Audit Committees, Boards of Directors, and Remediation of Material Weaknesses in Internal Control*

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1. Introduction

The Sarbanes-Oxley Act (SOX) was passed in 2002 in response to a series of accounting improprieties at well-known companies such as Enron and WorldCom. One important aspect of SOX is the internal control requirements. SOX section 302 requires that management evaluate the effectiveness of disclosure and control procedures, report results of the evaluation, and indicate any "significant changes" in internal controls since the last 10-K or 10-Q report (Securities and Exchange Commission [SEC] 2002). In addition, SOX section 404 requires that management's assessment of the effectiveness of internal control over financial reporting and auditors' attestation on management's assessment be included in firms' 10-K reports (SEC 2003a). The heightened attention to internal control can enhance the reliability of financial statements by helping companies to identify internal control deficiencies and remediate these deficiencies in a timely manner (Charles River Associates 2005).

Prior to SOX, little was understood about the remediation of internal control deficiencies due to the lack of publicly available data on internal controls. The remediation of internal control deficiencies is important because these deficiencies can undermine the quality of a firm's financial reporting, as proxied by accruals quality (Ashbaugh-Skaife, Collins, Kinney, and LaFond 2008; Doyle, Ge, and McVay 2007a), and the remediation of these deficiencies can improve the quality of financial reporting (Ashbaugh-Skaife et al. 2008).[1] Furthermore, Moody's has indicated that the existence of ongoing internal control problems can trigger negative rating action against the firm (Moody's 2006), highlighting the need for remediation of internal control deficiencies to restore confidence in financial reporting. The prompt remediation of these deficiencies also sends a strong signal to the market that the firm is committed to and competent in ensuring credible financial reporting. Following prior evidence that the quality of the audit committee is associated with the quality of financial reporting and internal controls (Carcello and Neal 2000; Krishnan 2005), this study examines whether corporate governance mechanisms, specifically the audit committee and the board of directors, play an important role in monitoring the remediation of internal control deficiencies.

Although the audit committee plays an important role in monitoring internal controls, the board of directors provides incremental oversight on internal controls as part of its fiduciary duties. Management often has self-interested incentives that may not necessarily serve the best interests of shareholders. When internal control deficiencies are detected, management may not be willing to invest time and resources in remediating these deficiencies because such efforts divert attention and resources from the core businesses. Effective audit committees and boards of directors can pressure management to invest in remediation efforts, resulting in faster remediation. Hence, I hypothesize a positive association between the effectiveness of the audit committee and the board and firms' timeliness in the remediation of internal control deficiencies.

I collect data on 208 unique firms that are accelerated filers and that disclosed at least one material weakness (MW) from July 2003 to December 2004 under SOX 302.[2] I focus on firms that disclose MWs to avoid the self-selection issues associated with the voluntary disclosure of significant deficiencies (Doyle, Ge, and McVay 2007b).[3] Furthermore, MWs are the most severe type of internal control deficiencies and, hence, their remediation should be of greater concern to investors and regulators. The sample firms are identified using *Compliance Week* and *Audit-Analytics* and the sample firms used in Doyle et al. 2007b.[4] I determine firms' timeliness in the remediation of MWs on the basis of how fast the firms receive a subsequent unqualified SOX section 404 opinion. I measure the effectiveness of the audit committee by its independence, financial expertise, size, and meeting frequency, and the effectiveness of the board by its independence, size, and meeting frequency, and by the duality of the chief executive officer (CEO) and chair positions (CEO duality). I also examine other factors that can affect firms' timeliness in the remediation of MWs, such as the severity of MWs, firms' profitability, the complexity of firms' operations, and so on. An estimation of the ordered logistic regression model yields the following results, which are consistent with my hypotheses.

First, the proportion of audit committee members with financial expertise is positively associated with firms' timeliness in the remediation of MWs. However, this result only holds for nonaccounting financial expertise (i.e., expertise gained through experience supervising employees with financial reporting responsibilities and overseeing the performance of companies) but not for accounting financial expertise (i.e., expertise gained through accounting-related experience in SEC reporting). Hence, it appears that the ability to effectively supervise and oversee the remediation process may be more important than domain-specific expertise in speeding up the remediation of MWs. Second, firms with larger audit committees are more likely to remediate MWs in a timely manner. This result is consistent with the view that a larger audit committee is more likely to question management on remediation efforts and meet with internal control system personnel, which in turn speeds up the remediation of MWs. Third, I find that a more independent board is associated with timelier remediation of MWs, suggesting that a more independent board is less susceptible to the undue influence of management and more likely to exert pressure on management to remediate MWs. Taken together, these results suggest that the audit committee and the board play an important role in monitoring

the remediation of MWs. Finally, the regression results show that firms that promptly appoint a new and experienced chief financial officer (CFO) are more likely to remediate MWs in a timely manner, while firms with more severe MWs, lower profitability, and more complex operations are less likely to remediate MWs in a timely manner.

This paper makes several contributions. First, it adds to the literature on internal control by examining how the effectiveness of corporate governance mechanisms affects firms' timeliness in the remediation of MWs. Because such deficiencies, especially when allowed to persist, expose firms to the risk of frauds and undermine the credibility of financial reporting, the results of this study can enhance our understanding of important factors that are necessary to achieve a sound financial reporting system and to restore investor confidence. This study also identifies other important determinants of firms' timeliness in the remediation of MWs — namely, the appointment of a new and experienced CFO, the severity of MWs, firms' profitability, and the complexity of firms' operations.

Second, this study contributes to the literature on the effectiveness of corporate governance mechanisms, especially in the post-SOX period. The study also sheds light on the efficacy of SOX requirements on the composition of the audit committee. The lack of significant results for audit committee independence may be due to firms' convergence toward fully independent audit committees under the SOX regime, such that audit committee independence no longer distinguishes between firms in terms of their governance strength. However, I find that both a larger audit committee and a more independent board help to ensure timelier remediation of MWs. Hence, firms can further tighten their corporate governance under the SOX regime by expanding their audit committees and by adding more independent directors to their boards. Given the debate over the definition of financial expertise under SOX, this study shows that nonaccounting financial expertise is a valuable component of the governance expertise of audit committee members. This lends support to the final provisions of SOX, which expand the definition of financial expertise to include nonaccounting expertise.

Third, this study complements other related studies. Krishnan (2005) finds a negative relation between audit committee quality and the incidence of internal control problems in the pre-SOX period. However, her study uses a restricted sample of firms that are smaller and that change auditors in the pre-SOX period. This study extends Krishnan 2005 by examining the remediation of MWs and by using firms that are larger (due to their accelerated filer status) and that are required to disclose MWs under SOX section 302. This study also complements Ashbaugh-Skaife et al. 2008, who find that the remediation of internal control deficiencies improves the quality of a firm's financial reporting. The results of this study suggest that effective audit committees and boards can improve the quality of financial reporting by ensuring the timely remediation of MWs.

The next section develops the hypotheses. Section 3 describes the research method and the data. Section 4 presents the empirical results and section 5 presents the supplemental analyses. Section 6 concludes and discusses implications and limitations.

2. Hypothesis development

Audit committee effectiveness and the remediation of MWs

The SEC has stated that the audit committee is an important element of corporate governance and is instrumental in ensuring the quality of financial reporting. The role of the audit committee in the oversight of internal control has long been emphasized. For instance, the SEC (1979) stresses the "importance of audit committees to enable board of directors to better fulfill their oversight responsibilities with respect to an issuer's accounting, financial reporting and control obligations". Indeed, studies have shown that audit committee members view monitoring internal controls as one of their responsibilities (Carcello, Hermanson, and Neal 2002; DeZoort 1997). Given the recent breakdowns in internal controls at several high-profile companies such as Enron and WorldCom, regulatory requirements on the audit committee's role in internal controls have tightened. For instance, the SEC (2003b) mandates that all material written communications between a company's accountant and management be provided to the entity's audit committee, which communications include "reports on observations and recommendations on internal controls". Furthermore, SOX section 301 states that "each audit committee shall establish procedures for the 'receipt, retention, and treatment' of complaints received by the issuer regarding accounting, *internal accounting controls*, or auditing matters" (emphasis added).

