

## **Does Tone at the Top Affect Internal Control Quality?**

**Hanmei Chen**

*Western Washington University*

**Shaowen Hua**

*California State University, Monterey Bay*

**Xiaojie Christine Sun\***

*California State University, Los Angeles*

**Lijuan Zhao**

*California State University, Los Angeles*

### **ABSTRACT**

Tone at the top is recognized as the foundation of the five components of the Internal Control–Integrated Framework. While the importance of tone at the top is highly recognized in regulations and professional guidance, there is a lack of empirical evidence on the effects of tone at the top on internal control quality. In this study, we examine how tone at the top, measured by the CEOs' and the CFOs' career stage difference, affects the internal control quality. We find a significantly lower level of internal control material weaknesses when there is a greater CEO-CFO career stage difference. Furthermore, we find the effects of CEO-CFO career stage difference on internal control effectiveness are diluted in companies exposed to high litigation risks. To our knowledge, this study is the first to examine the joint effect of CEOs and CFOs on internal control quality. Our research contributes to the current literature by providing evidence of the impact of CEO/CFO interactive characteristics on internal control effectiveness. It also sheds light on the relationship between the CEO and the CFO in the decision-making process.

**Keywords:** Internal Control, CEO-CFO Career Stage Difference, Tone at the Top

**JEL:** M4

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\* Corresponding author. Tel: 323-343-2844. Email: xsun21@calstatela.edu

## 1. Introduction

The Internal Control–Integrated Framework (COSO Framework) issued by the Committee of Sponsoring Organization of the Treadway Commission (COSO) is recognized as the leading guide for firms' internal control design and assessment. COSO Framework was first issued in the year of 1992 and was later updated in May 2013. Both COSO Frameworks include five components of internal control. Among these five components, the control environment, also referred to as tone at the top, is considered the most important component and the foundation of internal control (COSO 1992; COSO 2013). This study aims to provide empirical evidence on the effects of tone at the top on internal control quality.

While the importance of tone at the top is strongly emphasized by the regulators and professional guidance (PCAOB 2004; IIA 2010; ACFE 2012), there is little empirical evidence on the effects of tone at the top on internal control quality. Prior literature studying tone at the top mostly use experimental or survey method to measure the commitment to ethics or perceived tone at the top as a proxy (Hansen et al. 2009; Hunton et al. 2010; D'Aquila and Bean 2011). These approaches may capture the subjective estimation of the respondents and, therefore, may generate noise in the results. In this study, we use the archival measure of CEO-CFO career stage difference as a proxy for tone at the top. CEO-CFO career stage difference means that a firm's CEO and CFO are at different career stages and have different career concerns and goals. While pre-retirement CEOs have fewer concerns with their future career and are more likely to set the tone of pursuing earnings, younger CFOs who have more career concerns may constrain earnings management behavior (Zhang 2013; Cheng et al. 2016; Liu et al. 2017). Therefore, when there is a greater CEO-CFO career stage difference, the tone at the top of the firm is less likely to focus on the bottom-line earnings. We predict that the CEO-CFO career stage difference is positively associated with internal control quality.

We perform the logistic regression using 4,501 observations from the year 2007 to 2013. CEO-CFO career stage difference is measured by the age difference between the CEO and CFO in the firm's current year. Our results show that the CEO-CFO career stage difference is negatively related to firm's likelihood of reporting internal control material weaknesses. This is consistent with the notion that firms with greater CEO-CFO career stage differences are more likely to establish a better tone at the top, which results in higher internal control quality. We find similar results using the change in CEO-CFO career stage difference and change in internal control quality. The results suggest that internal control quality improves when CEO-CFO career stage difference becomes larger. Furthermore, rigorous litigation is expected to constrain management's opportunistic behavior. A company in a litigious environment may be more likely to exercise caution in its internal control system and financial reporting process. Therefore, we expect the effect of CEO-CFO career stage difference on internal control quality to be weakened for companies in litigious industries. Our analysis shows that the positive relationship between CEO-CFO career stage difference and internal control quality is only significant in non-litigation industries, suggesting the complementary effect of high litigation and good internal governance on internal control quality.

