Client Stock Market Reaction to PCAOB Sanctions Against a Big 4 Auditor*

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1. Introduction

We examine the stock market effects of news of the Public Company Accounting Oversight Board’s (PCAOB) sanctions imposed upon Deloitte and Touche, LLP (Deloitte) on December 10, 2007 for actions related to its 2003 audit of Ligand Pharmaceuticals Incorporated (Ligand). Deloitte was censured and fined one million dollars. In addition, the firm agreed to create an internal “Leadership Oversight Committee” responsible for increased supervision of its partners and directors. The engagement partner responsible for the Ligand audit was banned from association with a registered accounting firm, although after two years he may file a petition for relief. These sanctions mark the first time the PCAOB has used its enforcement powers against a Big 4 auditor (or any national or international firm), as well as the first time the PCAOB has issued a monetary penalty against any individual or registered accounting firm.¹

Audits are valued by investors because they assure the reliability of and reduce the uncertainty associated with financial statements (Francis and Wilson 1988; Wallace 1987). Any such value derived from the audit is related to its perceived quality (Wilson and Grimlund 1990, 44), and damage to an audit firm’s reputation can reduce the credibility of financial statements audited by the firm (the “reputation” effect) (Krishnamurthy, Zhou, and Zhou 2006; Rauterkus and Song 2005; Weber, Willenborg, and Zhang

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¹ From May 24, 2005 through February 17, 2010, the PCAOB implemented disciplinary proceedings against 32 individuals and 18 registered accounting firms. However, to date the PCAOB has issued only two other monetary penalties as a result of its disciplinary proceedings. In October 2008 and August 2009, the PCAOB imposed sanctions of $25,000 and $75,000, respectively, on two audit partners in the Chicago office of Deloitte (for matters unrelated to Ligand). Deloitte was not sanctioned. In November 2007, a senior auditor with KPMG was disciplined (but not fined); KPMG was not sanctioned. In December 2007, the PCAOB sanctioned an audit partner and an audit manager with BDO Seidman, LLP. Neither auditor was fined; the audit firm was not sanctioned.
Audits are also valued as a type of insurance, because in the event of an audit failure investors can potentially recoup investment losses from the auditor through litigation. Because auditor payouts resulting from litigation can harm the firm’s viability (Palmrose 2005), increased litigation against an audit firm can reduce the insurance value of its audits (the “insurance” effect). Thus, negative information revealed about an audit firm can lead investors to reassess their valuation of the firm’s clients due to reputation and/or insurance effects.

The PCAOB (2007a) order outlining the sanctions against Deloitte highlights three potentially value relevant pieces of information — information that could affect Deloitte’s reputation and/or the insurance value implicit in its audits. First, Deloitte did not conduct a quality audit of Ligand’s 2003 financial statements (the “Ligand audit failure”). For example, the PCAOB (2007a, 3) states that “Deloitte failed to exercise due professional care in the performance of the [Ligand] audit and failed to obtain sufficient competent evidential matter to support the opinion expressed in the audit report.” Second, the PCAOB sanctions bring to light for the first time serious problems in Deloitte’s quality control policies and procedures (as well as its violation of numerous PCAOB auditing standards) that extend beyond the Ligand audit failure. These include Deloitte’s failure to staff the 2003 Ligand audit with a competent engagement partner. In fact, the firm allowed this partner to remain in charge of the Ligand audit even after management at the highest levels of Deloitte deemed him to be incompetent and counseled him to resign. Third, as a result of the sanctions, Deloitte took steps to change its quality control policies as they relate to monitoring partners and directors in an effort to confront any problems related to audit quality (PCAOB 2007a, 12).

News of the Ligand audit failure and quality control problems at Deloitte could lead to negative market effects for the audit firm’s clients. In order for this to occur, however, the information must be new to the market and investors must consider it material enough to negatively affect the quality of Deloitte’s work. While news related specifically to the Ligand audit failure could be damaging to Deloitte, it may not be new because investors first learned of the Ligand audit failure in 2005 when the company announced the restatement of its financial statements for 2002–2004. Thus, any negative market effects related to the Ligand audit failure may have been impounded in clients’ stock prices before the disciplinary actions against Deloitte were announced in 2007. Additionally, investors could perceive the news of the Ligand audit failure as an isolated incident with limited or no effect on the quality of Deloitte’s other audits.

The quality control problems disclosed in the PCAOB order are more likely to be perceived by investors as evidence of a systemic problem at Deloitte, particularly because knowledge of problems with the Ligand engagement partner existed at the top levels of the firm. In addition, unlike news of the Ligand audit failure, the severity of Deloitte’s quality control
problems was not revealed to the market until the PCAOB sanctions were announced. In news releases related to the Ligand restatement and the Securities and Exchange Commission’s (SEC) investigation of Ligand, we find no mention of quality control (or other) problems at Deloitte, nor do we find any mention of problems with the Ligand engagement partner. Thus we argue that any negative market effects we may observe for Deloitte clients are due to control failures that are indicative of a more systemic, pervasive problem at the firm made public for the first time by the PCAOB sanctions.

As part of its settlement agreement with the PCAOB, Deloitte took actions to improve its quality control procedures particularly as they relate to the monitoring of audit partners and directors. These actions taken by Deloitte to improve its quality control policies could successfully alleviate investors’ concerns and signal improvements in the quality of its future audits. Thus, the PCAOB’s order may have potential remedial effects similar to those triggered by negative PCAOB inspection reports as suggested in Lennox and Pittman 2010. If the remedial effect offsets the negative consequences of the news of the control failures or other audit quality concerns, we will not observe any negative stock market consequences related to the PCAOB order. We could actually observe a positive stock market response if the remedial effect overwhelms.

In summary, the stock price of Deloitte clients could react negatively to news of the PCAOB sanctions against Deloitte if (1) market participants value an auditor’s reputation and the sanctions reveal new information damaging to Deloitte’s reputation or (2) the sanctions increase Deloitte’s litigation risk, thus decreasing the insurance value of its audits. We may observe no market reaction if the PCAOB order contains no new information or if investors do not consider the information indicative of a reduction in the quality of Deloitte’s work. Finally, news of remedial steps taken by Deloitte to improve its quality could be viewed positively by investors, offsetting partially or completely any negative effects, resulting in no market reaction or even a positive reaction to news in the PCAOB order. Thus, it is an empirical question whether the PCAOB order will lead to stock market consequences for Deloitte clients and, if so, in what direction the effects will be.

Broadly stated, the question we address is this: What effect, if any, does news of the PCAOB’s first disciplinary action taken against a Big 4 auditor — Deloitte — have on the firm’s reputation and/or the perceived insurance

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2. Firth, Mo, and Wong (2008, 2) report similar results in their study of regulatory actions against auditors in China. They state that “formal sanction is effective as an incentive for improving auditor independence and acts as a deterrent to unethical behavior”.

3. In his discussion of auditor legal liability and the PCAOB, Pritchard (2006, 43–44) states: “Being sanctioned by the PCAOB will send an unambiguous signal to the market, with a correspondingly significant effect on an audit firm’s reputational capital. . . . Publicity regarding accounting problems creates a high likelihood of lawsuits against the auditor, particularly if the misstated financials involve earnings or revenues.”
value of its audits? To address this question, we examine the stock market price reaction for clients of Deloitte and non-Deloitte Big 4 auditors (“non-Deloitte” hereafter) to news of the PCAOB sanctions.\(^4\) We study the effect (if any) on non-Deloitte clients to test for spillover effects as in Doogar, Sougiannis, and Xie 2007, as well as to ensure that our results are not driven by uncontrolled factors common to the clients of Big 4 auditors. Next, we examine the stock market effect on Deloitte clients of news of other events related to the Ligand audit failure — events that occurred before the PCAOB sanctions were announced. Finally, as in Baber, Kumar, and Verghese 1995 and Krishnamurthy et al. 2006, we estimate Sefcik and Thompson 1986 cross-sectional regressions that control for cross-correlation in residuals and include variables that prior studies have used to proxy for reputation and insurance effects.

Our final sample includes 707 Deloitte and 2,363 non-Deloitte clients. In analyses using the standard market model, we find that Deloitte clients exhibit significantly negative mean and median cumulative abnormal returns (CARs) across all event windows [day 0, days (0, +1), and days (0, +2)]. Non-Deloitte clients have significantly negative mean and median CARs over two event windows [days (0, +1), and days (0, +2)]. For event day zero for non-Deloitte clients, the mean CAR is positive but insignificant, and the median CAR is negative but significant only when using the sign test. Overall, however, the market reaction (both mean and median) of Deloitte clients is significantly more negative than that of non-Deloitte clients.