Studies have shown that the quality of the audit committee is positively associated with the quality of the firm's internal controls. Krishnan (2005) uses a sample of firms that changed auditors over the period 1994–2000 and finds that independent audit committees and audit committees with financial expertise are significantly less likely to be associated with internal control problems. Zhang, Zhou, and Zhou (2007) use a sample of firms that disclosed internal control deficiencies after the enactment of SOX and find that these firms are more likely to have audit committees that have less financial expertise. If audit committee quality is associated with the quality of internal controls, it seems reasonable to believe that a more effective audit committee will ensure timelier remediation of MWs in order to maintain the effectiveness of internal controls. An effective audit committee can directly engage in overseeing the firm's controls by reviewing internal accounting procedures and controls with the financial and accounting staff. When MWs are detected, an effective audit committee is more likely to take a hands-on approach and discuss with the internal and external auditors how to remediate MWs. By diligently following up on recommendations to improve internal controls and monitoring the progress of the remediation efforts closely, a more effective audit committee is likely to result in timelier remediation of MWs.

Although the audit committee monitors internal controls, management is ultimately held responsible for implementing proper internal controls. Because the remediation of MWs is often costly and can divert attention away from the core businesses, management may be unwilling to engage actively in such remediation efforts. Research has shown that an effective audit committee can have a strong influence on management, such as constraining management's earnings manipulation

(Klein 2002a) and influencing management to employ an industry specialist audi-tor (Abbott and Parker 2000). Hence, I expect an effective audit committee to exert a strong influence on management to invest the time and resources in remediation efforts. An effective audit committee is more likely to question whether manage-ment has exercised sufficient diligence in ensuring proper controls. By exerting its authority, the audit committee set a strong "tone at the top" that can raise manage-ment's proactiveness in remediating MWs.[5] The above discussions lead to the fol-lowing hypothesis:

> HYPOTHESIS 1. *The effectiveness of the audit committee is positively associated with firms' timeliness in the remediation of MWs.*

Board effectiveness and the remediation of MWs

Although the audit committee plays an important role in monitoring the remedia-tion of MWs, the board of directors can provide incremental oversight on the remediation process.[6] Within large corporations, agency conflicts arise due to the separation of ownership and control (Fama and Jensen 1983). To deal with these conflicts and to protect shareholders' interests, the board assumes an over-sight role that involves monitoring top management, approving the corporation's strategy, monitoring the internal control system, and ensuring the quality of financial reports. When MWs in internal control exist, management has greater opportunities to engage in opportunistic behaviors. For instance, management is more likely to manipulate earnings to maximize bonus compensation when duties are not prop-erly segregated or when the company lacks an effective internal audit function. As such, the board can discharge its fiduciary duties in monitoring management by ensuring that management take prompt actions to remediate MWs and maintain internal control quality.[7]

Studies have shown that the board can oust top management from the firm for aggressive accounting (Desai, Hogan, and Wilkins 2006). The board's imposing similar disciplinary actions on top management for internal control failures can create strong pressure for top management to remediate MWs promptly. A more effective board is likely to have a stronger influence on management and monitor the actions of management. For instance, studies have shown that a more effective board can deter managerial actions leading to frauds and SEC enforcement actions (Beasley 1996; Dechow, Sloan, and Sweeney 1996). Weisbach (1988) also finds that a more effective board increases the likelihood of CEO turnover due to poor financial performance. Hence, I expect a more effective board to result in timelier remediation of MWs.

> HYPOTHESIS 2. *The effectiveness of the board is positively associated with firms' timeliness in the remediation of MWs.*

3. Research method and data

Measurement of firms' timeliness in the remediation of MWs

Management's disclosure of MWs often consists of a list of problems, so it is difficult to trace the remediation of each individual problem. Furthermore, management's

disclosure of remediation efforts may be vague, making it subjective to pinpoint exactly when remediation is completed. Hence, I consider the remediation of MWs in their entirety and not as individual weaknesses per se.[8] This definition of remediation is cleaner and considers the quality of the firm's internal control environment as a whole; that is, firms are deemed to have failed to fully remediate MWs so long as *any* MW remains unremediated.

Ashbaugh-Skaife et al. (2008) determine whether a firm remediates internal control deficiencies on the basis of the receipt of a subsequent unqualified SOX section 404 opinion. Because an unqualified SOX section 404 opinion objectively and unambiguously shows that the firm has fully remediated its MWs, I use the SOX section 404 opinions to determine firms' timeliness in the remediation of MWs. The categorical variable *REMEDIED* is used to measure firms' timeliness in the remediation of MWs. It is equal to 2 (*FAST* remediators) if the firm remediates MWs within the first SOX section 404 report (i.e., the first and second SOX section 404 opinions are unqualified). It is equal to 1 (*SLOW* remediators) if the firm remediates MWs within the second SOX section 404 report (i.e., the first SOX section 404 opinion is adverse but the second SOX section 404 opinion is unqualified). Lastly, it is equal to 0 (*NON* remediators) if the firm fails to remediate MWs even within the second SOX section 404 report (i.e., the first and second SOX section 404 opinions are adverse).

Measurement of the effectiveness of the audit committee and the board

I first measure the independence of the audit committee because prior studies show that audit committee independence is negatively related to the incidence of internal control problems (Krishnan 2005). I also measure board independence because more independent boards reduce the likelihood of accounting fraud (Beasley 1996). *ACINDP* is an indicator variable that equals 1 if all members on the audit committee are independent, and 0 otherwise.[9] Because the audit committee is part of the board, full board characteristics (based on all the board members) could simply reflect audit committee characteristics, and vice versa.[10] Hence, I follow Carcello and Neal 2003 (110) and measure the characteristics of nonaudit committee board members. *BDINDP* is the proportion of nonaudit committee members who are independent.

Next, I measure the level of financial expertise of the audit committee because Krishnan (2005) and Zhang et al. (2007) find that firms are more likely to have internal control problems if their audit committees have lower financial expertise. Although SOX section 407 requires firms to disclose whether they have a financial expert on the audit committee, there are controversies over how to define financial expertise.[11] Following DeFond et al. 2005, I use two definitions of financial expertise. *ACCEXP* is the proportion of audit committee members with "accounting financial expertise"; that is, expertise gained through accounting-related experience in SEC reporting (e.g., public accountant, auditor, CFO, controller, or chief accounting officer). *NONACCEXP* is the proportion of audit committee members with "nonaccounting financial expertise"; that is, expertise gained through experience supervising employees with financial reporting responsibilities and overseeing

the performance of companies (e.g., CEO, president, general partner, or managing director of a for-profit corporation).

The sizes of the audit committee and the board also influence effectiveness. A larger audit committee is more likely to generate substantial discussions, consider emerging issues, question management, and meet with internal control system personnel (DeZoort, Hermanson, Archambeault, and Reed 2002; Anderson, Mansi, and Reeb 2004). Although Yermack (1996) finds that a larger board reduces firm value, Dalton, Daily, Johnson, and Ellstrand (1999) find that board size is positively associated with financial performance. Given these mixed empirical findings, I do not predict how board size affects firms' timeliness in the remediation of MWs. I measure audit committee size (*ACSIZE*) using the number of audit committee members. As was the case for board independence, I measure board size (*BDSIZE*) using nonaudit committee board characteristics. *BDSIZE* is the number of nonaudit committee board members.

I also measure the meeting frequency of the audit committee and the board because an audit committee or a board that meets more frequently is more likely to discuss remediation efforts with management and the auditors, thus helping to speed up the remediation process. However, it is also possible that more meetings subsequent to the detection of MWs may simply reflect the magnitude of the problems being faced by the firm (Krishnan 2005; Zhang et al. 2007). Hence, I do not make predictions on the relation between firms' timeliness in the remediation of MWs and the meeting frequency of the audit committee and the board. *ACMEET* and *BDMEET* are the number of times the audit committee and the board, respectively, meet in a fiscal year.

Finally, separating the CEO and chair positions (non-CEO duality) can strengthen board effectiveness because it prevents the CEO from limiting board activities by means of controlling the board's chair position (Jensen 1993). However, Finkelstein and D'Aveni (1994) argue that the board may be more vigilant in the presence of CEO duality. Hence, it is not clear how CEO duality affects the board's effectiveness in monitoring the remediation of MWs. To measure CEO duality, I use an indicator variable *NDUALITY* that equals 1 if the CEO and chair positions are held by different individuals, and 0 otherwise. Table 1 summarizes the above corporate governance measures and their expected signs.

