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The riskiness of audit firm continuing clients' portfolio

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Abstract

Purpose – The purpose of this paper is to test whether firms audited by the same Big 4 audit firm (Big 4 continuing clients) are more/less likely to report material weaknesses (systemic material weaknesses) in internal controls over a financial reporting than those audited by the same Non-Big 4 audit firm (Non-Big 4 continuing clients) over the period 2005-2008. It also investigates whether the number of material weaknesses and that of systemic material weaknesses varies among the two groups.

Design/methodology/approach – Logistic regression and count regression analysis for panel data tests the hypotheses using all firms that had SOX 404 filings and that were audited by the same auditor over the period 2005-2008 (1,668 firms; 6,672 firm-year observations).

Findings – Findings document that Big 4 continuing clients are less likely to report material weaknesses and systemic material weaknesses than Non-Big 4 continuing clients, especially during the first two years of investigation. Results also demonstrate that the number of material weaknesses and that of systemic material weaknesses reported by Big 4 continuing clients is significantly lower than that reported by Non-Big 4 continuing clients, primarily for the years 2005 and 2006.

Originality/value – Findings support the risk avoidance perspective where large audit firms avoid riskier clients due to potential litigation costs and/or due to potential sanctions by the Public Company Accounting Oversight Board (PCAOB). Results also suggest that smaller audit firms did not extensively test the quality of internal controls prior to the year 2004. They highlight that the enactment of SOX 404 and the establishment of the PCAOB heightened audit firms focus on internal controls and raised their sensitivity to audit risk arising from weaknesses in internal controls over financial reporting.

Keywords Auditors, Portfolio investment, Sarbanes-Oxley, Corporate governance, Financial reporting, Internal control

Paper type Research paper

Introduction

Auditors' portfolio management decisions have been a subject for academic research over the past decades (Landsman *et al.*, 2009). Prior research explores the evolution of audit firm clients' portfolio using two theoretical perspectives: risk-based and/or auditor-client misalignment-based perspective (Johnstone and Bedard, 2004; Landsman *et al.*, 2009)[1]. Findings document that audit firms consider:

- the risk profile of current and potential clients;
- the variation in the litigation environment facing the auditing industry; and
- the presence of auditor-client misalignment when managing their portfolios (Hogan and Martin, 2009; Landsman *et al.*, 2009; Choi *et al.*, 2004; Francis and Krishnan, 2003).

This paper extends current research by investigating the riskiness of audit firms' continuing clients over the period of 2005-2008 using audit risk proxies. It first tests whether firms audited by the same Big 4 audit firm (Big 4 continuing clients) are more/less likely to report a material weakness in internal controls over financial reporting

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than those audited by the same Non-Big 4 audit firm (Non-Big 4 continuing clients). It also investigates whether the presence of systemic, entity wide, and more pervasive material weaknesses in internal controls over financial reporting varies between Big 4 and Non-Big 4 continuing clients. Finally, it examines whether the number of material weaknesses and that of systemic material weaknesses varies among the two groups.

Findings document that Big 4 continuing clients are less likely to report material weaknesses and systemic material weaknesses in internal controls than Non-Big 4 continuing clients, especially during the first two years under investigation. Results also demonstrate that the number of material weaknesses and that of systemic material weaknesses reported by Big 4 continuing clients is significantly lower than that reported by Non-Big 4 continuing clients, primarily during the years 2005 and 2006. Taken together, these finding suggest that large audit firms are more likely to avoid risky clients due to associated costs arising from litigation and/or from sanctions by the Public Company Accounting Oversight Board (PCAOB). They also imply that smaller audit firms did not extensively test for weaknesses in internal controls prior to the year 2004.

This paper contributes to the literature in the following ways. First, it investigates auditor portfolio management decisions using a continuing portfolio of Big N/Non Big continuing clients to control for audit firm-client misalignment. Prior research investigating auditor portfolio management decisions fails to control for potential auditor-client misalignment by incorporating clients switching within the Big N/Non-Big N audit firm category. These switches may reflect a misalignment between the audit firm and its clients and/or a change in the sensitivity of the auditor to financial and/or audit risk. Landsman *et al.* (2009) criticize prior research for not considering the important and potentially confounding effects of auditor-client misalignment and document that capacity shocks following Enron increased the sensitivity of Big N audit firms to client misalignment.

Second, this paper investigates audit firms portfolio management decisions using a more comprehensive dataset that encompasses audit risk proxies. Prior research primarily investigates auditor portfolio management decisions using financial risk proxies, since audit risk proxies were not publicly available prior to the enactment of Section 404 of the SOX act[2]. Johnstone and Bedard (2004) note that audit firms attribute greater attention to audit risk than to financial risk for the following reasons. First, audit firms can manage their exposure to financial risk by complying with GAAP and GAAS, or by issuing a going-concern opinion in the event of imminent financial distress. Second, the likelihood of litigation and the associated costs to the audit firm arising from financial risk is relatively lower than that arising from audit risk (Bonner *et al.*, 1998; Palmrose, 2000).

Third, this paper examines the risk profile of audit firms clients' portfolio over a unique time period that follows the significant changes to the auditing industry over the years 2002-2004[3]. The creation of the PCAOB in 2002 exposed audit firms to increased monitoring and opened the way for the suspension or termination of an auditor's registration with the PCAOB (Hogan and Martin, 2009). The demise of Arthur Andersen in 2002 and the implementation of Section 404 of the Sarbanes-Oxley Act starting November 2004 changed the supply of and demand for audit and non-audit services resulting in an increase in auditor switching activity (Hogan and Martin, 2009; Landsman *et al.*, 2009)[4].