Because we have a common event date for all observations, we also test for a significant market reaction using Schipper and Thompson 1983 procedures that control for cross-sectional dependence in residuals. We find a significantly negative event-day effect for Deloitte clients over one- and three-day event windows; reaction over the two-day window is negative but not significant (\(t\)-statistic of \(-1.52\); two-tailed \(p\)-value of 0.128). Non-Deloitte clients show no significant reaction to news of the PCAOB sanctions when we use the Schipper and Thompson 1983 methodology. Thus, we find no evidence that the PCAOB sanctions against Deloitte lead to spillover effects to clients of the other Big 4 auditors. We conclude that (1) the stock market consequences are not a result of uncontrolled factors common to the clients of all Big 4 auditors and (2) the negative effects of news contained in the PCAOB order against Deloitte dominate any possible remedial effects.

Next, using the Schipper and Thompson 1983 approach, we examine the market reaction of Deloitte clients to four additional events related to Ligand that occurred before the PCAOB’s sanctions were announced. These events are (1) Deloitte’s resignation from the Ligand audit (2) the

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\(^4\) As in similar research, this is a joint hypothesis that (1) the event will affect the audit firm’s reputation or the perceived insurance value of its audits and (2) investors will react to this, resulting in cumulative abnormal returns to the firm’s clients over the event window.
announcement by Ligand’s audit committee of its upcoming review of the 2002–2004 financial statements, (3) Ligand’s announcement of restatement of its 2002–2004 financial statements, and (4) news that the SEC opened an investigation against Ligand. This allows us to see if news of events specific to the Ligand audit failure — events that took place prior to the announcement of the PCAOB sanctions — damaged Deloitte’s reputation or the insurance value of its audits sufficiently enough to affect the security prices of its clients. We find that Ligand’s stock experienced significantly negative one-, two-, and three-day CARs for these event dates (with the exception of a positive one-day CAR for event 4 of 3.4 percent). However, none of these events had a statistically significant stock market consequence for other, non-Ligand Deloitte clients. We interpret this as evidence that the PCAOB sanctions revealed new information, not found in the other Ligand events, that was damaging to Deloitte’s reputation or insurance value. We believe the quality control problems revealed by the PCAOB sanctions are the likely explanation for the negative stock market consequences. This is consistent with and supports the argument in Lennox and Pittman 2010 that clients value information about quality control weaknesses at audit firms.

Lastly, we conduct cross-sectional analyses using the portfolio weighting approach described by Sefcik and Thompson 1986 to control for cross-correlation in residuals. As discussed further in the research design section, the cross-sectional analyses include variables that prior literature finds useful in testing the reputation and insurance hypotheses. We find a more negative reaction to news of the PCAOB sanctions against Deloitte for firms that are financially distressed, consistent with both the reputation and insurance hypotheses as in Baber et al. 1995. Unlike Krishnamurthy et al. 2006, who examine market effects of the Andersen criminal indictment in 2002, we find no relation in cross-sectional analyses between event-period CARs and proxies for economic bonding between clients and auditors. We believe the following factors contribute to this difference. First, as the Andersen and Enron events were unfolding, there was public speculation about Andersen’s possible lack of independence due to both the large fees they collected from Enron and the many Andersen alumni employed by Enron (Barrionuevo 2002; Abelson 2002). In contrast, the PCAOB order against Deloitte mentions no concerns about auditor independence. Second, because Krishnamurthy et al. (2006) study an event occurring prior to the passage of the Sarbanes-Oxley Act of 2002, the differences could be due to changes in the regulatory environment since then, including the prohibition against auditors providing certain nonaudit services to their audit clients.

Our paper contributes in the following ways to the growing literature on the merits of PCAOB regulation. We provide additional evidence on the informativeness of PCAOB actions by showing that the PCAOB’s sanctions against Deloitte contain information useful to market participants. More specifically, our findings corroborate the notion proposed by Lennox and Pittman 2010 that clients value information about quality control problems.
at audit firms. We show that, when public disclosure of a quality control problem is made by the PCAOB (in its sanctions against Deloitte), investors react by discounting their valuation of that audit firm’s clients. Our results complement those of Abbott, Gunny, and Zhang 2008 and Lennox and Pittman 2010, who examine the value of PCAOB inspection reports in signaling auditor quality. Sanctions are a different (and more serious) outcome of the PCAOB’s inspection process.

Second, we study a regulatory event that clearly identifies specific quality control problems at Deloitte, making this a stronger setting than that of other audit failures that do not lead to dissolution or bankruptcy of the audit firm. Pritchard (2006, 28) notes that a regulatory body with expertise and unfettered access to audit working papers “might provide a more precise evaluation of the quality of an auditor’s work than the muddy signal provided by an audit failure”.

Third, we add to the research on audit quality, auditor reputation, and the insurance hypothesis by showing that the negative market reaction to the PCAOB’s sanctions is consistent with both the reputation and insurance hypotheses. Finally, we contribute to the literature examining spillover effects — that news of one audit firm’s quality problems can affect the reputation of other auditors or the insurance value provided by their audits. We find that the PCAOB disciplinary actions against Deloitte have negative stock market consequences only on the clients of Deloitte. Thus, unlike Doogar et al. 2007, we find no evidence of spillover effects to clients of other audit firms.

Section 2 provides information about the PCAOB’s disciplinary process, details of the sanctions, and a summary of extant research and motivation. Next we present our methodology and sample selection procedures. Results are presented in section 4, and the final section concludes.

2. Background and motivation

The PCAOB’s disciplinary procedures

The PCAOB was formed under the authority of the Sarbanes-Oxley Act of 2002. One responsibility of the PCAOB is to conduct inspections of registered audit firms. Firms with 100 or more publicly traded (issuer) clients are inspected annually; those with fewer than 100 issuer clients are inspected at least triennially. In addition to its inspection role, the PCAOB has authority to discipline registered audit firms and their “associated persons” (essentially, their professional employees and partners).


The disciplinary process begins with either an informal inquiry or a formal investigation. An informal inquiry can lead to a formal investigation if it appears to the PCAOB that rules have been violated. In the formal investigation, the PCAOB can question individuals from inside and outside the firm (such as clients), as well as examine the firm’s audit work papers and internal records. Testimony is given under oath, and the PCAOB can request the SEC to issue a subpoena in order to compel an individual to testify. Failure to cooperate with the PCAOB’s investigation leaves the firm or associated individual subject to disciplinary proceedings under Rule 5110, “Noncooperation with an Investigation”. The PCAOB may provide records of the investigation to federal and/or state regulatory authorities, but otherwise proceedings of the investigation remain confidential (Rule 5108).

The PCAOB will begin disciplinary proceedings if results of the formal investigation lead the PCAOB to believe that the firm or individual has violated PCAOB rules, SEC rules, securities laws, or professional standards. The PCAOB assigns a hearing officer who presides over the proceedings and submits an “initial decision” along with proposed sanctions to the PCAOB at the conclusion of the hearing. The initial decision becomes final unless the respondent or the PCAOB requests a review. To avoid a disciplinary hearing, firms or individuals may propose to the PCAOB an “offer of settlement”, in which the respondent(s) agree to PCAOB sanctions and waive certain rights of review. Through February 2010, all disciplinary proceedings conducted by the PCAOB have resulted in offers of settlement.

The PCAOB has a broad spectrum of sanctions it can administer against firms and individuals violating its rules. Examples of available sanctions include (but are not limited to) suspension or revocation of the firm’s registration, prohibition from working for a registered accounting firm, limitations on accepting or retaining clients, monetary penalties, hiring of an independent monitor, or requiring the firm to take certain actions to improve audit quality (Rule 5300).

**PCAOB findings against Deloitte**

Ligand is a pharmaceutical company that sells products to wholesalers, who in turn sell to retail pharmacies, hospitals, and other outlets. Ligand was a Deloitte audit client from October 31, 2000 until Deloitte’s resignation from the job effective August 5, 2004. James Fazio of the San Diego office was the engagement partner for Ligand. In summer 2003, Deloitte conducted an
internal practice office review that included some clients of the San Diego office. The reviewers were critical of Fazio’s work and notified the Deloitte national office of their concerns. During 2003 and early 2004, upper management of Deloitte had a variety of meetings and communications regarding the quality of Fazio’s work and concluded that he should be removed from audits of public companies and advised to resign. Fazio was told of these concerns, and in February 2004 the San Diego managing partner counseled Fazio to resign from the firm. Nevertheless, Fazio stayed with the firm and his responsibilities were unchanged. He remained in charge of the Ligand audit until Deloitte resigned from the engagement.9

As a result, the PCAOB concluded that Deloitte’s quality control procedures had failed. According to the PCAOB, quality control standards Deloitte violated include portions of QC §40 “The Personnel Management Element of a Firm’s System of Quality Control — Competencies required by a Partner-in-Charge of an Attest Engagement” and QC §20 “System of Quality Control for a CPA Firm’s Accounting and Auditing Practice”.10 The PCAOB (2007a, 7–8) writes:

PCAOB quality control standards emphasize the “significant responsibilities” of individuals who are responsible for supervising audit engagements and signing or authorizing the issuance of audit reports. PCAOB quality control standards further require firms to establish policies and procedures that “provide reasonable assurance that a practitioner-in-charge of an engagement possesses the competencies necessary to fulfill his or her engagement responsibilities.” Deloitte’s quality control system did not function effectively to cause the 2003 Ligand audit to be appropriately staffed and led by a practitioner-in-charge with the necessary competencies.

