the medians values of *RM* and *ABS_DA* in the specialists and non-specialists subsamples by terciles of auditor tenure and report the results in Panel D of Table 2.4. Within each tercile, both the median *RM* index and the median *ABS_DA* are not significantly different across the two types of auditors. It would appear that for a given length of auditor tenure auditors' industry expertise does not help differentiate auditor quality.

Taken together, univariate results from Panels B-D suggest that the relation between *TENURE* and *RM* does not differ significantly across the specialists and non-specialists subsamples, contrary to the prediction of Hypothesis $H_{2a}$. I will now address this research question more formally in a multivariate setting.

[Insert Table 2.4 about Here]

### *2.5.3 Multivariate OLS Results*

Panels A, B and C of Table 2.5 present OLS regression results for Equation (2-1) using the full sample of 9,329 firm-year observations and subsets of 1,238 and 8,091 firm-year observations audited by industry specialists and non-specialists, respectively.

Results indicate that at the overall level auditor tenure is positively associated with real activity management (*RM*) after controlling for the effects of covariates. The estimated coefficient on *TENURE* is positive (0.0025) and significant at the 5% level (Panel A). By comparison, the estimated coefficient on *SPEC* is not significantly different from zero, implying that industry specialization does not explain any variation in *RM*. It would appear that client-specific knowledge accumulated from long-term involvement with the same client plays the first-order effect and is more important to the assessment of accrual provisions, compared to industry-specific knowledge acquired through industry specialization. The interaction term $TENURE \bullet SPEC$ is also effectively zero (0.0005, t-statistics = 0.16), suggesting that specialists' and non-specialists' clients undertake a similar level of real activity management as auditor tenure lengthens.[18] Results on control variables indicate that real activity management is more likely to be carried out by firms that are smaller in size, less profitable, more mature and with greater growth perspectives and those operating in less competitive industries.

The overall results on *TENURE* extend to the subset of firms audited by non-specialists ($\alpha_1 = 0.0026$, t-statistics = 2.15; Panel C), but not to the specialists subsample where *TENURE* is found to be unrelated with the *RM* index (Panel B). Nonetheless, the coefficient estimates on *TENURE* do not differ significantly across these two subsamples based on an *F*-test (*F*-value = 0.02).

[Insert Table 2.5 about Here]

In short, holding aside the effect of accounting-based earnings management I find support for the prediction that long auditor tenure is positively associated with clients' real activities management (H1a), but no support for the prediction that auditors' industry expertise mitigates the association between auditor tenure and real activity management ($H_{2a}$).

### *2.5.4 Multivariate 2SLS Results*

Panels A, B and C of Table 2.6 present the 2SLS regression results based on Equations (2-5)-(2-6) for the full sample of 9,329 firm-year observations and subsets of 1,238 and 8,091 firm-year observations audited by industry specialists and non-specialists, respectively.

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[18] As robustness checks, I expand Equation (2-1) to include interaction terms between *SPEC* and all the control variables, including the industry and year fixed effect variables. Untabulated results are qualitatively similar to those reported in Column (1) of Table 2.5.

As is evident in Panel A of Table 2.6, the estimated coefficient on *TENURE* in the first-stage regression is –0.0002, significantly less than zero at the 1% level. After controlling for the effects of covariates, long auditor tenure is found to be associated with smaller absolute abnormal accruals at the overall level, consistent with that documented in Gul et al. (2009). The variable, *SPEC*, however does not explain any variation in *ABS_DA*. It would appear that client-specific knowledge accumulated from long-term involvement with the same client is more important to the assessment of accrual provisions, compared to industry-specific knowledge acquired through industry specialization. The first-stage control variables generally have signs consistent with those documented in the prior literature.[19] Moving to the second-stage regression, I find that the estimated coefficient on the predicted value of absolute abnormal accruals (i.e., *P_ABS_DA*) is –11.0522, significant at the 5% level. Taken together, these results support the prediction of Hypothesis $H_{1a}$ that there is a substitutive relation between accrual management and real activity-based management.

All the results continue to hold for the subset of firms audited by non-specialists (Panel C). In particular, *TENURE* is negatively associated with *ABS_DA* in the first-stage (–0.0002, t-statistics = –3.16) and *P_ABS_DA* is significantly negative in the second-stage (–11.3470, t-statistics = –2.15). By comparison, neither *TENURE* nor *P_ABS_DA* is significantly different from zero in the specialist regressions (Panel B). An F test of equality in the coefficient

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[19] For examples, firm size (*SIZE*) and lifecycle (*LIFECYCLE*) are negatively associated with *ABS_DA* (–0.0059 and –0.0049), significant at the 1% level. Conversely, both *ROA* and *BTM* are positively associated with *ABS_DA* (0.0303 and 0.0017), significant at the 1% level.

estimates on *TENURE* (or *P_ABS_DA*) cannot reject the null of no difference across the specialists and non-specialists subsamples. Contrary to the prediction of Hypothesize $H_{2a}$, industry expertise does not affect the association between auditor tenure and real activity management. Industry expertise would appear to have worked in concert with auditor tenure to exacerbate the effect of auditor tenure on the level of abnormal accruals. As a consequence, specialists' clients are also forced to substitute real activity management for accrual management, much like their counterparts audited by non-specialists with a similar length of tenure.

In short, evidence from the 2SLS regressions suggests that long auditor tenure constrains the overly aggressive or conservative use of abnormal accruals as a means to managing earnings. The reduced accounting flexibility in turn prompts audit clients to manage their real operating activities. The observed association between auditor tenure and real activity management is nonetheless not conditional on the presence of auditor industry expertise. These findings are consistent with those obtained using the OLS regressions. While OLS regressions are simpler and easier to follow, the 2SLS regressions offer an important advantage. That is, it allows researchers to identify the substitutive relation between accrual and real activity management as the source of auditor tenure effects on real activity management.

[Insert Table 2.6 About Here]

## 2.6 ROBUSTNESS CHECKS

In this section, I present results based on several robustness checks to ensure that primary findings of the study are not sensitive to the alternative definitions of earnings targets (Section 2.6.1), auditor tenure (Section 2.6.2) and industry specialization (Section 2.6.3) or the choice of proxy for accrual management (Section 2.6.4).

### *2.6.1 Alternative Definition of Earnings Targets*

In the main analysis, the sample is selected from firms whose reported earnings either are positive or represent growth over the immediately preceding fiscal year. This approach yields a larger sample size, compared to the alternative of focusing on each of the two earnings targets separately. However, firms' own circumstances may lead them to view an earnings target as far more important than the other. To allow for this possibility, I replicate the 2SLS regression model, Equations (2-5) and (2-6), for a subset of 8,879 (6,731) firm-year observations with positive earnings (positive earnings growth) and report the results under Test 1 (Test 2) in Table 2.7. In both cases, earlier conclusions about the positive association between auditor tenure and *RM* continue to hold at the overall level (Panel A). Moreover, evidence suggests that industry specialization does not affect such effect using either definition of earnings targets. For example, among firms that report positive earnings in the current fiscal years, longer tenure is negatively associated with *ABS_DA* in the first-stage ( $\delta_1$ = –0.0002, t-statistic = –3.41, significant at the 1% level) and the predicted absolute abnormal accruals estimated from the first-stage is also negatively associated with *RM* ( $\lambda_1$ = –14.4178, t-statistic = –2.86, significant at the 5% level). These results remain qualitatively unchanged among firms that report positive earnings growth (see results reported under Test 2). As before, I do not find any difference in the association between *TENURE* and *RM* across the specialists and non-specialists subsamples for either Test 1 or Test 2 (Panels B and C). Thus, the main results reported in Tables 2.4 and 2.5 do not appear to be driven by the definition of earnings targets.

### *2.6.2 Alternative Definition of Auditor Tenure*

Ghosh and Moon (2005) argue that high quality auditors may choose to terminate their engagement with clients whose financial statements are of low quality early. In this case, there is likely to be an over representation of clients with low earnings quality when auditor tenure is short. To deal with potential endogeneity problems, I follow Ghosh and Moon (2005) to impose a further requirement on the sample, i.e., auditor tenure must be at least five years. This new filter reduces sample size to 5,797 firm-year observations, which meet at least one of the two earnings targets. Results based on the 2SLS regression models, Equations (2-5)-(2-6), appear under Test 3 in Table 2.7.

Overall, the relation between *TENURE* and *RM* is qualitatively similar to the main findings (Panel A). In the first-stage, auditor tenure is negatively associated with *ABS_DA* ($\delta_1 = -0.0004$, t-statistics = –3.93, significant at the 1% level) and in the second-stage *P_ABS_DA* is negatively associated with *RM* ($\lambda_1 = -16.3038$, t-statistics = –3.74, significant at the 1% level). Finally, the association between *TENURE* and *RM* again does not appear to differ across the specialists and non-specialists subsamples (Panels B and C).

### 2.6.3 Alternative Definition of Industry Specialization

In the literature, researchers have used several approaches to proxy for an auditor's expertise within a given industry: the market share approach which defines specialists as the auditor with the largest market shares within an industry; the portfolio approach, which defines an auditor to be a specialist in the industry where the largest number of her audit clients comes from. According to Neal and Riley (2004), having the top-ranked market share within an industry may not yield expertise due to the small size of an industry. Conversely, the portfolio approach may bias in favor of large industries. Thus, the authors advocate using the weighted market share approach which takes into account not just an auditor's market share, but also her portfolio share.

To implement the weighted market share approach, I first define a cut-off point as the product of market share cut-off and portfolio share cut-off, i.e., $(1/N_{Big\_auditors}) \bullet (1/N_{Industry})$, where $N_{Big\_auditors}$ represents the number of audit firms in the market and $N_{Industry}$ denotes the number of industries to which an auditor's clients belong.[20] I then calculate each auditor's weighted market share as her actual market share times her actual portfolio share, i.e., $\left(\sum_{j=1}^{J_{ik}} Sales_{ijk} \Big/ \sum_{i=1}^{I_k}\sum_{j=1}^{J_{ik}} Sales_{ijk}\right) \bullet \left(\sum_{l=1}^{K_{ij}} Sales_{ijk} \Big/ \sum_{k=1}^{K_{jk}}\sum_{j=1}^{J_{ik}} Sales_{ijk}\right)$, where $Sales_{ijk}$ denotes the total sales of client firm $j$ in industry $k$ by auditor $i$.[21] An auditor is designated

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[20] According to Palmrose (1986), auditors develop industry specialty if they achieve a market share, which is at least 20 percent greater than the case when audit firms were to split the industry evenly among them. Krishnan (2001) on the other hand argues that absent specialization an auditor's portfolio share should distribute evenly over the industries.

[21] I use clients' sales instead of actual audit fees to compute market and portfolio shares because

as an industry specialist if her actual weighted market share exceeds the weighted market share cut-off (labeled *SPEC_2* and coded as one); and zero otherwise. Results based on the 2SLS regression models, Equations (2-5)-(2-6), appear under Test 4 in Tables 2.7. Panel A presents results for the overall sample of 9,300 firm-year observations.[22] The corresponding results for the specialist (non-specialist) subsample of 3,968 (5,332) firm-year observations appear in Panel B (C). Using the newly measured specialization proxy, results are once again consistent with those documented previously in Panels A-C of Table 2.5, suggesting that the main results are not driven by the definition/measurement of auditor industry specialization.[23]

[Insert Table 2.7 About Here]

### *2.6.4 Alternative Proxies for Accounting-based Earnings Management*

Up till now, I have used the absolute abnormal accruals as a proxy for accounting-based earnings management under the assumption that auditors are motivated to constrain not just income-increasing, but also income-decreasing, abnormal accruals. However, one may argue that since auditors are never sued for large income-decreasing accruals, *signed* abnormal accruals may be a more appropriate proxy for earnings quality in the auditing context (Heninger 2001; Becker et al. 1998; St. Pierre and Andersen 1984).

COMPUSTAT provides audit fees disclosure for a limited number of listed firms.

[22] The overall sample size is slightly lower than 9,329 used in the main analysis (Table 2-5) due to unique data requirements for *SPEC_2*.

[23] I also conduct the corresponding robustness tests (Tests 1-4) based on the OLS regression model, Equations (2-1). The untabulated results are qualitatively comparable to those reported in Table 2.4.

To address this concern, I now replicate the 2SLS regression models, Equations (2-5)-(2-6), by partitioning the overall sample into two subsamples according to the sign of abnormal accruals. All the model variables are as defined before, except that the dependent variable in the first-stage of the 2SLS model, Equation (2-5), is replaced by either positive abnormal accruals (i.e., *POS_DA*) or negative abnormal accruals (i.e., *NEG_DA*). Moreover, the variable *P_ABS_DA* in the second-stage of the 2SLS model (Equation (2-6)) now becomes the predicted values of signed abnormal accruals, i.e., *P_POS_DA* or *P_NEG_DA*.

Among the initial overall sample of 9,329 firm-year observations, there are 5,739 (3,590) firm-year observations with income-increasing (income-decreasing) abnormal accruals, of which 760 and 4,978 (477 and 3,113) retain industry specialists and non-specialists as their auditors, respectively. Tables 2.8 and 2.9 present the results for income-increasing and income-decreasing subsamples, respectively. In each table, the full sample results appear in Panel A, followed by results for specialists and non-specialists in Panels B and C, respectively.

At the overall level, I find that long auditor tenure is associated with less positive abnormal accruals in the first-stage (*TENURE* = –0.0002, t-statistics = –1.62; Table 2.8), which in turn induce greater real activity management in the second-stage (*P_POS_DA* = –16.8778, t-statistics = –2.27; Table 2.8). These results are consistent with the prediction of Hypothesis $H_{1a}$ and extend to the income-decreasing subsample. In this case, long auditor tenure is associated with less negative abnormal accruals in the first-stage (*TENURE* = 0.0005, t-statistics =

3.98; Table 2.9), prompting more real activity management in the second-stage (*P_NEG_DA* = 14.7412, t-statistics = 3.72; Table 2.9). An F-test of the equality of coefficient estimates for *TENURE* and *P_POS_DA* (*TENURE* and *P_NEG_DA*) across subsets of firms audited by specialists and non-specialists indicates that the null of no difference cannot be rejected at the conventional levels. The *F*-values are 0.17 and 0.01 (0.12 and 0.15) for the income-increasing (income-decreasing) subsample. These results do not support the prediction of Hypothesis $H_{2a}$.

[Insert Tables 2.8 and 2.9 about Here]

## 2.7 CONCLUDING REMARKS

In this study, I have examined the association between auditor tenure and real activity management and the role played by auditor industry specialization in mitigating such an association. Initially, I employ an OLS research design that abstracts away the potential substitutive relation between the two common earnings management techniques to achieve earnings targets, i.e., real activity and accrual management. Results indicate that auditor tenure is positively associated with real activity management. However, the strength of this association is statistically similar for clients of industry specialists versus those of non-specialists.

I then employ a 2SLS research design to explicitly recognize that real activity and accrual management may be undertaken concurrently. At the overall level, results indicate that longer auditor tenure is associated with small absolute abnormal accruals. The low absolute abnormal accruals in turn prompt firms, who are under pressure to achieve earnings targets, to resort to real activity management. Partitioning the sample by the auditor type (specialists and non-specialists), I once again find that auditor industry expertise does not lead to any significant difference in the association between auditor tenure and real activity management. Both sets of results are robust to the alternative definitions of earnings benchmarks, auditor tenure and industry specialization. Likewise, they are invariant to the choice of proxy for accounting-based earnings management. To the extent that real activity management can lower firm value in the long run, the findings documented in this study highlight an unintended consequence of long auditor tenure.

A potential caveat to this study is that auditor tenure may relate with accrual and real activity management in a non-linear fashion. Moreover, I have not considered corporate governance in order to maximize sample size. Strong internal governance or oversight by institutional investors may limit a firm's ability to replace accrual management with real activity management. I plan to address these concerns in a separate research project to help shed further light on the merits and shortcomings of mandatory audit firm rotation.

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| **Appendix 2-I. Definitions and Measurement of Variables in Chapter 2.** | |
|---|---|
| **Variables** | **Definition and Measurement** |
| ***Variable Used in the Estimation Models for Normal Levels of Real Transactions and Accruals*** | |
| *CFO* | Cash flows from operations = Data OANCF; |
| *A* | Total assets = Data AT; |
| *S* | Net sales = Data SALE; |
| $\Delta S$ | Change in sales from previous year to the current year = Data SALE; |
| *PROD* | Production costs = COGS + Change in inventory = Data COGS + $\Delta$ in Data INVT; |
| *DISEXP* | Discretionary expenses = Selling, General, and Administrative expenses = Data XSGA;[24] |
| *TAC* | Total accruals = Data IBC – OANCF; |
| *K* | Estimated slope coefficient from a regression of $\Delta REC$ on $\Delta S$ for each two-digit SIC industry-fiscal year grouping, i.e., $\Delta REC_{i,t} = \varpi_0 + K\Delta S_{i,t} + \varepsilon_{i,t}$; |
| $\Delta REC$ | Change in trade receivables from previous year to the current year = Data RECTR; |
| *PPE* | Gross property, plant, and equipment = Data PPEGT; |
| ***Proxies for Accrual and Real Activity Management*** | |
| *DCFO* | Residuals from the following regression, estimated cross-sectionally for each two-digit SIC industry –fiscal year grouping with at least 15 observations: $CFO_{i,t} / A_{i,t-1} = \beta_0 + \beta_1(1/A_{i,t-1}) + \beta_2(S_{i,t}/A_{i,t-1}) + \beta_3(\Delta S_{i,t}/A_{i,t-1}) + \varepsilon_{i,t}$; *DCFO*=(-1)×$\varepsilon_{i,t}$; |
| *DDISEXP* | Residuals from the following regression, estimated cross-sectionally for each two-digit SIC industry –fiscal year grouping with at least 15 observations: $EXP_{i,t} / A_{i,t-1} = \gamma_0 + \gamma_1(1/A_{i,t-1}) + \gamma_2(S_{i,t-1}/A_{i,t-1}) + \varepsilon_{i,t}$; *DDISEXP*=(-1)×$\varepsilon_{i,t}$; |
| *DPROD* | Residuals from the following regression, estimated cross-sectionally for each two-digit SIC industry –fiscal year grouping with at least 15 observations: $PROD_{i,t} / A_{i,t-1} = \eta_0 + \eta_1(1/A_{i,t-1}) + \eta_2(S_{i,t}/A_{i,t-1}) + \eta_3(\Delta S_{i,t}/A_{i,t-1}) + \eta_4(\Delta S_{i,t-1}/A_{i,t-1}) + \varepsilon_{i,t}$; *DPROD*= $\varepsilon_{i,t}$; |
| *RM* | The sum of the standardized three real earnings management proxies, i.e., *DPROD*, *DDISEXP* and *DCFO*. |
| *DA* | Residuals from the following regression, estimated cross-sectionally for each two-digit SIC industry –fiscal year grouping with at least 15 observations: $\frac{TAC_{i,t}}{A_{i,t-1}} = \frac{\psi_0}{A_{i,t-1}} + \psi_1 \frac{(1+k)\Delta S_{i,t} - \Delta REC_{i,t}}{A_{i,t-1}} + \psi_2 \frac{PPE_{i,t}}{A_{i,t-1}} + \psi_3 \frac{TAC_{i,t-1}}{A_{i,t-2}} + \psi_4 \frac{\Delta S_{i,t+1}}{S_{i,t}} + \varepsilon_{i,t}$ |

[24] Prior studies typically define the level of discretionary expenses as the sum of advertising expenses (COMPUSTAT item XAD), R&D expenses (COMPUSTAT item XRD) and SG&A (COMPUSTAT item XSGA). According to COMPUSTAT manual, item XSGA already includes advertising and R&D expenses.

| Appendix 2-I. Definitions and Measurement of Variables in Chapter 2 | |
|---|---|
| **Variables** | **Definition and Measurement** |
| ***Variables Used in the Regressions*** | |
| *TENURE* | The number of years an auditor is retained by the firm; |
| *SPEC* | A dummy variable that equals to 1 if an auditor is defined as an industry specialist and 0 otherwise; An auditor is defined to be an industry specialist if it is the largest supplier in the industry and difference between the first and second supplier in the industry is at least 10% in terms of market share. The auditor market share is calculated based on clients' sale; |
| *SIZE* | Logarithm of average total assets; |
| *ROA* | Return on average total assets; |
| *BTM* | The book value of equity divided by market value of equity; |
| *LIFECYCLE* | A composite measure that considers several economic factors including sales growth, capital expenditure, firm age, and net-capital transaction. Sales growth is measured as the cumulative sales growth rate over the past two years. Capital expenditure is the sum of capital expenditure and R&D expenses, as a proportion of total assets. Firm age is the number of years since the first year that its data is available in COMPUSTAT. Finally, net-capital transaction is measured as the difference between change in total shareholder's equity and net income, deflated by total assets. |
| *HF* | The sum of the squared share of each firm in total sales of the industry; |
| *ABS_DA* | The absolute value of *DA*; |
| *POS_DA* | The positive value of *DA*; |
| *NEG_DA* | The negative value of *DA*; |
| *P_ABS_DA* | Predicted absolute discretionary accruals estimated from the first-stage equation; |
| *P_POS_DA* | Predicted positive discretionary accruals estimated from the first-stage equation; |
| *P_NEG_DA* | Predicted negative discretionary accruals estimated from the first-stage equation; |
| *SPEC_2* | A dummy variable that equals to 1 if an auditor is defined as an industry specialist and 0 otherwise; An auditor is defined to be an industry specialist if its weighted market share is above the weighted market share cut-off (Neal and Riley 2004). |

**Appendix 2-II. Normal Levels of Accrual and Real Activity and Management**

**Panel A: Estimation of Normal Levels of Real Transactions.**

The following regressions are estimated cross-sectionally within each industry year over 1990-2006. Two-digit SIC codes are used to define industries. Industry-years with fewer than 15 firms are eliminated from the sample. The table reports the mean coefficient across all industry-year and t-statistics calculated using the standard error of the mean coefficients across the industry-years. The table also reports the mean adjusted R-squares and number of observations for each of these regressions.

$$CFO_{i,t} / A_{i,t-1} = \beta_0 + \beta_1(1/A_{i,t-1}) + \beta_2(S_{i,t}/A_{i,t-1}) + \beta_3(\Delta S_{i,t}/A_{i,t-1}) + \varepsilon_{i,t}$$

$$EXP_{i,t} / A_{i,t-1} = \gamma_0 + \gamma_1(1/A_{i,t-1}) + \gamma_2(S_{i,t-1}/A_{i,t-1}) + \varepsilon_{i,t}$$

$$PROD_{i,t} / A_{i,t-1} = \eta_0 + \eta_1(1/A_{i,t-1}) + \eta_2(S_{i,t}/A_{i,t-1}) + \eta_3(\Delta S_{i,t}/A_{i,t-1}) + \eta_4(\Delta S_{i,t-1}/A_{i,t-1}) + \varepsilon_{i,t}$$

| | $\frac{CFO_{i,t}}{A_{i,t-1}}$ | | $\frac{DISEXP_{i,t}}{A_{i,t-1}}$ | | $\frac{PROD_{i,t}}{A_{i,t-1}}$ |
|---|---|---|---|---|---|
| *Intercept* | -0.0185<br>(-3.91***) | *Intercept* | 0.1609<br>(20.05***) | *Intercept* | -0.0868<br>(-15.18***) |
| $\frac{1}{A_{i,t-1}}$ | -0.7958<br>(-15.05***) | $\frac{1}{A_{i,t-1}}$ | 1.5718<br>(15.98***) | $\frac{1}{A_{i,t-1}}$ | -0.2296<br>(-2.77***) |
| $\frac{S_{i,t}}{A_{i,t-1}}$ | 0.0698<br>(18.41***) | $\frac{S_{i,t}}{A_{i,t-1}}$ | 0.1263<br>(21.21***) | $\frac{S_{i,t}}{A_{i,t-1}}$ | 0.7688<br>(147.60***) |
| $\frac{\Delta S_{i,t}}{A_{i,t-1}}$ | -0.0565<br>(-6.32***) | | | $\frac{\Delta S_{i,t}}{A_{i,t-1}}$ | 0.0106<br>(1.11) |
| | | | | $\frac{\Delta S_{i,t-1}}{A_{i,t-1}}$ | -0.0317<br>(-2.97**) |
| Adj. R-square | 39.01% | Adj. R-square | 47.67% | Adj. R-square | 83.51% |
| Number of Observations | 124.89 | Number of Observations | 118.15 | Number of Observations | 115.31 |
| Number of Industry-years | 799 | Number of Industry-years | 761 | Number of Industry-years | 789 |

**Appendix 2-II. Normal Levels of Accrual and Real Activity and Management**

**Panel B: Estimation of Normal Level of Total Accruals.**

The following regressions are estimated cross-sectionally within each industry year over 1990-2006. Two-digit SIC codes are used to define industries. Industry-years with fewer than 15 firms are eliminated from the sample. The table reports the mean coefficient across all industry-year and t-statistics calculated using the standard error of the mean coefficients across the industry-years. The table also reports the mean adjusted R-squares and number of observations for each of these regressions.

DRT (2003) Model:

$$\frac{TAC_{i,t}}{A_{i,t-1}} = \frac{\psi_0}{A_{i,t-1}} + \psi_1 \frac{(1+k)\Delta S_{i,t} - \Delta REC_{i,t}}{A_{i,t-1}} + \psi_2 \frac{PPE_{i,t}}{A_{i,t-1}} + \psi_3 \frac{TAC_{i,t-1}}{A_{i,t-2}} + \psi_4 \frac{\Delta S_{i,t+1}}{S_{i,t}} + \varepsilon_{i,t}$$

DSS (1995) Model:

$$\frac{TAC_{i,t}}{A_{i,t-1}} = \mu_0 \frac{1}{A_{i,t-1}} + \mu_1 \frac{(\Delta S - \Delta REC)_{i,t}}{A_{i,t-1}} + \mu_2 \frac{PPE_{i,t}}{A_{i,t-1}} + \varepsilon_{i,t}$$

| DRT (2003) Model | | DSS (1995) Model | |
|---|---|---|---|
| $1/A_{i,t-1}$ | -0.0824<br>(-2.07**) | $1/A_{i,t-1}$ | -0.1532<br>(-4.46***) |
| $\frac{(1+k)\Delta S_{i,t} - \Delta REC_{i,t}}{A_{i,t-1}}$ | 0.0353<br>(9.72***) | $\frac{\Delta S_{i,t} - \Delta REC_{i,t}}{A_{i,t-1}}$ | 0.0347<br>(8.21***) |
| $PPE_{i,t} / A_{i,t-1}$ | -0.0765<br>(-22.03***) | $PPE_{i,t} / A_{i,t-1}$ | -0.0837<br>(-39.89***) |
| $TAC_{i,t-1} / A_{i,t-2}$ | 0.0407<br>(8.86***) | | |
| $\Delta S_{i,t+1} / S_{i,t}$ | 0.0238<br>(8.62***) | | |
| Adj. R-square | 35.92% | Adj. R-square | 30.87% |
| Number of Observations | 115.60 | Number of Observations | 117.42 |
| Number of Industry-years | 784 | Number of Industry-years | 792 |

For variable definitions, please refer to Appendix 2-I. *, **, *** indicate the significance of coefficients at the 10%, 5%, and 1% levels, respectively (for two-tailed test).