Fourth, this paper extends the growing literature on weaknesses in internal controls including the determinants of internal control problems (Krishnan, 2005;

Zhang *et al.*, 2007; Ge and McVay, 2005; Doyle *et al.*, 2007b; Ashbaugh-Skaife *et al.*, 2007), and their implications on financial reporting quality, cost of capital, and firm value (Doyle *et al.*, 2007a; Hammersley *et al.*, 2007). Finally, this paper contributes to practice by documenting a differential sensitivity to control risk among audit firms prior to the enactment of SOX 404 as Non-Big 4 audit firms did not equally test for weaknesses in internal controls prior to the enactment of SOX 404 as Big 4 audit firms.

The paper proceeds as follows. The following section presents the literature review and development of hypotheses. It next presents the methodology including sample selection and statistical models, in addition to the results to conclude with a section on contributions, limitations, and future research avenues.

Theoretical framework and hypotheses development

Audit firms manage their portfolio of clients using client acceptance, client continuance, and client discontinuance decisions (Johnstone and Bedard, 2004). Such portfolio management decisions, which are based on auditors' assessment of financial risk, audit risk, and auditor business risk[5] (Johnstone and Bedard, 2004; Shu, 2000), change the composition of the Big N/Non-Big N audit firm clients' portfolio and its riskiness over time[6]. Two competing views exist. The first (risk avoidance) posits that large audit firms are more likely to avoid risky clients than smaller audit firms since they have more to lose from an audit failure, both in terms of out-of-pocket litigation losses and reputation declines (Jones and Raghunandan, 1998). The second (risk tolerance) suggests that large audit firms are more likely to serve risky clients since they:

- can spread any given client risk over a diversified portfolio of clients; and
- rely on high-quality service to obtain reasonable assurance that no misstatements exist in the clients' financial statements (Francis and Reynolds, 2003; Francis and Krishnan, 2003).

The existing literature demonstrates a variation in the riskiness of Big N/Non-Big N evolving clients' portfolios using financial risk proxies prior to the year 2004. For instance, Jones and Raghunandan (1998) examine the change in the proportion of high-risk clients audited by Big 6 and Non-Big 6 audit firms over the period 1987-1994. The authors document that the likelihood of large auditors serving financially distressed clients and clients operating in the high-tech industry is lower in 1994 than in 1987, a period of increasing litigation costs. Francis and Reynolds (2003) compare the riskiness of large audit firms' clientele to that of small audit firms over the period 1976-1996. The authors show that although Big 6 audit firms' portfolios are less risky than those of Non-Big 6 audit firms, Big 6 firms' portfolios became riskier from 1976 to 1996 in terms of financial and market risk measures. Similarly, Francis and Krishnan (2003) show that from 1990 to 1994, Big 6 audit firms' portfolios became more risky in terms of financial and market risk measures and that Big 6 firms were also less conservative in their financial reporting behavior (i.e. issuing fewer going-concern reports). From 1995 to 1997, Francis and Krishnan (2003) show no further increase in financial and market risk measures but show a continuing trend in financial reporting behavior. Choi *et al.* (2004) document a decrease in the financial riskiness of large US audit firm clienteles over the period 1985-1989, strong evidence of risk decreases during 1990-1994, and strong evidence of risk increases during 1995-1999. Finally, Hogan and Martin (2009) investigate changes in the risk profile of second-tier audit firms over the period 2000-2004. Findings show that

although second tier audit firms accept clients having greater audit and client business risk than existing clients, they shed clients having greater risks relative to existing clients. They also took on riskier clients from the Big 4 auditors and shed riskier clients rebalancing their portfolios.

The disclosure of weaknesses in internal controls over financial reporting under the Sarbanes-Oxley Act of 2002 provide unique insights over auditor portfolio management decisions related to audit firms clients' control risk (Elder *et al.*, 2008). Starting November 2004, SOX 404 requires top management to assess the quality of internal controls over financial reporting. It also requires auditors to report on management assessments of internal control structures and to provide their own attestation on the effectiveness of internal controls. Weak internal controls provide management with greater discretion over the financial reporting process increasing the risk of earnings management and/or material misstatements (Ashbaugh-Skaife *et al.*, 2007; Doyle *et al.*, 2007a) and resulting in a greater exposure to audit risk and to future litigation (Stice, 1991; Lys and Watts, 1994).

The risk avoidance perspective posits that Big 4 audit firms are less likely to keep clients having higher audit risk in their continuing client portfolio than Non-Big 4 audit firms in order to reduce their litigation risk and/or to prevent potential sanctions by the PCAOB. In contrast, the risk tolerance perspective suggests that Big 4 audit firms are more likely to include firms having larger audit risk in their continuing client portfolio than Non-Big 4 audit firms capitalizing on their expertise and larger pool of clients. The scant empirical evidence supports the risk avoidance perspective by documenting a decrease in auditor quality (a shift from Big 4 to Non-Big 4 or from a Non-Big 4 to a smaller audit firm) following the disclosure of material weaknesses in internal controls prior to the SOX 404 period (Hertz, 2006).