Our study contributes to the literature in two aspects. First, we use an archival measure of CEO-CFO career stage difference as a proxy for tone at the top and find a positive relationship between tone at the top and internal control quality. Our results fill in the gap in internal control literature and provide empirical evidence on the effects of the fundamental internal control component on internal control quality. Second, our results support the recent stream of literature investigating the CEO-CFO career stage difference (Zhang 2013; Cheng et al. 2016; Liu et al. 2017) and provide evidence that CEO-CFO career stage difference, which is a component of internal governance, has a significant effect on internal control quality.

The rest of this paper is organized as follows. Section 2 discusses prior literature and presents the research hypothesis. Section 3 provides the sample selection process and the

research design. Section 4 presents the univariate and multivariate results. Section 5 discusses the additional analyses, and section 6 concludes.

## **2. Literature Review and Hypothesis Development**

### *2.1 Tone at the Top*

COSO Framework 2013 defines tone at the top as “the set of standards, processes, and structures that provide the basis for carrying out internal control across the organization.” (COSO 2013). Both regulators and professional guidance require that managers and directors focus on ethics and integrity and set the right tone at the top. For example, SOX requires firms to disclose their adoption of a code of ethics for senior managers. If any firms do not adopt one, they need to explain the reason (SOX 406(a)). In addition, both the Center for Audit Quality and the Association of Certified Fraud Examiners emphasize the importance of tone at the top set by top management on firms’ efficiency in operations and long-term success (CAQ 2010; ACFE 2012). However, with a great focus on tone at the top in regulations and professional guidance, there is a lack of empirical measurement of tone at the top in academic literature. Prior literature generally measures tone at the top using two approaches, ethics, and perceived tone at the top.

The ethics of a corporation, set by the top management, is essential to the culture of corporate governance, including honesty, responsibility, and rights (Schwartz et al. 2005). Therefore, prior literature use firms’ commitment to ethics as a proxy for tone at the top and find results that commitment to ethics is associated with firms’ value and future success. For example, Verschoor (1998) use the manager’s commitment to ethics as the proxy of tone at the top and find that companies with a commitment to ethical behavior rank significantly higher than companies that do not disclose any commitment to ethics. D’Aquila and Bean (2000) conduct an experiment and find evidence that personnel assigned to tone at the top that does not foster ethical decisions are more likely to act unethically. Similarly, Booth and Schulz (2004) perform a factorial experiment and show that managers are less likely to continue a failing project when the environment is strongly ethical. Schaubroeck et al. (2012) conduct a survey and conclude that ethical conduct set by senior managers affects the whole company’s culture and, thus, employees’ behavior.

Another proxy for tone at the top used by prior literature is perceived tone at the top. This stream of literature uses surveys to capture employees’ assessment of tone at the top of their organizations. For example, Hansen et al. (2009) survey the internal auditors’ assessment of the tone at the top in their companies. The authors provide evidence that firms have a better tone at the top when the internal auditors assess the tone at the top frequently. Hunton et al. (2011) measure tone at the top as the mid-level financial reporting managers’ perception of tone at the top set by upper managers. The authors find results that tone at the top is essential in the financial reporting process and is positively associated with earnings quality.

One limitation of using ethics or perceived tone at the top as the proxy is that there is a lack of unique standards on the quality of tone at the top. Participants of the experiments and surveys may have different standards and may respond with their subjective estimations, which results in a noisy and unreliable measurement of tone at the top.

### *2.2 CEO-CFO Career Stage Difference*

Senior managers are the ones that involve in day-to-day activities in corporate governance and make operating decisions for companies. Consistently, professional guidance (COSO 1992; ACFE 2012; COSO 2013) highly recognizes the importance of senior managers in setting the tone of the top. Top managers pursuing only the bottom line may lead to employees’ commitment to cheating or fraud (ACFE 2012). In addition, real-world cases (e.g.,

Enron; WorldCom) provide examples of how the words and behaviors of top managers set the tone at the top of the company and affect companies' success.