**Table 2.1 Descriptive Statistics**

**Panel A: Sample Selection**

| | |
|---|---|
| Firm-Years in COMPUSTAT 1990-2006 | 176,811 |
| Removing firm-year observations: | |
| SIC 6000-6999 (financial services) | (41,126) |
| SIC 4400-5000 (regulated industry) | (15,760) |
| Financial data not available in COMPUSTAT to construct regression variables | (83,823) |
| Fail to meet either one of the two earnings benchmarks | (26,773) |
| Full Sample | 9,329 |

| **Panel B: Sample Distribution by Industry** | N (Percent) |
|---|---|
| Consumer Non-Durables (0100-0999, 2000-2399, 2700-2749, 2770-2799, 3100-3199, 3940-3989) | 955 (10.24%) |
| Consumer Durables (2500-2519, 2590-2599, 3630-3659, 3710-3711, 3714-3714, 3716-3716, 3750-3751, 3792-3792, 3900-3939, 3990-3999) | 459 (4.92%) |
| Manufacturing (2520-2589, 2600-2699, 2750-2769, 3000-3099, 3200-3569, 3580-3629, 3700-3709, 3712-3713, 3715-3715, 3717-3749, 3752-3791, 3793-3799, 3830-3839, 3860-3899) | 1,866 (20.00%) |
| Energy (1200-1399, 2900-2999) | 491 (5.26%) |
| Chemicals and Allied Products (2800-2829, 2840-2899) | 428 (4.59%) |
| Business (3570-3579, 3660-3692, 3694-3699, 3810-3829, 7370-7379) | 1,920 (20.58%) |
| Telephone and Television Transmission (4800-4899) | 0 (0%) |
| Utilities (4900-4949) | 0 (0%) |
| Wholesale, Retail, and Some Services (5000-5999, 7200-7299, 7600-7699) | 1,212 (12.99%) |
| Healthcare, Medical Equipment & Drugs (2830-2839, 3693-3693, 3840-3859, 8000-8099) | 925 (9.92%) |
| Finance (6000-6999) | 0 (0%) |
| Others | 1,073 (11.50%) |
| Total | 9,329 (100%) |

**Panel C: Sample Distribution by Year**

| Year | Full Sample (Percent) | Positive Earnings (Percent) | Positive Earnings Growth (Percent) |
|---|---|---|---|
| 1990 | 429 (4.6%) | 422 (4.8%) | 263 (3.9%) |
| 1991 | 415 (4.4%) | 403 (4.5%) | 224 (3.3%) |
| 1992 | 433 (4.6%) | 418 (4.7%) | 325 (4.8%) |
| 1993 | 483 (5.2%) | 462 (5.2%) | 352 (5.2%) |
| 1994 | 522 (5.6%) | 503 (5.7%) | 427 (6.3%) |
| 1995 | 581 (6.2%) | 569 (6.4%) | 440 (6.5%) |
| 1996 | 590 (6.3%) | 574 (6.5%) | 435 (6.5%) |
| 1997 | 570 (6.1%) | 552 (6.2%) | 429 (6.4%) |
| 1998 | 564 (6.0%) | 542 (6.1%) | 391 (5.8%) |
| 1999 | 573 (6.1%) | 547 (6.2%) | 408 (6.1%) |
| 2000 | 549 (5.9%) | 521 (5.9%) | 374 (5.6%) |
| 2001 | 502 (5.4%) | 471 (5.3%) | 275 (4.1%) |
| 2002 | 540 (5.8%) | 485 (5.5%) | 397 (5.9%) |
| 2003 | 645 (6.9%) | 565 (6.4%) | 522 (7.8%) |
| 2004 | 660 (7.1%) | 629 (7.1%) | 553 (8.2%) |
| 2005 | 643 (6.9%) | 615 (6.9%) | 478 (7.1%) |
| 2006 | 630 (6.8%) | 601 (6.8%) | 438 (6.5%) |
| Total | 9,329 (100%) | 8,879 (100%) | 6,731 (100%) |

**Table 2.2 Summary Statistics**

**Panel A: Distributions of Continuous Variables in Main Regressions (Overall Sample)**

| Variables | N | 25th Pctl | Mean | Median | 75th Pctl | SD |
|---|---|---|---|---|---|---|
| *TENURE* | 9,329 | 10.0000 | 15.7908 | 16.0000 | 22.0000 | 8.4358 |
| *RM* | 9,329 | -0.7098 | -0.3129 | -0.2235 | 0.1804 | 0.8750 |
| *ABS_DA* | 9,329 | 0.0170 | 0.0513 | 0.0370 | 0.0683 | 0.0500 |
| *DA_POS* | 5,739 | 0.0195 | 0.0567 | 0.0413 | 0.0733 | 0.0604 |
| *DA_NEG* | 3,590 | -0.0600 | -0.0459 | -0.0312 | -0.0136 | 0.0526 |
| *SIZE* | 9,329 | 5.1885 | 6.5882 | 6.4931 | 7.9741 | 1.9439 |
| *ROA* | 9,329 | 0.0350 | 0.0695 | 0.0646 | 0.1002 | 0.0602 |
| *BTM* | 9,329 | 0.2629 | 0.4926 | 0.4221 | 0.6372 | 0.3343 |
| *LIFECYCLE* | 9,329 | -0.0138 | 0.8657 | 0.8337 | 1.6894 | 1.1482 |
| *HF* | 9,329 | 0.0376 | 0.0699 | 0.0476 | 0.0771 | 0.0623 |

**Panel B: Distributions of Continuous Variables (by Auditor Industry Specialization)**

| | SPEC = 1 (N = 1,238)[25] | | | SPEC = 0 (N = 8,091)[26] | | | Mean Diff. | Median Diff. |
|---|---|---|---|---|---|---|---|---|
| Variables | Mean | Median | SD | Mean | Median | SD | *t*-Statistic | *z*-Statistic |
| *TENURE* | 18.0089 | 19.0000 | 8.8547 | 15.4514 | 16.0000 | 8.3184 | 9.54*** | 9.84*** |
| *RM* | -0.3276 | -0.1878 | 0.8855 | -0.3107 | -0.2279 | 0.8734 | 0.63 | 0.75 |
| *ABS_DA* | 0.0469 | 0.0353 | 0.0435 | 0.0520 | 0.0372 | 0.0509 | -3.68*** | -2.18** |
| *DA_POS* | 0.0500 | 0.0389 | 0.0451 | 0.0577 | 0.0417 | 0.0623 | -4.17*** | -2.10** |
| *DA_NEG* | -0.0432 | -0.0299 | 0.0479 | -0.0463 | -0.0313 | 0.0533 | 1.30 | 0.98 |
| *SIZE* | 7.3711 | 7.4589 | 1.9086 | 6.4684 | 6.3668 | 1.9214 | 15.41*** | 15.23*** |
| *ROA* | 0.0673 | 0.0608 | 0.0527 | 0.0699 | 0.0652 | 0.0612 | -1.55 | -2.62*** |
| *BTM* | 0.4664 | 0.3983 | 0.3513 | 0.4966 | 0.4266 | 0.3315 | -2.83*** | -4.36*** |
| *LIFECYCLE* | 1.1732 | 1.1572 | 1.2244 | 0.8187 | 0.7821 | 1.1288 | 9.58*** | 9.87*** |
| *HF* | 0.0837 | 0.0623 | 0.0732 | 0.0678 | 0.0468 | 0.0601 | 7.31*** | 7.58*** |

For variable definitions, please refer to Appendix 2-I. *, **, *** indicate the significance of coefficients at the 10%, 5%, and 1% levels, respectively (for two-tailed test).

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[25] In the Specialists sample (*SPEC* = 1), the number of observations for the *DA_POS* sub-sample(i.e., *DA_POS* is not missing) is 761 and the *DA_NEG* sub-sample (i.e., *DA_NEG* is not missing) is 477.

[26] In the non-Specialists sample (*SPEC* = 0), the number of observations for the *DA_POS* sub-sample is 4,978 and the *DA_NEG* sub-sample is 3,113.

**Table 2.3 Pearson and Spearman Pair-wise Correlation Matrices**

| Variables | *TENURE* | *RM* | *ABS_DA* | *SPEC* | *SIZE* | *ROA* | *BTM* | *LIFECYCLE* | *HF* |
|---|---|---|---|---|---|---|---|---|---|
| *TENURE* | *1.00* | *0.01* | *-0.10****** | *0.10****** | *0.344****** | *-0.01* | *-0.07****** | *0.31****** | *-0.07****** |
| *RM* | *0.02*** | *1.00* | *-0.05****** | *-0.01* | *-0.10****** | *-0.22****** | *0.25****** | *-0.02** | *-0.05** |
| *ABS_DA* | *-0.08****** | *-0.06****** | *1.00* | *-0.03****** | *-0.22****** | *0.04****** | *0.00* | *-0.06****** | *-0.00* |
| *SPEC* | *0.10****** | *0.01* | *-0.02**** | *1.00* | *0.15****** | *-0.01* | *-0.03****** | *0.10****** | *0.08****** |
| *SIZE* | *0.34****** | *-0.08****** | *-0.21****** | *0.15****** | *1.00* | *0.02****** | *-0.23****** | *0.36****** | *-0.03****** |
| *ROA* | *-0.02**** | *-0.29****** | *0.03****** | *-0.03****** | *-0.01* | *1.00* | *-0.36****** | *-0.02** | *-0.05****** |
| *BTM* | *-0.06****** | *0.32****** | *-0.00* | *-0.05****** | *-0.23****** | *-0.46****** | *1.00* | *-0.14****** | *0.14****** |
| *LIFECYCLE* | *0.34****** | *-0.01** | *-0.07****** | *0.10****** | *0.38****** | *-0.02** | *-0.11****** | *1.00* | *0.06****** |
| *HF* | *-0.07****** | *0.04****** | *-0.03****** | *0.08****** | *-0.03****** | *-0.10****** | *0.23****** | *0.07****** | *1.00* |

Pearson correlation coefficients appear above the diagonal and Spearman rank correlation coefficients appear below the diagonal. For variable definitions, please refer to Appendix 2-I. *, **, *** indicate the significance of coefficients at the 10%, 5%, and 1% levels, respectively (for two-tailed test).

**Table 2.4 Comparisons of Median Proxies for Accrual and Real Activity Management**

**Panel A: Across Terciles of Auditor Tenure at the Overall Level (N = 9,329)**

| Variables | 1st TENURE Tercile N = 3,299 | 2nd TENURE Tercile N = 2,797 | 3rd TENURE Tercile N = 3,233 | Z-Statistics | | |
|---|---|---|---|---|---|---|
| | (a) | (b) | (c) | (a) - (b) | (b) - (c) | (a) - (c) |
| *TENURE* | 6 | 16 | 24 | --- | --- | --- |
| *RM* | -0.2367*** | -0.2464*** | -0.1945*** | 0.32 | -2.34*** | -2.16** |
| *ABS_DA* | 0.0408*** | 0.0372*** | 0.0333*** | 3.48*** | 4.46*** | 8.26*** |

**Panel B: Across Terciles of Auditor Tenure for Industry Specialists (*SPEC* = 1; N = 1,238)**

| Variables | 1st TENURE Tercile N = 394 | 2nd TENURE Tercile N = 437 | 3rd TENURE Tercile N = 407 | *Z-Statistics* | | |
|---|---|---|---|---|---|---|
| | (a) | (b) | (c) | (a) - (b) | (b) - (c) | (a) - (c) |
| *TENURE* | 8 | 19 | 27 | --- | --- | --- |
| *RM* | -0.2618*** | -0.1454*** | -0.1939*** | -2.05** | 1.28 | -0.89 |
| *ABS_DA* | 0.0390*** | 0.0351*** | 0.0340*** | 1.90* | 0.42 | 2.23** |

**Panel C: Across Terciles of Auditor Tenure for Non-Industry Specialists (*SPEC* = 0; N = 8,091)**

| Variables | 1st TENURE Tercile N = 2,595 | 2nd TENURE Tercile N = 2,843 | 3rd TENURE Tercile N = 2,653 | Z-Statistics | | |
|---|---|---|---|---|---|---|
| | (a) | (b) | (c) | (a) - (b) | (b) - (c) | (a) - (c) |
| *TENURE* | 5 | 16 | 24 | --- | --- | --- |
| *RM* | -0.2318*** | -0.2578*** | -0.2053*** | 1.62* | -2.54** | -0.87 |
| *ABS_DA* | 0.0405*** | 0.0386*** | 0.0334*** | 2.29** | -5.00*** | 7.11*** |

**Table 2.4 Comparisons of Median Proxies for Accrual and Real Activity Management**

**Panel D. Industry Specialists (*SPEC* = 1) versus Non-Industry Specialists (*SPEC* = 0) by Terciles of Auditor Tenure**

| | 1st TENURE Tercile N = 3,299 | | | 2nd TENURE Tercile N = 2,797 | | | 3rd TENURE Tercile N = 3,233 | | |
|---|---|---|---|---|---|---|---|---|---|
| Variables | *SPEC* = 1 | *SPEC* = 0 | *z*-Stat | *SPEC* = 1 | *SPEC* = 0 | z-Stat | *SPEC* = 1 | *SPEC* = 0 | z-Stat |
| *RM* | -0.2445*** | -0.2365*** | -0.51 | -0.2275*** | -0.2485*** | 0.02 | -0.1589*** | -0.2053*** | 1.25 |
| *ABS_DA* | 0.0400*** | 0.0408*** | -0.80 | 0.0355*** | 0.0377*** | -1.14 | 0.0333*** | 0.0334*** | -0.61 |

For variable definitions, please refer to Appendix 2-I. *, **, *** indicate the significance of coefficients at the 10%, 5%, and 1% levels, respectively (for two-tailed test).

**Table 2.5 Results from the OLS Regressions**

**Equation (2-1)**

$$RM_{i,t} = \alpha_0 + \alpha_1 TENURE_{i,t} + \alpha_2 SPEC_{i,t} + \alpha_3 TENURE_{i,t} \bullet SPEC_{i,t} + \alpha_4 SIZE_{i,t} + \alpha_5 ROA_{i,t} + \alpha_6 BTM_{i,t} + \alpha_7 LIFECYCLE_{i,t} + \alpha_8 HF_{i,t} + INDUSTRY\_DUMMIES + YEAR\_DUMMIES + \varepsilon$$

**Equation (2-1)'**

$$RM_{i,t} = \beta_0 + \beta_1 TENURE_{i,t} + \beta_2 SIZE_{i,t} + \beta_3 ROA_{i,t} + \beta_4 BTM_{i,t} + \beta_5 LIFECYCLE_{i,t} + \beta_6 HF_{it} + INDUSTRY\_DUMMIES + YEAR\_DUMMIES + \varepsilon$$

| | **Equation (2-1)** | | **Equation (2-1)'** | | **Equation (2-1)'** | |
|---|---|---|---|---|---|---|
| | **Panel A: Full Sample** | | **Panel B: Specialists Subsample** | | **Panel C: Non-Specialists Subsample** | |
| Indep. Variables | Coefficients | *t*-Statistics | Coefficients | *t*-Statistics | Coefficients | *t*-Statistics |
| *INTERCEPT* | -0.0090 | (-0.16) | -0.2506 | (-0.83) | 0.0134 | (0.23) |
| *TENURE* | 0.0025 | (2.07**) | 0.0024 | (0.38) | 0.0026 | (2.15**) |
| *SPEC* | 0.0123 | (0.22) | ---- | ---- | ---- | ---- |
| *TENURE* • *SPEC* | 0.0005 | (0.16) | ---- | ---- | ---- | ---- |
| *SIZE* | -0.0387 | (-7.51***) | 0.0113 | (0.36) | -0.0451 | (-8.26***) |
| *ROA* | -2.2686 | (-14.70***) | -2.5424 | (-2.68***) | -2.2103 | (-13.69***) |
| *BTM* | 0.5400 | (18.40***) | 0.3084 | (2.56**) | 0.5793 | (18.45***) |
| *LIFECYCLE* | 0.0319 | (3.77***) | -0.0534 | (-1.02) | 0.0436 | (4.82***) |
| *HF* | -0.9751 | (-6.47***) | -0.7796 | (-0.88) | -1.0620 | (-6.40***) |
| *INDUSTRY_DUMMIES* | YES | | YES | | YES | |
| *YEAR_DUMMIES* | YES | | YES | | YES | |
| *F*-test for the difference in $\beta_1$ across SPEC and Non-SPEC samples | ---- | | *F*-value = 0.02<br>*Pr*>*F*-value = 0.88 | | | |
| N | 9,329 | | 1,238 | | 8,091 | |
| Adj. R-square | 11.81% | | 11.87% | | 13.69% | |

For variable definitions, please refer to Appendix 2-I. *, **, *** indicate the significance of coefficients at the 10%, 5%, and 1% levels, respectively (for two-tailed test).

**Table 2.6 Results from the 2SLS Regressions**

**First-Stage Model:**

$$ABS\_DA_{i,t} = \delta_0 + \delta_1 TENURE_{i,t} + \delta_2 SPEC_{i,t} + \delta_3 SIZE_{i,t} + \delta_4 ROA_{i,t} + \delta_5 BTM_{i,t} + \delta_6 LIFECYCLE_{i,t} + \delta_7 HF_{i,t} + INDUSTRY\_DUMMIES + YEAR\_DUMMIES + \varepsilon_{i,t}$$

**Second-Stage Model:**

$$RM_{i,t} = \lambda_0 + \lambda_1 P\_ABS\_DA_{i,t} + \lambda_2 SPEC_{i,t} + \lambda_3 SIZE_{i,t} + \lambda_4 ROA_{i,t} + \lambda_5 BTM_{i,t} + \lambda_6 LIFECYCLE_{i,t} + \lambda_7 HF_{i,t} + INDUSTRY\_DUMMIES + YEAR\_DUMMIES + \varepsilon_{i,t}$$

| *First Stage* | **Panel A: Full Sample** | | **Panel B: Specialists Subsample** | | **Panel C: Non-Specialists Subsample** | |
|---|---|---|---|---|---|---|
| Indep. Variables | Coefficients | *t*-Statistics | Coefficients | *t*-Statistics | Coefficients | *t*-Statistics |
| *INTERCEPT* | 0.0980 | (30.09)*** | 0.0725 | (8.46)*** | 0.1012 | (28.59)*** |
| *TENURE* | -0.0002 | (-3.50)*** | -0.0002 | (-1.16) | -0.0002 | (-3.16)*** |
| *SPEC* | -0.0004 | (-0.27) | ---- | ---- | ---- | ---- |
| *SIZE* | -0.0059 | (-19.64)*** | -0.0039 | (-4.90)*** | -0.0062 | (-18.98)*** |
| *ROA* | 0.0303 | (3.35)*** | 0.0861 | (3.34)*** | 0.0245 | (2.54)** |
| *BTM* | 0.0017 | (3.32)*** | 0.0016 | (1.28) | 0.0016 | (3.03)*** |
| *LIFECYCLE* | -0.0049 | (-2.86)*** | -0.0028 | (-0.67) | -0.0051 | (-2.69)*** |
| *HF* | 0.0102 | (1.16) | -0.0210 | (-1.13) | 0.0155 | (1.56) |
| *INDUSTRY_DUMMIES* | Yes | Yes | Yes | Yes | Yes | Yes |
| *YEAR_DUMMIES* | Yes | Yes | Yes | Yes | Yes | Yes |
| *F*-test for the difference in $\delta_1$ across SPEC and Non-SPEC samples | | | *F*-value = 0.06<br>*Pr*>*F*-value = 0.81 | | | |
| Adj. R-square | 7.22% | | 7.28% | | 7.43% | |

**Table 2.6 Results from the 2SLS Regressions**

**First-Stage Model:**

$$ABS\_DA_{i,t} = \delta_0 + \delta_1 TENURE_{i,t} + \delta_2 SPEC_{i,t} + \delta_3 SIZE_{i,t} + \delta_4 ROA_{i,t} + \delta_5 BTM_{i,t} + \delta_6 LIFECYCLE_{i,t} + \delta_7 HF_{i,t} + INDUSTRY\_DUMMIES + YEAR\_DUMMIES + \varepsilon_{i,t}$$

**Second-Stage Model:**

$$RM_{i,t} = \lambda_0 + \lambda_1 P\_ABS\_DA_{i,t} + \lambda_2 SPEC_{i,t} + \lambda_3 SIZE_{i,t} + \lambda_4 ROA_{i,t} + \lambda_5 BTM_{i,t} + \lambda_6 LIFECYCLE_{i,t} + \lambda_7 HF_{i,t} + INDUSTRY\_DUMMIES + YEAR\_DUMMIES + \varepsilon_{i,t}$$

| ***Second Stage*** | **Panel A: Full Sample** | | **Panel B: Specialists Subsample** | | **Panel C: Non-Specialists Subsample** | |
|---|---|---|---|---|---|---|
| Indep. Variables | Coefficients | *t*-Statistics | Coefficients | *t*-Statistics | Coefficients | *t*-Statistics |
| *INTERCEPT* | 1.0737 | (2.26)** | 0.7197 | (0.58) | 1.1617 | (2.19)** |
| *P_ABS_DA* | -11.0522 | (-2.27)** | -13.3763 | (-0.77) | -11.3470 | (-2.15)** |
| *SPEC* | 0.0157 | (0.60) | ---- | ---- | ---- | ---- |
| *SIZE* | -0.1043 | (-3.41)*** | -0.0404 | (-0.57) | -0.1154 | (-3.34)*** |
| *ROA* | -1.9341 | (-9.01)*** | -1.3912 | (-0.86) | -1.9318 | (-9.32)*** |
| *BTM* | 0.0502 | (4.90)*** | -0.0326 | (-1.04) | 0.0622 | (5.64)*** |
| *LIFECYCLE* | 0.4856 | (12.60)*** | 0.2709 | (2.77)*** | 0.5218 | (12.46)*** |
| *HF* | -0.8616 | (-5.31)*** | -1.0605 | (-2.13)** | -0.8865 | (-4.66)*** |
| *INDUSTRY_DUMMIES* | Yes | Yes | Yes | Yes | Yes | Yes |
| *YEAR_DUMMIES* | Yes | Yes | Yes | Yes | Yes | Yes |
| *F*-test for the difference in $\lambda_1$ across SPEC and Non-SPEC samples | | | *F*-value = 0.10<br>*Pr>F*-value = 0.75 | | | |
| Adj. R-square | 11.82% | | 9.98% | | 12.43% | |
| N | 9,329 | | 1,238 | | 8,091 | |

For variable definitions, please refer to Appendix 2-I. *, **, *** indicate the significance of coefficients at the 10%, 5%, and 1% levels, respectively (for two-tailed test).

**Table 2.7 Summary of Key Variables from a Series of Robustness Checks Based on 2SLS Regressions**

**First-Stage Model:** $ABS\_DA_{i,t} = \delta_0 + \delta_1 TENURE_{i,t} + \delta_2 SPEC_{i,t} + \delta_3 SIZE_{i,t} + \delta_4 ROA_{i,t} + \delta_5 BTM_{i,t} + \delta_6 LIFECYCLE_{i,t} + \delta_7 HF_{i,t} + INDUSTRY\_DUMMIES + YEAR\_DUMMIES + \varepsilon_{i,t}$

**Second-Stage Model:** $RM_{i,t} = \lambda_0 + \lambda_1 P\_ABS\_DA_{i,t} + \lambda_2 SPEC_{i,t} + \lambda_3 SIZE_{i,t} + \lambda_4 ROA_{i,t} + \lambda_5 BTM_{i,t} + \lambda_6 LIFECYCLE_{i,t} + \lambda_7 HF_{i,t} + INDUSTRY\_DUMMIES + YEAR\_DUMMIES + \varepsilon_{i,t}$

| | **Panel A: Full Sample** | | **Panel B: Specialists Subsample** | | **Panel C: Non-Specialists Subsample** | |
|---|---|---|---|---|---|---|
| Indep. Variables | Coefficients | *t*-Statistics | Coefficients | *t*-Statistics | Coefficients | *t*-Statistics |
| **Test 1: Alternative Definition of Earnings Target (Firms with Positive Earnings)** | | | | | | |
| *First Stage* | | | | | | |
| *TENURE* | -0.0002 | -3.41*** | -0.0002 | -1.01 | -0.0002 | -3.10*** |
| *F*-test for the difference in $\delta_1$ across SPEC and Non-SPEC samples | | | | *F*-value = 0.18 (*Pr*>*F*-value = 0.67) | | |
| *Second Stage* | | | | | | |
| *P_ABS_DA* | -14.4178 | -2.86*** | -20.4023 | -1.03 | -14.6756 | -2.72*** |
| *F*-test for the difference in $\lambda_1$ across SPEC and Non-SPEC samples | | | | *F*-value = 0.31 (*Pr*>*F*-value = 0.58) | | |
| N | 8,879 | | 1,201 | | 7,678 | |
| **Test 2: Alternative Definition of Earnings Target (Firms with Positive Earnings Growth)** | | | | | | |
| *First Stage* | | | | | | |
| *TENURE* | -0.0003 | -3.21*** | -0.0004 | -2.20** | -0.0002 | -2.61*** |
| *F*-test for the difference in $\delta_1$ across SPEC and Non-SPEC samples | | | | *F*-value = 0.44 (*Pr*>*F*-value = 0.51) | | |
| *Second Stage* | | | | | | |
| *P_ABS_DA* | -8.7652 | -1.69* | -0.5959 | -0.07 | -10.9389 | -1.76* |
| *F*-test for the difference in $\lambda_1$ across SPEC and Non-SPEC samples | | | | *F*-value = 0.20 (*Pr*>*F*-value = 0.65) | | |
| N | 6,731 | | 878 | | 5,853 | |

**Table 2.7 Summary of Key Variables from a Series of Robustness Checks Based on 2SLS Regressions**

**First-Stage Model:**

$$ABS\_DA_{i,t} = \delta_0 + \delta_1 TENURE_{i,t} + \delta_2 SPEC_{i,t} + \delta_3 SIZE_{i,t} + \delta_4 ROA_{i,t} + \delta_5 BTM_{i,t} + \delta_6 LIFECYCLE_{i,t} + \delta_7 HF_{i,t} + INDUSTRY\_DUMMIES + YEAR\_DUMMIES + \varepsilon_{i,t}$$

**Second-Stage Model:**

$$RM_{i,t} = \lambda_0 + \lambda_1 P\_ABS\_DA_{i,t} + \lambda_2 SPEC_{i,t} + \lambda_3 SIZE_{i,t} + \lambda_4 ROA_{i,t} + \lambda_5 BTM_{i,t} + \lambda_6 LIFECYCLE_{i,t} + \lambda_7 HF_{i,t} + INDUSTRY\_DUMMIES + YEAR\_DUMMIES + \varepsilon_{i,t}$$

| | **Panel A: Full Sample** | | **Panel B: Specialists Subsample** | | **Panel C: Non-Specialists Subsample** | |
|---|---|---|---|---|---|---|
| Indep. Variables | Coefficients | *t*-Statistics | Coefficients | *t*-Statistics | Coefficients | *t*-Statistics |
| **Test 3: Alternative Definition of Auditor Tenure (at least Five years)** | | | | | | |
| *First Stage* | | | | | | |
| *TENURE* | -0.0004 | -3.93*** | -0.0007 | -2.56** | -0.0004 | -3.19*** |
| *F*-test for the difference in $\delta_1$ across SPEC and Non-SPEC samples | | | | *F*-value = 0.73 (*Pr*>*F*-value = 0.39) | | |
| *Second Stage* | | | | | | |
| *P_ABS_DA* | -16.3038 | -3.74*** | 3.9424 | 0.49 | -21.7924 | -4.17*** |
| *F*-test for the difference in $\lambda_1$ across SPEC and Non-SPEC samples | | | | *F*-value = 4.99 (*Pr*>*F*-value = 0.03) | | |
| N | 5,797 | | 782 | | 5,015 | |
| **Test 4: Alternative Definition of Auditor Industry Specialization (*SPEC_2*)** | | | | | | |
| *First-Stage* | | | | | | |
| *TENURE* | -0.0002 | -3.67*** | -0.0003 | -3.09*** | -0.0002 | -2.21** |
| *F*-test for the difference in $\delta_1$ across SPEC and Non-SPEC samples | | | | *F*-value = 0.17 (*Pr*>*F*-value = 0.68) | | |
| *Second-Stage* | | | | | | |
| *P_ABS_DA* | -10.6555 | -2.29** | -1.0834 | -0.19 | -21.2051 | -2.80*** |
| *F*-test for the difference in $\lambda_1$ across SPEC and Non-SPEC samples | | | | *F*-value = 3.31 (*Pr*>*F*-value = 0.07) | | |
| N | 9,300 | | 3,968 | | 5,332 | |

For variable definitions, please refer to Appendix 2-I. *, **, *** indicate the significance of coefficients at the 10%, 5%, and 1% levels, respectively (for two-tailed test).

**Table 2.8 Results from the 2SLS Regressions on Income-Increasing Abnormal Accruals (*POS_DA*)**

**<u>First-Stage Model</u>:** $$POS\_DA_{i,t} = \theta_0 + \theta_1 TENURE_{i,t} + \theta_2 SPEC_{i,t} + \theta_3 SIZE_{i,t} + \theta_4 ROA_{i,t} + \theta_5 BTM_{i,t} + \theta_6 LIFECYCLE_{i,t} + \theta_7 HF_{i,t} + INDUSTRY\_DUMMIES + YEAR\_DUMMIES + \varepsilon_{i,t}$$

**<u>Second-Stage Model</u>:** $$RM_{i,t} = \varphi_0 + \varphi_1 P\_POS\_DA_{i,t} + \varphi_2 SPEC_{i,t} + \varphi_3 SIZE_{i,t} + \varphi_4 ROA_{i,t} + \varphi_5 BTM_{i,t} + \varphi_6 LIFECYCLE_{i,t} + \varphi_7 HF_{i,t} + INDUSTRY\_DUMMIES + YEAR\_DUMMIES + \varepsilon_{i,t}$$

| ***First Stage*** | **Panel A: Full Sample** | | **Panel B: Specialists Subsample** | | **Panel C: Non-Specialists Subsample** | |
|---|---|---|---|---|---|---|
| Indep. Variables | Coefficients | *t*-Statistics | Coefficients | *t*-Statistics | Coefficients | *t*-Statistics |
| *INTERCEPT* | 0.1076 | (21.80)*** | 0.0793 | (6.94)*** | 0.1113 | (20.47)*** |
| *TENURE* | -0.0002 | (-1.62)* | -0.0001 | (-0.39) | -0.0002 | (-1.41) |
| *SPEC* | -0.0027 | (-1.18) | ---- | ---- | ---- | ---- |
| *SIZE* | -0.0078 | (-17.00)*** | -0.0057 | (-5.30)*** | -0.0081 | (-16.11)*** |
| *ROA* | 0.1024 | (7.14)*** | 0.0955 | (2.82)*** | 0.1039 | (6.65)*** |
| *LIFECYCLE* | 0.0032 | (4.28)*** | 0.0026 | (1.54) | 0.0032 | (3.86)*** |
| *MTB* | -0.0012 | (-0.46) | -0.0056 | (-1.05) | -0.0005 | (-0.18) |
| *HF* | 0.0239 | (1.72)* | 0.0031 | (0.11) | 0.0233 | (1.49) |
| *INDUSTRY_DUMMIES* | YES | YES | YES | YES | YES | YES |
| *YEAR_DUMMIES* | YES | YES | YES | YES | YES | YES |
| *F*-test for the difference in $\theta_1$ across SPEC and Non-SPEC samples | | | *F*-value = 0.17<br>*Pr>F*-value = 0.68 | | | |
| Adj. R-square | 8.47% | | 9.16% | | 8.37% | |

**Table 2.8 Results from the 2SLS Regressions on Income-Increasing Abnormal Accruals (*POS_DA*)**

**First-Stage Model:**
$$POS\_DA_{i,t} = \theta_0 + \theta_1 TENURE_{i,t} + \theta_2 SPEC_{i,t} + \theta_3 SIZE_{i,t} + \theta_4 ROA_{i,t} + \theta_5 BTM_{i,t} + \theta_6 LIFECYCLE_{i,t} + \theta_7 HF_{i,t} + INDUSTRY\_DUMMIES + YEAR\_DUMMIES + \varepsilon_{i,t}$$

**Second-Stage Model:**
$$RM_{i,t} = \varphi_0 + \varphi_1 P\_POS\_DA_{i,t} + \varphi_2 SPEC_{i,t} + \varphi_3 SIZE_{i,t} + \varphi_4 ROA_{i,t} + \varphi_5 BTM_{i,t} + \varphi_6 LIFECYCLE_{i,t} + \varphi_7 HF_{i,t} + INDUSTRY\_DUMMIES + YEAR\_DUMMIES + \varepsilon_{i,t}$$

| ***Second Stage*** | **Panel A: Full Sample** | | **Panel B: Specialists Subsample** | | **Panel C: Non-Specialists Subsample** | |
|---|---|---|---|---|---|---|
| Indep. Variables | Coefficients | *t*-Statistics | Coefficients | *t*-Statistics | Coefficients | *t*-Statistics |
| *INTERCEPT* | 1.8067 | (2.27)** | 2.1441 | (0.70) | -0.2977 | (-0.28) |
| *P_POS_DA* | -16.8778 | (-2.27)** | -30.2156 | (-0.77) | 4.4241 | (0.46) |
| *SPEC* | -0.0258 | (-0.77) | ---- | ---- | ---- | ---- |
| *SIZE* | -0.1705 | (-2.86)*** | -0.1593 | (-0.71) | -0.0243 | (-0.30) |
| *ROA* | -0.5412 | (-0.69) | 0.3423 | (0.09) | -2.7482 | (-2.69)*** |
| *LIFECYCLE* | 0.0864 | (3.66)*** | 0.0236 | (0.24) | 0.0604 | (1.98)** |
| *MTB* | 0.5195 | (16.77)*** | 0.1390 | (0.59) | 0.6159 | (15.31)*** |
| *HF* | -0.5715 | (-2.37)** | -0.6874 | (-1.72)* | -1.0393 | (-3.30)*** |
| *INDUSTRY_DUMMIES* | YES | YES | YES | YES | YES | YES |
| *YEAR_DUMMIES* | YES | YES | YES | YES | YES | YES |
| *F*-test for the difference in $\varphi_1$ across SPEC and Non-SPEC samples | | | *F*-value = 0.01<br>*Pr*>*F*-value = 0.93 | | | |
| Adj. R-square | 11.82% | | 9.98% | | 13.99% | |
| N | 5,739 | | 760 | | 4,978 | |

For variable definitions, please refer to Appendix 2-I. *, **, *** indicate the significance of coefficients at the 10%, 5%, and 1% levels, respectively (for two-tailed test).

