CEO Characteristics and Internal Control Quality

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ABSTRACT

Manuscript Type: Empirical

Research Question/Issue: This study investigates the influence of CEO characteristics on internal control quality in the U.S.

Research Findings/Insights: Using a sample of 4,374 *ExecuComp* non-financial firms, we find that CEO entrenchment and age are significantly associated with a material internal control weakness disclosure (MW) under Sarbanes-Oxley Section 404 (SOX 404). Our results demonstrate that entrenchment and age may affect CEOs' behavior in response to the SOX 404 internal control requirements.

Theoretical/Academic Implications: This study provides empirical support for the influence of CEO characteristics on material internal control weakness. As a result, the effects of internal control mechanisms are likely to be decreased in firms with entrenched and younger CEOs, consistent with entrenchment theory.

Practitioner/Policy Implications: This study offers insights to regulators and lawmakers interested in the effects of CEO characteristics on internal control weakness. Importantly, it points out that CEO entrenchment and age are likely to affect the strength of internal control mechanisms.

Keywords: Corporate Governance, CEO characteristics, entrenchment theory, Sarbanes-Oxley Section 404, material internal control weakness

INTRODUCTION

A number of major corporate accounting scandals in the last decade or so, such as Enron and WorldCom, adversely affected the global economy and seriously reduced investor confidence in the reliability of financial statements. Consequently, both legislators and regulators have emphasized the importance of internal controls to ensure the reliability of financial reporting.[1] In order to enhance the transparency of U.S. capital markets, Section 302 of the Sarbanes-Oxley Act (SOX 302) requires both the chief executive officer (CEO) and chief financial officer (CFO) to evaluate and report the effectiveness of internal controls in their firm's annual financial reports. Further, Section 404 of SOX (SOX 404) mandates that firms must disclose information about the quality of their internal controls, and that external auditors have to assess the effectiveness of these.[2] SOX thus aims to increase the responsibility of top management to establish and maintain effective internal controls in order to improve the quality of

corporate financial reporting (SEC, 2003a). Although SOX may have strengthened monitoring and mitigated agency conflicts, it has not entirely eliminated the latter, since many cases of managerial fraud, such as those in HealthSouth Corporation[3] and Hewlett-Packard's (HP) acquisition of Autonomy,[4] have been discovered post-SOX. Top managers may be tempted to override internal control systems and/or take full advantage of material internal control weaknesses (MWs) to achieve better performance or higher compensation if shareholders cannot effectively monitor their behavior. For example, researchers find that there is a positive relation between earnings management behavior (as measured by reporting higher positive or absolute discretionary accruals) and MWs (Chan, Farrell, & Lee, 2008; Doyle, Ge, & McVay, 2007). The incidence of insider trading is also significantly higher in firms reporting MWs (Skaife, Veenman, & Wangerin, 2013). In light of public concern about a lack of internal control quality in financial reporting, it is very important for researchers, practitioners, and auditors to explore how CEO characteristics impact the effectiveness of such controls, since the prediction of MWs is useful, and these characteristics could serve as indicators of potential misstatements.

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The purpose of this study is to examine the association between CEO characteristics and MWs reported under SOX 404. We use the U.S. data because internal control quality can be measured by an MW reported in the SOX 404 opinion. To conduct our investigation, we collected 4,374 sample firms reporting CEO demographic data from 2006 to 2009 in *Compustat/ExecuComp*, and adopted regression models with the CEO entrenchment and other characteristic variables. Jensen (1993) argues that if CEOs have more power to control the board, the culture of openness in boardrooms may be adversely affected, which in turn results in failures of the internal control system. Following entrenchment theory (Hu & Kumar, 2004) and the prior literature, we examine whether entrenched CEOs are more likely to design poorer internal controls and exploit an MW in order to increase investments in riskier projects (Chen & Steiner, 1999; Ogneva, Subramanyam, & Raghunandan, 2007), and whether older managers have a stronger incentive to achieve their organizational responsibilities, such as improving an existing MW (Steers, 1977; Stevens, Beyer, & Trice, 1978). We also examine how the ethical nature of female managers (Gold, Hunton, & Gomaa, 2009; Powell & Ansic, 1997) affects the likelihood of an MW disclosure.

This study provides several contributions to both academia and practice. First, we provide new evidence for the managerial literature by investigating the associations among CEO characteristics and internal control quality. Although some prior studies have discussed whether certain top management characteristics impact internal control quality (Ashbaugh-Skaife, Collins, & Kinney, 2007; Jensen, 1993), most focus on the issues of executive compensation (Hoitash, Hoitash, & Johnstone, 2012) and top management turnover (Johnstone, Li, & Rupley, 2010). In particular, due to the limited internal control data, previous studies only explain these associations by theoretical inferences. To fill this research gap, our paper provides empirical evidence to support the view that entrenchment and age significantly drive CEO behavior with regard to internal control quality. Second, compliance with SOX 404 incurs huge costs for U.S. domestic companies and U.S.-traded foreign companies (Financial Executives Institutes, 2005; SEC, 2005a), and our evidence may be of practical help to boards of directors looking for suitable managers who can effectively improve MWs and reduce these compliance costs. Finally, the effects of CEO entrenchment and other characteristics on internal control quality are neither well-clarified nor comprehensively explored in the corporate governance literature. Although most corporate governance studies explore the effects of board and audit committee on internal control, none of them provides evidence of how management incentives affect internal control quality based on entrenchment or theories related to CEO age. In particular, SOX 404 imposes a significant burden on and shrinks the market value of small companies (Iliev, 2010), and while the enhanced disclosure of top management characteristics by small firms is not costly, it may be as informative as SOX 404 opinions for both investors and debt holders. Moreover, we explore whether top management characteristics are associated with various types and severities of MWs, an issue which is addressed by recent studies (Bedard, Hoitash, Hoitash, & Westermann, 2011; Hermanson, Krishnan, & Ye,

2009; Raghunandan & Rama, 2006) or the major bond rating institutions (Moody's Investor Service, 2004). Our findings may be valuable for auditors when assessing the risks associated with the internal control weaknesses of their clients, and may also have constructive implications for global regulators and lawmakers when setting future financial reporting policies.

We organize this paper as follows. The next section discusses the related literature and develops our research hypotheses. This is followed by a discussion of the methods used in this paper, along with the data and results. The paper then ends with a summary of the conclusions, and highlights some avenues for future research.

LITERATURE AND HYPOTHESES DEVELOPMENT

Management Entrenchment and Internal Control Quality

Entrenched managers are able to establish certain policies that enable them to maximize private benefits at the expense of all other shareholders (Shleifer & Vishny, 1989; Stulz, 1988). Prior researchers mostly examine this issue with a focus on corporate financial policies, such as capital structure decisions (Berger, Ofek, & Yermack, 1997), payout policies (Hu & Kumar, 2004), and even spinoff decisions (Ahn & Walker, 2007), and provide abundant evidence to support the effect of managerial entrenchment. Likewise, it is also important to investigate how this entrenchment effect relates to accounting or auditing decisions, because financial reporting quality may serve as a useful tool to ease manager–shareholder conflicts. For example, Lennox (2005) finds that firms with more entrenched managers, proxied by the level of CEO ownership, are less likely to choose a high quality (Big 4) audit firm.

Management Ownership

A higher level of management ownership may lead to entrenchment, and have an unfavorable effect on internal control quality. Managers with higher shareholdings have stronger control over the firm, exacerbate the conflicts of interest between shareholders and bondholders, and hence a greater ability to pursue their own private interests (Holderness & Sheehan, 1991; Lennox, 2005). Moreover, managers with higher ownership usually have a stronger incentive to make riskier investment decisions (Chen & Steiner, 1999), and to induce discretionary investments, such as capital expenditures and R&D (Ghosh, Moon, & Tandon, 2007). Since the strength of internal control is highly associated with management philosophy, entrenched managers are likely to design and utilize poorer internal controls, and exploit an MW in order to invest in high-risk projects (Ogneva et al., 2007). In particular, managers with higher ownership are also more difficult for small investors to remove. As a result, they are more likely to engage in such riskier investments under poorer internal controls (Bozec & Bozec, 2007). Furthermore, Fernández and Arrondo (2005) document a negative relationship between managerial

ownership and the proportion of outside directors, suggesting that the supervisory function of the outside directors over internal control mechanisms is reduced by the level of entrenchment. A pre-SOX study shows a significantly negative association exists between the extent of internal control disclosure and the level of management ownership (Deumes & Knechel, 2008). Accordingly, we expect that entrenched CEOs with higher ownership are more likely to be associated with poorer internal control quality and the higher likelihood of an MW being reported by external auditors.

Management Power

Traditionally, CEOs in the U.S. are more powerful than in other countries, and thus may have a greater ability to arrange for friendly outside directors and submissive inside directors to sit on their boards (Thomas, 2004). In this way, an entrenched CEO may compromise the board's ability to monitor managerial decisions (Finkelstein & D'Aveni, 1994). Managerial power theory (Bebchuk, Fried, & Walker, 2002) suggests that CEO power affects the design of compensation contracts, and powerful CEOs are more likely to receive increases in bonus and equity compensation (Henderson, Masli, Richardson, & Sanchez, 2010). Liu and Jiraporn (2010) extend the CEO entrenchment hypothesis and find that the cost of debt is higher for firms with more dominant CEOs, while accounting restatements initiated by the SEC are also associated with stronger managers (Cheng, Gao, Lawrence, & Smith, 2011). Farrell, Yu, and Zhang (2013) investigate the firm characteristics associated with earnings management through share repurchases and find that powerful CEOs are more likely to manipulate earnings. Finally, Chidambaran, Kedia, and Prabhala (2010) find that CEO–board connectedness is positively associated with the probability of fraud. From this perspective, it can be seen that it is easier for powerful CEOs to override or weaken internal control and corporate monitoring systems to benefit their own personal interests.

