Does Auditor Tenure Impact the Effectiveness of Auditors' Response to Fraud Risk?

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ABSTRACT: We examine how the effectiveness of the auditor's response to fraud risk is affected by auditor tenure. Using two different prediction models to identify the risk of fraud (specifically, the M-score developed by Beneish (1997, 1999) and the F-score developed by Dechow et al. (2011)), we identify a sample of company-years where fraud risk is high at the end of the second fiscal quarter, when auditors' risk assessment procedures are in process. We then examine whether auditor tenure affects the likelihood of a reduction in fraud risk during the remainder of the audit period, when auditors perform most substantive audit procedures. We find that the likelihood of a reduction in fraud risk is greater among companies with longer auditor tenure. In addition, when fraud risk is low at the end of the second fiscal quarter, the likelihood of an increase in fraud risk during the remainder of the audit period is lower among companies with longer auditor tenure. Thus, although regulators and some other stakeholders argue that 'fresh eyes' can improve auditor independence and skepticism, we find that auditors with 'fresh eyes' are less effective in responding to fraud risk and auditors with greater client experience and familiarity are more effective at responding to this risk. These findings are important because prior work suggests that long auditor tenure is not necessarily beneficial in the post-Sarbanes-Oxley Act era and because regulators continue to debate the benefits and costs of regulation that would shorten auditor tenure on average.

I. Introduction

Auditors are required to assess and respond to the risks of material misstatement in the financial statements. Financial statement auditing enhances investor confidence in companies' financial reports by providing reasonable assurance from a *credible* and *independent* source that the financial statements are prepared in accordance with accounting standards and fairly reflect the economic outcomes of the underlying business operations. When performing the audit, an auditor must assess the risk of both fraud and error, and the risk assessment standards issued by the Public Company Accounting Oversight Board (PCAOB) state that auditors must use prior client experience as a factor in this assessment. Specifically, PCAOB Auditing Standard No. 12, *Identifying and Assessing Risks of Material Misstatement* (AS 12), states that auditors should incorporate knowledge obtained during past audits of the client into their process for identifying risks of material misstatement.

The value of an auditor's client-specific experience can be offset, however, if longer auditor-client relationships result in impaired auditor skepticism and independence. Therefore, some regulators and others suggest that a "fresh look" which results from auditor rotation is beneficial. For example, at a Public Company Accounting Oversight Board (PCAOB) Investment Advisory Group meeting where lessons learned from the financial crisis were discussed, PCAOB members stated that "key to concern over independence was the level of 'coziness' the firm had with the management of the company being audited", and members noted that "[m]any of the auditors of the large companies involved in the financial crisis ... had long running audit relationships with those companies" (PCAOB 2011). Consistent with this concern,

PCAOB inspection findings related to public company audits suggest that many audit deficiencies result from a lack of auditor independence and/or appropriate skepticism.[1]

In this paper, we investigate whether the auditor's response to fraud risk differs with the length of auditor tenure. Specifically, we examine whether longer-tenured auditors are better able and/or willing to appropriately respond to high fraud risk.[2] The importance and complexity of the auditor's risk assessment process is evidenced by the volume of guidance provided in the PCAOB's recently released suite of risk assessment standards (i.e., Auditing Standard (AS) No. 8 through 15). These standards outline the risk assessment procedures that auditors should perform and provide specific guidance for identifying and assessing fraud risk, as well as guidance for the design of tests that are responsive to the identified fraud risks. Despite the importance of the risk assessment process for the quality of audits, DeFond and Zhang (2014) note that the assessment of and response to fraud risk has been virtually ignored in the archival audit literature.

We estimate fraud risk using the M-score (Beneish (1997, 1999) and Beneish et al. (2012)) and the F-score (Dechow et al. 2011). Using interim and annual data from 2004 through 2010, we measure fraud risk at two points – during the planning and risk assessment phase of the audit (using year-to-date financial statement data at the end of the second fiscal quarter) and after

[1] In a statement about the PCAOB's *Concept Release on Auditor Independence and Audit Firm Rotation*, PCAOB Chairman James Doty stated, "too often, the audit failures identified by inspectors do not appear to be explainable by any lack of knowledge, on the auditor's part, about what audit steps are required in the circumstances" (Doty 2011). According to PCAOB board member Steven Harris, "inspectors have raised numerous concerns about professional skepticism in their inspections of both large and small firms, and these concerns are cited too often to ignore" (Harris 2011).

[2] A recent survey by PricewaterhouseCoopers LLP notes a continuing upward trend in the occurrence and detection of accounting fraud. According to the survey, fraud at U.S. organizations has more than doubled since 2011 and most internal frauds are now perpetrated by middle management (see *Global Economic Crime Survey, 2014: Key Highlights from the U.S.* at http://www.pwc.com/us/crimesurvey). Moreover, PCAOB inspection reports reveal several instances where audit firms identify fraud risks but fail to complete audit procedures designed to address the heightened risk (see *KPMG, PwC 2012 Inspection Reports List More Failures* at http://www.complianceweek.com/kpmg-pwc-2012-inspection-reports-list-more-failures/article/309259/).

audit procedures are complete (using audited year-end financial statement data). For each of the two fraud risk measures, we construct a sample comprised of observations where fraud risk is high at the end of the second fiscal quarter and then determine whether fraud risk decreases as audit procedures are performed.

We begin our analyses by performing tests to validate our measure of a reduction in fraud risk as a proxy for an effective response by the auditor. Specifically, we investigate the extent to which the measured reduction in fraud risk is associated with measures of both auditor effort (as proxied for by audit fees) and audit quality (as proxied for by contemporaneous misstatements revealed through subsequent financial statement restatements, where misstatements are limited to those due to fraud or resulting from an SEC investigation). The results reveal that audit fees are significantly higher when fraud risk is reduced during the course of the audit (relative to when fraud risk remains high). We also find that for observations where fraud risk is high at the end of the second fiscal quarter, there is a lower likelihood of misstatement when fraud risk is reduced during the course of the audit (relative to when fraud risk remains high). We infer from these results that the observed reductions in fraud risk are achieved, at least in part, through increased auditor effort and that observed reductions in fraud risk are meaningful in that they imply a lower likelihood of misstatement in the annual financial statements.

In our main tests, we investigate the association between auditor tenure and a reduction in fraud risk, controlling for the effects of seasonality and changes in company performance on fraud risk. The results suggest that a reduction in fraud risk is more likely among clients with longer-tenured auditors. These results hold for both measures of fraud risk and in a sample limited to the post Auditing Standard No. 5 (AS5) period. In addition, we find that a reduction in fraud risk is more likely for long-tenured auditors (i.e., those with auditor-client relationships of

fifteen or more years) and less likely for short-tenured auditors (i.e., those with auditor-client relationships of three years or less). Because our sample is limited to observations where fraud risk is high at the end of the second fiscal quarter, we interpret our results as suggesting that longer-tenured auditors are better at appropriately responding to high fraud risk that exists early in the audit, presumably as a result of their greater familiarity with the client.

In supplemental tests, we use an alternative sample comprised of observations where fraud risk is not high at the end of the second fiscal quarter, and investigate whether auditor tenure is associated with the likelihood of an increase in fraud risk. Consistent with our main results, we find that an increase in fraud risk is less likely among clients with longer-tenured auditors. Collectively, our results suggest that longer-tenured auditors are more effective than shorter-tenured auditors at performing the critical audit task of identifying and responding to fraud risk.

We expect these results to be informative to a number of stakeholders (i.e., regulators, investors, audit firms, audit committees, management, etc.) involved in ongoing debates surrounding proposals that would increase the frequency of auditor changes and, therefore, shorten auditor tenure on average. To date, proposed regulatory remedies for improving auditor independence include mandatory audit firm rotation and mandatory re-tendering, which are based, in part, on the premise that these issues can be mitigated by eliminating long-term auditor-client relationships. For example, the European Parliament recently implemented rules that require public companies in the European Union (E.U.), including cross-listed multinationals, to rotate auditors every 10 to 24 years. In the U.S., the PCAOB issued a *Concept Release on Auditor Independence and Audit Firm Rotation* seeking comments from stakeholders on audit firm rotation. In the 2011 concept release, the PCAOB asserts that "setting a limit on the

continuous stream of audit fees that an auditor may receive from one client would free the auditor, to a significant degree, from the effects of management pressure and offer an opportunity for a fresh look at the company's financial reporting" (PCAOB 2011, 2).[3, 4] Our results do not support arguments that are often advanced in support of these proposals – for example, arguments suggesting that auditors with 'fresh eyes' are likely to respond effectively to high fraud risk because of increased skepticism. Our results also do not support the notion that auditors with long client relationships are less effective at responding to fraud risk. In fact, our results suggest that auditors with 'fresh eyes' are significantly worse at responding to fraud risk, presumably because of their lack of familiarity with the client. Thus, we suggest that some of the proposed remedies for inadequate auditor independence and professional skepticism are likely to have unintended consequences.

Second, we add to the literature by focusing on the effect of auditor tenure on financial reporting quality in the years after the enactment of SOX. The vast majority of prior research examining the effect of auditor tenure on financial reporting quality use data from the pre-SOX era, describing relations that existed in a substantially different regulatory environment.[5] The

[3] In drafting the Sarbanes-Oxley Act of 2002 (SOX), the Senate Banking Committee asserted that benefits "accrue for the issuer and its shareholders when a new accountant with fresh and skeptical eyes evaluates the issuer periodically" (PCAOB 2011, 14). In addition, the Commission on Auditors' Responsibilities (also referred to as the Cohen Commission) stated that one of the potential benefits of a firm rotation requirement would be that the new auditor would bring a fresh viewpoint (AICPA 1978).

