

Internal Control Weaknesses and Financial Reporting Fraud

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ABSTRACT

This study examines whether and how weak internal controls increase the risk of financial reporting fraud by top managers. Since top managers can override controls, there is a longstanding debate on whether control strength significantly affects fraud risk, yet little evidence on this issue. In fact, prior work suggests that control weaknesses are linked to lower quality accruals associated with errors, not intentional manipulation. We find a strong association between material weaknesses and future fraud revelation. We theorize this link could be attributable to weak controls a) giving managers greater opportunity to commit fraud or b) signaling a management characteristic that does not emphasize reporting quality and integrity. We find support consistent with weak controls giving managers the opportunity to commit fraud through entity- not process-level controls. This supports the PCAOB's assertion that entity-level controls reduce the risk of fraud and management override of controls.

Keywords: internal controls; fraud; PCAOB

I. Introduction

This study examines whether and how disclosed internal control weaknesses are linked to future revelations of financial reporting fraud. We examine future fraud revelation because instances where fraud is revealed and an auditor issues a material weakness opinion contemporaneously (or soon thereafter) would be unsurprising. Such a “mechanical” link is expected because auditors routinely amend internal control reports whenever a restatement is issued (see Rice and Weber 2012) and material weaknesses are issued after the vast majority of restatement-related frauds (Scholz 2014). Instead, we focus on whether disclosed material weaknesses indicate that management is engaging in unrevealed accounting fraud or will engage in accounting fraud in the future.

Our analysis is interesting for three reasons. First, the idea that strong internal controls reduce the risk of accounting fraud has long been controversial. Supporting a link, SEC commissioner Goldschmid stated that strong controls “significantly deter management from committing fraud” (Solomon 2003). However, others dispute this link due to the ability of management to override controls (e.g., Kinney 2005). The AICPA states that “otherwise effective internal controls cannot be relied upon to prevent, detect, or deter fraudulent financial reporting perpetrated by senior management” (AICPA 2005).

Second, no empirical evidence links internal control weaknesses with a higher risk of unrevealed accounting fraud. This is an important issue because the Sarbanes-Oxley Act (SOX), which was intended to reduce fraud (Lucas 2004), mandates internal control audits. While prior studies find that material weaknesses are related to restatements (Chan et al. 2008, Hoitash et al. 2008) and lower accrual quality (Doyle et al. 2007a, Ashbaugh-Skaife et al. 2008), these studies generally do not distinguish between errors and fraud. One exception is Ashbaugh-Skaife et al.

(2008), who conclude that the link between internal control weaknesses and poor accrual quality is driven by errors rather than intentional manipulations.

Third, recent research raises concerns as to the quality of material weakness disclosures under SOX because many firms with apparently weak internal controls do not receive adverse control opinions (Rice and Weber 2012). Thus, even if strong controls do reduce financial reporting fraud by managers, it is unclear that material weaknesses disclosed under SOX Section 404(b) would be associated with future revelations of fraud by top management.

We gather auditor internal control opinions from Audit Analytics from 2004-2007 and identify those with and without material weaknesses. We measure financial reporting fraud based upon credible allegations of fraud, in the form of settled, accounting-based securities class-action lawsuits as well as SEC and Department of Justice enforcement actions claiming fraud or other intentional misconduct from Karpoff et al. (2008a, 2008b). The sample includes frauds revealed from 2005- 2010. Ending the revelation measurement window in 2010 allows time for government investigations to conclude and for private litigation to be resolved.

We find statistically and economically significant evidence that material weaknesses predict future fraud revelation using both a propensity score matched-pairs test and a multivariate logistic regression. In our multivariate setting, firm-years with a material weakness are, on average, 1.24 percentage points more likely to have a future fraud revelation. This represents approximately 78 percent of the base rate of fraud. In our matched-pairs analysis, 2.49 percent of firms with material weaknesses have future fraud revelation, roughly 2.7 times greater than their matched firms' rate of 0.92 percent. Importantly, firms with adverse control opinions do not have a higher risk of future fraud revelation simply because they have poorer accrual quality or a higher incidence of prior or concurrent restatements as we control for these factors.

We also investigate the mechanism through which material weaknesses are linked to the future revelation of fraud. Advocates of a link between internal controls weaknesses and fraud typically do not specify a mechanism to explain how or why weak internal controls should be associated with increased fraud risk. We explore three potential explanations.

First, we investigate whether internal control weaknesses provide managers with an opportunity to commit fraud in a specific account. This explanation relies on the intuition that internal control weaknesses make fraud commission easier due to poor control over the specific area in which fraud is committed. We term this the “specific opportunity” explanation.

Second, we investigate whether certain internal control weaknesses provide managers with a more general opportunity to commit fraud. When the Public Company Accounting Oversight Board issued Auditing Standard No. 5, they explicitly linked certain entity-level controls (e.g., controls that increase the cost for managers to commit fraud, such as a strong internal audit function or in-depth accounting expertise at the firm) with reduced risk of fraud and management override of other controls (PCAOB 2007, 14 and 24). Poor entity-level controls would not enable fraud in a particular account, but would allow for fraud commission in any account. We term this the “general opportunity” explanation.

Third, we investigate whether internal control weaknesses represent a more systemic, cultural characteristic of the firm or its management. For example, tolerance of internal control weaknesses may reflect a management characteristic related to poor financial reporting integrity and/or a firm culture tolerant of fraud and other misconduct. Under this view, it is not the control weakness per se that leads to the fraud commission. Rather, the control weakness signals that the manager or firm is a “bad apple.” We term this the “management characteristic” explanation.

Overall, our tests support the general opportunity explanation. Only five frauds have a

connection between a weakness in a specific account or process and the area of the fraud. Moreover, the link between material weaknesses and unrevealed fraud is entirely driven by entity-level material weaknesses. These findings are consistent with the general opportunity explanation but are inconsistent with the specific opportunity explanation. Inconsistent with the management characteristic explanation, material weaknesses predict fraud ongoing during the weakness period but do not predict fraud beginning after the weakness period. This is, however, consistent with a general opportunity explanation since the weakness and fraud periods overlap.

A potential alternative explanation for our findings is that material *weaknesses* do not lead to higher underlying fraud risk but instead their *disclosure* leads to greater discovery and/or prosecution of fraud. This could occur if the material weakness disclosure: 1) provides evidence that lawyers or regulators can use to build cases; 2) leads to investigation by directors, the press, or other parties, which in turn leads to fraud being uncovered; or 3) causes auditors to conduct more substantive procedures in future years, which leads to more fraud discovery. To guard specifically against 1) and 2), we exclude frauds where the complaint mentions the material weakness disclosure (i.e., if the disclosure was necessary to build a case or trigger an investigation, it likely would have been mentioned by the SEC or plaintiffs' attorneys). To guard specifically against 3), we control for abnormal audit fees in the year after the material weakness as a proxy for auditors' increased substantive procedures. Results are robust to these additional tests.

To guard more generally against all of the explanations above, we use *FSCORE* from Dechow et al. (2011) as a proxy for the *underlying commission* of fraud. This measure is based on financial statement data such as unusual accruals or sales growth. We find that firms with material weakness disclosures have a significantly higher *FSCORE* than control firms, consistent

with material weaknesses being associated with a higher incidence of underlying fraud. Thus, it seems unlikely that our inferences are driven by reverse causation (e.g., material weakness disclosures trigger SEC investigations) or other detection-related explanations (e.g., some managers can conceal detection of both material weaknesses and frauds while others cannot, leading to a positive association between disclosures of weaknesses and fraud revelation).

Our study contributes to the existing literature in several ways. We provide the first evidence that weak internal controls are associated with a higher risk of unrevealed accounting fraud perpetrated by top management. Unlike studies using restatements or accrual quality, we focus explicitly on accounting fraud, not errors. Given the significant difference in costs between errors versus fraud (Hennes et al. 2008), the policy debate before and after SOX on internal controls and fraud, and the conclusion in Ashbaugh et al. (2008) that errors drive the link between poor accrual quality and weak controls, our evidence is important.

Additionally, our findings offer the first evidence on the mechanism by which weak controls lead to increased fraud risk. In particular, entity-level control issues provide the opportunity for top managers to commit fraud. This evidence is important to investors, scholars, auditors and regulators such as the PCAOB. Our evidence supports the “top-down” focus on entity-level controls in Auditing Standard No. 5, at least in terms of reducing financial reporting fraud risk.

Finally, though this study cannot speak to the completeness of SOX Section 404(b) reporting in identifying all firms with weak controls, our findings indicate that those control opinions that *do* cite material weaknesses provide a meaningful signal of increased fraud risk. Thus, our findings extend the literature regarding the quality of material weakness disclosures (e.g., Rice and Weber 2012, Ge et al. 2014) and fraud prediction (e.g., Dechow et al. 2011).

II. Hypothesis Development

Whether reported internal control weaknesses should be related to the risk of financial reporting fraud by top management is unclear for several reasons.¹ First, management override of internal controls is always possible, as indicated by auditing textbooks (e.g., Messier 2003), academic commentary (e.g., Hogan et al. 2008), and the AICPA (2005). Kinney (2005) contends that "better internal control is unlikely to significantly reduce (intentional) management misrepresentation fraud resulting from management override of internal controls, or collusion." Similarly, just prior to SOX, the Panel on Audit Effectiveness expressly declined to recommend that auditors test internal controls because it was unclear that strong controls would reduce financial reporting fraud by managers (POB 2000). In Craven (2006), PricewaterhouseCoopers partner and forensic accounting specialist Thomas Golden stated that the internal control reporting requirements of SOX would not prevent fraud:

Companies have spent millions of dollars and much in terms of human resources and board attention toward improving their control systems, which is what [SOX] is all about, not fraud. Many forget this. As such, many now believe...fraud is less likely to occur for all their dollars and efforts. They are wrong. What they [may] not realize or are forgetting is that controls have little to no effect against collusion, present in most all significant [financial statement] frauds . . . When executive management gets involved in the fraud, there is little your control system can do to prevent it or detect it on a timely basis.

Second, detection of internal control issues by the auditor should result in increased substantive procedures, which could deter managers from committing fraud (see, e.g., Smith et al. 2000, PCAOB 2010, 38). Consistent with increased substantive procedures, Hogan and Wilkins (2008) find significantly higher audit fees in firms with reported material weaknesses. Increased substantive procedures are performed to reduce the risk of a material misstatement and, thus, could counteract increased fraud risk from weak controls (Smith et al. 2000).

¹ For expositional purposes, we refer to "financial reporting fraud by top management" simply as fraud hereafter.

Third, not all internal control weaknesses are observable. Some weaknesses are remediated prior to the end of the reporting period, eliminating the need for disclosure. The incentive to remediate may be particularly high for managers committing fraud, so as not to draw attention to the firm's financial reporting system. In addition, the quality of internal control disclosures is questionable. Rice and Weber (2012) report that a vast majority of restating firms failed to report existing material weaknesses until after the restatement announcement.² Thus, there may be no relation between disclosed material weaknesses and future revelations of fraud.

On the other side of the debate, some believe that weak internal controls increase the probability of fraud. Around the time of SOX's passage, several regulators endorsed the view that internal controls are related to fraud, although they did not specify the mechanism.³ Similarly, the auditing standards issued by the PCAOB for integrated audits (audits of both internal controls and financial statements) suggest a link between strong internal controls and fraud prevention. For example, Auditing Standard No. 2 (PCAOB 2004) states, "many frauds resulting in financial statement restatement relied upon the ability of management to exploit weaknesses in internal control...assessments of internal controls over financial reporting should emphasize controls that prevent or detect errors as well as fraud." Auditing Standard No. 5, which superseded Auditing Standard No. 2 as of May 24, 2007, also links internal control strength and fraud prevention, as well as the possibility of management override (PCAOB 2007).