In contrast, Prahalad and Doz (2000) indicate that CEOs in the U.S. have considerable power to make production decisions that may create firm value and enhance a firm's competitive position. The CEO reputation hypothesis suggests that powerful CEOs care about their reputations and relationships with external parties, and so may be more risk averse and attempt to select beneficial projects for outsiders (Liu & Jiraporn, 2010). In the banking industry, CEO power, as measured by a CEO's ability to be in command of board decisions, is negatively associated with firm risk-taking (Pathan, 2009). From this perspective, it is also likely that powerful CEOs make full use of their authority in order to deal with an MW more carefully and effectively. When powerful CEOs strive to remediate an MW, they can eradicate potential obstacles and challengers without difficulty (Combs, Ketchen, Perryman, & Donahue, 2007; Pitcher, Chreim, & Kisfavli, 2000). In addition, powerful CEOs are also more likely to receive support from other members of top management whose financial interests are aligned with theirs (Boeker & Goodstein, 1993). Finally, the two-tier governance system in the U.S. may be very effective, and also influence the relationship between CEO power and internal control quality.

Since the overall effect of CEO power (proxied by duality) on internal control strength seems to be ambiguous, we do not predict a direction between CEO duality and the likelihood of an MW.

Management Incentive Compensation

Executive incentive compensation type and proportion may also signal the level of management entrenchment. Some researchers suggest that cash salary and bonuses offer comparatively low powered incentives (Jensen & Murphy, 1990), and a relatively higher ratio of salary and bonuses with regard to overall compensation leads to a weak type of management (Hu & Kumar, 2004). A higher CEO cash compensation ratio also appears to decrease CEO power relative to outside shareholders. We thus expect that managers with a higher ratio of salary and bonuses with regard to overall compensation are less entrenched, and so are negatively associated with poorer internal control quality.

Management Tenure

Prior studies suggest that CEO tenure is negatively associated with firm performance (Bizjak, Lemmon, & Naveen, 2009; Jensen, 1993; Murphy, 1986). Miller (1991) argues that CEO autonomy, tenure and past performance, gestalts, momentum, and convergence may all lead to deviations from the business environment. Kaczmarek, Kimino, and Pye (2012) indicate that long-tenured CEOs may establish sub-groups, and the conflicts that arise among these can entrench and destroy firm value. Longer tenure is usually associated with stronger power which may make the CEO less vulnerable (Hu & Kumar, 2004). Salas (2010) finds that if sudden death removes an entrenched CEO with tenure that exceeds ten years and with poor performance over the last three years, the stock price will increase. Hence, we expect that managers with longer tenure are more entrenched, and so are positively associated with poorer internal control quality.

Based on the viewpoints derived from entrenchment theory and earlier research, we develop our first hypothesis, as follows (in the alternative forms):

Hypothesis 1. If the effect of CEO entrenchment dominates the incentive effect, then there exists a positive association between the level of CEO entrenchment and an MW reported under SOX 404.

Hypothesis 1a. If the effect of CEO ownership dominates the incentive effect, then there exists a positive association between the level of CEO ownership and an MW reported under SOX 404.

Hypothesis 1b. If the effect of CEO power dominates the incentive effect, then there exists an association between the existence of CEO duality and an MW reported under SOX 404.

Hypothesis 1c. If the effect of CEO incentive compensation dominates the incentive effect, then there exists a negative association between the level of CEO salary and bonus on compensation and an MW reported under SOX 404.

Hypothesis 1d. If the effect of longer CEO tenure dominates the incentive effect, then there exists a positive association between the longer CEO tenure and an MW reported under SOX 404.

Management Age and Internal Control Quality

Prior management studies suggest that older individuals commonly demonstrate higher organizational commitment and exert more effort to achieve organizational goals (Steers, 1977; Stevens et al., 1978). The psychological literature also provides evidence that age positively affects managers' commitment to their organizations (Bluedorn, 1982; Michaels & Spector, 1982; Williams & Hazer, 1986), as well as raising their individual identification and personal involvement with them (Bluedorn, 1982). Since older and younger managers may have different attitudes toward organizational commitment, age is likely to be an influential factor in top managers' establishment of internal control systems.

Age may also affect managers' risk preferences when it comes to their decision making, as older managers are more risk averse and usually tend to make more conservative decisions than their younger counterparts (Thomas, Litschert, & Ramaswamy, 1991). Similarly, previous studies indicate that older managers avoid investing in high-risk projects (Vroom & Pahl, 1971), while younger ones accept a higher level of risk in this regard (Hambrick & Mason, 1984). Similarly, Schoepfer (2007) find that the older the individual becomes a CEO, the less likely he/she is to engage in misconduct. Since financial misstatements are likely to bypass a firm's vulnerable internal control systems and increase the related potential legal liabilities, older managers are expected to devote more efforts to minimizing a firm's internal control risks.

The survival of older managers implies that they perform well in their jobs (Hambrick & Fukutomi, 1991), and managerial performance is always closely related to organizational commitment. This increased commitment of older managers consists of three factors: contributing to the development and implementation of organizational actions, making convincing arguments about the advantages of their approaches, and expressing conviction with regard to the continuing suitability of their management style (Rubin & Brockner, 1975). Moreover, the improvement of internal controls has become such a widespread objective for top managers after the enactment of SOX 404, that older managers with stronger organizational commitment are more likely to dedicate themselves to improving their firms' current and future internal control weaknesses.

Considering the higher organizational commitment and financial reporting conservatism of older managers, we expect that firms with such managers are negatively associated with weaker internal control quality, as in our second hypothesis (in the alternative form):

Hypothesis 2. There exists a negative association between the age of CEO and an MW reported under SOX 404.

Management Gender and Internal Control Quality

Gender is likely to have an impact on a firm's internal control quality. Prior studies argue that a deep entrenchment of the "old-boys club" dominates most industries, and that it is important to hire more women in top executive positions (McCool, 2008). In response to financial scandals, appointing a female CEO also has symbolic value with regard to both internal and external organizations (Burke, 2000). Some feminist economists claim that women tend to be more neutral in moral judgments (Nelson, 1996), and psychological research on gender issues mostly suggests that women are more ethical, cautious and risk averse than men (Gold et al., 2009; Powell & Ansic, 1997). Similarly, Byrnes, Miller, and Schafer (1999) indicate that males are more likely to take risks than females. Fondas (2000) claims that female managers have a slight edge over male counterparts in terms of executing corporate strategies, while Burgess and Tharenou (2002) propose that increasing the proportion of female directors on boards could effectively reduce instances of corporate failure. Empirically, female managers and audit committee directors have been found to be negatively associated with aggressive earnings management in a number of recent studies (Barua, Davidson, Rama, & Thiruvadi, 2010; Peni & Vähämaa, 2010; Thiruvadi & Huang, 2011). Female auditors also demonstrate superior ability in examining evidence related to complex audit tasks and in making professional judgments (Chung & Monroe, 2001). This supposedly more ethical and risk-averse nature may lead female managers to maintain stronger internal control systems.

Finally, Angle and Perry (1981) suggest that female employees are more strongly committed to their organizations than male ones, because they enjoy less inter-organizational mobility and thus are more restricted to their present employers (Angle & Perry, 1981; Hrebiniak & Alutto, 1972; Scandura & Lankau, 1997).

Only a few studies report that female CEOs perform relatively poorly. For example, Lantz, Bredehorst-Carlsson, and Johansson (2012) indicate that female CEOs are associated with lower returns on equity (ROE) and a lower Tobin's Q in Swedish financial firms.

In short, a large number of studies show that gender impacts management conservatism, opportunism, and risk preferences. Consistent with these research findings, we expect that firms with female managers are less likely to be associated with an MW, as in our third hypothesis (in the alternative form):

Hypothesis 3. There exists a negative association between female CEOs and an MW reported under SOX 404.

MODEL AND DATA

CEO Entrenchment Measurement

To examine the above research hypotheses, we first create a CEO entrenchment score (*CEO_ENTRENCH*) based on the principal component factor (PCF) analysis of the following six CEO characteristics variables.

CEO_SHARE. As discussed above, managers with higher shareholdings have stronger control over the firm, and hence a greater ability to pursue their own private interests (Holderness & Sheehan, 1991; Lennox, 2005). Therefore, the higher the proportion of outstanding shares held by the

CEO, the more likely the CEO entrenches. *CEO_SHARE*, the number of shares held by CEO divided by number of shares outstanding, is used as a factor in our PCF analysis.

CEO_CHAIR. As suggested above, CEO duality impairs board independence and functioning, which results in an increase in CEO power (Boyd, 1994; Jensen, 1993). If the CEO simultaneously serves as the chairperson of the board, the level of entrenchment may increase (Pathan, 2009). We thus use the factor *CEO_CHAIR*, indicating whether the CEO is also the chairperson of the board, in our PCF analysis.