Jensen and Meckling (1976) suggest that agency cost incurs when there is a conflict between the interests of the agent (managers) and the interests of the principal (shareholders). Fama (1980) extends this theory by considering the monitoring effects of the managerial labor market. Fama (1980) argues that good performance managers may not be rewarded immediately, but are rewarded by the labor market in the future. In other words, managers with a good performance in current period are more likely to find a good job when they are on the market in the future. Therefore, managers are aware that their current performance will have an impact on their future job opportunity and job benefits. Thus, agency costs may be decreased by managers' career concerns.

The career concerns for senior managers may not be as high as the ones for younger managers. Pre-retirement managers have less career concerns because it is less likely for them to be on the market to seek another job opportunity. Therefore, agency costs related to senior managers are higher, meaning senior managers are more likely to act for their personal benefit at the costs of companies' benefit. On the other hand, young managers have more career concerns because there are many years before they retire, and it is more likely for them to be on the labor market to seek job opportunities. Because of the career concern, agency costs related to younger managers are lessened, meaning younger managers are more likely to act for the benefit of the company rather than their own. Consistently, prior literature finds that pre-retirement managers are more likely to engage in earnings management behavior because they have less future career concerns (Dechow & Sloan, 1991; Barker & Mueller, 2002; Davidson et al., 2007). In addition to CEOs, CFOs are also responsible for the internal control quality. Li et al. (2010) find that firms are more likely to report internal control deficiencies when their CFOs have less accounting knowledge and experience.

In this study, we explore the interaction between firms' CEOs and CFOs. Specifically, we study the different career concerns between the CEO and the CFO in a firm, which is referred to as CEO-CFO career stage difference (Zhang 2013). Pre-retirement CEOs, who have less concern with their future career opportunities, may set a tone of pursuing the highest earning of the company to maximize CEOs' own compensation, which may lead to a low quality internal control. However, if the firm has a younger CFO, he/she may have a much bigger career concern. Then the CEO-CFO career stage difference is larger. The younger CFO may be unlikely to cooperate with the CEO's behavior. Thus, large CEO-CFO career stage differences set a positive tone at the top in the firm. Therefore, we predict that when there is a large CEO-CFO career stage difference, top management has a positive impact on a company's control environment, which results in a higher quality internal control. Our hypothesis is:

*H1: Firms' internal control quality is positively related to CEO-CFO career stage difference.*

### **3. Methodology**

#### *3.1 Sample Selection*

We obtain the information of firms' CEOs and CFOs from Execucomp for the years 2007-2013. We then merge the sample with the Audit Analytics database to obtain SOX 404 internal control material weakness and auditor-related information. The board characteristics are retrieved from BoardEx, and we require our sample firms to have sufficient financial information in Compustat. Following prior literature, we exclude financial companies (SIC codes 6000-6999) from our sample. This study only focuses on the situation where younger CFOs constrain the earnings management behavior of older CEOs. Therefore, we exclude the firm years with the CEO age smaller than or equal to the CFO age. Our final sample is composed of 4,501 firm-years from 2007 to 2013.

Table 1 shows the distribution of our sample firms by fiscal year and Fama-French 12 industries. Our sample varies slightly (17-20%) across the testing period except for the beginning (2007) and the terminal (2013) years because of the limited data in Execucomp and BoardEx. More than half of our observations are in Business Equipment (21.82%), Manufacturing (15.13%), and Other (14.53%) industries. Healthcare (10.55%) is the fourth largest industry in our sample.

**Table 1: Sample Year and Industry Distribution**

	2007	2008	2009	2010	2011	2012	2013	Total by Industry	%
<b>NoDur</b>	9	42	40	40	53	41	9	234	5.20
<b>Durbl</b>	7	30	30	32	30	31	3	163	3.62
<b>Manuf</b>	23	125	128	131	139	122	13	681	15.13
<b>Enrgy</b>	18	59	58	53	45	47	1	281	6.24
<b>Chems</b>	6	35	37	35	29	32	3	177	3.93
<b>BusEq</b>	51	200	186	177	177	167	24	982	21.82
<b>Telcm</b>	4	28	33	32	33	32	3	165	3.67
<b>Utils</b>	5	61	60	58	53	49	1	287	6.38
<b>Shops</b>	15	115	62	61	71	60	18	402	8.93
<b>Hlth</b>	28	98	93	86	87	80	3	475	10.55
<b>Other</b>	31	127	119	123	123	122	9	654	14.53
<b>Total by Fiscal Year</b>	197	920	846	828	840	783	87	4,501	100
<b>%</b>	4.38	20.44	18.8	18.4	18.66	17.4	1.93	100	