In addition to the quality control failures at Deloitte, the PCAOB order reveals details specific to the Ligand audit failure, many of which relate to revenue recognition when right of return exists. In brief, during the 2003 audit, Deloitte failed to evaluate adequately whether Ligand could reasonably estimate its future product returns, a requirement that must be met in order to recognize revenue when there is a right of return. This failure was

9. Pritchard (2006, 52) writes: “Under the current liability regime, the rational response for the audit firm in the wake of an audit failure is to circle the wagons rather than cut the deficient partner loose”.
made evident when, after issuing its report on the 2003 financial statements, Deloitte became aware of wholesalers returning large amounts of product to Ligand. According to the PCAOB, Deloitte failed to address adequately the effect these large product returns had on Ligand’s 2003 financial statements and whether this subsequent discovery of facts would have affected their audit report dated March 10, 2004 had they been aware of them at the time. On May 20, 2005, Ligand announced it was restating its financial statements for 2003 (and other periods). The 2003 restatement reduced its revenue for that year by over 50 percent and resulted in a loss of $97.5 million compared to the loss of $37.5 million reported originally. Additionally, we find one-, two-, and three-day CARs of –8.3 percent, –8.1 percent, and –8.4 percent, respectively, for Ligand on the date the restatement was announced (results untabulated).

In sum, Deloitte was sanctioned not only for actions specific to its failed audit of Ligand, but for broader quality control problems extending beyond the Ligand audit failure. These control failures related in part to its monitoring of partners and directors, including placing in charge of the Ligand audit a partner whom Deloitte upper management knew lacked the requisite skills needed to supervise the engagement. The PCAOB (2007a, 5) writes:

> Among other things, PCAOB auditing standards require that auditors “be assigned to tasks and supervised commensurate with their level of knowledge, skill and ability so that they can evaluate the audit evidence they are examining”. The auditor with final responsibility for the audit should know, at a minimum, the relevant professional accounting and auditing standards and should be knowledgeable about the client. Deloitte failed to staff the 2003 Ligand audit engagement in accordance with these requirements.

**Prior research and motivation**

Research to date discusses two primary motivations for audit firms to supply high-quality audits: the “reputation rationale” and the “insurance rationale” (Weber et al. 2008). Hiring an auditor with a high-quality reputation helps management reassure investors that company financial statements are reliable and accurate (Wilson and Grimlund 1990; Kinney 2005; Barton 2005) and can also be a means to reduce agency costs (DeAngelo 1981; Francis and Wilson 1988). The insurance rationale is related to the “deep pockets” of the auditor. If an auditor does not detect and report misstatements in the financial statements, investors can sue the auditor to recoup their investment losses (DeAngelo 1981; Palmrose 2005). Further, if a company fails, oftentimes the audit firm is the only party with sufficient resources to compensate investors. Thus, investors view the audit as a form of insurance protecting them from potential losses related to erroneous or fraudulent financial reporting.
Negative news revealed about an auditor may be interpreted by investors as evidence that the firm has been conducting inferior audits (Weber et al. 2008; Wilson and Grimlund 1990). Such information can damage the audit firm’s reputation, leading investors to question the reliability of audited financial statements issued by the firm’s clients — including those clients with no revealed audit failures. This loss of confidence in the audited financial statements can lead investors to revise their valuation of the audit firm’s clients. Prior research documents negative market reactions when information damaging to an auditor’s reputation is revealed (Krishnamurthy et al. 2006; Rauterkus and Song 2005; Weber et al. 2008). Additionally, news of audit failures or regulatory action taken against an audit firm can lead to increased litigation against the auditor. This reduces the insurance value inherent in the audit, leading to negative market effects for the audit firm’s clients, because payouts by an audit firm as a result of litigation can harm the viability of the auditor (Palmrose 2005). In summary, when damaging information about an auditor is revealed, investors may reduce their valuation of the firm’s clients due to either (1) reputation effects — loss of confidence in the veracity of the clients’ financial statements due to damage to the auditor’s reputation or (2) insurance effects — concerns that increased litigation against the auditor stemming from the disclosed event may reduce the insurance value of the audit.

The PCAOB order against Deloitte contains the type of information that could potentially damage the firm’s reputation or the insurance value inherent in its audits, leading investors to reassess their valuations of Deloitte’s clients. Because the PCAOB is an independent, quasi-governmental organization with a congressional mandate, any actions it takes against an auditor will likely be viewed by market participants as a potent indicator of problems at the audit firm (Abbott et al. 2008; Pritchard 2006). Thus, because the PCAOB order against Deloitte is a detailed and publicly disclosed censure of the firm by a regulatory body, it could have far-reaching effects on the auditor’s reputation and the insurance value of its audits.

The PCAOB has been conducting inspections of registered audit firms since 2003, and the availability of the public portion of the inspection reports has led to a new stream of research. Lennox and Pittman (2010) find no association between audit weaknesses disclosed in PCAOB inspection reports and subsequent changes in audit firms’ clientele. They note this is not surprising given that, unlike the American Institute of Certified Public Accountants (AICPA) peer-review reports (Casterella, Jensen, and Knechel 2009; Hilary and Lennox 2005), the PCAOB inspection reports do not provide an overall evaluation of audit quality for the firm, nor make public any

11. In 2003, the PCAOB inspected the Big 4 firms only, and the inspections were of a limited nature. Large-scale inspections of all audit firms began in 2004.

12. In untabulated results, Lennox and Pittman (2007, fn. 22) find no market reaction to news of inspection reports.
deficiencies in the firm’s quality control system. Lennox and Pittman (2010) do find that AICPA peer-review opinions become more favorable after a PCAOB inspection, a result interpreted as indicative of the remedial value of the PCAOB inspection process. In other words, while the PCAOB’s inspection program does not change clients’ auditor retention decisions, the program is associated with an improvement in the quality of audit firms.

Abbott et al. (2008) examine auditor switching behavior among clients of the 29 non–Big 4, non-national audit firms whose PCAOB inspection reports include failure to identify a departure from generally accepted accounting principles. They find that clients with more effective audit committees, more blockholders, and recent issuance of debt or equity securities were more likely to switch away from these auditors. Abbott et al. interpret these findings as an indication of the value provided by the PCAOB inspection reports in differentiating audit quality. Thus, the conclusions of Abbott et al. 2008 differ from those of Lennox and Pittman 2010. This may be due to differences in research design and sample selection.

These mixed findings in prior research and the continued public interest in understanding the role of the quasi-governmental PCAOB in protecting the public interest provide the motivations for our study. As noted earlier, we identify at least three potentially value-relevant pieces of information contained in the PCAOB order against Deloitte. The order describes details of the Ligand audit failure and highlights serious problems in Deloitte’s quality control policies and procedures that extend beyond the Ligand audit failure. The PCAOB order also discusses remedial actions Deloitte took to improve its quality control policies, which could signal improvements in the quality of the firm’s future audits.

The negative news highlighted by the PCAOB sanctions may lead to a negative market reaction for Deloitte clients, due to damage to Deloitte’s reputation or a reduction in the insurance value of its audits. However, there are countervailing reasons why news contained in the PCAOB order that is specific to the Ligand audit failure could have limited or no market effects. First, investors learned of the Ligand audit failure several years before the PCAOB imposed sanctions against Deloitte, and any negative market effects related to news of the Ligand audit failure could have been embedded in the price at that time. Second, the intra-audit firm spillover effects may be limited if the market perceives the Ligand audit failure as an isolated case that does not represent the overall quality of the audit firm.

