Auditing Standard No. 2 versus Auditing Standard No. 5: Implications for integrated audits and financial reporting quality[#]

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Abstract

The adoption of PCAOB Auditing Standard No. 5 (AS5) introduced a more flexible implementation of internal control testing intended to reduce burdensome requirements established under PCAOB Auditing Standard No. 2 (AS2). The risk-based approach of AS5, however, has elicited concern that the new standard reduces testing at the expense of quality and rigor. Using two methods to control for the underlying existence of material weaknesses, we find that auditors are less likely to identify material weaknesses in the AS5 period and document several changes in material weakness identification determinants between the AS5 and AS2 periods. Further, we find financial statement misstatements are related to predictable, but unidentified material weaknesses in the AS5 period, but not in the AS2 period. Overall, our results suggest that under AS5, auditors may not be focusing their risk-based control testing on certain risky areas, thus contributing in some cases to lower rates of material weakness identification and lower financial reporting quality.

JEL classification: K22, M42, M48

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1. Introduction

The Sarbanes-Oxley Act of 2002's Section 404 (SOX 404) establishes the requirement for management to report on the effectiveness of internal control over financial reporting (ICFR) and for auditors to attest to that assessment. This study investigates whether there are differences in the likelihood of disclosing material weaknesses in internal controls, and in financial reporting quality, between integrated audits conducted under Auditing Standard No. 2 (AS2) and Auditing Standard No. 5 (AS5), two standards of the Public Company Accounting Oversight Board (PCAOB) that establish the requirements for an audit of management's assessment of ICFR. When the PCAOB implemented AS2, applicable to accelerated filers for fiscal years ending after November 15, 2004, the standard met heavy criticism for being costly and an example of regulatory overreaction (SEC, 2005). The PCAOB acknowledged this criticism, stating that AS2 provides "higher quality and enhanced transparency," but that the "benefits have come from significant costs" (PCAOB, 2006). The PCAOB responded by replacing AS2 with AS5, effective for fiscal years ending after November 15, 2007 (PCAOB, 2007). AS5 adopts a ''top-down, risk-based'' approach in internal control audits, which proponents claim maintains the benefits of an audit of ICFR, but reduces costs by focusing on the most important issues and simplifying audit procedures (PCAOB, 2007). Whether the rigor of integrated audits and financial reporting quality has changed with the adoption of the new standard, however, is an empirical question.

The effectiveness of management's assessment process and AS5 integrated audits have been questioned due to the declining overall frequency of material weakness disclosures and the

increase in the frequency with which firms identify weaknesses concurrently with financial statement adjustments (Whitehouse, 2010). In addition, PCAOB inspections have identified numerous issues with audits of ICFR under AS5 (PCAOB, 2013). The frequency of adverse internal control opinions (indicating at least one material weakness exists as of the end of the year) has declined over the last several years, from an initial rate of 16.9% in 2004 to a rate of 2.4% in 2009 (Audit Analytics, 2010b). This decrease could be the result of companies strengthening their internal controls over time (i.e., a decrease in the *existence* of material weaknesses)[1], the result of companies detecting material weaknesses earlier in the year and being able to remediate and test controls prior to year-end, or due to a reduced rate of detection and/or reporting of material weaknesses.

Some evidence on whether management and auditors detect and disclose material weaknesses on a timely basis is provided by Rice and Weber (2012), who examine whether restating firms provide an early warning of poor financial reporting quality through material weakness disclosures. They document that only about 32% of restating firms disclosed the existence of a related material weakness during the misstated time period, suggesting a majority of the restating firms either did not detect the material weakness or did not classify and disclose the control deficiency as a material weakness. In addition, Rice and Weber (2012) find that the proportion of firms identifying a material weakness in the misstated period decreased between 2004 and 2008.

If there is a widespread decline in auditors identifying existing material weaknesses in internal control, there are implications for overall financial reporting quality. Prior research links the existence of material weaknesses to accruals quality (Doyle, Ge, and McVay, 2007a;

[1] When considering only companies that are undergoing ICFR audits for the first time, the rate of adverse internal control opinions decreases from 16.9% in 2004 to 5.8% in 2009 (Audit Analytics, 2010b).

Ashbaugh-Skaife, Collins, Kinney, and LaFond, 2008) and to financial statement restatements Doyle, Ge, and McVay, 2007a). The PCAOB also notes in their summary of findings related to the inspections of integrated audits that deficiencies in audits of internal controls over financial reporting frequently led to the auditors failing to gather sufficient evidence to support their overall opinion on the financial statements (PCAOB, 2013). Thus, if AS5 is a "weaker" standard, or is not being properly implemented, undetected material weaknesses will degrade financial reporting quality.

Using accelerated filers over the time period 2004-2011 as our sample, we first examine changes in the likelihood, and changes in the determinants, of material weakness identification between the AS2 period and the AS5 period. We model the determinants of material weakness identification using variables established in prior research that are associated with the existence of material weaknesses as well as incentives to detect and disclose these weaknesses (Ashbaugh-Skaife, Collins, and Kinney, 2007; Doyle, Ge, and McVay, 2007a). In addition, we include a measure of experience with integrated audits to control for a decrease in the likelihood of existence of a material weakness as companies strengthen internal controls over time. We find an overall decrease in the likelihood of material weakness identification in the AS5 period relative to the AS2 period, and that this decrease is associated with firm characteristics. For example, firms in high litigation risk industries are less likely to identify a material weakness in the AS5 period, while firms with recent auditor resignations are more likely to identify a material weakness. In addition, the inverse association between firm size and material weakness identification observed in the AS2 period lessens in the AS5 period. These findings suggest the risk-based approach may alter the likelihood of identifying a material weakness for at least some firms.

As an alternative method of determining whether firms are less likely to identify existing material weaknesses under AS5, we build on Rice and Weber's (2012) approach of examining firms that acknowledge a material weakness related to a financial restatement either during the misstated period or subsequently as part of the misstatement revelation. Because a material weakness clearly existed for these firms, a lack of material weakness disclosure prior to a misstatement revelation indicates the firms were unable to effectively identify their internal control deficiencies. Using this method, we find firms are less likely to identify existing material weaknesses in a timely manner under AS5 after controlling for incentives to detect and disclose material weaknesses identified in Rice and Weber (2012).

To the extent material weaknesses exist and are not being detected, or not being properly evaluated as to severity, financial reporting quality may suffer. To examine financial reporting quality, we use the material weakness determinants models discussed above to develop material weakness likelihood predictions for each firm-year. We then examine the likelihood of financial statement misstatements for firm-years that are predicted to have a material weakness but do not disclose one (potential undisclosed material weaknesses) relative to a control sample of firm-years that are not predicted to have a material weakness and do not disclose one. We find that firm-years with potential undisclosed material weaknesses in the AS5 period are significantly more likely to be misstated, but find no such evidence in the AS2 period. Further testing suggests the lower financial reporting quality for firms with predicted material weaknesses is at least in part due to evidence of past restatements being underweighted in auditors' risk assessments.

Overall, our results suggest that the risk-based approach of AS5 has resulted in a significant shift in the association of certain firm characteristics with the likelihood of material weakness

identification. The risk-based approach has resulted in "predictable" material weaknesses remaining undetected or undisclosed, and these unidentified material weaknesses are associated with financial statement misstatements.

Our study contributes to the literature by providing evidence as to whether identification of material weaknesses has changed between the AS2 period and AS5 period and whether the observed changes are associated with changes in financial reporting quality. This evidence provides information relevant to assessing whether AS5 has maintained the benefits of auditing ICFR, as regulators claimed it would (PCAOB, 2007), and whether the lower frequency of material weakness disclosures under AS5 is because fewer material weaknesses exist or because more material weaknesses are going undetected. Our results provide evidence that AS2 was not necessarily an overreaction to a political crisis as claimed by regulators (SEC, 2005) and academics (Doogar, Sivadasan, and Solomon, 2010). Rather, the adoption of a more relaxed standard in AS5 may have reduced some improvements in internal control generated by AS2.

2. Regulatory and conceptual background and hypotheses

2.1 Regulatory background

Regulatory requirements related to maintaining internal controls and the disclosure of internal control deficiencies have evolved over time. Under the books and records provision of the Foreign Corrupt Practices Act of 1977, management of publicly-traded companies is required to devise and maintain a system of internal controls. However, management was only required to publicly disclose an internal control deficiency upon a change in auditor (SEC, 1988). Under SOX Section 302, the CEO and CFO are required to certify that they are responsible for designing and maintaining a system of internal controls, and provide a conclusion on a quarterly

basis regarding the effectiveness of internal controls. If a material weakness (hereafter MW) is identified, then it is required to be disclosed (SOX, 2002); however, Section 302 does not have specific procedural requirements or an audit requirement related to the evaluation of a firm's internal control. [2]

The formal requirement for management to assess the design and operating effectiveness of internal controls over financial reporting (ICFR) was established under SOX Section 404, and Section 404 reaffirms the requirement for management to disclose MWs of which they are aware. Management's "awareness" of a MW, however, requires the identification of an existing control deficiency as well as the appropriate classification of its severity. The categorization of a control deficiency as a MW versus a significant deficiency is subjective as it depends on assessing both the likelihood (more than a reasonable possibility) and the significance (materiality) of a misstatement (Bedard and Graham, 2011). SOX Section 404 also requires the external auditors to attest to the assessment of ICFR made by management as part of the audit engagement, thus both management and the external auditor have responsibility under this regulation. The external audit is applicable only for accelerated filers, however, as non-accelerated filers have been permanently exempted from Section 404(b) through the Dodd-Frank Wall Street Reform and Consumer Protection Act of 2010 (Dodd-Frank, 2010).