[4] In July 2013, the House of Representatives passed H.R. 1564, the *Audit Integrity and Job Protection Act*, which would amend the Sarbanes-Oxley Act of 2002 (SOX) to deny the PCAOB authority to require auditor rotation. The bill still needs to pass through the Senate and be signed by the President before enactment but a recent statement made by PCAOB Chairman James Doty suggests that the PCAOB has removed this proposal from its list of active projects. However, H.R. 1564 also directs the U.S. Government Accountability Office to update its November 2003 report, *Study on the Potential Effects of Mandatory Audit Firm Rotation*, and to review the potential costs and benefits of requiring auditor rotation. Thus, even if H.R. 1564 is enacted, the issue of mandatory auditor rotation is likely to be subject to continued debate.

[5] For example, the samples in these studies are drawn primarily from a time period before the implementation of important provisions of SOX, such as Section 302 mandated management disclosures about the effectiveness of internal controls over financial reporting, Section 404(b) mandated audits of internal controls for accelerated filers, and Section 906 criminal penalties for chief executive officers and chief financial officers who make false financial statement certifications.

importance of investigating the effect of auditor tenure on financial reporting quality in the post-SOX era is highlighted by mounting evidence suggesting that the association between financial reporting quality and auditor tenure documented in the pre-SOX era has changed. Specifically, many studies using post-SOX data find no evidence of an association, or even evidence of a negative association, between auditor tenure and measures of financial reporting quality.[6] Understanding the association between auditor tenure and financial reporting quality in the post-SOX period is particularly important because it is the post-SOX regulatory environment that will be altered when/if the proposed regulatory remedies that would substantially limit the length of auditor-client relationships are implemented in the U.S.

Finally, due to a lack of visibility into the audit process, prior archival research examining factors that affect audit quality focuses almost exclusively on audit process input and output measures. For example, prior literature generally examines the relation between auditor tenure and audit outcome measures based on the numbers reported in the 10-K (e.g., the magnitude of accruals (or discretionary accruals), the frequency of meeting or beating earnings benchmarks, the frequency of material misstatements, etc.). While readers can speculate about the mechanics of how auditor tenure affects these outcomes, to our knowledge, there is no empirical evidence about how or why these outcomes come about. We address this void in the literature by showing that auditors with more client-specific experience (or longer tenure) are significantly more likely to reduce fraud risk when their clients experience elevated fraud risk in their unaudited 10-Qs.

[6] See, for example, Davis et al. (2009), Boone et al. (2010), Reichelt and Wang (2010), Asthana and Boone (2012), Choi et al. (2012), Lopez and Peters (2012), McGuire et al. (2012), Lobo and Zhao (2013), Minutti-Meza (2013), Czerney et al. (2014), Eshleman and Guo (2014), Johnstone et al. (2014), and Kwon et al. (2014).

DeFond and Zhang (2014) note the dearth of archival research related to auditors' assessment of and response to fraud risk. Moreover, DeFond and Zhang (2014, 86) state that "creative settings and research designs may allow archival researchers to peek into the black box to investigate interesting research questions." Our study contributes to prior literature by employing fraud prediction models from prior research to develop and validate a new measure of audit quality which should be related to auditors' assessment of and response to fraud risk – specifically, we develop a measure of the extent to which the auditor responds to high fraud risk early in the audit engagement. We expect that similar analyses could be useful in a variety of contexts because of the critical and complex nature of auditors' evaluation of and response to fraud risk.

The remainder of the paper is organized as follows. We develop our hypothesis in Section II. Section III describes our sample selection procedures and research methodology. We discuss our results in Section IV and provide concluding remarks in Section V.

II. Hypothesis Development

Auditing standards require the auditor to assess and respond to the risk of material misstatement whether due to fraud or error. The PCAOB's risk assessment standards (i.e., Auditing Standard (AS) No. 8 through 15) outline the risk assessment procedures that auditors should perform to appropriately identify, assess, and respond to identified risks.[7] According to the PCAOB's risk assessment standards, typical risk assessment procedures include considering information gained from the client continuance or acceptance process, past audits, planning activities, other engagements, procedures used to gain an understanding of the company's internal control environment, analytical procedures (e.g., trend and ratio analyses), and inquiries

[7] Risk assessments are part of an iterative process that takes place throughout the audit period.

and discussions with company personnel, executives, and board members. Based on this information, auditors should evaluate whether one or more fraud risk factors are present, and should design audit procedures to effectively respond to fraud risk.

The preceding discussion suggests that the risk assessment process is complex in that it requires information from a large variety of sources. Interestingly, the PCAOB's risk assessment standards and statements from regulators (who are responsible for these standards) provide conflicting predictions about the effect of auditor tenure on the effectiveness of the auditors' risk assessment procedures.

On the one hand, the PCAOB's risk assessment standards suggest that knowledge obtained from past audits can aid auditors in performing risk assessments. For example, AS12 states that "in subsequent years, the auditor should incorporate knowledge obtained during past audits into the auditor's process for identifying risks of material misstatement, including when identifying significant ongoing matters that affect the risks of material misstatement or determining how changes in the company or its environment affect the risks of material misstatement" (AS 12, paragraph 42). If knowledge gained from past audits facilitates effective fraud risk assessments/responses, we would expect that fraud risk assessments should improve with auditor tenure.

Consistent with this, evidence from a large body of pre-SOX literature suggests that financial reporting/audit quality improves as auditor tenure lengthens. For example, findings in Bell and Carcello (2000) and Carcello and Nagy (2004) suggest that fraudulent financial reporting is more likely to occur in the early years of an audit engagement.[8] In addition, several

[8] Moreover, findings in Sorenson et al. (1983), Loebbecke et al. (1989), and Krishnan and Krishnan (1997) suggest that the greater likelihood of auditor changes for companies engaging in fraudulent activities occurs because these companies are more likely to 'opinion shop' or because perceived risks lead auditors to resign.

studies find that earnings quality is lower for companies with short auditor tenure (Johnson et al. 2002; Carcello and Nagy 2004) and that earnings quality improves as tenure lengthens (Myers et al. 2003; Chen et al. 2008; Jenkins and Velury 2008). Furthermore, when auditor tenure is shorter, auditors are more likely to miss going-concern opinions (Geiger and Raghunandan 2002) and make less conservative accounting choices (Jenkins and Velury 2008), and their clients are more likely to make financial statement misstatements (Stanley and DeZoort 2007).[9]

On the other hand, regulators often suggest that a 'fresh look' at a company's financial statements should enhance auditor independence and skepticism. If enhanced auditor independence and skepticism facilitates effective fraud risk assessments/responses, we would expect that fraud risk assessments should be particularly good for auditors with relatively short tenure.

The results from prior research examining the effect of auditor tenure on audit quality in the post-SOX era provide some support for this prediction. For example, Lobo and Zhao (2013) and Czerney et al. (2014) find that auditor tenure is positively associated with the likelihood of an annual financial statement restatement in future periods. In contrast, several studies using post-SOX data (either exclusively or predominantly) find no evidence of an association between auditor tenure and measures of financial reporting quality including absolute discretionary accruals (Reichelt and Wang 2010; Asthana and Boone 2012; Choi et al. 2012; Knechel and Sharma 2012; Lopez and Peters 2012; McGuire et al. 2012; Omer et al. 2012; Gul et al. 2013; Minutti-Meza 2013; Johnstone et al. 2014), income-increasing discretionary accruals (Francis

[9] A few pre-SOX studies suggest that longer auditor tenure can impair audit quality. For example, experimental evidence from auditor subjects in Tan (1995) suggests that newly engaged auditors are better at identifying issues and are more likely to alter their judgments than are auditors with longer tenure. In addition, consistent with arguments in Bazerman et al. (1997) – that auditors become less skeptical of longstanding clients and are therefore less objective – Carey and Simnett (2006) find that audit quality, measured as the likelihood of issuing a going-concern opinion for distressed clients, declines with engagement partner tenure.

and Yu 2009; Boone et al. 2010; Reichelt and Wang 2010; Lopez and Peters 2012), and the likelihood of meeting or beating the consensus analyst earnings forecast using income-increasing discretionary accruals (Davis et al. 2009; Boone et al. 2012; Eshleman and Guo 2014).

In sum, conflicting arguments from regulators and conflicting evidence from empirical research about the association between audit quality and auditor tenure exist. Thus, we investigate whether auditor tenure influences the effectiveness of the risk assessment process, and our null hypothesis acknowledges these two competing predictions:

> *Hypothesis*: Auditor tenure is not associated with the likelihood of effectively responding to high fraud risk.

III. Sample Selection and Research Methodology

Our sample is comprised of all client-year observations from 2004 through 2010, other than those from regulated industries (i.e., SIC codes 4400-4999 and 6000-6999), with sufficient data from Compustat and Audit Analytics to construct our model variables. Our sample period begins with fiscal years ending on or after June 15, 2004 because this was the effective date of SOX Section 404(b) for accelerated filers, and our sample period ends in 2010 to allow time for misstatements to be revealed through subsequent financial statement restatements.