**Table 2.9 Results from the 2SLS Regressions on Income-Decreasing Abnormal Accruals (*NEG_DA*)**

**First-Stage Model:**
$$NEG\_DA_{i,t} = \kappa_0 + \kappa_1 TENURE_{i,t} + \kappa_2 SPEC_{i,t} + \kappa_3 SIZE_{i,t} + \kappa_4 ROA_{i,t} + \kappa_5 BTM_{i,t} + \kappa_6 LIFECYCLE_{i,t} + \kappa_7 HF_{i,t} + INDUSTRY\_DUMMIES + YEAR\_DUMMIES + \varepsilon_{i,t}$$

**Second-Stage Model:**
$$RM_{i,t} = \mu_0 + \mu_1 P\_NEG\_DA_{i,t} + \mu_2 SPEC_{i,t} + \mu_3 SIZE_{i,t} + \mu_4 ROA_{i,t} + \mu_5 BTM_{i,t} + \mu_6 LIFECYCLE_{i,t} + \mu_7 HF_{i,t} + INDUSTRY\_DUMMIES + YEAR\_DUMMIES + \varepsilon_{i,t}$$

| ***First Stage*** | **Panel A: Full Sample** | | **Panel B: Specialists Subsample** | | **Panel C: Non-Specialists Subsample** | |
|---|---|---|---|---|---|---|
| Indep. Variables | Coefficients | *t*-Statistics | Coefficients | *t*-Statistics | Coefficients | *t*-Statistics |
| *INTERCEPT* | -0.0948 | (-16.55)*** | -0.0655 | (-4.26)*** | -0.0969 | (-15.57)*** |
| *TENURE* | 0.0005 | (3.98)*** | 0.0006 | (1.89)* | 0.0004 | (3.36)*** |
| *SPEC* | -0.0019 | (-0.73) | ---- | ----- | ---- | ---- |
| *SIZE* | 0.0044 | (8.32)*** | 0.0015 | (1.08) | 0.0047 | (8.23)*** |
| *ROA* | 0.0451 | (3.03)*** | -0.0992 | (-2.10)** | 0.0604 | (3.83)*** |
| *LIFECYCLE* | 0.0000 | (0.01) | 0.0001 | (0.03) | 0.0000 | (0.02) |
| *MTB* | 0.0140 | (4.72)*** | 0.0004 | (0.05) | 0.0157 | (4.90)*** |
| *HF* | -0.0027 | (-0.18) | 0.0431 | (1.40) | -0.0146 | (-0.87) |
| *INDUSTRY_DUMMIES* | YES | YES | YES | YES | YES | YES |
| *YEAR_DUMMIES* | YES | YES | YES | YES | YES | YES |
| *F*-test for the difference in $\kappa_1$ across SPEC and Non-SPEC samples | | | *F*-value = 0.12<br>*Pr*>*F*-value = 0.73 | | | |
| Adj. R-square | 4.80% | | 6.12% | | 5.18% | |

**Table 2.9 Results from the 2SLS Regressions on Income-Decreasing Abnormal Accruals (*NEG_DA*)**

**First-Stage Model:**

$$NEG\_DA_{i,t} = \kappa_0 + \kappa_1 TENURE_{i,t} + \kappa_2 SPEC_{i,t} + \kappa_3 SIZE_{i,t} + \kappa_4 ROA_{i,t} + \kappa_5 BTM_{i,t} + \kappa_6 LIFECYCLE_{i,t} + \kappa_7 HF_{i,t} + INDUSTRY\_DUMMIES + YEAR\_DUMMIES + \varepsilon_{i,t}$$

**Second-Stage Model:**

$$RM_{i,t} = \mu_0 + \mu_1 P\_NEG\_DA_{i,t} + \mu_2 SPEC_{i,t} + \mu_3 SIZE_{i,t} + \mu_4 ROA_{i,t} + \mu_5 BTM_{i,t} + \mu_6 LIFECYCLE_{i,t} + \mu_7 HF_{i,t} + INDUSTRY\_DUMMIES + YEAR\_DUMMIES + \varepsilon_{i,t}$$

| ***Second Stage*** | **Panel A: Full Sample** | | **Panel B: Specialists Subsample** | | **Panel C: Non-Specialists Subsample** | |
|---|---|---|---|---|---|---|
| Indep. Variables | Coefficients | *t*-Statistics | Coefficients | *t*-Statistics | Coefficients | *t*-Statistics |
| *INTERCEPT* | 0.9927 | (2.66)*** | -0.1494 | (-0.24) | 1.2468 | (2.80)*** |
| *P_NEG_DA* | 14.7412 | (3.72)*** | 8.1527 | (0.88) | 16.5807 | (3.58)*** |
| *SPEC* | 0.1063 | (2.54)** | ---- | ---- | ---- | ---- |
| *SIZE* | -0.0669 | (-3.20)*** | 0.0526 | (1.70)* | -0.0903 | (-3.57)*** |
| *ROA* | -3.0759 | (-10.48)*** | -1.4455 | (-1.09) | -3.4105 | (-9.14)*** |
| *LIFECYCLE* | -0.0121 | (-0.88) | -0.0473 | (-1.25) | -0.0075 | (-0.51) |
| *MTB* | 0.2563 | (3.50)*** | 0.3248 | (2.36)** | 0.2227 | (2.50)** |
| *HF* | -0.8107 | (-3.46)*** | -0.9412 | (-1.45) | -0.7342 | (-2.66)*** |
| *INDUSTRY_DUMMIES* | YES | YES | YES | YES | YES | YES |
| *YEAR_DUMMIES* | YES | YES | YES | YES | YES | YES |
| *F*-test for the difference in $\mu_1$ across SPEC and Non-SPEC samples | | | | *F*-value = 0.15<br>*Pr*>*F*-value = 0.70 | | |
| Adj. R-square | 11.28% | | 11.13% | | 11.69% | |
| N | 3,590 | | 477 | | 3,113 | |

For variable definitions, please refer to Appendix 2-I. *, **, *** indicate the significance of coefficients at the 10%, 5%, and 1% levels, respectively (for two-tailed test).

# CHAPTER 3

# Has SOX Affected the Association Between Fee Dependence and Non Big-4 Clients' Accrual Reporting?

## 3.1 INTRODUCTION

A string of highly publicized corporate scandals, highlighted by Arthur Andersen's involvement in the collapse of Enron, raises a major concern over the impact of fee dependence on auditor independence.[27] If a significant portion of an auditor's revenues derives from a certain client, she may allow that client with more accounting flexibility in order to retain the client and avoid losing future revenues (DeAngelo 1981). The threat to reporting objectivity arising from fee dependence may be mitigated by auditors' expected litigation costs and professional sanctions in the event of audit failures (Dopuch et al. 2001). Two of the provisions in the Sarbanes-Oxley Act of 2002 (hereafter SOX) speak to these mitigating factors. Title I of SOX for example establishes the Public Company Accounting Oversight Board (hereafter PCAOB) to take over the oversight responsibilities of public accounting firms from the American Institute of Certified Public Accountants. Title XI raises auditors' litigation risks by expanding the parties to whom they owe a duty of care and imposing criminal penalties beyond those contained under the Securities Exchange Act of 1934.

[27] The term "fee dependence" is often referred to as "client influence" and "economic bonding" in the literature.

These provisions have significantly increased auditors' litigation exposures from the pre-SOX period (Johnstone and Bedard 2007; Rama and Read 2006).

The primary objective of this study is to address the question of whether non Big-4 auditors' ability to resist client pressure regarding accrual reporting has been affected by SOX. The extant literature has drawn inferences from years predating the passage of SOX based on samples comprised of mostly Big-4 auditors and generally concluded that fee dependence does not affect Big-4 auditors' propensity to compromise reporting objectivity (reviewed in Section 3.2). These findings however may not extend to non Big-4 auditors during the looser (pre-SOX) regulatory regime, because these auditors have lower investment in reputational capital (Francis and Wilson 1988) and hence less incentive to withstand client pressure compared to their Big-4 counterparts. Moreover, non Big-4's smaller audit portfolios and fewer SEC clients per office (Reichelt and Francis 2002) may work to exacerbate the financial consequences of every client loss, reducing their ability to resist pressure from clients. Thus, we expect the increased litigation exposures under SOX to have a relatively greater effect on non Big-4 clients. To the best of our knowledge, we are the first study to focus on the association between fee dependence and accrual reporting for the rapidly growing segment of market served by non Big-4 auditors following the enactment of SOX.

Our sample consists of 827 and 4,517 non Big-4 clients in the pre-SOX (2000-2001) and the post-SOX (2004-2007) periods, respectively. For comparison purposes, we also present analogous analysis for Big-4 clients comprised of 4,245 and 9,066 firm-year observations, respectively. Former clients of Arthur Andersen are not considered in the study to mitigate potential confounding effects due to strategies adopted by new auditors in dealing with these firms (Geiger and Raghunanda 2002). Following the theoretical model put forth by DeAngelo (1981), we measure fee dependence (labeled *FEEDEP* hereafter) as the ratio of total fees received from a particular client over an auditor's total revenue in a practice office. We proxy for audit quality using performance-adjusted abnormal accruals (labeled *DACC* hereafter), calculated based on the cross-sectional version of modified Jones model (Jones 1991). Our research design calls for regressing *DACC* on *FEEDEP* along with a set of control variables known to affect *DACC* in the earnings management literature, separately for each of the two sample periods.

Comparing the coefficient estimates on *FEEDEP* from periods surrounding the passage of SOX for non Big-4 clients, we find a significantly positive association between *FEEDEP* and *DACC* in the pre-SOX period, but not so in the post-SOX period. It would appear that increased litigation exposures following the enactment of SOX may have counter-balanced non Big-4 auditors' economic incentives to yield to client pressure such that they no longer allow aggressive accounting accruals by their clients. In contrast, there is no evidence of such association for our benchmark Big-4 clients in either sample period. Any incremental litigation risks arising from SOX seem to have little effect on the way Big-4 auditors deal with accrual reporting when facing client pressure, likely because they were already faced with high litigation risks in the pre-SOX period.

Since non Big-4 auditors can vary significantly in reputation, financial resources and market share, as a secondary objective of the study we also conduct a separate analysis for large and small non Big-4 auditors, labeled as second-tier and third-tier auditors, respectively. Following Hogan and Martin (2009) and Reichelt and Francis (2002), the former group is defined to include three non Big-4 audit firms, i.e., BDO Seidman, Grant Thornton, and McGladrey and Pullen, whereas the latter consists of the remaining non Big-4 audit firms. Anecdotal evidence suggests that the quality of audits by second-tier auditors is comparable to that of Big-4's.[28] Expressing a concern for the concentration of audit market after the collapse of Arthur Andersen, PCAOB encourages the use of second-tier auditors as an alternative to Big-4 (Cassell et al. 2008).[29] We seek to provide empirical evidence to see if the quality of second-tier auditors indeed exceeds that of third-tier auditors, as implied by PCAOB's comments.

Among our non Big-4 clients, 349 (478) and 1,373 (3,144) firm-year observations are classified as second-tier (third-tier) in the pre- and the post-SOX periods, respectively. Results indicate that third-tier auditors allow significantly greater abnormal accruals for clients whom they are financially dependent on in the less litigious (pre-SOX) regime, compared to second-tier auditors. In contrast, we do not find any evidence that either group of auditors yields to client pressure

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[28] For example, according to a CFO.com article, the PCAOB's "… latest inspection of the second-tier firms found far fewer deficiencies than those reported at the Big-4" (Johnson 2007).

[29] This may explain why there is more rapid growth in market share among this group of non Big-4 auditors, compared to other non Big-4 (Reilly 2006; Byrnes 2005; Gullapalli 2005). According to a proxy advisory firm, Glass, Lewis & Co., 238 companies with revenues of $100 million-plus switched auditors in 2004, up from 115 in 2003. The winners were the second-tier firms. BDO Seidman, LLP alone added 109 new clients in 2004, a figure exceeding the number of new clients added by any Big-4 during the same year (Gullapalli 2005).

in the post-SOX period. Like Big-4 auditors, second-tier auditors do not permit aggressive accounting accruals in both sample periods. Taken together, our findings on non Big-4 auditors appear to be driven mainly by third-tier auditors.

We contribute to the fee dependence literature in several ways: First, we extend the analysis to five years after the adoption of SOX to help shed light on the effectiveness of government regulations designed to curtail incidence of impairment to an auditor's reporting objectivity. Second, we draw attention to non Big-4 auditors, who have played an increasingly important role in the audit market since early 2000s. By showing that the stringent SOX regulations enhance these auditors' ability to withstand client pressure but have little effect on our benchmark Big-4 auditors, we highlight the importance of assessing the efficacy of SOX separately for subsets of auditors. Third, we provide empirical evidence that second-tier auditors behave in a similar manner as Big-4 auditors in the way they deal with client pressure arising from fee dependence. This finding lends support for the PCAOB's advice to use second-tier auditors as a substitute for Big-4.

The remainder of this paper proceeds as follows: Section 3.2 reviews the related literature and develops our research hypotheses; Section 3.3 presents our research design; Section 3.4 describes the data and sample selection procedure; Section 3.5 presents main empirical results for the study, followed by robustness checks in Section 3.6 and further analysis in Section 3.7; Section 3.8 concludes the paper.

## 3.2 LITERATURE REVIEW

### *3.2.1 Fee Dependence and Abnormal Accruals*

Audit quality is the joint probability that an auditor will *detect* and *reveal* material errors in her client's financial statements (DeAngelo 1981). The probability of detecting material errors is a function of auditor competence; whereas the probability of reporting such errors is a function of auditor independence. The extant fee dependence literature speaks to the ability of auditors to make unbiased judgment and provide quality audits in the face of client pressure under the assumption that all auditors conduct their audits in accordance with the Generally Accepted Auditing Standards. Audit independence however is unobservable, forcing researchers to draw inferences by linking an empirical proxy for fee dependence with the degree of accounting discretion permitted by auditors.[30]

Chung and Kallapur (2003) for example measure fee dependence as the ratio of clients' audit fees divided by the audit firm's (or a practice-office's) total revenues, a measure we label *FEEDEP* in our study. For a sample of 1,778 Big-5 clients with publicly disclosed audit fee data between February 5, 2001 and June 30, 2001, Chung and Kallapur (2003) fail to find any association between *FEEDEP* and abnormal discretionary accruals. Using a similar measure of fee dependence at the local office level, Reynolds and Francis (2001) show that large clients of Big-5 auditors adopt more conservative accrual reporting during fiscal

[30] Another branch of the fee dependence literature examines the association between fee dependence and audit opinions (qualified vs. unqualified). While interesting, it is outside the scope of current study. Thus, we do not provide a review of that line of research in this section.

year of 1996.[31] The authors interpret these results as suggesting that Big-5 auditors are concerned with protecting their reputation and do not yield to client pressure.

Instead of using *FEEDEP* to proxy for audit independence, Ashbaugh et al. (2003) measure the construct by reference to fee levels (i.e., audit fees, non-audit fees, total fees) and fee ratios (defined as non-audit fees over total fees).[32] For their sample of 2,803 Big-5 clients and 367 non Big-5 clients obtained from the 2000 proxy statements, Ashbaugh et al. (2003) note that there is no systematic evidence of an association between these four fee dependence metrics and abnormal current accruals. A concurrent study by Larcker and Richardson (2004) employs latent class mixture models to analyze the relationship between fee levels (i.e., non-audit fees, total fees, unexpected non-audit fees, and unexpected total fees) or fee ratios and abnormal accruals. Their sample includes 5,103 firms audited by Big-5 auditors and two second-tier auditors (i.e., BDO Seidman and Grant Thornton) in fiscal years 2000 and 2001. Results indicate that abnormal accruals are negatively related with fee levels but not with fee ratios, implying that auditors' decision to constrain their clients' accrual reporting may have been motivated out of a concern for reputation.

Unlike the aforementioned fee dependence literature, which has focused mostly on Big-N clients, Reichelt and Francis (2002) study similar issue for non

[31] Reynolds and Francis (2001) replace audit fees with client sales in the calculation of proxy for fee dependence, as their sample period predates February 5, 2001 when fee disclosures became mandatory under the SEC Rule 2-01 of Regulation S-X (SEC 2001).
[32] Ashbaugh et al (2003) choose to work with these four measures of fee dependence because their objective is to demonstrate the sensitivity of results reported in Frankel, Johnson and Nelson (2002) to research design.

Big-N clients and use both *FEEDEP* and fee ratios to measure audit independence. For 344 non Big-N clients obtained from fiscal year 2000, they show that abnormal accruals are positively associated with *FEEDEP*, though there is no evidence of any association for fee ratios.[33] Their finding on *FEEDEP* is contrary to that documented in Chung and Kallapur (2003) and Reynolds and Francis (2001) reviewed above. However, the difference is not surprising, in light of prior evidence showing that non Big-N clients on average report higher income-increasing abnormal accruals than Big-N clients (Francis et al. 1999; Becker et al. 1998).

Our study is closely related to Reichelt and Francis (2002). There are nevertheless several major differences that set us apart. First, we are interested in the effect of SOX-induced changes to non Big-4 auditors' litigation exposures on the association between fee dependence and their clients' earnings management activity, as proxied by signed abnormal accruals. By comparison, Reichelt and Francis (2002) focus on the extent of non Big-4 clients' accounting conservatism, as proxied by absolute values of abnormal accruals, during a period characterized by low litigation exposures. Second, our sample covers a longer period of time (year 2000-2001; year 2004-2007) with larger sample sizes (827 observations; 4,517 observations), compared to theirs (year 2000; 344 observations). Third, we conduct a separate regression analysis for Big-4 clients to provide a benchmark for interpretation purposes, whereas Reichelt and Francis (2002) only provide

[33] Reichelt and Francis (2002) also find that non Big-N clients on whom auditors are financially dependent appear to report more conservatively (measured by absolute value of abnormal accruals).

univariate comparisons for their Big-N and non Big-N clients. Fourth, we conduct a refined regression analysis for subsets of non Big-4 clients (second-tier vs. third-tier). This research design allows us to draw inferences about the relative audit quality of second-tier and Big-4 auditors. Except for some univariate statistics, Reichelt and Francis do not appear to formally consider second-tier auditors.

### *3.2.2 Effects of Litigation Exposures on Fee Dependence and Abnormal Accruals*

The basic premise underlying studies reviewed in the previous section was put forth in DeAngelo (1981) who argues that an auditor's incentive to compromise audit independence is related to fee dependence, defined as the ratio of client-specific quasi rents (labeled $QR_C$) over all other future quasi rents expected to be received by the auditor (labeled $QR_O$). Motivated by a fear of losing the combined future quasi rents, the auditor may be more lenient towards a client from whom she derives a significant portion of her total revenue. To maximize her overall utility function, an auditor will choose to report truthfully if and only if

$$QR_C / QR_O < P_{Detect} \alpha / P_{Fire} \qquad (3\text{-}1)$$

where the left-hand-side (LHS) of Inequality (3-1) is the quasi-rents ratio; the right-hand-side (RHS) denotes the probability ratio; $P_{Detect}$ is the probability of being detected by regulators and financial statement users for not reporting a major breach discovered in her client's accounting system; $P_{Fire}$ is the probability of being fired by her client if an auditor reports the breach; $\alpha$ denotes the portion of other future quasi rents lost upon detection. The theoretically supportable empirical proxy for quasi-rents ratio implied by DeAngelo's model (1981), according to Chung and Kallapur (2003), is the ratio of total fees from a client over an auditor's total revenues (i.e., *FEEDEP*). For that reason, we do not measure fee dependence based on fee ratios or fee levels.[34]

The magnitude of the RHS probability ratio reflects differences in an auditor's ability to withstand her client pressure over accounting discretion. For a given value of quasi-rents ratio, a high value of probability ratio is expected to widen the distance between these two ratios, giving rise to a stronger incentive by the auditor to maintain her reporting objectivity. The probability ratio likely depends on many factors. In this study, we focus on one factor, namely, detection risk, and argue that SOX raises the probability of detection through the establishment the PCAOB, expansion of auditors' duty of care and levying of substantial criminal penalties for audit failures. These new requirements are expected to lead to a fundamental shift in legal regime, exposing external auditors to higher detection risks and greater litigation risks than before, i.e., $P_{Detect}^{Post-SOX} > P_{Detect}^{Pre\text{-}SOX}$. A high detection risk implies a large RHS probability ratio in Inequality (3-1), i.e., $\left(P_{Detect}\alpha / P_{Fire}\right)^{Post-SOX} > \left(P_{Detect}\alpha / P_{Fire}\right)^{Pre-SOX}$, which in turn widens the distance between quasi-rents and probability ratios and increases the likelihood of maintaining auditor independence.

[34] Non-audit fees based fee ratios may be large for a particular client, even though it is an inconsequential part of an auditor's overall portfolio (Ashbaugh et al. 2003). Raw audit or total fees may also be misleading, as the same magnitude can have vastly different implications for auditors depending on the size of their total revenues.

The notion that an auditor's behavior is sensitive to her litigation concerns has been the subject of audit research over the past decade. Francis and Krishnan (2002) for example report that auditors' risk management policies were relaxed after the adoption of the 1995 Private Securities Litigation Reform Act (PSLRA) that eliminated joint and several liabilities under which auditors could be named to lawsuits due to deep pockets rather than culpability. Lee and Mande (2003) extend the analysis to study the impact of PSLRA on accounting accruals. For a sample of 15,600 firm-year observations over a six-year sample period (1992-1994; 1996-1998), the authors find an increase in income-increasing abnormal accruals for Big-6 clients in the post-PSLRA period, but no significant changes to those of non Big-6 clients. Unlike PLSRA which relaxes auditors' litigation exposures, SOX claims to have increased substantially the legal liabilities faced by auditors. Several recent studies consider the litigation effects of SOX on audit quality, as proxied by abnormal accruals and audit opinions (Li 2009; Cohen et al. 2008). Cohen et al. (2008) for example document that the accounting-based earnings management increases steadily from 1987 to 2002, but has since declined significantly. The authors suggest that the time series patterns of abnormal accruals reflect heightened public scrutiny of auditors and the ensuing rise in audit risks following the passage of SOX.

The auditing literature, however, has not addressed the issue of how auditors' changing litigation exposures may have affected their ability to withstand client pressure on accrual reporting – a focus of our study. We conjecture that the rising threat of litigations under SOX can mitigate an auditor's incentive to compromise her reporting objectivity. The effect may be most pronounced among non Big-4 auditors, who before the introduction of SOX had relatively less incentive and more limited ability to resist such pressure, compared to their Big-4 counterparts. It is an empirical issue whether the increase in litigation exposures is enough to alter the behavior of these auditors substantially such that they no longer yield to client pressure following the passage of SOX.

## 3.3 RESEARCH DESIGN

To address the primary research question of the study, we estimate the following ordinary-least-square (OLS) abnormal accruals model for non Big-4 audit clients in the pre- and post-SOX periods separately:[35]

$$\begin{aligned} DACC = {} & \alpha_0 + \alpha_1 FEEDEP + \alpha_2 SIZE + \alpha_3 ROA + \alpha_4 BV / MV \\ & + \alpha_5 LEVERAGE + \alpha_6 SALEGROWTH + \alpha_7 LOSS \\ & + \alpha_8 ISSUE + \alpha_9 LITIGATION + YEAR\_DUMMIES + \varepsilon \end{aligned} \qquad (3\text{-}2)$$

where the dependent variable *DACC* represents the signed value of performance-adjusted abnormal accruals[36] calculated based on Dechow et al. (1995)'s cross-sectional modified Jones model using the following two-step procedure: (1). Partitioning the sample into deciles according to lagged return on assets (*ROA*). (2). Taking the difference between firm *i*'s unadjusted *DACC* and the median

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[35] All the continuous variables are winsorized at the top and bottom 2% of respective distributions to mitigate the impact of extreme values on the parameter estimates.

[36] We adjust for firm performance because measurement errors in the estimation of abnormal accruals can lead to inappropriate inferences when these errors are correlated with the test variable (Kothari et al. 2005).

unadjusted *DACC* for its industry_*ROA* decile after excluding firm *i* from the calculation (Cahan and Zhang 2006; Francis et al. 2005).[37]

For the secondary research question of the study, we re-estimate Equation (3-2) separately for second-tier and third-tier audit clients. In both cases, *FEEDEP* is our test variable used to measure the extent of financial dependence of an auditor with respect to each of her clients. We define *FEEDEP* as, $TF_{ijk} \Big/ \sum_{i=1}^{I} TF_{ijk}$ , where $TF_{ijk}$ denotes total fees paid by client *i* to audit firm *j*'s local office *k* and $\sum_{i=1}^{I} TF_{ijk}$ denotes total fees earned by local office *k* of audit firm *j*. This *FEEDEP* measure is theory-based and it captures the relative importance of a particular audit client to its auditor's overall portfolio at the local-office level. We adopt the local-office approach because economic bonding between an auditor and her clients is likely to be more prominent at this level (DeFond and Francis 2005).[38] Moreover, audit firms that dominate nationally may not be a major player in parts of the country due to regional heterogeneity. Many multi-office audit firms often find it easier to decentralize some of their operations and

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[37] We work with the signed value of performance-adjusted *DACC* because the regulator appears to be more concerned with income-increasing accruals, noting that "… in the end, most would agree that inappropriately increasing earnings results in a lower quality of earnings" (POB 2000, 79). Heninger (2001) and Becker et al. (1998) also advocate using signed *DACC* to proxy for earnings quality in the auditing context, as auditors are never sued for large income-decreasing accruals. As well, evidence from earnings management literature suggests that firms tend to manipulate income upwards, rather than downwards, through the provision of discretionary accruals (Healy and Wahlen 1999). Finally, Hribar and Nichols (2007) remark that, "… tests based on absolute discretionary accruals are exposed to a class of correlated omitted variables that is generally not a concern in research using signed discretionary accruals".

[38] We check for the robustness of our main results by using a city-level *FEEDEP* measure in Section 2.6. Chung and Kallapur (2003) and Reynolds and Francis (2001) also use the local-office *FEEDEP* measure, whereas others work with an audit firm *FEEDEP* measure (Larcker and Richardson 2004; Ashbaugh et al. 2003; Chung and Kallapur 2003).

decision-makings, including contract negotiations for audit engagements, which in turn can contribute to variations in reporting objectivity across practicing offices.

Equation (3-2) also controls for eight well-known determinants of *DACC* in the earnings management literature, of which five are continuous variables: logarithm of average total assets (*SIZE*; Chung and Kallapur 2003); earnings before extraordinary items deflated by average total assets (*ROA*; Dechow et al. 1995); book-to-market ratio (*BV/MV*; Jones 1991); total debt liabilities deflated by total average assets (*LEVERAGE*; DeFond and Jiambalvo 1994); and growth in sales, defined as the change in sales from last year deflated by last year's sales (*SALEGROWTH*; McNichols 2002). The remaining three control variables are indicator variables: *LOSS*, set equal to one when the firm reports a bottom-line loss in the previous year and zero otherwise (Burgstahler and Dichev 1997); *ISSUE*, set equal to one if the change in common equity during the year is greater than 10% and zero otherwise (Teoh et al. 1998); and *LITIGATION*, set equal to one if the firm operates in a highly litigious industry and zero otherwise (Francis et al. 1994).[39] Finally, Equation (3-2) includes year dummies to control for the year effect.

For each subset of auditors (i.e., non Big-4, second-tier or third-tier), we compare the coefficient on *FEEDEP* estimated from Equation (3-2) in the pre-SOX period with the corresponding figure from the post-SOX period. A significantly more positive, or less negative, coefficient on *FEEDEP* in the pre-

[39] High-litigation industries include industries with SIC codes 2833–2836, 3570–3577, 3600–3674, 5200–5961, and 7370–7374 (Lim and Tan 2008).

SOX period implies that that the particular group of auditors is more likely to yield to client pressure and allows greater abnormal accruals in a loose (pre-SOX) regulatory regime than in a tight (post-SOX) regime. On the other hand, if coefficient on *FEEDEP* is insignificantly different from each other across sample periods, then the more stringent regulatory requirements are said to have no effect on the way auditors cope with client pressure. To provide a baseline for this analysis, we re-run Equation (3-2) and conduct analogous tests based on the Big-4 samples. However, we do not expect to see any significant difference in coefficient estimates on *FEEDEP* across time periods.

## 3.4 DATA AND SAMPLE SELECTION

Our initial sample consists of 28,916 and 58,705 firm-year observations whose audit fees and auditor information are available from Audit Analytics database in the pre-SOX (2000-2001) and the post-SOX (2004-2007) periods, respectively. We exclude the event year (2002) as well as the next fiscal year (2003) from our study because most audit- and reporting-related provisions of SOX did not come into effect until 2004. Moreover, audit firms, along with their clients and the public, may need time to fully assess the implications of tougher reporting regulations under SOX. Finally, both our regression Equation (3-2) and the model used to estimate abnormal accruals also include several lagged variables that would need to come from the event year (2002) if the year 2003 were part of our post-SOX period.

We apply the following filters to the initial sample: (1). Data required to calculate the office-level fee-dependence variable (*FEEDEP*) and to merge audit-fee data from Audit Analytics with financial information from COMPUSTAT must be available. (2). Firms must not retain multiple auditors for different services in any given year in order to minimize noise in our tests. (3). Firms are not former clients of Arthur Andersen before its collapse in 2002. (4). Firms do not belong to either financial or utility sectors. These filters, summarized in Table 3.1, yield a total sample of 827 (4,517) firm-year observations audited by non Big-4 auditors in the pre- (post-) SOX period and 4,245 (9,066) by Big-4 auditors.