Industries are classified following Fama-French 12 industry portfolios: **NoDur** includes food, tobacco, textiles, apparel, leather, and toys industries; **Durbl** includes cars, TVs, furniture, household appliances industries; **Manuf** includes machinery, trucks, planes, office furniture, paper production, and printing industries; **Enrgya** includes oil, gas, and coal extraction and allied production industries; **Chems** includes chemical and allied product industries; **BusEq** includes the computer, software, and electronic industries; **Telcm** includes telephone and television transmission industries; **Utils** includes utility industries; **Shops** includes wholesale, retail, laundries repair shops and related industries; **Hlth** includes medical instrument and drugs; **Other** includes mines, construction, building management, transportation, hotels, entertainment.

### 3.2 Empirical Model

We follow prior studies to develop a logistic regression model on internal control material weakness and age difference (Naiker and Sharma 2009; Bruynseels and Cardinaels 2014):

$$\begin{aligned}
 ICMW = & \beta_0 + \beta_1 AGEDIFF + \beta_2 CEODUAL + \beta_3 BDSIZE + \beta_4 INDEP + \beta_5 FINEX + \\
 & \beta_6 ACSIZE + \beta_7 INITIAL + \beta_8 BIGFOUR + \beta_9 LOGTA + \beta_{10} GROWTH + \\
 & \beta_{11} LOSS + \beta_{12} FOREIGN + \beta_{13} SEGMENTS + \beta_{14} DEBT + \beta_{15} INVREC + \\
 & \beta_{16} RESTRUCTURE + \beta_{17} LITIGATION + \beta_{18} YEAR + \varepsilon
 \end{aligned}$$

The dependent variable is internal control material weakness (*ICMW*) which equals one if the company reports at least one internal control material weakness in the current fiscal year, and zero otherwise. Our variable of interest is the CEO-CFO career stage difference (*AGEDIFF*) measured by the age difference between the CEO and the CFO in the current year.

### 3.3 Control Variables

Prior literature documents that several board characteristics, audit engagement characteristics, and company's financial characteristics also affect the likelihood of reporting internal control material weakness. In this section, we briefly explain these variables and their expected relation with internal control material weakness.

#### 3.3.1 Board Characteristics

We measure CEO power as whether the CEO is also chairman of the board of directors (*CEODUAL*) (Hill and Phan 1991; Hermalin and Weisbach 1998; Core et al. 1999). If the CEO chairs the board of directors, he/she has the power to direct the policy of the organization as well as the financial reporting process. Therefore, we expect this variable to be positively correlated with *ICMW*. A large size of board of directors (*BOARDSIZE*) and audit committee (*ACSIZE*) indicates a high level of expertise and skills in the monitoring process (Berghe and Levrau 2004; Zhang et al. 2007). Thus, we expect a negative relationship between these two variables and internal control material weakness. Beasley (1996) finds a lower likelihood of fraud when boards are more independent, and DeFond et al. (2005) conclude that the level of independent members of the board (*INDEP*) may help offset the potential influence of management. We expect to find a negative coefficient of board independence. The passage of SOX increased the importance of financial experts in the proper functioning of the audit committee and, thus, we control for the financial experts (*FINEXP*) serving on the audit committee (Bruynseels and Cardinaels 2014; Krishnan 2005; Abbott et al. 2004; Carcello et al. 2002). We expect a negative association with the level of financial experts and the presence of material internal control weaknesses.