Despite these suggestions, there is little direct evidence linking poor internal controls to a

² Similarly, a report by the Committee of Sponsoring Organizations of the Treadway Commission (COSO 2010, 5) that investigated fraudulent financial reporting found "adverse Section 404 opinions for the small sample examined were not diagnostic of future reporting problems, but instead only highlighted already-announced reporting problems." Scholz (2014) reports that 88 percent of fraudulent restatements are followed by material weakness disclosures, suggesting that material weakness disclosures often do not precede fraud revelation.

³ For instance, the former Comptroller General of the United States testified to Congress "that expanding auditors' responsibilities to report on the effectiveness of internal control over financial reporting would assist auditors in assessing risks for the opportunity of fraudulent financial reporting...internal control is the major line of defense in preventing and detecting fraud" (Walker 2002).

higher ex-ante risk of fraud.⁴ While Hogan et al. (2008) note that practitioner standards (like SAS 99) claim that weak controls can increase the opportunities for fraud, they find very little evidence on this point in their review of the academic literature. One exception is Bell and Carcello (2000), who survey audit partners to compare characteristics of fraud and non-fraud engagements. Auditors are more likely to report weak control environments for engagements they worked on involving fraud or “irregularities,” consistent with a link between internal control weaknesses and fraud. However, the direction of causation is unclear. The existence of a material, intentional misstatement is by definition an indicator of weak internal controls (PCAOB 2007, 69). Thus, the discovery of fraud likely increases the auditors’ ex-post reporting of weak control environments. Put another way, prior to SOX, it is impossible to know whether these fraud firms would have been flagged for weak controls prior to the revelation of fraud. For this reason, we focus on the link between control weaknesses and unrevealed fraud.

Overall, because of the competing arguments above and the lack of direct evidence linking internal control weaknesses to unrevealed fraud, we state our first hypothesis in the null:

H1: There is no association between material weaknesses in financial reporting and the future revelation of fraud.

Conditional on finding a link between material weaknesses and the future revelation of

⁴ Prior research links disclosed material weaknesses and low accrual quality (Ashbaugh-Skaife et al. 2008, Doyle et al. 2007a). Doyle et al. (2007a) find that the relation between material weaknesses and accrual quality is driven by “company-level” material weaknesses and that Section 404 disclosures of material weaknesses *are not* associated with accrual quality. Lower accrual quality can be caused by both unintentional errors as well as intentional misstatements (fraud). In fact, Ashbaugh -Skaife et al. (2008) conclude that the association between low accrual quality and control weaknesses reported under SOX 404(b) is primarily driven by unintentional errors, rather than intentional misstatements. Some studies (Chan et al. 2008, Hoitash et al. 2008) have also documented an association between restatements and internal control weaknesses, though this is not their primary focus. Like poor accrual quality, restatements can be triggered by either errors or fraud. Further, a significant part of this relation is likely “mechanical,” because restatements are themselves evidence of a control weakness that often leads auditors to issue adverse internal control opinions. Feng and Li (2010) also note this issue, and find that material weakness firms have more than twice the restatement rate of non-weakness firms, after removing potentially mechanical observations. Feng and Li (2010) do not focus or screen on management intent, although they find that restatements with larger than average negative returns (below -2.3%) are linked to material weaknesses.

fraud, we turn to potential mechanisms by which internal control weaknesses might predict the future revelation of fraud. We test two explanations, “opportunity” and “management characteristic.” Weak controls may provide opportunity, one of the key elements of fraud (AICPA 2012, Caplan 1999). We split the opportunity explanation into internal control weaknesses that allow for specific versus more general fraud commission.

The specific opportunity explanation relies on internal control weaknesses enabling fraud by allowing the manager improper control over a particular account or process. As such, under this explanation, the fraud should be in the area of the internal control weakness. For the general opportunity explanation, we distinguish between entity-level and process-level internal control weaknesses based on Auditing Standard No. 5. Process-level weaknesses (those limited to a specific account or process) would provide opportunity for managers to commit fraud in that specific account or process, while entity-level weaknesses (such as an ineffective internal audit function) reflect heightened opportunities to commit fraud more generally in any area. Auditing Standard No. 5 (PCAOB 2007, 14) suggests a link between entity-level controls and fraud risk: “As part of identifying and testing entity-level controls...the auditor should evaluate whether the company's controls sufficiently address identified risks of material misstatement due to fraud and controls intended to address the risk of management override of other controls.”

The management characteristic explanation deals with managers who tolerate poor control environments and is consistent with internal control weaknesses reflecting the type of firm where fraud is likely, but the internal control weakness itself does not lead to or allow fraud. The presence of internal control weaknesses may reflect management’s lack of attention to controls due to financial distress or other business pressures. Such pressures may also lead to managers to commit fraud (Rosner 2003). Under the management characteristic explanation,

internal controls are predictive of fraud in general but do not enable it. Thus, if this hypothesis is true, we expect internal control weaknesses to be associated with all types of fraud, including “non-opportunity” frauds such as misleading disclosures, where control weaknesses provide no direct opportunity for fraud. We state three forms of our second hypothesis, H2, in the null:

H2a: There is no association between material weaknesses that provide a specific opportunity to commit fraud and the future revelation of fraud.

H2b: There is no association between material weaknesses that provide a general opportunity to commit fraud and the future revelation of fraud.

H2c: There is no association between material weaknesses and the future revelation of “non-opportunity” frauds.

Ultimately, these predictions are empirical issues, which we examine in the next section.

III. Empirical Analysis

Sample Selection

We obtain our initial sample of auditor internal control opinions from Audit Analytics. SOX Section 404(b) requires auditors to opine on the effectiveness of internal controls and became effective for accelerated filers starting on November 15, 2004.⁵ We collect all auditor internal control opinions for fiscal years ending during the period from November 15, 2004 through December 31, 2007. We collect internal control opinions through 2007 because we utilize a three-year fraud revelation window and our fraud revelation sample ends in 2010 (see below). The final sample includes 14,093 firm-years, 1,488 of which have ineffective internal controls (i.e., at least one material weakness in internal controls exists at year-end).

To identify instances of fraud, we gather settled securities class-action lawsuits that allege violations of GAAP from RiskMetrics as well as SEC and Department of Justice

⁵ Accelerated filers have public float of \$75 million or more as of six months before their fiscal year-end. Firms with public float less than \$75 million as of six months before their fiscal year-end are defined as non-accelerated filers.

enforcement actions that allege fraud or other intentional financial reporting misconduct from the Federal Securities Regulation Database.⁶ We select all lawsuits filed and enforcement actions revealed between January 2005 and December 2010. We retain only those lawsuits and enforcement actions that allege intent under Section 17(a) of the Securities Act of 1933, or either Section 10(b) (including Rule 10b-5) or 13(b)(5) of the Securities Exchange Act of 1934. Overall, our sample contains 87 unique lawsuits and 71 unique enforcement actions, which correspond to 127 unique cases as 31 cases have both a lawsuit and an enforcement action.⁷

Panels A and B of Table 1 provide further details on these cases. For example, over 90 percent of the cases name the CEO and/or the CFO as involved in the fraud, implicating top management.

Variable Definitions

Material Weaknesses

To test H1, we create *MW*, which is an indicator variable that is equal to one if the firm's auditor disclosed at least one material weakness over financial reporting in year *t*, and zero otherwise. To test H2 we utilize the coding of material weakness type by Audit Analytics to identify entity-level and process-level material weaknesses. We define entity-level weaknesses, *MW_ENTITY*, based upon the controls listed in Auditing Standard No. 5 that address the risk of fraud and management override (PCAOB 2007, 14).⁸ *MW_PROCESS* is set to one when there is a material weakness for year *t*, but not an entity-level material weakness. Process or account-

⁶ For more information on these data see <http://www.fesreg.com/>. These data were hand-collected by Gerald Martin and initially used in Karpoff et al. (2008a; 2008b).

⁷ Some studies (e.g., Dechow et al. 2011) express concern with the use of securities litigation to proxy for fraud. Our main results reported below are robust to the exclusion of fraud cases involving only securities litigation.

⁸ Specifically, *MW_ENTITY* is an indicator variable that is equal to one if Audit Analytics identifies at least one material weakness in the following categories: (1) non-routine transaction control issues (code 77); (2) journal entry control issues (code 76); (3) foreign, related party, affiliated or subsidiary issues (code 38); (4) an ineffective, non-existent or understaffed audit committee (code 11); (5) senior management competency, tone, or reliability issues (code 13); (6) an insufficient or non-existent internal audit function (code 18); (7) ethical or compliance issues with personnel (code 21); or (8) accounting personnel resources, competency, or training issues (code 44).

level weaknesses are usually present when entity-level weaknesses are noted in the control opinion.⁹ Thus, an observation with *MW_ENTITY*=1 may involve process weaknesses, but a *MW_PROCESS*=1 observation will never involve entity-level weaknesses.

Table 1 Panel C reports the number of each type of material weakness across the sample period. The number of internal control opinions with material weaknesses declines monotonically over the sample period. A similar decreasing trend is observed for each type of material weakness. However, out of the opinions with material weaknesses, the percentage with entity-level material weaknesses increases over time compared to those with only process-level weaknesses. For example, in 2004, approximately 57 percent of adverse internal control opinions reported at least one entity-level material weakness.¹⁰ In 2008, approximately 69 percent of adverse internal control opinions reported at least one entity-level material weakness.

Table 1 Panel D reports the number of each type of material weakness included in the entity-level classification. The most common type of entity-level material weakness relates to accounting personnel resources, competency, or training issues (code 44). There are very few instances where audit committee or internal audit function weaknesses are disclosed.

Fraud

We are not interested in instances where the auditor reveals evidence of fraud contemporaneously with the issuance of a material weakness. In such a case, the material weakness disclosure is likely a reaction to the discovery of fraudulently misstated financial statements and, even without this material weakness disclosure, outsiders could reasonably infer

⁹ We conjecture that to justify disclosing an entity-level material weakness within an internal control opinion to the client and audit committee, an auditor will usually need to point to an actual or potential misstatement in a particular account or process.

¹⁰ An adverse internal control opinion is one where the auditor concludes that internal controls are ineffective and, thus, reports at least one material weakness.

the firm has problems with the integrity of its financial reporting system.

For this reason, we are interested only in revelations of fraud that *follow* the issuance of the auditor's internal control opinion. For lawsuits, we use the class period end date as a proxy for the fraud revelation date. The class period is the timeframe the plaintiff alleges the firm's stock price was inflated due to fraud and the end of the class period coincides with the revelation of the fraud and the correction of the stock price. For SEC and Department of Justice enforcement actions, we utilize the "trigger date" from the Federal Securities Regulation Database. This is the first date involving public revelation of the accounting improprieties mentioned in the enforcement action. In many cases, this revelation comes from the company itself (e.g., the firm announces a restatement, irregularity, or commencement of an SEC or Department of Justice inquiry), while in other cases the first public revelation comes from the SEC or Department of Justice (e.g., a press release indicating the SEC will pursue or has filed charges against a company or its executives). For frauds that involve both an enforcement action and a lawsuit, we use the earlier of the class period end date or the trigger date.

We then create an indicator variable for each firm-year, *FRAUD*, that equals one if fraud is announced within three years of the filing date (plus seven days) of the firm's audited internal control opinion for year t , and zero otherwise.¹¹ Figure 1 depicts our research design graphically. While we require a minimum of seven days between the filing date and the revelation date, we find that most frauds come well after the filing date. The shortest lags are 40, 55, and 58 days, respectively, and the average (median) lag is 526 (464) days. Thus, it is unlikely that the auditor

¹¹ The median duration of fraud committed by executives is two years (ACFE 2014); thus, a three-year window should capture most frauds that would be associated with a material weakness in year t . In addition to requiring the fraud revelation to follow the filing date of the internal control opinion, we also require at least seven days between the filing date of the internal control opinion and the fraud revelation date to help avoid any possible mechanical relation between material weaknesses and fraud. For example, if a firm has a calendar-year end and the related 2004 internal control opinion is filed on March 1, 2005, then *FRAUD* is set to one for this observation if the fraud was revealed on March 9, 2005 through March 8, 2008, and zero otherwise.

knows of the subsequent fraud revelation ex ante.