2.1.1 AS2 versus AS5

AS2, the PCAOB's first noteworthy regulation, and arguably its most controversial, provided guidance to auditors in conducting their Section 404(b) audits of internal controls over financial reporting. AS2 was a detailed regulation that left little flexibility regarding the scope and extent of testing of internal controls over financial reporting. Auditors and preparers expressed concern

[2] A material weakness is a deficiency, or combination of deficiencies which result in a reasonable possibility that a company's controls will fail to prevent or detect a material misstatement of an account balance or disclosure (PCAOB, 2007).

over the increased compliance requirements from SOX 404 and AS2 combined with shortened reporting deadlines. As a result, SOX 404 and AS2 were met with heavy criticism for the cost of implementation, especially in smaller or low risk accelerated filers who were subject to the same rigor as larger, high risk accelerated filers. In fact, in one survey of corporate executives, 80% stated that the costs of Sarbanes-Oxley outweighed the benefits (O'Sullivan, 2006).

The PCAOB agreed to revisit the standard related to audits of ICFR, and as a result, replaced AS2 with AS5 effective for audits of accelerated filers with fiscal years ending on or after November 15, 2007. AS5 was summarized by Christopher Cox, the SEC Chairman at the time, to be different than AS2 in four major ways: (1) AS5 is shorter and less prescriptive, (2) AS5 is more flexible in its implementation to allow the audit to be tailored toward the size and complexity of the audited firm, (3) AS5 directs the auditors towards a top-down, risk based approach, focusing auditors on the areas of highest risk and eliminating unnecessary procedures, and (4) AS5 includes a principles-based approach regarding the extent to which the auditor can use the work of others (Cox 2007).

The introduction of AS5's risk-based approach was not met with unanimous support, however. Certain PCAOB board members and comment letter-writers questioned whether AS5 would reduce work at the expense of quality, and whether AS5 would be perceived as a "relaxation" of AS2, and thus an abandoning of the objectives set forth in AS2 (Johnson, 2007). Research has documented a decline in audit fees with the implementation of AS5 consistent with a reduction in audit effort; however, this does not necessarily indicate a lower quality audit of internal controls or lower financial reporting quality. Doogar, Sivadasan, and Solomon (2010), for example, examine how the top-down, risk-based approach of AS5 affects the relation between audit risk and audit fees. They find that in the AS5 period, audit fees are more closely

linked to auditee fraud risk, which they suggest is consistent with AS5 improving the alignment of auditing effort and client risk as intended. Krishnan, Krishnan, and Song (2011), also find lower fees for lower risk clients. While these studies examine the possible efficiency benefits of AS5, they do not investigate the potential disadvantage that auditors may be less likely to identify deficiencies under a risk-based approach if their risk assessment is inadequate or not properly implemented.

The PCAOB monitored audit firm implementation of AS5 and issued Staff Audit Practice Alert No. 11 to report on common issues in performing integrated audits under the new standard (PCAOB, 2013). They identified deficiencies in internal control audits including failures to identify and/or sufficiently test controls designed to address the risk of material misstatement, management review controls, and controls over system-generated data, as well as failures to sufficiently evaluate identified control deficiencies, and failures to update control testing between an interim date and year-end. The PCAOB notes that one potential "root cause" for the identified deficiencies is a failure to properly implement the top-down, risk-based approach.

AS5 increased the amount of judgment in the auditor's testing of ICFR by requiring that auditors select which controls to test based on the risks of material misstatement, as opposed to consistently testing all controls. In addition, significant judgment continues to be required under AS5 in evaluating the severity of each control deficiency to determine whether the deficiencies, individually or collectively, constitute a significant deficiency or a MW (PCAOB, 2007; SEC, 2007).[3] To the extent auditors are not properly implementing the risk-based approach, as the PCAOB has criticized, existing control deficiencies may not be detected. Even for detected deficiencies, auditors may not be considering the appropriate risks in determining the

[3] A significant deficiency is defined by the SEC as a deficiency, or a combination of deficiencies in internal control over financial reporting that is less severe than a material weakness yet important enough to merit attention by those responsible for oversight of a registrant's financial reporting (SEC 2007).

classification of the control deficiency. Further, the importance of properly evaluating misstatement risk associated with control deficiencies increases as testing is reduced because the control testing is less likely to uncover instances where actual misstatements occur.

Consistent with concerns that AS5 was a relaxation of auditing standards, the rate of MW disclosures has declined from an initial rate of 16.9% in 2004 under AS2 to a rate of 2.4% in 2009 under AS5 (Audit Analytics, 2010b). Such concerns are exacerbated by the fact that more than half of the companies that restate their financial statements originally indicated their ICFR were effective during the misstated period (Rice and Weber, 2012). Brian Croteau, Deputy Chief Accountant at the SEC, noted in a speech "…I continue to question whether all material weaknesses are being properly identified. It is surprisingly rare to see management identify a material weakness in the absence of a material misstatement. This could be either because the deficiencies are not being identified in the first instance or otherwise because the severity of deficiencies is not being evaluated appropriately" (Croteau, 2013).

On the other hand, it is possible that AS5 has actually increased the likelihood that auditors identify and properly classify control deficiencies if they are appropriately focused on the areas with a greater risk of material misstatement. The declining trend in material weakness disclosures could be the result of a decline in the *existence* of MWs as companies strengthen their ICFR over time rather than due to a failure by management and auditors to identify or properly classify existing MWs. A declining rate in the underlying existence of material weaknesses is consistent with the declining trend in the number of restatements between 2006 and 2009 (Audit Analytics, 2010a). Further, the view that AS5 could increase material weakness detection is consistent with SEC statements that AS5 would eliminate unnecessary audit work and increase focus on important areas (SEC, 2007).

2.2 Impact on financial reporting quality

To the extent management and auditors are failing to identify or properly classify control deficiencies, financial reporting quality may decline. Prior research has documented significant financial reporting benefits attributable to SOX 404 including substantially improved control environments (Miller and Rittenburg, 2005), higher quality accruals (Ashbaugh-Skaife et al., 2008; Cohen, Dey and Lys, 2008; Doyle, Ge, and McVay 2007a), lower information risk and lower cost of equity (Ashbaugh-Skaife, Collins, Kinney, and LaFond, 2009), provision of new information to the public debt market (Dhaliwal, Hogan, Trezevant, and Wilkins, 2011), and improved investors' assessments of reporting credibility for firms admitting to accounting errors through restatements (Hirschey, Smith, and Wilson, 2012). Two recent surveys indicate that a majority of corporate insiders who have had experience with SOX believe that the internal control over financial reporting structure in their organizations and the overall quality of the information environment have improved since compliance with SOX 404 became a requirement (Alexander, Baugess, Bernile, Lee, and Marietta-Westberg, 2013; Cohn, 2012). It is possible that these benefits will continue under AS5, or it is possible the benefits will diminish if control testing is less rigorous. Interestingly, Alexander et al. (2013) find that firms perceive the *net* benefit of Section 404 to be higher following the implementation of AS5, but this is likely due to the decrease in costs.

Consistent with the concerns related to financial reporting quality, the PCAOB notes the following in regards to their inspection findings when they analyze the combined results of ICFR audit deficiencies and financial statement audit deficiencies (PCAOB, 2013):

> "Deficiencies in audits of internal control also can affect the audit of the financial statements. In integrated audits, auditors often rely on controls to reduce their substantive testing of financial statement accounts and disclosures. Thus, deficiencies in testing and evaluating internal control can lead to inadequate testing of accounts and disclosures in

> the financial statement audit. The general inspection report notes that, in 39 of the 46 engagements (85 percent) in which the inspection staff found that the firm did not have sufficient appropriate evidence to support the firm's internal control opinion, representing 13 percent of the 309 integrated audit engagements that were inspected, inspection staff found that the firm also failed to obtain sufficient appropriate evidence to support its opinion on the financial statements."

Thus, it appears the PCAOB is concerned about financial reporting quality as a result of deficiencies identified in the audits of internal controls.

In an early study, Wang and Zhou (2012) provide preliminary evidence that financial reporting quality, as measured by absolute value of abnormal accruals, remained the same under AS5. However, their sample is limited to only one year before and after the implementation of AS5 and to only firms that have data in both years. These sample restrictions suggest that the measures of financial reporting quality in the AS5 sample period could be confounded by the carry-over effects from the AS2 period and may not hold as we move further from the AS2 period.