We measure fraud risk using the M-score from Beneish (1997, 1999) and Beneish et al. (2012) as well as the F-score from Dechow et al. (2011). Beneish (1997, 1999) develop a model that uses eight financial ratios to predict the likelihood of a company receiving an Accounting and Auditing Enforcement Release (AAER), which is issued by the SEC during or at the conclusion of an investigation against a company, an auditor, or an officer for alleged accounting and/or auditing misconduct. The M-score is calculated in Beneish et al. (2012) as:

$$\text{Predicted Value} = -4.840 + 0.920*dsr + 0.528*gmi + 0.404*aqi + 0.892*sgi + 0.115*depi - 0.172*sgai + 4.679*acc - 0.327*lvgi$$

where:

dsr = days sales in receivables index, measured as the ratio of current year accounts receivable to current year sales divided by the ratio of prior year accounts receivable to prior year sales;

gmi = gross margin index, measured as the ratio of prior year gross margin (sales less cost of goods sold) to prior year sales divided by the ratio of current year gross margin to current year sales;

aqi = asset quality index, measured as one minus the ratio of current year current assets plus property, plant, and equipment to current year total assets divided by one minus the ratio of prior year current assets plus property, plant, and equipment to prior year total assets;

sgi = sales growth index, measured as the ratio of current year sales to prior year sales;

depi = depreciation index, measured as the ratio of prior year depreciation to prior year depreciation plus prior year property, plant, and equipment divided by the ratio of current year depreciation to current year depreciation plus current year property, plant, and equipment;

sgai = sales, general, and administrative expense index, measured as the ratio of current year sales, general, and administrative expense to current year sales divided by the ratio of prior year sales, general, and administrative expense to prior year sales;

acc = total accruals index, measured as the ratio of current year income before extraordinary items less current year operating cash flows to average total assets;[10] and

lvgi = leverage index, measured as the ratio of current year long-term debt and current liabilities to current year total assets divided by the ratio of prior year long-term debt and current liabilities to prior year total assets.

Beneish et al. (2012) categorize observations with a predicted value greater than -1.78 as potential manipulators. As such, we use this cut-off to identify our high fraud risk sample.

[10] The original model in Beneish (1997, 1999) uses a slightly different ratio for the total accruals index but Beneish et al. (2012) updates the model to use this ratio for the total accruals index.

Dechow et al. (2011) also develop their measure of financial statement manipulation using SEC AAERs. A higher F-score represents a greater risk of financial statement manipulation. The F-score is derived using the following model:

Predicted Value = -7.893 + 0.790*rsst_acc + 2.518*ch_rec + 1.191*ch_inv
+ 1.979*soft_assets + 0.171*ch_cs - 0.932*ch_roa + 1.029*issue

where:

rsst_acc	= Δwc + Δnco + Δfin scaled by average total assets, where Δ is the change operator, wc equals current assets less cash and short-term investments minus current liabilities less debt in current liabilities, nco equals total assets less current assets less investments and advances minus total liabilities less current liabilities and long-term debt, and fin equals short-term investments plus long-term investments minus the sum of long-term debt, debt in current liabilities, and preferred stock;
ch_rec	= the change in accounts receivable during the period divided by average total assets;
ch_inv	= the change in inventory during the period divided by average total assets;
soft_assets	= total assets less property, plant, and equipment and cash and cash equivalents divided by total assets;
ch_cs	= the percentage change in cash sales, where cash sales are measured as current period sales less the change in current period accounts receivable;
ch_roa	= the change in return on assets from the prior period, where return on assets is measured as net income for the period divided by average total assets for the period; and
issue	= an indicator variable set equal to one if the company issued debt or equity securities during the period, and zero otherwise.

To calculate the F-score, the predicted probability is derived as $e^{PV} / (1 + e^{PV})$ divided by the unconditional probability of misstatement (0.0037), where PV is the predicted value from the model above. Dechow et al. (2011) categorize observations with F-scores greater than 1.85 as

those with a 'substantial risk' or 'high risk' of misstatement, and as such, we use an F-score of 1.85 or greater to proxy for high fraud risk.[11]

We measure fraud risk at two points in time during the year. First, we measure fraud risk at the end of the second fiscal quarter, when auditors are typically still in the planning, risk assessment, and control testing phase of the audit.[12] To do this, we use balance sheet data and year-to-date income statement and statement of cash flow data from the Compustat Fundamental Quarterly database. Second, we measure fraud risk at the end of the fiscal year using audited year-end values from the Compustat Fundamental Annual database. Figure 1 presents a timeline of the different phases of the annual audit and indicates the points at which we measure fraud risk.

Table 1 presents our sample selection procedures. Using our two fraud risk measures, we create separate samples limited to company-year observations where fraud risk is high at the end of the second fiscal quarter. The final sample using the M-score to identify high fraud risk consists of 4,366 company-year observations (approximately 14 percent of the company-year observations with available data), and the final sample using the F-score to identify high fraud risk consists of 5,438 company-year observations (approximately 17 percent of the company-year observations with available data). Of the 4,366 (5,438) company-year observations where the M-score (F-score) indicates high fraud risk at the end of the second fiscal quarter, 60.4 (59.1) percent experience a reduction in fraud risk such that they are no longer in the high fraud risk category at the end of the year.

[11] Specifically, Dechow et al. (2011) categorize observations with F-scores between 1 and 1.85 as having 'above normal' risk, between 1.85 and 2.45 as having 'substantial risk', and greater than 2.45 as having 'high risk'.

[12] It is certainly possible that some risk assessment procedures are performed earlier in the year (i.e., during the first fiscal quarter). Therefore, in untabulated analyses, we measure fraud risk at the end of the first fiscal quarter and find that our inferences from these tests are consistent with inferences from the tabulated results.

Validating the Reduction in High Fraud Risk as a Proxy for an Effective Auditor Response to Fraud Risk

If our measure of a reduction in high fraud risk is a good proxy for an effective auditor response to high fraud risk, we expect auditor effort to be higher when fraud risk is high, suggesting that auditors respond to high fraud risk, and we expect that the likelihood of material misstatements will be lower following this response, suggesting that the response is effective. Thus, we first test: 1) whether audit fees are positively associated with a reduction in high fraud risk during the audit, and 2) whether a reduction in high fraud risk during the audit is associated a lower likelihood of financial statement misstatements due to fraud or as the result of an SEC investigation.

The Association between a Reduction in High Fraud Risk during the Audit and Audit Fees

Prior research finds a positive association between audit fees and audit hours (Palmrose 1986; Deis and Giroux 1996) and between audit fees and various client risk factors (Blankley et al. 2012; Cao et al. 2012). For example, research shows that audit fees are increasing in client size and complexity (Francis 1984; Palmrose 1986), internal control weaknesses (Raghunandan and Rama 2006; Hogan and Wilkins 2008; Hoitash et al. 2008; Hoag and Hollingsworth 2011), and a variety of inherent risk factors including business risk (Bell et al. 2001; Bentley et al. 2013) and fraud risk (Doogar et al. 2010).[13] Collectively, evidence from prior work suggests that auditors increase effort when risk is elevated. If the reduction in high fraud risk during the year is the result of additional testing and/or audit adjustments, and if audit fees are a good proxy for auditor effort, then the reduction in fraud risk during the year should be positively associated

[13] Charles et al. (2010) and Doogar et al. (2010) find that audit fees have become more sensitive to financial reporting risk and fraud risk in the post-SOX era.

with the level of audit fees. We test this by estimating the following ordinary least squares regression model:

$$\begin{aligned} LnAFEE_{it} = {} & \beta_0 + \beta_1 HighFRSK\_reduced_{it} + \beta_2 LnAssets_{it} + \beta_3 LnSEG_{it} + \beta_4 Foreign_{it} \\ & + \beta_5 ROA_{it} + \beta_6 Loss_{it} + \beta_7 InvRec_{it} + \beta_8 Leverage_{it} + \beta_9 MTB_{it} + \beta_{10} Delay_{it} \\ & + \beta_{11} Busy_{it} + \beta_{12} GC_{it} + \beta_{13} BigN_{it} + \beta_{14} Specialist_{it} + \beta_{15} Restate_{it} + \beta_{16} Accel_{it} \\ & + \beta_{17} ICMW_{it} + \beta_j Industry\ FE + \beta_k Year\ FE + \varepsilon_{it} \end{aligned} \quad (1)$$

where:

LnAFEE	= the natural log of audit fees;
HighFRSK_reduced	= an indicator variable set equal to one if fraud risk is high (i.e., the M-score is in the 'manipulator' range or the F-score is in the 'substantial risk' range or higher) at the end of the second fiscal quarter and is not high at the end of the fiscal year, and zero otherwise;
LnAssets	= the natural log of total assets;
LnSEG	= the natural log of the number operating segments;
Foreign	= an indicator variable set equal to one if the company has foreign operations, and zero otherwise;
ROA	= return on assets measured as net income divided by total assets;
Loss	= an indicator variable set equal to one if net income is less than zero, and zero otherwise;
InvRec	= inventory and receivables divided by total assets;
Leverage	= long-term debt plus the current portion of long-term debt divided by total assets;
MTB	= the market-to-book ratio, calculated as the market value of equity divided by the book value of equity;
Delay	= the number of days between the company's fiscal year-end and the filing of the 10-K;
Busy	= an indicator variable set equal to one if the company's fiscal year ends in December or January, and zero otherwise;
GC	= an indicator variable set equal to one if the company received a going concern modification to the auditor's report, and zero otherwise;

BigN = an indicator variable set equal to one if the auditor is from the Big 4, and zero otherwise;

Specialist = an indicator variable set equal to one if the auditor is an industry specialist (i.e., the auditor's share of audit fees in the 2-digit SIC code exceeds 30 percent at the national level), and zero otherwise;

Restate = an indicator variable set equal to one if a restatement was announced during the fiscal year, and zero otherwise;

Accel = an indicator variable set equal to one if the company is an accelerated or large accelerated filer, and zero otherwise;

ICMW = an indicator variable set equal to one if a material weakness in internal controls over financial reporting is disclosed in the year, and zero otherwise;

Industry FE = industry fixed-effects;[14]

Year FE = year fixed-effects; and

i and t = company and year indicators.