Firms may have weak governance at the time of detection of MWs (Krishnan 2005). Measuring governance variables at the end of the remediation process better captures how governance strength affects the remediation of MWs and allows for the possibility that governance structures improve upon detection of MWs. Hence, for the *FAST* and *SLOW* remediators, the governance variables are measured at the end of the fiscal year in which the firm first receives an unqualified SOX section 404 report. For the *NON* remediators, because the MWs have not been remediated, the governance variables are measured at the end of the fiscal year in which the second SOX section 404 report is issued. For meeting frequency, I use the number of times the audit committee or the board meets during the fiscal year in which the firm first receives an unqualified SOX section 404 report. In the case of *NON* remediators, I use the number of times the audit committee or the board meets during

TABLE 1

Definitions of variables

Variables	Definition
REMEDIED	*REMEDIED* is equal to 2 (*FAST* remediators) if the firm remediates MWs within the first SOX section 404 report (i.e., the first and second SOX section 404 opinions are unqualified). *REMEDIED* is equal to 1 (*SLOW* remediators) if the firm remediates MWs within the second SOX section 404 report (i.e., the first SOX section 404 opinion is adverse but the second SOX section 404 opinion is unqualified). *REMEDIED* is equal to 0 (*NON* remediators) if the firm fails to remediate MWs even within the second SOX section 404 report (i.e., the first and second SOX section 404 opinions are adverse).
ACINDP	An indicator variable that equals 1 if all members on the audit committee are independent, and 0 otherwise.
ACCEXP	Proportion of audit committee members with accounting financial expertise; that is, expertise gained through accounting-related experience in SEC reporting (e.g., public accountant, auditor, CEO, controller, or chief accounting officer).
NONACCEXP	Proportion of audit committee members with nonaccounting financial expertise; that is, expertise gained through experience supervising employees with financial reporting responsibilities and overseeing the performance of companies (e.g., CEO, president, general partner, or managing director of a for-profit corporation).
ACSIZE	Number of audit committee members.
ACMEET	Number of times the audit committee meets in a fiscal year.
BDINDP	Proportion of nonaudit committee board members who are independent.
BDSIZE	Number of nonaudit committee board members.
BDMEET	Number of times the board meets in a fiscal year.
NDUALITY	An indicator variable that equals 1 if the CEO and chairman positions are held by different individuals, and 0 otherwise.
MW_SEVERITY	An indicator variable that equals 1 if the firm reports at least one category B MW in its initial or subsequent disclosures, and 0 otherwise.
AUD_CHANGE	An indicator variable that equals 1 if the firm changed auditors subsequent to the detection of MWs, and 0 otherwise.
NEW_CFO	An indicator variable that equals 1 if the firm appoints a new CFO with prior experience in a similar capacity within 12 months of the detection of MWs, and 0 otherwise.

(The table is continued on the next page.)

TABLE 1 (Continued)

Variables	Definition
FIN_DISTRESS	Average financial distress measure during the remediation period, measured from the probit coefficients of Zmijewski 1984 (69). It is calculated as the cumulative distribution function of $-4.336 - 4.513ROA + 5.679FINL + 0.004LIQ$, where *ROA* is net income (COMPUSTAT item #13) divided by total assets (COMPUSTAT item #6), FINL is total debt (COMPUSTAT item #9 + COMPUSTAT item #34) divided by total assets (COMPUSTAT item #6), and *LIQ* is current assets (COMPUSTAT item #4) divided by current liabilities (COMPUSTAT item #5). Greater values of *FIN_DISTRESS* indicate higher levels of distress present in the firm.
ROA	Average return on assets during the remediation period, calculated as net income (COMPUSTAT item #13) divided by total assets (COMPUSTAT item #6).
LGTA	The log of average total assets (COMPUSTAT item #6) during the remediation period.
SEGMENTS	Number of business segments as reported by the COMPUSTAT segment file.
FOREIGN	An indicator variable that equals 1 if the firm reports any nonzero foreign currency adjustments (COMPUSTAT item #150) during the remediation period, and 0 otherwise.
GROWTH	Average percentage change in sales (COMPUSTAT item #12) during the remediation period.
RESTRUCTURE	An indicator variable that equals 1 if the firm reports any nonzero restructuring charges (COMPUSTAT item #376) during the remediation period, and 0 otherwise.
M&A	An indicator variable that equals 1 if the firm reports any mergers or acquisitions as indicated in COMPUSTAT AFTNT1 during the remediation period, and 0 otherwise.
LITIGATION	An indicator variable that equals 1 if the firm operates in industries with SIC codes of 2833–2836 (biotechnology), 3570–3577 and 7370–7374 (computers), 3600–3674 (electronics), and 5200–6961 (retailing), and 0 otherwise.

the fiscal year in which the second SOX section 404 report is issued. All information on the governance variables is obtained from the proxy statements. I determine the independence and financial expertise of the directors from their employment history, family relationships, and other material relationships, which are disclosed in the proxy statements.

Other factors affecting firms' timeliness in the remediation of MWs

Severe MWs may take more time to remediate. Consistent with Doyle et al. 2007b, I follow the logic put forth in Moody's 2004 to classify the severity of MWs. The less severe category A weaknesses relate to controls over specific account balances or transaction processes, and are identifiable by auditors through substantive testing. The more severe category B weaknesses relate to macro-level controls such as the control environment and the overall financial reporting process, which auditors may not be able to effectively "audit around".[12] *MW_SEVERITY* is an indicator variable that equals 1 if the firm reports at least one category B MW in its initial or subsequent disclosures, and 0 otherwise. I also examine auditor changes because such changes may reveal troublesome audit situations that can affect remediation time. Auditor change firms also tend to be smaller and trade on the smaller stock exchanges (Krishnan 2005). I define *AUD_CHANGE* as an indicator variable that equals 1 if the firm changed auditors subsequent to the detection of MWs, and 0 otherwise. Geiger and North (2006) find that the CFO wields great influence over financial reporting and that the appointment of a new CFO can improve financial reporting. Hence, I examine whether the prompt appointment of a new and experienced CFO helps remediate MWs faster. *NEW_CFO* is an indicator variable that equals 1 if the firm appoints a new CFO with prior experience in a similar capacity within 12 months of the detection of MWs, and 0 otherwise.

Ashbaugh-Skaife, Collins, and Kinney (2007) and Doyle et al. (2007b) find that firms that are smaller, financially weaker, more complex, growing rapidly, and undergoing organizational changes (i.e., through restructuring or mergers and acquisitions) are more likely to have internal control problems. I expect financially weaker firms to face greater difficulties in remediating MWs. It is unclear how the other characteristics affect the remediation time. For instance, firms that are more complex have greater incentives to remediate MWs but may need more time because of their complexity.[13] Hence, I do not predict their effect on remediation time.

I capture distress risk using Zmijewski's 1984 measure of financial distress (*FIN_DISTRESS*) and profitability using return on assets (*ROA*). The values of these variables are averaged over the remediation period — that is, from the fiscal year the MWs are disclosed to the fiscal year the MWs are remediated.[14] I measure complexity using (a) the log of average total assets (*LGTA*) during the remediation period, (b) the number of business segments within the firm (*SEGMENTS*), and (c) the presence of foreign operations, measured by the indicator variable *FOREIGN* that equals 1 if the firm reports any nonzero foreign currency adjustments during the remediation period, and 0 otherwise. Sales growth (*GROWTH*) is measured as the average percentage change in sales during the remediation period. I use *RESTRUCTURE* and *M&A* to proxy for organizational changes during the remediation period. *RESTRUCTURE* (*M&A*) is an indicator variable that equals 1 if the firm reports any nonzero restructuring charges (mergers or acquisitions as indicated in COMPUSTAT AFTNT1) during the remediation period, and 0 otherwise. Lastly, firms operating in more litigious industries may face greater incentives to remediate MWs in order to reduce legal liability. *LITIGATION* is an indicator

variable that equals 1 if the firm operates in a litigious industry, and 0 otherwise.[15] Table 1 summarizes how the above variables are measured or computed, and their expected signs.