COM_RATIO, SALARY_BONUS, and STOCK_ OPTION. The extant evidence shows that cash salary and/or bonus compensation are more likely to be associated with weaker management (Hu & Kumar, 2004). A higher ratio of salary and bonus with regard to overall CEO compensation thus indicates a lower level of CEO entrenchment. In addition, executive stock options can be used to deliver high-powered incentives to managers (Hu & Kumar, 2004) and lead to increased risk taking (Ross, 2004). Three factors, *COM_RATIO*, salary and bonus in relation to overall compensation, *SALARY_BONUS*, the logarithm of salary and bonus, and *STOCK_OPTION*, the logarithm of executive stock options value over the logarithm of overall compensation, are thus employed in our PCF analysis.

LONG_TENURE. As discussed, managers with longer tenure are more entrenched, may establish sub-groups, and so are positively associated with poorer internal control quality (Hu & Kumar, 2004; Kaczmarek et al., 2012). Hence, we use the factor *LONG_TENURE*, indicating whether the length of CEO's tenure ranks in the top 20 percent in our sample, in our PCF analysis.

The process of calculating the CEO entrenchment score is similar to that used in Song, Thomas, and Yi (2010), who suggest that this approach can reduce random measurement errors with regard to individual CEO variables.

A Two-Stage Process to Control for Endogeneity

Because there are likely to be latent common factors that influence CEO characteristics and internal control quality, we use a two-stage process and control for endogeneity, as in the prior studies. In the first stage, we construct the following model for the determinants of potential CEO entrenchment (Lisic, Neal, Zhang, & Zhang, 2012), and then estimate the inverse Mills ratio (Doyle et al., 2007; Heckman, 1979).

$$
\begin{aligned}
CEO\_ENTRENCH = {} & \alpha_0 + \alpha_1 SEGMENT + \alpha_2 FOREIGN \\
& + \alpha_3 MERGER + \alpha_4 RESTRUCTURE \\
& + \alpha_5 SALE\_GROWTH \\
& + \alpha_6 MARKET\_VALUE + \alpha_7 LOSS \\
& + \alpha_8 FIRM\_AGE + \alpha_9 LEV + \alpha_{10} ROA + \varepsilon
\end{aligned}
$$
(1)

where,
CEO_ENTRENCH = CEO entrenchment score based on the principal component factor analysis of the six CEO characteristics variables (*CEO_SHARE*; *CEO_CHAIR*; *COM_RATIO*; *SALARY_BONUS*; *STOCK_OPTION*; and *LONG_TENURE*);
SEGMENT = logarithm of number of business segments;
FOREIGN = a dummy variable that takes a value of 1 if the firm has a non-zero foreign currency transaction, and 0 otherwise;
MERGER = a dummy variable that takes a value of 1 if the firm was involved in mergers or acquisitions in the previous three years, and 0 otherwise;
RESTRUCTURE = a dummy variable that takes a value of 1 if the firm reported restructuring;
SALE_GROWTH = a dummy variable that takes a value of 1 if industry-adjusted growth in sales falls into the top quintile, and 0 otherwise;
MARKET_VALUE = logarithm of market value of equity, where market value of equity is equal to price per share multiplied by number of shares outstanding;
LOSS = a dummy variable that takes a value of 1 if the sum of earnings before extraordinary items in the previous two years is less than 0, and 0 otherwise;
FIRM_AGE = logarithm of number of current year minus the first year of reporting stock data in CRSP;
LEV = long-term liability/(total assets − total liability);
ROA = return on assets.

In the second stage, we employ a logistic regression model[5] used in prior internal control related studies (Ashbaugh-Skaife et al., 2007; Doyle et al., 2007; Ogneva et al., 2007) and control for endogeneity to investigate whether CEO entrenchment, age, and/or gender influence internal control quality, as follows:

$$
\begin{aligned}
MW = {} & \alpha + \beta_1 CEO\_ENTRENCH + \beta_2 CEO\_AGE \\
& + \beta_3 CEO\_GENDER + \beta_4 SEGMENT + \beta_5 FOREIGN \\
& + \beta_6 MERGER + \beta_7 RESTRUCTURE \\
& + \beta_8 SALE\_GROWTH + \beta_9 INVENTORY \\
& + \beta_{10} MARKET\_VALUE + \beta_{11} LOSS + \beta_{12} ZSCORE \\
& + \beta_{13} FIRM\_AGE + \beta_{14} BIG4 + \beta_{15} IMR \\
& + \sum_{i=1}^{3} \beta_{i+15} YEAR\_DUMMY_i \\
& + \sum_{j=1}^{11} \beta_{j+18} INDUSTRY\_DUMMY_j + \varepsilon
\end{aligned}
$$
(2)

Variables of interest:
MW = a dummy variable that takes a value of 1 if a firm reports that a "material weakness exists", and 0 if a firm reports "no material weakness found by the auditor";
CEO_ ENTRENCH = as defined in model (1);
CEO_AGE = the age of the CEO;
CEO_GENDER = a dummy variable that takes a value of 1 if the CEO is female, and 0 otherwise;

Control variables:
INVENTORY = inventory divided by total assets;
ZSCORE = the decreasing deciles rank of Altman's (1968) Z-Score;
BIG4 = a dummy variable that takes a value of 1 if the firm is audited by a Big 4 audit firm, and 0 otherwise;
IMR = inverse Mills ratio estimated in the first stage model (Doyle et al., 2007; Heckman, 1979);
YEAR_DUMMY = a dummy variable of the firm's sample year;

TABLE 1
Sample Selection

Panel A: Sample selection process

	2006–2009
Non-financial firms listed in *ExecuComp* with SOX 404 MW data in *AuditAnalytics*	5,743
Less: missing *CEO* characteristics data in *ExecuComp*	−810
missing financial data in *Compustat*	−547
missing stock price data in *CRSP*	−12
Final sample	4,374

Panel B: Sample distribution by industry

Industry type	MW firms	Total firms	% of MW
Food (2000–2111)	3	131	2.29%
Textiles & printing/publishing (2200–2799)	6	268	2.24%
Chemicals (2800–2824, 2840–2899)	5	153	3.27%
Pharmaceuticals (2830–2836)	11	183	6.01%
Extractive (2900–2999, 1300–1399)	5	219	2.28%
Durable manufacturers (3000–3999, excluding 3570–3579 and 3670–3679)	35	1,060	3.30%
Transportation (4000–4899)	12	263	4.56%
Utilities (4900–4999)	5	273	1.83%
Retail (5000–5999)	23	597	3.85%
Services (7000–8999, excluding 7370–7379)	19	429	4.43%
Computers (7370–7379, 3570–3579, 3670–3679)	36	591	6.09%
Other	6	207	2.90%
Total	166	4,374	3.80%

This table reports the process of sample selection and sample distribution by industries. The identification of industries follows Frankel et al. (2002) and Ashbaugh-Skaife et al. (2003).

INDUSTRY_DUMMY = a dummy variable of the firm's industry (see Ashbaugh-Skaife, LaFond, & Mayhew, 2003 and Frankel, Johnson, & Nelson, 2002).

The other variables are as defined in model (1).

Other Factors Associated with Internal Control Quality

In accordance with several important prior studies (e.g., Ashbaugh-Skaife et al., 2007; Doyle et al., 2007; Ge & McVay, 2005), Ogneva et al. (2007) classify a firm's characteristics into (1) complexity of operations; (2) organizational change; (3) accounting application measurement risk; and (4) resource constraint indicators. As in Ogneva et al. (2007), we control for the complexity of operations (*SEGMENT* and *FOREIGN*), organizational change (*MERGER* and *RESTRUCTURE*), accounting application and measurement risk (*SALE_GROWTH* and *INVENTORY*), resource constraint indicators (*MARKET_VALUE*, *LOSS*, and *ZSCORE*), and firm age (*FIRM_AGE*). We also control the firm's audit quality (*BIG4*), sample year (*YEAR_DUMMY*), and affiliated industry (*INDUSTRY_DUMMY*) for any potential effects.

Data

Panel A of Table 1 presents our sample selection process. This paper focuses on non-financial firms, since financial firms are more regulated than non-financial ones due to the specific role they play in the US economy and the higher external monitoring they are subject to from stakeholders. The data of CEO characteristics (shares, duality, compensation, age, and gender) is collected from *Compustat/ExecuComp*, and SOX 404 disclosures of MWs are obtained from *AuditAnalytics*. The beginning year of our sample is 2006, because some of the CEO characteristics data is not available in *ExecuComp* before 2005. Initially, there were 5,743 firm-year observations with both the CEO demographic information and SOX 404 internal control data after matching the two databases. We then deleted 810 firms missing any of the CEO characteristics data. In addition, we removed 547 firms after merging this with information with the *Compustat* financial data and firm age data collected from *CRSP*, and also deleted 12 firms with missing stock price data. The final sample consists of 4,374 firm-year observations.

Panel B of Table 1 shows our sample distribution by industry, which is classified as in Ashbaugh-Skaife et al.