The control variables in Equation (1) follow prior literature (e.g., Francis (1984), Francis and Simon (1988), Craswell et al. (1995), Ettredge et al. (2007), Doogar et al. (2010), and Blankley et al. (2012)). We include industry and year fixed effects to control for variation in audit fees across industry and time, and we cluster standard errors by company to control for serial dependence (Petersen 2009). The coefficient of interest is β_1, which will be positive if audit fees are higher when there is a reduction in high fraud risk between the end of the second fiscal quarter and year-end. This would suggest that auditor effort is related to a reduction in fraud risk (given high fraud risk early in the year).

[14] Following Ashbaugh et al. (2003), we use SIC codes to define industries as follows: agriculture (0100-0999), mining and construction (1000-1999, excluding 1300-1399), food (2000-2111), textiles and printing/publishing (2200-2799), chemicals (2800-2824; 2840-2899), pharmaceuticals (2830-2836), extractive (1300-1399; 2900-2999), durable manufacturers (3000-3999, excluding 3570-3579 and 3670-3679), transportation (4000-4899), retail (5000-5999), services (7000-8999, excluding 7370-7379), computers (3570-3579; 3670-3679; 7370-7379), and utilities (4900-4999).

The Association between a Reduction in High Fraud Risk during the Audit and the Likelihood of Financial Statement Misstatements

Even if a reduction in fraud risk is associated with higher audit fees, suggesting that auditors perform additional work in the presence of risk, it is not clear that auditor effort will be *effective* at curbing material misstatements. Thus, we assess whether a reduction in high fraud risk is effective at reducing the risk of a material misstatement by testing whether companies experiencing a reduction in high fraud risk during the audit are less likely to misstate their annual financial statements, as revealed though future restatements, than are companies where fraud risk remains high. To do this, we estimate the following logistic regression model:

$$\begin{aligned}\Pr(Misstate_{it}=1) = {} & \alpha_0 + \alpha_1 HighFRSK\_reduced_{it} + \alpha_2 LnAssets_{it} + \alpha_3 Leverage_{it} + \alpha_4 MTB_{it} \\ & + \alpha_5 Loss_{it} + \alpha_6 FIN_{it} + \alpha_7 ROA_{it} + \alpha_8 LnSEG_{it} + \alpha_9 ICMW_{it} + \alpha_{10} FreeCF_{it} \\ & + \alpha_{11} InvRec_{it} + \alpha_{12} M\&A_{it} + \alpha_j Industry\ FE + \alpha_k Year\ FE \qquad (2)\end{aligned}$$

where:

Misstate	= an indicator set equal to one if the annual financial statements are misstated as the result of fraud or if the misstatement is revealed by an SEC investigation (as categorized by Audit Analytics), and zero otherwise;
FIN	= the sum of cash raised from the issuance of long-term debt, common stock, and preferred stock divided by total assets;
FreeCF	= the sum of cash from operations less average capital expenditures scaled by lagged total assets;
M&A	= an indicator variable set equal to one if there was a merger or acquisition in the year, and zero otherwise; and

all other variables are as previously defined. The control variables in Equation (2) follow prior literature (e.g., Dechow et al. 1996; Summers and Sweeney 1998; Kinney et al. 2004; Romanus et al. 2008; Blankley et al. 2012; Cao et al. 2012; Lobo and Zhao 2013) to the extent that these variables are widely available for our sample. We include industry and year fixed effects to control for variation in misstatements across industries and time, and we cluster standard errors

by company to control for serial dependence (Petersen 2009). The coefficient of interest is α_1, which will be negative if a reduction in high fraud risk is associated with a lower likelihood of misstatement.

Auditor Tenure Tests

To test whether auditor tenure affects the likelihood of a reduction in high fraud risk between the end of the second fiscal quarter and the company's fiscal year-end, we estimate the following logistic regression model:[15, 16]

$$\begin{aligned}\Pr(\text{HighFRSK\_reduced}_{it}=1) = {} & \gamma_0 + \gamma_1\text{Tenure}_{it} + \gamma_2\text{BigN}_{it} + \gamma_3\text{Specialist}_{it} + \gamma_4\text{LnAssets}_{it} \\ & + \gamma_5\text{Loss}_{it} + \gamma_6\text{MTB}_{it} + \gamma_7\text{StdREV}_{it} + \gamma_8\text{StdCFO}_{it} + \gamma_9\text{StdROA}_{it} + \gamma_{10}\text{FIN}_{it} \\ & + \gamma_{11}\text{Leverage}_{it} + \gamma_{12}\text{Ind\_salesgrowth}_{it} + \gamma_{13}\text{M\&A}_{it} + \gamma_{14}\text{FreeCF}_{it} + \gamma_{15}\text{Restructure}_{it} \\ & + \gamma_{16}\text{Discops}_{it} + \gamma_{17}\text{InstHoldings}_{it} + \gamma_j\text{Industry FE} + \gamma_k\text{Year FE} \qquad (3)\end{aligned}$$

where:

Tenure	= auditor tenure, measured as the length (in consecutive years) of the auditor-client relationship to date;
StdREV	= the standard deviation of revenue deflated by lagged total assets over the prior five years;
StdCFO	= the standard deviation of operating cash flows deflated by lagged total assets over the prior five years;
StdROA	= the standard deviation of return on assets deflated by lagged total assets over the prior five years;
Ind_salesgrowth	= total industry sales (by 2-digit SIC code) in the current year divided by total industry sales in the prior year;
Restructure	= an indicator variable set equal to one if the company is involved in restructuring activity during the year, and zero otherwise;

[15] In untabulated analyses, we also examine whether the relation between auditor tenure and the likelihood of a reduction in high fraud risk is non-linear. Specifically, following Davis et al. (2009), we include the continuous measure of tenure as well as tenure squared to allow for a convex or concave relation between auditor tenure and the likelihood of a reduction in high fraud risk. We find a positive and significant coefficient on Tenure and an insignificant coefficient on tenure squared for both measures of fraud risk. This suggests that the positive relation between auditor tenure and the reduction in high fraud risk does not deteriorate as the auditor-client relationship lengthens.

[16] We winsorize all continuous variables at 1 and 99 percent to mitigate the influence of outliers.

Discops = an indicator variable set equal to one if the company reports discontinued operations during the year, and zero otherwise;

InstHoldings = the percentage of shares held by institutions at the end of the year; and

all other variables are as previously defined. The coefficient of interest is the coefficient on Tenure; if the likelihood of a reduction in fraud risk increases as auditor tenure lengthens, γ_1 will be positive.

Because M-score and F-score are driven primarily by changes in accruals, Equation (3) includes variables that control for changes in accruals which occur for reasons other than the auditors' response. Specifically, because prior research finds that discretionary accruals are lower for companies audited by a Big N auditor (Becker et al. 1998) and by auditor industry specialists (Reichelt and Wang 2010) and because auditor size or industry specialization could be related to auditor tenure, we control for the use of a Big N auditor (BigN) and an industry specialist auditor (Specialist). Prior research finds that company size and profitability affect the level of discretionary accruals so we control for company size (LnAssets) and whether the company experiences a loss in the year (Loss). Changes in accruals are also related to company growth potential (McNichols 2000) so we include expected growth (MTB). Because prior research finds that volatility in company operations is associated with changes in accruals (Myers et al. 2003; Hribar and Nichols 2007; Davis et al. 2009), we control for the volatility of company sales (StdREV), operating cash flows (StdCFO), and performance (StdROA). These control variables also help to alleviate concerns that changes in fraud risk are the result of seasonality or changes in company performance. In addition to changes in accruals, the F-score is also affected by debt or equity issuances during the year. As such, we control for debt and equity issuances (FIN) and company leverage (Leverage). Changes in accruals can also be a function of the industry in which the company operates so we control for industry sales growth

(Ind_salesgrowth) and include industry fixed effects. We control for merger and acquisitions (M&A) because these can cause large fluctuations in current period accruals. Because greater cash flow should reduce the need to manipulate earnings (Dechow et al. 1996), we control for free cash flow (FreeCF). We control for restructuring activities (Restructure) and discontinued operations (Discops) because these events/activities also affect current period accruals. We also control for institutional holdings (InstHoldings) because prior research suggests that institutional investors perform a monitoring function (Chung et al. 2002). Finally, we include year fixed effects to control for changes in accruals over time. Consistent with previous models, we cluster standard errors by company to control for serial dependence (Petersen 2009).