#### 3.3.2 Audit Engagement Characteristics

Previous studies use Big4/5 audit firms as a proxy of auditor quality and claim that Big4/5 audit firms have much greater resources and specialties (Ferguson and Stokes 2002). A good auditor should assess the internal control systems of the client and impact the quality of financial reporting (Ashbaugh et al. 2003). We expect a negative relationship between auditor quality (*BIGFOUR*) and internal control material weakness (*ICMW*). Ettredge et al. (2011) find that firms receiving an adverse opinion on internal control are significantly related to auditor change. We capture a change in auditors by identifying if an auditor is new to the firm (*INITIAL*), and we expect a positive association between auditor change and internal control material weakness (*ICMW*).

#### 3.3.3 Firm Financial Characteristics

Francis and Yu (2009) report that bigger firms tend to have better financial reporting quality, and thus we use the natural log of total assets (*LOGTA*) to proxy for firm size and expect a negative association with *ICMW*. Firms with rapid growth may have deteriorating controls (Beasley 1996). Therefore, we control the growth in sales as a proxy for rapid growth (*GROWTH*) along with the ratio of inventory and receivables to total assets (*INVREC*) (Ashbaugh-Skaife et al. 2008). We expect positive coefficients for both variables. Firms reporting losses (*LOSS*) are more likely to engage in earnings management (Ashbaugh-Skaife et al. 2008) and we expect a positive relationship between losses and *ICMW*. Ashbaugh-Skaife et al. (2008) also suggest that more complex operations are associated with poor financial

reporting quality while Carcello et al. (2005) and Doyle et al. (2007) agree and suggest there is a greater need for better monitoring as a firm becomes more complex. We expect positive coefficients for our proxies of firm complexity, number of operating segments (*SEGMENTS*) and restructuring activities (*RESTRUCTURE*), as suggested by Doyle et al. (2007). As firms become more globalized, there is an increasing demand for high-quality control systems (Ditello 2004) and thus, we measure the international operations using foreign currency gains or losses (*FOREIGN*) and expect a positive association with *ICMW*. Firms with high leverage are more likely to engage in earnings management or work around controls in order to avoid debt covenants (DeFond et al. 1991). Aier et al. (2005) find a positive relationship between leverage and accounting restatements. Thus, we use leverage (*DEBT*) to capture this potential influence and expect a positive coefficient. Firms operating in a litigious industry may have more incentive to discover and disclose internal control problems to minimize potential shareholder litigation (Ge and McVay 2005; Ashbaugh-Skaife et al. 2007). We expect a negative relationship between our litigious variable (*LITIGATION*) and *ICMW*. The detailed definitions of the variables are described in Appendix A.

## 4. Results

### 4.1 Univariate Results

Table 2 reports descriptive statistics of our variables. There are only 2.5% of our sample firms report at least one internal control material weakness (*ICMW*) in our sample year. CEO (*CEO\_AGE*) is, on average, older than CFO (*CFO\_AGE*) by nine years. About 63.8% of the sample firms have their CEO chairing the board of directors (*CEODUAL*). The size of the board (*BDSIZE*) is, on average, 9.089 people. The mean proportion of independent directors (*INDEPENDENCE*) on the board is 79.7%, and approximately 21% of the audit committee members are financial experts (*FINEX*). Audit committees (*ACSIZE*) are composed of 3.872 directors on average. Approximately 0.3% of our sample firms change their auditors (*INITIAL*) for the fiscal year, and 90.3% of the sample firms are audited by Big4 audit firms (*BIGFOUR*). The average sales growth rate (*GROWTH*) is 7.4%, and inventory and receivables (*INVREC*) are, on average, 23.3% of total assets. There are 19% firms in our sample incur losses (*LOSS*), and 52.5% of their capital is financed through debts (*DEBT*). Our sample firms have, on average, 3.285 operating segments (*SEGMENTS*), and 39.7% of them have foreign operations (*FOREIGN*). Finally, about 41.8% of observations experience restructuring during the year, and only 21% of our sample companies are in litigious industries.