TABLE 2
Descriptive Statistics

Variables	MW firms		Non-MW firms		Mean difference (t-test)
	Mean	Median	Mean	Median	
CEO_ENTRENCH	−1.77	−1.81	−1.95	−2.06	−.19 (<.001)***
CEO_SHARE	.05	.02	.03	.01	−.02 (<.001)***
CEO_CHAIR	.36	.00	.49	.00	.12 (.002)**
COM_RATIO	.37	.31	.29	.22	−.08 (<.001)***
SALARY_BONUS	6.48	6.48	6.71	6.71	.23 (<.001)***
STOCK_OPTION	.54	.77	.58	.79	.04 (.24)
LONG_TENURE	.28	.00	.22	.00	−.07 (.06)†
CEO_GENDER	.02	.00	.03	.00	.01 (.69)
CEO_AGE	3.97	3.97	4.01	4.01	.03 (<.001)***
SEGMENT	.42	.48	.37	.48	−.06 (.02)*
FOREIGN	.39	.00	.33	.00	−.06 (.10)
MERGER	.18	.00	.16	.00	−.02 (.49)
RESTRUCTURE	.68	1.00	.51	1.00	−.17 (<.001)***
SALE_GROWTH	.10	.00	.08	.00	−.02 (.42)
INVENTORY	.11	.09	.11	.08	−.01 (.44)
MARKET_VALUE	8.86	8.83	9.27	9.23	.41 (<.001)***
LOSS	.28	.00	.13	.00	−.15 (<.001)***
ZSCORE	4.49	5.00	3.69	4.00	−.80 (<.001)***
FIRM_AGE	1.22	1.20	1.26	1.26	.04 (.18)
BIG4	.87	1.00	.94	1.00	.06 (.02)*
N	166		4,208		

This table reports the descriptive statistics of variables, and the values in parentheses display the p-value of t-test. *MW* = a dummy variable that takes a value of 1 if a firm reports that a "material weakness exists", and 0 if a firm reports "no material weakness found by the auditor"; *CEO_ENTRENCH* = CEO entrenchment score based on the principal component factor analysis of the six CEO characteristics variables (*CEO_SHARE*; *CEO_CHAIR*; *COM_RATIO*; *SALARY_BONUS*; *STOCK_OPTION*, and *LONG_TENURE*); *CEO_SHARE* = the number of shares held by the CEO divided by number of shares outstanding; *CEO_CHAIR* = 1 if the CEO is also the chairperson of the board, and 0 otherwise; *COM_RATIO* = (salary+ bonus)/compensation; *SALARY_BONUS* = the logarithm of (1 + salary + bonus); *STOCK_OPTION* = log(1 + OPTION_AWARDS)/log(compensation); *LONG_TENURE* = 1 if CEO tenure ranks top 20 percent, else 0; *CEO_GENDER* = a dummy variable that takes a value of 1 if the CEO is female, and 0 otherwise; *CEO_AGE* = the logarithm of CEO age; *SEGMENT* = logarithm of number of business segments; *FOREIGN* = a dummy variable that takes a value of 1 if the firm has a non-zero foreign currency transaction, and 0 otherwise; *MERGER* = a dummy variable that takes a value of 1 if the firm was involved in mergers or acquisitions over the three years, and 0 otherwise; *RESTRUCTURE* = a dummy variable that takes a value of 1 if the firm reported restructuring; *SALE_GROWTH* = a dummy variable that takes a value of 1 if industry-adjusted growth in sales falls into the top quintile, and 0 otherwise; *INVENTORY* = inventory divided by total assets; *MARKET_VALUE* = logarithm of market value of equity, where market value of equity is equal to price per share multiplied by number of shares outstanding; *LOSS* = a dummy variable that takes a value of 1 if the sum of earnings before extraordinary items over two years less than 0, and 0 otherwise; *ZSCORE* = the decreasing deciles rank of Altman's (1968) Z-Score; *FIRM_AGE* = logarithm of number of current year minus the beginning year reporting stock data in *CRSP*; *BIG4* = a dummy variable that takes a value of 1 if the firm is audited by a Big 4 audit firm, and 0 otherwise.
†p < .10
*p < .05
**p < .01
***p < .001

(2003). A total of 166 firms reported MWs (3.80 percent) in our sample. The percentage of MW firms decreases significantly each year after the enactment of SOX 404. For example, Ashbaugh-Skaife, Veenman, and Wangerin (2011) report that only 3.2 percent of firms reported an MW in 2008. Firms in pharmaceuticals (6.01 percent) and computers (6.09 percent) had higher percentages of MWs, while no MWs existed for agriculture and mining/construction firms.

RESULTS

Table 2 reports the mean and median values of sample firms with and without an MW. The independent sample *t* tests for means show that firms with an MW have higher average *CEO_ENTRENCH* (p < .001), higher average *CEO_SHARE* (p < .001), lower average *CEO_CHAIR* (p = .002), lower average *SALARY_BONUS* (p < .001), and lower average

CEO_AGE (p < .001) than firms without an MW. We also find that firms with an MW are associated with a higher complexity of operations (SEGMENT, p = .02), more frequent organizational changes (RESTRUCTURE, p < .001), more resource constraints (MARKET_VALUE, p < .001; LOSS, p < .001 and ZSCORE, p < .001), and lower audit quality (BIG4, p = .02), than firms without an MW.

CEO Characteristics and Internal Control Quality

Table 3 reports the univariate results of the Chi-square tests. Using the median value as a benchmark of CEO entrenchment, 4.89 percent of more entrenched CEOs report an MW, which is significantly higher (p < .001) than less entrenched CEOs (2.70 percent). For CEO ownership, 4.9 percent of CEOs with more outstanding shares report an MW, which is significantly higher (p < .001) than CEOs with fewer outstanding shares (2.7 percent). 2.9 percent of CEOs serving as the chairperson of the board report an MW, which is significantly lower (p = .002) than less powerful CEOs (4.7 percent). Further, we use median age as a benchmark to classify younger and older managers. 2.5 percent of firms with older CEOs report an MW, which is significantly lower (p < .001) than firms with younger CEOs (5.0 percent). We also use median SALARY_BONUS as a benchmark to classify managers receiving a higher or lower ratio of salary and bonus with regard to overall compensation. 2.97 percent of firms with CEOs receiving a higher ratio of salary and bonus report an MW, which is significantly lower (p = .004) than firms with CEOs receiving a lower ratio of salary and bonus (4.62 percent). Finally, 3.8 percent of firms with male CEOs report an MW, which is higher than firms with female CEOs (3.1 percent), although the difference is insignificant.

Table 4 reports the first-stage results of our CEO entrenchment model (Lisic et al., 2012). The results show that major determinants of CEO entrenchment are firm complexity (RESTRUCTURE), growth (SALE_GROWTH), risk (LOSS), size (MARKET_VALUE), and performance (ROA). As discussed earlier, we then estimate the inverse Mills ratio to control for endogeneity, as in prior studies (Doyle et al., 2007; Heckman, 1979).

Table 5 shows the second-stage results of our logistic regression analysis,[6] controlling for endogeneity. Both models are significant (p < .001) and report reasonable pseudo R-squares (18.17 percent and 20.07 percent, respectively). Our control variables, SEGMENT, RESTRUCTURE, and ZSCORE, are all statistically significant, and have the expected signs. Regarding the variables of interest, CEO_ENTRENCH (β = .72, p < .002), CEO_SHARE (β = 3.89, p = .002) and LONG_TENURE (β = .69, p = .002) are positively significant, while SALARY_BONUS is negatively significant (β = −.54, p = .004). The results suggest that firms with a higher level of entrenchment, higher CEO ownership, longer tenure and lower salary and bonus with regard to overall compensation are associated with an MW, which consistently supports Hypothesis 1. In addition, both models demonstrate a negatively significant relationship (p < .001) between CEO_AGE and MW, which shows that firms with older CEOs have better performance with regard to internal control establishment and maintenance than those with younger CEOs. These results are consistent with Hypothesis

2. CEO_GENDER is negative, as predicted, but insignificant with regard to MW in both models, although this may be due to the limited number of female CEOs in the sample.

Gibbons and Murphy (1992) suggest that an ideal compensation contract optimizes total incentives, both implicitly by addressing career concerns, and explicitly in the compensation contract, and that the explicit incentives are strongest for employees close to retirement, because they have the fewest career concerns. We therefore control the dummy variable AGERET to distinguish the effects of age and retirement and to assess whether our results for CEO_AGE continue to hold. AGERET is set equal to 1 if the CEO is 63 or older, and 0 otherwise. We also used cutoffs of 60 and 65 for AGERET. However, AGERET is insignificant, and thus our findings for CEO_AGE are unchanged.

Types and Severities of Internal Control Material Weaknesses

Different types of MWs may influence an investor's perceptions of financial reporting quality in different ways, and bond rating institutions state that the types and severities of an MW may affect their evaluations (Moody's Investor Service, 2004). It is thus important to examine whether the major CEO characteristics are associated with the severity and pervasiveness of an MW in an organization. Hermanson et al. (2009) indicate that an entity level MW has a greater effect on stockholder dissatisfaction with the auditor. Bedard and Graham (2011) also suggest that remediation of an entity level MW is highly associated with resource constraints. Firms with entity level MWs are found to pay significantly higher loan rates than those with account level MWs (Kim, Song, & Zhang, 2011). As in prior studies (Bedard & Graham, 2011; Hermanson et al., 2009), we classify MWs as either entity level or account level ones,[7] and then examine the associations between CEO entrenchment, age, gender, and type of MWs.