IV. Empirical Results

Validating the Reduction in High Fraud Risk as a Proxy for an Effective Auditor Response to Fraud Risk

Table 2 presents the results from investigating whether a reduction in high fraud risk, as measured using the M-score or the F-score, is associated with audit fees. Equation (1) has good explanatory power, with an adjusted R^2 of 0.803 using the M-score sample and of 0.843 using the F-score sample. With the exception of the market-to-book ratio (MTB) using either sample and industry specialization (Specialist) using the M-score sample, the signs and significance of the control variables are consistent with results from prior research. More importantly, using either sample, we find that the coefficient on HighFRSK_reduced is positive and significant (p-values ≤ 0.003). To the extent that audit fees proxy for auditor effort, these results suggest increased auditor effort is associated with a reduction in high fraud risk.

Table 3 presents the results from estimating Equation (2) to investigate whether a reduction in high fraud risk is effective in reducing the likelihood of misstatement due to fraud or as the result of an SEC investigation for those firms with high fraud risk early in the year. Using

either sample, we find that the coefficient on HighFRSK_reduced is negative and significant (p-values ≤ 0.055). Thus, we find that a reduction in fraud risk lowers the likelihood of a financial statement misstatement (as revealed through a subsequent restatement). In addition, we find that material weaknesses in internal controls over financial reporting increase the likelihood of misstatement but greater free cash flow reduces the likelihood of misstatement.

Collectively, the results in Tables 2 and 3 suggest that a reduction in high fraud risk is associated with increased auditor effort and with an improvement in financial reporting quality.

Auditor Tenure Tests

Univariate Tests

Table 4 presents the results from tests of differences in means and medians of our primary model variables for company-year observations with a reduction in high fraud risk versus observations where fraud risk remains high. Panel A presents the results for the sample where fraud risk is measured using the M-score. We find that on average, auditor tenure is significantly longer for company-years that experience a reduction in fraud risk relative to company-years where fraud risk remains high. In addition, among company-years experiencing a reduction in fraud risk, there is a smaller proportion where auditor tenure is short (i.e., 3 years or less) and a larger proportion where auditor tenure is long (15 years or more), relative to company-years where fraud risk remains high. We find similar results in Panel B, where fraud risk is measured using the F-score.

Multiple Regression Analyses

Table 5 presents the results from tests of our hypothesis which relates to the impact of auditor tenure on the effectiveness of the response to high fraud risk. The first column presents the results from estimating Equation (3) where fraud risk is measured using the M-score, while the second column presents the results where fraud risk is measured using the F-score. For both

fraud risk measures, we find that auditor tenure is positively associated with the likelihood of a reduction in high fraud risk during the year (p-values ≤ 0.013).

When fraud risk is measured using the M-score, we find that a reduction in fraud risk is more likely for companies that are audited by a Big N auditor, experience a loss, have greater volatility in operating cash flows, have higher leverage, have greater free cash flow, have discontinued operations, and have a greater proportion of shares held by institutions. We find that a reduction in fraud risk is less likely when companies have greater growth potential or more volatile revenues. When fraud risk is measured using the F-score, we find that a reduction in fraud risk is more likely for larger companies, and for companies reporting a loss, with more volatile operating cash flows or operating performance, with greater free cash flow, involved in restructuring activities, and with discontinued operations. We find that a reduction in fraud risk is less likely when companies have more volatile revenues, operate in an industry experiencing higher sales growth, and engage in mergers and acquisitions.

Additional Analyses

The Effects of Short Tenure and Long Tenure

The PCAOB's concept release on auditor independence and mandatory audit firm rotation suggests that a new auditor can offer a 'fresh look' and that new auditors may be more skeptical when evaluating evidence. It also suggests that long-term auditor-client relationships can impair auditor skepticism and objectivity (PCAOB 2011). Because of this, we examine the effects of short tenure, defined as an auditor-client relationship of 3 years or less (Johnson et al. 2002; Carcello and Nagy 2004; Davis et al. 2009), and long tenure, defined as an auditor-client relationship of 15 years or more (Davis et al. 2009) on the likelihood of a reduction in high fraud risk. In Equation (3), we replace Tenure with Shorttenure (an indicator variable set equal to one

if tenure is 3 years or less, and zero otherwise) and Longtenure (an indicator variable set equal to one if tenure is 15 years or more, and zero otherwise).

Table 6 presents the results using these alternative measures of auditor tenure. Using either measure of fraud risk, we find that the likelihood of a reduction in high fraud risk is significantly lower when tenure is short (p-values ≤ 0.050) and is significantly higher when tenure is long (p-values ≤ 0.053). In untabulated analyses, we re-estimate Equation (3) including both Shorttenure and Longtenure. Results using this alternative specification are consistent with those presented in Table 6. These results contradict the view that auditors with 'fresh eyes' are more effective at responding to high fraud risk. They also suggest that, on average, the effectiveness of auditors' response to high fraud risk is not impaired by longstanding auditor-client relationships. In fact, longer auditor-client relationships appear to improve auditors' ability to respond effectively to high fraud risk.

Auditing Standard No. 5

One of the most substantial changes brought about by SOX was the requirement for companies to document and report on the effectiveness of internal controls over financial reporting under SOX Section 404(a). This requirement was even more dramatic for accelerated filers, where the independent auditor is also required to attest to the effectiveness of internal controls under SOX Section 404(b). The PCAOB was charged with audit standard setting for public company audits and issued Auditing Standard No. 2 (AS2) to provide authoritative guidance on the performance of audits of internal controls over financial reporting. After much debate about the costs and benefits associated with these audits, the PCAOB issued AS5 to replace AS2. AS5 sets forth updated guidance, aimed at reducing some of the costs of internal controls audits by directing auditors to focus on specific risks and eliminate unnecessary

procedures. Doogar et al. (2010) find that audit fees are a better reflection of client fraud risk under AS5 (relative to under AS2), suggesting that auditors became more sensitive to client risk after the issuance of AS5. To rule out the possibility that our results are unique to audits performed under AS2, we re-estimate our models after limiting our sample to company-year observations where the fiscal year ends on or after November, 15, 2007 (the effective date for AS5). This reduces our samples to 2,071 observations using the M-score and 2,351 observations using the F-score.

Table 7 presents the results from tests of the impact of auditor tenure on the effectiveness of auditors' response to high fraud risk post-AS5. Using either measure of fraud risk, auditor tenure is positively associated with the likelihood of a reduction in high fraud risk (p-values $\leq$ 0.011), suggesting that the impact of auditor tenure on the likelihood of an effective response to high fraud risk persists under AS5.

The Likelihood of an Increase in Fraud Risk

In addition to examining whether and how auditor tenure impacts the effectiveness of auditors' response to high fraud risk early in the audit, we examine whether auditor tenure is associated with an increase in fraud risk during the audit period. To test whether auditor tenure affects the likelihood of an increase in fraud risk, we construct two samples (one using the M-score and one using the F-score) that are limited to those company-year observations where fraud risk is *not* high at the end of the second fiscal quarter. We then replace HighFRSK_reduced with LowFRSK_increased (an indicator variable set equal to one if fraud risk is not high at the end of the second fiscal quarter but is high at the end of the fiscal year, and zero otherwise).

Table 8 presents the results of the impact of auditor tenure on the likelihood of an increase in fraud risk for clients with low fraud risk at the end of the second fiscal quarter. The

first column presents the results from estimating Equation (3) where fraud risk is measured using the M-score, while the second column presents results where fraud risk is measured using the F-score. Using either fraud risk measure, we find that auditor tenure is negatively associated with the likelihood of an increase in low fraud risk during the audit period (p-values < 0.001).

High Fraud Risk in Interim Periods for Long Tenured Auditors

Because longer tenured auditors appear to better respond to high fraud risk that exists early in the year before most audit procedures are performed, the question arises as to why fraud risk becomes high during interim periods for clients of longer tenured auditors. We conjecture that this occurs because quarterly financial reports are unaudited (reviews only provide limited assurance) and audit adjustments are likely to come later in the audit process after substantive audit procedures have been performed (refer to Figure 1 for the timing of audit procedures). In untabulated analysis, we re-estimate Equation (3) replacing HighFRSK_reduced with an indicator variable for HighFRSK at the end of the second fiscal quarter. Here, we find that the coefficient on Tenure is negative and significant (p-values ≤ 0.094), suggesting that the likelihood of having high fraud risk at the end of the second fiscal quarter is lower among clients with longer tenured auditors. Taken together with our primary findings, these results suggest that clients of longer tenured auditors are less likely to have high fraud risk at the end of the second fiscal quarter and, conditional on having high fraud risk early in the year, longer tenured auditors are better able to respond to this high fraud risk.

V. Conclusion

The PCAOB's risk assessment standards suggest that knowledge obtained from past audits can aid auditors in performing risk assessments. However, regulators often suggest that a 'fresh look' at a company's financial statements should enhance auditor independence and skepticism. In this study, we examine how the effectiveness of the auditor's response to fraud

risk is affected by auditor tenure. We find that a reduction in high fraud risk during the audit period is more likely when auditors have greater client-specific experience (i.e., when auditor tenure is longer). We also find that the likelihood of a reduction in fraud risk is less likely for auditors with short tenure (3 years or less) and more likely for auditors with long tenure (15 years or more).

Despite the importance of the risk assessment process for the quality of audits, DeFond and Zhang (2014) note that the assessment of and response to fraud risk has been virtually ignored in the archival audit literature. Additionally, although prior research examines the relation between auditor tenure and output measures of financial reporting quality such as abnormal accruals or restatements, to our knowledge, there are no empirical studies that investigate the mechanisms through which auditor tenure might affect such audit outcomes. We address this by showing that auditors with more client-specific experience (or longer tenure) are significantly more likely to reduce fraud risk when their clients experience elevated fraud risk in their unaudited 10-Qs.