Given these two conflicting perspectives and the scant empirical evidence available, this paper tests the following non-directional hypothesis:

H_{1a}. The presence of material weaknesses in internal controls over financial reporting is not significantly different between Big 4 and Non-Big 4 continuing clients.

Audit risk is expected to be more significant in firms having systemic and entity-wide material weaknesses as opposed to those having account-specific material weaknesses. Systemic material weaknesses are more pervasive, more difficult to audit, and call into question management's ability to prepare accurate financial statements and to control the business (Doyle *et al.*, 2007b; Ettredge *et al.*, 2006). Account-specific material weaknesses, however, do not present a serious concern for the reliability of financial statements since they are identifiable by the auditor through substantive testing (Doyle *et al.*, 2007b; Ettredge *et al.*, 2006; Hermanson and Ye, 2007). Audit risk may also be more significant in firms having a larger number of material weaknesses in internal controls over financial reporting since they may represent a set of internal control problems that is more serious, more pervasive, and more difficult to remediate (Hermanson and Ye, 2007; Li *et al.*, 2007).

The risk avoidance perspective posits that Big 4 continuing clients are less likely to report the presence of systemic material weaknesses than Non-Big 4 continuing clients. It also suggests that the number of material weaknesses and that of systemic material weaknesses reported by Big 4 continuing clients is significantly lower than that reported by Non-Big 4 continuing clients. The opposite may be true under the risk tolerance

perspective. Scant empirical evidence supports the risk avoidance perspective. For instance, Ettredge *et al.* (2006) find that Big 4 audit firms are less likely to serve as successor auditors when the prior auditor resigned and a systemic material weakness is reported. Thevenot and Hall (2009) find that the number of systemic material weaknesses is associated with switches from Big 4 audit firms.

Hence, given the presence of two competing perspectives and the scant empirical evidence available, the paper tests the following non-directional hypotheses:

$H_{1b.}$ The presence of systemic material weaknesses in internal controls over financial reporting is not significantly different between Big 4 and Non-Big 4 continuing clients.

$H_{2a.}$ The number of material weaknesses in internal controls over financial reporting reported by Big 4 continuing clients is not significantly different from that reported by Non-Big 4 continuing clients.

$H_{2b.}$ The number of systemic material weaknesses in internal controls over financial reporting reported by Big 4 continuing clients is not significantly different from that reported by Non-Big 4 continuing clients.

Methodology

Sample

The initial sample includes all firms that had SOX 404 filings and that were audited by the same auditor over the period 2005-2008 (2,271 firms; 9,084 firm-year observations) as reported by the Audit Analytics database. In line with Landsman *et al.* (2009), this paper excludes 521 firms (2,084 firm-year observations) operating in the financial services industry (SIC Code: 6000-6999) and 82 firms (328 firm-year observations) with missing Compustat data to reach a final sample of 1,668 firms (6,672 firm-year observations). Table I shows that sample firms primarily operate in the manufacturing, transportation, and services industry with a concentration in the manufacturing industry.

Research models

Two different models are used to tests the hypotheses. The first tests whether the likelihood of having:

SIC code	Industry	Overall	Big 4	Non-Big 4
10-14	Mining	93 (5.58)	81 (5.34)	12 (8.00)
15-17	Construction	17 (1.02)	16 (1.05)	1 (0.67)
20-39	Manufacturing	825 (49.46)	758 (49.93)	67 (44.67)
40-49	Transportation, communications, electric, gas, and sanitary services	214 (12.83)	199 (13.11)	15 (10.00)
50-51	Wholesale trade	55 (3.30)	51 (3.36)	4 (2.67)
52-59	Retail trade	142 (8.51)	131 (8.63)	11 (7.33)
70-89	Services	324 (19.42)	282 (18.58)	40 (28.00)
Total		1,668 (100.00)	1,518 (100.00)	150 (100.00)

Note: Values in parentheses are in percentage

Table I.
Sample distribution by industry and audit firm

- a material weaknesses; or
- a systemic material weakness in internal controls over financial reporting, *WEAK*, is significantly different between Big 4 and Non-Big 4 continuing clients (H_{1a} and H_{1b}, respectively) using logistic regression for panel data (balanced panel) as follows:

$$\begin{aligned} Model\,1: WEAK = {} & \alpha + \beta_1{*}AUD + \beta_2{*}SEG + \beta_3{*}FOR + \beta_4{*}M\&A + \beta_5{*}RESTR \\ & + \beta_6{*}LOSS + \beta_7{*}MVEQ + \beta_8{*}RESTAT + \beta_9{*}LITIG \\ & + \beta_{10}{*}ALTMAN + \beta_{11}{*}QR + \beta_{12}{*}FCF + \beta_{13}{*}SALGROW \\ & + \beta_{14}{*}AGE + YRDUM + INDDUM \end{aligned}$$

Our dependent variable, WEAK, takes the value of 1 in the presence of a material weakness or in the presence of a systemic material weakness, and 0 otherwise. In line with prior research, firms having a material weakness include those firms reported by audit analytics to have one or more material weakness in internal controls over financial reporting (Doyle *et al.*, 2007b; Ettredge *et al.*, 2006; Raghunandan and Rama, 2006). Likewise, firms having a systemic material weakness include those having material weaknesses related to the control environment (audit committee, board of directors, and internal audit), management integrity, information technology systems, and/or financial reporting processes (Doyle *et al.*, 2007b; Ettredge *et al.*, 2006; Raghunandan and Rama, 2006).