Unlike news related to the Ligand audit failure, however, the PCAOB order against Deloitte makes public for the first time the severity of

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13. The PCAOB makes public quality control problems found during inspections only if the audit firm does not correct them within one year. To date this has not occurred for any of the Big 4 audit firms.
14. While the PCAOB is not publicly funded, it is overseen by the SEC. Boster (2007), Special Advisor to the PCAOB, discusses the peculiarities of the Board’s organizational structure.
Deloitte’s quality control problems, and this new information may have a negative effect on the reputation of the firm. In addition, the quality control deficiencies revealed by the PCAOB’s order can increase Deloitte’s litigation risk, because the PCAOB sanctions provide prima facie evidence of a problem with control procedures at the firm, as well as violations of auditing standards.\footnote{Dye (1993, 891) writes: “If auditors fail to comply with GAAS, then investors in failed firms have a prima facie case of negligence against the firm’s auditor.” Pritchard (2006, 52) states: “What better evidence of accounting incompetence, i.e., ‘recklessness’, than criticism from the experts at the PCAOB?”} Alternatively, news about the steps Deloitte took to improve its quality control policies in light of the PCAOB’s disciplinary actions may successfully alleviate investors’ concerns and signal improvements in the quality of the firm’s future audits, leading to a remedial effect similar to that of the PCAOB inspection reports suggested by Lennox and Pittman 2010.

In light of the above we address the following research questions. First, does news of quality control problems revealed by the PCAOB order against Deloitte damage the firm’s reputation and/or the perceived insurance value of its audits, or does the remedial effect overwhelm? Second, if the market discounts its valuation of Deloitte’s clients as a result of the sanctions, are there spillover effects to the clients of other Big 4 auditors? Finally, if news of the PCAOB sanctions leads to a negative market effect for Deloitte’s clients, is this due to the loss of (1) investor confidence in the quality of Deloitte’s audits of other clients — the reputation effect or (2) the perceived insurance value provided by the audit? The next section discusses the methodology we use to address these questions.

3. Research design

Research shows that event study methodology can be problematic in the presence of event date clustering (Bernard 1987; Schipper and Thompson 1983). Cross-sectional dependence in the residuals can result in biased estimates of standard errors, causing researchers to draw incorrect conclusions from the data (Bernard 1987, 2). Thus, our primary analyses use the Schipper and Thompson 1983 methodology for examining price reaction to the announcement of the PCAOB’s sanctions against Deloitte. This method is robust to event-date clustering. However, for descriptive and comparative purposes, we also present results using the standard market model.\footnote{Our final sample includes three Deloitte and 50 non-Deloitte clients with auditors based in San Diego. Thus, we do not include analyses specific to the San Diego clients of Deloitte because there are too few with available data.}

We apply the market model to estimate expected returns over the period from 260 days before through 10 days before December 10, 2007 — the date the PCAOB made public its sanctions against Deloitte. We use the Center for Research in Security Prices (CRSP) value-weighted return to proxy for the market return. To minimize contamination of the event window, we end the estimation period at day $-10$. Returns are inclusive of dividends. The
abnormal return for firm $i$ on day $t$ ($AR_{it}$) equals the difference between the firm’s return and its estimated return using the market model. The CAR is the sum of the abnormal returns over the alternative event windows (1, 2, and 3 days). We test the statistical significance of the CARs using parametric $t$-tests and nonparametric sign and Wilcoxon signed rank tests.

To control for cross-sectional dependence in residuals, we estimate the following Schipper and Thompson 1983 regressions:

$$R_{pt} = \alpha + \beta R_{mt} + \sum \delta_k Event_k + \mu_t$$

$R_{pt}$ is the equally weighted portfolio return for all clients of Deloitte (or non-Deloitte) on day $t$, and $R_{mt}$ is the market return on day $t$ (proxied by the CRSP value-weighted index). $Event_k$ is a dummy variable equal to one for the days in the three event windows and zero for all other days in the estimation period. The estimation period runs from January 1, 2007 to December 31, 2007. The coefficient $\delta_k$ represents the “shift in mean excess return” associated with the event (Schipper and Thompson 1983, 196). A significantly negative coefficient on the event dummy will suggest that the negative effects of the PCAOB sanctions outweigh any perceived positive effects of the news of remedial actions taken by Deloitte as a result of the PCAOB’s actions. On the other hand, a significantly positive coefficient will indicate that the remedial effects dominate the negative effects.

In order to test whether the univariate relations will hold in a multivariate setting, we estimate regressions using the Sefcik and Thompson 1986 portfolio weighting approach to control for cross-correlation in the residuals caused by event-date clustering. The method we use is as described in Weber et al. 2008 (954-55) and the following discussion draws on theirs. We form a matrix $F$ with dimension $N \times J$. Each row has one in the first column followed by $J-1$ columns of individual firm characteristics. $N$ represents the number of firm observations:

$$F = \begin{bmatrix} 1 & X_{11} & \ldots & X_{1(j-1)} \\ \vdots & \vdots & \ddots & \vdots \\ 1 & X_{N1} & \ldots & X_{N(j-1)} \end{bmatrix}$$

Next, we calculate a $J \times N$ matrix of portfolio weights $W$:

$$W = (F'F)^{-1}F' = \begin{bmatrix} W_{11} & \ldots & W_{1N} \\ W_{21} & \ldots & W_{2N} \\ \vdots & \ddots & \vdots \\ W_{J1} & \ldots & W_{JN} \end{bmatrix}$$

17. This estimation period differs slightly from that of the univariate analyses, as the Schipper and Thompson 1983 estimation method requires the inclusion of some trading days after the event period (Baber et al. 1995; Weber et al. 2008).
We then form a J×T matrix of weighted portfolio returns P:

\[ P = WR = \begin{bmatrix} W_{11} & \ldots & W_{1N} \\ W_{21} & \ldots & W_{2N} \\ \vdots & \ddots & \vdots \\ W_{J1} & \ldots & W_{JN} \end{bmatrix} \begin{bmatrix} r_{11} & \ldots & r_{1T} \\ r_{21} & \ldots & r_{2T} \\ \vdots & \ddots & \vdots \\ r_{N1} & \ldots & r_{NT} \end{bmatrix} = \begin{bmatrix} p_{11} & \ldots & p_{1T} \\ p_{21} & \ldots & p_{2T} \\ \vdots & \ddots & \vdots \\ p_{J1} & \ldots & p_{JT} \end{bmatrix} \]

where R is an N×T matrix of daily firm returns. Thus, P represents a matrix of weighted portfolio returns for T trading days. We separately estimate J portfolio time-series regressions for each of the J-1 firm characteristics and the constant as follows:

\[ \text{Return}_{j,t} = x_j + \beta_j \text{Return}_{m,t} + \delta_j \text{Event}_t + \epsilon_{j,t}. \]  

(2)

\( \text{Return}_{j,t} \) is the weighted portfolio return for firm characteristic j on day t, that is, the element of matrix P in row j and column t. \( \text{Return}_{m,t} \) is the market return on day t. \( \text{Event}_t \) is an indicator variable that equals one for event days and zero otherwise.

Our model includes firm-specific characteristics to examine whether the stock market results we find for Deloitte clients are consistent with reputation or insurance effects. Drawing on prior literature, we predict that client-specific factors that proxy for either greater need for a reputable auditor or increased risk of auditor litigation will be associated with a more negative reaction to news of the PCAOB sanctions against Deloitte.

As in Baber et al. 1995, we include Zmijewski’s measure of financial distress (Zmijewski 1984) and note that a significantly negative coefficient would be consistent with both the reputation and insurance hypotheses for the following reasons. First, financially distressed companies are perceived as having more incentives to manipulate earnings, leading investors to demand a high-quality auditor in an attempt to constrain such behavior. Second, the insurance value of the audit is more important for financially troubled companies, as investors in such companies sue the audit firm more to try to recoup investment losses. We include a dummy variable equal to one if the client’s audit report contained a going concern (GC) explanatory paragraph in 2006 and zero otherwise. While a GC opinion could be viewed as an “alternative measure of financial distress”, issuance of a GC opinion could also be a mitigating factor in litigation against the auditor (Baber et al. 1995, 391). Thus, a positive relation between a GC opinion and Deloitte client abnormal returns may be interpreted as evidence of insurance effects (Baber et al. 1995).

We include a dichotomous variable equal to one if the company is a new Deloitte client and zero otherwise (Baber et al. 1995). Johnson, Khurana, and Reynolds (2002) find evidence that short auditor tenure is associated with a reduction in financial statement quality due to the auditor’s lack of familiarity with the client. Moreover, as noted by Stice 1991 (522), “the risk
of litigation to the auditor is greater in the first years of the client/auditor relationship”. These arguments suggest that investors in such companies would react more negatively to news of the PCAOB sanctions against Deloitte due to both reputation and insurance effects. On the other hand, to the extent that a prior auditor acts as a co-insurer for client investor losses, short auditor tenure might reduce the impact of the negative news on the insurance value of the current auditor. Thus, as in Baber et al. 1995, a positive sign on this coefficient would be evidence of insurance effects.