Our findings have important implications for ongoing debates surrounding proposals that would increase the frequency of auditor changes and, therefore, shorten auditor tenure on average. Our study provides evidence on the effect of auditor tenure on an important aspect of audit quality – the auditors' response to high fraud risk. Contrary to the view that auditors with 'fresh eyes' are more effective at responding to high fraud risk, we find that auditors with more client-specific experience are better able to respond to high fraud risk that exists early in the year, before most audit procedures are performed. Thus, these findings should help inform the debate on the costs and benefits of proposed regulations that would to limit the length of auditor-client relationships and suggest that such actions could have unintended consequences.

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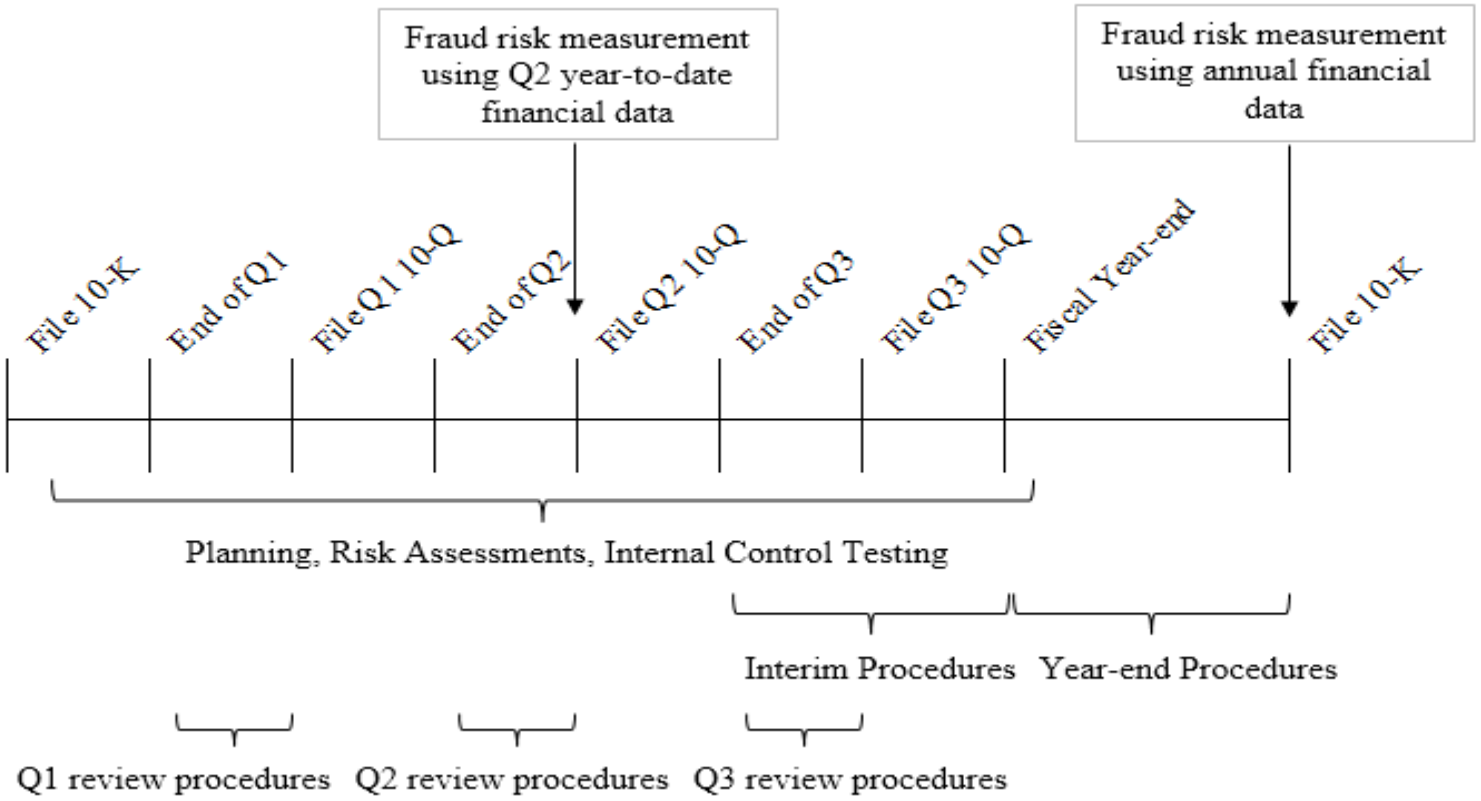
Figure 1
Annual Audit Timeline



This figure represents the timing of auditor procedures for a public company audit (including the typical timing of the planning, risk assessment, and internal control testing procedures) as well as the timing of our fraud risk measurements.

Appendix
Variable Definitions

Variable	Definition
acc	Total accruals index, measured as the ratio of current year income before extraordinary items less current year operating cash flows to average total assets;
Accel	An indicator variable set equal to one if the company is an accelerated or large accelerated filer, and zero otherwise;
aqi	Asset quality index, measured as one minus the ratio of current year current assets plus property, plant, and equipment to current year total assets divided by one minus the ratio of prior year current assets plus property, plant, and equipment to prior year total assets;
BigN	An indicator variable set equal to one if the auditor is from the Big 4, and zero otherwise;
Busy	An indicator variable set equal to one if the company's fiscal year ends in December or January, and zero otherwise;
ch_cs	The percentage change in cash sales, where cash sales are measured as current period sales less the change in current period accounts receivable;
ch_inv	The change in inventory during the period divided by average total assets;
ch_rec	The change in accounts receivable during the period divided by average total assets;
ch_roa	The change in return on assets from the prior period, where return on assets is measured as net income for the period divided by average total assets for the period;
Delay	The number of days between the company's fiscal year-end and the filing of the 10-K;
depi	Depreciation index, measured as the ratio of prior year depreciation to prior year depreciation plus prior year property, plant, and equipment divided by the ratio of current year depreciation to current year depreciation plus current year property, plant, and equipment;
Discops	An indicator variable set equal to one if the company reports discontinued operations during the year, and zero otherwise;
dsr	Days sales in receivables index, measured as the ratio of current year accounts receivable to current year sales divided by the ratio of prior year accounts receivable to prior year sales;
FIN	The sum of cash raised from the issuance of long-term debt, common stock, and preferred stock divided by total assets;

Foreign	An indicator variable set equal to one if the company has foreign operations, and zero otherwise;
FreeCF	The sum of cash from operations less average capital expenditures scaled by lagged total assets;
GC	An indicator variable set equal to one if the company received a going concern modification to the auditor's report, and zero otherwise;
gmi	Gross margin index, measured as the ratio of prior year gross margin (sales less cost of goods sold) to prior year sales divided by the ratio of current year gross margin to current year sales;
HighFRSK_reduced	An indicator variable set equal to one if fraud risk is high (i.e., the M-score is in the "manipulator" range or the F-score is in the "substantial risk" range or higher) at the end of the second fiscal quarter and is not high at the end of the fiscal year, and zero otherwise;
ICMW	An indicator variable set equal to one if a material weakness in internal controls over financial reporting is disclosed in the year, and zero otherwise;
Ind_salesgrowth	Total industry sales (by 2-digit SIC code) in the current year divided by prior total sales in the prior year;
Industry FE	Industry fixed effects; following Ashbaugh et al. (2003), we use SIC codes to define industries as follows: agriculture (0100-0999), mining and construction (1000-1999, excluding 1300-1399), food (2000-2111), textiles and printing/publishing (2200-2799), chemicals (2800-2824; 2840-2899), pharmaceuticals (2830-2836), extractive (1300-1399; 2900-2999), durable manufacturers (3000-3999, excluding 3570-3579 and 3670-3679), transportation (4000-4899), retail (5000-5999), services (7000-8999, excluding 7370-7379), computers (3570-3579; 3670-3679; 7370-7379), and utilities (4900-4999);
InstHoldings	The percentage of shares held by institutions at the end of the year;
InvRec	Inventory and receivables divided by total assets;
Issue	An indicator variable set equal to one if the company issued debt or equity securities during the period, and zero otherwise;
Leverage	Long-term debt plus the current portion of long-term debt divided by total assets;
LnAFEE	The natural log of audit fees;
LnAssets	The natural log of total assets;
LnSEG	The natural log of the number operating segments;
Longtenure	An indicator variable set equal to one if tenure is 15 years or more, and zero otherwise;