[Insert Table 3.1 About Here]

## 3.5 MAIN RESULTS

### *3.5.1 Descriptive Statistics*

Panel A of Table 3.2 presents the distributions of model variables for non Big-4 audit clients by sample period. Non Big-4 auditors report a significantly lower median value of abnormal accruals (*DACC*) in the post-SOX period than the pre-SOX period, i.e., –0.01 vs. –0.00 (*z*-statistics = 1.93), consistent with findings documented in Cohen et al. (2008) that abnormal accruals decline significantly after the passage of SOX in 2002. The extent of fee dependence between a non Big-4 auditor and her clients (*FEEDEP*) also decreases significantly, from a median value of 0.04 in the pre-SOX period to 0.03 in the post-SOX period. The difference is significant at the 1% level (*z*-statistics = 5.33). Turning to the control variables, we find that non Big-4 firms in the post-SOX period are larger (*SIZE*;

10.16 vs. 9.84) with higher future growth prospect (*BV/MV*; 0.34 vs. 0.64), lower debt level (*LEVERAGE*; 0.14 vs. 0.21), superior current sales performance (*SALEGROWTH*; 0.10 vs. 0.05) and greater likelihood of issuing new equity capital (*ISSUE*; 1.00 vs. 0.00), compared to the pre-SOX period.

Columns (1) and (2), Panel B of Table 3.2, present median values of model variables for second-tier and third-tier audit clients in the pre-SOX period, respectively. The corresponding median values for the post-SOX period appear in Columns (3) and (4), Panel B of Table 3.2. Contrasting median values across sample periods, we find that third-tier audit clients report significantly lower level of *DACC* in the post-SOX period than in the pre-SOX period (–0.01 vs. 0.02, *z*-statistics = 3.67), whereas second-tier clients report statistically similar level of *DACC* in both sample periods (–0.01 vs. –0.02, *z*-statistics = –1.53). For both non Big-4 subsamples, the median value of fee dependence measure declines significantly from the pre-SOX period to the post-SOX period, i.e., 0.005 to 0.002 (*z*-statistics = 10.41) and 0.21 to 0.06 (*z*-statistics = 12.81) for the second-tier and third-tier audit clients, respectively. While clients audited by the second-tier auditors reported a significantly lower level of *DACC* than those audited by the third-tier auditors in the pre-SOX period (–0.02 vs. 0.02, *z*-statistics = –4.09), the median levels of *DACC* are similar in the post-SOX period (–0.01 vs. –0.01, *z*-statistics = –0.44).

[Insert Table 3.2 About Here]

Panels A and B (C and D) of Table 3.3 present the correlation matrices involving the dependent variable and each of the independent variables in

Equation (3-2) for non Big-4 (Big-4) audit clients in the pre- and post-SOX periods, respectively. In each panel, pair-wise Pearson (Spearman rank) correlation coefficients appear above (below) the diagonal. Focusing on the non Big-4 subsample, we find that *DACC* is positively and significantly correlated with *FEEDEP* in both sample periods, though the strength of Pearson (Spearman rank) correlations declines from 0.11 (0.11) in the pre-SOX period to 0.05 (0.03) in the post-SOX period. By comparison, for our benchmark Big-4 subsample the dependent variable *DACC* is generally uncorrelated with *FEEDEP* at the conventional levels, implying that economic bonding does not appear to affect Big-4 clients' accrual reporting at the univariate level. While a number of independent variables are positively correlated with each other at the conventional levels, the highest Belsley, Kuh and Welsch's (1980) Condition Index is 2.69. Thus, multicollinearity is not a concern.[40]

[Insert Table 3.3 About Here]

### *3.5.2 Regression Results*

Columns 1a and 1b (2a and 2b) of Table 3.4 present the regression results for Equation (3-2) estimated separately for non Big-4 (Big-4) clients in the pre- and the post-SOX periods, respectively.

After controlling for the potential effects of covariates, we find that the coefficient estimate on *FEEDEP* is positive and significant at the 10% level for

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[40] We view multicollinearity to be present if the Condition Index is at least 30. We also check the variance inflation factor (*VIF*) and find that the highest *VIF* is 1.74, well below the threshold of 10 considered to be indicative of multicollinearity.

non Big-4 clients prior to the passage of SOX (0.03, *t*-statistic = 1.77; Column 1a), whereas it is not significantly different from zero in the post-SOX period (0.01, *t*-statistic = 1.02; Column 1b). An *F*-test indicates that the former is significantly higher than the latter at the 10% level (*F*-value = 3.23; Column 1c), implying that non Big-4 auditors allowed greater accrual discretion by clients with whom they have strong economic bonding during the pre-SOX period when they faced low litigation risks. The heightened litigation concerns brought about by SOX appear to have counter-balanced these auditors' economic incentives to yield to client pressure. An implication from these results is that non Big-4 auditors may have chosen to enhance the quality of their audits following SOX in order to avoid costly litigations.

Different patterns emerge for the benchmark Big-4 clients (Column 2). While the coefficient estimate on *FEEDEP* is significantly lower in the pre-SOX period, compared to the post-SOX period (–0.12 vs. 0.03, *F*-value = 3.91; Column 2c), there is nonetheless no evidence of a positive association between fee dependence and abnormal accruals in either time period. Thus, it would appear that Big-4 auditors are able to consistently maintain independence in dealing with their clients, regardless of the external regulatory environments. We surmise that these auditors were already faced with high litigation risks in the loose (pre-SOX) regime, mitigating any incentive they might have to compromise reporting objectivity due to economic bonding. Incremental litigation risks arising from SOX may not be large enough for these auditors to alter their behavior and demand even more conservative reporting from their clients.

Columns 3a-3b of Table 3.4 compare the coefficients on *FEEDEP* across non Big-4 and Big-4 audit clients by sample period. Results based on *F*-tests indicate that coefficient estimate on *FEEDEP* for non Big-4 is significantly higher than that of Big-4's in the pre-SOX period (*F*-value = 2.66) at the 10% level. But, they are not statistically different from each other in the post-SOX period (*F*-value = 0.15), implying that neither group of auditors allows economic bonding to affect their audit quality in a tighter (post-SOX) regulatory regime. In effect, non Big-4 auditors make significant change to the way they deal with their clients such that they behave in a similar manner as Big-4 auditors after the passage of SOX.

[Insert Table 3.4 About Here]

## 3.6 SENSITIVITY TESTS

### *3.6.1 Measuring FEEDEP at Practice-office Level*

Some of the audit firms in our sample have multiple practice-offices within a city. The database (Audit Analytics) we use to extract audit fee data does not provide information about the identity of practice-office that performs the audit. To calculate the practice-office based *FEEDEP* measure in the main analysis, we have followed Chung and Kallapur (2003) and invoke the assumption that local office situated closest to the client performs the audit. This approach is arguably *ad hoc*, as within-city travel is unlikely to be substantial enough to deter a client from retaining a local office that is located at the opposite end of the city. If so, arbitrary revenue allocation may give rise to measurement errors in *FEEDEP*.

To address this issue, we now re-define *FEEDEP* as $TF_{ijk} \Big/ \sum_{i=1}^{I} TF_{ijk}$, where $TF_{ijk}$ denotes total fees paid by client *i* to all the local offices of audit firm *j* located in city k; and $\sum_{i=1}^{I} TF_{ijk}$ denotes total fees earned by all the local offices of audit firm *j* located in city k. This city-based *FEEDEP* measure captures the relative importance of a particular audit client to its auditor's overall portfolio on a city-by-city basis. We choose city as the unit of analysis because audit firms that dominate nationally or regionally may not be a major player in a city market. Moreover, audit contracting often occurs in each city, lending support for analyzing auditor independence at this level (Francis, Maydew and Sparks1999).

Results (untabulated) are qualitatively similar to those discussed in the previous section. In the pre-SOX period the coefficient estimate on *FEEDEP* for non Big-4 audit clients is 0.03 (*t*-statistics = 2.21) significant at the 5% level, whereas that in the post-SOX period is insignificantly different from zero. In contrast, for Big-4 audit clients the coefficient estimates on *FEEDEP* are effectively zero in both sample periods, suggesting that these auditors are able to consistently maintain their independence. In short, our main findings that non Big-4 auditors do not impair their reporting objectivity during the less litigious (pre-SOX) regulatory regime are invariant to alternative measure of *FEEDEP* at the city-level.

### 3.6.2 Controlling for Auditor Self-Selection Bias

Up till now, we have used the OLS research design under the assumption that firms choose their auditors randomly. While unlikely to hold in practice, such an assumption is not expected to pose a problem in this study because we are primarily interested in tracking the impact of fee dependence on abnormal accruals for one group of audit firms (i.e., non Big-4) and only refer to Big-4 for benchmark comparison purposes. Nonetheless, as robustness check we also employ the alternative Heckman (1978) two-stage treatment model to control for potential auditor self-selection bias (Chaney et al. 2004, 2005). Specifically, in the first stage we estimate the following multivariate *probit* model:

$$\begin{aligned} BIG4 = {} & \beta_0 + \beta_1 SIZE + \beta_2 LEVERAGE + \beta_3 SQRTSEG + \beta_4 ROA \\ & + \beta_5 SQRTEMPL + \beta_6 INVENTORY + \beta_7 SIZE \bullet SIZE \\ & + \beta_8 SIZE \bullet LEVERAGE + \beta_9 SIZE \bullet SQRTSEG + \beta_{10} SIZE \bullet ROA \qquad (3\text{-}3) \\ & + \beta_{11} SIZE \bullet SQRTEMPL + \beta_{12} SIZE \bullet INVENTORY \\ & + YEAR\_DUMMIES + \varepsilon \end{aligned}$$

where the dependent variable, *BIG4*, denotes the probability that a firm chooses to be audited by a Big-4 auditor. This is likely to happen when clients are large or when audits are risky and complex (Chaney et al. 2004). We measure these three constructs using the following proxy variables: *SIZE* is the logarithm of the year-end total assets; *SQRTSEG* (*SQRTEMPL*) is the square root of the number of business segments (employees), intended to measure audit complexity; [41]

[41] Results are qualitatively unchanged if we log transform both the number of employees and the number of segments.

*LEVERAGE* denotes total liabilities deflated by average total assets; *ROA* denotes earnings before extraordinary items deflated by total assets; *INVENTORY* denotes total inventory deflated by total assets. The last three proxies are used to capture audit risks. Following Chaney et al. (2005), we interact each independent variable with *SIZE* to allow for potential variations in incentives to choose a Big-4 auditor by large and small audit clients who face different agency and monitoring costs.

In the second stage, we first estimate the following OLS regression separately for non Big-4 and Big-4 audit clients:

$$\begin{aligned} DACC = {} & \omega_0 + \omega_1 FEEDEP + \omega_2 SIZE + \omega_3 ROA + \omega_4 BV/MV \\ & + \omega_5 LEVERAGE + \omega_6 SALEGROWTH + \omega_7 LOSS + \omega_8 ISSUE \\ & + \omega_9 LITIGATION + \omega_{10} LAMBDA + YEAR\_DUMMIES + \varepsilon \end{aligned} \quad (3\text{-}4)$$

where *LAMBDA* denotes the inverse mills ratios obtained from the first-stage probit model and it is included in Equation (3-4) to control for unobservable variables that may have affected the decision by clients to choose either a non Big-4 or a Big-4 auditor. The remaining variables are as defined before in Equation (3-2). We then test the equality of each coefficient to identify variables whose coefficients are significantly different in these two regressions. Finally, we run an OLS regression using the pooled sample of non Big-4 and Big-4 clients, where in addition to *BIG4* the model includes interaction terms involving *BIG4* and each of the variables found to have different loadings in the non Big-4 and Big-4 regressions.

The coefficient on *FEEDEP* captures the impact of fee dependence on *DACC* for non Big-4 auditors, whereas the sum of coefficients on *FEEDEP* and

$BIG4 \bullet FEEDEP$ captures the effect of fee dependence for Big-4 auditors. Table 3.5 presents results from the pooled OLS regression for the second-stage of Heckman two-stage treatment model based on a sample of 1,060 (2,720) firm-year observations in the pre-SOX (post-SOX) period.[42]

Focusing first on the pre-SOX period, we find that the coefficient on *FEEDEP* is positive and significant at the 5% level (0.08, t-statistics = 2.05), whereas an *F*-test on $FEEDEP + BIG4 \bullet FEEDEP$ is insignificantly different from zero (*F*-value = 0.04, Column 1). After controlling for an auditor self-selection bias, non Big-4 auditors again allow greater accrual discretion by clients with whom they have strong economic bonding during the loose (pre-SOX) regulatory regime, but fee dependence has no effect on the level of abnormal accruals reported by Big-4 audit clients. For the post-SOX period, neither term is significant once auditor self-selection bias and other confounding effects have been partialled out (*FEEDEP* =0.004, t-statistics =0.18; *F*-value =1.56 for $FEEDEP + BIG4 \bullet FEEDEP$ ; Column 2). Taken together, these results are generally consistent with the OLS results reported in Table 3.4.

[Insert Table 3.5 About Here]

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[42] The reduction in sample size is caused by further data requirements to construct first-stage variables. Regression results from the first-stage of the Heckman two-stage treatment model are available from the authors upon request.

## 3.7 FURTHER ANALYSIS: SECOND-TIER VS. THEIR-TIER NON BIG-4 AUDITORS

Major changes to the audit market have taken place since early 2000s. In particular, second-tier audit firms have seen a more rapid growth in their market share, compared to third-tier auditors (Hogan and Martin 2009; Byrnes 2005; Gullapalli 2005). To recognize the inherent differences between second-tier and third-tier auditors, in this section we conduct a separate analysis for these two groups of non Big-4 auditors. Of particular interest to us is the question of whether they differ in their incentive and abilities to withstand client pressure in periods surrounding SOX. Columns 1a-1c (2a-2c) of Table 3.6 present the regression results based on Equation (3-2) estimated separately for the second-tier (third-tier) auditors; whereas Columns 3a-3b report comparisons across these two groups of auditors by sample period.

Focusing first on the pre-SOX period, we find that the coefficient on *FEEDEP* is significantly negative among second-tier clients at the 10% level, suggesting second-tier auditors tolerate less accrual discretion as fee dependence level increases (–0.51, t-statistics = –1.66; Column 1a). For this sample period, second-tier auditors tolerate significantly less accrual discretion for a given level of fee dependence than the third-tier auditors based on an *F*-test (*F*-value = 3.76; Column 3a). By comparison, in the post-SOX period there is no difference in the coefficient estimate on *FEEDEP* across these two groups of non Big-4 auditors based on an *F*-test (*F*-value = 1.27; Column 3b). Taken together, these results point to differences in the way second-tier and third-tier auditors cope with client pressure in a less litigious (pre-SOX) regime, but not so after the passage of SOX. While second-tier auditors appear to be more conservative about their clients' accrual reporting than third-tier auditors in the pre-Sox period, we do not find similar evidence in the post-Sox period. The pattern of performance-matched abnormal accrual reporting allowed by second-tier auditors surrounding the SOX is analogous to that of Big-4 documented previously in Table 3.4. Take together, our earlier findings that non Big-4 auditors are more likely to yield to client pressure in less litigious pre-SOX period may have been driven mainly by smaller third-tier auditors.

[Insert Table 3.6 About Here]

Finally, untabulated *F*-tests indicate that the coefficient estimate on *FEEDEP* for the second-tier auditors is not statistically different from that for Big-4 auditors in both the pre- and the post-SOX periods (*F*-values = 1.84 and 0.68, respectively). It would appear that second-tier auditors behave much like Big-4 auditors when faced with client pressure regarding accrual reporting.

## 3.8 CONCLUDING REMARKS

In this study, we have examined the effects of SOX on the association between fee dependence and abnormal accruals for non Big-4 auditors. Results from OLS regressions estimated separately by sample period indicate that non Big-4 auditors yield to client pressure in the loose (pre-SOX) regulatory regime but not so during the stringent (post-SOX) regime, implying that tighter government regulations under SOX mitigate any adverse impact that economic bonding may have on auditor independence. By comparison, Big-4 auditors are able to maintain independence over accrual reporting in both the pre- and the post-SOX periods.

Our results continue to hold when we employ the Heckman (1978) two-stage treatment model to control for the potential auditor self-selection bias. Replacing practice-office based fee dependence measure with one calculated at the city level also does not alter any of the results qualitatively speaking. As further analysis, we partition non Big-4 auditors into second-tier and third-tier audit firms and find that the latter group is much more affected by client pressure in the less litigious (pre-SOX) regime, compared to the former. However, both groups of non Big-4 auditors exhibit a similar ability to withstand client pressure regarding accrual reporting when their exposures to litigation risks are high following the passage of SOX. Finally, we compare the impact of fee dependence on abnormal accruals across Big-4 and second-tier auditors by sample period. Irrespective of litigation regimes, there is no evidence of either group's yielding to client pressure. This result lends support for the advice by PCAOB to use second-tier auditors as an alternative to Big-4. Overall, we show that SOX has differential impact across auditor size classes, hence highlighting the importance of assessing the efficacy of SOX separately for subsets of auditors. As a future direction of research, we plan to further examine whether SOX has differential effects on subsets of auditors classified based on the length of auditor tenure and industry specialization, two dimensions of audit quality that vary within a given auditor size class. Examining differential impacts of nationwide regulation is warranted to assess the actual impact of such legislative events on affected parties.

The documented evidence will help to formulate more accurate estimates of the impact of future legislative changes on auditors. There are several limitations to our study. First, the level of clients' abnormal accruals reporting may not offer a clear indication of impairment to audit independence. Second, while we use performance-adjusted abnormal accruals in the analysis, the association between *FEEDEP* and *DACC* that we identify may still reflect measurement errors rather than changes in auditor behavior.

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**Appendix 3-I Definitions and Measurement of Regression Variables in Chapter 3**

| Model Variables | Definition and Measurement |
|---|---|
| *DACC* | Performance matched abnormal accruals, measured as the difference between a firm's abnormal accruals estimated from modified Jones model and the median abnormal accruals of other firms in the same industry-ROA decile; |
| *FEEDEP* | Total fees paid by client *i* to audit firm *j*'s local office *k* over the total fees earned by local office *k* over all of its clients; |
| *BIG4* | =1 if a firm is audited by one of the Big-4 auditors; =0, otherwise. The Big-4 auditors refer to PricewaterhouseCoopers, Ernst & Young, Deloitte & Touche, and KPMG; |
| *Second-tier* | =1 if a firm is audited by one of the following audit firms: BDO Seidman, Grant Thornton LLP, and McGladrey & Pullen, and 0 otherwise; |
| *Third-tier* | =1 if a firm is not audited by one of the Big-4 and Second-tier auditors, and 0 otherwise; |
| *SIZE* | Logarithm of average total assets; |
| *ROA* | Earnings before extraordinary items deflated by average total assets; |
| *BV/MV* | Book-to-Market ratio at fiscal year-end; |
| *LEVERAGE* | Sum of short-term and long-term debts deflated by average total assets; |
| *SALEGROWTH* | The difference of sales between last year and the current year over last year's sales; |
| *LOSS* | =1 when a firm reports a bottom-line loss in the previous year and 0 otherwise; |
| *ISSUE* | =1 if the change of common equity during the year is greater than 10% and 0 otherwise; |
| *LITIGATION* | =1 if the firm is operates in a high-litigation industries (industries with SIC codes 2833–2836, 3570–3577, 3600–3674, 5200–5961, and 7370–7374) and 0 otherwise; |
| *SQRTSEG* | Square root of the number of business segments; |
| *SQRTEMPL* | Square root of the number of employees (in thousands); |
| *INVENTORY* | Total inventory deflated by average total assets. |

| **Table 3.1 Sample Selection Procedures** | **Pre-SOX Period (2000–2001)** | **Post-SOX Period (2004–2007)** |
|---|---|---|
| Original sample contained in Audit Analytics | 28,916 | 58,705 |
| Less: | | |
| Firms that do not have sufficient data to calculate fee dependence variable (*FEEDEP*) | (3,269) | (5,052) |
| Firms with missing symbols[43] | (8,972) | (27,852) |
| Firms with multiple auditors in the same year | (14) | (34) |
| Arthur Andersen's former clients | (2,646) | (3,803) |
| Firms that do not have sufficient data to calculate *DACC* and firms with missing financial information for control variables[44] | (8,943) | (8,415) |
| Sample Observations | 5,072 (100%) | 13,583 (100%) |
| Clients of non Big-4 auditors | 827 (16.31%) | 4,517 (33.25%) |
| Clients of second-tier auditors | 349 ( 6.88%) | 1,373 (10.11%) |
| Clients of third-tier auditors | 478 ( 9.43%) | 3,144 (23.15%) |
| Clients of Big-4 auditors | 4,245 (83.69%) | 9,066 (66.74%) |

[43] Symbol (Ticker) is used to merge data from Audit Analytics and COMPUSTAT.

[44] We exclude firms in the financial services and utility industries because accruals of these firms are likely to be different from accruals of firms in other industries.

**Table 3.2 Descriptive Statistics**
**Panel A. Distribution of Model Variables by Sample Period for Non Big-4 Clients**

| Model Variables | Pre-SOX Period (2000–2001) (N = 827) | | | | Post-SOX Period (2004–2007) (N = 4,517) | | | | Comparisons Pre-SOX vs. Post-SOX | |
|---|---|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | | | (3) | (4) | | | (1) – (3) | (2) – (4) |
| | Mean | Median | 25% | 75% | Mean | Median | 25% | 75% | *t*-stat | *z*-stat |
| *DACC* | -0.02 | -0.003 | -0.10 | 0.08 | -0.03 | -0.01 | -0.10 | 0.07 | 1.63* | 1.93* |
| *FEEDEP* | 0.22 | 0.04 | 0.00 | 0.30 | 0.12 | 0.03 | 0.00 | 0.11 | 8.58*** | 5.33*** |
| *SIZE* | 10.02 | 9.84 | 9.04 | 10.90 | 10.18 | 10.16 | 9.04 | 11.29 | -2.62*** | -3.51*** |
| *ROA* | -0.20 | -0.03 | -0.27 | 0.05 | -0.22 | -0.03 | -0.29 | 0.06 | 1.32 | -0.62 |
| *BV/MV* | 0.78 | 0.64 | 0.23 | 1.29 | 0.28 | 0.34 | 0.11 | 0.64 | 10.87*** | 13.63*** |
| *LEVERAGE* | 0.28 | 0.21 | 0.05 | 0.41 | 0.28 | 0.14 | 0.00 | 0.38 | -0.40 | 5.02*** |
| *SALEGROWTH* | -0.01 | 0.05 | -0.12 | 0.25 | 0.06 | 0.10 | -0.05 | 0.26 | -3.66*** | -4.23*** |
| *LOSS* | 0.53 | 1.00 | 0.00 | 1.00 | 0.55 | 1.00 | 0.00 | 1.00 | -1.29 | -1.29 |
| *ISSUE* | 0.42 | 0.00 | 0.00 | 1.00 | 0.51 | 1.00 | 0.00 | 1.00 | -4.92*** | -4.91*** |
| *LITIGATION* | 0.36 | 0.00 | 0.00 | 1.00 | 0.37 | 0.00 | 0.00 | 1.00 | -0.63 | -0.63 |

**Table 3.2 Descriptive Statistics**

**Panel B. Comparison of Median Values of Model Variables: Second-tier versus Third-tier Clients**

| Model Variables | Pre-SOX Period (2000–2001) (1) Second-Tier (N = 349) | (2) Third-Tier (N = 478) | (1) – (2) Z-stat[1] | Post-SOX Period (2004–2007) (3) Second-Tier (N =1,373) | (4) Third-Tier (N=3,144) | (3) – (4) Z-stat[1] | Pre-SOX vs. Post-SOX (1) – (3) Second-tier *t*-stat | (2) – (4) Third-tier *z*-stat |
|---|---|---|---|---|---|---|---|---|
| *DACC* | -0.02 | 0.02 | -4.09*** | -0.01 | -0.01 | -0.44 | -1.53 | 3.67*** |
| *FEEDEP* | 0.005 | 0.21 | -19.98*** | 0.002 | 0.06 | -44.26*** | 10.41*** | 12.81*** |
| *SIZE* | 10.40 | 9.55 | 8.30*** | 11.20 | 9.78 | 27.56*** | -7.53*** | -1.79* |
| *ROA* | -0.04 | -0.02 | -0.19 | 0.01 | -0.07 | 11.75*** | -5.57*** | 2.03** |
| *BV/MV* | 0.70 | 0.60 | 2.19** | 0.43 | 0.29 | 11.01*** | 7.35*** | 10.68*** |
| *LEVERAGE* | 0.21 | 0.20 | 0.36 | 0.11 | 0.15 | -4.28*** | 5.46*** | 2.59*** |
| *SALEGROWTH* | 0.04 | 0.07 | -1.87* | 0.09 | 0.11 | -1.77* | -4.16*** | -2.07** |
| *LOSS* | 1.00 | 1.00 | 0.00 | 0.00 | 1.00 | -7.95*** | 2.16** | -2.61*** |
| *ISSUE* | 0.00 | 0.00 | -1.77* | 0.00 | 1.00 | -4.12*** | -2.75*** | -3.55*** |
| *LITIGATION* | 0.00 | 0.00 | 3.01*** | 0.00 | 0.00 | 3.66*** | 0.26 | -1.59 |
| No. of Obs. | 349 | 478 | NA | 1,373 | 3,144 | NA | NA | NA |

For variable definitions, please refer to Appendix 3-I. *, **, *** indicate the significance of coefficients at the 10%, 5%, and 1% levels, respectively (for two-tailed test).

**Table 3.3 Pearson and Spearman Pair-wise Correlation Matrices**

**Panel A. Pre-SOX Period (2000–2001) for the Non Big-4 Subsample**

| | *1* | *2* | *3* | *4* | *5* | *6* | *7* | *8* | *9* | *10* |
|---|---|---|---|---|---|---|---|---|---|---|
| *1. DACC* | 1 | *0.11** | *-0.00* | *0.43** | *0.09** | *-0.04* | *0.19** | *-0.2** | *0.14** | *-0.09** |
| *2. FEEDEP* | *0.11** | 1 | *-0.13** | *0.04* | *-0.00* | *-0.04* | *0.04* | *-0.05* | *0.03* | *-0.10** |
| *3. SIZE* | *-0.02* | *-0.10** | 1 | *0.39** | *0.25** | *-0.06* | *0.10** | *-0.33** | *-0.13** | *-0.14** |
| *4. ROA* | *0.51** | *0.08** | *0.34** | 1 | *0.30** | *-0.14** | *0.21** | *-0.41** | *-0.08** | *-0.21** |
| *5. BV/MV* | *0.07** | *-0.04* | *0.36** | *0.26** | 1 | *-0.33** | *0.03* | *-0.20** | *-0.33** | *-0.08** |
| *6. LEVERAGE* | *-0.01* | *-0.01* | *0.10** | *-0.02* | *-0.11** | 1 | *-0.04* | *0.06* | *0.15** | *-0.08** |
| *7. SALEGROWTH* | *0.20** | *0.08** | *-0.02* | *0.19** | *-0.16** | *0.02* | 1 | *-0.04* | *0.15** | *-0.07** |
| *8. LOSS* | *-0.22** | *-0.06* | *-0.35** | *-0.56** | *-0.27** | *-0.01* | *0.03* | 1 | *0.04* | *0.24** |
| *9. ISSUE* | *0.18** | *0.06* | *-0.14** | *0.15** | *-0.37** | *0.10** | *0.30** | *0.04* | 1 | *0.04* |
| *10. LITIGATION* | *-0.10** | *-0.14** | *-0.13** | *-0.27** | *-0.14** | *-0.10** | *-0.03* | *0.24* | *0.04* | 1 |
| **Panel B. Post-SOX Period (2004–2007) for the Non Big-4 Subsample** | | | | | | | | | | |
| *1. DACC* | 1 | *0.05** | *0.08** | *0.41** | *0.15** | *-0.10** | *0.08** | *-0.24** | *0.03** | *-0.07** |
| *2. FEEDEP* | *0.03** | 1 | *-0.13** | *0.01* | *-0.03** | *0.06** | *0.02* | *-0.03** | *0.02* | *-0.10** |
| *3. SIZE* | *0.04** | *-0.24** | 1 | *0.47** | *0.27** | *-0.25** | *0.11** | *-0.32** | *-0.04** | *-0.06** |
| *4. ROA* | *0.46** | *-0.08** | *0.40** | 1 | *0.28** | *-0.35** | *0.14** | *-0.41** | *-0.01* | *-0.11** |
| *5. BV/MV* | *0.16** | *-0.11** | *0.39** | *0.33** | 1 | *-0.50** | *0.06** | *-0.21** | *-0.19** | *-0.06** |
| *6. LEVERAGE* | *-0.04** | *0.13** | *-0.07** | *-0.21** | *-0.27** | 1 | *-0.05** | *0.19** | *0.06** | *-0.05** |
| *7. SALEGROWTH* | *0.07** | *0.04** | *0.07** | *0.16** | *-0.10** | *0.01* | 1 | *-0.06** | *0.14** | *-0.04** |
| *8. LOSS* | *-0.24** | *0.05** | *-0.32** | *-0.61** | *-0.30** | *0.13** | *-0.02* | 1 | *-0.06** | *0.12** |
| *9. ISSUE* | *0.06** | *0.07** | *-0.05** | *0.15** | *-0.26** | *0.07** | *0.23** | *-0.06** | 1 | *-0.04** |
| *10. LITIGATION* | *-0.09** | *-0.11** | *-0.06** | *-0.12** | *-0.10** | *-0.13** | *-0.04** | *0.12** | *-0.04** | 1 |

**Table 3.3 Pearson and Spearman Pair-wise Correlation Matrices**

**Panel C. Pre-SOX Period (2000–2001) for the Big-4 Subsample**

| | *1* | *2* | *3* | *4* | *5* | *6* | *7* | *8* | *9* | *10* |
|---|---|---|---|---|---|---|---|---|---|---|
| *1. DACC* | 1 | *-0.02* | *0.11** | *0.59** | *0.04** | *0.06** | *-0.01* | *-0.30** | *0.02* | *-0.20** |
| *2. FEEDEP* | *0.03* | 1 | *0.05** | *0.01* | *0.02* | *0.01* | *-0.01* | *0.00* | *-0.01* | *-0.02* |
| *3. SIZE* | *0.09** | *0.77** | 1 | *0.37** | *-0.06** | *0.26** | *0.07** | *-0.38** | *-0.02* | *-0.17** |
| *4. ROA* | *0.48** | *0.23** | *0.37** | 1 | *0.08** | *0.08** | *0.12** | *-0.53** | *0.07** | *-0.28** |
| *5. BV/MV* | *0.06** | *-0.11** | *-0.07** | *-0.05** | 1 | *-0.18** | *-0.06** | *-0.05** | *-0.30** | *-0.08** |
| *6. LEVERAGE* | *0.09** | *0.27** | *0.36** | *0.10** | *-0.01* | 1 | *0.03** | *-0.07** | *0.04** | *-0.26** |
| *7. SALEGROWTH* | *0.01* | *0.04** | *-0.00* | *0.10** | *-0.18** | *-0.02* | 1 | *0.02* | *0.23** | *-0.04** |
| *8. LOSS* | *-0.28** | *-0.25** | *-0.38** | *-0.63** | *-0.09** | *-0.14* | *0.11** | 1 | *-0.02* | *0.24** |
| *9. ISSUE* | *0.05** | *0.06** | *-0.01* | *0.24** | *-0.35** | *-0.00* | *0.35** | *-0.02* | 1 | *0.06** |
| *10. LITIGATION* | *-0.19** | *-0.11** | *-0.18** | *-0.25** | *-0.16** | *-0.31** | *0.03* | *0.24** | *0.06** | 1 |

**Panel D. Post-SOX Period (2004–2007) for the Big-4 Subsample**

| | *1* | *2* | *3* | *4* | *5* | *6* | *7* | *8* | *9* | *10* |
|---|---|---|---|---|---|---|---|---|---|---|
| *1. DACC* | 1 | *0.01* | *0.10** | *0.41** | *0.06** | *0.03** | *0.01* | *-0.18** | *0.06** | *-0.12** |
| *2. FEEDEP* | *0.02** | 1 | *0.00* | *-0.01* | *0.01* | *-0.01* | *-0.02** | *0.01* | *-0.01* | *0.02* |
| *3. SIZE* | *0.09** | *0.75** | 1 | *0.39** | *0.02* | *0.24** | *0.01* | *-0.36** | *-0.02* | *-0.21** |
| *4. ROA* | *0.30** | *0.18** | *0.29** | 1 | *0.09** | *-0.05** | *0.11** | *-0.51** | *0.14** | *-0.17** |
| *5. BV/MV* | *0.10** | *-0.03** | *0.05** | *-0.16** | 1 | *-0.23** | *-0.05** | *-0.10** | *-0.17** | *-0.04** |
| *6. LEVERAGE* | *0.08** | *0.28** | *0.40** | *-0.11** | *-0.04** | 1 | *0.02* | *0.03** | *0.02* | *-0.22** |
| *7. SALEGROWTH* | *-0.02* | *-0.07** | *-0.10** | *0.19** | *-0.18** | *-0.05** | 1 | *-0.03** | *0.22** | *-0.00* |
| *8. LOSS* | *-0.16** | *-0.24** | *-0.37** | *-0.58** | *-0.09** | *-0.04** | *0.01* | 1 | *-0.09** | *0.19** |
| *9. ISSUE* | *0.06** | *0.01* | *-0.01* | *0.31** | *-0.23** | *0.01* | *0.33** | *-0.09** | 1 | *-0.02* |
| *10. LITIGATION* | *-0.13** | *-0.15** | *-0.22** | *-0.12** | *-0.13** | *-0.29** | *0.03** | *0.19** | *-0.02* | 1 |

For variable definitions, please refer to Appendix 3-I. Pearson correlation coefficients appear above the diagonal and Spearman rank correlation coefficients appear below the diagonal. * Significant at the 5% level or better.