To help ensure that results are not driven by counting frauds across multiple firm-years (e.g., a fraud revealed in 2006 could possibly be counted for the 2004 and 2005 observations), we create *FRAUD_NO_DUP*, which is equal to one for only the first firm-year in the three-year window.¹² When this variable is used, we exclude firm-years from fraud firms other than the first-firm year that is matched to a fraud. Table 1 Panel C reports the count of frauds across the sample period. There are 225 firm-years (127 firm-years when counting frauds only one time) within the sample period where an internal control opinion precedes future fraud revelation within three years.

Future Fraud Revelation

As an initial test of H1, we estimate a pooled logistic regression using available data on all audited internal control disclosures over our sample period. Compared to a propensity-matched design, which we utilize later, this specification allows us to use all of the fraud revelations over our sample period. The propensity-matched sample excludes many fraud revelations involving firms without material weaknesses that are not matched to firms with material weaknesses. Our pooled design is as follows:

$$\begin{aligned} \text{Prob}(FRAUD / FRAUD_NO_DUPS = 1) = & F(\beta_0 + \beta_1 MW + \beta_2 LN_MARKETCAP + \\ & \beta_3 AGGREGATE_LOSS + \beta_4 LN_SEGCOUNT + \\ & \beta_5 FOREIGN_CURRENCY_TRANSLATION + \beta_6 EXTREME_SALES_GROWTH + \\ & \beta_7 MERGER + \beta_8 RESTRUCTURING_CHARGE + \beta_9 BIG4 + \beta_{10} AUDITOR_RESIGN + \\ & \beta_{11} BANKRUPTCY_RISK) \end{aligned} \quad (1)$$

We control for contemporaneous determinants of material weaknesses drawn from Ashbaugh-Skaife et al. (2007) and Doyle et al. (2007b). These control variables are all measured

¹² Using the example above, for a fraud revealed in 2006, *FRAUD_NO_DUP* would equal one for 2004 and all other firm-years for the given firm would be excluded. Results are similar if we keep other years and set *FRAUD_NO_DUP* equal to zero.

for year t . Detailed variable definitions are provided in Appendix A. Table 2 presents correlations between all variables in equation (1).

Table 3 presents the results from estimating equation (1). The first column presents results with *FRAUD* as the dependent variable, and the coefficient on *MW* is positive and significant (p-value less than one percent). To put these results in economic perspective, firm-years with a material weakness are 1.24 percentage points more likely to have a fraud revelation within the next three years compared to firm-years without a material weakness. This represents approximately 78 percent of the 1.60 percent unconditional probability of fraud.¹³ The second column reports results when *FRAUD_NO_DUPS* is the dependent variable, and once again, the coefficient on *MW* is positive and significant (p-value less than one percent). Thus, it does not appear that results are affected by counting frauds more than once.

We also use propensity score matching to test H1 (Armstrong et al. 2010, Tucker 2010). This approach allows us to match firms on observable characteristics, thus comparing treatment firms (those with material weaknesses) to the most similar control firms (those without material weaknesses). We match 1,488 firm-years from firms with at least one material weakness to firm-years from firms that never had a material weakness over the sample period but that have the closest predicted probability of reporting a material weakness. To match, we first estimate the following logistic regression for the probability of reporting a material weakness:

$$\begin{aligned} \text{Prob}(MW = 1) = & F(\beta_0 + \beta_1 LN_MARKETCAP + \beta_2 AGGREGATE_LOSS + \\ & \beta_3 LN_SEG_COUNT + \beta_4 FOREIGN_CURRENCY_TRANSLATION + \\ & \beta_5 EXTREME_SALES_GROWTH + \beta_6 MERGER + \beta_7 RESTRUCTURING_CHARGE + \\ & \beta_8 BIG4 + \beta_9 AUDITOR_RESIGN + \beta_{10} BANKRUPTCY_RISK) \end{aligned} \quad (2)$$

Using the predicted probabilities from equation (2), we match each firm-year reporting a material weakness to the firm-year without a reported material weakness in the same year with

¹³ Marginal effects are the average of discrete or partial changes over all observations (Bartus 2005).

the closest predicted probability of a material weakness.¹⁴ We retain only those pairs whose scores match within 0.01. This results in 1,406 treatment firm-years and 1,406 control firm-years. To assess the effectiveness of matching, or covariate balance, we compare the average level of the covariates in equation (2) across treatment and control samples. In Table 4 Panel A, we report t-tests of means and paired t-tests of means between the two samples. Only one t-test of means (for *BIG4*) is statistically significant at the 0.05 level. None of the paired t-tests of means are statistically significant at the 0.05 level. Thus, our matching procedure selects a set of control observations that are comparable to our treatment observations.

Table 4 Panel B presents the mean of *FRAUD* across both samples. Overall, the future revelation of fraud is more common among firms with material weaknesses. The incidence of future fraud revelation among firms with a material weakness is 2.49 percent, while it is only 0.92 percent for matched firms without material weaknesses. This difference is statistically significant with p-values less than one percent. While fraud is relatively rare, the issuance of an adverse internal control opinion by the auditor conveys meaningful information about fraud likelihood. All else equal, a firm with an adverse internal control opinion is roughly 2.71 (2.49/0.92) times more likely to experience a future fraud revelation relative to a similar firm without an adverse internal control opinion. As in Panel A, these results support the conclusion that disclosure of material weaknesses predicts the revelation of fraud. Thus, we reject the null hypothesis in H1.

Nature of Internal Control Weaknesses that Predict Fraud Revelation

Given the strong relation between material weaknesses and the future revelation of fraud, a natural question is whether certain types of material weaknesses predict fraud better than

¹⁴ Though we lose observations, results are similar and slightly stronger if we match firms by industry (untabulated).

others. H2a, H2b, and H2c explore this possibility.

Specific vs. General Opportunity

Before conducting tests of the specific versus general opportunity hypotheses, we first identify and limit our focus to ongoing (i.e., latent) fraud. We do this because these hypotheses deal with the *opportunity* to commit fraud. If a material weakness provides either a specific or general opportunity to commit fraud, the fraud should be ongoing during the timeframe when the material weakness is present. *FRAUD_LATENT* is equal to one if fraud is ongoing during year t and is announced after the filing date (plus seven days) of the firm's audited internal control opinion for year t , and zero otherwise. We then examine whether entity- versus process-level control weaknesses can predict latent fraud. Specifically, we estimate the following logistic model:

$$\text{Prob}(FRAUD_LATENT=1) = F(\beta_0 + \beta_1 MW_ENTITY + \beta_2 MW_PROCESS + \beta_3 LN_MARKETCAP + \beta_4 AGGREGATE_LOSS + \beta_5 LN_SEGCOUNT + \beta_6 FOREIGN_CURRENCY_TRANSLATION + \beta_7 EXTREME_SALES_GROWTH + \beta_8 MERGER + \beta_9 RESTRUCTURING_CHARGE + \beta_{10} BIG4 + \beta_{11} AUDITOR_RESIGN + \beta_{12} BANKRUPTCY_RISK) \quad (3)$$

If the specific opportunity hypothesis is true, we expect β_2 to be positive and significant, as process-level material weaknesses would provide a specific opportunity for managers to commit fraud in the area of the process or account weakness. If the general opportunity hypothesis is true, we expect β_1 to be positive and significant since entity-level material weaknesses make it easier for managers to commit fraud in any area, not just one particular account or process.

Column (1) of Table 5 presents the results, and the coefficient on *MW_ENTITY* is positive and significant (p-value less than one percent), while the coefficient on *MW_PROCESS* is insignificant. The fact that process-level weaknesses by themselves are not associated with

unrevealed fraud is inconsistent with the specific opportunity hypothesis. Instead, these results are more consistent with the general opportunity hypothesis as entity-level weaknesses must be present in order for a material weakness report to predict heightened fraud risk.¹⁵

However, as we note above, even when an auditor reports an entity-level weakness (i.e., $MW_ENTITY=1$), it is common for process-level weaknesses to exist as well. It is therefore possible that the positive association between MW_ENTITY and fraud is driven by instances where there is a direct correspondence between the fraud area and a specific account or process weakness, which would support the specific opportunity hypothesis. To help rule out this possibility, we read each legal complaint/enforcement release and the associated internal control opinion (for all $MW=1$ and $FRAUD_LATENT=1$ observations) and note whether internal control opinions contained material weaknesses that were in the area of the fraud.

Out of the 27 latent fraud cases preceded by an adverse internal control opinion only five have any material weaknesses in the area of the fraud. This low rate of correspondence suggests that managers are not typically committing fraud in the specific process areas or accounts with weak internal controls. This finding is more consistent with the general opportunity hypothesis, where entity-level weaknesses open the door for fraud in any area rather than the specific opportunity hypothesis, which implies the link between MW and fraud should be dominated by

¹⁵ Although we are unaware of theory for why a certain type of entity-level material weakness should be more or less strongly related to future latent fraud revelation, we also test which types of entity-level material weaknesses predict latent fraud revelation. When we estimate equation (3) after replacing MW_ENTITY with indicators for the components for entity level weaknesses, only the coefficients for foreign, related-party, affiliated or subsidiary control issues (Audit Analytics code 38) and ethical or compliance issues (Audit Analytics code 21) are positive and significant (p-value less than 10 percent) (untabulated). However, we caution the reader in making inferences from these results for two reasons. First, some of these material weakness types are very rare. For example, an ineffective, non-existent or understaffed audit committee (code 11) and an insufficient or non-existent internal audit function (code 18) only occurs 17 and 33 times in our sample, respectively. Second, it is often the case that more than one of the entity-level types is disclosed in the same year. For example, the correlation between ethical or compliance issues with personnel (code 21) and senior management competency, tone, or reliability issues (code 13) is 56 percent. Similarly, the correlation between accounting personnel resources, competency, or training issues (code 44) and journal entry control issues (code 76) is 41 percent.

instances where the fraud and the material weakness share the same process or account.

To demonstrate this more formally, we estimate equation (3) after excluding the five instances where a material weakness area specifically corresponds with the fraud area. This exclusion results in a sample where there is no direct correspondence between the fraud and control weakness areas for all observations where $MW=1$ and $FRAUD_LATENT=1$. The specific opportunity hypothesis cannot therefore be a factor in this sample. Results are presented in column (2) of Table 5, and the coefficient on MW_ENTITY is positive and significant (p-value less than five percent), while the coefficient on $MW_PROCESS$ is again insignificant. This evidence suggests the positive association between unrevealed fraud and material weaknesses is driven by instances where entity-level weaknesses exist and there is no correspondence between specific account or process weaknesses and the fraud area.¹⁶

As a final test of the specific opportunity story, we also dichotomize internal control weaknesses into those related to the revenue process versus all other internal control weaknesses because most frauds involve revenue (e.g., Stubben 2010; Donelson et al. 2012). We perform this test to alleviate any concern with the interpretation of whether a material weakness is in the area of fraud alleged in an enforcement action or lawsuit. We re-run model 3 (above), substituting revenue-related and non-revenue-related material weakness variables for the process and entity variables. If the specific opportunity explanation holds, revenue-related internal control weaknesses should predict fraud revelation, while other internal control weaknesses should have much weaker or no predictive power. The results from this test (untabulated) show

¹⁶ We also performed an equivalent, untabulated test where we retained only the direct correspondence frauds for the $MW=1$ sample. Using this sample, the positive association between MW and unrevealed reporting fraud disappears, which again is inconsistent with the specific opportunity hypothesis. In fact, since we exclude so many non-corresponding frauds for $MW=1$ observations, the fraud rate for this group drops dramatically, and the relation between MW and reporting fraud becomes negative.

that revenue-related material weaknesses are unrelated to the likelihood of future fraud revelation, while non-revenue-related material weaknesses are significantly related to future fraud revelation. Overall, the evidence does not support the specific opportunity hypothesis (H2a), but does provide support for the general opportunity hypothesis (H2b).