We include proxies for recent losses in stock price, because Menon and Williams (1994) argue that the insurance value of the audit is higher for firms with negative pre-event returns. Small firms are more likely to suffer audit failures because they have less effective corporate governance and tend to manage earnings more (Weber et al. 2008). Thus, we include a size proxy (log of total assets). On the other hand, auditors of larger companies are more likely to be sued (Stice 1991); thus, a negative coefficient on size is uniquely consistent with insurance effects, while a positive coefficient would be evidence of reputation effects. Unlike Baber et al. 1995, we omit a proxy for recent initial public offering (IPO) because none of the 45 IPO firms in our initial sample survive after we run the various screens discussed in the sample selection section.

Because investors’ valuation of client firms is conditional on their assessment of the auditor’s reputation to attest to the credibility of the financial statements and constrain earnings manipulation, we include variables that proxy for client incentives or opportunities to manage earnings, as well as proxies for effectiveness of corporate governance (Krishnamurthy et al. 2006). Firms with high sales growth, high leverage, low return on assets (ROA), lower book-to-market ratios, and less effective corporate governance (low institutional ownership) have greater incentives or opportunities to manage earnings (Krishnamurthy et al. 2006; Weber et al. 2008). Thus, we propose that negative coefficients on sales growth and leverage, and positive coefficients on book-to-market ratio, institutional holding percentage, and ROA are supportive of the reputation hypothesis. We use percentage increase in sales and the ratio of debt to total assets as proxies for growth and leverage, respectively.

The insurance value of the audit is more important for investors in companies having increased risk of auditor litigation. Research shows that sales growth, leverage, and poor firm performance (measured by ROA) are associated with increased auditor litigation (Shu 2000). Further, we argue

18. Baber et al. (2005, 391) challenge this prediction, arguing that “pre-bankruptcy returns do not indicate the component of insurance provided by the auditor that is impounded in security prices”. They further propose that “financial distress measures will dominate pre-bankruptcy returns in multivariate specifications”.

19. Although Shu (2000) predicts that lower ROA is associated with increased litigation against the auditor, she instead finds a weakly positive relation between ROA and auditor litigation.
that investors in companies with lower book-to-market ratios are more likely to sue the auditor in the event of bankruptcy because it is more difficult for investors to recover losses from such companies with fewer assets in place. Investors in companies with less effective corporate governance are also more likely to sue the auditor because, as noted by Stice 1991 (520), auditors whose clients have “characteristics related to the occurrence of alleged audit failures” are more likely to be sued. For these reasons, negative coefficients on sales growth and leverage and positive coefficients on ROA, book-to-market ratio, and percentage of institutional holdings in the Sefcik and Thompson 1986 regressions are consistent with the insurance rationale.

Lastly, Krishnamurthy et al. (2006) find the damage to Andersen’s reputation caused by the indictment had a more negative effect on client firms’ equity values when the market perceived Andersen’s independence to be impaired. Moreover, auditor litigation is more likely when there is a strong economic bond between the auditor and its clients (Stice 1991). To see if the market reacts similarly to news of the sanctions against Deloitte, we include fee measures (log of nonaudit fees and ratio of nonaudit fees to total fees) to proxy for possible economic bonding between Deloitte and its clients.

**Sample selection**

Table 1 presents our sample selection criteria. Using Audit Analytics, we identify companies audited by Big 4 auditors as of the event date (December 10, 2007). We match these companies to COMPUSTAT, resulting in 1,001 Deloitte and 3,001 non-Deloitte clients. We drop 110 Deloitte and 215 non-Deloitte clients with no data available on CRSP. Companies must have return data during the event period and for at least 120 days during the estimation period. This requirement results in a loss of 140 Deloitte and 331 non-Deloitte clients, leaving 751 Deloitte and 2,455 non-Deloitte clients. Finally, as in Baber et al. 1995, we exclude companies (44 Deloitte and 92 non-Deloitte clients) that made potentially value relevant disclosures within five days of the event. Announcements of earnings, dividends, mergers, acquisitions, repurchases, equity issuances, bankruptcy filings, and tax-related events are considered value-relevant disclosures (Thompson, Olsen, and Dietrich 1987). Our final sample includes 707 Deloitte and 2,363 non-Deloitte clients. The sample encompasses a wide range of firms, spread over 10 industry sectors using Global Industry Classification Standards (GICS).

**4. Results**

Table 2 presents mean and median abnormal returns for Deloitte and non-Deloitte clients around the date the PCAOB’s sanctions were announced.

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20. We do not require fee data for the analyses in Tables 2 and 3. We use all firms for which Audit Analytics identifies an auditor whether fee data are available or not.
TABLE 1
Sample selection

<table>
<thead>
<tr>
<th>Companies with a Big 4 auditor as of December 10, 2007 (as identified by Audit Analytics) and with data on COMPUSTAT</th>
<th>Deloitte clients</th>
<th>Non-Deloitte clients</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1,001</td>
<td>3,001</td>
</tr>
<tr>
<td>Less: firms not matched to CRSP</td>
<td>(110)</td>
<td>(215)</td>
</tr>
<tr>
<td>Sample available on both CRSP and COMPUSTAT</td>
<td>891</td>
<td>2,786</td>
</tr>
<tr>
<td>Less: firms with insufficient or missing return data on CRSP</td>
<td>(140)</td>
<td>(331)</td>
</tr>
<tr>
<td>Sample with sufficient return data for CAR calculation</td>
<td>751</td>
<td>2,455</td>
</tr>
<tr>
<td>Less: firms that made potentially value-relevant disclosures between 12/5/07 and 12/15/07</td>
<td>(44)</td>
<td>(92)</td>
</tr>
<tr>
<td>Final sample</td>
<td>707</td>
<td>2,363</td>
</tr>
</tbody>
</table>

Notes:
The event date (day 0) is the day the PCAOB announced its sanctions against Deloitte (December 10, 2007). The estimation period for calculating the CARs is 250 days before day 10. Firms must have returns for at least 120 of the 250 trading days to be included in the sample. To mitigate the concern that significant abnormal returns may be associated with confounding events, we exclude firms that made potentially value-relevant disclosures within five days of the event of interest (as in Baber et al. 1995). Announcements of earnings, dividends, mergers, acquisitions, repurchases, equity issuances, bankruptcy filings, and tax-related events are treated as value-relevant disclosures (Thompson et al. 1987).
### TABLE 2
Abnormal returns for Deloitte and non-Deloitte clients

#### Panel A: Day 0

<table>
<thead>
<tr>
<th>Client auditor</th>
<th>N</th>
<th>% Neg.</th>
<th>Mean CAR</th>
<th>Median CAR</th>
<th>Mean (t-test) p-values</th>
<th>Sign test p-values</th>
<th>Wilcoxon signed rank test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deloitte</td>
<td>707</td>
<td>60.8%</td>
<td>-0.463%</td>
<td>-0.359%</td>
<td>&lt;0.001</td>
<td>&lt;0.001</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Non-Deloitte</td>
<td>2,363</td>
<td>52.0%</td>
<td>0.042%</td>
<td>-0.066%</td>
<td>0.500</td>
<td>0.058</td>
<td>0.134</td>
</tr>
</tbody>
</table>

*p*-values for:
- *t*-test of difference in mean
- *Wilcoxon* rank sum test

#### Panel B: Days (0, +1)

<table>
<thead>
<tr>
<th>Client auditor</th>
<th>N</th>
<th>% Neg.</th>
<th>Mean CAR</th>
<th>Median CAR</th>
<th>Mean (t-test) p-values</th>
<th>Sign test p-values</th>
<th>Wilcoxon signed rank test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deloitte</td>
<td>707</td>
<td>57.9%</td>
<td>-0.534%</td>
<td>-0.280%</td>
<td>&lt;0.001</td>
<td>&lt;0.001</td>
<td>0.001</td>
</tr>
<tr>
<td>Non-Deloitte</td>
<td>2,363</td>
<td>53.8%</td>
<td>-0.172%</td>
<td>-0.176%</td>
<td>0.026</td>
<td>&lt;0.001</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

*p*-values for:
- *t*-test of difference in mean
- *Wilcoxon* rank sum test

#### Panel C: Days (0, +2)

<table>
<thead>
<tr>
<th>Client auditor</th>
<th>N</th>
<th>% Neg.</th>
<th>Mean CAR</th>
<th>Median CAR</th>
<th>Mean (t-test) p-values</th>
<th>Sign test p-values</th>
<th>Wilcoxon signed rank test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deloitte</td>
<td>707</td>
<td>60.1%</td>
<td>-0.833%</td>
<td>-0.502%</td>
<td>&lt;0.001</td>
<td>&lt;0.001</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Non-Deloitte</td>
<td>2,363</td>
<td>54.2%</td>
<td>-0.376%</td>
<td>-0.235%</td>
<td>&lt;0.001</td>
<td>&lt;0.001</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

*p*-values for:
- *t*-test of difference in mean
- *Wilcoxon* rank sum test

(The table is continued on the next page.)
The mean and median CARs for the non-Deloitte clients are also significantly negative for the two-day and three-day windows, but the CARs for the non-Deloitte clients are significantly smaller in absolute value than those of the Deloitte clients. Both the parametric difference of means $t$-test and the nonparametric Wilcoxon rank sum test reject the null hypothesis that the two groups have the same means and medians, respectively. Nonetheless, these results do not control for cross-correlation among residuals resulting from event-date clustering and thus should be interpreted with caution.