As for our second model, it includes a count regression model for panel data (balanced panel) and tests whether the number of material weaknesses or systemic material weaknesses in internal controls over financial reporting, WEAKNUM, reported by Big 4 continuing clients is significantly different from that reported by Non-Big 4 continuing clients (H_{2a} and H_{2b}, respectively) as follows:

$$\begin{aligned} Model\,2: WEAKNUM = {} & \alpha + \beta_1{*}AUD + \beta_2{*}SEG + \beta_3{*}FOR + \beta_4{*}M\&A \\ & + \beta_5{*}RESTR + \beta_6{*}LOSS + \beta_7{*}MVEQ + \beta_8{*}RESTAT \\ & + \beta_9{*}LITIG + \beta_{10}{*}ALTMAN + \beta_{11}{*}QR + \beta_{12}{*}FCF \\ & + \beta_{13}{*}SALGROW + \beta_{14}{*}AGE + YRDUM + INDDUM \end{aligned}$$

Both models include a test variable, AUD, which takes the value of 1 in case the auditor is a Big 4 audit firm, 0 otherwise. The models also control for a wide battery of variables identified in the internal controls over financial reporting literature (Ashbaugh-Skaife *et al.*, 2007; Doyle *et al.*, 2007b; Ge and McVay, 2005; Ogneva *et al.*, 2007). It first controls for the complexity and scope of a firm's operations using the number of reported business segments (SEG) and foreign sales (FOR). Second, the model controls for changes in organization structure through mergers or acquisitions (M&A) or through restructurings (RESTR) over the three years preceding the SOX 404 filing date. It also controls for firm's financial performance (LOSS), firm size (MVEQ), financial restatements (RESTAT), litigation risk (LITIG) related to industry affiliation, and financial risk proxies including Altman Z score (ALTMAN), quick ratio (QR) and free cash flows (FCF) available to the firm, sales growth (SALGROW) and firm age (AGE), in addition to year of SOX filing (YRDUM) and industry affiliation (INDDUM).

Table II presents the distribution of weaknesses in internal controls over financial reporting by year and audit firm category (Big 4 and Non-Big 4 audit firms). Sample firms disclosed the presence of material weaknesses (systemic material weaknesses) 415 (168) times over the period 2005-2008, 352/63 (148/20) of which are reported by Big 4 (Non-Big 4) audit firm clients. The percentage of firms disclosing the presence of weaknesses in internal controls declined over time for the overall sample, for Big 4 continuing clients, and for Non-Big 4 continuing clients. In addition, the likelihood of reporting material weaknesses is significantly lower for Big 4 continuing clients as compared to Non-Big 4 continuing clients during the years 2005 ($p < 0.01$) and 2006 ($p < 0.01$), while that for disclosing systemic material weaknesses is significantly lower for the year 2005 only ($p < 0.01$). This finding provides preliminary support for the risk avoidance perspective by documenting a lower risk profile for Big 4 continuing clients as opposed to Non-Big 4 continuing clients at the beginning of the time period under consideration.

Table III presents the number of weaknesses in internal controls over financial reporting by year and by audit firm category (Big 4 and Non-Big 4 audit firms). Data in Table III corroborate that presented in Table II by documenting a decrease in the average number of weaknesses in internal controls over financial reporting reported by sample firms. Firms in our sample reported an average of 0.22 (0.13) material weaknesses (systemic material weaknesses) over the period 2005-2008. Firms audited by Big 4 (Non-Big 4) reported an average of 0.21 (0.37) material weaknesses and 0.12 (0.22) systemic material weaknesses over the same time period. The mean number of weaknesses in internal controls (both material and systemic weaknesses) is significantly lower for Big 4 continuing clients as compared to Non-Big 4 continuing clients during the years 2005 and 2006 ($p < 0.01$; $p < 0.05$). This finding provides further support for the

Year	Overall N (%)	Big 4 N (%)	Non-Big 4 N (%)
Panel A – MW			
2005	172 (10.97)	139 (9.16)	33 (22.00)*
2006	108 (6.89)	91 (5.99)	17 (11.33)*
2007	91 (5.80)	82 (5.40)	9 (6.00)
2008	44 (3.81)	40 (2.64)	4 (2.67)
Pooled	415 (6.22)	352 (5.80)	63 (10.50)*
Panel B – SMW			
2005	85 (5.42)	72 (4.74)	13 (8.67)*
2006	43 (2.74)	38 (2.50)	5 (3.33)
2007	31 (1.98)	29 (1.91)	2 (1.33)
2008	9 (0.57)	9 (0.59)	0 (0.00)
Pooled	168 (2.52)	148 (2.44)	20 (3.33)

Notes: Significance at the *1 and **5 percent level using non-parametric, two-tailed tests; Big 4/Non-Big 4 (N) – the number of firms audited by Big 4/Non-Big 4 (N) and reporting the presence of weaknesses in internal controls over financial reporting (material weaknesses (MW) and/or systemic material weaknesses (SMW)) during each year and over the pooled time period, 2005-2008; Big 4/Non-Big 4 (%) – the percentage of firms audited by Big 4/Non-Big 4 (N) and reporting the presence of weaknesses in internal controls over financial reporting (material weaknesses (MW) and/or systemic material weaknesses (SMW)) on a yearly basis and pooled over the period 2005-2008; values in parentheses are in percentage