Loss	An indicator variable set equal to one if net income is less than zero, and zero otherwise;
LowFRSK_increased	An indicator variable set equal to one if fraud risk is not high at the end of the second fiscal quarter but is high at the end of the fiscal year, and zero otherwise;
lvgi	Leverage index, measured as the ratio of current year long-term debt and current liabilities to current year total assets divided by the ratio of prior year long-term debt and current liabilities to prior year total assets;
Misstate	An indicator set equal to one if the annual financial statements are misstated as the result of fraud or if the misstatement is revealed by an SEC investigation (as categorized by Audit Analytics), and zero otherwise;
MTB	The market-to-book ratio, calculated as the market value of equity divided by the book value of equity;
M&A	An indicator variable set equal to one if there was a merger or acquisition in the year, and zero otherwise;
Restate	An indicator variable set equal to one if a restatement was announced during the fiscal year, and zero otherwise;
Restructure	An indicator variable set equal to one if the company is involved in restructuring activity during the year, and zero otherwise;
ROA	Return on assets measured as net income divided by total assets;
rsst_acc	ΔWC + ΔNCO + ΔFIN scaled by average total assets, where Δ is the change operator, WC equals current assets less cash and short-term investments minus current liabilities less debt in current liabilities, NCO equals total assets less current assets less investments and advances minus total liabilities less current liabilities and long-term debt, and, FIN equals short-term investments plus long-term investments minus the sum of long-term debt, debt in current liabilities, and preferred stock;
sgai	Sales, general, and administrative expense index, measured as the ratio of current year sales, general, and administrative expense to current year sales divided by the ratio of prior year sales, general, and administrative expense to prior year sales;
sgi	Sales growth index, measured as the ratio of current year sales to prior year sales;
Shorttenure	An indicator variable set equal to one if tenure is 3 years or less, and zero otherwise;
soft_assets	Total assets less property, plant and equipment and cash and cash equivalents divided by total assets;

Specialist	An indicator variable set equal to one if the auditor is an industry specialist (i.e., the auditor's share of audit fees in the 2-digit SIC code exceeds 30 percent at the national level), and zero otherwise;
StdCFO	The standard deviation of operating cash flows deflated by lagged total assets, over the prior five years;
StdREV	The standard deviation of revenue deflated by lagged total assets, over the prior five years;
StdROA	The standard deviation of return on assets deflated by lagged total assets over the prior five years;
Tenure	Auditor tenure, measured as the length (in consecutive years) of the auditor-client relationship to date;
Year FE	Year fixed effects.

Table 1
Sample Selection

	N
M-Score Sample	
Successfully merged company-year observations with available Compustat and Audit Analytics data from 2004 through 2010	65,277
Less: observations in regulated industries (SIC codes (4400-4999 and 6000-6999))	(25,123)
Less: observations missing data (in Compustat or Audit Analytics) needed to construct variables for the M-Score sample	(8,605)
Company-year observations with necessary data	**31,549**
Less: observations where fraud risk (using M-Score) is below the high fraud risk cut-off at the end of the second fiscal quarter	(27,183)
M-Score Sample	**4,366**
M-Score Sample observations where fraud risk is reduced to below the high fraud risk cut-off by the end of the year	2,635 *60.4%*
F-Score Sample	
Successfully merged company-year observations with available Compustat and Audit Analytics data from 2004 through 2010	65,277
Less: observations in regulated industries (SIC codes (4400-4999 and 6000-6999))	(25,123)
Less: observations missing data (in Compustat or Audit Analytics) needed to construct variables for the F-Score sample	(8,441)
Company-year observations with necessary data	**31,713**
Less: observations where fraud risk (using F-Score) is below the high fraud-risk cut-off at the end of the second fiscal quarter	(26,275)
F-Score Sample	**5,438**
F-Score Sample observations where fraud risk is reduced to below the high fraud risk cut-off by the end of the year	3,214 *59.1%*

Table 2
The Association between a Reduction in High Fraud Risk during the Audit and Audit Fees

		M-Score Sample			F-Score Sample		
Variable	**Prediction**	**Coeff. Est.**	**p-value**		**Coeff. Est.**	**p-value**	
Intercept	?	-3.714	<.001	***	-4.124	<.001	***
HighFRSK_reduced	+	0.081	<.001	***	0.056	.003	***
LnAssets	+	0.462	<.001	***	0.496	<.001	***
LnSEG	+	0.067	.001	***	0.043	.019	**
Foreign	+	0.082	.002	***	0.106	<.001	***
ROA	-	-0.097	<.001	***	-0.061	<.001	***
Loss	+	0.114	<.001	***	0.158	<.001	***
InvRec	+	0.196	.001	***	0.135	.019	**
Leverage	+	0.078	<.001	***	0.073	<.001	***
MTB	+	-0.001	.645		-0.002	.903	
Delay	+	0.000	.017	**	0.001	.020	**
Busy	+	0.040	.084	*	0.148	<.001	***
GC	+	0.150	<.001	***	0.125	.001	***
BigN	+	0.430	<.001	***	0.364	<.001	***
Specialist	+	-0.015	.344		0.073	.012	**
Restate	+	0.047	.087	*	0.100	.001	***
Accel	+	0.263	<.001	***	0.271	<.001	***
ICMW	+	0.308	<.001	***	0.293	<.001	***
N		4,366			5,438		
N HighFRSK_reduced		2,635			3,214		
Adj. R^2		0.803			0.843		

In both columns, the dependent variable is the natural log of audit fees (LnAFEE). The models include year and industry fixed effects. The samples are limited to observations where fraud risk is high at the end of the second fiscal quarter. P-values are two-tailed unless a prediction is made. *, **, and *** denote statistical significance at the 10, 5, and 1 percent levels, respectively. Standard errors are clustered by company. All variables are defined in the Appendix.

Table 3
The Association between a Reduction in High Fraud Risk during the Audit and the Likelihood of Financial Statement Misstatements

		M-Score Sample			F-Score Sample		
Variable	**Prediction**	**Coeff. Est.**	**p-value**		**Coeff. Est.**	**p-value**	
Intercept	?	-2.356	<.001	***	-2.516	<.001	***
HighFRSK_reduced	-	-0.353	.055	*	-0.395	.021	**
LnAssets	?	-0.019	.730		0.004	.949	
Leverage	+	0.149	.044	**	-0.076	.790	
MTB	?	-0.011	.438		-0.010	.331	
Loss	+	-0.105	.654		0.080	.385	
FIN	+	0.025	.354		-0.020	.740	
ROA	?	0.058	.500		0.072	.237	
LnSEG	+	-0.132	.698		-0.048	.589	
ICMW	+	1.013	<.001	***	0.934	<.001	***
FreeCF	-	-0.128	.077	*	-0.064	.057	*
InvRec	+	-0.078	.550		-0.526	.814	
M&A	+	-0.121	.596		-0.294	.755	
N		4,366			5,438		
N HighFRSK_reduced		2,635			3,214		
Pseudo R^2		0.075			0.077		
Likelihood ratio χ^2		67.119	<.001	***	88.360	<.001	***

In both columns, the dependent variable is Misstate. The models include year and industry fixed effects. The samples are limited to observations where fraud risk is high at the end of the second fiscal quarter. P-values are two-tailed unless a prediction is made. *, **, and *** denote statistical significance at the 10, 5, and 1 percent levels, respectively. Standard errors are clustered by company. All variables are defined in the Appendix.

Table 4
Univariate Tests

Panel A: M-Score Sample

Variable	Fraud Risk Reduced (N=2,635) Mean	Median	Fraud Risk Remains High (N=1,731) Mean	Median	Diff. in Means		Diff. in Medians	
Tenure	7.677	6.000	6.918	5.000	0.759	***	1.000	***
Shorttenure	0.258	0.000	0.302	0.000	-0.043	***	0.000	***
Longtenure	0.107	0.000	0.080	0.000	0.026	***	0.000	***
BigN	0.562	1.000	0.490	0.000	0.071	***	1.000	***
Specialist	0.156	0.000	0.138	0.000	0.018	*	0.000	
LnAssets	4.706	4.723	4.506	4.453	0.200	***	0.270	***
Loss	0.502	1.000	0.420	0.000	0.082	***	1.000	***
MTB	2.653	1.913	3.760	2.299	-1.107	***	-0.385	***
StdREV	0.311	0.190	0.363	0.204	-0.052	***	-0.014	***
StdCFO	0.458	0.089	0.379	0.120	0.079		-0.031	***
StdROA	0.727	0.112	0.839	0.151	-0.112		-0.039	***
FIN	0.273	0.048	0.272	0.105	0.001		-0.058	***
Leverage	0.319	0.125	0.264	0.094	0.055	**	0.031	***
Ind_salesgrowth	0.068	0.077	0.076	0.080	-0.007	**	-0.004	**
M&A	0.067	0.000	0.057	0.000	0.010		0.000	
FreeCF	-0.176	-0.012	-0.311	-0.107	0.135	***	0.095	***
Restructure	0.175	0.000	0.124	0.000	0.051	***	0.000	***
Discops	0.148	0.000	0.117	0.000	0.031	***	0.000	***
InstHoldings	0.313	0.159	0.260	0.091	0.053	***	0.068	***

Table 4 cont'd
Univariate Tests

Panel B: F-Score Sample

Variable	Fraud Risk Reduced (N=3,214) Mean	Median	Fraud Risk Remains High (N=2,224) Mean	Median	Diff. in Means		Diff. in Medians	
Tenure	8.698	6.000	6.735	5.000	1.963	***	1.000	***
Shorttenure	0.265	0.000	0.339	0.000	-0.074	***	0.000	***
Longtenure	0.153	0.000	0.084	0.000	0.069	***	0.000	***
BigN	0.592	1.000	0.514	1.000	0.078	***	0.000	***
Specialist	0.165	0.000	0.134	0.000	0.031	***	0.000	***
LnAssets	5.136	5.353	4.583	4.907	0.553	***	0.447	***
Loss	0.405	0.000	0.401	0.000	0.003		0.000	
MTB	2.598	1.879	2.571	2.032	0.027		-0.153	***
StdREV	0.300	0.163	0.373	0.223	-0.073	***	-0.060	***
StdCFO	1.252	0.062	0.880	0.081	0.372		-0.019	***
StdROA	1.356	0.065	1.602	0.079	-0.245		-0.014	***
FIN	0.431	0.071	0.717	0.181	-0.286	***	-0.110	***
Leverage	0.417	0.195	0.448	0.203	-0.032		-0.009	*
Ind_salesgrowth	0.064	0.072	0.075	0.078	-0.010	***	-0.007	***
M&A	0.099	0.000	0.125	0.000	-0.026	***	0.000	***
FreeCF	-0.339	0.032	-0.633	-0.015	0.294	***	0.047	***
Restructure	0.258	0.000	0.155	0.000	0.103	***	0.000	***
Discops	0.196	0.000	0.128	0.000	0.068	***	0.000	***
InstHoldings	0.393	0.292	0.353	0.198	0.040	***	0.094	***

The samples are limited to observations where fraud risk is high at the end of the second fiscal quarter. P-values are two-tailed. *, **, and *** denote statistical significance at the 10, 5, and 1 percent levels, respectively. Tests for differences in sample means are based on t-tests. Tests for differences in sample medians are based on Wilcoxon two sample tests. All variables are defined in the Appendix.