In Table 3, we report Schipper and Thompson 1983 regression results for both Deloitte and non-Deloitte clients. In the regression for Deloitte clients (panel A), the event-day dummy is significantly negative for the one-day and three-day event windows ($t$-statistics of $-1.96$ and $-2.01$, respectively). The event-day dummy is negative but insignificant for the two-day window ($t$-statistic of $-1.52$, with two-tailed $p$-value of 0.128). For the non-Deloitte clients (panel B), the event-day dummy is not significant in any of the three event windows. Thus, the significantly negative stock market effect on Deloitte clients of the news of the PCAOB sanctions is robust to controls for cross-correlations among residuals while the negative market effect on the non-Deloitte clients is not. These results suggest that the negative stock market effect of the news of the PCAOB sanctions is limited to the Deloitte clients; we find no evidence of spillover effects to clients of other Big 4 firms.

Investors first learned of the problems with Ligand’s 2003 financial statements several years before the PCAOB sanctions were imposed against

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Notes:

All $p$-values are two-tailed. Non-Deloitte auditors are PricewaterhouseCoopers, KPMG, or Ernst and Young. The event date (day 0) is the day the Public Company Accounting Oversight Board announced its sanctions against Deloitte (December 10, 2007). The estimation period is 250 days before day $-10$. Firms must have returns for at least 120 of the 250 trading days to be included in the sample. Market is the Center for Research in Security Prices value-weighted index.

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23. In untabulated results, we find positive one-, two-, and three-day CARs of 1.9 percent, 4.1 percent, and 5.6 percent, respectively, for Ligand’s stock on the date of the PCAOB’s announcement of sanctions against Deloitte. Deloitte resigned from the Ligand engagement on August 3, 2004, at which time Ligand hired BDO Seidman for its audit work. Therefore, on the date the PCAOB sanctions were announced, Ligand had not used Deloitte’s services for over three years.

24. As noted previously, the estimation period for the Schipper and Thompson 1983 regressions is slightly different from that of the univariate analysis reported in Table 2. We reestimate all models presented in Table 3 using a longer event period to coincide with the beginning date of our market model estimation period — 260 trading days before the event date, or November 27, 2006. The signs and significances of our results are unchanged.
### TABLE 3
Schipper and Thompson (1983) regressions for Deloitte and non-Deloitte clients

\[ R_{p,t} = \alpha + \beta R_{m,t} + \sum \delta_k Event_{k,t} + \epsilon_t \]

**Panel A: Deloitte clients**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Day 0 coefficient (t-statistic)</th>
<th>Days (0, +1) coefficient (t-statistic)</th>
<th>Days (0, +2) coefficient (t-statistic)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>-0.0003 (-1.95)*</td>
<td>0.0003 (1.92)*</td>
<td>-0.0003 (1.84)*</td>
</tr>
<tr>
<td>( R_m )</td>
<td>0.8662 (59.48)***</td>
<td>0.8630 (58.95)***</td>
<td>0.8635 (59.32)***</td>
</tr>
<tr>
<td>Event</td>
<td>-0.0045 (-1.96)**</td>
<td>-0.0025 (-1.52)</td>
<td>-0.0027 (-2.01)**</td>
</tr>
<tr>
<td>Adj. ( R^2 )</td>
<td>0.934</td>
<td>0.934</td>
<td>0.934</td>
</tr>
</tbody>
</table>

**Panel B: Non-Deloitte clients**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Day 0 coefficient (t-statistic)</th>
<th>Days (0, +1) coefficient (t-statistic)</th>
<th>Days (0, +2) coefficient (t-statistic)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>-0.0004 (-2.27)**</td>
<td>-0.0004 (-2.22)**</td>
<td>-0.0004 (-2.16)**</td>
</tr>
<tr>
<td>( R_m )</td>
<td>0.9374 (55.94)*</td>
<td>0.9369 (55.81)*</td>
<td>0.9368 (55.98)*</td>
</tr>
<tr>
<td>Event</td>
<td>-0.0004 (-0.15)</td>
<td>-0.0008 (-0.43)</td>
<td>-0.0012 (-0.80)</td>
</tr>
<tr>
<td>Adj. ( R^2 )</td>
<td>0.926</td>
<td>0.926</td>
<td>0.926</td>
</tr>
</tbody>
</table>

**Notes:**

Non-Deloitte clients are clients of PricewaterhouseCoopers, KPMG, or Ernst and Young. Observations are the daily portfolios of the 707 Deloitte (panel A) and 2,363 non-Deloitte (panel B) clients for the 251 trading days from January 1, 2007 to December 31, 2007. Estimation is ordinary least squares with \( t \)-statistics in parentheses. The coefficient \( \delta_k \) represents the “shift in mean excess return” associated with the event (Schipper and Thompson 1983, 196). \( Event \) equals one for the one day (0), two days (0, +1), and three days (0, +2) around the date when the Public Company Accounting Oversight Board imposed sanctions against Deloitte for actions related to its audit of Ligand (December 10, 2007) and zero otherwise.

\( R_p \) equals the daily return to an equally-weighted portfolio of Deloitte (panel A) and non-Deloitte (panel B) clients from January 1, 2007 to December 31, 2007. \( R_m \) equals the daily market return from January 1, 2007 to December 31, 2007. The market proxy is the value-weighted Center for Research in Security Prices index.

*, **, and *** indicate significance at the 0.10, 0.05, and 0.01 levels (two-tailed), respectively.
its auditor. Deloitte’s reputation or insurance value could have been
damaged at that time, when news of the Ligand audit failure was first made
public. To explore this possibility, we investigate the stock market effects
on Ligand and Deloitte’s other clients of news of four major events related
to the Ligand audit failure in 2003. These four events (the “Ligand events”)
are:

1. Deloitte’s resignation from the Ligand audit (August 3, 2004),
2. The announcement by Ligand’s audit committee of its decision to con-
duct a review of the 2002–2004 financial statements (March 17, 2005),
3. Ligand’s announcement of restatement of its 2002–2004 financial state-
ments (May 20, 2005), and
4. News Wire’s report that the SEC opened an investigation against Ligand
(September 12, 2005).

In untabulated results, we find one-, two-, and three-day CARs of
-39.1 percent, -41.2 percent, and -41.2 percent, respectively, for Ligand on
the date Deloitte’s resignation was announced. Ligand also announced on
that date a second-quarter loss of $14.2 million or $0.19 per share when the
projected loss had been $0.06 per share. Thus, the large negative abnormal
returns to Ligand on August 3, 2004 could be caused by either or both
pieces of news. We find Ligand one-, two-, and three-day CARs of -12.9
percent, -7.7 percent, and -10.3 percent, respectively, on the date of the
audit committee’s announcement and -8.3 percent, -8.1 percent, and -8.4
percent, respectively, when the restatement was announced. Finally, on the
date the SEC investigation was announced, Ligand had one-, two-, and
three-day CARs of 3.5 percent, -4.0 percent, and -5.2 percent, respec-
tively.\footnote{All return data for Ligand are from CRSP with the following exception. Ligand’s stock began trading over the counter on September 7, 2005 after it was delisted from NASDAQ. Thus, for Ligand event 4, we calculate the Ligand returns manually using the Yahoo! Finance close price and adjusting for stock splits and stock dividends in the same manner as is done in the CRSP database. Ligand began trading again on NASDAQ on June 14, 2006.} Therefore, with the exception of the one-day window for news
related to the opening of an SEC investigation, Ligand had a noticeably
negative market reaction to news of all four of these Ligand-specific events.

Table 4 presents results of Schipper and Thompson 1983 regressions for
reaction to the Ligand events for Deloitte’s other clients. Panels A, B, and
C show that none of the event-day dummies is statistically significant in any
of the three windows (one day, two day, and three day) around the Ligand
events. Thus, we find no evidence to support the view that news of these
four Ligand events led investors to discount the reputation or insurance
value of Deloitte; the effect was limited to Ligand.