Regression model

I use the following model to test the relation between the effectiveness of the audit committee and the board, and firms' timeliness in the remediation of MWs. Because the dependent variable is categorical and ordinal, I use the ordered logistic regression model (Long 1997).

$$
\begin{aligned}
P(REMEDIED) = {} & a + b_1 ACINDP + b_2 ACCEXP + b_3 NONACCEXP \\
& + b_4 ACSIZE + b_5 ACMEET + b_6 BDINDP + b_7 BDSIZE \\
& + b_8 BDMEET + b_9 NDUALITY + b_{10} MW\_SEVERITY \\
& + b_{11} AUD\_CHANGE + b_{12} NEW\_CFO \\
& + b_{13} FIN\_DISTRESS + b_{14} ROA + b_{15} LGTA \\
& + b_{16} SEGMENTS + b_{17} FOREIGN + b_{18} GROWTH \\
& + b_{19} RESTRUCTURE + b_{20} M\&A + b_{21} LITIGATION + e.
\end{aligned}
$$

Data

I use *Compliance Week*, *AuditAnalytics*, and the sample firms used in Doyle et al. 2007b to identify firms that disclosed MWs in their 10-Q, 10-K, or 8-K filings from July 2003 to December 2004 under SOX section 302. I end the sample period in December 2004 to allow a sufficiently long period to observe firms' remediation efforts. These initial SOX section 302 disclosures pertain to periods ending on or before October 31, 2004 and precede SOX section 404 reporting. As mentioned in the introduction, I choose firms that disclose MWs to avoid the self-selection issues associated with the voluntary disclosure of significant deficiencies, and because MWs are the most severe type of deficiencies. I also focus on accelerated filers under SOX section 404 because the SOX section 404 opinions provide an objective way to determine whether management has fully remediated the MWs.[16] Lastly, I exclude firms that terminated their securities registration, firms without the second SOX section 404 reports, firms that failed to file 10-K reports since SOX section 404 reporting, firms with weaknesses that are dated too far back, firms that are foreign issuers, firms that are a subsidiary of another MW firm, and firms with missing proxy statements.[17] Table 2 summarizes the sample collection procedure and shows the sample composition by industry. Among the 208 sample firms, 76 are *FAST* remediators, 73 are *SLOW* remediators, and 59 are *NON* remediators.[18]

4. Empirical results

Descriptive statistics and univariate analyses

Table 3 presents the descriptive statistics for the full sample and its partitions by the remediation time. It also presents two-tailed tests of differences in means and medians between any two groups of remediators. The results for the audit committee

variables provide some preliminary evidence for Hypothesis 1. First, the *FAST* remediators have significantly higher mean and median values for *ACINDP* than the *SLOW* remediators and significantly higher mean and median values for *NON-ACCEXP* than the *NON* remediators. Next, I find that the *FAST* remediators have significantly higher mean and median values for *ACSIZE* than the other groups of remediators. These results indicate that firms with more independent audit committees, audit committees with greater nonaccounting financial expertise, and larger

TABLE 2

Sample collection procedure and sample composition

Panel A: Sample collection procedure

Total MWs (July 2003 to December 2004)[*]	515
Less	
Nonaccelerated filers	(151)
Securities registration termination	(74)
No second SOX section 404 reports[†]	(12)
No filings or delays in the filings of 10-K reports since SOX section 40 reporting	(30)
Weaknesses dated too far back	(13)
Foreign issuers	(12)
Subsidiary of another MW firm	(8)
Proxy statements used to obtain the governance data were not available	(7)
Final sample (July 2003 to December 2004)	208

Panel B: Sample composition by industry

Two-digit SIC code	Industry description	Number of firms
10–17	Mining and construction	21
20–39	Manufacturing	72
40–49	Transportation and utilities	30
50–59	Wholesale and retail	13
60–69	Financial services	21
70–89	Services	51
Total		208

Notes:

[*]   Doyle et al. (2007b) report a total of 970 unique firms with MWs from August 2002 to August 2005. However, many of these firms disclosed MWs subsequent to December 31, 2004; these firms first disclosed MWs under SOX section 404. This explains the difference in the number of sample firms identified between the two studies.

[†]   Seven firms filed the first SOX section 404 report, but failed to file the second SOX section 404 report in a timely manner. Five firms became nonaccelerated filers after issuing the first SOX section 404 report.

audit committees are more likely to remediate MWs in a timely manner. I also find that the *NON* remediators have significantly higher mean and median values for *ACMEET* than the other groups of remediators, suggesting that audit committee meeting frequency reflects the magnitude of the problems being faced by the firm.

The results for the board variables also provide some preliminary evidence for Hypothesis 2. I find that the *FAST* remediators have significantly higher mean and median values for *BDINDP* than the *NON* remediators. The mean and median values for *NDUALITY* are also significantly lower for the *FAST* remediators relative to the other groups of remediators. These results suggest that firms with more independent boards and with CEO duality are more likely to remediate MWs in a timely manner. As was the case for the audit committee, the *NON* remediators have significantly higher mean and median values for *BDMEET* than the *SLOW* remediators. Hence, board meeting frequency may also reflect the magnitude of the problems being faced by the firm.

Turning to the other variables, both the *SLOW* and *NON* remediators have significantly higher mean and median values for *MW_SEVERITY* than the *FAST* remediators, indicating that more severe MWs may take a longer time to remediate. The *SLOW* remediators have significantly higher mean and median values for *AUD_CHANGE* than the *FAST* remediators, suggesting that auditor changes subsequent to the detection of MWs may impede remediation efforts. The *FAST* remediators have significantly higher mean and median values for *NEW_CFO* than the *NON* remediators, indicating that the prompt appointment of a new, experienced CFO may speed up the remediation of MWs. I also find that the *FAST* remediators have significantly higher mean and median values for *ROA* than the other groups of remediators and a significantly higher mean value for *FIN_DISTRESS* than the *NON* remediators. Hence, low profitability and financial distress may slow down remediation efforts. Lastly, the *NON* remediators have significantly higher mean and median values for *FOREIGN* than the *FAST* remediators, implying that firms with more complex operations likely face greater challenges in remediating MWs.

Multivariate analysis

Table 4 presents the ordered logistic regression results. The model is significant, as indicated by its chi-square value (*p*-value < 0.0001). The pseudo R^2 of the model is 41 percent, suggesting high goodness of fit. Wald chi-square statistics are used to test the significance of the coefficient estimates in the model.[19]

Hypothesis 1 predicts a positive association between audit committee effectiveness and firms' timeliness in the remediation of MWs. Consistent with this hypothesis, I find that the coefficient on *NONACCEXP* is positive and significant (*p*-value < 0.05). This result suggests that audit committees with greater non-accounting financial expertise (i.e., expertise gained through experience supervising employees with financial reporting responsibilities and overseeing the performance of companies) are more effective in monitoring the remediation of MWs. In contrast, the coefficient on *ACCEXP* is not significant at the conventional level, suggesting that the audit committee's accounting financial expertise (i.e., expertise

TABLE 3
Descriptive statistics and univariate tests

Variables	Mean (median) values of the independent variables				t-statistics (Z-statistics) for tests of differences in means (medians)		
	Overall [n = 208]	NON [n = 59]	SLOW [n = 73]	FAST [n = 76]	[FAST − NON]	[SLOW − NON]	[FAST − SLOW]
ACINDP	0.90	0.88	0.85	0.96	1.65	−0.53	2.33†
	(1.00)	(1.00)	(1.00)	(1.00)	(1.73)‡	(−0.53)	(2.31)†
ACCEXP	0.30	0.31	0.31	0.28	−0.93	−0.17	−0.76
	(0.33)	(0.33)	(0.33)	(0.33)	(−0.87)	(−0.04)	(−0.86)
NONACCEXP	0.66	0.59	0.68	0.70	2.31†	1.88‡	0.52
	(0.67)	(0.67)	(0.67)	(0.67)	(2.24)†	(1.61)	(0.67)
ACSIZE	3.54	3.36	3.44	3.78	3.11*	0.66	2.42†
	(3.00)	(3.00)	(3.00)	(4.00)	(2.76)*	(0.28)	(2.60)*
ACMEET	11.20	13.54	9.84	10.68	−2.66*	−3.73*	1.09
	(10.00)	(11.00)	(10.00)	(10.00)	(−2.51)†	(−3.47)*	(0.73)
BDINDP	0.50	0.43	0.50	0.57	2.98*	1.72‡	1.61
	(0.50)	(0.50)	(0.50)	(0.60)	(2.93)*	(1.60)	(1.76)‡
BDSIZE	4.63	4.32	5.07	4.46	0.43	1.96‡	−1.89‡
	(4.00)	(4.00)	(5.00)	(4.00)	(0.81)	(1.71)‡	(−1.17)
BDMEET	10.11	12.11	8.77	9.83	−1.85‡	−3.07*	1.22
	(9.00)	(10.00)	(8.00)	(8.50)	(−1.92)‡	(−2.44)†	(0.45)
NDUALITY	0.47	0.54	0.56	0.33	−2.53†	0.22	−2.92*
	(0.00)	(1.00)	(1.00)	(0.00)	(−2.47)†	(0.22)	(−2.85)*

(The table is continued on the next page.)