Management Characteristic

To test H2c (i.e., a management characteristic indicates the type of firm that would have poor internal controls and managers who would commit fraud), we test whether material weaknesses are associated with non-latent fraud and non-GAAP fraud. These are non-opportunity frauds, where a current material weakness in internal control should play no *direct* role in providing an opportunity for fraud. If existing material weaknesses predict these types of fraud, such evidence would tend to support the management characteristic explanation.

Non-latent frauds occur when fraud begins after the report date on the internal control opinion. *FRAUD_NON_LATENT* is equal to one if the fraud begins after year t and is announced after the filing date (plus seven days) of the firm's audited internal control opinion for year t , and zero otherwise. Non-GAAP fraud includes securities class-action filings that *do not* contain an allegation related to misstated financial statements, but rather allege the failure to disclose regulatory investigations or other material information.¹⁷ *FRAUD_NON_GAAP* is equal to one if a class-action lawsuit unrelated to accounting is announced within three years of the filing date (plus seven days) of the firm's audited internal control opinion for year t , and zero otherwise.

If material weaknesses are associated with either non-latent or non-GAAP fraud, this

¹⁷ A common example of a non-GAAP suit involves an announcement of bad news (e.g., product launch failure, sluggish sales, an earnings decline, etc.), which triggers a large price decline. In a non-GAAP suit, plaintiffs would not allege that previously issued financial statements were misstated. Instead, they will allege that the entity had a duty to disclose this adverse information sooner or that management knowingly made prior false statements outside the financial statements (e.g., a conference call or press release).

would be consistent with the management characteristic theory H2c because the weakness itself does not lead to an opportunity for fraud. To test H2c, we estimate the following logistic regression with three separate dependent variables:

$$\text{Prob}(FRAUD_LATENT / FRAUD_NON_LATENT / FRAUD_NON_GAAP = 1) = F(\beta_0 + \beta_1 MW + \beta_2 LN_MARKETCAP + \beta_3 AGGREGATE_LOSS + \beta_4 LN_SEGCOUNT + \beta_5 FOREIGN_CURRENCY_TRANSLATION + \beta_6 EXTREME_SALES_GROWTH + \beta_7 MERGER + \beta_8 RESTRUCTURING_CHARGE + \beta_9 BIG4 + \beta_{10} AUDITOR_RESIGN + \beta_{11} BANKRUPTCY_RISK) \quad (4)$$

Table 6 presents the results. Material weaknesses are positively associated with latent fraud (p-value less than five percent in column (1)), but unassociated with non-latent fraud (column (2)) and non-GAAP fraud (column (3)). The column (2) and (3) results are robust to excluding observations with latent fraud and accounting fraud, respectively. These results support the overall opportunity hypothesis, which requires the weakness period and fraud period to overlap. However, the findings do not support the management characteristic hypothesis.

To summarize, we find no support for the specific opportunity hypothesis in H2a or the management characteristic hypothesis in H2c, but do find support for the general opportunity hypothesis in H2b. Therefore, our findings support the view that entity-level internal control weaknesses provide a general opportunity for managers to commit fraud.

Fraud Prediction Model

While the results above demonstrate that material weaknesses predict fraud revelation, it is possible that more complete controls for fraud would drive out such a result. We do not examine this as our primary analysis because the inclusion of such variables could result in “over-controlling” for factors that are also associated with the presence of a material weakness. However, for completeness, we report the results of logistic regressions that control for indicators of on-going fraud (i.e., the F-score from Dechow et al. 2011) and indicators of future

litigation (Kim and Skinner 2012). These regressions allow us to gauge the extent to which the material weakness variable retains its predictive ability for future fraud revelation in the face of other common fraud or litigation risk indicators. Our model is as follows:

$$\begin{aligned} \text{Prob}(FRAUD= 1) = F(\beta_0 + \beta_1 MW + \beta_2 LN_MARKETCAP + \beta_3 AGGREGATE_LOSS + \\ \beta_4 LN_SEGCOUNT + \beta_5 FOREIGN_CURRENCY_TRANSLATION + \\ \beta_6 EXTREME_SALES_GROWTH + \beta_7 MERGER + \beta_8 RESTRUCTURING_CHARGE + \\ \beta_9 BIG4 + \beta_{10} AUDITOR_RESIGN + \beta_{11} BANKRUPTCY_RISK + \beta_{12} FSCORE + \beta_{13} FPS + \\ \beta_{14} RETURN + \beta_{15} RETURN_SKEWNESS + \beta_{16} RETURN_STD_DEV + \\ \beta_{17} TRADING_VOLUME_TURNOVER) \end{aligned} \quad (5)$$

FSCORE is from Dechow et al. (2011) and is designed to be a “signal of the likelihood of earnings management or misstatement” (Dechow et al. 2011, 18). Equation (5) also controls for industry membership, stock performance, and stock volatility, as these are predictors of litigation risk (Kim and Skinner 2012). Detailed variable definitions are in Appendix A.

Table 7 presents the results. In the first column, we include *FSCORE*; in the second column, we include controls for litigation risk; and in the third column we include all predictors of fraud. In each column the coefficient on *MW* is positive and significant. To put these results in an economic perspective, the average marginal effect for firm-years with a material weakness is between 1.06 and 1.18 percentage points, which represents between approximately 66 and 74 percent of the 1.60 percent unconditional probability of fraud. This is consistent with disclosed material weaknesses within auditor internal control opinions being a significant predictor of future fraud revelation within three years. In fact, it appears to be a better predictor of fraud than extant predictors such as *FSCORE*.¹⁸

Additional Analysis and Robustness Tests

Do Internal Control Weakness Disclosures Mechanically Lead to Fraud Filings?

¹⁸ While *FSCORE* is insignificant in the test, this is driven by the *EXTREME_SALES_GROWTH* variable, which is correlated with the sales growth variable in *FSCORE*. If we exclude *EXTREME_SALES_GROWTH*, the coefficient on *FSCORE* is positive with a p-value less than 15 percent (two-tailed).

In our main tests, we protect against a mechanical relation between fraud and material weaknesses by requiring the fraud be revealed at least seven days after the filing of the internal control opinion. However, it is possible that when choosing between two otherwise identical cases, plaintiff's attorneys and regulators (i.e., the SEC or Department of Justice) may select cases that involve material weaknesses because this item represents one more fact that strengthens their case. It is also possible that other factors may lead to a mechanically positive link between the issuance of material weaknesses and the filing of a lawsuit or initiation of an SEC or Department of Justice investigation. For example, the disclosure of a material weakness could lead to investigations by directors, plaintiffs' attorneys or other outsiders, which could trigger the revelation of fraudulent accounting practices and the filing of a suit or investigation. To the extent that such factors influence our results, it could mean that material weaknesses merely provide stronger cases for attorney's or lead to heightened suspicions or investigations, which in turn lead to greater uncovering of accounting fraud.

To address these issues, we read the internal control opinions as well as the first complaint filed by plaintiffs in the related lawsuit or the enforcement action from the SEC or the Department of Justice for all frauds with a prior adverse internal control opinion. Of these 36 frauds, only three mention the specific material weaknesses from the associated internal control opinion.¹⁹ We then drop these three firm-years from our analyses. Results from both the multivariate and propensity-score analyses are robust to dropping these frauds.

The logic of this approach is that, to the extent that the material weakness provides a stronger case or aids in the actual revelation of the fraud, there is no apparent reason that the

¹⁹ All 36 frauds preceded by a material weakness are included in the multivariate analysis presented in Table 3. 35 of these are included in the propensity-score analysis presented in Table 4 Panel B. One was dropped because an appropriate match (i.e., control firm-year) could not be found.

lawyers from the SEC or Department of Justice or the lawyers representing the plaintiffs would not mention the adverse internal control opinion. In private litigation, plaintiffs' lawyers seek the strongest possible case to avoid dismissal, and it seems likely that government regulators have similar incentives to present strong cases to avoid controversy if firms appear to be accused in borderline cases. Despite these incentives, there is obviously no way we can assure with perfect accuracy whether the material weakness contributed to an investigation but was not cited.

Do Auditors Discover Fraud Due to Additional Procedures?

Prior studies suggest that auditors perform more substantive procedures when material weaknesses are present (Hogan and Wilkins 2008). It is possible that auditors continue to perform additional substantive procedures in the year after the material weakness because the past material weakness increases the perceived inherent risk of the client. These additional procedures could increase the chance of fraud discovery and be the reason there is a positive association between material weakness disclosure and future fraud revelation. To test this possibility, we include abnormal audit fees for the year after the adverse internal control opinion. *ABNORMAL_AUDIT_FEES* is the year $t+1$ residual of an audit-fee regression based off of equation (2) from Hogan and Wilkins (2008) that is estimated for all public, non-financial firms for years 2004 through 2012 covered by both Compustat and Audit Analytics. Positive abnormal audit fees serves as a proxy for increased auditor effort in the year after the adverse internal control opinion. Column (1) of Table 8 presents the results when controlling for *ABNORMAL_AUDIT_FEES*, and the corresponding coefficient is insignificant. Additionally, the coefficient on *MW* remains positive and significant. This suggests that *MW* is not simply capturing additional auditor effort.

Using FSCORE to Proxy for Underlying Fraud

The common theme in both of the alternative explanations above (weakness disclosures mechanically leading to filings or greater auditor investigation) is that material weakness disclosures do not increase the underlying incidence of fraud but instead increase the incidence of fraud detection and/or prosecution. To further guard against this possibility, we examine *FSCORE* developed by Dechow et al. (2011) as a proxy for underlying fraud commission. *FSCORE* is based upon financial statement data (e.g., unusual accruals, sales growth, etc.) and serves as a “red flag” that fraud is occurring. In our propensity-matched analysis, we find the mean *FSCORE* in year *t* for the treatment group is more than double the mean for the control group (1.41 vs 0.60, $p = 0.05$, untabulated).²⁰ Results are similar for *HIGHFSCORE*, an indicator variable set to one for the highest quintile of *FSCORE* in our sample ($p < .01$, untabulated).²¹ In Column (2) of Table 8, we estimate equation (1) after replacing the dependent variable with the *HIGHFSCORE* in year *t*. The coefficient on *MW* is positive and significant ($p < 0.05$). These results suggest that the underlying commission of fraud, not just its revelation, is higher for firms with material weakness opinions. Thus, it is unlikely that reverse causation – disclosure of material weaknesses triggering SEC investigations or securities lawsuits – is driving our main inferences.

The results above also help rule out other potential detection-related explanations for our findings. For example, not all material weaknesses are disclosed, and some managers may have more skill in suppressing disclosures. Additionally, although many studies assume fraud must eventually be revealed (e.g., Dyck et al. 2010), certain managers may be more skilled at hiding fraud. If the same managers are able to conceal both fraud and material weaknesses, the positive association we observe between material weakness disclosure and future fraud revelation may be

²⁰ We exclude *EXTREME_SALES_GROWTH* from the matching regression because it is a determinant of *FSCORE*.

²¹ Dechow et al. (2011) indicate that the majority of revealed frauds fall in the top quintile of *FSCORE*.

driven by managerial ability. However, based on *FSCORE*, the underlying incidence of fraud appears higher among firms with material weaknesses, which suggests that managerial ability to suppress control weaknesses and fraud is not driving our main inferences.

Number of Areas Affected by the Material Weaknesses

We next test whether the pervasiveness of internal control issues drives our findings. *MW_SUM* is a count of the areas associated with the material weaknesses disclosed in the internal control opinion as coded by Audit Analytics. Higher counts reflect more pervasive control issues. In untabulated results, the coefficient on *MW_SUM* is positive and significant when omitting *MW* from the regression. However, Table 9 column (1) reports that it is insignificant when *MW* is included in the regression. Additionally, the coefficient on *MW* remains positive and significant. The results are also robust to including a count of the material weaknesses (as opposed to a count of the material weakness areas) as reported by Audit Analytics (untabulated). Overall, these results suggest that it is the area of the material weakness (i.e., an entity-level material weakness) that matters for future fraud revelation as opposed to the number of material weaknesses or the number of areas affected by the material weaknesses.

Are Material Weaknesses Really Just a Proxy for Concurrent Restatement Announcements?