2.3 Hypotheses development

The trends in MW disclosures discussed above suggest a decline in the identification of MWs in the AS5 period relative to the AS2 period. However, it is not clear whether the downward trend is due to a decline in the existence of MWs or in the detection/classification and disclosure. It is possible that the decline in MW identification is simply due to firms improving their internal controls as they gain experience under SOX 404. If auditors are adept at implementing the risk-based approach of AS5, then the likelihood of disclosing a MW in the AS5 period, after controlling for the likelihood of MW existence, will remain the same as in the AS2 period or possibly even increase as more resources can be directed to the areas of greatest concern. If auditors are less adept at implementing the risk-based approach, however, then the likelihood of

disclosing an existing MW will be lower compared to the AS2 period. Our first hypothesis related to the likelihood of disclosing existing MWs is stated in the null form.

H_1. There is no change in the likelihood of disclosing existing MWs between the AS2 and AS5 periods.

More important than whether there has been a change in the likelihood of disclosing existing material weaknesses is whether unidentified MWs are related to firms' financial reporting quality. Consistent with the arguments above, the relation between unidentified MWs and financial reporting quality could become stronger, weaker, or remain the same under AS5. Examining financial reporting quality provides a more direct test of the effects of adopting the AS5 standard from a financial statement user's perspective and provides additional evidence on whether changes in the MW disclosure rates are related to an underlying change in the existence or in the detection and disclosure of MWs. Our second hypothesis related to financial reporting quality is also stated in the null form.

H_2. There is no change in the relation between unidentified MWs and financial statement misstatements from AS2 to AS5.

3. Research Design

3.1 Determinants of material weakness existence, detection, and disclosure

Prior research examining determinants of weaknesses in internal control are linked by several common themes and similar variables. We draw on the variables used in prior studies, primarily Ashbaugh-Skaife et al. (2007) and Doyle et al. (2007b) to estimate a model of MW disclosure. We include proxies for both the likelihood of MW existence as well as for the likelihood of a MW to be detected and disclosed. Our logistic regression estimating the model is as follows.

$$MWFirm = \beta_0 + \beta_1 LnSize + \beta_2 LnAge + \beta_3 \#404Reports + \beta_4 Segments + \beta_5 Foreign\_Trans$$

$$+ \beta_6 MandA + \beta_7 Restructure + \beta_8 Inventory + \beta_9 RGrowth + \beta_{10} PropLoss$$
$$+ \beta_{11} ShumRank + \beta_{12} Auditor\_Resign + \beta_{13} Auditor + \beta_{14} Restate$$
$$+ \beta_{15} Inst\_Con + \beta_{16} Litigation + \varepsilon \quad (1)$$

We first estimate the model for our entire sample and include an indicator variable for observations in the AS5 period in order to test H1, and then we estimate our model separately for the AS2 period and AS5 period, and test for differences in coefficients across the periods. The dependent variable, *MWFirm*, equals one for firms disclosing a material weakness in ICFR, and zero otherwise. Explanatory variables are discussed below and complete definitions for all variables are available in the Appendix.

We include in our model variables that prior studies have used to proxy for the risk of MW existence. These variables include measures of firm complexity and stability. Prior research has found that larger and older firms are less likely to have control deficiencies (Ashbaugh-Skaife et al., 2007; Doyle et al., 2007b), perhaps because these firms have more resources to invest in internal control and have had more time to develop a strong control system. We use natural logs of firm size, as measured by market value of equity (*LnSize)*, and firm age (*LnAge)* to proxy for firms' investment in and development of internal controls. Additionally, we attempt to capture the likelihood of existence of a MW based on how often a firm has been subject to integrated audits. Longer exposure to AS2 and/or AS5 results in more opportunities to detect and remediate any deficiencies in internal control. Therefore, we posit that existence and disclosure of MWs will be decreasing in the number of years a firm undergoes ICFR audits under SOX 404 (*#404Reports*).[4]

[4] In selecting our sample we only consider auditor reports (indicated as type "A" in Audit Analytics). We acknowledge that some firms may have filed management reports (as indicated by being type "M" in Audit Analytics) prior to filing auditor reports and have therefore likely identified and remediated material weaknesses; however, we are interested in observations where the firm is subject to an integrated audit.

The need for internal controls is unique to each firm's particular operating environment and the likelihood of deficiencies in internal control has been shown to increase in the complexity of operations (Ashbaugh-Skaife et al., 2007; Doyle et al., 2007b). We examine complexity by considering the scope of a firm's operations, recent changes in reporting entity, accounting measurement risk, and extent of firm's resources invested in internal controls (Ashbaugh-Skaife et al., 2007). The scope of a firm's operations is measured by the number of reported business segments (*Segments)* and the existence of foreign transactions (*Foreign_Trans).* A recent change in reporting entity is measured by an indicator of whether the firm has been involved in either a merger or acquisition (*MandA)* or a restructuring (*Restructure)* from year *t-2* to year *t.* Accounting measurement risk is likely to increase when firms have difficult-to-measure items such as inventory or when their investment in internal controls is not able to keep pace with growth. Thus, we use the average of inventory, scaled by total assets (*Inventory)* and the decile rank of within-industry average sales growth (*RGrowth)* from year *t-2* to year *t* to proxy for accounting measurement risk. We also use proxies for constraints on internal control investment including profitability, as measured by the proportion of the previous three years a firm has experienced a loss *(PropLoss)* and the decile rank of a measure of financial distress (*ShumRank)* (Ashbaugh-Skaife et al., 2007; Doyle et al., 2007b). Finally, recent auditor turnover can be a signal that the auditor either believes an internal control system is weak or considers the risks of auditing the client to outweigh the benefit from the revenues. Thus, we include an indicator of whether an auditor has resigned between year *t-1* and year *t* (*Auditor_Resign).*

Also consistent with prior research, we consider variables that motivate MW detection and disclosure. These variables include proxies for auditor size, regulatory oversight in financial reporting due to prior restatements, monitoring by institutional investors, and industry litigation

risk (Ashbaugh-Skaife et al., 2007). We use an indicator variable for companies using one of the six largest audit firms (*Auditor*) because large audit firms have been shown to face a greater reputation (DeAngelo, 1981) and litigation risk (Dye, 1993) and thus, have stronger incentives to detect and disclose existing MWs.[5] A firm that has had a financial statement restatement in recent years is more likely to be subject to regulatory monitoring, thus auditors' incentives to detect and disclose subsequent MWs should be higher in firms following restatements. We measure restatement history (*Restate)* as an indicator of whether a firm has filed a restatement per the Audit Analytics Non-reliance Restatements database between year *t-2* and year *t* (Ashbaugh-Skaife et al., 2007). Ashbaugh-Skaife et al. (2007) find that the propensity to disclose a MW is increasing in the concentration of institutional ownership of the firm's stock. Thus, we use institutional ownership (*Inst_Con)* measured as the percentage of shares held by institutional investors divided by the number of institutions that own the stock as of year *t.* Finally, managers of firms in litigious industries have a greater incentive to detect and disclose MWs to reduce the risk of lawsuit which we proxy for, based on litigious industries (*Litigation*) as identified by Ashbaugh-Skaife et al. (2007) and Francis et al. (1994).[6]

3.2 An alternative approach to controlling for existence of a material weakness

As an alternative approach to controlling for the existence of a MW using the number of Section 404(b) reports, we estimate a model focusing on firm-year observations where a MW is known to exist and then examine the likelihood of detection and disclosure. This approach is similar to the one used in Rice and Weber (2012). We focus on the subsample of restatements where the company discloses a "related" MW either during the misstated period or subsequently.

[5] We base this classification on the largest six audit firms as of 2003. These audit firms include PWC, Deloitte & Touche, Ernst & Young, KPMG, Grant Thornton and BDO Seidman. We also review univariate differences and estimate our logistic regressions using the Big 4 audit firms and find no significant difference in our results.

[6] Firms operating in litigious industries are identified by SIC codes 2833-2836; 3570-3577; 3600-3674; 5200-5961; and 7370.

Rice and Weber (2012) note that not all restatements are associated with a material weakness in internal controls, and thus a restatement is not necessarily evidence that a MW exists or existed. In cases where the restatement is associated with a MW, the company will either disclose a related MW during the misstated period, or disclose after the fact that a MW existed. We are interested in the likelihood that a MW is disclosed in a timely manner (during the misstated period), and thus our model, based on Rice and Weber (2012), includes variables that proxy for the incentives to detect and disclose a MW.

$$\begin{aligned} TimelyMW = {} & \gamma_0 + \gamma_1 PrevRestate + \gamma_2 LnSize + \gamma_3 Loss + \gamma_4 XFin + \gamma_5 Big4 \\ & + \gamma_6 Audit\_Fees + \gamma_7 NonAudit\_Fees + \gamma_8 AuditorChange + \gamma_9 MgtChange \\ & + \gamma_{10} AS5 + \varepsilon \end{aligned} \quad (2)$$

We estimate this regression for misstated firm-years with related MWs. Using Audit Analytics material weakness and restatement codes, we consider a MW to be related to the restatement if at least one of the MW reason codes matches at least one of the restatement codes (e.g. both mention revenue recognition). If the related MW was disclosed during the misstated period, then *TimelyMW* is coded 1. Otherwise, if the related MW was disclosed at the time of the restatement announcement or subsequently, we consider this to be a "late" disclosure of a related MW, and *TimelyMW*=0.