**Table 3.4 OLS Regression Results on the Association between *FEEDEP* and *DACC* on Non Big-4 and Big-4 Samples in the Pre- and Post-SOX Periods**

$$DACC = \alpha_0 + \alpha_1 FEEDEP + \alpha_2 SIZE + \alpha_3 ROA + \alpha_4 BV/MV + \alpha_5 LEVERAGE + \alpha_6 SALEGROWTH + \alpha_7 LOSS + \alpha_8 ISSUE + \alpha_9 LITIGATION + YEAR\_DUMMIES + \varepsilon$$

| Variable | (1). Non Big-4 Audit Clients | | | (2). Big-4 Audit Clients | | | (3). Non Big-4 vs. Big-4 | |
|---|---|---|---|---|---|---|---|---|
| | (1a). Pre-SOX 2000–2001 | (1b). Post-SOX 2004–2007 | (1c). (1a) vs. (1b) | (2a). Pre-SOX 2000–2001 | (2b). Post-SOX 2004–2007 | (2c). (2a) vs. (2b) | (3a). Pre-SOX 2000–2001 | (3b). Post-SOX 2004–2007 |
| | Coeff. Estimate (t-Stat.) | | *F*-value | Coeff. Estimate (t-Stat.) | | *F*-value | *F*-value | *F*-value |
| *INTERCEPT* | 0.23 | 0.18 | | 0.14 | 0.04 | | | |
| | (5.08)*** | (9.28)*** | | (9.35)*** | (3.92)*** | | | |
| *FEEDEP* | 0.03 | 0.01 | 3.23* | -0.12 | 0.03 | 3.91** | 2.66* | 0.15 |
| | (1.77)* | (1.02) | | (-1.37) | (0.86) | | | |
| *SIZE* | -0.02 | -0.02 | | -0.01 | -0.01 | | | |
| | (-5.80)*** | (-10.83)*** | | (-10.31)*** | (-8.09)*** | | | |
| *ROA* | 0.18 | 0.15 | | 0.32 | 0.22 | | | |
| | (12.72)*** | (26.39)*** | | (41.75)*** | (39.48)*** | | | |
| *BV/MV* | 0.01 | 0.02 | | -0.00 | 0.01 | | | |
| | (1.24) | (5.72)*** | | (-1.29) | (4.30)*** | | | |
| *LEVERAGE* | 0.01 | 0.03 | | 0.02 | 0.03 | | | |
| | (0.31) | (4.70)*** | | (2.97)*** | (7.37)*** | | | |
| *SALEGROWTH* | 0.03 | 0.01 | | -0.02 | -0.02 | | | |
| | (2.79)*** | (1.64)* | | (-5.53)*** | (-4.45)*** | | | |
| *LOSS* | -0.03 | -0.04 | | 0.00 | 0.01 | | | |
| | (-2.38)** | (-7.52)*** | | (0.10) | (3.06)*** | | | |
| *ISSUE* | 0.06 | 0.01 | | -0.00 | 0.00 | | | |
| | (4.69)*** | (2.64)*** | | (-0.99) | (1.08) | | | |
| *LITIGATION* | 0.00 | -0.01 | | -0.01 | -0.01 | | | |
| | (0.23) | (-0.99) | | (-3.21)*** | (-4.98)*** | | | |
| *YEAR_DUMMIES* | YES | YES | | YES | YES | | | |
| N | 827 | 4,517 | | 4,245 | 9,066 | | | |
| Adj. R-Square | 25.62% | 20.01% | | 36.81% | 18.77% | | | |

For variable definitions, please refer to Appendix 3-I. *, **, *** indicate the significance of coefficients at the 10%, 5%, and 1% levels (two-tailed), respectively.

**Table 3.5 Results for the Second Stage of Heckman Two-Stage Least Square Regressions in the Pre- and Post-SOX Periods**

$$
\begin{aligned}
DACC = {} & \varpi_0 + \varpi_1 FEEDEP + \varpi_2 SIZE + \varpi_3 ROA + \varpi_4 BV/MV + \varpi_5 LEVERAGE + \varpi_6 SALEGROWTH \\
& + \varpi_7 LOSS + \varpi_8 ISSUE + \varpi_9 LITIGATION + \varpi_{10} LAMBDA + \varpi_{11} BIG4 + \varpi_{12} BIG4 \bullet FEEDEP \\
& + \varpi_{13} BIG4 \bullet ROA + \varpi_{14} BIG4 \bullet ISSUE + \varpi_{15} BIG4 \bullet LOSS + \varpi_{16} BIG4 \bullet SALEGROWTH \\
& + YEAR\_DUMMIES + \varepsilon
\end{aligned}
$$

| Variables | Pre-SOX Period (2000–2001) | Post-SOX Period (2004–2007) |
|---|---|---|
| *INTERCEPT* | 0.06 (1.40) | 0.05 (3.88)*** |
| *FEEDEP* | 0.08 (2.05)** | 0.00 (0.18) |
| *SIZE* | -0.01 (-1.91)* | 0.01 (3.49)*** |
| *ROA* | -0.22 (-2.17)** | -0.01 (-0.18) |
| *BTM* | -0.02 (-1.63)* | 0.00 (0.73) |
| *LEVERAGE* | 0.01 (0.35) | 0.00 (0.70) |
| *SALEGROWTH* | -0.14 (-1.34) | 0.03 (1.73)* |
| *LOSS* | -0.09 (-2.07)** | 0.02 (3.41)*** |
| *ISSUE* | 0.04 (1.33) | -0.01 (-0.44) |
| *LITIGATION* | -0.01 (-0.72) | -0.01 (-3.78)*** |
| *LAMBDA* | -0.01 (-0.19) | 0.06 (5.21)*** |
| *BIG4* | 0.02 (0.30) | -0.11 (-5.79)*** |
| *BIG4* • *FEEDEP* | -0.08 (-1.87)* | 0.01 (0.36) |
| *BIG4* • *ROA* | 0.46 (3.64)*** | 0.04 (0.97) |
| *BIG4* • *ISSUE* | -0.07 (-2.01)** | 0.02 (1.02) |
| *BIG4* • *LOSS* | 0.14 (2.71)*** | NA |
| *BIG4* • *SALEGROWTH* | 0.15 (1.39) | -0.06 (-2.71)*** |
| *FEEDEP+ BIG4* • *FEEDEP (F-value)* | -0.01 (0.04) | 0.01 (1.56) |
| *YEAR_DUMMIES* | YES | YES |
| N | 1,060 | 6,592 |
| Adj. R-Square | 8.59% | 2.18% |

For variable definitions, please refer to Appendix 3-I. *, **, *** indicate the significance of coefficients at the 10%, 5%, and 1% levels (two-tailed), respectively.

**Table 3.6 Further Analysis on the Association between *FEEDEP* and *DACC* on Second-tier and Third-tier Samples in the Pre- and Post-SOX Periods**

$$DACC = \alpha_0 + \alpha_1 FEEDEP + \alpha_2 SIZE + \alpha_3 ROA + \alpha_4 BV/MV + \alpha_5 LEVERAGE + \alpha_6 SALEGROWTH + \alpha_7 LOSS + \alpha_8 ISSUE + \alpha_9 LITIGATION + YEAR\_DUMMIES + \varepsilon$$

| Variables | (1). Second-tier Audit Clients | | | (2). Third-tier Audit Clients | | | (3). *F*-value: Second-tier vs. Third-tier by Sample Period | |
|---|---|---|---|---|---|---|---|---|
| | (1a) Pre-SOX | (1b) Post-SOX | (1c) *F*-value | (2a) Pre-SOX | (2b) Post-SOX | (2c) *F*-value | (3a) Pre-SOX | (3b) Post-SOX |
| *INTERCEPT* | 0.15 (2.29)** | 0.09 (2.96)*** | | 0.27 (3.96)*** | 0.23 (9.00)*** | | | |
| *FEEDEP* | -0.51 (-1.66)* | 0.11 (1.65) | 4.63** | 0.01 (0.56) | 0.01 (0.88) | 0.00 | 3.76* | 1.27 |
| *SIZE* | -0.01 (-2.42)** | -0.01 (-4.13)*** | | -0.03 (-4.26)*** | -0.02 (-9.94)*** | | | |
| *ROA* | 0.23 (8.84)*** | 0.24 (16.17)*** | | 0.18 (10.43)*** | 0.14 (22.04)*** | | | |
| *BV/MV* | 0.00 (0.64) | 0.00 (0.40) | | 0.00 (0.44) | 0.02 (5.83)*** | | | |
| *LEVERAGE* | 0.01 (0.40) | 0.03 (2.41)** | | -0.01 (-0.43) | 0.04 (4.07)*** | | | |
| *SALEGROWTH* | 0.06 (4.04)*** | -0.01 (-0.92) | | 0.01 (0.61) | 0.01 (1.78)* | | | |
| *LOSS* | -0.03 (-1.84)* | -0.00 (-0.23) | | -0.02 (-1.05) | -0.05 (-7.08)*** | | | |
| *ISSUE* | 0.00 (0.09) | 0.01 (1.60) | | 0.09 (5.66)*** | 0.01 (2.25)** | | | |
| *LITIGATION* | 0.01 (0.71) | -0.01 (-0.75) | | 0.00 (0.16) | -0.00 (-0.55) | | | |
| *YEAR_DUMMIES* | YES | YES | | YES | YES | | | |
| N | 349 | 1,373 | | 478 | 3,144 | | | |
| Adj. *R*-Square | 29.08% | 19.72% | | 26.34% | 21.01% | | | |

For variable definitions, please refer to Appendix 3-I.
*, **, *** indicate the significance of coefficients at the 10%, 5%, and 1% levels (two-tailed), respectively.

# CHAPTER 4

## Has SOX Affected the Association Between

## Fee Dependence and Auditors' Going-Concern Opinions?

### 4.1 INTRODUCTION

The purpose of this study is to examine whether the Sarbanes-Oxley Act of 2002 (hereafter SOX) has enhanced auditor independence. Many highly publicized accounting scandals taking place in late 1990s and early 2000's put an auditor's ability to maintain independence throughout an audit under close scrutiny.[45] From auditors' standpoint, it may be desirable to compromise independence if the perceived benefits from yielding to client pressure outweigh the costs (Coffee 2001). Against this backdrop and to restore market confidence, the U.S. Congress introduced SOX in 2002. Among many provisions of SOX, several speak directly or indirectly to the issue of auditor independence. Title I of SOX for example establishes the quasi-governmental Public Company Accounting Oversight Board (PCAOB), taking over the oversight responsibilities of public accounting firms

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[45] Big-5 auditors were involved in one or more of the following accounting scandals between 2000 and 2002 in the U.S.: Microstrategy, Unify Corporation, Computer Associates, Xerox, One.Tel, Enron, Adelphia, AOL, Bristol-Myers Squibb, CMS Energy, Duke Energy, Dynegy, EI Paso Corporation, Freddie Mac, Global Crossing, Halliburton, Homestore.com, ImClone Systems, Kmart, Merck & Co., Merrill Lynch, Mirant, Nicor, Peregrine Systems, Qwest Communications, Reliant Energy, Sunbeam, Tyco International and WorldCom.

from the private sector American Institute of Certified Public Accountants (AICPA). SOX also increases auditors' litigation risks by expanding the parties to whom they owe a duty of care[46] and imposing criminal penalties beyond those contained in the Securities Exchange Act of 1934 (Section 1106, Title XI). Together, these provisions are intended to increase the costs associated with a lack of auditor independence.

Taking the view that joint provision of audit and non-audit services impairs auditor independence, SOX also severely restricts an auditor's ability to provide the same client with both types of services by banning a wide range of non-audit services (Title II).[47] While auditors are still permitted to offer a limited number of non-audit services not contained in the list, pre-approval of such services by the audit committee is nonetheless required.[48] The restrictions on non-audit services reflect an attempt by lawmakers to lower the perceived benefits of compromise to auditor independence.

Citing that SOX would reduce the net benefits resulting from yielding to client pressure by auditors, its supporters contend that SOX is a well thought-out remedy for accounting scandals and will enhance auditor independence. However, opponents of SOX argue that while SOX has brought major changes to the way

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[46] Section 404 of SOX requires that auditors attest to internal control assessments made by management and form their own independent assessments (Johnstone and Bedard 2007; Rama and Read 2006).

[47] They include bookkeeping or other services related to audit clients' accounting records; financial information system design and implementation; appraisal or valuation services, fairness opinions, or contribution-in-kind reports; actuarial services; internal audit outsourcing services; management functions or human resources; broker or dealer; investment advisor or investment banking services; legal services and expert services unrelated to the audit.

[48] The PCAOB was also given the authority to grant exemptions to auditors for providing any of the prohibited non-audit services.

auditors are policed through the creation of PCAOB, these changes need not alter auditors' legal liability nor raise the costs of audit failures. Moreover, provisions speaking to prohibition of many non-audit services lack empirical and theoretical support. Using data from the pre-SOX period, most of the extant auditing literature fails to find any association between fee dependence measures and empirical proxies for auditor independence (reviewed in Section 4.2). By overly focusing on non-audit services, SOX may have overlooked potential threats to auditor independence due to future economic rents derived from audit-related services. Such a narrow regulatory focus, according to DeFond and Francis (2005), may be rooted in a history of conflict between accounting profession and the Congress over non-audit services and represents a payback by the Congressional and SEC staffers. This sentiment prompts some commentators to suggest that SOX is a product of political expediency by the Bush Administration, intended to demonstrate their resolve to deal with corporate malfeasance in months leading to the November 2002 Congressional election (DeFond and Francis 2005; Romano 2005; Hilzenrath, Weisman and Vandehei 2002; Ribstein 2002).

Heeding a recent call by DeFond and Francis (2005) for further research to support the claim that SOX has improved auditor independence, we seek to provide evidence on whether empirical data drawn from a five-year period after the passage of SOX are consistent with the enhancement of auditor independence argument. To address this research question, we follow the convention of prior auditing literature and use the incidence of going-concern opinions to proxy for the extent of auditor independence (Li 2009; Lim and Tan 2008; Geiger and Rama 2003; Craswell, Stokes and Laughton 2002; DeFond, Raghunandan and Subramanyam 2002; Reynolds and Francis 2001). Unlike abnormal accruals, failures by auditors to warn users of financial statements that their clients may not continue as a going concern represent a clear indication of impairment to independence.

Our final sample consists of 1,043 and 1,794 firm-year observations facing potential financial distress in the pre-SOX (2000-2001) and the post-SOX (2003-2007) periods, respectively. Under the assumption that any improvement to reporting objectivity is likely to come from auditors who are most affected by the provisions of SOX, we partition our sample along the following three dimensions: First, high versus low non-audit services (NAS) groups, corresponding to audit clients with the above versus below median ratios of non-audit fees to total fees in the pre-SOX period. All else held equal, if SOX has indeed enhanced auditor independence, then the improvement is more likely to come from high NAS group's auditors, as a large number of their non-audit services would be taken away by Title II Provision. Second, high versus low litigation risks (LR) groups, representing audit clients with the above versus below median risks in the pre-SOX period. Clients in the high LR group may have greater difficulties complying with the tougher SOX regulations, exposing their auditors to increased litigation costs due to Titles I and XI Provisions. Thus, we expect auditors of high LR clients to have a stronger incentive to improve independence following SOX, compared to those of low-risk clients. Third, low NAS_low LR, high NAS_high

LR versus the remaining groups. We expect to see little or no changes to audit independence for clients characterized by low NAS_low LR before the passage of SOX and most pronounced changes for those in the high NAS_high LR group. This is because auditors of low NAS_low LR (high NAS_high LR) clients face the least (greatest) reduction in net benefits if they compromise their reporting objectivity in the post-SOX period. By comparison, we expect the extent of changes to audit independence in the remaining two cases (i.e., low NAS_high LR and high NAS_low LR) to lie in-between these two extreme cases.

For each partition of sample firms, we regress the incidence of going-concern opinions on a fee dependence measure (*FEEDEP*), defined as a client's total fees over total revenues earned by its auditor's office in a given year, the applicable group dummy variable(s) and interaction term(s) between these two sets of test variables. Results indicate that none of the coefficient estimates are significantly different from zero in either sample period. More importantly, the coefficient estimates are statistically similar across the pre- and post-SOX periods based on *Wald Chi-Square* statistics. All the results continue to hold when we redefine fee dependence measure at the city level or use alternative proxies for auditor litigation risks, suggesting that SOX has not altered the association between fee dependence and the incidence of going-concern opinions even for the subset of firms more likely to be affected by SOX. Since prior literature typically studies the association between economic bonding and audit quality at the overall level, we also replicate our analysis for the full sample using several commonly employed proxies for fee dependence. The general conclusion of no association is nonetheless invariant to this alternative design choice. Taken together, these results are not consistent with the contention that SOX has improved auditor independence.

We extend the auditing literature looking into the question of whether auditors allow economic bonding to affect their judgment about a firm's ability to continue as a going-concern to a five-year (2003-2007) period following SOX. Except for a recent study by Li (2009), prior studies have typically focused on years *pre-dating* the passage of SOX (Lim and Tan 2008; Geiger and Rama 2003; DeFond et al. 2002; Reynolds and Francis 2001). Unlike us however, Li's post-SOX sample includes only the first fiscal year immediately after SOX had come into effect (i.e., 2003). Year 2003 is arguably too short to provide an adequate assessment of the long-term effect of SOX on auditor independence, as auditors faced intense media, regulatory and market scrutiny during that year. This may explain at least in part why Li (2009) finds that her measures of fee dependence is associated with a greater incidence of going-concern opinions following SOX, whereas we do not. Li interprets her results as implying that auditors are less likely to compromise reporting objectivity when they face high litigation risks in 2003. But, as elaborated in Section 4.7, Li's findings appear sensitive to model specification and sample selection.

It is interesting to note that two recent studies of non-U.S. publicly traded companies by Basioudis et al. (2008) and Fargher and Jiang (2008) also fail to find any association between fee dependence and the incidence of going-concern opinions during years overlapping the early part of our post-SOX period.[49] The setting in these two studies however differs from ours because analogous country-specific government regulations, targeted at improving auditor independence, were absent during the period under examination. The phenomenon identified by the authors therefore may have captured the impact of public outcry against the audit profession for their alleged role in accounting irregularities. In contrast, we document the effectiveness of government regulations designed to strengthen auditor independence. SOX provides a particularly rich setting to study this issue because its provisions offer remedies to curtail benefits and raise costs of impairment to auditor independence. By using a research design that classifies auditors into those most affected vs. least affected by SOX along these dimensions, we are able to isolate the effects of reduced non-audit services, increased litigation costs or both on auditor independence. We view this aspect of our study as offering an important contribution to the academic literature. While the average effects may be lacking, government regulations can still be effective if they lead to improvements for targeted firms. Our sub-sample analysis allows us to take a closer look at this possibility and provide inputs for further debates concerning whether political expediency or the enhancement of auditor independence may have been behind the enactment of SOX.

[49] Fargher and Jiang (2008) for example find that auditors are more likely to issue going-concern opinions to financially stressed Australian firms in year 2003 but not in 2004 or 2005, a finding the authors attribute to rising litigations against auditors due to many high-profile collapses in the crisis period (2000-2002). As another example, Basioudis et al. (2008) report that financially stressed British companies with high non-audit fees are *less* likely to receive going-concern opinions in 2003.

The rapid growth in non-audit services throughout the 1990s and early 2000s was widely believed by regulators and commentators to have contributed to auditors' lax attitudes towards accounting irregularities committed by their clients. Our findings that limiting the scope of non-audit services does not improve auditor independence, or increase the incidence going-concern opinions, suggest that such causal inferences may not be well supported. However, it is difficult to conclude from our study that SOX was motivated solely out of political considerations, as SOX is a far more comprehensive piece of legislation than what we aim to examine in the study.

The rest of the paper proceeds as follows. Section 4.2 reviews the related literature; Section 4.3 presents the research design; Section 4.4 describes the data and sample selection procedure; Section 4.5 reports main results, followed by robustness checks in Section 4.6; Section 4.7 presents results based on further analysis at the overall level and reconciliation with Li's (2009) findings; Section 4.8 concludes the paper.

## 4.2 LITERATURE REVIEW

### *4.2.1 Economic Bonding and Auditor Independence*

The joint provision of audit and non-audit services allows auditors to transfer knowledge gained from non-audit services to the existing audit services and vice versa (Simunic 1984).[50] High profit-margin non-audit services can also be used to

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[50] Whisenant, Sankaraguruswamy and Raghunandan (2003) argue that audit and non-audit fees are jointly determined using simultaneous-equations. Thus, the benefits of knowledge spillovers

compensate for losses resulting from low balling initial audit fees in order to win new clients (Wallman 1996). In the event of disagreement over audit-related issues, clients may threaten to terminate existing non-audit service contracts or choose not to reward new ones to avoid attracting public attention from dismissal of the incumbent auditor (Coffee 2003). Thus, auditors who provide considerable non-audit services for their clients have an incentive to yield to client pressure (Simunic 1984; DeAngelo 1981). This concern prompted the Securities and Exchange Committee to issue a ruling, limiting certain non-audit services by the incumbent auditor effective February 5, 2001[51] and the Congress to introduce a more comprehensive list of excluded non-audit services under Title II of SOX (reviewed in Section 4.1).

The regulatory concern for non-audit services however has not received much empirical support using data from financially distressed U.S. companies in the pre-SOX period. DeFond et al. (2002) for example fail to find any significant association between the ratio of non-audit fees to total fees paid to the incumbent auditor (*FEERATIO*) and the auditor's propensity to issue going-concern opinions for a sample of 1,158 companies between February 5, 2001 and October 31, 2001. Focusing on the manufacturing sector with fiscal year-ends between September 30, 2000 and February 28, 2001, Geiger and Rama (2003) also document a lack of association between non-audit fees and the incidence of going-concern opinions. A recent study by Li (2009) reaches a similar conclusion for her sample of 1,681

arising from the joint provision of audit and non-audit services may be debatable.

[51] They include bookkeeping, certain valuation services and operating or supervising of a client's information system (SEC 2001). The ruling also required firms to disclose audit and non-audit fees in their proxy filings.

companies in 2001 using several measures of fee dependence defined as a client's audit fees or total fees, divided by total revenue of the audit office that issues the auditor's report (*AFDEP* or *FEEDEP*).

These general findings of no association extend to financially distressed companies in Australia where audit fee data had been publicly available long before the fee disclosures became mandatory in the U.S.. Craswell (1999) for example reports that *FEERATIO* has no effect on the incidence of qualified opinions based on samples from 1984, 1987 and 1994. In a follow-up study, Craswell et al. (2002) also do not find any statistically detectable impact on audit opinions in 1994 and 1996 for their proxy of fee dependence, *AFDEP*, measured at either the national audit firm or the local office level.

Recently, Callaghan, Parkash and Singhal (2009) re-examine the issue of fee dependence within the context of Chapter 11 bankruptcy in the U.S. For a sample of 92 companies that filed bankruptcy within a year of receiving going-concern opinions, the authors report no significant association between the incidence of going-concern opinions and either *FEERATIO*, audit fees, non-audit fees or total fees in years surrounding the passage of SOX (i.e., January 1, 2001-March 16, 2005). Callaghan et al.'s findings differ from the negative association reported by Sharma and Sidhu (2001) for a sample of 49 bankrupt companies de-listed from the Australian Stock Exchange between 1989 and 1996, a discrepancy that they attribute to jurisdictional differences.

### *4.2.2 Litigation Risks and Auditor Independence*

In the U.S., lawsuits against auditors for deficient audits can be launched under both common laws and statutory laws. Auditors face considerable litigation risks in the event they issue an unqualified auditor report when a going-concern opinion is warranted. The threat of litigations is considered the primary costs of impairment to reporting objectivity (Kurana and Raman 2004; Reynolds and Francis 2001; DeAngelo 1981). It can mitigate benefits arising from economic bonding, forcing an auditor to apply higher standard of care during the course of audit. Thus, the incidence of going-concern opinions is expected to be positively associated with an auditor's litigation exposures.

Evidence that an auditor's behavior may be sensitive to her litigation concerns can be found in Reynolds and Francis (2001). For a sample of 2,439 financially distressed U.S. companies in 1996, the authors show that auditors report more conservatively for larger clients, which pose higher litigation risks. Instead of using client size to proxy for litigation risks, several studies focus on the adoption of the 1995 Private Securities Litigation Reform Act (PSLRA) in the U.S., which lowered auditors' legal exposure. Geiger and Raghunandan (2002) report that auditors were most likely to issue going-concern opinions to financially distressed companies in 1992-93 (pre-Reform Act) when they faced relatively higher litigation risks, followed by two post-Reform periods, i.e., 1996-97 and 1999-2000. Restricting their attention to the 383 bankrupt companies over an eight-year (1991-98) period, Geiger and Raghunandan (2001) again find a decline in the incidence of going-concern opinions after PSLRA. Finally, Geiger, Raghunandan and Rama (2006) reach a similar conclusion for the 694 financially distressed companies that entered into bankruptcies between 1991 and 2001. The above evidence from archival studies is consistent with findings from a web-based experiment by Blay (2005) who concludes that auditors facing high litigation risks are more likely to favor a modified audit report.

## 4.3 RESEARCH DESIGN

To address the research question of whether SOX has enhanced auditor independence, we run the following logistic models, adapted from DeFond et al. (2002), separately for the pre-SOX (2000-2001) and the post-SOX (2003-2007) periods:

$$\begin{aligned} GC = {} & \alpha_0 + \alpha_1 FEEDEP + \alpha_2 FEEDEP \bullet MAG + \alpha_3 MAG \\ & + \alpha_4 PROBANKZ + \alpha_5 ASSETS + \alpha_6 FIRMAGE + \alpha_7 BETA \\ & + \alpha_8 ANNRET + \alpha_9 VOLATILITY + \alpha_{10} LEV + \alpha_{11} CLEV \\ & + \alpha_{12} LLOSS + \alpha_{13} INVESTMENTS + \alpha_{14} FINANCE \\ & + \alpha_{15} BIG4 + \alpha_{16} CFO + \alpha_{17} REPORTLAG + YEAR\_DUMMIES + \varepsilon \end{aligned} \quad (4\text{-}1)$$

where *GC* is an indicator variable, set equal to one if a firm receives a first-time going-concern reservation and zero otherwise.

**<u>Test Variables</u>**

Equation (4-1) has three test variables: the fee dependence variable (*FEEDEP*), measured as the ratio of a client's total (audit and non-audit) fees to total revenues earned by its auditor's local office; [52] a group dummy variable (*MAG*),

[52] We choose to employ the total-fee based fee dependence measure, as it captures the total economic bonding between auditor and her client (Kinney and Libby 2002). Our data, discussed in Section 7, show that the reduction in non-audit fees is accompanied by an increase in audit fees

representing the group most affected by SOX (defined below); an interaction term$\left( FEEDEP \bullet MAG \right)$, capturing the incremental impact of fee dependence on auditors' going-concern decisions for the most affected group.