Rice and Weber (2012) report that material weaknesses are frequently not disclosed during the misstatement periods. Also, several studies report a positive association between material weaknesses and concurrent and historical restatement announcements (e.g., Chan et al 2008, Hoitash et al. 2008). Our design protects against restatement announcements being a correlated omitted variable, as we require the fraud revelation to occur after the material weakness disclosure. Generally revelation of fraud occurs soon after (if not the very next day) of a restatement. Thus, it seems unlikely that our results could be explained by restatement

announcements preceding the fraud revelation.

We formally test whether restatement announcements are driving our results by controlling for *RESTATEMENT*, which is an indicator variable that is equal to one if there is a restatement announced on the filing date or within 365 days before the filing date of the auditor's internal control opinion for year t as reported by Audit Analytics. Column (2) of Table 9 reveals that our results are robust to controlling for restatement announcements. In untabulated results, inferences remain similar even if we control for restatement announcements that occur within the 90 days subsequent to the filing date of the auditor's internal control opinion for year t .

Are Material Weaknesses Really Just a Proxy for Poor Accrual Quality?

Accrual quality is negatively associated with material weaknesses (Ashbaugh-Skaife et al. 2008, Doyle et al. 2007a), suggesting that weak internal controls leads to worse accrual quality. There is mixed evidence as to whether accrual quality is associated with fraud. For example, using a sample from 1988 to 2001 Jones et al. (2010) provides evidence that accrual quality is positively associated with fraud. However, Price et al. (2011) use a sample period of 1995 to 2008 and find little to no correlation between accrual quality and observable measures of fraud. Additionally, Ashbaugh-Skaife et al. (2008) report that the relation between material weaknesses and accrual quality is driven by errors rather than intentional manipulations.

We thus control for *ACCRUAL_QUALITY*, the standard deviation of the residuals from Dechow and Dichev (2002), as implemented by Doyle et al. (2007a), for years $t-4$ to t . Column (3) of Table 9 reveals that our results are robust to controlling for accrual quality. The coefficient on *ACCRUAL_QUALITY* is positive and has a p-value of 10.8 percent. As Doyle et al. (2007a) report that the relation between accrual quality and internal controls is driven by “company-level controls,” we also estimate the likelihood of future fraud revelation using latent fraud as a

dependent variable and including *MW_ENTITY* and *MW_PROCESS* as independent variables. The coefficient on *MW_ENTITY* in column (4) of Table 9 is positive and significant, while the coefficient on *MW_PROCESS* is insignificant. Thus, results are consistent with our main conclusion that managers exploit the opportunity presented by weak entity-level controls.

Remediation versus Recurrence of Material Weaknesses

Next, we investigate whether the recurrence or remediation of material weaknesses affect the results because prior studies find that earnings quality improves after remediation (e.g., Ashbaugh-Skaife et al. 2008). In the multivariate setting, we re-estimate equation (1) and include an indicator equal to one when there is an adverse internal control opinion in both t and $t+1$ and the $t+1$ opinion is not mechanically related to the fraud revelation (i.e., it has to be filed before seven days of the fraud revelation). In this untabulated test, the coefficient on the recurring material weakness indicator is insignificant, while the coefficient on *MW* remains positive and significant (p-value less than one percent). This does not support the proposition that recurrence or remediation of material weaknesses affect the likelihood of future fraud revelation.²²

Excluding Cases that do not Name Management

Table 1 Panel B notes that 115 out of 127 cases name either the CEO or CFO as a

²² In our matched-pairs analysis, we also examined how remediation affected the duration of fraud. For each firm-year in the matched-pairs analysis that is (1) associated with future fraud and (2) preceded by an adverse internal control opinion, we read subsequent internal control opinions and find that 18 out of 35 were fully remediated because they have an unqualified internal control opinion prior to fraud revelation. Three had no full remediation (i.e., a repeat MW), while 14 were indeterminate because there were no future control opinions before fraud revelation. In univariate tests, the 18 firm-years identified as having remediated material weakness issues are associated with a *longer* time to fraud revelation than the other 17 firm-years ($p < 0.01$), which seems inconsistent with remediation of control weaknesses reducing fraud risk. It is unclear how to interpret these results, however. As firms have incentives to report remediated material weaknesses, it is possible that material weaknesses associated with future fraud revelation are not remediated despite the absence of a recurring material weakness in the auditor's internal control opinion. That is, perhaps management does enough to satisfy the auditor and receive a "clean" opinion, but does not fully remediate the underlying weakness in place.

participant in the fraud. After excluding the 12 cases that do not explicitly name either the CEO or CFO, results remain robust. Specifically, the coefficient on *MW* remains positive and significant when we re-estimate equation (1), and in the propensity score matched-pairs test the rate of fraud is statistically larger in the treatment (material weakness) sample than the control sample. Additionally, when re-estimating equation (3) the coefficient on *MW_ENTITY* remains positive and significant, while the coefficient on *MW_PROCESS* remains insignificant.

IV. Conclusion

This study finds a statistically and economically significant association between material weaknesses and the future revelation of fraud. This association is driven entirely by instances where the internal control issue reflects a general opportunity to commit fraud (as captured by entity-level material weaknesses) rather than account- or process-specific control deficiencies.

Our findings have implications for financial statement users, accounting scholars, policymakers, standard setters, and auditors. For users, our results indicate that the issuance by an auditor of an adverse internal control opinion (one that discloses at least one material weakness) should be a “red flag” indicating a significantly higher probability that managers are committing (unrevealed) fraud. Further, our findings suggest that the type of internal control weakness is important from a fraud prediction standpoint. For researchers, our findings imply that fraud and/or litigation prediction models should include a control variable for internal control weaknesses. For policymakers and regulators, our findings indicate that SOX Section 404(b) provides a potential benefit to financial statement users in the form of an early warning system for future fraud revelation. Given the substantial criticisms of SOX (e.g., Romano 2005) and recent discussion in favor of its repeal or curtailment (e.g., Rosen 2011), this benefit is important to consider alongside the costs of internal control reporting. Policymakers and

regulators could also consider ways to improve the accuracy of material weakness disclosures.

Our results support the premise of Auditing Standard No. 5 that certain entity-level controls reduce the risk of material misstatement due to fraud. Our results are also consistent with auditors not sufficiently expanding the scope of audit procedures in the presence of internal control weaknesses to negate the heightened fraud risk. This is an avenue for future research.

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Appendix A - Variable Definitions

	Definition
Variables - data come from Audit Analytics, Compustat, CRSP, Risk Metrics, and the Securities Regulation Database. Compustat variables names are in parenthesis.	
<i>MW</i>	An indicator variable that is equal to one if the firm's auditor disclosed a material weakness over financial reporting as reported by Audit Analytics, and zero otherwise.
<i>MW_ENTITY</i>	An indicator variable that is equal to one if the firm's auditor disclosed at least one entity-level material weakness over financial reporting as reported by Audit Analytics, and zero otherwise. Entity-level material weaknesses are those where Audit Analytics identifies (1) non-routine transaction control issues (code 77); (2) journal entry control issues (code 76); (3) foreign, related party, affiliated or subsidiary issues (code 38); (4) an ineffective, non-existent, or understaffed audit committee (code 11); (5) senior management competency, tone, or reliability issues (code 13); (6) an insufficient or non-existent internal audit function (code 18); (7) ethical or compliance issues with personnel (code 21); or (8) accounting personnel resources, competency, or training issues (code 44). Audit Analytics' codes are in parentheses.
<i>MW_PROCESS</i>	An indicator variable that is equal to one if the firm's auditor disclosed at least one process-level material weakness and no entity-level material weaknesses as reported by Audit Analytics, and zero otherwise.
<i>MW_SUM</i>	A count of the areas associated with the material weaknesses disclosed within the internal control opinion as coded by Audit Analytics.
<i>FRAUD</i>	An indicator variable equal to one if fraud is announced within three years of the filing date (plus seven days) of the firm's audited internal control opinion for year <i>t</i> , and zero otherwise. Frauds are made up of (1) SEC and Department of Justice enforcement actions that establish intent under Section 17(a) of the Securities Act of 1933, or either Section 10(b) (including Rule 10b-5) or 13(b)(5) of the Securities Exchange Act of 1934 per the Federal Securities Regulation Database and (2) settled securities class-action lawsuits that allege violations of Generally Accepted Accounting Principles per RiskMetrics.
<i>FRAUD_NO_DUPS</i>	An indicator variable equal to one if fraud is announced within three years of the filing date (plus seven days) of the firm's audited internal control opinion for year <i>t</i> , and zero otherwise. For firm-years from fraud firms, only the first firm-year within the three-year window is kept. All firm-years other than the first firm-year within the three-year window are excluded.

<i>FRAUD_LATENT</i>	An indicator variable equal to one if fraud is ongoing during year t and is announced after the filing date (plus seven days) of the firm's audited internal control opinion for year t , and zero otherwise.
<i>FRAUD_NON_LATENT</i>	An indicator variable equal to one if the fraud begins after year t and is announced after the filing date (plus seven days) of the firm's audited internal control opinion for year t , and zero otherwise.
<i>FRAUD_NON_GAAP</i>	An indicator variable equal to one if a class-action lawsuit unrelated to accounting is announced within three years of the filing date (plus seven days) of the firm's audited internal control opinion for year t , and zero otherwise.
<i>LN_MARKETCAP</i>	The natural log of market capitalization ($\text{prcc}_f \cdot \text{csho}$).
<i>AGGREGATE_LOSS</i>	An indicator variable equal to one if earnings before extraordinary items (ib) in years t and $t-1$ sum to less than zero, and zero otherwise.
<i>LN_SEGCOUNT</i>	The natural log of the sum of the number of operating and geographic segments reported by the Compustat Segments database for the firm.
<i>FOREIGN_CURRENCY_TRANSLATION</i>	An indicator variable that is equal to one if the firm has a non-zero foreign currency translation (fca), and zero otherwise.
<i>EXTREME_SALES_GROWTH</i>	An indicator variable that is equal to one if year-over-year industry-adjusted sales growth (sale) falls into the top quintile, and zero otherwise.
<i>MERGER</i>	An indicator variable that is equal to one if the firm has a non-zero acquisition expense (aqp) in years t or $t-1$, and zero otherwise.
<i>RESTRUCTURING_CHARGE</i>	The aggregate restructuring charges ($\text{rcp} * -1$) in years t and $t-1$ scaled by the firm's year t market capitalization ($\text{csho} * \text{prcc}_f$).
<i>BIG4</i>	An indicator variable that is equal to one if the firm engaged one of the largest four audit firms as reported by Audit Analytics. The largest four audit firms include Deloitte, Ernst and Young, KPMG, and PricewaterhouseCoopers.
<i>AUDITOR_RESIGN</i>	An indicator variable that is equal to one if the firm experienced an auditor resignation in year t as reported by Audit Analytics.
<i>BANKRUPTCY_RISK</i>	The decile rank of the percentage probability of bankruptcy in year t from the default hazard model prediction based on Shumway (2001). Note: higher score translates to higher probability of bankruptcy.
<i>FSCORE</i>	Equals the predicted probability from Model (1) of Dechow et al. (2011) divided by the unconditional fraud rate of 0.0037 in Dechow et al. (2011).
<i>HIGHFSCORE</i>	An indicator variable that is equal to one if a firm in year t has an <i>FSCORE</i> in the top quintile of the sample, and zero otherwise.