The control variables are briefly discussed here and defined in more detail in the Appendix. We include measures of firm size and profitability to control for a firm's ability to invest in internal control testing which in turn will increase the likelihood of timely detection of MWs. However, as noted by Rice and Weber (2012), large firms and poorly performing firms may have a disincentive to disclose existing MWs due to greater capital market pressures. Similarly, firms in need of capital may have a disincentive to disclose existing MWs, and thus we include *XFin* to

capture the net change in financing activities. We expect a higher quality audit, and greater audit effort to increase the likelihood of a timely MW disclosure, and include *Big4* and *Audit_Fees* as proxies for quality and effort. In addition, we include *NonAudit_Fees*; however, we do not make a prediction on this variable as higher non-audit fees may signal greater investment in internal controls or may signal a lack of auditor independence that would decrease the likelihood of timely disclosure. Similar to Rice and Weber (2012), we expect recent auditor turnover and recent management turnover to increase the likelihood of disclosure of existing MWs. Finally, our variable of interest in this model is *AS5*, which is set equal to 1 if the end of the misstatement period occurs on or after November 15, 2007. A negative (positive) coefficient on *AS5* will indicate that auditors are less (more) likely to detect or disclose a related MW on a timely basis during the AS5 period.

3.3 Unidentified material weaknesses and financial reporting quality

We investigate how unidentified material weaknesses relate to financial reporting quality by examining whether firm-years that are predicted to have a MW, but do not disclose one, are more likely to be misstated. Specifically, we estimate the following logistic regression separately for the AS2 and AS5 periods using firm-years where no material weaknesses were disclosed:

$$\begin{aligned} Misstatement = {} & \alpha_0 + \alpha_1 Predict\_MW + \alpha_2 LnSize + \alpha_3 LnAge + \alpha_4 \#404Reports + \alpha_5 RGrowth \\ & + \alpha_6 PropLoss + \alpha_7 ShumRank + \alpha_8 MandA + \alpha_9 Restructure + \alpha_{10} Lev \\ & + \alpha_{11} Litigation + \alpha_{12} Auditor + \alpha_{13} Auditor\_Resign + \varepsilon \end{aligned} \quad (3)$$

Variables in Model (3) are discussed below and defined in the Appendix. The dependent variable *Misstatement* captures whether the financial statements for the firm-year were subsequently restated. The variable of interest in the model, *Predict_MW*, captures whether a

MW is expected for the firm-year based on the estimations of Model (1).[7] We control for firm-specific characteristics, such as firm size, complexity, profitability, and capital market pressures, which prior literature find to be related to financial statement misstatements (e.g., Richardson et al., 2003; Carcello and Nagy, 2004; Scholz, 2008; Czerney et al., 2013).

Prior research shows that firm size is positively associated with the likelihood of misstatements during our sample period, and thus we include the natural log of the average market value of equity (*LnSize*) as our measure of firm size (Scholz, 2008). We also include the natural log of firm age (*LnAge*) because older firms are more likely to have a greater investment in their internal controls. We include the number of Section 404(b) reports a company has filed (*#404Reports*) as a measure of experience with integrated audits, and expect that companies strengthen their internal controls with exposure to integrated audits, reducing the likelihood of misstatement.

We control for profitability and other financial reporting pressures as managers of firms with lower profitability and financial reporting pressures have stronger incentives to use aggressive accounting (Scholz, 2008; Palmrose and Scholz, 2004; Richardson et al., 2003). We include *PropLoss* to capture lower profitability and *ShumRank* to capture firms more at risk of going bankrupt. We also include an indicator variable for merger and acquisition activity (*MandA*), consistent with Palmrose and Scholz (2004), and a measure of financial leverage (*Lev*), consistent with Richardson et al. (2003), to capture pressures associated with acquisition activity and higher leverage. Managers of firms in litigious industries may have an incentive to avoid misstatements, and thus, we include an indicator for firms in industries with a greater likelihood of litigation (*Litigation*). We also include *RGrowth* to capture firms with extreme sales growth.

[7] Note that we use Model 1 to develop firm-year MW predictions as Model 2 is limited to only the subsample of observations with restatements and related MW disclosures. Model 1 allows us to develop a prediction for each firm-year observation.

Misstatements have been found to be more likely for firms audited by a BigN auditor (Czerney et al., 2013) and have also been found to be more likely in earlier years of audit firm tenure (Carcello and Nagy, 2004; Czerney et al., 2013) as well as after a recent auditor resignation (Boland et al., 2013). Thus, we include indicators for *Auditor* and *Auditor_Resign* to capture the stability of the auditor-client relationship.

4. Sample Selection and descriptive statistics

4.1 Sample selection

As detailed in Table 1, Panel A, our sample of firms initially includes all accelerated filer firm-year observations from the start of the AS2 period (fiscal year-ends ending after November 15, 2004) through 2011 with an auditor's opinion on internal control as obtained from Audit Analytics' SOX 404 Internal Control Database, yielding 32,999 firm-year observations. We merge this sample with Compustat to obtain financial information for our proxies of MW determinants. Data requirements for these determinants reduce our overall sample of firm-year observations to 17,223, of which 6,537 are from the AS2 period and 10,686 are from the AS5 period. In the AS2 period there are 923 MW disclosure observations (14.1% of the AS2 observations) and in the AS5 period there are 553 MW observations (5.2% of the AS5 observations).

4.2 Descriptive and univariate analyses

We present sample properties in Table 2. Table 2, Panel A presents descriptive statistics and results for univariate tests comparing MW firm-year observations to non-MW firm-year (control) observations. Consistent with prior research our proxies for MW existence indicate that MWs are associated with smaller, younger firms that are more likely to show signs of financial distress. Additionally, MW firm-years are more likely to be subject to an auditor resignation or

a restatement of financial statements and are less likely to occur for firms operating in litigious industries. In contrast to Ashbaugh-Skaife et al. (2007), however, we find that MW firms are less likely to employ one of the six largest auditors, have lower institutional ownership concentration, and have fewer operating segments. Also, contrary to Doyle et al. (2007b) we do not find significance on variables representing complexity, such as foreign transactions, mergers and acquisition activity, and growth, although MW firm-years are more likely to report restructuring activity and have a significantly higher mean value of average inventory to total assets. These differences may result from our longer sample period, which captures determinants of MWs under both AS2 and AS5. It may also indicate that firms with higher detection and disclosure rates of MWs in the earlier years have remediated their MWs and, thus now have a lower MW disclosure rate. As expected, MW observations are decreasing in the number of years that the firm has been filing a 404(b) report.

Panel B of Table 2 shows the distribution of MWs classified as entity-level (*ELCWeak*) versus those that relate to process-level, or account specific deficiencies (*ProcessWeak*). We classify a MW as entity-level versus process based on the Audit Analytics codes.[8] The percentage of MWs classified as entity-level by year varies from 37.1% to 46.4% in the AS2 period and from 39.7% to 50.6% in the AS5 period, with an average of about 42% across all years. There is no clear trend over time, however, suggesting the distribution of entity-level versus process is similar across the AS2 and AS5 periods.

[8] We classify a MW as entity-level if at least one of the weaknesses disclosed is 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); or (7) ethical or compliance issues (code 21). If none of these codes are present, we classify the MW as a process-level weakness (Donelson et al., 2014).

5. Results of multivariate analyses

5.1 Determinants of material weakness existence and disclosure

We first estimate logistic regression equation (1) for our full sample of firm-years in order to test H1, and then we separately estimate the model for the AS2 and AS5 time periods and test for differences in coefficients to better understand differences in the determinants of MW disclosures across the two standards.[9] The results of estimating equation (1) for all firm-years and including an AS5 indicator, presented in Table 3 Column 1 and 2, show that the sign and magnitude of determinants of MWs are mostly consistent with prior research (Ashbaugh-Skaife et al., 2007; Doyle et al., 2007b). Overall, observations with MWs tend to be more complex (*Segments, Foreign_Trans, MandA, Restructure, and Inventory)*, smaller, have a higher risk of bankruptcy, and are more likely to have had a recent restatement or auditor resignation. In addition, MW firms are less likely to use a top six audit firm, have lower institutional ownership, and are less likely to be in a high litigation industry. We also find a significant and negative coefficient on *#404Reports* suggesting the likelihood of disclosing a material weakness declines over time as companies gain more experience with SOX 404 reporting and integrated audits. In other words, even though the costs of AS2 in initial years have been documented to be high, it appears that controls improve with exposure to the standards, consistent with the survey findings of Alexander et al. (2013).