As discussed in Section 4.1, several provisions of SOX deal with auditor independence. By banning most of the non-audit services (NAS), Title II reduces the benefits associated with impairment to reporting objectivity. At the same time, the establishment of PCAOB and the expansion of duty of care under Titles I and XI expose auditors to greater litigation costs for compromising their independence. We surmise that auditors are most affected by SOX if one of the following two scenarios prevailed prior to the passage of SOX: Scenario 1, auditors provided their clients with considerable non-audit services. In this scenario, we re-label the group dummy variable *MAG* as *HNAS*, which takes on a value of one for audit clients whose ratios of non-audit fees to total fees exceed the sample median ratio in the pre-SOX period and zero otherwise.[53] Scenario 2, auditors were exposed to high litigation costs from their audit engagements. For this case, we replace *MAG* with the label *HLR*, which is set equal to one for audit clients whose litigation risks exceed the sample median in the pre-SOX period and zero otherwise. Implicitly, we assume that an auditor's litigation risks are positively related with her clients'. High-risk clients attract close public and regulatory scrutiny and may have greater difficulties complying with various provisions of SOX, thus raising

following SOX. Thus, looking at non-audit fees or audit fees alone gives an incomplete picture. Nonetheless, we also conduct consistency checks with the literature by decomposing *FEEDEP* into *AFDEP* and *NAFDEP*. All the results continue to hold.

[53] If years 2000 and 2001 yield different NAS group classifications, we use classification based on 2001. Our results remain qualitatively unchanged if we delete firm-observations with conflicting NAS group classifications. While doing so provides a cleaner setting for our analysis, the sample size nonetheless decreases significantly.

their auditors' exposure to litigation costs following SOX. We measure client-specific litigation risks by applying the parameter estimates suggested by Rogers and Stocken (2005; Appendix B on Page 1,256) to the actual values of firm-specific characteristics in our sample.

In Scenarios 1 and 2, the association between fee dependence and the incidence of going-concern opinions for the subset of firms least affected by SOX provisions is given by *FEEDEP*, whereas that for the subset of firms most affected by SOX provisions is reflected in $(FEEDEP + FEEDEP \bullet MAG)$. Positive and significant changes in the coefficient estimates on *FEEDEP* and $(FEEDEP + FEEDEP \bullet MAG)$ from the pre- to the post-SOX period are consistent with the notion that SOX has enhanced auditor independence for both groups of auditors. The change in the coefficient of $FEEDEP \bullet MAG$ from the pre- to the post-SOX period is of particular interest. If SOX is indeed effective, then we expect the coefficient on $FEEDEP \bullet MAG$ to have a positive change from the pre- to the post-SOX period since it captures the association between fee dependence and the incidence of going-concern opinion for the most affected group in comparison to others.

Further, we also consider the third scenario that takes into account the combined effects of non-audit services and litigation risks on auditor independence. For this scenario (Scenario 3), we replace *MAG* with two group dummy variables: *HNAS_HLR* which takes on a value of one for audit clients with the above median non-audit fees and above median litigation risks in the pre-SOX period and zero otherwise; *LNAS_LLR* which takes on a value of one for audit clients with the below median non-audit fees and below median litigation risks in the pre-SOX period and zero otherwise. The expanded logistic model for Scenario 3 is summarized below:

$$\begin{aligned} GC = {} & \alpha_0 + \alpha_1 FEEDEP + \alpha_{2a} FEEDEP \bullet HNAS\_HLR \\ & + \alpha_{2b} FEEDEP \bullet LNAS\_LLR + \alpha_{3a} HNAS\_HLR \\ & + \alpha_{3b} LNAS\_LLR + \alpha_4 PROBANKZ + \alpha_5 ASSETS + \alpha_6 FIRMAGE \\ & + \alpha_7 BETA + \alpha_8 ANNRET + \alpha_9 VOLATILITY + \alpha_{10} LEV \\ & + \alpha_{11} CLEV + \alpha_{12} LLOSS + \alpha_{13} INVESTMENTS + \alpha_{14} FINANCE \\ & + \alpha_{15} BIG4 + \alpha_{16} CFO + \alpha_{17} REPORTLAG + YEAR\_DUMMIES + \varepsilon \end{aligned} \quad (4\text{-}2)$$

For each sample period, the association between fee dependence and the incidence of going -concern opinions for the subset of firms least and most affected by SOX is reflected in $(FEEDEP + FEEDEP \bullet LNAS\_LLR)$ and $(FEEDEP + FEEDEP \bullet HNAS\_HLR)$, respectively, and that for the intermediate cases of *HNAS_LLR* and *LNAS_HLR* is given by *FEEDEP*. Again, positive and significant changes in $FEEDEP \bullet HNAS\_HLR$ from the pre- to the post-SOX period would suggest that the provisions of SOX on non-audit services and litigation risk effectively affect audit independence.

**<u>Control Variables</u>**

Equations (4-1)-(4-2) also control for a set of factors known to influence an auditor's propensity to issue a going-concern opinion, discussed below: (1). Financial distress (*PROBANKZ*), measured as the probability of bankruptcy score from Zmijewski (1984), with higher values indicating a higher probability of bankruptcy (Mutchler, Hopwood and McKeown 1997; Carcello, Hermanson and Huss 1995; McKeown, Mutchler and Hopwood 1991). (2). Firm size (*ASSETS*), measured as the natural logarithm of total assets at the end of current fiscal year

(Geiger and Raghunandan 2001; Mutchler et al. 1997; Carcello et al. 1995; McKeown et al. 1991). (3). Firm age (*FIRMAGE*), measured as the natural logarithm of the number of years since the firms have been listed in a stock exchange (Dopuch, Holthausen and Leftwich 1987). (4). Systematic risks (*BETA*), defined as the firm's beta estimated using a market model over the current fiscal year. (5). Annual stock return (*ANNRET*), measured as raw return accumulated over the current fiscal year. (6). Earnings volatility (*VOLATILITY*), estimated as the variance of residuals from the market model for the current fiscal year. (7). Levels of debt (*LEV*), measured as total liabilities over total assets at the end of current fiscal year. (8). Changes in debt ratios (*CLEV*), measured as the change in debt ratios from the previous year to the current fiscal year (Mutchler et al. 1997; Beneish and Press 1993; Chen and Church 1992). (9). Profitability (*LLOSS*), set equal to one if the firm reported a bottom-line loss in the immediately preceding fiscal year and zero otherwise. (10). Financial liquidity (*INVESTMENTS*), measured as the sum of cash and investment securities deflated by total assets at the end of current fiscal year. (11). New financing (*FINANCE*), set equal to one if a firm issues debt or equity in the next fiscal year and zero otherwise (Mutchler et al. 1997). (12). Auditor quality (*BIG4*), set equal to one if a firm is audited by a Big-4 auditor and zero otherwise (Francis and Krishnan 1999; Hogan and Jeter 1999; Raghunandan and Rama 1999). (13). Operating cash flows (*CFO*), deflated by total assets at the end of current fiscal year (Lim and Tan, 2008; Defond et al 2002). (14). Reporting lag (*REPORTLAG*), measured as the number of days between current fiscal yearend and earnings announcement date (Carcello et al. 1995; Raghunandan and Rama 1995).

We expect a positive association between *GC* and *PROBANKZ*, *BETA*, *VOLATILITY*, *LEV*, *CLEV* and *LLOSS*, as high values in any of these variables casts doubt about a firm's ability to continue as a going-concern. High values in *ASSETS*, *FIRMAGE*, *ANNRET*, *INVESTMENTS*, *FINANCE* and *CFO*, on the other hand, suggest that firms are financially sound and hence lower the prospect of their becoming financially distressed or bankrupt. Since large auditors have lower thresholds for issuing modified audit reports, we expect *BIG4* to be positively associated with *GC*. Finally, a long reporting lag suggests possible disagreements between clients and auditors or difficulties faced by auditors in gathering and evaluating audit evidence to form their opinions. Thus, the association between *REPORTLAG* and *GC* is also expected to be a positive one.

## 4.4 DATA AND SAMPLE SELECTOIN

Table 4.1 presents the sample selection procedure. The initial sample consists of 57,717 firm-year observations with related audit fee data from Audit Analytics in the post-SOX (2003-2007) period. The corresponding figure for the pre-SOX (2000-2001) period is 12,581 firm-year observations. We then impose the following filter rules on the initial samples: (1). They must have sufficient financial and daily return data from COMPUSTAT and CRSP such that regression variables can be constructed; (2). They must be financially distressed, i.e., reporting negative earnings or negative operating cash flows during the current fiscal year (Mutchler et al. 1997); (3). The same set of companies must appear in both periods to ensure meaningful comparisons across the pre- and post-SOX periods.[54]

Our final sample consists of 1,043 (1,794) firm-year observations, or 777 distinctive firms, meeting all data requirements in the pre-SOX (post-SOX) period. Among them, a total of 100 firm-year observations received a first-time going-concern opinion and 2,737 did not. We label the former as the GC sample and the latter as the non-GC sample. The GC sample has 38 (62) firm-year observations in the pre-SOX (post-SOX) period, and the corresponding figures for the non-GC sample are 1,005 and 1,732 firm-year observations, respectively.

[Insert Table 4.1 About Here]

Panels A-C of Table 4.2 present the descriptive statistics for our full sample of financially distressed companies, both at the overall level and by sample period. For the full sample, client's total fees are on average 6.30% of an auditor's total revenue (*FEEDEP*, Panel A). The mean fee dependence measure, *FEEDEP*, has increased from 5.18% in the pre-SOX period to 6.95% in the post-SOX period (Panels B and C). The change is significant at the 1% level (*Z*-statistics = –8.96). Following the passage of SOX, firms generally face higher risks (*PROBZ*, *BETA, LEV* and *LLOSS*)[55] with better return (*ANNRET*, 0.20 vs. –0.13) and less volatile earnings (*VOLATILITY*, 0.003 vs. 0.004), compared to the pre-SOX period. Moreover, the mean proportion of sample firms audited by a

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[54] Each sample period consists of multiple years. We retain a firm-year observation as long as it appears in any year during that sample period.

[55] The mean values for *PROBZ*, *BETA, LEV* and *LLOSS* in the post-SOX (pre-SOX) period are 0.25 (0.18), 1.42 (1.20), 0.48 (0.44) and 0.74 (0.61), respectively.

Big-4 auditor declines significantly (*BIG4*, 85% vs. 70%), whereas the lag in releasing audit reports on average lengthens significantly (*REPORTLAG*, 54.74 vs. 60.79), implying that SOX may have increased the complexity of financial reporting and costs of audit.

[Insert Table 4.2 About Here]

## 4.5 EMPIRICAL RESULTS

### *4.5.1Univariate Results*

Panel A (B) of Table 4.3 reports the mean and median values of each model variable for the GC (non-GC) sample over the entire six-year sample period.[56] Univariate tests indicate that neither the mean nor the median fee dependence measure (*FEEDEP*) is significantly different across these two samples (*Z*-statistics = 0.48 and *t*-statistics = –1.35). Financially distressed firms receiving going-concern opinions for the first time are on average more leveraged (*LEV*, 0.59 vs. 0.46; *CLEV*, 0.09 vs. 0.03), smaller in size (*ASSETS*, 17.58 vs. 18.65), riskier (*BETA*, 1.16 vs. 1.35) with more volatile returns (*VOLATILITY*, 0.004 vs. 0.003), worse performance (*CFO*, –0.22 vs. –0.09) and longer report lag (*REPORTLAG*, 83.31 vs. 57.66), compared to the non-GC sample. These firms are also less likely to issue debt and equity in the near future (*INVESTMENTS*, 0.17 vs. 0.30) and to retain a Big-4 auditor (*BIG4*, 0.68 vs. 0.76).

[Insert Table 4.3 About Here]

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[56] We do not report the corresponding mean and median values by sample period, as there are very few firm-year observations in the GC sample, especially in the pre-SOX period.

Panels A and B of Table 4.4 present the pair-wise correlation coefficients between the dependent variable *GC* and each of the independent variables, other than group dummy, in Equation (4-1) for the pre- and post-SOX periods, respectively. Pearson (Spearman rank) correlation coefficients appear above (below) the diagonal. With the exception of one case, auditors' going-concern decisions (*GC*) are not significantly correlated with fee dependence measure (*FEEDEP*). At the univariate level, there does not appear to be much support for the argument that economic bonding affects auditors' decisions to issue going-concern opinions, either before or after the introduction of SOX. Univariate comparisons however do not control for factors that could also impact on going-concern reporting, an issue that we turn to next.[57]

[Insert Table 4.4 About Here]

### *4.5.2 Multivariate Results*

Panels A and B of Table 4.5 present logistic regression results estimated by sample period using Equation (4-1) for Scenarios 1 and 2, respectively. The corresponding results estimated based on Equation (4-2) for Scenario 3 appear in Panel C. In each panel, we report coefficient estimates for the pre-SOX (post-SOX) period in Column 1 (2) and *Wald Chi-Square* statistics for comparisons across sample periods in Column 3. Scenario 1 (2) partitions the sample into two subsets according to the median value of non-audit fees (litigation risks) in the

[57] While several pair-wise correlations among independent variables are significant, the highest variance inflation factor is 2.70, suggesting that multi-collinearity is not a concern (Greene 1999). We also test the condition index and find that the highest value is 3.60, which is well below the threshold of 30 (Belsley, Kuh and Welsch 1980).

pre-SOX period, whereas Scenario 3 partitions the sample into four subsets based on the median value of non-audit fees and the median value of litigation risks.

After controlling for the potential confounding effects of covariates, we find that the coefficient estimates on *FEEDEP*, $FEEDEP \bullet HNAS$ and *HNAS* under Scenario 1 are all insignificantly different from zero in both sample periods (Columns 1-2, Panel A), implying that auditors do not allow economic bonding to affect their judgment regarding a firm's ability to continue as a going-concern with or without SOX. Of particular interest to us is the change in coefficient estimates on *FEEDEP*, and especially $FEEDEP \bullet HNAS$, from the pre- to the post-SOX period. According to *Wald Chi-Square* statistics, neither change is statistically significant (Column 3, Panel A). It would appear that limiting the incumbent auditors' ability to provide non-audit services has not altered the association between fee dependence and going-concern opinions whether they supplied high or low levels of non-audit services prior to the introduction of SOX.

We next turn to Scenario 2 to see if raising auditors' potential litigation risks under SOX has enhanced auditor independence. Results indicate that the coefficient estimates on all three test variables (i.e., *FEEDEP*, $FEEDEP \bullet HLR$ and *HLR*) are insignificantly different from zero in the pre- as well as the post-SOX periods (Columns 1-2, Panel B). More importantly, we cannot reject the null hypothesis of equal coefficients on either *FEEDEP* or $FEEDEP \bullet HLR$ across sample periods based on *Wald Chi-Square* statistics (Column 3, Panel B). These results suggest that, irrespective of the level of their clients' litigation risks, SOX provisions intended to increase the costs of impairment to auditor independence has not affected the way auditors react to economic bonding when making going-concern decisions.

Taking the combined effects of increased litigation risks and reduced non-audit services into account in Scenario 3, we find that the coefficient estimates on $FEEDEP$, $FEEDEP \bullet HNAS\_HLR$ and $FEEDEP \bullet LNAS\_LLR$ are effectively zero in either sample period (Columns 1-2, Panel C) and that changes in these coefficient estimates from the pre-SOX to the post-SOX period are statistically insignificant using *Wald Chi-Square* statistics (Column 3, Panel C). Thus, even for the subset of auditors who are likely to be most affected by the SOX provisions (*HNAS_HLR*), there is no evidence to suggest that SOX has led to changes to the association between fee dependence and the incidence of going-concern opinions.

[Insert Table 4.5 About Here]

In short, we find no support for the arguments made by proponents of SOX that banning auditors from performing non-audit services and/or raising auditors' litigation exposures have enhanced auditor independence. These results are not surprising given that a non-trivial number of client firms with questionable ability to continue as a going-concern eventually go bankrupt, exposing their auditors to litigations from investors and creditors, disciplinary action from regulators and intense scrutiny by the press. Thus, auditors are generally reluctant to compromise reporting objectivity by issuing an unqualified audit opinion when their clients do not have a viable plan to deal with severe financial distress. This is so whether or not they derive much of their revenues from non-audit services or face significant exposure to litigations.

## 4.6 ROBUSTNESS CHECKS

In this section, we present several robustness checks to ensure that our main results are not sensitive to alternative measure of *FEEDEP* at the city level (Section 4.6.1) and alternative definitions of auditor litigation risks (Section 4.6.2). They are discussed in turn.

### *4.6.1 Alternative Measure of FEEDEP at the City Level*

Some of the audit firms in our sample have multiple practice-offices within a city. Audit Analytics that we use to extract audit fee data does not provide information about the identity of practice-office that performs the audit. To calculate the practice-office based *FEEDEP* measure, we have invoked the assumption that local office situated closest to the client performs the audit (Chung and Kallapur 2003). This approach is arguably *ad hoc*, as within-city travel may not be substantial enough to deter a client from retaining a local office located at the opposite end of the city. If so, arbitrary revenue allocation may give rise to measurement errors in *FEEDEP*.

To address this issue, we now re-define *FEEDEP* as $TF_{ijk} \Big/ \sum_{i=1}^{I} TF_{ijk}$, where $TF_{ijk}$ denotes total fees paid by client $i$ to all the local offices of audit firm $j$ located in city k (labeled as $FEEDEP^{CITY}$); and $\sum_{i=1}^{I} TF_{ijk}$ denotes total fees earned by all the local offices of audit firm $j$ located in city $k$. This city-based fee dependence measure captures the relative importance of a particular audit client to its auditor's overall portfolio on a city-by-city basis.

Panels A-C of Table 4.6 present the coefficient estimates on test variables for Scenarios 1-3, respectively. Irrespective of the basis used to partition the full sample, we find that none of the coefficient estimates is significantly different from zero in either sample period.[58] Moreover, results based on *Wald Chi-Square* statistics cannot reject the null hypothesis that coefficients are equal across sample periods. Thus, our earlier conclusion that SOX has not weakened the association between economic bonding and the incidence of going-concern opinions is unlikely to be driven by our decision to measure fee dependence at the local office level.

[Insert Table 4.6 About Here]

### *4.6.2 Alternative Measure of Auditor Litigation Risks*

In Scenarios 2 and 3, we have used a set of client-specific characteristics proposed by Rogers and Stocken (2005) to proxy for clients' litigation risks under the assumption that auditors' litigation risks are positively correlated with their clients'. We now consider two robustness checks to see if our findings are sensitive to this assumption: First, re-measuring clients' exposure to litigation risks at the industry level by setting the group dummy variable (labeled $HLR^{IND}$)

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[58] They include $FEEDEP^{CITY}$ and $FEEDEP^{CITY} \bullet HNAS$ for Scenario 1, $FEEDEP^{CITY}$ and $FEEDEP^{CITY} \bullet HLR$ for Scenario 2 and $FEEDEP^{CITY}$, $FEEDEP^{CITY} \bullet HNAS\_HLR$ and $FEEDEP^{CITY} \bullet LNAS\_LLR$ for Scenario 3.

to one if audit clients operate in one of the following highly litigious industries, Biotechnology (SIC 2833-2836), Computer (SIC 3570-3577 and 7370-7374), Electronics (SIC 3600-3674) and Retailing (SIC 5200-5961), and zero otherwise (Ashbaugh et al. 2003). Second, using auditor size to directly measure auditors' litigation risks assuming that Big-4 auditors face greater exposure to litigations than non Big-4 auditors due to their perceived deep pockets (Dye 1993). For this proxy, the group dummy variable (labeled $HLR^{B4}$) is set equal to one if firms are audited by a Big-4 auditor and zero otherwise.[59]

Panels A and B of Table 4.7 presents coefficient estimates on key test variables for Scenarios 2 and 3, respectively. Focusing on Scenario 2, we find that coefficient estimates on *FEEDEP* and $FEEDEP \bullet HLR^{IND}$ are insignificantly different from zero in both sample periods and that changes from the pre- to the post-SOX period are not significant based on *Wald Chi-Square* statistics (Columns 1a-1c, Panel A). Replacing $HLR^{IND}$ with $HLR^{B4}$ in Equation (4-1) does not alter any of the results qualitatively (Columns 2a-2c, Panel A). Both sets of results extend to Scenario 3 (Columns 1a-1c and 2a-2c, Panel B). Thus, our main findings appear to be invariant to the way auditors' litigation risks are measured.

[Insert Table 4.7 About Here]

## 4.7 FURTHER ANALYSIS AT THE OVERALL LEVEL

The subsample research design employed in our study provides a cleaner setting to examine the effects of SOX provisions that speak to directly or indirectly to

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[59] Since *BIG4* is now used to partition the full sample, it is removed from Equations (4-1) and (4-2) for Scenarios 2 and 3, respectively.

auditor independence. Prior fee dependence literature however has typically conducted the analysis at the overall level. To align ourselves with this line of research and shed light on the average effects of SOX on auditor independence, we now replicate our analysis for the full sample using the following logistic model (DeFond et al. 2002), estimated separately for the pre- and the post-SOX periods:

$$\begin{aligned} GC = {} & \beta_0 + \beta_1 CI + \beta_2 PROBANKZ + \beta_3 ASSETS + \beta_4 FIRMAGE \\ & + \beta_5 BETA + \beta_6 ANNRET + \beta_7 VOLATILITY + \beta_8 LEV + \beta_9 CLEV \\ & + \beta_{10} LLOSS + \beta_{11} INVESTMENTS + \beta_{12} FINANCE + \beta_{13} BIG4 \\ & + \beta_{14} CFO + \beta_{15} REPORTLAG + YEAR\_DUMMIES + \varepsilon \end{aligned} \qquad (4\text{-}3)$$

Except for *CI* (discussed below), all the variables in Equation (4-3) are as defined previously for Equations (4-1)-(4-2).

The test variable in Equation (4-3) is given by *CI*, which represents the construct of fee dependence. In addition to *FEEDEP* modeled in Equations (4-1)-(4-2), we also consider four new proxies for *CI* found in the extant literature (see Section 4.2 for review): (1). *AFDEP* (*NAFDEP*) defined as the proportion of a client's audit (non-audit) fees to total revenues earned by its auditor in a given year, where *AFDEP* is the test variable and *NAFDEP* the control (Li 2009). (2). *FEERATIO* measured as the ratio of non-audit fees to total fees (Frankel, Johnson and Nelson 2002). (3). *LGTOTFEE* is the natural logarithm of total fees charged on a client. (4). *LGAUDFEE* (*LGNONAUDFEE*) defined as the natural logarithm of audit (non-audit) fees charged on a client, where *LGAUDFEE* is the test variable and *LGNONAUDFEE* the control (Ashbaugh et al. 2003).

Panels A-C of Table 4.2 present descriptive statistics for these new proxy variables, both overall and by sample period. For the full sample, client's audit fees on average amount to 4.55% of an auditor's total revenue (*AFDEP*) and the corresponding figure for non-audit fees (*NAFDEP*) is 1.64%. While *NAFDEP* declines from 2.20% in the pre-SOX period to 1.32% in the post-period, the converse is true for *AFDEP* (from 2.90% to 5.50%). These opposite trends suggest that looking at non-audit services alone may not fully capture the total economic bonding between auditors and their clients. Consistent with SOX provisions limiting the incumbent auditors' ability to offer concurrent non-audit services, we find a significant reduction in the mean logarithm of non-audit fees (*LGNONAUDFEE*), from 11.24 to 10.12 surrounding SOX. By comparison, the mean logarithm of total fees (*LGTOTFEE*) increases significantly from 12.71 to 13.14, reflecting perhaps higher costs of complying with SOX. Together, they lead to a significant reduction in the ratios of non-audit fees over total fees (*FEERATIO*), from 42% in the pre-period to 19% in the post-SOX period.

For each sample period, a significantly negative (an insignificant) coefficient on *CI* indicates that auditors' independence is (not) impaired. Furthermore, if SOX has indeed enhanced auditor independence, we would expect to see a significant increase in the level of coefficient estimate on *CI* from the pre- to the post-SOX period. Panels (A)-(E) of Table 4.8 present logistic regression results based on Equation (4-3) when *CI* is given by *FEEDEP*, *AFDEP*, *FEERATIO*, *LGTOTFEE* and *LGAUDFEE*, respectively. In each panel, coefficient estimates on the key test variables for the pre-SOX (post-SOX) period appear in Column 1 (2) and *Wald Chi-Square* statistics for comparisons across sample periods appear in Column 3. Regardless of the choice of proxies for fee dependence, we do not find any evidence to suggest that economic bonding impairs auditors' reporting objectivity with respect to going-concern opinions for the full sample in either the pre- or the post-SOX period. Moreover, we cannot reject the null hypothesis of equality in coefficients on various *CI* measures across sample periods based on *Wald Chi-Square* statistics.

[Insert Table 4.8 About Here]

Findings that auditor independence has not improved from the pre- to the post-SOX period for average firms are not surprising, as we have previously reached similar conclusion for subsets of firms most likely to be affected by SOX. However, these results contradict those documented by Li (2009) for 1,780 publicly traded U.S. companies in the year (2003) right after the passage of SOX. For that year, both of Li's proxies for fee dependence, *FEEDEP* and *AFDEP*, are positively associated with the incidence of going-concern opinions at the overall level. Interestingly, Fargher and Jiang (2008) also find a positive association for their sample of publicly traded Australian firms in 2003, but not in 2004 and 2005. Since Australian firms were not directly impacted by SOX regulations, the similarity of findings in these two studies suggests that the phenomenon identified by the authors may have reflected auditors' short-term reaction to the collapses of Enron and Arthur Andersen, which were felt worldwide (Sercu, Bauwhede and Willekens 2006), rather than the impact of SOX on auditor independence *per se*.

To explore this conjecture further and to reconcile our findings with Li's, we next conduct a series of analyses using the following Li's model:

$$\begin{aligned} GC = &\lambda_0 + \lambda_1 CI + \lambda_2 SALES + \lambda_3 ROA + \lambda_4 LEVERAGE \\ &+\lambda_5 LIQUIDITY + \lambda_6 CHGDT + \lambda_7 PRLOSS \\ &+\lambda_8 PRNOCF + \lambda_9 BIGN + \lambda_{10} DELAY + \lambda_{11} NEWDEBT \end{aligned} \quad (4\text{-}4)$$

where *CI* is defined in two ways, one based on *FEEDEP* and the other on *AFDEP* with *NAFDEP* included as a control. Like us, in Equation (4-4) Li controls for the potential effects of firm size (*SALES*), firm performance (*ROA, PRLOSS* and *PRNOCF*), debts (*LEVERAGE, CHGDT* and *NEWDEBT*) and external auditor quality (*BIGN* and *DELAY*) on an auditor's going-concern decisions.[60] However unlike us, Li (2009) does not control for market risks (*BETA, ANNRET, VOLATILITY*), financial liquidity (*INVESTMENTS*), firm age (*FIRMAGE*) and bankruptcy risks (*PROBANKZ*), modeled in DeFond et al. (2002).

Since the purpose of this exercise is to replicate Li (2009), we follow her approach and estimate Equation (4-4) annually over a six-year period surrounding the passage of SOX. Panels A and B of Table 4.9 present logistic regression results when *CI* is given by *FEEDEP* and *AFDEP*, respectively. In each panel, coefficient estimates on key test variables for 2001 and 2003-2007 appear in Columns 1-6, respectively.

Focusing first on Li's 2001 and 2003 samples which she generously shares with us, we are able to replicate her findings of no association between *FEEDEP*

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[60] Detailed definitions and measurements of Li's control variables are provided in the Appendix to conserve space. We use largely similar proxies with different notations to represent the same four constructs. They are *ASSETS*, *CFO* and *LLOSS*, *LEV*, *CLEV* and *FINANCE* and finally *BIG4* and *REPORTLAG*, respectively (DeFond et al. 2002).

and the incidence of going-concern opinions in 2001, but positive association in 2003 (Columns 1-2, Panel A). Results are similar when *CI* is measured by *AFDEP* instead (Columns 1-2, Panel B). We then extend the analysis to fours years beyond Li's sample period, i.e., 2004-2007. With the exception of one case,[61] there is no evidence of any association between *FEEDEP* (or *AFDEP*) and auditors' going-concern opinions. Any effect that SOX may have had on auditor independence would appear temporary.[62]

[Insert Table 4.9 About Here]

So far in our attempts to replicate Li's findings, we have used her model specification but extended the post-SOX analysis by four years to 2007. This allows us to shed light on the short-term vs. long-term effects of SOX regulations on auditor independence. There is nonetheless another important difference that sets our study apart from Li's, namely model specification. As discussed above, our model (Equation 4-3) includes six additional control variables not considered by Li (2009). To see if Li's results will continue to hold using our more comprehensive model specification, we now replicate the analysis based on Equation (4-3) using Li's 2001 and 2003 samples. Columns 1 and 2, Panel A (B) of Table 4.10 present logistic regression results for 2001 and 2003, respectively when *CI* is given by *FEEDEP* (*AFDEP*). For both proxy variables, economic bonding does not appear to have any significant effect on an auditor's going-concern decisions in either 2001 or 2003. These results are contrary to what is

[61] That is, when *FEEDEP* is used as a proxy for *CI* in 2006, the coefficient estimate is positive and significant at the 5% level.

[62] Li (2009) also points out that "… the immediate post-SOX year studies may not prove representative of an equilibrium of the post-SOX audit market" (page 225).

documented in Li (2009) and suggest that her findings may also be sensitive to the modeling choice.[63]

[Insert Table 4.10 About Here]

## 4.8 CONCLUSION

In this paper, we have presented empirical evidence on changes to the association between fee dependence measures and the incidence of going-concern opinions for financially distressed U.S. firms over a six-year period surrounding the passage of SOX (2001; 2003-2007). Citing that SOX alters the net benefits from yielding to client pressure, proponents of SOX contend that the Act would effectively enhance auditor independence. Distracters of SOX however argue that SOX was motivated out of political expediency because many of the provisions speaking to auditor independence lack theoretical and empirical support.

Recently, Li (2009) studies this issue for one year immediately after SOX (2003) and finds that for average firms SOX has strengthened auditor independence by increasing the incidence of going-concern opinions for auditors who are financially dependent on their clients. However, we are unable to replicate Li's findings beyond 2003 using her sample and model specification. Likewise, we fail to find evidence of enhancement to auditor independence when we apply Li's 2001 and 2003 samples to an alternative model specification based on DeFond et al. (2002).

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[63] In fairness to Li (2009), researchers generally do not agree on what is the most theoretically defendable empirical model.

While the average effects may be lacking, government regulations can still be effective if they lead to improvements for targeted firms. In our main analysis, we partition the full sample into subsets expected to be most affected vs. least affected by SOX. This research design allows us to isolate the effects of limiting non-audit services and/or raising litigation costs on auditor independence. Nonetheless, even for subset of firms targeted by SOX, there is no evidence to suggest that auditors allow financial dependence to affect their judgment regarding a firm's ability to continue as a going-concern in either the pre- or the post-SOX period. Taken together, our results do not lend support for the argument that SOX has improved auditor independence. These findings however do not imply that SOX was motivated solely out of political considerations, as SOX is a far more comprehensive piece of legislation than what we aim to examine in the study.