**Table 2: Descriptive Statistics (n=4,501)**

Variable	Mean	Std Dev	Median	Min	Max
<i>ICMW</i>	0.025	0.157	0.000	0.000	1.000
<i>AGEDIFF</i>	0.090	0.068	0.080	0.000	0.300
<i>CEO_AGE</i>	57.353	6.874	57.000	29.000	95.000
<i>CFO_AGE</i>	48.368	6.060	48.000	29.000	76.000
<i>CEODUAL</i>	0.638	0.481	1.000	0.000	1.000
<i>BDSIZE</i>	9.089	2.216	9.000	5.000	15.000
<i>INDEPENDENCE</i>	0.797	0.111	0.833	0.429	0.929
<i>FINEX</i>	0.210	0.212	0.200	0.000	0.750
<i>ACSIZE</i>	3.872	0.989	4.000	2.000	7.000
<i>INITIAL</i>	0.003	0.058	0.000	0.000	1.000
<i>BIGFOUR</i>	0.903	0.296	1.000	0.000	1.000

<i>LOGTA</i>	7.609	1.688	7.540	3.933	11.792
<i>GROWTH</i>	0.074	0.225	0.062	-0.502	1.033
<i>LOSS</i>	0.190	0.392	0.000	0.000	1.000
<i>FOREIGN</i>	0.397	0.489	0.000	0.000	1.000
<i>SEGMENTS</i>	3.285	2.905	3.000	0.000	16.000
<i>DEBT</i>	0.525	0.236	0.522	0.087	1.317
<i>INVREC</i>	0.233	0.155	0.215	0.016	0.699
<i>RESTRUCTURE</i>	0.418	0.493	0.000	0.000	1.000
<i>LITIGATION</i>	0.210	0.407	0.000	0.000	1.000

Pair-wise correlations are displayed in Table 3. Correlations between *AGEDIFF* and the other independent variables are all less than 0.8, which does not pose multicollinearity issue (Gujarati 2003). Furthermore, untabulated variance inflation factors (VIF) show none of the variables exhibit VIF higher than 10. Thus, multicollinearity is not a concern in our regression model.

#### 4.2 Multivariate Results

The results of the logit regression of internal control material weakness and age difference are presented in Table 4. Consistent with our hypothesis, we find a negative and significant coefficient for the CEO and CFO age difference (*AGEDIFF*). The results support the notion that large CEO and CFO career stage difference sets a better tone at the top of the company and therefore increases the quality of internal control.

For the control variables, the coefficients on the size of the company (*LOGTA*), size of the board (*BOARDSIZE*), and the proportion of independent directors on the board (*INDEPENDENCE*) are significantly negative, suggesting that larger firms and firms with more independent boards are less likely to report internal control material weaknesses. In addition, unprofitable (*LOSS*) and highly leveraged (*DEBT*) companies are more likely to have weaker internal controls. Contrary to our expectation, we find a positive coefficient on *BIGFOUR*, suggesting that clients of Big4 audit firms are more likely to report internal control material weaknesses.