The coefficient on the AS5 indicator variable is negative and significant at $p < 0.01$, suggesting a lower likelihood of MW disclosure in the AS5 period relative to the AS2 period, even after controlling for the decrease in the existence of MWs due to longer exposure to ICFR

[9] The area under the receiver operating characteristic curves for these regressions range from 0.73 to 0.79. Per Hosmer and Lemeshow (2013, 177) ROC curve values between 0.7 and 0.79 suggest acceptable discrimination, between 0.8 and 0.89 suggest excellent discrimination, and > 0.9 suggest outstanding discrimination.

audits *(#404Reports*). Thus, we reject the null hypothesis (H1) of no difference in likelihood across the two periods. However, we note that the pooled model assumes the MW determinants are constant across periods which may not be true given the changes in the standard related to ICFR audits. Therefore, we estimate the MW determinants model separately for the AS2 and AS5 periods, allowing the coefficients to vary, in order to better understand differences in the determinants across the two periods.

Results of estimating model (1) in the AS2 (AS5) period are presented in Column 2 (3) of Table 3 and are largely consistent with the pooled results in Column 1, although not all of the same variable coefficients are significant. We focus on the results of the chi-square tests comparing the coefficients across the AS2 and AS5 period to shed light on what is driving the decrease in disclosure of MWs.[10] In Column 4 of Table 3, we find significant differences across periods for the coefficients on *LnSize*, *#404Reports,* and *Litigation*. The coefficients on *LnSize* are negative and significant in both periods, but significantly more negative in the AS2 period relative to the AS5 period. This indicates a slight reversal of the inverse relationship between size and the likelihood of MWs observed in the AS2 period. One possible explanation is that the disparity in control quality between smaller and larger firms is decreasing in the AS5 period. Alternatively, auditors may be putting forth less effort to detect MWs in smaller client firms as a result of the "scalability" aspect of AS5. While the standard is designed to make integrated audits scalable for smaller firms, it is possible that a significant reduction in internal control testing results in a lower MW detection rate.

In terms of litigation risk, being in a more litigious industry was not a significant determinant of MW disclosures in the AS2 period. However, the negative coefficient on *Litigation* in the AS5 period and the significant difference across periods indicates that the likelihood of a MW

[10] This test is performed using Stata's SUEST command.

disclosure is significantly lower in the AS5 period, relative to the AS2 period, for firms in these industries. The negative coefficient could reflect either a decrease in the rate of MW existence in these industries, or could reflect a reluctance to disclose a MW in these industries as a MW disclosure increases the likelihood of litigation in the event of a financial statement restatement (Hogan, Lambert, and Schmidt, 2013).

The significant difference in the negative coefficients on *#404Reports* is also interesting. The effect of *#404Reports* on the propensity to disclose a MW is significantly less negative in the AS5 period, relative to the AS2 period, consistent with firms previously subjected to AS2 already improving their controls under the more rigorous AS2 regime. The likelihood of a MW, however, does not continue to go down with more integrated audits perhaps because at some point the benefits have been fully achieved or because of the rate of improvement slows under the AS5 standard. We also note that the intercept in the AS5 period is significantly lower than in the AS2 period, suggesting a lower likelihood of MW disclosure in the AS5 period, even after controlling for differences in the determinants of MW disclosure across the two periods.

5.2 The likelihood of timely disclosure of existing material weaknesses

The sample selection process for the observations used in estimating Model 2, our analysis of timely versus late MW disclosure of existing MWs, is detailed in Table 4 Panel A. Out of the 900 unique restatement filings (1,476 misstatement firm-years) included in our primary sample, 359 of these (39.9%) are associated with a related material weakness in internal controls (i.e., a MW related to the reason for the restatement was announced either during the misstated period or subsequently). Of the 359 restatement observations, 151 (42.1%) of the MWs were disclosed on a timely basis, i.e., during the misstated period, and the remaining 208 (57.9%) were disclosed concurrent with or subsequent to the restatement announcement. Panel B of Table 4

presents the percentage of timely MW disclosures by year, and Panel C presents descriptive statistics for the timely versus late disclosure observations.

The results of estimating the likelihood of a timely versus late disclosure of an existing MW (Model 2) are presented in Table 5. We find results largely consistent with Rice and Weber (2012), except the coefficients on *LnSize* and *MgtChange* are insignificant in our model. We find that a prior restatement increases the likelihood of disclosing an existing MW on the timely basis, as does greater audit investment (*Audit_Fees*). Less profitable firms and firms with a recent auditor change are more likely to disclose an existing MW on the timely basis whereas firms in need of financing and firms with a Big 4 auditor are less likely to disclose an existing MW. The ratio of non-audit fees to the square root of total assets (*Nonaudit_Fees*) is negatively associated with the likelihood of timely disclosure.

The coefficient on our variable of interest in this model, *AS5*, is negative and significant suggesting a lower likelihood of disclosing an existing MW on a timely basis in the AS5 period relative to the AS2 period. Overall, the results presented in Tables 3 and 5 suggest the likelihood of MW detection/classification and disclosure is significantly lower in the AS5 period relative to the AS2 period, using two different approaches of controlling for the existence of a MW.

5.3 Unidentified material weaknesses and financial reporting quality

The findings discussed above suggest a decrease in the likelihood of disclosing an existing MW in the AS5 period relative to the AS2 period. The findings also suggest that this decrease is due in part to changes in the association of certain firm characteristics with MW disclosures, after controlling for the existence of a MW. These results raise concerns about whether there are undetected and/or undisclosed MWs in the AS5 period as a result of changes in the integrated audit approach, which has implications for financial reporting quality. In this section, we use the

MW determinants model (Model 1) results discussed above to develop predictions about which companies are more likely to have undisclosed MWs. We then examine financial reporting quality for these firms relative to firms that we predict do not have a MW (and do not disclose one) both in the AS2 and AS5 periods.

To assess the predictive ability of the MW determinants models, and to generate predictions about which firm-years are more likely to have undisclosed MWs (either because they were not detected or not disclosed), we use coefficients from Model 1 estimated separately in the AS2 and AS5 time periods to calculate a probability score for each firm-year observation.[11] To convert the probabilities into a 2x2 classification table, we need to have a "probability cutoff value" that determines whether firms are likely to have a MW or not, and compare that to the actual reporting of MWs. We determine the cutoff value for the AS2 period using the AS2 observations and probabilities, and the cutoff value for the AS5 period using the AS5 observations and probabilities. Companies with a probability greater than (lower than) the cutoff value are classified as likely (not likely) to have a MW. Because we do not have any prior expectations on the relative costs of Type I and Type II errors in this setting, we use the cutoff value that maximizes both the sensitivity and the specificity of the model.[12]

The classification tables for the AS2 and AS5 periods are shown in Table 6. For the AS2 period, based on the probability cutoff value of 14.3%, the sensitivity (percent of correctly predicted events) is 65.2% and specificity (percent of correctly predicted non-events) is 68.2%.

[11] We retain variables in our MW prediction model that prior research has associated with MW detection and disclosure. While these variables may have reflected incentives to detect and disclose MWs prior to SOX (Ashbaugh-Skaife et al. 2007), they could also be considered to be incentives to remediate MWs in the post-SOX period.

[12] We follow Hosmer and Lemeshow (2013) and develop contingency tables based on the receiver operating characteristic (ROC) curves. Per Hosmer and Lemeshow (2013) the ROC curve plots the probability of detecting true signals (sensitivity) and false signals (1-specificity). For our tests, sensitivity represents the proportion of MW firm-years that are accurately predicted while specificity represents the proportion of non-MW firm-years that are accurately predicted. The cutoff probability value is the value that maximizes both sensitivity and specificity of the model.

For the AS5 period, the probability cutoff value is not surprisingly lower (4.4%), which results in a sensitivity of 76.1% and a specificity of 66.4%. In both periods, the determinants model correctly classifies more than 65% of the MW observations.

We next examine financial reporting quality for firms in both periods that are predicted to have a MW based on the determinants model, but do not report one. These observations represent firm-years more likely to have undetected or undisclosed MWs which, if undetected, could have resulted in undetected misstatements as well. To assess the relation between these observations and financial reporting quality, we use financial statement misstatements subsequently revealed through a restatement as evidence of poor financial reporting quality that originally went undetected. We estimate a logistic regression of the likelihood of a financial statement misstatement (Model 3) separately in the AS2 and AS5 time period and include an indicator for the firm-years that are predicted to have a MW (but do not disclose one) based on the classifications discussed above (*Predict_MW*=1).

The rates of misstatements across the two groups are reported in Table 7, Panel A, and the associated regression results are reported in Panel B. Our variable of interest, *Predict_MW*, is coded as 1 for firm-years that are predicted to have a MW but do not disclose one, and 0 for firm-years that are not predicted to have a MW and do not disclose one. As shown in Panel A, significantly higher percentages of *Predict_MW*=1 firm-years, 10.0% in the AS2 period and 6.3% in the AS5 period, are misstated compared to 8.1% and 4.7% control group (where MWs are not predicted and not disclosed) firm-years.