Table 5
The Association between Auditor Tenure and the Likelihood of a Reduction in High Fraud Risk: Continuous Auditor Tenure

	M-Score			F-Score		
Variable	**Coeff. Est.**	**p-value**		**Coeff. Est.**	**p-value**	
Intercept	0.096	.625		-0.672	<.001	***
Tenure	0.014	.013	**	0.034	<.001	***
BigN	0.161	.061	*	0.051	.602	
Specialist	0.009	.928		0.118	.222	
LnAssets	-0.022	.325		0.040	.074	*
Loss	0.609	<.001	***	0.240	.002	***
MTB	-0.012	.003	***	0.001	.646	
StdREV	-0.292	.001	***	-0.160	.057	*
StdCFO	0.040	.069	*	0.006	.046	**
StdROA	-0.007	.655		0.018	.009	***
FIN	0.101	.197		-0.025	.118	
Leverage	0.143	.006	***	0.022	.505	
Ind_salesgrowth	-0.477	.242		-0.901	.038	**
M&A	0.094	.517		-0.725	<.001	***
FreeCF	0.162	.099	*	0.074	.001	***
Restructure	0.114	.249		0.468	<.001	***
Discops	0.322	.002	***	0.426	<.001	***
InstHoldings	0.490	<.001	***	-0.081	.501	
N	4,366			5,438		
Pseudo R^2	0.041			0.058		
Likelihood ratio χ^2	242.136	<.001	***	429.003	<.001	***

In both columns, the dependent variable is HighFRSK_reduced. The models include year and industry fixed effects. The samples are limited to observations where fraud risk is high at the end of the second fiscal quarter. P-values are two-tailed. *, **, and *** denote statistical significance at the 10, 5, and 1 percent levels, respectively. Standard errors are clustered by company. All variables are defined in the Appendix.

Table 6
The Association between Auditor Tenure and the Likelihood of a Reduction in High Fraud Risk: Short and Long Auditor Tenure

	M-Score			M-Score			F-Score			F-Score		
Variable	**Coeff. Est.**	**p-value**		**Coeff. Est.**	**p-value**		**Coeff. Est.**	**p-value**		**Coeff. Est.**	**p-value**	
Intercept	0.223	.256		0.159	.414		-0.398	.026	**	-0.513	.004	***
Shorttenure	-0.142	.050	*				-0.258	<.001	***			
Longtenure				0.227	.053	*				0.515	<.001	***
BigN	0.166	.056	*	0.188	.027	**	0.081	.265		0.096	.325	
Specialist	0.004	.966		0.012	.906		0.112			0.122	.209	
LnAssets	-0.019	.385		-0.024	.290		0.050	.019	**	0.040	.071	*
Loss	0.593	<.001	***	0.604	<.001	***	0.228	.004	***	0.226	.003	***
MTB	-0.012	.003	***	-0.012	.002	***	0.001	.689		0.001	.642	
StdREV	-0.298	.001	***	-0.292	.001	***	-0.176	.038	**	-0.160	.056	*
StdCFO	0.040	.068	*	0.041	.071	*	0.006	.038	**	0.006	.044	**
StdROA	-0.007	.661		-0.006	.682		0.018	.006	***	0.019	.005	***
FIN	0.097	.210		0.097	.211		-0.026	.113		-0.026	.115	
Leverage	0.147	.005	***	0.148	.005	***	0.031	.329		0.029	.375	
Ind_salesgrowth	-0.483	.234		-0.484	.235		-0.946	.033	**	-0.891	.040	**
M&A	0.094	.514		0.097	.500		-0.719	<.001	***	-0.726	<.001	***
FreeCF	0.319	.002	***	0.321	.002	***	0.072	.002	***	0.075	.001	***
Restructure	0.184	.061	*	0.171	.083	*	0.490	<.001	***	0.488	<.001	***
Discops	0.128	.194		0.119	.229		0.442	<.001	***	0.430	<.001	***
InstHoldings	0.492	<.001	***	0.495	<.001	***	-0.071	.563		-0.059	.622	
N	4,366			4,366			5,438			5,438		
Pseudo R^2	0.041			0.041			0.054			0.056		
Likelihood ratio χ^2	239.205	<.001	***	239.417	<.001	***	391.412	<.001	***	404.741	<.001	***

In both columns, the dependent variable is HighFRSK_reduced. The models include year and industry fixed effects. The samples are limited to observations where fraud risk is high at the end of the second fiscal quarter. P-values are two-tailed. *, **, and *** denote statistical significance at the 10, 5, and 1 percent levels, respectively. Standard errors are clustered by company. All variables are defined in the Appendix.

Table 7
The Association between Auditor Tenure and the Likelihood of a Reduction in High Fraud Risk: Continuous Auditor Tenure, Post AS5 Tests

	M-Score			F-Score		
Variable	**Coeff. Est.**	**p-value**		**Coeff. Est.**	**p-value**	
Intercept	-0.083	.758		-0.183	.474	
Tenure	0.024	.011	**	0.033	<.001	***
BigN	-0.001	.992		0.167	.239	
Specialist	-0.071	.626		0.124	.429	
LnAssets	-0.002	.955		0.018	.609	
Loss	0.767	<.001	***	0.316	.005	***
MTB	-0.011	.069	*	0.003	.534	
StdREV	-0.238	.091	*	-0.309	.045	**
StdCFO	0.166	.105		0.011	.161	
StdROA	-0.027	.536		0.019	.234	
FIN	0.248	.198		-0.085	.181	
Leverage	0.191	.007	***	0.035	.446	
Ind_salesgrowth	-0.118	.821		-0.472	.405	
M&A	0.164	.361		-0.595	<.001	***
FreeCF	0.594	.020	**	0.121	.038	**
Restructure	0.022	.872		0.421	.001	***
Discops	-0.104	.464		0.513	<.001	***
InstHoldings	0.467	.008	***	-0.024	.894	
N	2,071			2,351		
Pseudo R^2	0.052			0.060		
Likelihood ratio χ^2	145.484	<.001	***	185.278	<.001	***

In both columns, the dependent variable is HighFRSK_reduced. The models include year and industry fixed effects. The samples are limited to post-AS5 observations (i.e., audits of company-years on or after November 15, 2007) and to observations where fraud risk is high at the end of the second fiscal quarter. P-values are two-tailed. *, **, and *** denote statistical significance at the 10, 5, and 1 percent levels, respectively. Standard errors are clustered by company. All variables are defined in the Appendix.

Table 8
The Association between Auditor Tenure and the Likelihood of an Increase in Low Fraud Risk: Continuous Auditor Tenure

	M-Score			F-Score		
Variable	**Coeff. Est.**	**p-value**		**Coeff. Est.**	**p-value**	
Intercept	-1.758	<.001	***	-2.226	<.001	***
Tenure	-0.026	<.001	***	-0.046	<.001	***
BigN	0.033	.603		-0.371	<.001	***
Specialist	-0.136	.051	*	0.052	.613	
LnAssets	-0.040	.003	***	-0.034	.061	*
Loss	-0.363	<.001	***	-0.114	.123	
MTB	0.005	.022	**	-0.001	.686	
StdREV	0.585	<.001	***	0.364	<.001	***
StdCFO	-0.010	.184		-0.005	.389	
StdROA	-0.025	.003	***	-0.001	.833	
FIN	0.006	.151		0.004	.254	
Leverage	-0.175	<.001	***	-0.015	.547	
Ind_salesgrowth	-0.242	.429		0.170	.703	
M&A	0.163	.080	*	1.075	<.001	***
FreeCF	-0.010	.552		-0.143	<.001	***
Restructure	-0.371	<.001	***	-0.306	.002	***
Discops	-0.069	.295		-0.342	.001	***
InstHoldings	-0.637	<.001	***	-0.789	<.001	***
N	27,183			26,275		
Pseudo R^2	0.047			0.097		
Likelihood ratio χ^2	754.565	<.001	***	996.066	<.001	***

In both columns, the dependent variable is LowFRSK_increased. The models include year and industry fixed effects. The samples are limited to observations where fraud risk is not high at the end of the second fiscal quarter. P-values are two-tailed. *, **, and *** denote statistical significance at the 10, 5, and 1 percent levels, respectively. Standard errors are clustered by company. All variables are defined in the Appendix.