**Table 3: Pearson Correlation (n=4,501)**

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
(1) <i>ICMW</i>	1.000										
(2) <i>AGEDIFF</i>	-0.027	1.000									
(3) <i>CEODUAL</i>	-0.026	<b>0.050</b>	1.000								
(4) <i>BDSIZE</i>	<b>-0.074</b>	<b>-0.065</b>	<b>0.124</b>	1.000							
(5) <i>INDEP</i>	<b>-0.053</b>	<b>-0.146</b>	<b>-0.062</b>	<b>0.210</b>	1.000						
(6) <i>FINEX</i>	0.002	<b>-0.109</b>	<b>-0.128</b>	<b>-0.031</b>	<b>0.116</b>	1.000					
(7) <i>ACSIZE</i>	<b>-0.048</b>	-0.010	<b>0.088</b>	<b>0.506</b>	<b>0.329</b>	<b>-0.140</b>	1.000				
(8) <i>INITIAL</i>	0.014	0.019	0.006	-0.026	<b>-0.034</b>	-0.004	-0.026	1.000			
(9) <i>BIGFOUR</i>	-0.018	<b>-0.040</b>	<b>0.048</b>	<b>0.293</b>	<b>0.203</b>	<b>0.032</b>	<b>0.180</b>	<b>-0.030</b>	1.000		
(10) <i>LOGTA</i>	<b>-0.085</b>	<b>-0.049</b>	<b>0.204</b>	<b>0.650</b>	<b>0.219</b>	<b>-0.070</b>	<b>0.397</b>	<b>-0.031</b>	<b>0.390</b>	1.000	
(11) <i>GROWTH</i>	-0.007	-0.015	0.000	<b>-0.083</b>	<b>-0.047</b>	<b>0.032</b>	<b>-0.076</b>	<b>-0.031</b>	<b>-0.043</b>	<b>-0.046</b>	1.000
(12) <i>LOSS</i>	<b>0.083</b>	0.021	<b>-0.100</b>	<b>-0.112</b>	<b>-0.061</b>	0.005	<b>-0.095</b>	<b>0.037</b>	<b>-0.099</b>	<b>-0.190</b>	<b>-0.222</b>
(13) <i>FOREIGN</i>	0.012	<b>-0.048</b>	-0.027	0.000	<b>0.036</b>	<b>0.086</b>	-0.009	-0.002	0.012	-0.014	-0.006
(14) <i>SEGMENTS</i>	-0.027	<b>-0.051</b>	-0.026	<b>0.042</b>	<b>0.088</b>	<b>0.048</b>	<b>0.051</b>	0.007	0.028	<b>0.064</b>	-0.029
(15) <i>DEBT</i>	0.004	<b>-0.038</b>	0.012	<b>0.324</b>	<b>0.139</b>	-0.023	<b>0.244</b>	0.004	<b>0.225</b>	<b>0.420</b>	<b>-0.101</b>
(16) <i>INVREC</i>	0.024	0.019	-0.029	<b>-0.104</b>	<b>-0.074</b>	<b>0.044</b>	0.008	0.007	<b>-0.100</b>	<b>-0.221</b>	-0.028
(17) <i>RESTRUCTURE</i>	-0.006	<b>-0.088</b>	<b>-0.053</b>	<b>0.161</b>	<b>0.153</b>	<b>0.101</b>	<b>0.052</b>	-0.005	<b>0.107</b>	<b>0.133</b>	<b>-0.165</b>
(18) <i>LITIGATION</i>	-0.005	0.011	<b>-0.048</b>	<b>-0.126</b>	<b>-0.032</b>	<b>0.047</b>	<b>-0.144</b>	<b>0.052</b>	<b>-0.111</b>	<b>-0.160</b>	<b>0.046</b>

**Table 3: Pearson Correlation (Continued)**

	(12)	(13)	(14)	(15)	(16)	(17)	(18)
(12) <i>LOSS</i>	1.000						
(13) <i>FOREIGN</i>	0.002	1.000					
(14) <i>SEGMENTS</i>	-0.013	<b>0.372</b>	1.000				
(15) <i>DEBT</i>	<b>0.084</b>	<b>-0.077</b>	<b>-0.095</b>	1.000			
(16) <i>INVREC</i>	<b>0.035</b>	<b>0.141</b>	<b>0.162</b>	<b>-0.057</b>	1.000		
(17) <i>RESTRUCTURE</i>	<b>0.127</b>	<b>0.175</b>	<b>0.200</b>	<b>0.135</b>	<b>0.078</b>	1.000	
(18) <i>LITIGATION</i>	<b>0.060</b>	0.012	<b>0.058</b>	<b>-0.200</b>	<b>0.040</b>	0.019	1.000

\*Correlation figures are bold if they are significant at the 5 percent level. Variable definitions are described in Appendix A.