Table 6 presents the descriptive data for different types of MWs. In Panel A, the independent sample t tests for means show that there are significant CEO_ENTRENCH (p < .001), CEO_SHARE (p = .001), CEO_CHAIR (p < .001), SALARY_BONUS (p < .001), LONG_TENURE (p = .07) and CEO_AGE (p = .002) differences between firms with an entity level MW and those without an MW. However, we find the differences are weaker between firms with an account level MW and firms without an MW.

Panel B presents the detailed classifications of entity and account level MWs based on the AuditAnalytics definitions. Panel B shows that entity level MWs are mostly associated with the COSO (The Committee of Sponsoring Organizations of the Treadway Commission) category of monitoring (MONITORING, 24.0 percent), controls over general ledger processes (GENERAL_LEDGER, 7.6 percent), and information technology general controls (ITGC, 4.2 percent).

We then match our control sample, firms without an MW (N = 4,208), with those reporting an entity level MW (N = 132) and an account level one (N = 34) separately in order to examine whether CEO characteristics are associated with different types of MWs. The regression results of the two sub-samples are reported in Table 7. We find that CEO_ENTRENCH is positively and significantly related to

TABLE 3
CEO Characteristics and an MW

	CEO_ENTRENCH > median	%	CEO_ENTRENCH < median	%
MW firms	107	4.89%	59	2.70%
Non-MW firms	2,080	95.11%	2,128	97.30%
2*2 Chi-square test		14.42*** (<.001)		

	CEO_SHARE > median	%	CEO_SHARE < median	%
MW firms	108	4.90%	58	2.70%
Non-MW firms	2,079	95.10%	2,129	97.30%
2*2 Chi-square test		15.65*** (<.001)		

	CEO _CHAIR = 0	%	CEO _CHAIR = 1	%
MW firms	106	4.70%	60	2.90%
Non-MW firms	2,162	95.30%	2,046	97.10%
2*2 Chi-square test		9.96** (.002)		

	COM_RATIO > median	%	COM_RATIO < median	%
MW firms	108	4.94%	58	2.65%
Non-MW firms	2,079	95.06%	2,129	97.35%
2*2 Chi-square test		15.65*** (<.001)		

	SALARY_BONUS > median	%	SALARY_BONUS < median	%
MW firms	65	2.97%	101	4.62%
Non-MW firms	2,122	97.03%	2,086	95.38%
2*2 Chi-square test		8.11** (.004)		

	STOCK_OPTION > median	%	STOCK_OPTION < median	%
MW firms	74	3.38%	92	4.21%
Non-MW firms	2,113	96.62%	2,095	95.79%
2*2 Chi-square test		2.02 (.15)		

	LONG_TENURE = 0	%	LONG_TENURE = 1	%
MW firms	119	3.48%	47	4.94%
Non-MW firms	3,303	96.52%	905	95.06%
2*2 Chi-square test		4.34* (.03)		

	CEO _GENDER = 0	%	CEO _GENDER = 1	%
MW firms	162	3.80%	4	3.10%
Non-MW firms	4,084	96.20%	124	96.90%
2*2 Chi-square test		.16 (.69)		

	CEO_AGE > median	%	CEO_AGE<median	%
MW firms	52	2.50%	114	5.00%
Non-MW firms	2,042	97.50%	2,166	95.00%
2*2 Chi-square test		18.93*** (<.001)		
N		4,374		

This table reports the Chi-square test of the main CEO characteristics, and the Wald Chi-square p-values are reported below the estimated coefficients. *CEO_ ENTRENCH* = CEO entrenchment score based on the principal component factor analysis of the six CEO characteristics variables (*CEO_SHARE*; *CEO_CHAIR*; *COM_RATIO*; *SALARY_BONUS*; *STOCK_OPTION*, and *LONG_TENURE*); *CEO_SHARE* = the number of shares held by the CEO divided by number of shares outstanding; *CEO_CHAIR* = 1 if the CEO is also the chairperson of the board, and 0 otherwise; *COM_RATIO* = (salary+ bonus)/compensation; *SALARY_BONUS* = the logarithm of (1 + salary + bonus); *STOCK_OPTION* = log(1 + OPTION_AWARDS)/log(compensation); *LONG_TENURE* = 1 if CEO tenure ranks top 20 percent, else 0; *CEO_GENDER* = a dummy variable that takes a value of 1 if the CEO is female, and 0 otherwise; *CEO_AGE* = the logarithm of CEO age.
†$p < .10$
*$p < .05$
**$p < .01$
***$p < .001$

TABLE 4
First Stage Analysis: CEO Entrenchment Determinants

Dependent variable: CEO_ENTRENCH

Variable		Coefficients
INTERCEPT	?	1.07 (<.001)***
SEGMENT	?	−.03 (.24)
FOREIGN	+	−.02 (.10)
MERGER	+	−.03 (.15)
RESTRUCTURE	?	−.15 (<.001)***
SALE_GROWTH	+	.08 (.003)**
MARKET_VALUE	−	−.31 (<.001)***
LOSS	+	−.04 (.07)†
FIRM_AGE	−	−.02 (.28)
LEV	−	−.00 (.80)
ROA	?	.00 (<.001)***
F value		116 (<.001)***
Adjusted R^2		.208
N		4,374

This table reports the estimate of the first stage, model (1), and the values in parentheses display the p-value. *CEO_ENTRENCH* = CEO entrenchment score based on the principal-component factor analysis of the six CEO characteristics variables (*CEO_SHARE*; *CEO_CHAIR*; *COM_RATIO*; *SALARY_BONUS*; *STOCK_OPTION*, and *LONG_TENURE*); *SEGMENT* = logarithm of number of business segments; *FOREIGN* = a dummy variable that takes a value of 1 if the firm has a non-zero foreign currency transaction, and 0 otherwise; *MERGER* = a dummy variable that takes a value of 1 if the firm was involved in mergers or acquisitions over the three years, and 0 otherwise; *RESTRUCTURE* = a dummy variable that takes a value of 1 if the firm reported restructuring; *SALE_GROWTH* = a dummy variable that takes a value of 1 if industry-adjusted growth in sales falls into the top quintile, and 0 otherwise; *MARKET_VALUE* = logarithm of market value of equity, where market value of equity is equal to price per share multiplied by number of shares outstanding; *LOSS* = a dummy variable that takes a value of 1 if the sum of earnings before extraordinary items over two years less than 0, and 0 otherwise; *FIRM_AGE* = logarithm of number of current year minus the beginning year reporting stock data in *CRSP*; *LEV* = long-term liability/(total assets − total liabilities); *ROA* = return on assets.
†p < .10
*p < .05
**p < .01
***p < .001

both the entity level MW (β = .67, p = .001) and account level MW (β = .87, p = .03) samples, and *CEO_AGE* is also consistently negative and significant. *CEO_GENDER* is negatively but insignificantly related to the two types of MWs. *CEO_CHAIR* and *SALARY_BONUS* are negatively and significantly related to only the entity level MW (*CEO_CHAIR*, p = .007; *SALARY_BONUS*, p = .005). This implies that powerful CEOs are more seriously concerned about the possible loss of reputation in SOX 404 reporting, especially with the disclosure of an entity level MW. Overall, our findings suggest that remediating an entity level MW is subject to resource constraints, and thus is highly influenced by CEOs, who usually have a high level of control over firm resources. Therefore, these CEO characteristics should not be ignored with regard to effectively remediating an entity level MW.

Potential Impacts of Audit Committee Effectiveness

Prior studies point out that audit committee effectiveness has positive impacts on internal control quality (Krishnan, 2005; Zhang, Zhou, & Zhou, 2007). To avoid the possibility that our results are affected by this, in this section we control for the potential effects of audit committee size, age, financial expertise, and gender on internal control quality. The audit committee characteristics data is collected from *Corporate Library*. We do not control for the meeting frequency and education level of audit committee members, because the data is not reported in *Corporate Library*. We re-test our regression model (1) (N = 3,717), and the results are reported in Table 8. Audit committee expertise and size are found to have positive impacts on internal control quality, and results of CEO variables are similar as our previous results.

MW Disclosure and Subsequent CEO Turnover

Li, Sun, and Ettredge (2010) suggest that firms with MW disclosure have less qualified CFOs and experience more CFO turnover in the subsequent year, with the newly appointed CFOs having better qualifications than the previous ones. Accordingly, we conduct the following analyses.

First, we identify whether firms with MW disclosures are more likely to change their CEOs in the subsequent year. Using 3,016 firms with CEO turnover and MW data from the *Compustat* and *AuditAnalytics* databases, we find that MW firms are positively associated with CEO turnover in the next year, after controlling for factors that may affect this. However, this association is insignificant.

To examine how the severity of an MW affects CEO turnover, we design a variable, *MW_level*, which is 2 if the MW is entity level, 1 if it is account level, and 0 if no MW is reported. We re-test the model and find that *MW_level* is marginally significant with regard to CEO turnover, indicating that firms which disclose more severe MWs are more likely to change their CEOs.

Further, we separate CEO turnover into three groups: CEO resignation, CEO dismissal, and CEO retire/other reasons. We match each group with the non-CEO turnover sample and re-run our model. The results show that MW firms are significantly and positively associated with only the subsequent year's CEO resignation. Our findings imply that disclosure of MWs may lead the CEO to resign.