In sum, because Deloitte clients suffer negative market effects to news of
the PCAOB sanctions but none to news of the other Ligand events, we
Market reaction by Deloitte clients to four Ligand events occurring before announcement of the Public Company Accounting Oversight Board sanctions against Deloitte

Schipper and Thompson (1983) regressions \( R_{p,t} = \alpha + \beta R_{m,t} + \sum \delta_k \text{Event}_k,t + \varepsilon_t \)

### Panel A: Day 0

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient (t-statistic)</th>
<th>Coefficient (t-statistic)</th>
<th>Coefficient (t-statistic)</th>
<th>Coefficient (t-statistic)</th>
<th>Coefficient (t-statistic)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>0.0003 (3.07)***</td>
<td>0.0003 (2.99)***</td>
<td>0.0003 (2.95)***</td>
<td>0.0003 (2.94)***</td>
<td>0.0003 (2.97)***</td>
</tr>
<tr>
<td>( R_m )</td>
<td>0.8886 (57.73)***</td>
<td>0.8900 (57.73)***</td>
<td>0.8901 (57.79)***</td>
<td>0.8900 (57.81)***</td>
<td>0.8899 (57.71)***</td>
</tr>
<tr>
<td>Event1</td>
<td>-0.0030 (-1.12)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Event2</td>
<td>-0.0004 (-0.18)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Event3</td>
<td></td>
<td>0.0016 (0.81)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Event4</td>
<td></td>
<td></td>
<td></td>
<td>0.0019 (0.96)</td>
<td></td>
</tr>
<tr>
<td>Event1234</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>&lt;0.0001 (0.04)</td>
</tr>
<tr>
<td>Adj. ( R^2 )</td>
<td>0.894</td>
<td>0.893</td>
<td>0.893</td>
<td>0.894</td>
<td>0.893</td>
</tr>
</tbody>
</table>

### Panel B: Days (0, +1)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient (t-statistic)</th>
<th>Coefficient (t-statistic)</th>
<th>Coefficient (t-statistic)</th>
<th>Coefficient (t-statistic)</th>
<th>Coefficient (t-statistic)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>0.0003 (3.04)***</td>
<td>0.0003 (3.01)***</td>
<td>0.0003 (2.96)***</td>
<td>0.0003 (2.94)***</td>
<td>0.0003 (2.98)***</td>
</tr>
<tr>
<td>( R_m )</td>
<td>0.8892 (57.66)***</td>
<td>0.8899 (57.75)***</td>
<td>0.8899 (57.74)***</td>
<td>0.8904 (57.73)***</td>
<td>0.8898 (57.67)***</td>
</tr>
<tr>
<td>Event1</td>
<td>-0.0012 (-0.83)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Event2</td>
<td>-0.0006 (-0.43)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Event3</td>
<td></td>
<td>0.0005 (0.37)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Event4</td>
<td></td>
<td></td>
<td></td>
<td>0.0009 (0.63)</td>
<td></td>
</tr>
<tr>
<td>Event1234</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>-0.0001 (-0.13)</td>
</tr>
<tr>
<td>Adj. ( R^2 )</td>
<td>0.893</td>
<td>0.893</td>
<td>0.893</td>
<td>0.893</td>
<td>0.893</td>
</tr>
</tbody>
</table>

(The table is continued on the next page.)
### Table 4 (Continued)

**Panel C: Days (0, +2)**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient (t-statistic)</th>
<th>Coefficient (t-statistic)</th>
<th>Coefficient (t-statistic)</th>
<th>Coefficient (t-statistic)</th>
<th>Coefficient (t-statistic)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>0.0003 (3.03)***</td>
<td>0.0003 (2.99)***</td>
<td>0.0003 (2.97)***</td>
<td>0.0003 (3.01)***</td>
<td>0.0003 (3.03)***</td>
</tr>
<tr>
<td>( R_m )</td>
<td>0.8889 (57.30)***</td>
<td>0.8899 (57.72)***</td>
<td>0.8899 (57.73)***</td>
<td>0.8896 (57.64)***</td>
<td>0.8892 (57.46)***</td>
</tr>
<tr>
<td>Event1</td>
<td>-0.0007 (-0.57)</td>
<td>-0.0002 (-0.17)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Event2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Event3</td>
<td>0.0002 (0.14)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Event4</td>
<td></td>
<td></td>
<td>-0.0005 (-0.42)</td>
<td></td>
<td>-0.0003 (-0.52)</td>
</tr>
<tr>
<td>Event1234</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adj. ( R^2 )</td>
<td>0.893</td>
<td>0.893</td>
<td>0.893</td>
<td>0.893</td>
<td>0.893</td>
</tr>
</tbody>
</table>

**Notes:**

Observations are the daily portfolios of Deloitte clients for the 401 trading days from June 1, 2004 to December 31, 2005. Estimation is ordinary least squares with \( t \)-statistics in parentheses. \( Event1, Event2, Event3, \) and \( Event4 \) are dummy variables that equal one on the one day (panel A), two days (panel B), or three days (panel C) around the event dates below and zero otherwise. \( Event1234 \) equals one for the four days (panel A), eight days (panel B), and 12 days (panel C) that constitute \( Event1, Event2, Event3, \) and \( Event4 \) and zero otherwise. \( R_p \) equals the daily return to an equally weighted portfolio of Deloitte clients from June 1, 2004 to December 31, 2005. \( R_m \) equals the daily market return from June 1, 2004 to December 31, 2005. The market proxy is the value-weighted CRSP index.

**Event1:** Ligand announces Deloitte’s resignation (August 3, 2004).

**Event2:** Ligand announces its audit committee will conduct a review of the 2002–2004 financial statements (March 17, 2005).

**Event3:** Ligand announces restatement of its 2002–2004 financial statements (May 20, 2005).

**Event4:** News Wire reports that the SEC has opened an investigation against Ligand with respect to its 2002–2004 financial statements (September 12, 2005).

All of the above events occurred prior to the announcement date of the PCAOB’s sanctions against Deloitte (December 10, 2007).

*** indicates significance at the 0.01 level (two-tailed).
conclude that the PCAOB’s disciplinary actions against Deloitte contain information new to the market that extends beyond the Ligand audit failure. As discussed earlier, the PCAOB sanctions, unlike the other Ligand events, have made public for the first time failures in the quality control systems at Deloitte. We argue that it is this negative information about Deloitte’s quality control procedures — unique to the PCAOB sanctions — that led to the negative stock market effect to Deloitte’s clients that we document.

The extant literature suggests alternative explanations for the negative stock market effects of events that impact auditors: the reputation and the insurance explanations (Baber et al. 1995). Table 5 presents the results from the Sefcik and Thompson 1986 portfolio-weighted time-series regressions that control for the cross-correlation among residuals and is equivalent to a multivariate cross-sectional regression that includes proxies for the two alternative explanations. Descriptive statistics are in panel A and the regression results are in panel B. In this analysis, 487 of the Deloitte clients have data for all variables.

Of the firm-specific variables, only the probability of bankruptcy [Pr(Bankrupt)] is significantly negative, with $t$-statistics of -2.10 and -2.12 in models 1 and 2, respectively. All other variables are not significantly different from zero. As noted by Baber et al. 1995, this result is compatible with both the reputation and insurance hypotheses because (1) investors count on reputable auditors to constrain earnings manipulation, which is more likely in financially distressed firms (Palmrose 1987, 96) and (2) investors in financially distressed companies are more likely to sue the audit firm in an attempt to recoup investment losses (Stice 1991; Palmrose 1987). The fee proxies (FeeRatio and NonAuditfee) are both insignificant. Thus, while we confirm Baber et al. 1995, we do not find evidence that abnormal returns to Deloitte clients around news of the PCAOB sanctions are more negative when investors perceive Deloitte’s independence to be weaker. This differs from Krishnamurthy et al. 2006, who find that clients with higher economic bonding to Andersen had a more negative stock market reaction to the Andersen criminal indictment than did other clients. We believe the following factors contribute to the differences between our results and those of Krishnamurthy et al. 2006. First, during the Andersen saga, media reporting led to speculation about Andersen’s possible lack of independence from Enron (Barrionuevo 2002; Abelson 2002). However, the PCAOB order against Deloitte mentions no independence concerns. Second, Krishnamurthy et al. (2006) study an event that occurred before the enactment of the Sarbanes-Oxley Act, and thus the difference between our results and theirs could be due to changes in the regulatory regime and audit environment.