Panel B of Table 7 presents the results of estimating Model 3 separately for the AS2 and AS5 time periods, including our variable of interest, *Predict_MW*. We first present the results of estimating Model 3 without including a control for recent (within the prior two years)

restatement announcements (Columns 1 and 3), and then present the results when we include a *PrevRestate2* indicator variable (Columns 2 and 4), to highlight changes in inferences when we consider the association between prior period restatements and current period misstatements. The control group in this regression is all firm-years in the AS2 (AS5) period that were not predicted to disclose a MW and did not disclose one, and thus the regression does not include any firm-years where a MW was disclosed. The insignificant coefficient on *Predict_MW* in the AS2 period (-0.047, p = 0.75) suggests that firm-years predicted to have a MW, but do not disclose one (potential undisclosed MWs), are not significantly associated with misstatements in those firm-years. In comparison, the results in Panel B Column 3 that are estimated during the AS5 time period and without including *PrevRestate2*, suggest that firm-years that are more likely to have a MW but do not disclose one are more likely to be misstated (*Predict_MW* = 0.295, p = 0.02).

When we include *PrevRestate2* in the models, the coefficients on *Predict_MW* and *PrevRestate2* in the AS2 period are insignificant. In the AS5 period, the coefficient on *PrevRestate2* is positive and significant while the coefficient on *Predict_MW* becomes insignificant. These findings indicate that recent restatements (announced in the prior two years) are a significant predictor of misstatements in the current period, and the composite measure of predicted MWs is no longer significantly associated with current period misstatements. This result suggests that auditors underweight prior restatements as a risk factor in the AS5 period. Recall the Table 5 results show that recent restatements increase the likelihood of a timely MW disclosure for restatements with a related MW; however, the Table 7 results suggest that overall, auditors still seem to be underweighting the information contained in a recent restatement and issuing unqualified internal control opinions to these firms prematurely.

In terms of the control variables, we find that the likelihood of misstatements is positively associated with restructuring activities and high litigation risk industries, but inversely associated with the number of 404 reports in the AS2 period. The latter finding suggests that greater experience with Section 404 results in a lower likelihood of misstatements. In the AS5 period, the number of 404 reports is no longer significant, suggesting diminishing returns beyond a certain number of years. In the AS5 period, misstatements are positively associated with leverage, and inversely associated with the proportion of loss years and recent auditor resignations. Note that, consistent with prior research, the restatement models do not have good predictive ability in that the ROC curve scores are low (approximately 59%); however, the Hosmer and Lemeshow (2000) goodness of fit test suggests the models are well specified (χ^2 = 7.54 (6.98), p=0.48 (0.54) in the AS2 (AS5) periods).

Taken together, our results suggest that the firm characteristics associated with the disclosure of a MW have changed in the AS5 period relative to the AS2 period, and that auditors may not be identifying (or are identifying but not disclosing) MWs in the AS5 period that are associated with a higher likelihood of a misstatement. This suggests auditors may be making more Type II errors in the AS5 period. Specifically, auditors seem to be underweighting the positive association between prior period restatements and the likelihood of current period misstatements. Table 7, however, shows that firm-years with predicted MWs under AS5 are significantly more likely to have misstatements, whereas firm-years with predicted MWs under AS2 are not. Improvements in risk assessment, especially related to assessing risk following restatements, may be able to reduce the likelihood of missed predictable MWs.

5.4 Sensitivity analyses

In this section, we explore the sensitivity of our results that link predicted, but undisclosed, MWs to financial misstatements by considering alternative research designs. A key challenge in this study is developing a proxy for MWs that exist, but are not detected and/or disclosed. In our main analysis, we do this by modeling MW likelihood separately in the AS2 and AS5 periods using determinants identified in prior research. Firms that are estimated to have a relatively high probability of having a material weakness within a period, but do not disclose one, are included in the *Predict_MW*=1 group (i.e., are assumed to have a higher likelihood of having an unobserved material weakness in that period). An alternative design is to assume that the determinants of MW existence have not changed between the AS2 period and the AS5 period and that any difference between the periods is due to differences in MW detection and disclosure. To implement this approach, we estimate a model of MW likelihood in the AS2 period and apply the parameter estimates from this model to firms in AS5 period to identify potential undisclosed MWs.

In untabulated results, we find that the sensitivity for the AS2 classification model applied in the AS5 period is only 34.4% compared to 76.1% for the classification model estimated within the AS5 period. This result indicates that the AS2 classification model is less accurate at identifying MWs in the AS5 period than the AS5-based model, likely due to changes in the determinants of MWs between the periods. When we use AS2-predicted MWs in the misstatement regression (untabulated), we find the coefficient on *Predict_MW* is insignificant, which is unsurprising given that they are less likely to represent actual undisclosed MWs.

We also explore the sensitivity of our results to alternative cutoffs for classifying firms by their likelihood of having MWs. We classify firms as more likely to have MWs (*Predict_MW*=1) if they are in the top quintile of estimated MW likelihood, rather than using the

cutoff that maximizes sensitivity and specificity. The untabulated classification table shows a reduction in the sensitivity of the classifications relative to our main analysis in both periods, but higher specificity indicating the top quintile cutoff does a better job classifying non-MW observations. This is not surprising given that the top quintile cutoff predicts fewer MWs overall. If we estimate the likelihood of a misstatement model for the subset of firms that do not disclose a MW (untabulated), we find results similar to those presented in Table 5 for our variables of interest in the AS5 period. However, in the AS2 period, the coefficient on *Predict_MW* becomes negative and significant while the coefficient on *PrevRestate* in the AS2 period becomes significantly positive. Overall, our inferences remain the same that auditors appear to underweight the information contained in prior restatements as it relates to the likelihood of current period misstatements in the AS5 period.

6. Conclusion

In this study, we investigate changes in the likelihood and determinants of MW disclosure from the AS2 period to the AS5 period, and the implications for financial reporting quality. Our results show that MWs are less likely to be identified in the AS5 period after controlling for the existence of MW using two different methods. Further, we document several changes in MW disclosure determinants. We find that the decrease in the likelihood of MW disclosures in the AS5 period is in part associated with certain firm characteristics including size, litigation risk, and the extent of previous exposure to ICFR audits. Thus, even though the costs of AS2 in initial years have been documented to be high, it appears that controls improve with exposure to integrated audits, though the rate of improvement may be slowing under AS5. We also find some evidence that financial reporting quality decreased under AS5 in that financial statement

misstatements are related to predictable, but unidentified MWs in the AS5 period, but not in the AS2 period.

Our results have implications for practitioners and regulators, as well as for literature examining the effectiveness of the AS5 standard. Though certain determinants of MW disclosure may be receiving increased attention in the AS5 period, auditors, managers, and financial statement users should realize that it is possible that auditors may not be focusing their risk-based control testing on certain other risky areas, thus contributing in some cases to lower rates of MW identification. It is important to realize, however, that auditors may be able to improve their risk assessment of internal control issues because financial misstatements are related to MWs that are predictable based on firm attributes. Studies exploring whether AS5 leads to efficiencies relative to AS2 should consider the evidence that determinants of MW disclosure and financial reporting quality may not have remained the same in the years following the implementation of AS5.

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Appendix

Variable	Definition and Data Source
Dependent variables	
MWFIRM	Coded 1 if a firm reports a material weakness related to year *t* , and 0 otherwise (Audit Analytics SOX 404 Internal Controls database).
MISSTATEMENT	Coded 1 if year *t* is misstated, as subsequently revealed in a restatement announcement, and 0 otherwise (Audit Analytics Non-Reliance Restatement database).
TIMELY_MW	Coded 1 if the firm disclosed the existence of a material weakness in internal control over financial reporting in any SOX 404 report between the beginning of the misstatement period up through the end of the misstatement period, and 0 otherwise (Audit Analytics).
Model 1 variables	
LnSIZE	Natural log of average market value of equity from year *t* -2 to year *t* (log of Compustat CSHO*PRCC_F).
LnAGE	Natural log of number of years the firm has appeared in Compustat Names file.
#404REPORTS	Count of number of years as of year *t* that the firm has filed a SOX Section 404(b) report (Audit Analytics SOX 404 Internal Control database).
SEGMENTS	Number of reported business segments in year *t* (Compustat Segment file).
FOREIGN_TRANS	Coded 1 if a firm reports foreign transactions in year *t*, and 0 otherwise (Compustat data item FCA does not=0).
MandA	Coded 1 if a firm is involved in a merger or acquisition from year *t* -2 to year *t*, and 0 otherwise (Compustat AFNT #1).
RESTRUCTURE	Coded 1 if a firm was involved in a restructuring from year *t* -2 to year *t*, and 0 otherwise. This variable is coded 1 if RCA, RCEPS, RCP, or RCD is non zero.
INVENTORY	Average inventory to total assets from year *t* -2 to year *t* (Compustat INVT/AT).
RGROWTH	Decile rank of average sales growth within industry from year *t* -2 to year *t* (percent change in Compustat REVT).
PROPLOSS	Proportion of years from *t* -2 to *t* that a firm reports negative earnings (Compustat IB<0).
SHUMRANK	Decile rank of Shumway (2001) score (bankruptcy risk model) in year *t* .
AUDITOR_RESIGN	Coded 1 if the auditor resigned from the client in year *t* -1 or year *t*, and 0 otherwise (Audit Analytics Auditor Change database).
AUDITOR	Coded 1 if the firm is audited by a 'top 6' auditor, and 0 otherwise (Compustat AU=4, 5, 6, 7, 11, or 17).
RESTATE	Coded 1 if the firm filed a restatement in any of years *t* -2 to year *t*, and 0 otherwise (Audit Analytics Non-Reliance Restatements database).
INST_CON	Percentage of shares held by institutional investors divided by the number of institutions that own the stock as of year *t* (Thompson Reuters Institutional Holdings database).
LITIGATION	Coded 1 if firm operates in a litigious industry (SIC codes 2833-2836; 3570-3577; 3600-3674; 5200-5961; and 7370), and 0 otherwise (Compustat).