TABLE 3 (Continued)

Variables	Mean (median) values of the independent variables				t-statistics (Z-statistics) for tests of differences in means (medians)		
	Overall [n = 208]	NON [n = 59]	SLOW [n = 73]	FAST [n = 76]	[FAST − NON]	[SLOW − NON]	[FAST − SLOW]
MW_SEVERITY	0.75	0.92	0.88	0.51	−5.89*	−0.71	−5.23*
	(1.00)	(1.00)	(1.00)	(1.00)	(−4.98)*	(−0.71)	(−4.78)*
AUD_CHANGE	0.36	0.34	0.48	0.25	−1.13	1.63	−2.98*
	(0.00)	(0.00)	(0.00)	(0.00)	(−1.12)	(1.62)	(−2.90)*
NEW_CFO	0.41	0.34	0.37	0.51	2.04†	0.37	1.77‡
	(0.00)	(0.00)	(0.00)	(1.00)	(2.01)†	(0.36)	(1.75)‡
FIN_DISTRESS	0.07	0.10	0.07	0.04	−1.99†	−0.80	−1.60
	(0.00)	(0.00)	(0.00)	(0.00)	(−1.99)†	(−0.24)	(−1.14)
ROA	0.06	0.01	0.04	0.10	2.90*	1.04	2.78*
	(0.07)	(0.04)	(0.05)	(0.10)	(3.00)*	(0.50)	(2.68)*
LGTA	6.39	6.18	6.42	6.53	1.19	0.78	0.39
	(6.23)	(5.92)	(6.28)	(6.32)	(1.17)	(0.53)	(0.63)
Total assets ($ millions)	3,232	1,993	4,797	2,689	0.79	1.14	−0.85
	(505)	(372)	(536)	(556)	(1.17)	(0.53)	(0.63)
SEGMENTS	2.70	2.86	2.71	2.57	−0.98	−0.45	−0.51
	(3.00)	(3.00)	(2.00)	(2.50)	(−0.60)	(−0.41)	(−0.21)
FOREIGN	0.35	0.49	0.34	0.25	−2.98*	−1.74‡	−1.23
	(0.00)	(0.00)	(0.00)	(0.00)	(−2.89)*	(−1.72)‡	(−1.23)

(The table is continued on the next page.)

TABLE 3 (Continued)

Variables	Mean (median) values of the independent variables				t-statistics (Z-statistics) for tests of differences in means (medians)		
	Overall [n = 208]	NON [n = 59]	SLOW [n = 73]	FAST [n = 76]	[FAST − NON]	[SLOW − NON]	[FAST − SLOW]
GROWTH	0.19	0.26	0.16	0.15	−0.96	−0.79	−0.16
	(0.07)	(0.05)	(0.08)	(0.08)	(1.13)	(0.91)	(−0.25)
RESTRUCTURE	0.54	0.58	0.51	0.55	−0.27	−0.79	0.56
	(1.00)	(1.00)	(1.00)	(1.00)	(−0.27)	(−0.79)	(0.56)
M&A	0.31	0.32	0.27	0.33	0.08	−0.60	0.73
	(0.00)	(0.00)	(0.00)	(0.00)	(0.08)	(−0.60)	(0.73)
LITIGATION	0.43	0.37	0.49	0.41	0.41	1.38	−1.04
	(0.00)	(0.00)	(0.00)	(0.00)	(0.41)	(1.38)	(−1.04)

Notes:

FAST remediators are firms that remediate MWs within the first SOX section 404 report. *SLOW* remediators are firms that remediate MWs within the second SOX section 404 report. *NON* remediators are firms that fail to remediate MWs even within the second SOX section 404 report. Other variables are as defined in Table 1. A two-sample *t*-test is used to test for significant differences in means between two groups of remediators. A Wilcoxon-Mann-Whitney two-sample test is used to test whether the observations in the two groups of remediators are from populations with different distributions (i.e., whether the medians are different between the two groups).

* Significant at the 0.01 percent level (two-tailed).

† Significant at the 0.05 percent level (two-tailed).

‡ Significant at the 0.10 percent level (two-tailed).

TABLE 4

Ordered logistic regression results for firms' timeliness in the remediation of MWs

$P(REMEDIED) = a + b_1 ACINDP + b_2 ACCEXP + b_3 NONACCEXP + b_4 ACSIZE$
$\qquad + b_5 ACMEET + b_6 BDINDP + b_7 BDSIZE + b_8 BDMEET$
$\qquad + b_9 NDUALITY + b_{10} MW\_SEVERITY + b_{11} AUD\_CHANGE$
$\qquad + b_{12} NEW\_CFO + b_{13} FIN\_DISTRESS + b_{14} ROA + b_{15} LGTA$
$\qquad + b_{16} SEGMENTS + b_{17} FOREIGN + b_{18} GROWTH$
$\qquad + b_{19} RESTRUCTURE + b_{20} M\&A + b_{21} LITIGATION + e$

Variables	Expected sign	Coefficient estimates	Wald chi-square
ACINDP	+	0.19	0.16
ACCEXP	+	0.03	0.00
NONACCEXP	+	1.46†	5.48
ACSIZE	+	0.56*	7.30
ACMEET	?	−0.05	2.44
BDINDP	+	1.42†	4.88
BDSIZE	?	0.01	0.01
BDMEET	?	−0.03	1.46
NDUALITY	?	−0.55	2.95
MW_SEVERITY	−	−2.23*	30.30
AUD_CHANGE	?	0.41	1.54
NEW_CFO	+	0.88*	6.97
FIN_DISTRESS	−	−1.13	1.43
ROA	+	4.97*	15.07
LGTA	?	0.00	0.00
SEGMENTS	?	−0.13	1.76
FOREIGN	?	−1.18*	12.60
GROWTH	?	−0.08	0.08
RESTRUCTURE	?	0.01	0.00
M&A	?	−0.09	0.07
LITIGATION	+	−0.00	0.00
Pseudo R^2		41%	
Chi-square		109.63	
(p-value)		(<0.0001)	
n		208	

Notes:

Variables are as defined in Table 1.

*   Significant at the 0.01 percent level (one-tailed tests where the signs are predicted, and two-tailed tests otherwise).

†   Significant at the 0.05 percent level (one-tailed tests where the signs are predicted, and two-tailed tests otherwise).

gained through accounting-related experience with SEC reporting) does not help to speed up the remediation process. One explanation for these findings is that the ability to effectively supervise and oversee the remediation process may be more important than domain-specific expertise (i.e., knowledge of accounting and internal control systems) in speeding up the remediation of MWs.

Table 4 also shows that the coefficient on *ACSIZE* is positive and significant (p-value < 0.01), suggesting that firms with larger audit committees are more likely to remediate MWs in a timely manner. This result supports the view that a larger audit committee is more likely to question management and meet with internal control system personnel, which in turn speeds up the remediation of MWs. Contrary to the results of the univariate analyses, the coefficients on *ACINDP* and *ACMEET* are not significant at the conventional level. The lack of a significant result for *ACINDP* may be due to firms' convergence toward fully independent audit committees under the SOX regime, such that audit committee independence no longer distinguishes between firms in terms of their governance strength.

The results in Table 4 also provide some support for Hypothesis 2, which predicts a positive association between board effectiveness and firms' timeliness in the remediation of MWs. Specifically, the coefficient on *BDINDP* is positive and significant (p-value < 0.05), indicating that a more independent board is associated with timelier remediation of MWs. This result is consistent with the view that a more independent board is less susceptible to the undue influence of management and more able to exert pressure on management to remediate MWs. Hence, a more independent board better protects shareholders' interests by improving the quality of internal controls. Contrary to the results of the univariate analyses, the coefficients on *BDMEET* and *NDUALITY* are not significant at the conventional level.[20]

Among the other variables, the coefficient on *MW_SEVERITY* is negative and significant (p-value < 0.01). Hence, more severe MWs (i.e., those relating to macro-level controls such as ineffective control environment and weak tone at the top) take longer time to remediate. The coefficient on *NEW_CFO* is positive and significant (p-value < 0.01), indicating that the prompt appointment of a new and experienced CFO helps to speed up the remediation of MWs. The coefficient on *ROA* is positive and significant (p-value < 0.01), suggesting that low profitability can put even more strain on firms' remediation efforts. Finally, the coefficient on *FOREIGN* is negative and significant (p-value < 0.01). This result indicates that firms with more complex operations are likely to face greater challenges in remediating MWs.