Table II.
The number (percentage) of firms reporting the presence of material weaknesses (MW) or systemic material weaknesses (SMW) in internal controls over financial reporting over the period 2005-2008

Year	Overall	Big 4	Non-Big 4
Panel A – MW			
2005	0.37	0.34	0.71*
2006	0.24	0.22	0.42*
2007	0.19	0.20	0.25
2008	0.09	0.09	0.10
Pooled	0.22	0.21	0.37*
Panel B – SMW			
2005	0.21	0.19	0.41*
2006	0.13	0.12	0.25**
2007	0.10	0.11	0.16
2008	0.05	0.05	0.06
Pooled	0.13	0.12	0.22*

Table III.
The average number of material weaknesses (MW) or systemic material weaknesses (SMW) in internal controls over financial reporting over the period 2005-2008

Notes: Significance at the *1 and **5 percent level using non-parametric, two-tailed tests; Big 4 – the average number of weaknesses in internal controls over financial reporting (material weaknesses (MW) and/or systemic material weaknesses (SMW)) reported by Big 4 audit firm continuing clients during each year and over the pooled time period, 2005-2008; Non-Big 4 – the average number of weaknesses in internal controls over financial reporting (material weaknesses (MW) and/or systemic material weaknesses (SMW)) reported by Non-Big 4 audit firm continuing clients during each year and over the pooled time period, 2005-2008

risk avoidance perspective by documenting that the risk profile of Big 4 portfolio of continuing clients is significantly lower than that of Non-Big 4 continuing clients during the first two years of the time under consideration.

Results

Table IV presents logistic regression analysis for the pooled sample (balanced panel data analysis) over the period 2005-2008. The first (second) model tests whether the presence of material weaknesses (MW) or systemic material weaknesses (SMW) in internal controls over financial reporting varies between Big 4 and Non-Big 4 continuing clients. Both models are significant with Wald χ^2 equal to 201.63 and 194.83, respectively, ($p < 0.00$). Model 1 documents that Big 4 continuing clients are less likely to report material weaknesses than Non-Big 4 continuing clients ($-0.44, p < 0.01$). This finding supports the risk avoidance perspective by documenting that large audit firms are more likely to avoid riskier clients than Non-Big 4 audit firms. This may be primarily due to the fact that Big 4 audit firms have more to lose in case of litigation and/or in case of sanctions by the PCAOB. Yearly logistic regression analysis (un-tabulated) documents that the risk profile of Big 4 continuing clients is significantly lower than that of Non-Big 4 continuing clients for the years 2005 and 2006 only ($p < 0.01$). In other words, although Non-Big 4 audit firms had a riskier client portfolio at the beginning of the time period under consideration, they had a risk profile which is comparable to that of Big 4 audit firms in later years.

Model 2 shows that the likelihood of having systemic material weaknesses is also significantly different between Big 4 and Non-Big 4 continuing clients ($-0.39, p < 0.01$). Big 4 audit firms also seem to be more sensitive to the risks arising from the presence of systemic material weaknesses in internal controls over financial reporting than Non-Big 4 audit firms. This finding may be due to the severity of systemic material weaknesses and

Variables	Predicted sign	MW Coef.	*Z*-value	SMW Coef.	*Z*-value
INTERCEPT	?	−1.77***	−5.35	−1.81***	−5.41
AUD	?	−0.44***	−2.92	−0.39***	−2.55
SEG	+	0.03***	6.08	0.03***	5.98
FOR	+	0.06	0.50	0.08	0.67
M&A	+	0.22*	1.63	0.21*	1.55
RESTR	+	0.23**	2.01	0.28**	1.92
LOSS	+	0.52***	3.97	0.54***	4.08
MVEQ	−	−0.21***	−6.18	−0.21***	−6.17
RESTAT	+	0.60***	4.19	0.60**	4.13
LITIG	+	0.14	1.10	0.15	1.16
ALTMAN	+	0.02*	0.80	0.00	0.33
QR	+	0.05*	1.51	0.09***	2.74
FCF	+	0.01***	2.63	0.01***	2.73
SALGROW	+	0.01*	1.37	0.01	1.31
LNAGE	−	−0.13**	−1.70	−0.12*	−1.58
YRDUM		Yes		Yes	
INDDUM		Yes		Yes	
No. of observations		6,672		6,712	
No. of groups		1,678		1,678	
Wald χ^2 ($p < 0.00$)		201.63		194.83	