Second, we examine the 166 MW firms in our sample, and find that only 12 of them have CEO turnovers in the subsequent year. We then observe the changes in characteristics of the predecessor and successor CEOs, and find that, on average, new CEOs have lower ownership and greater age, are less likely to be the chairperson of the board, and more likely to have a shorter tenure.

CEO Age and Generational Differences

To further explore the implications of CEO age, we consider that the effects of age on managerial behavior may be driven

TABLE 5
Second Stage Logistic Regression Analysis: CEO Characteristics and an MW

Dependent variable: MW

Variable	Expected sign	Coefficients	Coefficients
INTERCEPT	?	13.17 (<.001)***	13.55 (.001)***
CEO_ENTRENCH	+	.72 (.001)***	
CEO_SHARE	+		3.89 (.002)**
CEO_CHAIR	?		−.36 (.06)†
COM_RATIO	−		.69 (.11)
SALARY_BONUS	−		−.54 (.004)**
STOCK_OPTION	+		.20 (.41)
LONG_TENURE	+		.69 (.002)**
CEO_GENDER	−	−.60 (.27)	−.53 (.34)
CEO_AGE	−	−2.72 (.001)***	−2.85 (<.001)***
SEGMENT	+	1.69 (<.001)***	1.80 (<.001)***
FOREIGN	+	.26 (.20)	.32 (.12)
MERGER	+	.01 (.96)	.02 (.92)
RESTRUCTURE	+	.78 (.07)†	.93 (.04)*
SALE_GROWTH	+	.19 (.56)	.14 (.69)
INVENTORY	+	1.06 (.27)	1.42 (.15)
MARKET_VALUE	−	−.50 (.55)	−.20 (.81)
LOSS	+	.07 (.77)	.09 (.75)
ZSCORE	+	.22 (<.001)***	.26 (<.001)***
FIRM_AGE	−	.16 (.53)	.24 (.36)
BIG4	−	−.31 (.27)	−.14 (.63)
IMR	?	−1.47 (.63)	−2.07 (.51)
YEAR_DUMMY	?	YES	YES
INDUSTRY_ DUMMY	?	YES	YES
Pseudo R^2		18.17%	20.07%
Model Chi-Square		224 (<.001)***	249 (<.001)***
N		4,374	

This table reports the result of the second stage, model (2), and the values in parentheses display the p-value. *MW* = a dummy variable that takes a value of 1 if a firm reports that a "material weakness exists", and 0 if a firm reports "no material weakness found by the auditor"; *CEO_ ENTRENCH* = CEO entrenchment score based on the principal component factor analysis of the six CEO characteristics variables (*CEO_SHARE*; *CEO_CHAIR*; *COM_RATIO*; *SALARY_BONUS*; *STOCK_OPTION*, and *LONG_TENURE*); *CEO_SHARE* = the number of shares held by the CEO divided by number of shares outstanding; *CEO_CHAIR* = 1 if the CEO is also the chairperson of the board, and 0 otherwise; *COM_RATIO* = (salary + bonus)/compensation; *SALARY_BONUS* = the logarithm of (1 + salary + bonus); *STOCK_OPTION* = log(1 + OPTION_AWARDS)/log(compensation); *LONG_TENURE* = 1 if CEO tenure ranks top 20 percent, else 0; *CEO_GENDER* = a dummy variable that takes a value of 1 if the CEO is female, and 0 otherwise; *CEO_AGE* = the logarithm of CEO age; *SEGMENT* = logarithm of number of business segments; *FOREIGN* = a dummy variable that takes a value of 1 if the firm has a non-zero foreign currency transaction, and 0 otherwise; *MERGER* = a dummy variable that takes a value of 1 if the firm was involved in mergers or acquisitions over the three years, and 0 otherwise; *RESTRUCTURE* = a dummy variable that takes a value of 1 if the firm reported restructuring; *SALE_GROWTH* = a dummy variable that takes a value of 1 if industry-adjusted growth in sales falls into the top quintile, and 0 otherwise; *INVENTORY* = inventory divided by total assets; *MARKET_VALUE* = logarithm of market value of equity, where market value of equity is equal to price per share multiplied by number of shares outstanding; *LOSS* = a dummy variable that takes a value of 1 if the sum of earnings before extraordinary items over two years less than 0, and 0 otherwise; *ZSCORE* = the decreasing deciles rank of Altman's (1968) Z-Score; *FIRM_AGE* = logarithm of number of current year minus the beginning year reporting stock data in *CRSP*; *BIG4* = a dummy variable that takes a value of 1 if the firm is audited by a Big 4 audit firm, and 0 otherwise; *IMR* = inverse Mills ratio estimated in the first stage model (Doyle et al., 2007; Heckman, 1979); *YEAR_DUMMY* = a dummy variable of the firm's sample year; *INDUSTRY_DUMMY* = a dummy variable of the firm's industry.
†p < .10
*p < .05
**p < .01
***p < .001

TABLE 6
Descriptive Data of CEO Characteristics and MW Types

Panel A

Variables	Non-MW		Entity level MW			Account level MW		
	Mean	Median	Mean	Median	t-test	Mean	Median	t-test
CEO_ENTRENCH	-1.95	-2.06	-1.77	-1.84	-.18 (<.001)***	-1.73	-1.74	-.22 (.03)*
CEO_SHARE	.03	.01	.05	.02	-.02 (.001)**	.05	.01	-.03 (.13)
CEO_CHAIR	.49	.00	.32	.00	.17 (<.001)***	.53	1.00	-.04 (.62)
COM_RATIO	.29	.22	.36	.30	-.08 (<.001)***	.38	.33	-.09 (.05)†
SALARY_BONUS	6.71	6.71	6.46	6.45	.24 (<.001)***	6.54	6.57	.16 (.09)†
STOCK_OPTION	.58	.79	.55	.77	.03 (.33)	.53	.65	.05 (.47)
LONG_TENURE	.22	.00	.29	.00	-.07 (.07)†	.26	.00	-.05 (.48)
CEO_GENDER	.03	.00	.02	.00	.01 (.61)	.03	.00	.00 (.99)
CEO_AGE	4.01	4.01	3.97	3.97	.03 (.002)**	3.98	3.95	.03 (.16)
N	4,208		132			34		

Panel B

MW types	Excerpts from *AuditAnalytics* definitions	Frequency (percent)
A. Entity Level		
MONITORING	COSO category of Monitoring	202 (24.0%)
CONTROLENVIR	COSO category of Control Environment	21 (2.5%)
INFOCOM	COSO category of Information/Communications	12 (1.4%)
RISKASSESS	COSO category of Risk Assessment	8 (1.0%)
GENERAL_LEDGER	Controls over general ledger processes, including accruals, closing, consolidations, and SEC filings	64 (7.6%)
ITGC	Information technology general controls	35 (4.2%)
B. Account Level		
PURCHASES	Purchase to payment cycle	34 (4.0%)
REVENUES	Revenue to cash cycle	68 (8.1%)
COMPENSATION	Compensation, payroll and benefits	42 (5.0%)
FIXEDINTANG	Fixed assets and intangibles	49 (5.8%)
TAXES	Taxes	64 (7.6%)
LIABILITIES	Commitments and contingencies	58 (6.9%)
TREASURY	Treasury and investments.	6 (.7%)
DOCUMENTATION	Accounting documentation	116 (13.8%)
RESTATEMENT	Restatement of disclosures or company filings	40 (4.8%)
OTHER		23 (2.7%)
Total MW sample		166

This table reports the descriptive data of CEO characteristics and MW types, and sample distribution by MW types. The values in parentheses display the p-value of t-test. *Entity Level MW* = 1 if the material internal control weakness reported in the auditor's SOX Section 404 opinion is classified as entity level, else 0 (Bedard & Graham, 2011); *Account Level MW* = 1 if the material internal control weakness reported in the auditor's SOX Section 404 opinion is classified as account level, else 0 (Bedard & Graham, 2011); *CEO_ ENTRENCH* = CEO entrenchment score based on the principal component factor analysis of the six CEO characteristics variables (*CEO_SHARE; CEO_CHAIR; COM_RATIO; SALARY_BONUS; STOCK_OPTION, and LONG_TENURE*); *CEO_SHARE* = the number of shares held by the CEO divided by number of shares outstanding; *CEO_CHAIR* = 1 if the CEO is also the chairperson of the board, and 0 otherwise; *COM_RATIO* = (salary + bonus)/compensation; *SALARY_BONUS* = the logarithm of (1 + salary + bonus); *STOCK_OPTION* = log(1 + OPTION_AWARDS)/log(compensation); *LONG_TENURE* = 1 if CEO tenure ranks top 20 percent, else 0; *CEO_GENDER* = a dummy variable that takes a value of 1 if the CEO is female, and 0 otherwise; *CEO_AGE* = the logarithm of CEO age.
†p < .10
*p < .05
**p < .01
***p < .001