Overall, the results provide empirical support for Hypotheses 1 and 2. The nonaccounting financial expertise and size of the audit committee and the independence of the board are positively associated with firms' timeliness in the remediation of MWs. These results suggest that the audit committee and the board play an important role in monitoring the remediation of MWs. Because the remediation of MWs can improve financial reporting quality (Ashbaugh-Skaife et al. 2008), effective audit committees and boards can maintain high-quality financial reporting by ensuring the timely remediation of MWs. Although effective corporate governance mechanisms are key to achieving timely remediation of MWs, the results show that

other factors such as the prompt appointment of a new and experienced CFO, the severity of the MWs, firms' profitability, and the complexity of firms' operations can affect the remediation time of MWs.

5. Supplemental analyses

Severe MW sample

Table 4 shows that the severity of MWs is negatively associated with firms' timeliness in the remediation of MWs. As a sensitivity test, I estimate the model using only firms that disclosed severe MWs. There are 157 firms (75 percent of the 208 sample firms) that disclosed severe MWs. The results, presented in model 1 of Table 5, are consistent with those in Table 4. The coefficients on *NONACCEXP*, *ACSIZE*, and *BDINDP* are positive and significant (*p*-value < 0.05).

Alternative measures of firms' timeliness in the remediation of MWs

I also define three alternative measures of firms' timeliness in the remediation of MWs. First, I combine the *SLOW* and *NON* remediators, and define the dependent variable as an indicator variable that equals 1 if the firm remediates MWs within the first SOX section 404 report, and 0 otherwise.[21] Second, I combine the *FAST* and *SLOW* remediators and define the dependent variable as an indicator variable that equals 1 if the firm remediates MWs within the second SOX section 404 report, and 0 otherwise. Lastly, I drop the *SLOW* remediators and define the dependent variable as an indicator variable that equals 1 if the firm remediates MWs within the first SOX section 404 report, and 0 if the firm fails to remediate MWs even within the second SOX section 404 report. The binary logistic regression results are presented in models 2, 3, and 4 of Table 5, respectively.

The results are generally consistent with those in Table 4. The coefficient on *NONACCEXP* is positive and significant in models 3 and 4 (*p*-value < 0.05). The coefficient on *ACSIZE* is positive and significant in models 2 and 4 (*p*-value < 0.01), and positive and marginally significant in model 3 (*p*-value < 0.10). Finally, the coefficient on *BDINDP* is positive and significant in all three models (*p*-value < 0.05). Hence, the results in Table 4 are robust to alternative measures of firms' timeliness in the remediation of MWs.[22]

Alternative measures of audit committee and board effectiveness

I also examine alternative definitions of governance measures. First, I measure audit committee independence as the proportion of audit committee members who are independent (Krishnan 2005). Second, I measure audit committee accounting financial expertise using an indicator variable that equals 1 if the audit committee has at least one member with accounting financial expertise, and 0 otherwise. The results (not tabulated) show that the coefficients on these variables are not significant at the conventional level, consistent with the earlier results. Next, I measure audit committee financial expertise as defined by SOX. I replace *ACCEXP* and *NONACCEXP* in the model in Table 4 with a variable that measures the proportion of audit committee members with either accounting or nonaccounting financial expertise, or both. The results (not tabulated) show that the coefficient on the new

TABLE 5
Regression results using severe MWs sample and alternative measures of firms' timeliness in the remediation of MWs

Variables	Expected sign	Ordered logistic model Severe MWs sample (model 1)		Binary logistic model Remediated within the first SOX section 404 report (model 2)		Remediated within the second SOX section 404 report (model 3)		Comparing FAST versus NON remediators (model 4)	
		Coefficient estimates	Wald chi-square	Coefficient estimates	Wald chi-square	Coefficient estimates	Wald chi-square	Coefficient estimates	Wald chi-square
ACINDP	+	0.14	0.06	0.94	1.27	0.23	0.14	1.27	1.19
ACCEXP	+	−0.05	0.00	1.11	1.19	0.00	0.00	−0.19	0.02
NONACCEXP	+	2.23*	8.78	0.86	0.96	2.11†	6.44	3.47†	4.43
ACSIZE	+	0.60†	6.56	0.84*	8.93	0.51‡	2.70	1.36*	7.73
ACMEET	?	−0.06	3.05	−0.07	3.07	−0.10†	6.08	−0.10	2.67
BDINDP	+	1.45†	4.42	2.30†	5.91	1.76†	4.38	3.05†	4.95
BDSIZE	?	0.17	2.56	−0.17	1.98	0.20	2.64	−0.12	0.33
BDMEET	?	−0.02	0.48	0.05	1.57	−0.08†	5.18	−0.04	0.66
NDUALITY	?	−0.51	1.89	−0.77	2.82	−0.29	0.46	−1.46	3.65
MW_SEVERITY	−			−2.96*	30.61	−1.61*	6.99	−3.60*	15.98
AUD_CHANGE	?	0.67	3.14	−0.30	0.40	1.18†	6.49	0.84	1.15
NEW_CFO	+	1.34*	12.31	0.85‡	3.77	1.05‡	5.17	0.99	2.35
FIN_DISTRESS	−	−1.16	0.98	−2.24	1.91	−1.08	0.81	−3.70	2.61
ROA	+	5.04*	11.66	8.24*	13.42	4.42*	8.23	6.99*	7.26
LGTA	?	0.12	0.81	−0.11	0.48	0.13	0.64	−0.10	0.18

(The table is continued on the next page.)

TABLE 5 (Continued)

| Variables | Expected sign | Ordered logistic model | | Binary logistic model | | | | | |
| | | Severe MWs sample (model 1) | | Remediated within the first SOX section 404 report (model 2) | | Remediated within the second SOX section 404 report (model 3) | | Comparing *FAST* versus *NON* remediators (model 4) | |
		Coefficient estimates	Wald chi-square	Coefficient estimates	Wald chi-square	Coefficient estimates	Wald chi-square	Coefficient estimates	Wald chi-square
SEGMENTS	?	−0.22‡	4.07	−0.16	1.33	−0.17	1.87	−0.35	2.44
FOREIGN	?	−1.24*	10.57	−1.57*	9.76	−1.03†	5.75	−1.27	3.29
GROWTH	?	−0.01	0.00	0.03	0.00	−0.26	0.61	−0.92	0.78
RESTRUCTURE	?	−0.29	0.64	0.38	0.76	−0.41	0.94	−0.29	0.17
M&A	?	−0.14	0.14	0.28	0.39	−0.23	0.29	−0.12	0.03
LITIGATION	+	−0.07	0.04	−0.10	0.05	0.42	0.90	−0.04	0.00
Pseudo R^2		38%		41%		31%		52%	
Chi-square		76.31		109.46		76.71		99.48	
(*p*-value)		(<0.0001)		(<0.0001)		(<0.0001)		(<0.0001)	
n		157		208		208		135	

TABLE 5 (Continued)

Notes:

Variables are as defined in Table 1. Model 1 shows the ordered logistic regression results using only firms that disclose severe MWs. This sample consists of firms that reported at least one category B MW in their initial or subsequent disclosures. Model 2 shows the binary logistic regression results of the firm's likelihood of remediating MWs within the first SOX section 404 report. Model 3 shows the binary logistic regression results of the firm's likelihood of remediating MWs within the second SOX section 404 report. Model 4 shows the binary logistic regression results of the firm's likelihood of remediating MWs within the first SOX section 404 report or of failing to remediate MWs even within the second SOX section 404 report.

*   Significant at the 0.01 percent level (one-tailed tests where the signs are predicted, and two-tailed tests otherwise).

†   Significant at the 0.05 percent level (one-tailed tests where the signs are predicted, and two-tailed tests otherwise).

‡   Significant at the 0.10 percent level (one-tailed tests where the signs are predicted, and two-tailed tests otherwise).

variable is positive and significant (p-value < 0.05), suggesting that greater audit committee financial expertise (as defined by SOX) is associated with timelier remediation of MWs. Lastly, I measure audit committee (board) meeting frequency using an indicator variable that equals 1 if the number of audit committee (board) meetings is above the median, and 0 otherwise. The results (not tabulated) are similar to those in Table 4.