Notes: Significance at the *10, **5, and ***1 percent level (two-tailed tests); WEAKNUM – the number of material weaknesses or systemic material weaknesses in internal controls over financial reporting reported by sample firms; AUD – dummy variable that takes the value of 1 in case the auditor is a Big 4 audit firm, 0 otherwise; SEG – number of reported business segments for the year using Compustat Segment file; FOR – coded 1 if Compustat reports a non-zero foreign currency translation in year t, and zero otherwise; M&A – coded 1 if Compustat AFNT no. 1 reports that the firm was involved in a merger or acquisition over the three years preceding the SOX 404 filing date, and zero otherwise; RESTR – coded 1 if a firm was involved in a restructuring (Compustat data items 376, 377, 378 or 379 are non-zero) over the three years preceding the SOX 404 filing date, and zero otherwise; LOSS – coded 1 in the presence of a loss over the three years preceding the SOX 404 filing date; MVEQ – share price x number of shares outstanding at the end of the year; RESTAT – coded 1 in case the firm had a financial restatement over the three years preceding the SOX 404 filing date; LITIG – coded 1 if a firm was in a litigious industry – SIC codes 2833-2836; 3570-3577; 3600-3674; 5200-5961; and 7370, and zero otherwise; ALTMAN: 1.2*(current assets – current liabilities) +1.4*(retained earnings scaled by total assets) + 3.3*(earnings before interest and taxes scaled by total assets) + 0.6*market value of equity scaled by total liabilities + 0.998*(sales scaled by total assets); QR – quick assets over current liabilities; FCF – operating income before depreciation – income taxes – interest expense – preferred dividends – common dividends; SALGROW – dummy variable taking the value of 1 in case industry adjusted sales revenue growth falls in the top quintile for a given year; LNAGE – natural log of the age of the firm as per Compustat IPO date; YRDUM – dummy variables that take the value of 1 for SOX 404 filings during the years 2005, 2006, and 2007, respectively, 0 otherwise; INDDUM – dummy variables that take the value of 1 in case a firm operates in the mining, manufacturing, transportation, wholesale, retail, and services industry, respectively, 0 otherwise; $WEAK = \alpha + \beta_1{*}AUD + \beta_2{*}SEG + \beta_3{*}FOR + \beta_4{*}M\&A + \beta_5{*}RESTR + \beta_6{*}LOSS + \beta_7{*}MVEQ + \beta_8{*}RESTAT + \beta_9{*}LITIG + \beta_{10}{*}ALTMAN + \beta_{11}{*}QR + \beta_{12}{*}FCF + \beta_{13}{*}SALGROW + \beta_{14}{*}AGE + YRDUM + INDDUM$

Table IV.
Logistic regression analysis

to the potential costs arising from future litigation and/or PCAOB sanctions. Yearly analysis (not reported) show that the risk profile for Big 4 and Non-Big 4 audit firms continuing clients is significantly different for the first year, 2005, only ($p < 0.01$). Taken together, the findings in Table IV suggest that many audit firms, especially smaller

audit firms, did not extensively test for weaknesses in internal controls prior to the year 2004.

Additional results in Table IV concur with prior research findings related to the disclosure of material weaknesses in internal controls over financial reporting. Table IV documents that the likelihood of reporting weaknesses in internal controls (material weaknesses or systemic material weaknesses) is positively related to the number of segments (0.03; $p < 0.01$), M&A activity (0.22, 0.21; $p < 0.10$), restructuring (0.23, 0.28; $p < 0.05$), and financial losses (0.52, 0.54; $p < 0.01$). The likelihood of reporting weaknesses in internal controls is also positively related to financial restatements (0.60; $p < 0.05$, 0.01) and firm liquidity as measured by the quick ratio (0.05, 0.09; $p < 0.10$, 0.01) and free cash flows (0.01; $p < 0.01$), while being negatively related to firm size (-0.21; $p < 0.01$) and firm age (-0.13, -0.12; $p < 0.05$, 0.10).

Table V presents count regression analysis for the pooled sample (balanced panel data analysis) over the period 2005-2008. The first (second) model tests whether the number of material weakness (systemic material weakness) varies between Big 4 and Non-Big 4 continuing clients. Both models are significant with likelihood ratio (LR) χ^2 equal to 306.08 and 195.45 ($p < 0.00$), respectively. Models 1 and 2 document that the number of material weaknesses and systemic material weaknesses reported by Big 4 continuing clients is significantly lower than that reported by Non-Big 4 continuing clients (-0.29, -0.31; $p < 0.05$). This finding provides further support for the risk avoidance perspective and documents that smaller audit firms are providing attestation services for riskier clients. Yearly logistic analysis (un-tabulated) shows that the risk profile for Big 4 continuing clients is significantly lower than that of Non-Big 4 continuing clients for the years 2005 and 2006 ($p < 0.01$) only. This finding suggest that Non-Big 4 audit firms managed to reduce the risk profile of their continuing clients to match that of Big 4 continuing clients in later years.

Additional results in Table V concur with prior research findings related to the number of weaknesses in internal controls over financial reporting. Findings document that the number of material weaknesses or systemic material weaknesses in internal controls is positively related to the number of segments (0.03; $p < 0.01$), M&A activities (0.25, 0.24; $p < 0.05$, 0.10), restructuring (0.22, 0.19; $p < 0.01$, 0.10), and financial losses (0.67, 0.75; $p < 0.01$). The likelihood of reporting weaknesses in internal controls is also positively related to financial restatements (0.69, 0.76; $p < 0.01$), liquidity proxied for using the quick ratio (0.12, 0.17; $p < 0.01$) and free cash flows (0.00, 0.01; $p < 0.01$), and sales growth (0.01; $p < 0.10$), while being negatively related to firm size (-0.19; $p < 0.01$).

Additional analysis

This paper performs additional analyses as follows. First, it replicates the tests reported in Tables IV and V after excluding firms operating in the manufacturing industry given their predominance in the sample. Findings primarily confirm those obtained with the full sample with minor exceptions. For instance, Big 4 continuing client portfolio are less likely to report material weaknesses (systemic material weaknesses) in internal controls than Non-Big 4 audit firms (-0.48; $p < 0.05$; -0.38; $p < 0.05$). Results also show that Big 4 audit firms report a significantly lower number of material weaknesses (systemic material weaknesses) in internal controls than Non-Big 4 audit firms (-0.32; $p < 0.10$; -0.34; $p < 0.10$). In contrast, the parameter estimates for foreign sales and quick ratio lost their significance in the four tests ($p > 0.10$).