<i>FPS</i>	Equals one if the firm is in the biotech (SIC codes 2833-2836 and 8731-8734), computer (3570-3577 and 7370-7374), electronics (3600-3674), or retail (5200-5961) industry, and zero otherwise.
<i>RETURN</i>	Market-adjusted stock return for year t .
<i>RETURN_SKEWNESS</i>	Skewness of the firm's stock return for year t .
<i>RETURN_STD_DEV</i>	Standard deviation of the firm's stock return for year t .
<i>TRADING_VOLUME_TURNOVER</i>	Trading volume accumulated over year t .
<i>ABNORMAL_AUDIT_FEES</i>	The year $t+1$ residual of an audit-fee regression based off of equation (2) from Hogan and Wilkins (2008) that is estimated for all public, non-financial firms for years 2004 through 2012 covered by both Compustat and Audit Analytics.
<i>RESTATEMENT</i>	An indicator variable that is equal to one if there is a restatement announced on the filing date or within 365 days before the filing date of the auditor's internal control opinion for year t as reported by Audit Analytics.
<i>ACCRUAL_QUALITY</i>	The standard deviation of the residuals from Dechow and Dichev (2002), as implemented by Doyle et al. (2007a), for years $t-4$ to t . The proxy for accrual quality is estimated cross-sectionally within each two-digit SIC code and year.

Table 1, Panel A – Fraud Revelation by Year

Frauds Revealed in:					
2005		2006		2007	
Lawsuits	SEC / DOJ	Lawsuits	SEC / DOJ	Lawsuits	SEC / DOJ
17	18	26	29	14	11
Frauds Revealed in:					
2008		2009		2010	
Lawsuits	SEC / DOJ	Lawsuits	SEC / DOJ	Lawsuits	SEC / DOJ
18	8	9	3	3	2

This panel presents the fraud sample by year of revelation. The sample period for frauds is 2005 through 2010. We obtain a fraud sample made up of (1) SEC and Department of Justice enforcement actions that establish intent under Section 17(a) of the Securities Act of 1933, or either Section 10(b) (including Rule 10b-5) or 13(b)(5) of the Securities Exchange Act of 1934 per the Federal Securities Regulation Database and (2) settled securities class-action lawsuits that allege violations of Generally Accepted Accounting Principles per RiskMetrics.

Table 1, Panel B – Fraud Details

	Number of Cases	Number Where the CEO is Named	Number Where the CFO is Named	Number Where Either the CEO or CFO is Named	Number Where the Company is Named
SEC / DOJ Enforcement Action Only	40	25	23	28	30
Class-Action Lawsuit Only	56	55	54	56	55
Both Enforcement Action and Lawsuit	31	31	31	31	30
Total	127	111	108	115	115

This panel presents whether the CEO, CFO, or company is named in the fraud case. The sample period for frauds is 2005 through 2010. We obtain a fraud sample made up of (1) SEC and Department of Justice enforcement actions that establish intent under Section 17(a) of the Securities Act of 1933, or either Section 10(b) (including Rule 10b-5) or 13(b)(5) of the Securities Exchange Act of 1934 per the Federal Securities Regulation Database and (2) settled securities class-action lawsuits that allege violations of Generally Accepted Accounting Principles per RiskMetrics.

Table 1, Panel C – Fraud and Material Weaknesses by Year

	2004 (n=2,854)	2005 (n=3,461)	2006 (n=3,786)	2007 (n=3,992)	Total (n=14,093)
<i>FRAUD</i>	65	73	50	37	225
<i>FRAUD_NO_DUPS</i>	65	39	14	9	127
<i>MW</i>	472	396	330	290	1,488
<i>MW_ENTITY</i>	271	250	196	200	917
<i>MW_PROCESS</i>	201	146	134	90	571

This panel presents the fraud and material weakness counts by year. The sample period is 2004 through 2007 for material weaknesses and 2005 through 2010 for frauds. We obtain a fraud sample made up of (1) SEC and Department of Justice enforcement actions that establish intent under Section 17(a) of the Securities Act of 1933, or either Section 10(b) (including Rule 10b-5) or 13(b)(5) of the Securities Exchange Act of 1934 per the Federal Securities Regulation Database and (2) settled securities class-action lawsuits that allege violations of Generally Accepted Accounting Principles per RiskMetrics. *FRAUD* is equal to one if fraud is announced within three years of the filing date (plus seven days) of the firm's audited internal control opinion for year t , and zero otherwise. *FRAUD_NO_DUPS* is equal to *FRAUD*, but only counts each fraud one time. Specifically, only the first year within the three-year window is retained, thus removing duplicate frauds. The other firm-years from the fraud firm are excluded. The number of firm-years for *FRAUD_NO_DUPS* is 2,831, 3,387, 3,688, and 3,892 for years 2004 through 2007, respectively. *MW* is an indicator variable that is equal to one if the firm's auditor disclosed a material weakness over financial reporting as reported by Audit Analytics, and zero otherwise. *MW_ENTITY* is an indicator variable that is equal to one if the firm's auditor disclosed at least one entity-level material weakness over financial reporting as reported by Audit Analytics, and zero otherwise. *MW_PROCESS* is an indicator variable that is equal to one if the firm's auditor disclosed at least one process-level material weakness and no entity-level material weaknesses as reported by Audit Analytics, and zero otherwise. See Appendix A for detailed variable definitions.

Table 1, Panel D – Types of Entity-Level Material Weaknesses by Year

	2004 (n=2,854)	2005 (n=3,461)	2006 (n=3,786)	2007 (n=3,992)	Total (n=14,093)
Non-routine transaction control issues (code 77)	84	73	62	46	265
Journal entry control issues (code 76)	52	60	43	25	180
Foreign, related party, affiliated or subsidiary issues (code 38)	61	58	51	38	208
Ineffective, non-existent or understaffed audit committee (code 11)	8	2	1	6	17
Senior management competency, tone, or reliability issues (code 13)	29	23	21	17	90
Insufficient or non-existent internal audit function (code 18)	12	5	8	8	33
Ethical or compliance issues with personnel (code 21)	22	23	21	15	81
Accounting personnel resources, competency, or training issues (code 44)	225	202	149	172	748

This panel presents the count of the types of material weaknesses that are included in *MW_ENTITY*. The Audit Analytics' identification code is in parenthesis. See Appendix A for detailed variable definitions.

Table 2 – Correlations

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1 <i>FRAUD</i>														
2 <i>FRAUD_NO_DUPS</i>	1.000													
3 <i>MW</i>	0.023	0.033												
4 <i>MW_ENTITY</i>	0.017	0.026	0.768											
5 <i>MW_PROCESS</i>	0.014	0.019	0.598	-0.054										
6 <i>LN_MARKETCAP</i>	0.055	0.033	-0.133	-0.109	-0.070									
7 <i>AGGREGATE_LOSS</i>	-0.024	-0.012	0.139	0.138	0.045	-0.344								
8 <i>LN_SEGCOUNT</i>	0.016	0.019	0.048	0.053	0.009	0.280	-0.008							
9 <i>FOREIGN_CURRENCY_TRANSLATION</i>	-0.008	0.006	0.055	0.074	-0.007	0.172	0.032	0.424						
10 <i>EXTREME_SALES_GROWTH</i>	0.025	0.018	-0.002	0.004	-0.007	-0.028	0.044	-0.058	-0.020					
11 <i>MERGER</i>	0.041	0.021	0.001	0.003	-0.002	0.081	-0.013	0.010	0.022	0.066				
12 <i>RESTRUCTURING_CHARGE</i>	0.000	0.001	-0.006	-0.012	0.005	-0.009	0.042	0.000	0.002	-0.005	0.003			
13 <i>BIG4</i>	0.025	0.014	-0.056	-0.054	-0.021	0.363	-0.051	0.197	0.106	-0.037	0.011	0.000		
14 <i>AUDITOR_RESIGN</i>	-0.003	0.000	0.098	0.093	0.036	-0.073	0.065	0.003	0.000	0.015	0.007	0.007	-0.177	
15 <i>BANKRUPTCY_RISK</i>	-0.029	-0.024	0.121	0.106	0.056	-0.624	0.356	-0.325	-0.182	-0.010	0.001	0.011	-0.230	0.054

This table provides Pearson correlation coefficients for primary variables. The sample period is from 2004 through 2007 for material weaknesses and 2005 through 2010 for frauds. We obtain a fraud sample made up of (1) SEC and Department of Justice enforcement actions that establish intent under Section 17(a) of the Securities Act of 1933, or either Section 10(b) (including Rule 10b-5) or 13(b)(5) of the Securities Exchange Act of 1934 per the Federal Securities Regulation Database and (2) settled securities class-action lawsuits that allege violations of Generally Accepted Accounting Principles per RiskMetrics. Variable definitions are provided in Appendix A. Bolded coefficients are significant at the 10 percent level.

Table 3 – Multivariate Fraud Results

Logistic Regression, Dependent Variable is <i>FRAUD</i> for column (1) and <i>FRAUD_NO_DUPS</i> for column (2)		
Independent Variables	(1)	(2)
<i>MW</i>	0.6286 *** (0.214)	0.7262 *** (0.234)
<i>LN_MARKETCAP</i>	0.2513 *** (0.077)	0.2123 *** (0.074)
<i>AGGREGATE_LOSS</i>	-0.3079 (0.276)	-0.1616 (0.276)
<i>LN_SEGCOUNT</i>	0.1246 (0.161)	0.1672 (0.152)
<i>FOREIGN_CURRENCY_TRANSLATION</i>	-0.3518 (0.245)	0.0310 (0.236)
<i>EXTREME_SALES_GROWTH</i>	0.4910 *** (0.187)	0.4954 ** (0.211)
<i>MERGER</i>	0.7366 *** (0.234)	0.6308 ** (0.249)
<i>RESTRUCTURING_CHARGE</i>	0.0541 (0.088)	0.2730 (0.904)
<i>BIG4</i>	0.2351 (0.313)	-0.1645 (0.322)
<i>AUDITOR_RESIGN</i>	-0.1094 (0.602)	-0.2591 (0.753)
<i>BANKRUPTCY_RISK</i>	0.0233 (0.043)	-0.0120 (0.043)
Year fixed effects?	Yes	Yes
Obs. where dependent variable = 1	225	127
Total Obs.	14,093	13,801
Pseudo R-square	0.05	0.09

This table reports the results of the following logistic regression for the probability of fraud revelation, which controls for contemporaneous determinants of material weakness disclosure:

$$\text{Prob}(FRAUD / FRAUD_NO_DUPS = 1) = F(\beta_1 MW + \beta'(\text{CONTROLS}))$$

The sample period is 2004 through 2007 for material weaknesses and 2005 through 2010 for frauds. We obtain a fraud sample made up of (1) SEC and Department of Justice enforcement actions that establish intent under Section 17(a) of the Securities Act of 1933, or either Section 10(b) (including Rule 10b-5) or 13(b)(5) of the Securities Exchange Act of 1934 per the Federal Securities Regulation Database and (2) settled securities class-action lawsuits that allege violations of Generally Accepted Accounting Principles per RiskMetrics. *FRAUD* is equal to one if fraud is announced within three years of the filing date (plus seven days) of the firm's audited internal control opinion for year *t*, and zero otherwise. *FRAUD_NO_DUPS* is equal to *FRAUD*, but only counts each fraud one time. Specifically only the first year within the three-year window is retained, thus removing duplicate frauds. The other firm-years from fraud firms are excluded. *MW* is an indicator variable that is equal to one if the firm's auditor disclosed a material weakness over financial reporting as reported by Audit Analytics, and zero otherwise. Variable definitions are provided in Appendix A. Standard errors clustered by firm are in parentheses. Pseudo R-Square is the

max re-scaled r-square from SAS (also known as Cragg & Uhler's pseudo r-square). *, **, and *** represent statistical significance at the 10%, 5%, and 1% levels, respectively.

Table 4, Panel A – Covariate Balance

	Mean Treatment	Mean Control	t-Test Difference p-Value (on mean)	Paired t-Test Difference p-Value (on Mean)
<i>LN_MARKETCAP</i>	6.3267	6.3009	0.6451	0.5017
<i>AGGREGATE_LOSS</i>	0.3521	0.3748	0.2098	0.0799
<i>LN_SEGCOUNT</i>	1.0395	1.0216	0.5128	0.4977
<i>FOREIGN_CURRENCY_TRANSLATION</i>	0.2994	0.2809	0.2802	0.2516
<i>EXTREME_SALES_GROWTH</i>	0.1735	0.1970	0.1093	0.1036
<i>MERGER</i>	0.0982	0.0875	0.3298	0.3301
<i>RESTRUCTURING_CHARGE</i>	0.0135	0.0103	0.3405	0.3385
<i>BIG4</i>	0.7916	0.8250	0.0243	0.3385
<i>AUDITOR_RESIGN</i>	0.0263	0.0263	1.0000	1.0000
<i>BANKRUPTCY_RISK</i>	5.3599	5.3670	0.9463	0.9311

This table reports the covariate balance between matched pairs. Test statistics are for the difference between treatment group (those with auditor-reported material weaknesses) and control group (those without auditor-reported material weaknesses, but with the closest probability of having a material weakness). There are 1,406 firm-year observations for the treatment group, which are matched to 1,406 firm-year control group observations. Variables are defined in Appendix A.