Composite measure of corporate governance

I further examine whether corporate governance as a whole is associated with timelier remediation of MWs. I use the governance score, *GOVSCORE*, created by Brown and Caylor 2006.[23] The score is a composite measure of 51 factors encompassing eight corporate governance categories: audit, board of directors, charter/bylaws, director education, executive and director compensation, ownership, progressive practices, and state of incorporation. A higher score indicates stronger corporate governance. Only 136 sample firms have an available governance score. I replace the audit committee and board variables in Table 4 with *GOVSCORE*. The results (not tabulated) show that *GOVSCORE* is positive and marginally significant (p-value < 0.05), providing evidence that a stronger overall corporate governance structure is associated with timelier remediation of MWs.

Corporate governance changes upon detection of MWs

The results in Tables 4 and 5 show that more effective audit committees and boards are associated with timelier remediation of MWs. It is possible that firms that remediate MWs promptly have taken steps to improve their governance structures, while firms that fail to remediate MWs promptly have not. To shed light on this

issue, I conduct additional analyses to examine corporate governance changes of the *FAST*, *SLOW*, and *NON* remediators upon detection of MWs. Table 6 shows the changes in audit committee and board characteristics from the year before the detection of MWs to the year after the detection of MWs.

The results show that the sample firms exhibit significant increases in independence (*ACINDP*), accounting financial expertise (*ACCEXP*), financial expertise based on SOX definition (*FINEXP*), size (*ACSIZE*), and meeting frequency (*ACMEET*) of the audit committee, and independence (*BDINDP*) and meeting frequency (*BDMEET*) of the board. However, there are no significant differences in the corporate governance changes among the three groups of remediators, except that the increase in *ACSIZE* is significantly different between the *SLOW* and *FAST* remediators (*p*-value < 0.05). Hence, the significant association between the effectiveness of corporate governance mechanisms and firms' timeliness in the remediation of MWs is not fully attributable to the improvement in governance structures subsequent to the detection of MWs.

6. Conclusion, implications, and limitations

This study examines whether the effectiveness of corporate governance mechanisms is associated with firms' timeliness in the remediation of MWs. I find that firms with larger audit committees, audit committees with greater nonaccounting financial expertise, and more independent boards are more likely to remediate MWs in a timely manner. The results have some implications. First, although the major exchanges require audit committees to have at least three directors, the results of this study suggest that firms can enhance the monitoring of internal controls by expanding their audit committees. With regard to the controversies over the definition of financial expertise under SOX section 407, the results of this study suggest that the nonaccounting financial expertise of the audit committee members enhances the monitoring of MW remediation. Hence, nonaccounting financial expertise is a valuable component of the governance expertise of the audit committee members. This finding lends support to the final provisions of SOX, which expand the definition of financial expertise to include nonaccounting expertise.

This study has certain limitations. First, prior studies show that firms with effective audit committees are less likely to have internal control problems (Krishnan 2005; Zhang et al. 2007). The sample in this study comprises firms with MWs and may thus be biased in favor of firms with relatively ineffective audit committees. The lack of sufficient variation in audit committee characteristics can also work against finding significant results for these characteristics. Furthermore, using firms that disclose MWs and that are accelerated filers limits the generalizability of the results of this study.

Second, firms that terminate their securities registration or delay the filing of their 10-K reports are excluded from the sample. It is not clear how the addition of these firms would affect the results of this study.[24] Third, the statistical power of the various tests performed may be low due to the small sample size. Lastly, this is a study of association, not causation. It is possible that unobserved factors that are correlated with both internal control quality and governance characteristics drive

TABLE 6

Corporate governance changes upon detection of MWs by remediation time

Variables	Mean values of changes from the year before detection of MWs to the year after detection of MWs				t-statistics for test differences in means		
	Overall [n = 199]	NON [n = 56]	SLOW [n = 72]	FAST [n = 71]	[FAST – NON]	[SLOW – NON]	[FAST – SLOW]
ACINDP	0.07*	0.04‡	0.07*	0.09*	−1.47	−0.89	−0.69
ACCEXP	0.12*	0.14*	0.09*	0.13*	0.37	1.13	−0.83
NONACCEXP	−0.00	0.01	−0.02	0.01	−0.15	0.45	−0.68
FINEXP	0.06*	0.08†	0.04‡	0.06*	0.08	0.68	−0.72
ACSIZE	0.16*	0.20	0.01	0.27*	−0.54	1.26	−2.16§
ACMEET	6.13*	7.21*	5.69*	5.72*	1.01	0.95	−0.02
BDINDP	0.10*	0.09†	0.08*	0.14‡	−0.55	0.32	−0.76
BDSIZE	−0.14	−0.16	0.11	−0.38‡	0.72	−0.91	1.67#
BDMEET	2.17*	2.07†	1.76*	2.65*	−0.44	0.28	−0.86
NDUALITY	0.00	0.09	0.01	−0.09	1.14	1.02	0.67

(The table is continued on the next page.)

TABLE 6 (Continued)

Notes:

Variables are as defined in Table 1. *FINEXP* is the proportion of audit committee members with either accounting or nonaccounting financial expertise, or both. This definition of financial expertise is consistent with that of SOX. Nine firms are excluded from the analysis due to the lack of proxy statements for the year before the detection of MWs. A two-sample *t*-test is used to test for significant differences in mean values of changes between two groups of remediators.

*   Indicates that the changes in corporate governance variables from the year before the detection of MWs to the year after the detection of MWs are statistically significant at less than 1 percent, based on two-tailed tests.

†   Indicates that the changes in corporate governance variables from the year before the detection of MWs to the year after the detection of MWs are statistically significant at less than 5 percent, based on two-tailed tests.

‡   Indicates that the changes in corporate governance variables from the year before the detection of MWs to the year after the detection of MWs are statistically significant at less than 10 percent, based on two-tailed tests.

§   Significant at the 0.05 percent level (two-tailed).

Significant at the 0.10 percent level (two-tailed).

the findings. This problem is mitigated by adding various variables that are found to affect internal control quality in the post-SOX period (Ashbaugh-Skaife et al. 2007; Doyle et al. 2007b).

Endnotes

1. Anecdotal evidence also suggests that internal control deficiencies lead to fraudulent financial reporting. In 1999, a study conducted by the Committee of Sponsoring Organizations of the Treadway Commission 1999 asserted that a poor internal control environment contributed to the occurrences of fraud documented over the 10-year time frame 1987–1997. Former SEC commissioner Issac Hunt Jr., in his speech in 1999, also noted that "internal control deficiencies were undermining the financial reporting system" (Hunt 1999).

2. An accelerated filer (a U.S. company with market capitalization over $75 million that has filed at least one annual report with the SEC) was required to comply with SOX section 404 requirements for its first fiscal year ending on or after November 15, 2004. A nonaccelerated filer must comply with the management reporting requirements under SOX section 404 for its fiscal years ending on or after December 15, 2007, and with the auditor attestation requirements under SOX section 404 for its fiscal years ending on or after December 15, 2008.

    According to *Auditing Standards* (*AS*) *No. 2* (Public Company Accounting Oversight Board [PCAOB] 2004), a MW is "a significant deficiency, or combination of significant deficiencies, that results in more than a remote likelihood that a material misstatement of the financial statements will not be prevented or detected". A

significant deficiency is "a control deficiency, or combination of control deficiencies, that adversely affects the company's ability to initiate, authorize, record, process, or report external financial data reliably in accordance with generally accepted accounting principles such that there is more than a remote likelihood that a misstatement of the company's annual or interim financial statements that is more than inconsequential will not be prevented or detected".

3. Although both MWs and significant deficiencies are deficiencies in the design or operation of internal controls, significant deficiencies are less severe and are not required to be publicly disclosed under SOX section 302 (SEC 2004). Hence, the disclosure of significant deficiencies is clearly voluntary. On the other hand, under SOX section 302, if management identifies a MW in its controls, it is precluded from reporting that the controls are effective and must disclose the identified MW. Hence, the disclosure of MWs is effectively mandatory.

4. I thank Jeffrey Doyle, Weili Ge, and Sarah McVay for sharing the data. The data can be found at http://faculty.washington.edu/geweili/ICdata.html.

5. Readers can refer to the 10-K report of Spatialight Inc. for the year ending December 31, 2005 for an example of how the audit committee questioned management's failure to ensure proper internal controls. The example also highlights how the audit committee handled the remediation efforts and exercised its authority and oversight on management.

6. Krishnan (2005) also maintains that the quality of an entity's internal control is a function of the quality of its control environment, which includes the board of directors and the audit committee. By examining both audit committee and board characteristics, this study can provide evidence on the relative contribution of each component in monitoring the remediation of MWs.