Appendix (continued)

Variable	Definition and Data Source
Model 2 additional variables	
PREVRESTATE	Coded 1 if the firm filed a restatement in either year *t-2* or year *t-1* from the end of the misstatement period, and 0 otherwise (Audit Analytics Non-Reliance Restatements database).
SIZE	Natural log of the total market value of common equity at the end of the misstatement period (Compustat CSHO x PRCC_F)
LOSS	Coded 1 of the firm reports a loss in the final year of the misstatement period, and 0 otherwise (Compustat IB<0).
XFIN	Sum of cash received from the sale of stock and issuance of long-term debt, minus cash used in repurchase of stock, payment of dividends, and reduction of debt (Compustat; SSTK+DLTIS-PRSTKC-DV-DLTR+DLCCH), measured over the first fiscal year after the misstatement period and scaled by average total assets (Compustat AT).
BIG4	Coded 1 if the firm is audited by a Big 4 auditor, and 0 otherwise (Compustat AU=4, 5, 6, or 7).
AUDIT_FEES	Audit fees (Audit Analytics Audit Fees database), scaled by the square root of total assets, for the final year of the misstatement period
NONAUDIT_FEES	Total non-audit fees paid to the outside audit firm (Audit Analytics Audit Fees database), scaled by the square root of total assets, for the final year of the misstatement period.
AUDITOR_CHANGE	Coded 1 if the firm experienced an auditor change within the two-year window prior to the end of the misstatement period, and 0 otherwise (Audit Analytics Auditor Changes database).
MGMT_CHANGE	Coded 1 if the firm experienced a CEO or CFO change within the two-year window prior to the end of the misstatement period, and 0 otherwise (Audit Analytics Director and Officer Changes database).
AS5	Coded 1 if the end of the misstatement period occurs on or after November 15, 2007, and 0 otherwise.
Model 3 additional variables	
PREDICT_MW	Coded 1 if observation is an incorrectly predicted material weakness. These are observations for which a MW was predicted based on a ROC curve classification, but a MWdid not occur. Coded 0 if it is an observation where no MW was predicted and no MW was disclosed.
PREVRESTATE2	Coded 1 if the firm filed a restatement in either year *t* -2 or year *t-1*, and 0 otherwise (Audit Analytics Non-Reliance Restatements database).
LEV	Firm leverage in year *t* measured as long-term debt (Compustat DLTT+DLC) divided by total assets (Compustat AT).

Table 1

Sample Selection Procedure and Material Weakness (MW) Disclosure Rate by Audit Standard

Panel A: Sample Selection Procedure

Number of auditor opinion Audit Analytics observations (type "A")	32,999
Elimination of duplicate firm-year observations	(495)
Elimination of firm-year observations from financial services and utilities industries	(9,357)
Firm-years with insufficient Compustat data	(2,952)
Firms without segment data	(2,438)
Firms missing Shumway score data	(534)
Total sample	17,223
Material weakness firm-years	1,476

Panel B: Sample Observations by MW Disclosure Rate and Auditing Standard

	Firm-years	MW disclosure rate
AS2 firm-years	6,537	
AS2 MW firm-years	923	14.1%
AS5 firm-years	10,686	
AS5 MW firm-years	553	5.2%
Total firm-years	17,223	
Total MW firm-years	1,476	8.6%

Table 2
Descriptive Statistics and Univariate Tests of Differences

Panel A: Descriptive Statistics and Univariate Tests of Differences for MW vs. non-MW firm-years

MW sample n=1,476, control sample n=15,747, total sample n=17,223

Variable	Mean		Median		Std Dev	
	MW firm	*Control*	*MW firm*	*Control*	*MW firm*	*Control*
Proxies for material weakness existence						
LnSIZE	6.042	6.822 ***	5.795	6.569 ***	1.243	1.644
LnAGE	2.628	2.812 ***	2.565	2.708 ***	0.649	0.653
#404REPORTS	2.485	3.831 ***	2.000	4.000 ***	1.635	2.071
SEGMENTS	2.275	2.369 ***	1.000	1.000	1.565	1.665
FOREIGN_TRANS	0.371	0.371	0.000	0.000	0.483	0.483
MandA	0.444	0.430	0.000	0.000	0.497	0.495
RESTRUCTURE	0.366	0.342 *	0.000	0.000 *	0.482	0.474
INVENTORY	0.104	0.097 ***	0.064	0.064	0.122	0.110
RGROWTH	4.470	4.503	4.000	5.000	3.172	2.842
PROPLOSS	0.425	0.286 ***	0.333	0.000 ***	0.393	0.374
SHUMRANK	4.493	5.572 ***	4.000	6.000 ***	2.391	2.439
Proxies for incentives to detect and disclose material weaknesses						
AUDITOR_RESIGN	0.207	0.091 ***	0.000	0.000 ***	0.406	0.287
AUDITOR	0.851	0.930 ***	1.000	1.000 ***	0.356	0.255
RESTATE	0.446	0.192 ***	0.000	0.000 ***	0.497	0.394
INST_CON	0.064	0.067 ***	0.073	0.073	0.044	0.041
LITIGATION	0.285	0.313 **	0.000	0.000 **	0.452	0.464

All continuous variables are winsorized as the 1st and 99th percentiles. A t-test compares mean values and a wilcoxon rank-sum test compares median values. Variable definitions are provided in the Appendix.

*, **, and *** indicate statistical significance at the 10%, 5%, and 1% level (two-tailed).

Table 2 (continued)

Descriptive Statistics and Univariate Tests of Differences

Panel B: MW Observations by Entity-Level, Process-Level, and Total (ELCWEAK & PROCESSWEAK)

	Entity-Level		Process-Level		Total MWs
	Count	% of total MW's	Count	% of total MW's	Count
SOX year 1 (11/15/04-11/14/05) AS2 year 1	150	37.1%	254	62.9%	404
SOX year 2 (11/15/05-11/14/06)	126	44.1%	160	55.9%	286
SOX year 3 (11/15/06-11/14/07)	108	46.4%	125	53.6%	233
SOX year 4 (11/15/07-11/14/08) AS5 year 1	81	39.7%	123	60.3%	204
SOX year 5 (11/15/08-11/14/09)	52	45.6%	62	54.4%	114
SOX year 6 (11/15/09-11/14/10)	36	41.4%	51	58.6%	87
SOX year 7 (11/15/10-11/14/11)	42	50.6%	41	49.4%	83
SOX year 8 (11/15/11-12/31/11) partial year	30	46.2%	35	53.8%	65
Total All Years	625	42.3%	851	57.7%	1,476

ELCWEAK=1 if 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 or (8) accounting personnel resources, *PROCESSWEAK=1* if a material weakness exists, but none of the reasons identified by *ELCWEAK=1* are present.