We have used the incidence of going-concern opinions to proxy for the extent of auditor independence in this study. But, the consequence of failing to warn users of financial distress faced by their clients may be viewed as so severe that most auditors are reluctant to withhold issuing going-concern reservation no matter how financially dependent they are on their clients. A natural extension of our study is to consider less severe forms of impairment to auditor independence, such as the incidence of qualified auditor's report (for departures from GAAP) or the extent of accounting discretion permitted by the auditor. It will also be interesting to examine whether limiting the joint provision of non-audit services imposes costs to the society by raising costs of audit or forcing clients to replace high quality auditors with lower quality ones.

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**Appendix 4-I Definitions and Measurement of Variables in Chapter 4**

| Variable Names | Definition and Measurement |
|---|---|
| **Dependent Variables** | |
| *GC* | An indicator variable set to one for firms receiving first-time going-concern audit opinions and zero otherwise. |
| **Key Explanatory Variables** | |
| *FEEDEP* | Client total fees (sum of audit fees and non-audit fees) divided by the total revenue of the local auditor office that issues the audit report; |
| $FEEDEP^{CITY}$ | Client total fees (sum of audit fees and non-audit fees) divided by the total revenue of an auditor at a city level; |
| *HNAS* | An indicator variable set to one when clients' *FEERATIO* is greater than the sample median and zero otherwise; |
| *LITIGATION* | Litigation risks estimated using the following probit model (Rogers and Stocken 2005); |
| *HLR* | An indicator variable set to one when clients' *LITIGATION* is higher than the sample median and zero otherwise; |
| *HNAS_HLR* | An indicator variable set to one when clients' *FEERATIO* is greater than the sample median and *LITIGATION* is higher than the sample median and zero otherwise; |
| *LNAS_LLR* | An indicator variable set to one when clients' *FEERATIO* is less than the sample median and *LITIGATION* is lower than the sample median and zero otherwise; |
| $HLR^{IND}$ | An indicator variable set to one when clients operate in a high-litigation industry (SIC codes 2833–2836, 3570–3577, 3600–3674, 5200–5961 and 7370–7374) and zero otherwise. |
| $HLR^{B4}$ | An indicator variable set to one when clients are audited by a Big-4 auditor and zero otherwise. |
| $HNAS\_HLR^{IND}$ | An indicator variable set to one when clients' *FEERATIO* is greater than the sample median and they operate in a high-litigation industry (SIC codes 2833–2836, 3570–3577, 3600–3674, 5200–5961 and 7370–7374) and zero otherwise; |
| $HNAS\_HLR^{B4}$ | An indicator variable set to one when clients' *FEERATIO* is greater than the sample median and they are audited by a Big-4 auditor and zero otherwise; |
| $LNAS\_LLR^{IND}$ | An indicator variable set to one when clients' *FEERATIO* is less than the sample median and they do not operate in a high-litigation industry (SIC codes 2833–2836, 3570–3577, 3600–3674, 5200–5961 and 7370–7374) and zero otherwise; |
| $LNAS\_LLR^{B4}$ | An indicator variable set to one when clients' *FEERATIO* is less than the sample median and they are not audited by a Big-4 auditor and zero otherwise; |

**Appendix 4-I Definitions and Measurement of Variables**

| Variable Names | Definition and Measurement |
|---|---|
| **Control Variables** | |
| *PROBANKZ* | Probability of bankruptcy score (Zmijewski 1984), where Zscore = 1.2 (current asset – current liability)/total assets + 1.4 (retained earnings/total assets) + 3.3 (earnings before tax/total assets) + 0.6 (market value/long-term debt) + sales/total assets; |
| *ASSETS* | Natural logarithm of total assets at the end of the year, in millions of dollars; |
| *FIRMAGE* | Number of years since a company was listed in a stock exchange; |
| *BETA* | A company's beta estimated using a market model over the fiscal year; |
| *ANNRET* | A company's stock return over the fiscal year; |
| *VOLATILITY* | The variance of the residual from the market model over the fiscal year; |
| *LEV* | The ratio of total liabilities to total assets at the end of the fiscal year; |
| *CLEV* | Change in *LEV* over the fiscal year; |
| *LLOSS* | An indicator variable set to one if a company reports a negative net income in the previous fiscal year and zero otherwise; |
| *INVESTMENTS* | Short- and long-term investment securities (including cash and cash equivalents) deflated by total assets at the end of the fiscal year; |
| *FINANCE* | An indicator variable set to one if a company issues new equity or long-term debt in the subsequent fiscal year and zero otherwise; |
| *BIG4* | An indicator variable set to one if a company is audited by one of the Big-4 auditors and zero otherwise. The Big-4 auditors refer to PricewaterhouseCoopers LLP, Ernst & Young LLP, Deloitte & Touche LLP, and KPMG LLP; |
| *CFO* | Operating cash flow deflated by total assets at the end of the fiscal year; |
| *REPORTLAG* | Number of days between fiscal year-end and earnings announcement date; |
| **Alternative Fee Dependence Variables Defined in Prior Studies** | |
| *AFDEP* | A client's audit fees divided by the total revenues of her auditor's local office that issues the audit report. |
| *NAFDEP* | A client's non-audit fees divided by the total revenues of her auditor's local office that issues the audit report; |
| *FEERATIO* | Ratio of non-audit service fees to total fees (i.e., sum of audit fees and non-audit fees); |
| *LGTOTFEE* | Natural logarithm of a client's total fees; |
| *LGAUDFEE* | Natural logarithm of a client's audit fees; |
| *LGNONAUDFEE* | Natural logarithm of a client's non-audit fees; |

**Appendix 4-I Definitions and Measurement of Variables**

| Variable Names | Definition and Measurement |
|---|---|
| **Control Variables Defined in Li (2009)'s Model** | |
| *SALES* | Natural logarithm of client's total sales at the end of the year; |
| *ROA* | Net income divided by total assets at the end of the year; |
| *LEVERAGE* | Total liabilities divided by total assets at the end of the year; |
| *LIQUIDITY* | Total current assets divided by total current liabilities at the end of the year; |
| *CHGDT* | The change in long-term debt divided by total assets; |
| *PRLOSS* | An indicator variable set to one if the firm reported negative net income in the prior year and zero otherwise; |
| *PRNOCF* | An indicator variable set to one if the firm reported negative operating cash flows in the prior year and zero otherwise; |
| *BIGN* | An indicator variable set to one if the auditor is Big 4 (5) and zero otherwise; |
| *DELAY* | Number of days between the fiscal year-end and the auditor's report signing date; |
| *NEWDEBT* | An indicator variable set to one if the firm issues new debt in the subsequent year and zero otherwise. |

**Table 4.1 Sample Selection Procedure**

| | Pre-SOX 2000-2001 | Post-SOX 2003-2007 |
|---|---|---|
| Firm-years in Audit Analytics[64] | 12,581 | 57,717 |
| Removing firm-year observations: | | |
| Accounting variables unavailable on COMPUSTAT | 4,166 | 31,799 |
| Data of returns unavailable on CRSP | 592 | 979 |
| Firm-year not classified as final distressed | 4,716 | 18,501 |
| Firm not appearing in the other period | 2,064 | 4,644 |
| Final Sample | 1,043 | 1,794 |
| Distinctive Firms (firms) | 777 | 777 |
| | | |
| Number (percentage) of firm-year observations in GC sample | 38 (3.6%) | 62 (3.5%) |
| Number (percentage) of firm-year observations in Non-GC sample | 1,005 (96.4%) | 1,732 (96.5%) |

[64] Initial samples are restricted to firms receiving going-concern audit opinions for the first time. We also require the sample firms have related audit fee data available from Audit Analytics database.

**Table 4.2 Summary Statistics: Overall Sample and by Sample Period**

| Model Variables | Panel A. Full Sample (N = 2,837) Mean | Median | Std. Dev. | Panel B. Pre-SOX Sample (2000-2001; N = 1,043) (1). Mean | (2). Median | Std. Dev. | Panel C. Post-SOX Sample (2003-2007; N = 1,794) (3). Mean | (4). Median | Std. Dev. | Comparisons Pre vs. Post *Z*-Stat (1) - (3) | *t*-Stat (2) - (4) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| *GC* | 0.04 | 0.00 | 0.18 | 0.04 | 0.00 | 0.19 | 0.03 | 0.00 | 0.18 | 0.26 | 0.26 |
| *FEEDEP* | 0.063 | 0.01 | 0.12 | 0.0518 | 0.00 | 0.12 | 0.0695 | 0.01 | 0.11 | -8.96*** | -3.95*** |
| *PROBZ* | 0.23 | 0.02 | 0.36 | 0.18 | 0.01 | 0.32 | 0.25 | 0.02 | 0.37 | -5.38*** | -5.57*** |
| *ASSETS* | 18.61 | 18.44 | 1.67 | 18.65 | 18.49 | 1.71 | 18.59 | 18.41 | 1.65 | 0.78 | 0.92 |
| *FIRMAGE* | 2.33 | 2.30 | 0.71 | 2.04 | 1.95 | 0.81 | 2.51 | 2.40 | 0.58 | -15.95*** | -16.46*** |
| *BETA* | 1.34 | 1.25 | 0.86 | 1.20 | 1.14 | 0.78 | 1.42 | 1.35 | 0.89 | -6.61*** | -7.03*** |
| *ANNRET* | 0.09 | -0.10 | 0.76 | -0.13 | -0.27 | 0.63 | 0.20 | -0.02 | 0.81 | -13.10*** | -12.13*** |
| *VOLATILITY* | 0.00 | 0.00 | 0.00 | 0.004 | 0.00 | 0.00 | 0.003 | 0.00 | 0.00 | 11.68*** | 10.26*** |
| *LEV* | 0.46 | 0.42 | 0.28 | 0.44 | 0.40 | 0.27 | 0.48 | 0.43 | 0.29 | -3.39*** | -3.75*** |
| *CLEV* | 0.03 | 0.02 | 0.13 | 0.03 | 0.02 | 0.14 | 0.03 | 0.02 | 0.13 | -0.37 | -0.49 |
| *LLOSS* | 0.69 | 1.00 | 0.46 | 0.61 | 1.00 | 0.49 | 0.74 | 1.00 | 0.44 | -7.09*** | -6.97*** |
| *INVESTMENTS* | 0.30 | 0.22 | 0.27 | 0.28 | 0.18 | 0.28 | 0.31 | 0.23 | 0.27 | -4.05*** | -2.72*** |
| *FINANCE* | 0.34 | 0.00 | 0.47 | 0.35 | 0.00 | 0.48 | 0.33 | 0.00 | 0.47 | 1.83* | 1.83* |
| *BIG4* | 0.76 | 1.00 | 0.43 | 0.85 | 1.00 | 0.36 | 0.70 | 1.00 | 0.46 | 8.92*** | 9.65*** |
| *CFO* | -0.09 | -0.03 | 0.21 | -0.09 | -0.03 | 0.23 | -0.09 | -0.03 | 0.19 | 1.76* | 0.40 |
| *REPORTLAG* | 58.56 | 56.00 | 23.97 | 54.74 | 51.00 | 23.45 | 60.79 | 59.00 | 24.00 | -6.56*** | -6.53*** |
| **Alternative Fee Dependence Variables Employed in Prior Studies** | | | | | | | | | | | |
| *AFDEP* | 0.0455 | 0.01 | 0.09 | 0.029 | 0.00 | 0.07 | 0.055 | 0.01 | 0.09 | -12.96*** | -8.26*** |
| *NAFDEP* | 0.0164 | 0.00 | 0.04 | 0.022 | 0.00 | 0.05 | 0.0132 | 0.00 | 0.03 | 3.73*** | 4.83*** |
| *FEERATIO* | 0.28 | 0.23 | 0.23 | 0.42 | 0.42 | 0.23 | 0.19 | 0.15 | 0.18 | 25.66*** | 28.06*** |
| *LGTOTFEE* | 12.99 | 12.95 | 1.26 | 12.71 | 12.55 | 1.32 | 13.14 | 13.13 | 1.21 | -9.67*** | -8.61*** |
| *LGNONAUDFEE* | 10.53 | 11.27 | 3.51 | 11.24 | 11.64 | 3.03 | 10.12 | 11.02 | 3.69 | 9.93*** | 8.72*** |

*, **, *** Significant at the 10%, 5% and 1% levels, respectively (two-tail tests).
See the Appendix 4-I for the definition and measurement of each variable.

| Table 4.3 Summary Statistics: GC Sample vs. Non-GC Sample at the Overall Level | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | **Panel A. GC Sample (2000-2001 and 2003-2007; N = 100)** | | | **Panel B. Non-GC Sample (2000-2001 and 2003-2007; N = 2,737)** | | | **Comparisons GC vs. Non-GC** | |
| Model Variables | (1). Mean | (2). Median | Std. Dev. | (3). Mean | (4). Median | Std. Dev. | *Z*-Statistics (1) - (3) | *t*-Statistics (2) - (4) |
| *FEEDEP* | 0.08 | 0.01 | 0.16 | 0.06 | 0.01 | 0.11 | 0.48 | -1.35 |
| *PROBANKZ* | 0.56 | 0.61 | 0.43 | 0.22 | 0.01 | 0.35 | 8.82*** | 7.88*** |
| *ASSETS* | 17.58 | 17.39 | 1.43 | 18.65 | 18.50 | 1.66 | -6.42*** | -7.28*** |
| *FIRMAGE* | 2.31 | 2.40 | 0.72 | 2.34 | 2.30 | 0.71 | 0.01 | 0.32 |
| *BETA* | 1.16 | 1.06 | 0.84 | 1.35 | 1.27 | 0.86 | -2.34** | -2.08** |
| *ANNRET* | -0.24 | -0.34 | 0.54 | 0.10 | -0.10 | 0.77 | -5.25*** | -5.92*** |
| *VOLATILITY* | 0.004 | 0.00 | 0.00 | 0.003 | 0.00 | 0.00 | 3.06*** | 3.24*** |
| *LEV* | 0.59 | 0.58 | 0.31 | 0.46 | 0.41 | 0.28 | 4.48*** | 4.36*** |
| *CLEV* | 0.09 | 0.06 | 0.17 | 0.03 | 0.02 | 0.13 | 5.09*** | 3.87*** |
| *LLOSS* | 0.84 | 1.00 | 0.37 | 0.68 | 1.00 | 0.47 | 3.33*** | 4.14*** |
| *INVESTMENTS* | 0.17 | 0.07 | 0.22 | 0.30 | 0.23 | 0.27 | -5.16*** | -5.81*** |
| *FINANCE* | 0.49 | 0.00 | 0.50 | 0.34 | 0.00 | 0.47 | 3.15*** | 3.16*** |
| *BIG4* | 0.68 | 1.00 | 0.47 | 0.76 | 1.00 | 0.43 | -1.78* | -1.78* |
| *CFO* | -0.22 | -0.11 | 0.30 | -0.09 | -0.03 | 0.20 | -4.27*** | -4.23*** |
| *REPORTLAG* | 83.31 | 90.00 | 20.87 | 57.66 | 55.00 | 23.60 | 10.13*** | 10.72*** |
| **Alternative Fee Dependence Variables Employed in Prior Studies** | | | | | | | | |
| *AFDEP* | 0.06 | 0.01 | 0.13 | 0.04 | 0.01 | 0.09 | -0.17 | -1.36 |
| *NAFDEP* | 0.02 | 0.00 | 0.05 | 0.02 | 0.00 | 0.04 | -0.98 | -0.98 |
| *FEERATIO* | 0.26 | 0.18 | 0.26 | 0.28 | 0.23 | 0.23 | -1.50 | 0.71 |
| *LGTOTFEE* | 12.47 | 12.35 | 1.24 | 13.00 | 12.96 | 1.26 | -4.59*** | -4.18*** |
| *LGNONAUDFEE* | 9.27 | 10.33 | 4.14 | 10.58 | 11.31 | 3.47 | -4.43*** | -3.12*** |

*, **, *** Significant at the 10%, 5% and 1% levels, respectively (two-tail tests).
See the Appendix 4-I for the definition and measurement of each variable.

**Table 4.4 Pearson and Spearman Pair-wise Correlation Matrices**

**Panel A. Pre-SOX Period (2000-2001)**

| | *1.* | *2.* | *3.* | *4.* | *5.* | *6.* | *7.* | *8.* |
|---|---|---|---|---|---|---|---|---|
| *1. GC* | 1.00 | *-0.00* | *0.22** | *-0.15** | *-0.04* | *-0.05* | *-0.08** | *0.06* |
| *2. FEEDEP* | *-0.01* | 1.00 | *-0.05* | *-0.02* | *0.12** | *-0.03* | *-0.06** | *-0.01* |
| *3. PROBZ* | *0.18** | *0.01* | 1.00 | *-0.19** | *-0.16** | *0.21** | *-0.20** | *0.23** |
| *4. ASSETS* | *-0.15** | *0.15** | *-0.03* | 1.00 | *0.06** | *0.03* | *0.01* | *-0.35** |
| *5. FIRMAGE* | *-0.04* | *0.20** | *-0.00* | *0.04* | 1.00 | *-0.24** | *0.08** | *-0.21** |
| *6. BETA* | *-0.05* | *-0.06** | *0.01* | *0.06** | *-0.22** | 1.00 | *-0.13** | *0.41** |
| *7. ANNRET* | *-0.08** | *-0.09** | *-0.26** | *0.03* | *0.13** | *-0.16** | 1.00 | *-0.05* |
| *8. VOLATILITY* | *0.05* | *-0.13** | *0.04* | *-0.43** | *-0.32** | *0.43** | *-0.13** | 1.00 |
| *9. LEV* | *0.11** | *0.12** | *0.58** | *0.21** | *0.21** | *-0.18** | *-0.00* | *-0.25** |
| *10. CLEV* | *0.11* | *0.03* | *0.34** | *-0.02* | *-0.06* | *-0.01* | *-0.17** | *0.00* |
| *11. LLOSS* | *0.07** | *-0.19** | *0.13** | *-0.22** | *-0.21** | *0.13** | *0.05* | *0.28** |
| *12.INVESTMENTS* | *-0.12** | *-0.27** | *-0.29** | *-0.16** | *-0.26** | *0.32** | *0.03* | *0.32** |
| *13. FINANCE* | *0.07** | *0.06* | *0.16** | *0.13** | *0.06** | *-0.13** | *0.02* | *-0.13** |
| *14. BIG4* | *-0.03* | *-0.32** | *-0.04* | *0.32** | *-0.11** | *0.10** | *0.02* | *-0.08** |
| *15. CFO* | *-0.08** | *0.21** | *-0.05* | *0.37** | *0.24** | *-0.19** | *0.06** | *-0.35** |
| *16. REPORTLAG* | *0.20** | *0.05* | *0.20** | *-0.45** | *0.18** | *-0.20** | *-0.00* | *0.11** |

| | *9.* | *10.* | *11.* | *12.* | *13.* | *14.* | *15.* | *16.* |
|---|---|---|---|---|---|---|---|---|
| *1. GC* | *0.12** | *0.11** | *0.07** | *-0.11** | *0.07** | *-0.03* | *-0.10** | *0.22** |
| *2. FEEDEP* | *0.05* | *0.04* | *-0.11** | *-0.15** | *-0.01* | *-0.19** | *0.11** | *0.13** |
| *3. PROBZ* | *0.30** | *0.33** | *0.27** | *0.02* | *0.05* | *-0.02* | *-0.40** | *0.15** |
| *4. ASSETS* | *0.21** | *-0.05* | *-0.22** | *-0.16** | *0.14** | *0.32** | *0.38** | *-0.43** |
| *5. FIRMAGE* | *0.18** | *-0.07** | *-0.22** | *-0.23** | *0.06** | *-0.10** | *0.21** | *0.16** |
| *6. BETA* | *-0.18** | *-0.00* | *0.15** | *0.27** | *-0.13** | *0.07** | *-0.16** | *-0.15** |
| *7. ANNRET* | *-0.02* | *-0.14** | *0.08** | *0.08** | *-0.00* | *0.03* | *0.03* | *-0.04* |
| *8. VOLATILITY* | *-0.12** | *0.03* | *0.20** | *0.13** | *-0.07** | *-0.10** | *-0.22** | *0.18** |
| *9. LEV* | 1.00 | *0.38** | *-0.08** | *-0.41** | *0.32** | *-0.01* | *0.09** | *0.16** |
| *10. CLEV* | *0.36** | 1.00 | *0.08** | *-0.07** | *0.04* | *-0.00* | *-0.17** | *0.04* |
| *11. LLOSS* | *-0.11** | *0.08** | 1.00 | *0.32** | *-0.07** | *0.01* | *-0.31** | *0.05* |
| *12.INVESTMENTS* | *-0.52** | *-0.09** | *0.33** | 1.00 | *-0.32** | *0.17** | *-0.43** | *-0.20** |
| *13. FINANCE* | *0.32** | *0.06* | *-0.07** | *-0.36** | 1.00 | *-0.03* | *0.06* | *0.14** |
| *14. BIG4* | *-0.02* | *-0.00* | *0.01* | *0.15** | *-0.03* | 1.00 | *-0.04* | *-0.36** |
| *15. CFO* | *0.21** | *-0.07** | *-0.32** | *-0.44** | *0.09** | *-0.02* | 1.00 | *-0.10** |
| *16. REPORTLAG* | *0.17** | *0.03* | *0.05* | *-0.24** | *0.15** | *-0.34** | *-0.06** | 1.00 |

**Table 4.4 Pearson and Spearman Pair-wise Correlation Matrices**

**Panel B. Post-SOX Period (2003-2007)**

| | *1.* | *2.* | *3.* | *4.* | *5.* | *6.* | *7.* | *8.* |
|---|---|---|---|---|---|---|---|---|
| *1. GC* | 1.00 | *0.06** | *0.16** | *-0.10** | *0.02* | *-0.04* | *-0.08** | *0.11** |
| *2. FEEDEP* | *0.03* | 1.00 | *0.00* | *-0.08** | *0.16** | *-0.09** | *-0.11** | *-0.02* |
| *3. PROBZ* | *0.16** | *0.02* | 1.00 | *-0.13** | *-0.16** | *0.19** | *-0.15** | *0.25** |
| *4. ASSETS* | *-0.10** | *-0.00* | *0.02* | 1.00 | *0.07** | *0.20** | *0.03* | *-0.32** |
| *5. FIRMAGE* | *0.03* | *0.26** | *-0.08** | *0.03* | 1.00 | *-0.18** | *-0.10** | *-0.24** |
| *6. BETA* | *-0.04* | *-0.13** | *0.12** | *0.24** | *-0.17** | 1.00 | *0.09** | *0.26** |
| *7. ANNRET* | *-0.11** | *-0.13** | *-0.25** | *0.08** | *-0.07** | *0.04* | 1.00 | *0.09** |
| *8. VOLATILITY* | *0.06** | *-0.09** | *0.15** | *-0.36** | *-0.27** | *0.33** | *0.07** | 1.00 |
| *9. LEV* | *0.07** | *0.08** | *0.51** | *0.35** | *0.11** | *-0.05** | *0.02* | *-0.11** |
| *10. CLEV* | *0.09** | *0.03* | *0.28** | *0.06** | *0.02* | *0.01* | *-0.18** | *-0.06** |
| *11. LLOSS* | *0.06** | *-0.14** | *0.17** | *-0.10** | *-0.14** | *0.16** | *0.10** | *0.23** |
| *12.INVESTMENTS* | *-0.08** | *-0.25** | *-0.04* | *-0.17** | *-0.21** | *0.27** | *-0.01* | *0.18** |
| *13. FINANCE* | *0.06** | *0.12** | *0.13** | *0.17** | *0.08** | *-0.06** | *0.05* | *-0.06** |
| *14. BIG4* | *-0.04* | *-0.41** | *0.02* | *0.41** | *-0.19** | *0.25** | *0.12** | *-0.04* |
| *15. CFO* | *-0.08** | *0.13** | *-0.16** | *0.38** | *0.08** | *-0.09** | *0.12** | *-0.21** |
| *16. REPORTLAG* | *0.19** | *0.16** | *0.08** | *-0.42** | *0.18** | *-0.35** | *-0.12** | *0.03* |

| | *9.* | *10.* | *11.* | *12.* | *13.* | *14.* | *15.* | *16.* |
|---|---|---|---|---|---|---|---|---|
| *1. GC* | *0.08** | *0.07** | *0.06** | *-0.07** | *0.06** | *-0.04* | *-0.12** | *0.19** |
| *2. FEEDEP* | *-0.00* | *-0.00* | *-0.07** | *-0.16** | *0.08** | *-0.25** | *0.05** | *0.17** |
| *3. PROBZ* | *0.28** | *0.20** | *0.23** | *0.16** | *-0.00* | *0.02* | *-0.37** | *0.05** |
| *4. ASSETS* | *0.35** | *0.04* | *-0.10** | *-0.18** | *0.18** | *0.41** | *0.37** | *-0.39** |
| *5. FIRMAGE* | *0.10** | *0.02* | *-0.15** | *-0.20** | *0.10** | *-0.17** | *0.11** | *0.16** |
| *6. BETA* | *-0.03* | *-0.01* | *0.16** | *0.23** | *-0.06** | *0.24** | *-0.09** | *-0.33** |
| *7. ANNRET* | *0.02* | *-0.16** | *0.12** | *0.00* | *0.03* | *0.12** | *0.09** | *-0.10** |
| *8. VOLATILITY* | *-0.07** | *-0.07** | *0.18** | *0.11** | *-0.04* | *-0.05* | *-0.19** | *0.07** |
| *9. LEV* | *1.00* | *0.31** | *-0.01* | *-0.35** | *0.30** | *0.08** | *0.13** | *0.07** |
| *10. CLEV* | *0.32** | *1.00* | *-0.01* | *-0.02* | *0.05** | *0.03* | *-0.07** | *0.03* |
| *11. LLOSS* | *-0.04* | *-0.01* | *1.00* | *0.24** | *-0.07** | *0.04* | *-0.24** | *-0.03* |
| *12.INVESTMENTS* | *-0.45** | *-0.06** | *0.26** | *1.00* | *-0.33** | *0.17** | *-0.47** | *-0.20** |
| *13. FINANCE* | *0.33** | *0.07** | *-0.07** | *-0.38** | *1.00* | *-0.04* | *0.09** | *0.09** |
| *14. BIG4* | *0.06** | *0.04* | *0.04* | *0.16** | *-0.04* | *1.00* | *-0.00* | *-0.34** |
| *15. CFO* | *0.18** | *-0.03* | *-0.24** | *-0.41** | *0.11** | *0.05** | *1.00* | *-0.09** |
| *16. REPORTLAG* | *0.07** | *0.05* | *-0.03* | *-0.23** | *0.10** | *-0.36** | *-0.13** | *1.00* |

See the Appendix 4-I for the definition and measurement of each variable.
Pearson correlation coefficients are reported above the diagonal, and Spearman
Rank correlation coefficients are reported below the diagonal. * Significant at the 5% level or better.