Table 4, Panel B – Frequency of Fraud for Treatment and Control Groups

Frequency of Fraud Disclosure within t+3 (n=48)			
Control Group (MW_t=0)		Treatment Group (MW_t=1)	
Mean	Std. Deviation	Mean	Std. Deviation
0.0092	0.0957	0.0249	0.1559
		t-value	p-value
Significance of difference in means (t-test)		-3.21	0.0014
Significance of difference in means (paired t-test)		-3.19	0.0015

This table reports the difference in fraud occurrence between the treatment group (those with auditor-reported material weaknesses) and control group (those without auditor-reported material weaknesses, but with the closest probability of having a material weakness). There are 1,406 firm-year observations for the treatment group, which are matched to 1,406 firm-year control group observations. Frauds are matched to firm-years where the fraud revelation date is after the SEC filing date for the audit opinion. This helps ensure that the relationship between material weakness and fraud is not mechanical. 35 (13) of the frauds are (not) preceded by a material weakness.

The sample period is 2004 through 2007 for material weaknesses and 2005 through 2010 for frauds. We obtain a fraud sample made up of (1) SEC and Department of Justice enforcement actions that establish intent under Section 17(a) of the Securities Act of 1933, or either Section 10(b) (including Rule 10b-5) or 13(b)(5) of the Securities Exchange Act of 1934 per the Federal Securities Regulation Database and (2) settled securities class-action lawsuits that allege violations of Generally Accepted Accounting Principles per RiskMetrics. Variable definitions are provided in Appendix A.

Table 5 – Types of Material Weaknesses and Fraud Revelation

Logistic Regression, Dependent Variable is <i>FRAUD_LATENT</i>		
Independent Variables	(1)	(2)
<i>MW_ENTITY</i>	0.8728 *** (0.282)	0.6353 ** (0.308)
<i>MW_PROCESS</i>	-0.1007 (0.462)	-0.3146 (0.512)
<i>LMARKETCAP</i>	0.0885 (0.085)	0.0911 (0.087)
<i>AGGLOSS</i>	-0.1849 (0.299)	-0.0704 (0.295)
<i>LSEGCOUNT</i>	0.2948 (0.209)	0.2566 (0.216)
<i>FORTTRANS</i>	-0.2533 (0.303)	-0.2154 (0.310)
<i>EXTREMESG</i>	0.4659 ** (0.224)	0.4294 * (0.228)
<i>MERGER</i>	0.9012 *** (0.292)	0.9012 *** (0.296)
<i>RESTRUCTURE</i>	0.1046 (0.195)	0.0682 (0.124)
<i>BIG4</i>	-0.1033 (0.376)	-0.1637 (0.381)
<i>AUDITOR_RESIGNED</i>	-1.0747 (0.858)	-1.0083 (0.856)
<i>BANKRUPTCY_RISK</i>	-0.0468 (0.045)	-0.0591 (0.046)
Year fixed effects?	Yes	Yes
Removed observations with MWs in the area of the fraud?	No	Yes
Obs. where <i>FRAUD_LATENT</i> = 1	139	134
Total Obs.	14,093	14,088
Pseudo R-square	0.05	0.05

This table reports the results of logistic regressions for the probability of fraud revelation, controlling for contemporaneous determinants of material weakness disclosure:

$$\text{Prob}(FRAUD_LATENT = 1) = F(\beta_1 MW_ENTITY + \beta_2 MW_PROCESS + \beta'(CONTROLS))$$

The sample period is 2004 through 2007 for material weaknesses and 2005 through 2010 for frauds. We obtain a fraud sample made up of (1) SEC and Department of Justice enforcement actions that establish intent under Section 17(a) of the Securities Act of 1933, or either Section 10(b) (including Rule 10b-5) or 13(b)(5) of the Securities Exchange Act of 1934 per the Federal Securities Regulation Database and (2) settled securities class-action lawsuits that allege violations of Generally Accepted Accounting Principles per RiskMetrics. *FRAUD_LATENT* is an indicator variable equal to one if fraud is ongoing during year *t* and is announced after the filing date (plus seven days) of the firm's audited internal control opinion for year *t*, and zero otherwise. *MW_ENTITY* is an indicator variable that is equal to one if the firm's auditor disclosed at least one entity-level material weakness over financial reporting as reported by Audit Analytics, and zero otherwise. *MW_PROCESS* is an indicator variable that is equal to one if the firm's auditor disclosed at least one process-level material weakness and no entity-level material

weaknesses as reported by Audit Analytics, and zero otherwise. In the second column, five fraud observations are removed that have material weaknesses in the area of the fraud. Variable definitions are provided in Appendix A. Standard errors clustered by firm are in parentheses. Pseudo R-Square is the max re-scaled r-square from SAS (also known as Cragg & Uhler's pseudo r-square). *, **, and *** represent statistical significance at the 10%, 5%, and 1% levels, respectively.

Table 6 – Latent, Non-latent, and Non-GAAP Fraud

Logistic Regression, Dependent Variable is <i>FRAUD_LATENT</i> , <i>FRAUD_NON_LATENT</i> , and <i>FRAUD_NON_GAAP</i> for columns (1), (2), and (3), respectively			
Independent Variables	(1)	(2)	(3)
<i>MW</i>	0.5698 ** (0.245)	0.3337 (0.366)	0.1952 (0.349)
<i>LN_MARKETCAP</i>	0.0894 (0.085)	0.5901 *** (0.134)	0.2461 ** (0.102)
<i>AGGREGATE_LOSS</i>	-0.1670 (0.298)	-0.3731 (0.529)	-0.1045 (0.426)
<i>LN_SEGCOUNT</i>	0.3016 (0.211)	-0.3749 (0.234)	-0.0944 (0.183)
<i>FOREIGN_CURRENCY_TRANSLATION</i>	-0.2297 (0.300)	-0.4902 (0.425)	-0.4721 (0.344)
<i>EXTREME_SALES_GROWTH</i>	0.4769 ** (0.224)	0.3295 (0.278)	0.3614 (0.285)
<i>MERGER</i>	0.8976 *** (0.292)	0.3704 (0.319)	0.6977 ** (0.306)
<i>RESTRUCTURING_CHARGE</i>	0.1097 (0.261)	-0.0379 (0.063)	-0.0546 (0.059)
<i>BIG4</i>	-0.1207 (0.380)	0.2909 (0.718)	-0.7532 * (0.394)
<i>AUDITOR_RESIGN</i>	-1.0360 (0.862)	0.3335 (0.811)	-0.7402 (1.001)
<i>BANKRUPTCY_RISK</i>	-0.0444 (0.045)	0.1438 * (0.077)	-0.1074 ** (0.045)
Year fixed effects?	Yes	Yes	Yes
Obs. where dependent variable = 1	139	118	112
Total Obs.	14,093	14,093	14,093
Pseudo R-square	0.05	0.10	0.05

This table reports the results of a logistic regression for the probability of latent fraud revelation, non-latent fraud revelation, and non-GAAP fraud revelation controlling for contemporaneous determinants of material weakness disclosure:

$$\text{Prob}(FRAUD_LATENT / FRAUD_NON_LATENT / FRAUD_NON_GAAP = 1) = F(\beta_1 MW + \beta'(\text{CONTROLS}))$$

The sample period is 2004 through 2007 for material weaknesses and 2005 through 2010 for frauds. For the first two columns we obtain a fraud sample made up of (1) SEC and Department of Justice enforcement actions that establish intent under Section 17(a) of the Securities Act of 1933, or either Section 10(b) (including Rule 10b-5) or 13(b)(5) of the Securities Exchange Act of 1934 per the Federal Securities Regulation Database and (2) settled securities class-action lawsuits that allege violations of Generally Accepted Accounting Principles per RiskMetrics. For the third column, we gather settled securities class-action lawsuits that contain allegations other than violations of Generally Accepted Accounting Principles per RiskMetrics. *FRAUD_LATENT* is an indicator variable equal to one if fraud is ongoing during year *t* and is announced after the filing date (plus seven days) of the firm's audited internal control opinion for year *t*, and zero otherwise. *FRAUD_NON_LATENT* is an indicator variable equal to one if fraud begins after year *t* and is announced after the filing date (plus seven days) of the firm's audited internal control opinion for year *t*, and zero otherwise. *FRAUD_NON_GAAP* is equal to one if a class-action lawsuit unrelated to accounting is announced within three years of the filing date (plus seven days) of the firm's audited internal control opinion for year *t*, and zero otherwise. *MW* is an indicator variable that is equal to one if the firm's auditor disclosed a material weakness over financial reporting as reported by Audit Analytics, and zero otherwise. Variable definitions are provided in Appendix A. Standard errors clustered by firm are in parentheses. Pseudo R-Square is the max re-

scaled r-square from SAS (also known as Cragg & Uhler's pseudo r-square). *, **, and *** represent statistical significance at the 10%, 5%, and 1% levels, respectively.

Table 7 – Fraud Prediction Model

Logistic Regression, Dependent Variable is <i>FRAUD</i>			
Independent Variables	(1)	(2)	(3)
<i>MW</i>	0.6334 *** (0.245)	0.6423 ** (0.250)	0.5944 ** (0.249)
<i>LN_MARKETCAP</i>	0.0974 (0.090)	0.1234 (0.099)	0.0879 (0.093)
<i>AGGREGATE_LOSS</i>	-0.3747 (0.310)	-0.4170 (0.328)	-0.4594 (0.337)
<i>LN_SEGCOUNT</i>	0.4164 ** (0.204)	0.3990 ** (0.194)	0.4159 ** (0.207)
<i>FOREIGN_CURRENCY_TRANSLATION</i>	-0.3235 (0.258)	-0.3790 (0.253)	-0.3225 (0.256)
<i>EXTREME_SALES_GROWTH</i>	0.6306 *** (0.233)	0.5779 *** (0.218)	0.6381 *** (0.226)
<i>MERGER</i>	0.8270 *** (0.272)	0.7169 *** (0.269)	0.7854 *** (0.270)
<i>RESTRUCTURING_CHARGE</i>	0.0906 (0.112)	0.0848 (0.083)	0.0920 (0.089)
<i>BIG4</i>	-0.2114 (0.345)	-0.1798 (0.350)	-0.2095 (0.349)
<i>AUDITOR_RESIGN</i>	-0.1208 (0.639)	-0.1490 (0.640)	-0.1660 (0.646)
<i>BANKRUPTCY_RISK</i>	-0.0149 (0.049)	-0.0657 (0.070)	-0.0599 (0.073)
<i>FSCORE</i>	-0.0009 (0.003)		0.0006 (0.003)
<i>FPS</i>		0.4325 * (0.243)	0.5306 ** (0.250)
<i>RETURN</i>		-0.4240 (0.273)	-0.4517 (0.291)
<i>RETURN_SKEWNESS</i>		-0.1572 (0.108)	-0.1817 * (0.108)
<i>RESTURN_STD_DEV</i>		0.7570 (1.860)	0.6712 (1.905)
<i>TRADING_VOLUME_TURNOVER</i>		0.0028 * (0.002)	0.0024 ** (0.001)
Year fixed effects?	Yes	Yes	Yes
Obs. where dependent variable = 1	153	163	153
Total Obs.	10,270	10,806	10,270
Pseudo R-square	0.06	0.07	0.07

This table reports the results of a logistic regression for the probability of fraud revelation, controlling for contemporaneous determinants of material weakness disclosure and contemporaneous determinants of fraud included in Dechow et al. (2011) and Kim and Skinner (2012):

$$\text{Prob}(FRAUD = 1) = F(\beta_1 MW + \beta'(\text{CONTROLS}))$$

The sample period is 2004 through 2007 for material weaknesses and 2005 through 2010 for frauds. We obtain a fraud sample made up of (1) SEC and Department of Justice enforcement actions that establish intent under Section 17(a) of the Securities Act of 1933, or either Section 10(b) (including Rule 10b-5) or 13(b)(5) of the Securities

Exchange Act of 1934 per the Federal Securities Regulation Database and (2) settled securities class-action lawsuits that allege violations of Generally Accepted Accounting Principles per RiskMetrics. *FRAUD* is equal to one if fraud is announced within three years of the filing date (plus seven days) of the firm's audited internal control opinion for year t , and zero otherwise. *MW* is an indicator variable that is equal to one if the firm's auditor disclosed a material weakness over financial reporting as reported by Audit Analytics, and zero otherwise. Column (1) includes the F-score from Dechow et al. (2011). Column (2) include control variables from the litigation risk model two of Kim and Skinner (2012). Column (3) includes both the F-score from Dechow et al. (2011) and the control variables from the litigation risk model of Kim and Skinner (2012). Variable definitions are provided in Appendix A. Standard errors clustered by firm are in parentheses. Pseudo R-Square is the max re-scaled r-square from SAS (also known as Cragg & Uhler's pseudo r-square). *, **, and *** represent statistical significance at the 10%, 5%, and 1% levels, respectively.