Table 3

Logit Model Estimating the Key Determinants of Material Weakness Disclosure across AS2 and AS5 Time Periods

	Dependent variable = *MWFIRM*						
	Pooled sample 11/15/2004-12/31/2011		AS2 period 11/15/2004-11/14/2007		AS5 period 11/15/2007-12/31/2011		
	1	**2**	**3**	**4**	**5**	**6**	**7**
Independent variables	Coefficient	Odds ratio	Coefficient	Odds ratio	Coefficient	Odds ratio	Chi-Square test of differences
INTERCEPT	0.624 **		1.005 ***		-0.152		5.20 **
LnSIZE	-0.236 ***	*0.79*	-0.278 ***	*0.76*	-0.176 ***	*0.84*	3.35 *
LnAGE	-0.088	*0.92*	-0.038	*0.96*	-0.180 *	*0.84*	1.54
#404REPORTS	-0.300 ***	*0.74*	-0.454 ***	*0.64*	-0.231 ***	*0.79*	15.08 ***
SEGMENTS	0.056 **	*1.06*	0.060 **	*1.06*	0.043	*1.04*	0.15
FOREIGN_TRANS	0.213 ***	*1.24*	0.274 ***	*1.32*	0.172	*1.19*	0.57
MandA	0.135 *	*1.14*	0.120	*1.13*	0.172	*1.19*	0.15
RESTRUCTURE	0.248 ***	*1.28*	0.264 ***	*1.30*	0.221 *	*1.25*	0.09
INVENTORY	0.812 **	*2.25*	0.625	*1.87*	1.059 **	*2.88*	0.52
RGROWTH	0.010	*1.01*	0.007	*1.01*	0.018	*1.02*	0.24
PROPLOSS	0.021	*1.02*	-0.087	*0.92*	0.125	*1.13*	0.77
SHUMRANK	-0.115 ***	*0.89*	-0.128 ***	*0.88*	-0.108 ***	*0.90*	0.29
AUDITOR_RESIGN	0.527 ***	*1.69*	0.437 ***	*1.55*	0.718 ***	*2.05*	2.70
AUDITOR	-0.256 **	*0.78*	-0.149	*0.86*	-0.428 ***	*0.65*	1.83
RESTATE	0.992 ***	*2.70*	0.952 ***	*2.59*	1.094 ***	*2.99*	1.20
INST_CON	-1.594 *	*0.20*	-1.366	*0.26*	-1.559	*0.21*	0.01
LITIGATION	-0.252 ***	*0.78*	-0.100	*0.91*	-0.455 ***	*0.63*	5.16 **
AS5PERIOD	-0.400 ***	*0.67*					
Likelihood ratio $\chi 2$	1,498.5		562.9		571.9		
Model significance	<0.0001		<0.0001		<0.0001		
Max re-scaled R-square	18.8%		14.8%		15.6%		
MWFIRM=1 observations	1,476		923		553		
Total observations	17,223		6,537		10,686		
Area under ROC curve	78.5%		73.3%		77.8%		

The models are estimated using logistic regression with standard errors adjusted for clustering on each company. All continuous variables are winsorized as the 1st and 99th percentiles. Variable definitions are provided in the Appendix.

*, **, and *** indicate statistical significance at the 10%, 5%, and 1% level (two-tailed).

Table 4

Sample Selection Procedure for Test of Timely Matches of Misstatements to Material Weaknesses

Panel A: Sample Selection Procedure

Total unique announcements from initial sample of misstated firm-years	900
Elimination of restatement filings with no corresponding material weakness reported	(368)
Elimination of restatement filings with a corresponding, but non matching material weakness	(151)
Elimination of observations with missing information to construct variables in primary model	(22)
Total matched restatements	359
Firms that report a related material weakness during the misstatement period (timely)	151
Firms that report controls are effective during the misstatement period, but subsequently disclose a related material weakness (late)	208
Total matched restatements	359

Panel B: Sample Observations by TIMELYMW

	TIMELYMW=1	Total matches	% Timely
SOX year 1 (11/15/04-11/14/05) AS2 year 1	36	80	45.0%
SOX year 2 (11/15/05-11/14/06)	51	93	54.8%
SOX year 3 (11/15/06-11/14/07)	22	50	44.0%
SOX year 4 (11/15/07-11/14/08) AS5 year 1	10	27	37.0%
SOX year 5 (11/15/08-11/14/09)	13	33	39.4%
SOX year 6 (11/15/09-11/14/10)	3	26	11.5%
SOX year 7 (11/15/10-11/14/11)	9	31	29.0%
SOX year 8 (11/15/11-12/31/11) partial year	7	19	36.8%
Total All Years	151	359	42.1%

Table 4 (continued)

Panel C: Descriptive Statistics and Univariate Tests of Differences for timely vs. late MW's

TIMELYMW sample n=153, control sample n=206, total sample n=359

Variable	Full Sample			*TIMELYMW=1*	*TIMELYMW=0*	
	Mean	*Std. Dev*	*Median*	*Mean*	*Mean*	
PREVRESTATE	0.323	0.468	0.000	0.490	0.199	***
SIZE	6.173	1.360	6.079	6.116	6.216	
LOSS	0.404	0.491	0.000	0.497	0.335	
XFIN	0.047	0.253	0.000	0.021	0.066	*
BIG4	0.813	0.390	1.000	0.765	0.850	**
AUDIT_FEES	70.610	72.854	50.432	95.811	51.892	***
NONAUDIT_FEES	9.734	13.596	5.098	9.366	10.008	
AUDITOR_CHANGE	0.153	0.361	0.000	0.222	0.102	***
MGMT_CHANGE	0.398	0.474	0.000	0.399	0.296	**
AS5	0.379	0.486	0.000	0.288	0.447	***

All continuous variables are winsorized as the 1st and 99th percentiles. A t-test compares mean values.

*, **, and *** indicate statistical significance at the 10%, 5%, and 1% level (two-tailed).

Table 5

Logit Model Estimating the Key Determinants of a Timely MW

Dependent variable = *TIMELYMW*

	Pooled sample 11/15/2004-12/31/2011	
Independent variables	Coefficient	Odds ratio
INTERCEPT	-1.514 *	
PREVRESTATE	1.313 ***	*3.72*
SIZE	0.128	*1.14*
LOSS	0.846 ***	*2.33*
XFIN	-1.646 **	*0.19*
BIG4	-1.236 ***	*0.29*
AUDIT_FEES	0.017 ***	*1.02*
NONAUDIT_FEES	-0.024 *	*0.98*
AUDITOR_CHANGE	1.044 ***	*2.84*
MGMT_CHANGE	0.321	*1.38*
AS5	-1.119 ***	*0.33*
Likelihood ratio $\chi 2$	116.4	
Model significance	<0.0001	
Max re-scaled R-square	37.3%	
TIMELYMW=1 observations	153	
Total observations	359	
Area under ROC curve	80.1%	

The models are estimated using logistic regression . Variable definitions are provided in the Appendix.

*, **, and *** indicate statistical significance at the 10%, 5%, and 1% level (two-tailed).

Table 6

ROC Curve Classification Tables

Panel A: AS2 Observations

	Observed		
Classified	*MWFIRM=1*	*MWFIRM*=0	Total
MWFIRM=1	602	1,785	2,387
MWFIRM=0	321	3,829	4,150
Total	923	5,614	6,537
Sensitivity			65.2%
Specificity			68.2%
Probability cutoff value			14.3%

Panel B: AS5 Observations

	Observed		
Classified	*MWFIRM=1*	*MWFIRM*=0	Total
MWFIRM=1	421	3,404	3,825
MWFIRM=0	132	6,729	6,861
Total	553	10,133	10,686
Sensitivity			76.1%
Specificity			66.4%
Probability cutoff value			4.4%

Table 7

Frequency and Estimates of Misstatement for Non-Material Weakness Firm-Years

Panel A: Frequency of Misstatements for Non-Material Weakness Firm-Years

Classified	*MISSTATEMENT* Frequency	
	AS2 period 11/15/2004-11/14/2007	AS5 period 11/15/2007-12/31/2011
PREDICT_MW=1	10.0%	6.3%
PREDICT_MW=0	8.1%	4.7%
Difference	1.9%***	1.5%***

Panel B: Logistic Regression Model Estimating the Determinants of Misstatements for Firm-Years without Material Weaknesses

Independent variables	Dependent variable=*MISSTATEMENT*			
	AS2 period 11/15/2004-11/14/2007		AS5 period 11/15/2007-12/31/2011	
	1	**2**	**3**	**4**
INTERCEPT	-1.129 **	-1.038	-2.472 ***	-2.164 ***
PREDICT_MW	-0.047	-0.132	0.295 *	0.020
LnSIZE	-0.055	-0.062	-0.068	-0.077 *
LnAGE	-0.060	-0.057	-0.026	-0.042
#404REPORTS	-0.280 ***	-0.304 ***	0.033	0.012
RGROWTH	-0.025	-0.024	-0.008	-0.005
PROPLOSS	-0.119	-0.122	-0.372 *	-0.353 *
SHUMRANK	-0.018	-0.022	-0.045	-0.054 *
MandA	0.045	0.052	0.073	0.090
RESTRUCTURE	0.276 **	0.288 **	0.104	0.118
LEV	0.257	0.244	0.762 ***	0.731 ***
LITIGATION	0.310 **	0.308 **	0.097	0.049
AUDITOR	-0.169	-0.159	-0.024	-0.069
AUDITOR_RESIGN	-0.174	-0.169	-0.350 *	-0.316
PREVRESTATE2		0.209		0.502 ***
Likelihood ratio $\chi 2$	46.3	48.3	43.8	57.6
Model significance	<.0001	<.0001	<.0001	<.0001
Max re-scaled R-square	1.8%	1.9%	1.3%	1.5%
MISSTATEMENT=1 observations	490	490	531	531
Total observations	5,614	5,614	10,133	10,133
Area under ROC curve	59.3%	59.4%	58.7%	60.1%

The models are estimated using logistic regression with standard errors adjusted for clustering on each company. All continuous variables are winsorized as the 1st and 99th percentiles. Variable definitions are provided in the Appendix.

*, **, and *** indicate statistical significance at the 10%, 5%, and 1% level (two-tailed).