TABLE 7
Logistic Regression Analysis of CEO Characteristics and MW Types

Variable	Expected sign	Entity Level MW		Account Level MW	
		Coefficients	Coefficients	Coefficients	Coefficients
INTERCEPT		11.46 (.001)**	11.22 (.004)**	15.35 (.03)*	17.35 (.02)*
CEO_ENTRENCH	+	.67 (.001)**		.87 (.03)*	
CEO_SHARE	+		3.15 (.02)*		4.71 (.06)†
CEO_CHAIR	?		−.59 (.007)**		.34 (.38)
COM_RATIO	−		.69 (.15)		.74 (.43)
SALARY_BONUS	−		−.57 (.005)**		−.41 (.33)
STOCK_OPTION	+		.10 (.70)		.56 (.31)
LONG_TENURE	+		.75 (.003)**		.59 (.22)
CEO_GENDER	−	−.62 (.32)	−.52 (.41)	−.49 (.65)	−.40 (.71)
CEO_AGE	−	−2.51 (.001)**	−2.46 (.003)**	−3.46 (.02)*	−4.01 (.01)*
SEGMENT	+	1.58 (<.001)***	1.69 (<.001)***	2.19 (.004)**	2.29 (.003)**
FOREIGN	+	.22 (.32)	.28 (.21)	.39 (.37)	.42 (.36)
MERGER	+	−.19 (.49)	−.19 (.47)	.74 (.12)	.81 (.09)†
RESTRUCTURE	+	.45 (.34)	.58 (.23)	2.21 (.04)*	2.32 (.03)*
SALE_GROWTH	+	.27 (.47)	.22 (.56)	−.15 (.84)	−.19 (.79)
INVENTORY	+	.02 (.98)	.35 (.76)	4.32 (.02)*	4.43 (.02)*
MARKET_VALUE	−	−.99 (.26)	−.72 (.43)	1.71 (.43)	1.86 (.39)
LOSS	+	.04 (.89)	.00 (.98)	.17 (.77)	.28 (.63)
ZSCORE	+	.19 (.001)**	.24 (.001)***	.27 (.04)*	.30 (.03)*
FIRM_AGE	−	.28 (.35)	.35 (.24)	−.19 (.70)	−.14 (.78)
BIG4	−	−.38 (.20)	−.21 (.49)	.10 (.88)	.13 (.85)
IMR	?	.68 (.84)	.33 (.92)	−10.80 (.17)	−11.40 (.15)
YEAR_DUMMY	?	YES	YES	YES	YES
INDUSTRY_ DUMMY	?	YES	YES	YES	YES
Pseudo R^2		18.56%	20.76%	16.93%	18.30%
Model Chi-Square		196 (<.001)***	220 (<.001)***	64 (<.001)***	69 (<.001)***
N		4,340		4,242	

This table reports the result of the logistic regression analysis of CEO characteristics and MW types, and the value in parentheses display the p-value. *Entity Level MW* = 1 if the material internal control weakness reported in the auditor's SOX Section 404 opinion is classified as entity level, else 0 (Bedard & Graham, 2011); *Account Level MW* = 1 if the material internal control weakness reported in the auditor's SOX Section 404 opinion is classified as account level, else 0 (Bedard & Graham, 2011); *CEO_ ENTRENCH* = CEO entrenchment score based on the principal component factor analysis of the six CEO characteristics variables (*CEO_SHARE*; *CEO_CHAIR*; *COM_RATIO*; *SALARY_BONUS*; *STOCK_OPTION*, and *LONG_TENURE*); *CEO_SHARE* = the number of shares held by the CEO divided by number of shares outstanding; *CEO_CHAIR* = 1 if the CEO is also the chairperson of the board, and 0 otherwise; *COM_RATIO* = (salary+ bonus)/compensation; *SALARY_BONUS* = the logarithm of (1 + salary + bonus); *STOCK_OPTION* = log(1 + OPTION_AWARDS)/ log(compensation); *LONG_TENURE* = 1 if CEO tenure ranks top 20 percent, else 0; *CEO_GENDER* = a dummy variable that takes a value of 1 if the CEO is female, and 0 otherwise; *CEO_AGE* = the logarithm of CEO age; *SEGMENT* = logarithm of number of business segments; *FOREIGN* = a dummy variable that takes a value of 1 if the firm has a non-zero foreign currency transaction, and 0 otherwise; *MERGER* = a dummy variable that takes a value of 1 if the firm was involved in mergers or acquisitions over the three years, and 0 otherwise; *RESTRUCTURE* = a dummy variable that takes a value of 1 if the firm reported restructuring; *SALE_GROWTH* = a dummy variable that takes a value of 1 if industry-adjusted growth in sales falls into the top quintile, and 0 otherwise; *INVENTORY* = inventory divided by total assets; *MARKET_VALUE* = logarithm of market value of equity, where market value of equity is equal to price per share multiplied by number of shares outstanding; *LOSS* = a dummy variable that takes a value of 1 if the sum of earnings before extraordinary items over two years less than 0, and 0 otherwise; *ZSCORE* = the decreasing deciles rank of Altman's (1968) Z-Score; *FIRM_AGE* = logarithm of number of current year minus the beginning year reporting stock data in *CRSP*; *BIG4* = a dummy variable that takes a value of 1 if the firm is audited by a Big 4 audit firm, and 0 otherwise; *IMR* = inverse Mills ratio estimated in the first stage model (Doyle et al., 2007; Heckman, 1979); *YEAR_DUMMY* = a dummy variable of the firm's sample year; *INDUSTRY_DUMMY* = a dummy variable of the firm's industry.
†p < .10
*p < .05
**p < .01
***p < .001

TABLE 8
Logistic Regression Analysis: CEO Characteristics and an MW controlling for Audit Committee Effects

Variable	Expected sign	Full sample		BIG 4 sample	
		Coefficients	Coefficients	Coefficients	Coefficients
INTERCEPT	?	13.59 (<.001)***	13.86 (<.001)***	10.88 (.002)**	12.39 (.001)**
CEO_ENTRENCH	+	.67 (<.001)***		.62 (.004)**	
CEO_SHARE	+		3.46 (.007)**		2.54 (.09)†
CEO_CHAIR	?		−.41 (.04)*		−.46 (.03)*
COM_RATIO	−		.78 (.08)†		.48 (.33)
SALARY_BONUS	−		−.53 (.005)**		−.43 (.05)†
STOCK_OPTION	+		.29 (.25)		.18 (.50)
LONG_TENURE	+		.73 (.002)**		.93 (<.001)***
CEO_GENDER	−	−.46 (.41)	−.34 (.54)	−1.47 (.15)	−1.29 (.21)
CEO_AGE	−	−2.50 (<.001)***	−2.59 (<.001)***	−2.06 (.008)**	−2.40 (.004)**
SEGMENT	+	1.71 (<.001)***	1.83 (<.001)***	1.98 (<.001)***	2.07 (<.001)***
FOREIGN	+	.25 (.23)	.31 (.14)	.43 (.05)†	.46 (.04)*
MERGER	+	.07 (.77)	.09 (.71)	.12 (.63)	.11 (.67)
RESTRUCTURE	+	.86 (.05)†	1.04 (.02)*	1.29 (.009)**	1.46 (.004)**
SALE_GROWTH	+	.12 (.73)	.05 (.89)	−.37 (.35)	−.46 (.26)
INVENTORY	+	.89 (.37)	1.19 (.24)	.58 (.60)	.95 (.40)
MARKET_VALUE	−	−.27 (.75)	.08 (.93)	.37 (.69)	.64 (.51)
LOSS	+	.01 (.98)	.00 (.98)	.04 (.88)	.03 (.92)
ZSCORE	+	.21 (<.001)***	.26 (<.001)***	.24 (.001)***	.29 (<.001)***
FIRM_AGE	−	.31 (.23)	.40 (.13)	.32 (.23)	.41 (.14)
BIG4	−	−.32 (.25)	−.15 (.61)		
IMR	?	−2.05 (.51)	−2.78 (.39)	−4.7 (.17)	−5.32 (.13)
AC_SIZE	?	−.21 (.03)*	−.20 (.04)*	−.19 (.06)†	−.18 (.08)†
AC_AGE	?	−.03 (.10)	−.03 (.06)†	−.02 (.17)	−.03 (.17)
AC_EXPERT	−	−.76 (.04)*	−.77 (.04)*	−.70 (.07)†	−.74 (.06)†
AC_FEMALE	?	1.64 (.008)**	1.69 (.006)**	1.55 (.02)*	1.61 (.01)*
YEAR_DUMMY	?	YES	YES	YES	YES
INDUSTRY_DUMMY	?	YES	YES	YES	YES
Pseudo R²		20.82%	22.79%	21.44%	23.16%
Model Chi-Square		258 (<.001)***	283 (<.001)***	238 (<.001)***	257 (<.001)***
N		3,717		3,488	