Table 8 – Controlling for Abnormal Audit Fees and Using FSCORE as a Fraud Proxy

Logistic Regression, Dependent Variable is <i>FRAUD</i> for (1) and <i>HIGHFSCORE</i> for (2)		
Independent Variables	(1)	(2)
<i>MW</i>	0.6632 ** (0.264)	0.1657 ** (0.081)
<i>LN_MARKETCAP</i>	0.0550 (0.165)	0.0088 (0.025)
<i>AGGREGATE_LOSS</i>	-0.2877 (0.315)	-0.5684 *** (0.082)
<i>LN_SEGCOUNT</i>	0.2517 (0.238)	0.0988 * (0.051)
<i>FOREIGN_CURRENCY_TRANSLATION</i>	-0.3578 (0.277)	0.1407 * (0.072)
<i>EXTREME_SALES_GROWTH</i>	0.6634 *** (0.247)	0.8359 *** (0.065)
<i>MERGER</i>	0.8284 *** (0.287)	0.6118 *** (0.086)
<i>RESTRUCTURING_CHARGE</i>	0.1205 (0.172)	0.1217 (0.089)
<i>BIG4</i>	-0.2613 (0.389)	-0.1190 (0.096)
<i>AUDITOR_RESIGN</i>	0.0125 (0.635)	-0.3411 (0.215)
<i>BANKRUPTCY_RISK</i>	-0.0185 (0.056)	0.1268 *** (0.015)
<i>ABNORMAL_AUDIT_FEES</i>	0.1764 (0.282)	
Year fixed effects?	Yes	Yes
Obs. where dependent variable = 1	140	2,053
Total Obs.	8,559	10,270
Pseudo R-square	0.06	0.06

This table reports the results of a logistic regression for the probability of fraud revelation controlling for abnormal audit fees and using high *FSCORE* as a proxy for fraud:

$$\text{Prob}(FRAUD / HIGHFSCORE = 1) = F(\beta_1 MW + \beta'(\text{CONTROLS}))$$

The sample period is 2004 through 2007 for material weaknesses and 2005 through 2010 for frauds. We obtain a fraud sample made up of (1) SEC and Department of Justice enforcement actions that establish intent under Section 17(a) of the Securities Act of 1933, or either Section 10(b) (including Rule 10b-5) or 13(b)(5) of the Securities Exchange Act of 1934 per the Federal Securities Regulation Database and (2) settled securities class-action lawsuits that allege violations of Generally Accepted Accounting Principles per RiskMetrics. *FRAUD* is equal to one if fraud is announced within three years of the filing date (plus seven days) of the firm's audited internal control opinion for year *t*, and zero otherwise. *HIGHFSCORE* is an indicator variable that is equal to one if a firm in year *t* has an *FSCORE* in the top quintile of the sample, and zero otherwise. *MW* is an indicator variable that is equal to one if the firm's auditor disclosed a material weakness over financial reporting as reported by Audit Analytics, and zero

otherwise. *ABNORMAL_AUDIT_FEES* is the residual of an audit-fee regression based off of equation (2) from Hogan and Wilkins (2008) that is estimated for all public, non-financial firms for years 2004 through 2012 covered by both Compustat and Audit Analytics. Standard errors clustered by firm are in parentheses. Pseudo R-Square is the max re-scaled r-square from SAS (also known as Cragg & Uhler's pseudo r-square). *, **, and *** represent statistical significance at the 10%, 5%, and 1% levels, respectively.

Table 9 - Controlling for Material Weakness Areas, Restatements, and Accrual Quality

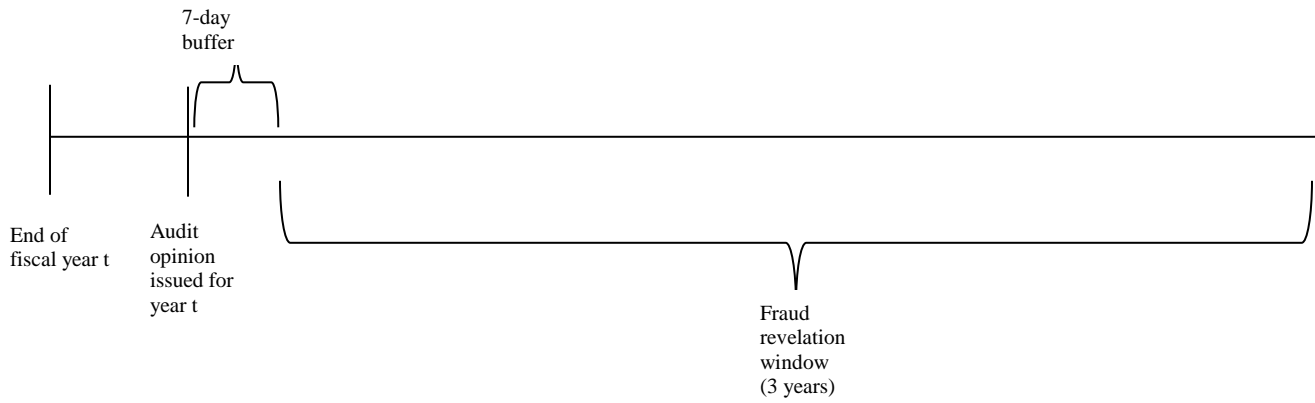
Logistic Regression, Dependent Variable is <i>FRAUD</i> for (1), (2), (3), and is <i>FRAUD_LATENT</i> for (4)				
Independent Variables	(1)	(2)	(3)	(4)
<i>MW</i>	0.6242 ** (0.302)	0.5883 ** (0.252)	0.5946 ** (0.255)	
<i>MW_ENTITY</i>				0.8735 *** (0.301)
<i>MW_PROCESS</i>				-0.1329 (0.536)
<i>LN_MARKETCAP</i>	0.2512 *** (0.077)	0.2509 *** (0.076)	0.1484 (0.092)	0.0616 (0.107)
<i>AGGREGATE_LOSS</i>	-0.3080 (0.276)	-0.3079 (0.276)	-0.3879 (0.326)	-0.1882 (0.339)
<i>LN_SEGCOUNT</i>	0.1245 (0.161)	0.1242 (0.161)	0.3203 (0.217)	0.3361 (0.259)
<i>FOREIGN_CURRENCY_TRANSLATION</i>	-0.3519 (0.245)	-0.3498 (0.245)	-0.3176 (0.266)	-0.3050 (0.332)
<i>EXTREME_SALES_GROWTH</i>	0.4909 *** (0.186)	0.4904 *** (0.187)	0.5417 ** (0.238)	0.4521 * (0.258)
<i>MERGER</i>	0.7367 *** (0.234)	0.7365 *** (0.234)	0.8352 *** (0.288)	1.0710 *** (0.316)
<i>RESTRUCTURING_CHARGE</i>	0.0541 (0.088)	0.0522 (0.088)	0.0749 (0.093)	0.0707 (0.090)
<i>BIG4</i>	0.2350 (0.315)	0.2324 (0.313)	-0.0327 (0.368)	-0.4581 (0.393)
<i>AUDITOR_RESIGN</i>	-0.1097 (0.603)	-0.1134 (0.603)	0.0877 (0.635)	-1.1316 (0.828)
<i>BANKRUPTCY_RISK</i>	0.0232 (0.044)	0.0231 (0.043)	-0.0083 (0.051)	-0.0315 (0.059)
<i>MW_SUM</i>	0.0009 (0.045)			
<i>RESTATEMENT</i>		0.0783 (0.232)		
<i>ACCRUAL_QUALITY</i>			3.4086 (2.118)	0.7555 (3.044)
Year fixed effects?	Yes	Yes	Yes	Yes
Obs. where dependent variable = 1	225	225	144	102
Total Obs.	14,093	14,093	8,818	8,818
Pseudo R-square	0.05	0.05	0.06	0.07

This table reports the results of a logistic regression for the probability of fraud revelation and latent fraud revelation controlling for the count of material weakness areas:

$$\text{Prob}(FRAUD / FRAUD_LATENT = 1) = F(\beta_1 MW + \beta'(\text{CONTROLS}))$$

The sample period is 2004 through 2007 for material weaknesses and 2005 through 2010 for frauds. We obtain a fraud sample made up of (1) SEC and Department of Justice enforcement actions that establish intent under Section 17(a) of the Securities Act of 1933, or either Section 10(b) (including Rule 10b-5) or 13(b)(5) of the Securities Exchange Act of 1934 per the Federal Securities Regulation Database and (2) settled securities class-action lawsuits that allege violations of Generally Accepted Accounting Principles per RiskMetrics. *FRAUD* is equal to one if fraud is announced within three years of the filing date (plus seven days) of the firm's audited internal control opinion for year *t*, and zero otherwise. *FRAUD_LATENT* is an indicator variable equal to one if fraud is ongoing during year *t* and is announced after the filing date (plus seven days) of the firm's audited internal control opinion for year *t*, and zero otherwise. *MW* is an indicator variable that is equal to one if the firm's auditor disclosed a material weakness over financial reporting as reported by Audit Analytics, and zero otherwise. *MW_ENTITY* is an indicator variable that is equal to one if the firm's auditor disclosed at least one entity-level material weakness over financial reporting as reported by Audit Analytics, and zero otherwise. *MW_PROCESS* is an indicator variable that is equal to one if the firm's auditor disclosed at least one process-level material weakness and no entity-level material weaknesses as reported by Audit Analytics, and zero otherwise. *MW_SUM* is a count of the areas associated with the material weaknesses disclosed within the internal control opinion as coded by Audit Analytics. *RESTATEMENT* is an indicator variable that is equal to one if there is a restatement announced on or within 365 days before the filing date of the auditor's internal control opinion for year *t* as reported by Audit Analytics. *ACCRUAL_QUALITY* is the standard deviation of the residuals from the Dechow and Dichev (2002) accruals quality measure, following Doyle et al. (2007a), measured from year *t-4* to *t*. Variable definitions are provided in Appendix A. Standard errors clustered by firm are in parentheses. Pseudo R-Square is the max re-scaled r-square from SAS (also known as Cragg & Uhler's pseudo r-square). *, **, and *** represent statistical significance at the 10%, 5%, and 1% levels, respectively.

Figure 1



This figure depicts the timeline for the research design used in our main tests. The auditor's internal control opinion for year t ($MW=1$ or $MW=0$) is associated with future fraud revelation ($FRAUD=1$ or $FRAUD=0$) using a three-year window starting seven days after the issuance of the opinion for year t 's financial statements.