7. Readers can refer to the 10-K report of Curon Medical Inc. for the year ending December 31, 2004 for an example of how the board directed management to implement corrective measures on the internal control deficiencies.

8. For example, weaknesses A, B, and C are first disclosed. Subsequently, A and B are remediated, but C is not. In this case, the firm is not considered to have remediated MWs. Another example is when weaknesses A, B, and C are remediated but new weaknesses D and E have surfaced. As such, the firm is also not considered to have remediated MWs.

9. Although SOX section 301 requires that all members on the audit committee be independent, SOX refers to the SEC for the definition of independence. The SEC (2003c) defines an "independent" director as one not receiving, other than for service on the board, any consulting, advisory, or other compensatory fee from the issuer, and not being an affiliated person of the issuer, or any subsidiary thereof. However, the exchanges have more stringent definitions of independence, such as limiting ex-employees who have been with the firm within the past three years, limiting cross-compensation committee links, and so on. Consistent with Carcello and Neal 2000 and Krishnan 2005, I apply a more stringent definition of independence. I define nonindependent or affiliated directors as current or former officers or employees of the firm or of a related entity, relatives of management, professional advisers to the firm (e.g., consultants, bank officers, legal counsels), officers of significant suppliers or

customers of the firm, and interlocking directors. On the basis of this definition, 21 sample firms (10 percent) do not have fully independent audit committees. Of these firms, 17 have at least one ex-employee sitting on the audit committee (in one case the audit committee member is still a general partner of one of the firm's subsidiaries). In one firm, an audit committee member has interlocking relationships as disclosed under the "compensation committee interlocks and insider participation" section of the proxy statement. In another firm, an audit committee member has familial relationships with key employees of the firm. In the remaining two firms, an audit committee member is a key executive of another firm that engages in transactions with the firm.

10. Klein (2002b) also finds that board independence (based on all the board members) is positively correlated with audit committee independence. In this study, the correlation coefficient between audit committee independence and board independence (based on all the board members) is 0.415 (p-value $<$ 0.01). If board variables (based on all the board members) and audit committee variables are included in the same regression, the high correlations among these variables can affect the results of this study.

11. For discussions on the controversies surrounding the definition of financial expertise under SOX section 407, see DeFond, Hann, and Hu 2005; Dhaliwal, Naiker, and Navissi 2006; and Carcello, Hollingsworth, Klein, and Neal 2006. The initial SOX promulgations recommended a narrow definition that focuses on whether the director has prior accounting-related experience with SEC financial reporting. However, critics argue that this definition is unnecessarily restrictive and limits the pool of qualified directors. The final version of SOX effectively expands the definition of financial expertise by also including the expertise gained through experience supervising employees with financial reporting responsibilities and overseeing the performance of companies.

12. Examples of category A weaknesses include inadequate internal controls for accounting for loss contingencies, deficiencies in the documentation of a receivables securitization program, and inadequate internal controls over the application of new accounting principles or the application of existing accounting principles to new transactions (Doyle et al. 2007b, Appendix B). Examples of category B weaknesses include override by senior management, ineffective control environment, weak tone at the top, inadequate fraud detection, pervasive ineffective processes, and ineffective accounting personnel (Doyle et al. 2007b, Appendix B; Moody's 2006, Appendix 3). Consistent with Doyle et al. 2007b, firms that have at least three category A weaknesses are also considered to have category B weaknesses.

13. For instance, MWs that occur in firms that are larger, more complex, and growing rapidly are more likely to attract the attention of investors and regulators, which should provide incentives for these firms to remediate MWs promptly. On the other hand, these firms may need more time to remediate MWs because the MWs affect more segments of the firm, and fast-growing firms need not only to invest in resources in remediating MWs but also to match the internal controls with the firms' growth. Firms that undergo restructuring or mergers and acquisitions have greater incentives to fix MWs due to their desire to emerge stronger after the organizational changes. However, these firms need more time to remediate MWs because resources might be diverted to other areas during the organizational changes, hence impeding remediation efforts.

14. For *NON* remediators, I take the average values from the fiscal year the MWs are disclosed to the fiscal year of the second SOX section 404 report.

15. Consistent with Francis, Philbrick, and Schipper 1994, firms that operate in industries with Standard Industrial Classification (SIC) codes of 2833–2836 (biotechnology), 3570–3577 and 7370–7374 (computers), 3600–3674 (electronics), and 5200–6961 (retailing) are considered to be operating in a litigious industry.

16. Because I use only accelerated filers, the sample is biased toward larger firms, which have better internal controls (Doyle et al. 2007b). This may offset the bias in using only firms with MWs, which have weaker internal controls.

17. Firms with weaknesses that are dated too far back are firms that disclosed MWs in their filings during the sample period, but had already detected the weaknesses in fiscal year 2000, 2001, or 2002. Because these firms had already remediated the weaknesses in fiscal year 2003, I exclude these firms from the sample.

18. There are 16 firms that require special mention. Five firms have an unqualified first SOX section 404 opinion but an adverse second SOX section 404 opinion. These firms are treated as *NON* remediators because MWs existed at the time of the first SOX section 404 report but were not detected. Eleven firms have the second SOX section 404 report but do not have the first SOX section 404 report due to their initial nonaccelerated filer status. Seven of these firms (4 *NON* remediators and 3 *SLOW* remediators) clearly have not remediated MWs at the time at which the first SOX section 404 report would have been issued, because the firms asserted that MWs still existed at that time. Four of the other 11 firms asserted that MWs had been remediated at the time at which the first SOX section 404 report would have been issued. This is confirmed by the second SOX section 404 opinion, which is unqualified. Sensitivity tests show that the results are not affected by the exclusion of these 16 firms.

19. The Pearson correlation coefficients among the independent variables are below $+/-0.40$, except the coefficient between *ACMEET* and *BDMEET*, which is 0.41 (p-value < 0.01); the coefficient between *BDSIZE* and *LGTA*, which is 0.41 (p-value < 0.01); and the coefficient between *LGTA* and *SEGMENTS*, which is 0.40 (p-value < 0.01). The variance inflation factors of all the independent variables are under 1.6, except for *LGTA*, which is 1.89. Hence, multicollinearity does not appear to be a concern.

20. As mentioned in section 3, I measure nonaudit committee board characteristics because audit committee characteristics are highly correlated with board characteristics. I reestimate the model in Table 4 using board independence and size based on full board characteristics (i.e., based on all the board members). The results (not tabulated) for the corporate governance variables are similar to those in Table 4, except that the coefficient on board independence becomes insignificant at the conventional level (p-value $= 0.23$). This insignificant result could be due to the high correlation between the board independence and audit committee independence variables (correlation coefficient $= 0.42$). Hence, I reestimate this model by removing the audit committee variables and using only the board variables based on full board characteristics. The results (not tabulated) show that the coefficient on board independence is positive and significant (p-value < 0.05), consistent with the results in Table 4. Finally, I reestimate the model in Table 4 by removing the board variables and

using only the audit committee variables. The results (not tabulated) for *NONACCEXP* and *ACSIZE* are similar to those in Table 4.

21. This method of measuring timeliness is similar to Ashbaugh-Skaife et al. 2008, who determine whether firms remediate MWs on the basis of the first SOX section 404 opinion. I measure the governance variables at the end of the fiscal year of the first SOX section 404 report to reflect the governance characteristics at the time of the first SOX section 404 report.

22. There are some interesting results in model 3. The coefficients on *ACMEET* and *BDMEET* are negative and significant (p-value $<$ 0.05), suggesting that audit committee and board meeting frequency could reflect the magnitude of the problems being faced by the firm. The coefficient on *AUD_CHANGE* is positive and significant (p-value $<$ 0.05), suggesting that firms that change auditors subsequent to the detection of MWs are more likely to remediate MWs in a timely manner.

23. I thank Larry Brown and Marcus Caylor for providing the governance data. The data are available at http://www.robinson.gsu.edu/accountancy/gov_score.html.

24. To shed some light on how the addition of these firms would affect the results of this study, I compare the governance characteristics (at the time of detection of the MWs) of these firms with those of the sample firms. Using firms with available governance data, I find no significant differences in governance characteristics between these two groups of firms, except that the sample firms have significantly larger audit committees than the firms that terminate their securities registration or delay the filings of their 10-K reports. Assuming that these latter firms are firms that are not likely to remediate MWs in a timely manner, it is possible that the addition of these firms to the sample firms would strengthen the result on the positive association between audit committee size and firms' timeliness in the remediation of MWs.

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