Variables	Predicted sign	MW Coef.	*Z*-value	SMW Coef.	*Z*-value
INTERCEPT	?	−0.66**	−1.94	−1.18***	−3.18
AUD	?	−0.29**	−2.00	−0.31**	−2.00
SEG	+	0.03***	6.45	0.03***	6.02
FOR	+	0.06	0.53	0.09	0.73
M&A	+	0.25**	1.75	0.24*	1.57
RESTR	+	0.22**	1.93	0.19*	1.56
LOSS	+	0.67***	5.05	0.75***	5.29
MVEQ	−	−0.19***	−5.84	−0.19***	−5.35
RESTAT	+	0.69***	4.89	0.76***	5.03
LITIG	+	0.14	1.16	0.21*	1.52
ALTMAN	+	0.01	0.67	0.01	0.22
QR	+	0.12***	3.32	0.17***	4.32
FCF	+	0.00***	4.40	0.01***	3.90
SALGROW	+	0.01*	1.58	0.01*	1.54
AGE	−	−0.06	−0.76	−0.05	−0.37
YRDUM		Yes		Yes	
INDDUM		Yes		Yes	
No. of observations		6,672		6,672	
No. of groups		1,618		1,618	
LR χ^2 ($p < 0.00$)		306.08		195.45	

Notes: Significance at the *10, **5, and ***1 percent level (two-tailed tests); WEAKNUM – the number of material weaknesses or systemic material weaknesses in internal controls over financial reporting reported by sample firms; AUD – dummy variable that takes the value of 1 in case the auditor is a Big 4 audit firm, 0 otherwise; SEG – number of reported business segments for the year using Compustat Segment file; FOR – coded 1 if Compustat reports a non-zero foreign currency translation in year t, and zero otherwise; M&A – coded 1 if Compustat AFNT no. 1 reports that the firm was involved in a merger or acquisition over the three years preceding the SOX 404 filing date, and zero otherwise; RESTR – coded 1 if a firm was involved in a restructuring (Compustat data items 376, 377, 378 or 379 are non-zero) over the three years preceding the SOX 404 filing date, and zero otherwise; LOSS – coded 1 in the presence of a loss over the three years preceding the SOX 404 filing date; MVEQ – share price x number of shares outstanding at the end of the year; RESTAT – coded 1 in case the firm had a financial restatement over the three years preceding the SOX 404 filing date; LITIG – coded 1 if a firm was in a litigious industry – SIC codes 2833-2836; 3570-3577; 3600-3674; 5200-5961; and 7370, and zero otherwise; ALTMAN – 1.2*(current assets - current liabilities) +1.4*(retained earnings scaled by total assets) + 3.3*(earnings before interest and taxes scaled by total assets) + 0.6*market value of equity scaled by total liabilities + 0.998*(sales scaled by total assets); QR – quick assets over current liabilities; FCF – operating income before depreciation – income taxes – interest expense – preferred dividends – common dividends; SALGROW – dummy variable taking the value of 1 in case industry adjusted sales revenue growth falls in the top quintile for a given year; LNAGE – natural log of the age of the firm as per Compustat IPO date; YRDUM – dummy variables that take the value of 1 for SOX 404 filings during the years 2005, 2006, and 2007, respectively, 0 otherwise; INDDUM – dummy variables that take the value of 1 in case a firm operates in the mining, manufacturing, transportation, wholesale, retail, and services industry, respectively, 0 otherwise; $WEAKNUM = \alpha + \beta_1{*}AUD + \beta_2{*}SEG + \beta_3{*}FOR + \beta_4{*}M\&A + \beta_5{*}RESTR + \beta_6{*}LOSS + \beta_7{*}MVEQ + \beta_8{*}RESTAT + \beta_9{*}LITIG + \beta_{10}{*}ALTMAN + \beta_{11}{*}QR + \beta_{12}{*}FCF + \beta_{13}{*}SALGROW + \beta_{14}{*}AGE + YRDUM + INDDUM$

Table V.
Count regression analysis

Second, the paper replicates the analyses reported in Tables IV and V using firms audited by the same Big 4/Non-Big 4 audit firm over the period 2004-2008. The sample includes 998 firms (4,990 firm years) reporting SOX 404 filings with full available data firms and audited by the same audit firm over the period 2004-2008. Data analysis shows that 134

firms (13.40 percent) reported weaknesses in internal controls over financial reporting during the year 2004. Results confirm our prior analysis by confirming a significant association between Big 4 audit firm continuing client portfolio and the disclosure of both material weaknesses and systemic material weaknesses in internal control over financial reporting (-0.40, -0.36; $p < 0.01$). Findings also document that Big 4 audit firm continuing clients report a significantly lower number of material weaknesses and of systemic material weaknesses than Non-Big 4 audit firms (-0.26, -0.39; $p < 0.01$). Other findings are comparable to those documented for the 2005-2008 sample.