5. Conclusion

We examine market effects of the news of the PCAOB’s sanctions imposed upon Deloitte for quality control problems uncovered at the firm due to its failed audit of Ligand. These sanctions mark the first time the PCAOB has
TABLE 5
Cross-sectional analysis of market reaction to Public Company Accounting Oversight Board sanctions for Deloitte clients

Panel A: Descriptive statistics

<table>
<thead>
<tr>
<th>Variable</th>
<th>N</th>
<th>Mean</th>
<th>Std. dev.</th>
<th>Lower quartile</th>
<th>Median</th>
<th>Upper quartile</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pr(Bankrupt)</td>
<td>487</td>
<td>0.125</td>
<td>0.215</td>
<td>0.001</td>
<td>0.019</td>
<td>0.130</td>
</tr>
<tr>
<td>GC</td>
<td>487</td>
<td>0.012</td>
<td>0.110</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>NewAuditor</td>
<td>487</td>
<td>0.092</td>
<td>0.290</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>PreviousRet</td>
<td>487</td>
<td>0.047</td>
<td>0.436</td>
<td>-0.181</td>
<td>0.004</td>
<td>0.201</td>
</tr>
<tr>
<td>ln(Asset)</td>
<td>487</td>
<td>7.253</td>
<td>1.923</td>
<td>6.017</td>
<td>7.191</td>
<td>8.382</td>
</tr>
<tr>
<td>SaleGrowth</td>
<td>487</td>
<td>0.126</td>
<td>0.354</td>
<td>0.016</td>
<td>0.093</td>
<td>0.187</td>
</tr>
<tr>
<td>Leverage</td>
<td>487</td>
<td>0.232</td>
<td>0.222</td>
<td>0.036</td>
<td>0.202</td>
<td>0.362</td>
</tr>
<tr>
<td>ROA</td>
<td>487</td>
<td>0.071</td>
<td>0.533</td>
<td>-0.019</td>
<td>0.016</td>
<td>0.083</td>
</tr>
<tr>
<td>BM</td>
<td>487</td>
<td>0.520</td>
<td>0.465</td>
<td>0.273</td>
<td>0.475</td>
<td>0.682</td>
</tr>
<tr>
<td>InstHold</td>
<td>487</td>
<td>0.766</td>
<td>0.301</td>
<td>0.574</td>
<td>0.808</td>
<td>0.973</td>
</tr>
<tr>
<td>FeeRatio</td>
<td>487</td>
<td>0.165</td>
<td>0.139</td>
<td>0.059</td>
<td>0.137</td>
<td>0.248</td>
</tr>
</tbody>
</table>

Panel B: Sefcik and Thompson 1986 regressions

\( \text{Return}_{jt} = \alpha_j + \beta_j \text{Return}_{m,t} + \delta_j \text{Event}_t + \epsilon_{jt} \)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Model 1</th>
<th>Model 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>-0.0079</td>
<td>-0.0068</td>
</tr>
<tr>
<td>Pr(Bankrupt)</td>
<td>-0.0111</td>
<td>-0.0111</td>
</tr>
<tr>
<td>GC</td>
<td>0.0102</td>
<td>0.0100</td>
</tr>
<tr>
<td>NewAuditor</td>
<td>0.0005</td>
<td>0.0004</td>
</tr>
<tr>
<td>PreviousRet</td>
<td>-0.0003</td>
<td>-0.0002</td>
</tr>
<tr>
<td>ln(Asset)</td>
<td>0.0007</td>
<td>0.0008</td>
</tr>
<tr>
<td>SaleGrowth</td>
<td>-0.0018</td>
<td>-0.0019</td>
</tr>
<tr>
<td>Leverage</td>
<td>-0.0002</td>
<td>-0.0001</td>
</tr>
<tr>
<td>ROA</td>
<td>0.0014</td>
<td>0.0014</td>
</tr>
<tr>
<td>BM</td>
<td>0.0017</td>
<td>0.0016</td>
</tr>
<tr>
<td>InstHold</td>
<td>-0.0003</td>
<td>-0.0002</td>
</tr>
<tr>
<td>FeeRatio</td>
<td>0.0005</td>
<td>-0.0002</td>
</tr>
<tr>
<td>NonAuditfee</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(The table is continued on the next page.)
disciplined a Big 4 auditor and also the first time the PCAOB has fined any registered audit firm or individual. Unlike PCAOB inspection reports, the PCAOB order imposing sanctions on Deloitte publicly reveals problems found by the PCAOB in the firm’s quality control policies and procedures. This allows us to test the notion proposed by Lennox and Pittman 2010 that clients value information about quality control deficiencies in audit firms.

** indicates significance at the 0.05 level (two-tailed).

TABLE 5 (Continued)

Notes:
This table presents the cross-sectional analysis of market reaction to PCAOB sanctions against Deloitte for the 487 Deloitte clients with stock returns for the 251 trading days in 2007 and necessary information for computing all independent variables. Estimation is portfolio-weighted least squares as in Sefcik and Thompson 1986. The fee measure is FeeRatio in Model 1 and NonAuditfee in Model 2.

\[ Pr(Bankrupt) = \text{Zmijewski’s (1984) financial distress measure} \]
\[ PreviousRet = \text{Cumulative raw returns from January 1, 2007 to November 10, 2007} \]
\[ \ln(Asset) = \text{Natural log of total assets (in million dollars)} \]
\[ BM = \text{Book value of equity divided by market value of equity} \]
\[ Leverage = \text{Total debt divided by total assets} \]
\[ SaleGrowth = \text{Growth rate in sales} \]
\[ ROA = \text{Two-digit SIC code median adjusted ROA} \]
\[ GC = 1 \text{ if client received a going-concern explanatory paragraph opinion in 2006 and 0 otherwise} \]
\[ FeeRatio = \text{Ratio of nonaudit fees to total fees} \]
\[ NonAuditfee = \text{Natural log of (1 + nonaudit fees)} \]
\[ NewAuditor = 1 \text{ if client switches to Deloitte during 2005–2006 and 0 otherwise} \]
\[ InstHold = \text{Percentage of shares owned by institutional shareholders} \]
\[ Return_{j,t} = \text{Weighted portfolio return on day } t \text{ } (t = 1, 2, \ldots, 251) \text{ for firm characteristic } j \text{ } (j = 1, 2, \ldots, 12). \text{ Day } t \text{ represents a trading day from January 1, 2007 to December 31, 2007. Firm characteristic } j \text{ represents one of the 12 firm-specific characteristics (including the constant).} \]
\[ Return_{m,t} = \text{Market excess return on day } t \text{ } (t = 1, 2, \ldots, 251), \text{ calculated as the value-weighted return on all NYSE, AMEX, and NASDAQ stocks (from CRSP) minus the risk-free rate} \]
\[ Event_{t} = \text{An indicator variable for the PCAOB sanctions event, equal to 1 for the 3-day event period (December 10, 2007 – December 12, 2007) and 0 otherwise.} \]

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Using the Schipper and Thompson 1983 methodology, we find that Deloitte clients have a significantly negative market reaction to news of the PCAOB sanctions over one- and three-day event windows; reaction over the two-day window is negative but not significant ($t$-statistic of $-1.52$, with two-tailed $p$-value of 0.128). Non-Deloitte clients show no significant reaction to news of the PCAOB sanctions against Deloitte when we use the Schipper and Thompson 1983 methodology. The lack of significance for non-Deloitte clients suggests that our results are not driven by uncontrolled factors common to clients of Big 4 auditors and that there is no evidence of spillover effects to clients of other Big 4 auditors. We conclude that the negative effects of information contained in the PCAOB order against Deloitte outweigh any possible remedial effects coming from news of Deloitte’s corrective actions taken after the sanctions.

We find that Deloitte clients had no reaction to other events specifically related to the Ligand audit failure (such as news of the restatement of its financial statements) that predate the sanctions. Thus, the evidence shows that the PCAOB sanctions revealed value-relevant information about Deloitte’s reputation or insurance value that was not contained in the other Ligand events. Because the severity of Deloitte’s quality control problems was made public for the first time by the PCAOB sanctions, we conclude that the negative market effects we observe are most likely the result of the news of the control weaknesses at Deloitte rather than events specific to the Ligand audit. This supports the findings of Lennox and Pittman 2010, who conclude that clients value disclosures about control weaknesses found at audit firms. Finally, in cross-sectional analyses using the Sefcik and Thompson 1986 approach, we find a more negative reaction to news of the PCAOB sanctions against Deloitte for firms that are financially distressed. This is consistent with both the reputation and insurance hypotheses for audit quality as in Baber et al. 1995.

References
Barrionuevo, A. 2002. Questioning the books: Court documents show Andersen’s ties with Enron were growing in early ’90s. The Wall Street Journal, February 26, A6.