This table reports the result of the logistic regression analysis of CEO characteristics and an MW controlling for audit committee effects, and the values in parentheses display the p-value. *MW* = a dummy variable that takes a value of 1 if a firm reports that a "material weakness exists", and 0 if a firm reports "no material weakness found by the auditor"; *CEO_ ENTRENCH* = CEO entrenchment score based on the principal component factor analysis of the six CEO characteristics variables (*CEO_SHARE*; *CEO_CHAIR*; *COM_RATIO*; *SALARY_BONUS*; *STOCK_OPTION*, and *LONG_TENURE*); *CEO_SHARE* = the number of shares held by the CEO divided by number of shares outstanding; *CEO_CHAIR* = 1 if the CEO is also the chairperson of the board, and 0 otherwise; *COM_RATIO* = (salary + bonus)/compensation; *SALARY_BONUS* = the logarithm of (1 + salary + bonus); *STOCK_OPTION* = log(1 + OPTION_AWARDS)/log(compensation); *LONG_TENURE* = 1 if CEO tenure ranks top 20 percent, else 0; *CEO_GENDER* = a dummy variable that takes a value of 1 if the CEO is female, and 0 otherwise; *CEO_AGE* = the logarithm of CEO age; *SEGMENT* = logarithm of number of business segments; *FOREIGN* = a dummy variable that takes a value of 1 if the firm has a non-zero foreign currency transaction, and 0 otherwise; *MERGER* = a dummy variable that takes a value of 1 if the firm was involved in mergers or acquisitions over the three years, and 0 otherwise; *RESTRUCTURE* = a dummy variable that takes a value of 1 if the firm reported restructuring; *SALE_GROWTH* = a dummy variable that takes a value of 1 if industry-adjusted growth in sales falls into the top quintile, and 0 otherwise; *INVENTORY* = inventory divided by total assets; *MARKET_VALUE* = logarithm of market value of equity, where market value of equity is equal to price per share multiplied by number of shares outstanding; *LOSS* = a dummy variable that takes a value of 1 if the sum of earnings before extraordinary items over two years less than 0, and 0 otherwise; *ZSCORE* = the decreasing deciles rank of Altman's (1968) Z-Score; *FIRM_AGE* = logarithm of number of current year minus the beginning year reporting stock data in *CRSP*; *BIG4* = a dummy variable that takes a value of 1 if the firm is audited by a Big 4 audit firm, and 0 otherwise; *IMR* = inverse Mills ratio estimated in the first stage model (Doyle et al., 2007; Heckman, 1979); *AC_SIZE* = the number of audit committee members; *AC_AGE* = logarithm of average age of audit committee members; *AC_EXPERT* = the percentage of financial experts on audit committee; *AC_FEMALE* = the percentage of female members on audit committee; *YEAR_DUMMY* = a dummy variable of the firm's sample year; *INDUSTRY_DUMMY* = a dummy variable of the firm's industry.
†p < .10
*p < .05
**p < .01
***p < .001

by generational factors. Generational differences are commonly attributed to rapid changes in politics, culture, and fashion, and such factors are likely to affect both the actual work and ethical values of managers. For example, Wey Smola and Sutton (2002) find that work values are more affected by generational practices than by maturation. Twenge and Campbell (2008) review the literature on generational differences, and indicate that Generation X shows a weaker work ethic than Baby Boomers and the so-called Silent Generation. Parker and Cusmir (1990) suggest that managers of the Silent Generation, born before 1944, were more traditional, while Baby Boomer managers are more likely to have more humanistic values. Therefore, we classify our sample CEOs into three different generations by age: *Silent_Generation* (pre-1943), *Baby_Boomers* (1944–1960), and *Generation X* (1961–1980). We use two dummy generation variables, *Silent_Generation* and *Baby_Boomers*, to replace *CEO_AGE* and re-test our model. We find that compared to *Generation X* (the default variable), *Silent_Generation* has a stronger and significantly negative effect on MW, and *Baby_Boomers* has a negative but insignificant effect on MW. The results show that it is also likely that the negative effect of age on MW is due to the generational differences among managers.

Sensitivity Analysis

The internal control quality of small firms may be different from that of large firms, because it is more difficult for the former to afford the significant costs of meeting the SOX 404 requirements (Iliev, 2010; Kamar, Karaca-Mandic, & Talley, 2007; Small Business Administration, 2005). In model (1), we control for the size effect using *MARKET_VALUE*. To exclude the size effect of extremely small firms, we delete those with a market value of less than 75 million US dollars (small and mid-sized businesses, as defined by the SEC 2005b), and the results do not change.

We also consider the influence of quasi-retired CEOs on our model, and follow Barro and Barro (1990) by using 63 years old, a dummy variable, as the benchmark of quasi-retired. The results are consistent with our main findings, and our quasi-retired dummy variable has insignificant results. In addition, we also refer to Huang, Rose-Green, and Lee (2012) and use 62 years old to measure quasi-retired. The results remain unchanged.

To examine the potentially nonlinear relation between age and MW, we control for the square of *CEO_AGE* in our model. The results remain consistent with our earlier findings.

With regard to the potential effect of CEO turnover on internal control quality, we test CEO turnover and find that it is insignificantly related to MW. We also exclude firms with CEO turnover (34 firms) and re-test the reduced sample, and our results for CEO characteristics remained unchanged.

To increase the representativeness of our findings, we include 663 financial firms with CEO data reported in *Compustat/ExecuComp* into our sample and re-test the model. The results are still consistent with our earlier findings. In addition, we also use Fama and French's (1992) approach to identify the industries, and the results are similar.

Following Hu and Kumar (2004), we include market-to-book ratio (*MTB*) and R&D ratio (*RD_ASSET*) to control for growth and investment opportunities. While the empirical results remain similar, the coefficients of these two control variables are insignificant. We also use ROE and the previous year's stock returns to control for the impact of past performance, and the results remain unchanged.

We also conduct tests using an ordered logit regression model with the total number of MWs as the dependent variable, and find similar results as in our main analyses.

CONCLUSIONS

Both internal control quality and the effectiveness of SOX 404 are important issues in the current corporate governance research field. In this study, we investigate the influence of CEO characteristics on internal control quality post-SOX. Using a sample of 4,374 *ExecuComp* non-financial firms, we find that CEOs with higher ownership, longer tenure, and younger age are significantly associated with an MW under SOX 404. We thus suggest that these CEO characteristics should be considered to effectively remediate an entity level MW, as they appear to affect how CEOs behave in response to the SOX 404 requirements.

Although this paper is closely related to a prior study (Ashbaugh-Skaife et al., 2007), it has some significant differences. Before the enactment of SOX 404, SOX 302 required top managers to evaluate the effectiveness of disclosure controls and procedures in Form 10-K or Form 10-Q filings (SEC, 2002). Using one-year internal control disclosures (ICD) after SOX 302 becomes effective,[8] but before the implementation of SOX 404, Ashbaugh-Skaife et al. (2007) discovered that CEO tenure had no significant impact on internal control quality for firms that were not yet required to comply with SOX 404 in 2003. In this study, we find similar and more persuasive results based on a larger sample of firms following the SOX 404 requirements. In addition, our findings also support those of Doyle et al. (2007), who only examine the effects of firm characteristics on MW, by exploring whether CEO entrenchment, age, and gender affect the quality of internal controls, an issue which is not discussed in prior research.

Our study is subject to the following limitations, some of which may be of interest to future researchers. First, there is still a possibility that an MW is affected by other management characteristics, such as ethnicity, nationality, cultural differences, personality, qualifications, experience, social networks, and so on, and we do not examine these in this work because of data limitations. We thus suggest that future researchers investigate these qualitative CEO characteristics by using a questionnaire approach. Second, the sample firms we examined are mostly large ones in *Compustat/ ExecuComp*. Since SOX 404 imposes huge costs on small firms, future research could explore the management characteristics and major MWs of such companies, as the results may help small businesses to improve both internal control quality and the reliability of financial reporting under limited budgets. Because the *Compustat/ExecuComp*

database does not report CEO characteristics data for non-US cross-listed companies, we are unable to examine the effects of these on MW. Finally, we control for the impact of auditor quality on internal control quality by a BIG 4 dummy variable, but do not consider all the attributes of auditors. In the US, the audit report only presents the basic information about the audit firms. Future researchers may thus utilize Chinese or Taiwanese audit reports, which include individual auditor information, such as gender and age, to explore the effects of auditor characteristics on internal control quality.

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NOTES

1. The Committee of Sponsoring Organizations (COSO) defines internal control as "A process effected by the entity's board of directors, management, and other personnel, designed to provide reasonable assurance regarding, achievement of (the entity's) objectives on the reliability of financial reporting, effectiveness and efficiency of operations, and compliance with applicable laws and regulations." See http://www.coso.org/.
2. SOX Section 404 attempts to improve internal control effectiveness by adding external supervision from auditors, and thus provides higher quality financial reporting to market investors under a more complete monitoring process (Goh, 2009; Li et al., 2010).
3. In 2003, the US SEC accused HealthSouth Corporation and its CEO, Richard M. Scrushy, of accounting fraud in related to inflated earnings reports (SEC, 2003b).
4. In 2012, Meg Whitman, the CEO of HP, accused some ex-managers of Autonomy of hiding the company's true value via fraudulent accounting methods (Fisher, 2012).
5. Potential clustering effects along two dimensions, firm and time, are controlled by SAS cluster identifiers.
6. Big 4 audit quality may have an impact on the association between management characteristics and an MW, because Big 4 auditors may choose clients with better internal control mechanisms, and have more industry specialists to monitor and improve the quality of clients' internal control quality (Rose-Green, Huang, & Lee, 2011). In addition, the prior literature suggests that when the senior management devotes attention to the development of enterprise risk management, Big 4 auditors may act as a facilitator to extend the implementation of this (Mark, Clune, & Hermanson, 2005). In this section, we provide an additional regression analysis for Big 4 clients in order to exclude the potential impact of Big 4 audit quality.
7. If a firm reports SOX 404 internal control weaknesses of both an entity level MW and an account level MW, the firm will be classified as having only an entity level MW.
8. Three conditions must exist for a registrant to disclose an ICD under Section 302: (1) an ICD must exist; (2) the deficiency must be discovered by management or the independent auditor; and

(3) management, perhaps after consultation with its independent auditor, must conclude that the deficiency should be publicly disclosed (Ashbaugh-Skaife et al., 2007).

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