**Table 4.5 Logistic Regression Results**

**Panel A. Sample Partitioned by Non-Audit Fees (Scenario 1)**

$$GC = \alpha_0 + \alpha_1 FEEDEP + \alpha_2 FEEDEP \bullet HNAS + \alpha_3 HNAS + \alpha_4 PROBANKZ + \alpha_5 ASSETS$$
$$+ \alpha_6 FIRMAGE + \alpha_7 BETA + \alpha_8 ANNRET + \alpha_9 VOLATILITY + \alpha_{10} LEV + \alpha_{11} CLEV + \alpha_{12} INVESTMENTS$$
$$+ \alpha_{13} FINANCE + \alpha_{14} BIG4 + \alpha_{15} CFO + \alpha_{16} REPORTLAG + YEAR\_DUMMIES + \varepsilon$$

| Model Variables | Exp. Sign | (1). Pre-SOX Period (2000-2001) Coefficient Estimate (*Wald Chi-Square*) | (2). Post-SOX Period (2003-2007) Coefficient Estimate (*Wald Chi-Square*) | (3). (1) vs. (2) Wald Chi-Square (Pr > *Chi-Square*) |
|---|---|---|---|---|
| *INTERCEPT* | | 1.37 (0.16) | -5.64 (4.56)** | |
| *FEEDEP* | | 1.12 (0.45) | 0.39 (0.14) | 0.13 (0.72) |
| *FEEDEP* • *HNAS* | | -6.83 (1.41) | 0.91 (0.54) | 1.77 (0.18) |
| *HNAS* | | 0.30 (0.44) | -0.41 (1.31) | 1.65 (0.20) |
| *PROBANKZ* | + | 1.61 (6.37)** | 1.21 (7.25)*** | |
| *ASSETS* | – | -0.42 (5.14)** | -0.05 (0.15) | |
| *FIRMAGE* | – | -0.46 (3.00)* | 0.21 (0.63) | |
| *BETA* | + | -0.19 (0.44) | -0.11 (0.39) | |
| *ANNRET* | – | -0.47 (0.99) | -0.69 (5.86)** | |
| *VOLATILITY* | + | 71.92 (1.75) | 84.51 (2.29) | |
| *LEV* | + | 0.71 (0.79) | 0.45 (0.52) | |
| *CLEV* | + | 0.42 (0.11) | 0.60 (0.34) | |
| *LLOSS* | + | 0.52 (1.13) | 0.37 (0.75) | |
| *INVESTMENTS* | – | -4.42 (8.86)*** | -2.84 (10.52)*** | |
| *FINANCE* | – | 0.07 (0.03) | 0.46 (2.18) | |
| *BIG4* | + | 0.94 (3.50)* | 0.56 (2.53) | |
| *CFO* | – | -0.50 (0.37) | -2.90 (13.14)*** | |
| *REPORTLAG* | + | 0.04 (16.01)*** | 0.03 (21.61)*** | |
| *YEAR_ DUMMIES* | | YES | YES | |
| N | | 1,043 | 1,794 | |
| Pseudo $R^2$ | | 37.22% | 30.06% | |

**Table 4.5 Logistic Regression Results**

**Panel B. Sample Partitioned by Litigation Costs (Scenario 2)**

$$GC = \beta_0 + \beta_1 FEEDEP + \beta_2 FEEDEP \bullet HLR + \beta_3 HLR + \beta_4 PROBANKZ + \beta_5 ASSETS + \beta_6 FIRMAGE + \beta_7 BETA + \beta_8 ANNRET + \beta_9 VOLATILITY + \beta_{10} LEV + \beta_{11} CLEV + \beta_{12} INVESTMENTS + \beta_{13} FINANCE + \beta_{14} BIG4 + \beta_{15} CFO + \beta_{16} REPORTLAG + YEAR\_DUMMIES + \varepsilon$$

| Model Variables | Exp. Sign | (1). Pre-SOX Period (2000-2001) Coefficient Estimate (*Wald Chi-Square*) | (2). Post-SOX Period (2003-2007) Coefficient Estimate (*Wald Chi-Square*) | (3). (1) vs. (2) Wald Chi-Square (Pr > *Chi-Square*) |
|---|---|---|---|---|
| *INTERCEPT* | | 2.22 (0.40) | -5.42 (4.12)** | |
| *FEEDEP* | | 0.12 (0.00) | 0.46 (0.18) | 0.03 (0.87) |
| *FEEDEP* • *HLR* | | -2.30 (0.42) | 0.29 (0.03) | 0.50 (0.48) |
| *HLR* | | 0.41 (0.64) | -0.04 (0.01) | 0.60 (0.44) |
| *PROBANKZ* | + | 1.46 (5.23)** | 1.17 (6.61)** | |
| *ASSETS* | − | -0.47 (5.99)** | -0.08 (0.31) | |
| *FIRMAGE* | − | -0.44 (2.84)* | 0.24 (0.74) | |
| *BETA* | + | -0.24 (0.67) | -0.09 (0.27) | |
| *ANNRET* | − | -0.48 (1.03) | -0.68 (5.67)** | |
| *VOLATILITY* | + | 67.02 (1.47) | 86.80 (2.45) | |
| *LEV* | + | 0.70 (0.77) | 0.34 (0.30) | |
| *CLEV* | + | 0.35 (0.08) | 0.70 (0.46) | |
| *LLOSS* | + | 0.50 (1.06) | 0.37 (0.72) | |
| *INVESTMENTS* | − | -4.60 (9.22)*** | -2.93 (11.13)*** | |
| *FINANCE* | − | 0.16 (0.16) | 0.46 (2.22) | |
| *BIG4* | + | 0.96 (3.72)* | 0.56 (2.47) | |
| *CFO* | − | -0.48 (0.34) | -2.98 (13.74)*** | |
| *REPORTLAG* | + | 0.04 (16.37)*** | 0.03 (23.15)*** | |
| *YEAR_DUMMIES* | | YES | YES | |
| N | | 1,043 | 1,794 | |
| Pseudo $R^2$ | | 36.62% | 29.79% | |

**Table 4.5 Logistic Regression Results**

**Panel C. Sample Partitioned by Non-Audit Fees and Litigation Costs (Scenario 3)**

$$GC = \gamma_0 + \gamma_1 FEEDEP + \gamma_{2a} FEEDEP \bullet HNAS\_HLR + \gamma_{2b} FEEDEP \bullet LNAS\_LLR + \gamma_{3a} HNAS\_HLR + \gamma_{3b} LNAS\_LLR + \gamma_4 PROBANKZ + \gamma_5 ASSETS + \gamma_6 FIRMAGE + \gamma_7 BETA + \gamma_8 ANNRET + \gamma_9 VOLATILITY + \gamma_{10} LEV + \gamma_{11} CLEV + \gamma_{12} LLOSS + \gamma_{13} INVESTMENTS + \gamma_{14} FINANCE + \gamma_{15} BIG4 + \gamma_{16} CFO + \gamma_{17} REPORTLAG + YEAR\_DUMMIES + \varepsilon$$

| Model Variables | Exp. Sign | (1). Pre-SOX Period (2000-2001) Coefficient Estimate (*Wald Chi-Square*) | (2). Post-SOX Period (2003-2007) Coefficient Estimate (*Wald Chi-Square*) | (3). (1) vs. (2) Wald Chi-Square (Pr > *Chi-Square*) |
|---|---|---|---|---|
| *INTERCEPT* | | 2.57 (0.48) | -6.10 (4.96)** | |
| *FEEDEP* | | -3.30 (0.68) | 0.59 (0.32) | 0.93 (0.33) |
| *FEEDEP* • *HNAS_HLR* | | -0.15 (0.00) | 0.14 (0.00) | 0.00 (0.96) |
| *HNAS_HLR* | | -0.41 (0.35) | -0.47 (0.85) | 0.02 (0.88) |
| *FEEDEP* • *LNAS_LLR* | | 4.76 (1.23) | -0.40 (0.05) | 1.05 (0.31) |
| *LNAS_LLR* | | -0.67 (2.02) | 0.00 (0.00) | 1.28 (0.26) |
| *PROBANKZ* | + | 1.59 (6.01)** | 1.20 (6.97)*** | |
| *ASSETS* | – | -0.45 (5.24)** | -0.03 (0.04) | |
| *FIRMAGE* | – | -0.47 (3.02)* | 0.20 (0.54) | |
| *BETA* | + | -0.23 (0.62) | -0.09 (0.26) | |
| *ANNRET* | – | -0.42 (0.78) | -0.68 (5.59)** | |
| *VOLATILITY* | + | -67.20 (1.50) | 90.39 (2.59) | |
| *LEV* | + | 0.66 (0.68) | 0.31 (0.24) | |
| *CLEV* | + | 0.46 (0.13) | 0.74 (0.50) | |
| *LLOSS* | + | 0.53 (1.13) | 0.38 (0.78) | |
| *INVESTMENTS* | – | -4.57 (9.34)*** | -2.86 (10.48)*** | |
| *FINANCE* | – | 0.08 (0.04) | 0.45 (2.04) | |
| *BIG4* | + | 0.92 (3.39)* | 0.54 (2.30) | |
| *CFO* | – | -0.51 (0.38) | -2.98 (13.44)*** | |
| *REPORTLAG* | + | 0.04 (15.21)*** | 0.03 (22.33)*** | |
| *YEAR_DUMMIES* | | YES | YES | |
| N | | 1,043 | 1,794 | |
| Pseudo $R^2$ | | 37.45% | 30.00% | |

See the Appendix 4-I for the definition and measurement of each variable.
*, **, *** Significant at the 10%, 5% and 1% levels, respectively (two-tail tests).

**Table 4.6 Robustness Checks: Alternative Measure of *FEEDEP* at the City Level**

**Panel A. Sample Partitioned by Non-Audit Fees (Scenario 1)**

$$GC = \alpha_0 + \alpha_1 FEEDEP^{CITY} + \alpha_2 FEEDEP^{CITY} \bullet HNAS + \alpha_3 HNAS + \alpha_4 PROBANKZ + \alpha_5 ASSETS$$
$$+ \alpha_6 FIRMAGE + \alpha_7 BETA + \alpha_8 ANNRET + \alpha_9 VOLATILITY + \alpha_{10} LEV + \alpha_{11} CLEV + \alpha_{12} INVESTMENTS$$
$$+ \alpha_{13} FINANCE + \alpha_{14} BIG4 + \alpha_{15} CFO + \alpha_{16} REPORTLAG + YEAR\_DUMMIES + \varepsilon$$

| Model Variables | (1). Pre-SOX Period (2000-2001) Coefficient Estimate (*Wald Chi-Square*) | (2). Post-SOX Period (2003-2007) Coefficient Estimate (*Wald Chi-Square*) | (3). (1) vs. (2) Wald Chi-Square (Pr > *Chi-Square*) |
|---|---|---|---|
| $FEEDEP^{CITY}$ | 1.15 (0.48) | 0.67 (0.36) | 0.03 (0.86) |
| $FEEDEP^{CITY} \bullet HNAS$ | -6.77 (1.38) | 0.62 (0.19) | 1.59 (0.21) |
| *HNAS* | 0.30 (0.43) | -0.39 (1.16) | 1.52 (0.22) |
| N | 1,043 | 1,794 | |
| Pseudo $R^2$ | 37.20% | 30.10% | |

**Panel B. Sample Partitioned by Litigation Costs (Scenario 2)**

$$GC = \beta_0 + \beta_1 FEEDEP^{CITY} + \beta_2 FEEDEP^{CITY} \bullet HLR + \beta_3 HLR + \beta_4 PROBANKZ + \beta_5 ASSETS$$
$$+ \beta_6 FIRMAGE + \beta_7 BETA + \beta_8 ANNRET + \beta_9 VOLATILITY + \beta_{10} LEV + \beta_{11} CLEV + \beta_{12} INVESTMENTS$$
$$+ \beta_{13} FINANCE + \beta_{14} BIG4 + \beta_{15} CFO + \beta_{16} REPORTLAG + YEAR\_DUMMIES + \varepsilon$$

| Model Variables | (1). Pre-SOX Period (2000-2001) Coefficient Estimate (*Wald Chi-Square*) | (2). Post-SOX Period (2003-2007) Coefficient Estimate (*Wald Chi-Square*) | (3). (1) vs. (2) Wald Chi-Square (Pr > *Chi-Square*) |
|---|---|---|---|
| $FEEDEP^{CITY}$ | 0.19 (0.01) | 0.87 (0.63) | 0.14 (0.71) |
| $FEEDEP^{CITY} \bullet HLR$ | -2.30 (0.43) | -0.10 (0.00) | 0.35 (0.55) |
| *HLR* | 0.41 (0.63) | -0.01 (0.00) | 0.53 (0.47) |
| N | 1,043 | 1,794 | |
| Pseudo $R^2$ | 36.61% | 29.87% | |

**Table 4.6 Robustness Checks: Alternative Measure of *FEEDEP* at the City Level**

**Panel C. Sample Partitioned by Non-Audit Fees and Litigation Costs (Scenario 3)**

$$GC = \gamma_0 + \gamma_1 FEEDEP^{CITY} + \gamma_{2a} FEEDEP^{CITY} \bullet HNAS\_HLR + \gamma_{2b} FEEDEP^{CITY} \bullet LNAS\_LLR + \gamma_{3a} HNAS\_HLR + \gamma_{3b} LNAS\_LLR$$
$$+ \gamma_4 PROBANKZ + \gamma_5 ASSETS + \gamma_6 FIRMAGE + \gamma_7 BETA + \gamma_8 ANNRET + \gamma_9 VOLATILITY + \gamma_{10} LEV + \gamma_{11} CLEV + \gamma_{12} LLOSS$$
$$+ \gamma_{13} INVESTMENTS + \gamma_{14} FINANCE + \gamma_{15} BIG4 + \gamma_{16} CFO + \gamma_{17} REPORTLAG + YEAR\_DUMMIES + \varepsilon$$

| Model Variables | (1).<br>Pre-SOX Period<br>(2000-2001)<br>Coefficient Estimate<br>(*Wald Chi-Square*) | (2).<br>Post-SOX Period<br>(2003-2007)<br>Coefficient Estimate<br>(*Wald Chi-Square*) | (3).<br>(1) vs. (2)<br>*Wald Chi-Square*<br>(Pr > *Chi-Square*) |
|---|---|---|---|
| $FEEDEP^{CITY}$ | -3.12 (0.60) | 1.47 (1.51) | 1.20 (0.27) |
| $FEEDEP^{CITY} \bullet HNAS\_HLR$ | -0.30 (0.00) | -0.78 (0.12) | 0.00 (0.97) |
| *HNAS_HLR* | -0.41 (0.34) | -0.43 (0.70) | 0.01 (0.91) |
| $FEEDEP^{CITY} \bullet LNAS\_LLR$ | 4.60 (1.14) | -1.30 (0.46) | 1.31 (0.25) |
| *LNAS_LLR* | -0.66 (1.96) | 0.04 (0.01) | 1.32 (0.25) |
| N | 1,043 | 1,794 | |
| Pseudo $R^2$ | 37.41% | 30.22% | |

See the Appendix 4-I for the definition and measurement of each variable.
*, **, *** Significant at the 10%, 5% and 1% levels, respectively (two-tail tests).

**Table 4.7 Robustness Checks: Alternative Measure of *LITIGATION***

**Panel A. Sample Partitioned by Litigation Costs (Scenario 2)**

**Model for Column (1)**

$$GC = \beta_0 + \beta_1 FEEDEP + \beta_2 FEEDEP \bullet HLR^{IND} + \beta_3 HLR^{IND} + \beta_4 PROBANKZ + \beta_5 ASSETS + \beta_6 FIRMAGE + \beta_7 BETA + \beta_8 ANNRET + \beta_9 VOLATILITY + \beta_{10} LEV + \beta_{11} CLEV + \beta_{12} INVESTMENTS + \beta_{13} FINANCE + \beta_{14} BIG4 + \beta_{15} CFO + \beta_{16} REPORTLAG + YEAR\_DUMMIES + \varepsilon$$

**Model for Column (2)**

$$GC = \beta_0 + \beta_1 FEEDEP + \beta_2 FEEDEP \bullet HLR^{B4} + \beta_3 HLR^{B4} + \beta_4 PROBANKZ + \beta_5 ASSETS + \beta_6 FIRMAGE + \beta_7 BETA + \beta_8 ANNRET + \beta_9 VOLATILITY + \beta_{10} LEV + \beta_{11} CLEV + \beta_{12} INVESTMENTS + \beta_{13} FINANCE + \beta_{14} BIG4 + \beta_{15} CFO + \beta_{16} REPORTLAG + YEAR\_DUMMIES + \varepsilon$$

| | **(1). *LITIGATION* Defined by Clients' Industry ($HLR^{IND}$)** | | | **(2). *LITIGATION* Defined by Auditor Size ($HLR^{B4}$)** | | |
|---|---|---|---|---|---|---|
| Model Variables | (1a). Pre-SOX Period (2000-2001) Coefficient Estimates (*Wald Chi-Square*) | (1b). Post-SOX Period (2003-2007) Coefficient Estimates (*Wald Chi-Square*) | (1c). (1a) vs. (1b) *Wald Chi-Square* (Pr > *Chi-Square*) | (2a). Pre-SOX Period (2000-2001) Coefficient Estimates (*Wald Chi-Square*) | (2b). Post-SOX Period (2003-2007) Coefficient Estimates (*Wald Chi-Square*) | (2c). (2a) vs. (2b) *Wald Chi-Square* (Pr > *Chi-Square*) |
| *FEEDEP* | 0.14 (0.01) | -0.56 (0.18) | 0.11 (0.74) | 0.22 (0.01) | -0.86 (0.33) | 0.11 (0.74) |
| *FEEDEP* • *HLR* | -2.33 (0.45) | 0.89 (0.16) | 0.59 (0.44) | -0.94 (0.08) | 0.25 (0.02) | 0.09 (0.76) |
| *HLR* | -0.05 (0.01) | -0.16 (0.26) | 0.02 (0.90) | 1.03 (3.22)* | 1.15 (8.20)*** | 0.01 (0.94) |
| N | 1,043 | 1,794 | | 1,043 | 1,794 | |
| Pseudo $R^2$ | 36.57% | 35.16% | | 36.37% | 34.82% | |

**Table 4.7 Robustness Checks: Alternative Measure of *LITIGATION***

**Panel B. Sample Partitioned by Non-Audit Fees and Litigation Costs (Scenario 3)**

**Model for Column (1)**

$$GC = \gamma_0 + \gamma_1 FEEDEP + \gamma_{2a} FEEDEP \bullet HNAS\_HLR^{IND} + \gamma_{2b} FEEDEP \bullet LNAS\_LLR^{IND} + \gamma_{3a} HNAS\_HLR^{IND} + \gamma_{3b} LNAS\_LLR^{IND}$$
$$+\gamma_4 PROBANKZ + \gamma_5 ASSETS + \gamma_6 FIRMAGE + \gamma_7 BETA + \gamma_8 ANNRET + \gamma_9 VOLATILITY + \gamma_{10} LEV + \gamma_{11} CLEV + \gamma_{12} LLOSS$$
$$+\gamma_{13} INVESTMENTS + \gamma_{14} FINANCE + \gamma_{15} BIG4 + \gamma_{16} CFO + \gamma_{17} REPORTLAG + YEAR\_DUMMIES + \varepsilon$$

**Model for Column (2)**

$$GC = \gamma_0 + \gamma_1 FEEDEP + \gamma_{2a} FEEDEP \bullet HNAS\_HLR^{B4} + \gamma_{2b} FEEDEP \bullet LNAS\_LLR^{B4} + \gamma_{3a} HNAS\_HLR^{B4} + \gamma_{3b} LNAS\_LLR^{B4}$$
$$+\gamma_4 PROBANKZ + \gamma_5 ASSETS + \gamma_6 FIRMAGE + \gamma_7 BETA + \gamma_8 ANNRET + \gamma_9 VOLATILITY + \gamma_{10} LEV + \gamma_{11} CLEV + \gamma_{12} LLOSS$$
$$+\gamma_{13} INVESTMENTS + \gamma_{14} FINANCE + \gamma_{15} BIG4 + \gamma_{16} CFO + \gamma_{17} REPORTLAG + YEAR\_DUMMIES + \varepsilon$$

| | (1). *LITIGATION* Defined by Clients' Industry ($HLR^{IND}$) | | | (2). *LITIGATION* Defined by Auditor Size ($HLR^{B4}$) | | |
|---|---|---|---|---|---|---|
| Model Variables | (1a). Pre-SOX Period (2000-2001) Coefficient Estimates (*Wald Chi-Square*) | (1b). Post-SOX Period (2003-2007) Coefficient Estimates (*Wald Chi-Square*) | (1c). (1a) vs. (1b) *Wald Chi-Square* (Pr > *Chi-Square*) | (2a). Pre-SOX Period (2000-2001) Coefficient Estimates (*Wald Chi-Square*) | (2b). Post-SOX Period (2003-2007) Coefficient Estimates (*Wald Chi-Square*) | (2c). (2a) vs. (2b) *Wald Chi-Square* (Pr > *Chi-Square*) |
| *FEEDEP* | -1.54 (0.29) | -1.50 (1.02) | 0.01 (0.94) | 0.84 (0.19) | -0.38 (0.07) | 0.24 (0.62) |
| *FEEDEP* • *HNAS_ HLR* | -5.85 (0.28) | 3.05 (1.66) | 0.61 (0.43) | -7.05 (1.02) | -1.09 (0.26) | 0.60 (0.44) |
| *HNAS_ HLR* | 0.02 (0.00) | -0.54 (1.12) | 0.50 (0.48) | 0.39 (0.63) | 0.08 (0.04) | 0.30 (0.59) |
| *FEEDEP* • *LNAS_ HLR* | 3.05 (0.83) | 2.39 (1.38) | 0.02 (0.88) | -0.24 (0.00) | 0.50 (0.03) | 0.03 (0.85) |
| *LNAS_ HLR* | -0.14 (0.11) | -0.23 (0.47) | 0.05 (0.83) | -0.76 (1.44) | -1.25 (5.78)** | 0.27 (0.61) |
| N | 1,043 | 1,794 | | 1,043 | 1,794 | |
| Pseudo $R^2$ | 37.15% | 35.60% | | 36.57% | 34.58% | |

See the Appendix 4-I for the definition and measurement of each variable.
*, **, *** Significant at the 10%, 5% and 1% levels, respectively (two-tail tests).

**Table 4.8 Consistency Checks with Prior Literature Using Several Fee Dependence Measures at the Overall Level (Full Sample)**

**Basic Model**:

$$GC = \lambda_0 + \lambda_1 CI + \lambda_2 PROBANKZ + \lambda_3 ASSETS + \lambda_4 FIRMAGE + \lambda_5 BETA + \lambda_6 ANNRET + \lambda_7 VOLATILITY + \lambda_8 LEV + \lambda_9 CLEV$$
$$+ \lambda_{10} LLOSS + \lambda_{11} INVESTMENTS + \lambda_{12} FINANCE + \lambda_{13} BIG4 + \lambda_{14} CFO + \lambda_{15} REPORTLAG + YEAR\_DUMMIES + \varepsilon$$

*CI* in the basic model is defined in five ways, as described below:
Panel A. *CI = FEEDEP*; Panel B. *CI = AFDEP* (using *NAFDEP* as a control); Panel C. *CI = FEERATIO*; Panel D. *CI = LGTOTFEE*; Panel E. *CI = LGAUDFEE* (using *LGNONAUDFEE* as a control), where

*FEEDEP*: Client total fees (sum of audit fees and non-audit fees) divided by the total revenue of the local auditor office
that issues the audit report;
*AFDEP*: A client's audit fees divided by the total revenues of her auditor's local office that issues the audit report;
*NAFDEP*: A client's non-audit fees divided by the total revenues of her auditor's local office that issues the audit report;
*FEERATIO*: Ratio of non-audit service fees to total fees (i.e., sum of audit fees and non-audit fees);
*LGTOTFEE*: Natural logarithm of a client's total fees;
*LGAUDFEE*: Natural logarithm of a client's audit fees;
*LGNONAUDFEE*: Natural log of a client's non-audit fees.

| | **Panel A.** ***CI = FEEDEP*** | | | **Panel B.** ***CI = AFDEP*** | | | **Panel C.** ***CI = FEERATIO*** | | |
|---|---|---|---|---|---|---|---|---|---|
| | (1) Pre-SOX 2000-01 | (2) Post-SOX 2003-07 | (3) (1)vs(2) | (1) Pre-SOX 2000-01 | (2) Post-SOX 2003-07 | (3) (1)vs(2) | (1) Pre-SOX 2000-01 | (2) Post-SOX 2003-07 | (3) (1)v (2) |
| Model Variables | Coefficient Estimates (*Wald Chi-Square*) | | | | | | | | |
| *FEEDEP* | 0.44 (0.41) | 0.51 (0.53) | 0.02 (0.88) | --- | --- | | --- | --- | |
| *AFDEP* | --- | --- | | 0.20 (0.02) | 0.51 (0.26) | 0.07 (0.79) | --- | --- | |
| *NAFDEP* | --- | --- | | 0.90 (0.16) | 0.50 (0.04) | 0.03 (0.87) | --- | --- | |
| *FEERATIO* | --- | --- | | --- | --- | | -0.05 (0.01) | -0.28 (0.27) | 0.12 (0.73) |
| *LGTOTFEE* | --- | --- | | --- | --- | | --- | --- | |
| *LGAUDFEE* | --- | --- | | --- | --- | | --- | --- | |
| *LGNONAUDFEE* | --- | --- | | --- | --- | | --- | --- | |
| N | 1,932 | 4,252 | | 1,932 | 4,252 | | 1,932 | 4,252 | |
| Pseudo $R^2$ | 40.98% | 30.72% | | 40.99% | 30.72% | | 40.94% | 30.70% | |

**Table 4.8 Consistency Checks with Prior Literature Using Several Fee Dependence Measures at the Overall Level (Full Sample)**

**Basic Model**:

$$GC = \lambda_0 + \lambda_1 CI + \lambda_2 PROBANKZ + \lambda_3 ASSETS + \lambda_4 FIRMAGE + \lambda_5 BETA + \lambda_6 ANNRET + \lambda_7 VOLATILITY + \lambda_8 LEV + \lambda_9 CLEV$$
$$+ \lambda_{10} LLOSS + \lambda_{11} INVESTMENTS + \lambda_{12} FINANCE + \lambda_{13} BIG4 + \lambda_{14} CFO + \lambda_{15} REPORTLAG + YEAR\_DUMMIES + \varepsilon$$

*CI* in the basic model is defined in five ways, as described below:
Panel A. *CI = FEEDEP*; Panel B. *CI = AFDEP* (using *NAFDEP* as a control); Panel C. *CI = FEERATIO*; Panel D. *CI = LGTOTFEE*;
Panel E. *CI = LGAUDFEE* (using *LGNONAUDFEE* as a control), where

*FEEDEP*: Client total fees (sum of audit fees and non-audit fees) divided by the total revenue of the local auditor office that issues the audit report;
*AFDEP*: A client's audit fees divided by the total revenues of her auditor's local office that issues the audit report;
*NAFDEP*: A client's non-audit fees divided by the total revenues of her auditor's local office that issues the audit report;
*FEERATIO*: Ratio of non-audit service fees to total fees (i.e., sum of audit fees and non-audit fees);
*LGTOTFEE*: Natural logarithm of a client's total fees;
*LGAUDFEE*: Natural logarithm of a client's audit fees;
*LGNONAUDFEE*: Natural log of a client's non-audit fees.

| Model Variables | **Panel D. *CI = LGTOTFEE*** (1) Pre-SOX 2000-01 | (2) Post-SOX 2003-07 | (3) (1)vs(2) | **Panel E. *CI = LGAUDFEE*** (1) Pre-SOX 2000-01 | (2) Post-SOX 2003-07 | (3) (1)vs(2) |
|---|---|---|---|---|---|---|
| | Coefficient Estimates (*Wald Chi-Square*) | | | | | |
| *FEEDEP* | --- | --- | | --- | --- | |
| *AFDEP* | --- | --- | | --- | --- | |
| *NAFDEP* | --- | --- | | --- | --- | |
| *FEERATIO* | --- | --- | | --- | --- | |
| *LGTOTFEE* | 0.04 (0.49) | 0.10 (0.50) | 0.05 (0.83) | --- | --- | |
| *LGAUDFEE* | --- | --- | | 0.03 (0.21) | -0.08 (2.47) | 1.76 (0.18) |
| *LGNONAUDFEE* | --- | --- | | 0.03 (0.69) | -0.04 (2.20) | 2.70 (0.10) |
| N | 1,932 | 4,252 | | 1,932 | 4,252 | |
| Pseudo $R^2$ | 41.00% | 30.72% | | 41.11% | 31.05% | |

See the Appendix 4-I for the definition and measurement of each variable.
*, **, *** Significant at the 10%, 5% and 1% levels, respectively (two-tail tests).

**Table 4.9 Replication of Li (2009) Using Li's Model**

**Basic Model**: $GC = \lambda_0 + \lambda_1 CI + \lambda_2 SALES + \lambda_3 ROA + \lambda_4 LEVERAGE + \lambda_5 LIQUIDITY + \lambda_6 CHGDT + \lambda_7 PRLOSS + \lambda_8 PRNOCF + \lambda_9 BIGN + \lambda_{10} DELAY + \lambda_{11} NEWDEBT + \varepsilon$

*CI* in the basic model is defined in two ways, as described below:
Panel A. *CI* = *FEEDEP*; Panel B. *CI* = *AFDE* (using *NAFDEP* as a control), where

*FEEDEP*: Client total fees (sum of audit fees and non-audit fees) divided by the total revenue of the local auditor office that issues the audit report;
*AFDEP*: A client's audit fees divided by the total revenues of her auditor's local office that issues the audit report;
*NAFDEP*: A client's non-audit fees divided by the total revenues of her auditor's local office that issues the audit report.

| | **Panel A. *CI* = *FEEDEP*** | | | | | | **Panel B. *CI* = *AFDEP*** | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | (1). 2001 | (2). 2003 | (3). 2004 | (4). 2005 | (5). 2006 | (6). 2007 | (1). 2001 | (2). 2003 | (3). 2004 | (4). 2005 | (5). 2006 | (6). 2007 |
| Model Variables | Coefficient Estimates (*Wald Chi-Square*) | | | | | | Coefficient Estimates (*Wald Chi-Square*) | | | | | |
| *FEEDEP* | 0.12 (0.03) | 1.01 (3.31)* | 0.28 (0.25) | -0.64 (1.15) | 0.89 (3.90)** | 0.30 (0.07) | --- | --- | --- | --- | --- | --- |
| *AFDEP* | --- | --- | --- | --- | --- | --- | 0.43 (0.08) | 1.42 (2.74)* | -0.41 (0.28) | -0.02 (0.00) | 0.86 (2.09) | -0.16 (0.01) |
| *NAFDEP* | --- | --- | --- | --- | --- | --- | -0.42 (0.05) | -0.57 (0.05) | 3.04 (2.12) | -5.28 (2.23) | 1.04 (0.25) | 3.49 (0.72) |
| N | 1,589 | 1,747 | 1,689 | 1,559 | 1,403 | 1,393 | 1,589 | 1,747 | 1,689 | 1,559 | 1,403 | 1,393 |
| Pseudo $R^2$ | 33.83% | 23.74% | 38.94% | 40.99% | 48.93% | 28.33% | 33.84% | 23.77% | 39.17% | 41.26% | 48.93% | 28.50% |

See the Appendix 4-I for the definition and measurement of each variable.
*, **, *** Significant at the 10%, 5% and 1% levels, respectively (two-tail tests).

**Table 4.10 Replication of Li (2009) Using DeFond et al's (2002) Model**[65]

**Basic Model**: $GC = \alpha_0 + \alpha_1 CI + \alpha_2 PROBANKZ + \alpha_3 ASSETS + \alpha_4 FIRMAGE + \alpha_5 BETA + \alpha_6 ANNRET + \alpha_7 VOLATILITY + \alpha_8 LEV + \alpha_9 CLEV$
$+ \alpha_{10} LLOSS + \alpha_{11} INVESTMENTS + \alpha_{12} FUTUREFINANCE + \alpha_{13} BIG5 + \alpha_{14} OPCASHFLOW + \alpha_{15} REPORTLAG + \varepsilon$

*CI* in the basic model is defined in two ways, as described below:
Panel A. *CI* = *FEEDEP*; Panel B. *CI* = *AFDE* (using *NAFDEP* as a control), where

*FEEDEP*: Client total fees (sum of audit fees and non-audit fees) divided by the total revenue of the local auditor office that issues the audit report;
*AFDEP*: A client's audit fees divided by the total revenues of her auditor's local office that issues the audit report;
*NAFDEP*: A client's non-audit fees divided by the total revenues of her auditor's local office that issues the audit report.

| Model Variables | **Panel A. *CI* = *FEEDEP*** | | **Panel B. *CI* = *AFDEP*** | |
|---|---|---|---|---|
| | (1). 2001 | (2). 2003 | (1). 2001 | (2). 2003 |
| | Coefficient Estimates (*Wald Chi-Square*) | | Coefficient Estimates (*Wald Chi-Square*) | |
| *FEEDEP* | 0.06 (0.01) | -0.21 (0.09) | --- | --- |
| *AFDEP* | --- | --- | 1.55 (1.97) | -0.19 (0.02) |
| *NAFDEP* | --- | --- | -3.11 (2.48) | -1.54 (0.15) |
| N | 1,589 | 1,435 | 1,589 | 1,435 |
| Pseudo $R^2$ | 42.87% | 35.69% | 43.25% | 35.73% |

See the Appendix 4-I for the definition and measurement of each variable.
*, **, *** Significant at the 10%, 5% and 1% levels, respectively (two-tail tests).

[65] The objective of this panel is to show that Li's results are sensitive to the choice of control variables. Thus, we keep Li's (2009) fee dependence measures (i.e., *FEEDEP* and *AFDEP*) plus *NAFDEP*, but include all the control variables used in DeFond et al. (2002), instead of those employed by Li (2009). Note that DeFond et al. (2002) use different proxies for fee dependence in their paper, including *FEERATIO*, *LGTOTFEE*, *FEERATIO* and *LGAUDFEE*.