Discussion, contributions, and limitations

This paper investigates the riskiness of audit firms' continuing clients over the period of 2005-2008. It first tests whether firms audited by the same Big 4 audit firm (Big 4 continuing clients) are more/less likely to report material weaknesses (systemic material weaknesses) in internal controls over financial reporting than those audited by the same Non-Big 4 audit firm (Non-Big 4 continuing clients). It also investigates whether the number of material weaknesses and that of systemic material weaknesses varies among the two groups. Findings document that Big 4 continuing clients are less likely to report material weaknesses and systemic material weaknesses than Non-Big 4 continuing clients, especially during the first two years of investigation. Results also demonstrate that the number of material weaknesses and that of systemic material weaknesses reported by Big 4 continuing clients is significantly lower than that reported by Non-Big 4 continuing clients, primarily for the first two years under investigation, 2005 and 2006. These finding are in line with the risk avoidance perspective where large audit firms avoid riskier clients due to potential litigation costs and/or due to potential sanctions by the PCAOB.

This paper contributes to the literature in the following ways. First, it investigates the riskiness of audit firms continuing clients' portfolio over a unique time period that was not investigated before. Second, it examines audit firm portfolio management decisions using a more comprehensive dataset that encompasses audit risk proxies and a unique research design that controls for auditor-client misalignment. Third, it extends the growing literature on weaknesses in internal controls including the determinants of internal control problems. Finally, this paper contributes to practice by showing that audit firms were not equally sensitive to control risk prior to the enactment of SOX 404 and/or did not equally test for internal control weaknesses prior to the year 2004. Future research may compare the characteristics of newly accepted and departing Big 4 and Non-Big 4 clients to their continuing portfolio of clients. Future research may also compare the governance attributes of newly accepted and departing Big 4 and Non-Big 4 clients to their continuing portfolio of clients assuming that continuing clients constitute an optimal set of portfolio.

Notes

1. The risk-based perspective posits that audit firms are less (more) likely to accept (discontinue) riskier clients from the pool of available prospective clients (Bedard and Johnstone, 2004). As for the auditor-client misalignment perspective, it suggests that auditors are likely to continue (discontinue) the provision of their services to clients that fit (do not fit) with the firm's portfolio (Landsman *et al.*, 2009).

2. As an exception, Johnstone and Bedard (2004) investigate auditors client continuance and acceptance decisions at a large audit firm using proxies for clients' financial and audit risk for the year 2000-2001. The authors document that continuing client portfolio is declining in risk, and that differences are most evident in audit risk variables.
3. Ettredge *et al.* (2006) recommend excluding the last quarter of 2004 since firms required disclosing their reports in the initial year are fairly large and since regulations and guidance regarding these opinions is still coalescing.
4. Etredge *et al.* (2006) report an increase in auditor dismissals and resignations following the enactment of the SOX of 2002, while Ettredge *et al.* (2007) suggest that riskier clients are likely to switch from Big 4 to Non-Big 4 auditors leading to an increase in the overall risk profile of Non-Big 4 client portfolios.
5. This paper focuses on the risk-based perspective since our research design controls for auditor-client misalignment.
6. Auditors' portfolio management decisions also affect the financial stability of the audit industry and the valuation of audit firms' clients (Wells and Loudder, 1997; Khalil *et al.*, 2008).

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Appendix

Variable	Definition
WEAK	Dummy variable that takes the value of 1 in the presence of a material weakness or in the presence of a systemic material weakness, and 0 otherwise
WEAKNUM	The number of material weaknesses or systemic material weaknesses in internal controls over financial reporting reported by sample firms
AUD	Dummy variable that takes the value of 1 in case the auditor is a big 4 audit firm, 0 otherwise
SEG	Number of reported business segments for the year using Compustat Segment file
FOR	Coded 1 if Compustat reports a non-zero foreign currency translation in year t, and 0 otherwise
M&A	Coded 1 if Compustat AFNT no. 1 reports that the firm was involved in a merger or acquisition over the three years preceding the SOX 404 filing date, and 0 otherwise
RESTR	Coded 1 if a firm was involved in a restructuring (Compustat data items 376, 377, 378 or 379 are non-zero) over the three years preceding the SOX 404 filing date, and 0 otherwise
LOSS	Coded 1 in the presence of a loss over the three years preceding the SOX 404 filing date
MVEQ	Share price x number of shares outstanding at the end of the year
RESTAT	Coded 1 in case the firm had a financial restatement over the three years preceding the SOX 404 filing date
LITIG	Coded 1 if a firm was in a litigious industry – SIC codes 2833-2836; 3570-3577; 3600-3674; 5200-5961; and 7370, and 0 otherwise
ALTMAN	1.2*(current assets – current liabilities) +1.4*(retained earnings scaled by otal assets) + 3.3*(earnings before interest and taxes scaled by total assets) + 0.6*market value of equity scaled by total liabilities + 0.998*(sales scaled by total assets)
QR	Quick assets over current liabilities
FCF	Operating income before depreciation – income taxes – interest expense – preferred dividends- common dividends
SALGROW	Dummy variable taking the value of 1 in case industry adjusted sales revenue growth falls in the top quintile for a given year
LNAGE	Natural log of the age of the firm as per Compustat Company IPO date
YRDUM	Dummy variables that take the value of 1 for SOX 404 filings during the years 2005, 2006, and 2007, respectively, 0 otherwise
INDDUM	Dummy variables that take the value of 1 in case a firm operates in the mining, manufacturing, transportation, wholesale, retail, and services industry, respectively, 0 otherwise

Table AI.
Variable definition

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