**Table 4: Logit Regression of Internal Control Material Weakness on Age Difference**

Variables	Expected Sign	Coefficient	Wald $\chi^2$	p-value
Intercept		2.102	3.818	0.051
<i>AGEDIFF</i>	-	-4.058	5.978	0.015
<i>CEODUAL</i>	+	-0.028	0.074	0.786
<i>BDSIZE</i>	-	-0.120	3.382	0.066
<i>INDEPENDENCE</i>	-	-1.924	4.611	0.032
<i>FINEX</i>	-	0.023	0.002	0.962
<i>ACSIZE</i>	-	0.001	0.000	0.994
<i>INITIAL</i>	+	0.100	0.033	0.855
<i>BIGFOUR</i>	-	0.299	3.453	0.063
<i>LOGTA</i>	-	-0.289	9.987	0.002
<i>GROWTH</i>	+	-0.309	0.511	0.475
<i>LOSS</i>	+	0.415	13.512	0.000
<i>FOREIGN</i>	+	0.145	1.796	0.180
<i>SEGMENTS</i>	+	-0.065	2.155	0.142
<i>DEBT</i>	+	0.681	2.925	0.087
<i>INVREC</i>	+	0.211	0.126	0.722
<i>RESTRUCTURE</i>	+	-0.022	0.042	0.838
<i>LITIGATION</i>	-	-0.190	2.267	0.132
Year fix effects		Included		
n		4,501		
Pseudo R-square		0.1093		

All independent variable definitions are described in Appendix A.

## 5. Additional Analyses

We perform several additional tests to demonstrate the robustness of our results and to explore further the relationship between internal control material weakness and CEO and CFO age difference.

In the last section, we show that a larger age difference between CEO and CFO is associated with less likelihood of having internal control material weakness. However, such a relationship could be due to the fact that the company already has no internal control material weakness, and the company has a large age gap between the CEO and the CFO. We then take the difference between *ICMW* of this year and *ICMW* of last year. The dependent variable is *Delta\_ICMW* ( $ICMW_t - ICMW_{t-1}$ ), which contains three values: -1, 0, and 1. We then regress *Delta\_ICMW* on the change of CEO and CFO age difference (*Delta\_AGEDIFF*). Table 5 reports that the change in age difference is significantly and negatively associated with the change in *ICMW*. The results suggest that when the age difference becomes larger this year, the company's internal controls become stronger.

**Table 5: Logit Regression of Change of ICMW on Change of AGEDIFF**

Variables	Expected Sign	Coefficient	Wald $\chi^2$	P-value
Intercept		-8.357	7.386	0.007
Intercept		0.112	0.001	0.971
<i>Delta_AGEDIFF</i>	-	-6.471	6.825	0.009
<i>CEODUAL</i>	+	-0.128	0.375	0.540
<i>BDSIZE</i>	-	-0.085	1.853	0.173
<i>INDEPENDENCE</i>	-	-0.285	0.085	0.771
<i>FINEX</i>	-	0.227	0.229	0.632
<i>ACSIZE</i>	-	0.068	0.318	0.573
<i>INITIAL</i>	+	2.383	4.179	0.041
<i>BIGFOUR</i>	-	-0.590	2.824	0.093
<i>LOGTA</i>	-	0.120	1.913	0.167
<i>GROWTH</i>	+	-0.162	0.113	0.737
<i>LOSS</i>	+	-0.070	0.067	0.796
<i>FOREIGN</i>	+	-0.317	2.192	0.139
<i>SEGMENTS</i>	+	-0.052	2.126	0.145
<i>DEBT</i>	+	-1.178	6.729	0.010
<i>INVREC</i>	+	-0.281	0.173	0.678
<i>RESTRUCTURE</i>	+	0.016	0.005	0.942
<i>LITIGATION</i>	+	0.127	0.258	0.612
Year Fix Effects		Included		
n		3,265		
Pseudo R <sup>2</sup>		0.0467		

The dependent variable is *Delta\_ICMW* ( $ICMW_t - ICMW_{t-1}$ ), which contains three values: -1, 0, and 1. All independent variable definitions are described in Appendix A.

A litigious environment makes companies cautious about their financial reporting process and thus may dilute the effect of age differences on internal control quality. We interact *AGEDIFF* with *LITIGATION* to observe whether the effects of the age difference between CEOs and CFOs on the internal control quality is different for companies in litigious industries. As reported in Table 6, the coefficient of the interaction of *AGEDIFF* and *LITIGATION* is significantly positive, and the combined coefficient of *AGEDIFF* and the interaction is also significantly positive (coefficient is 1.7978; p-value is 0.0421). The age difference between CEO and CFO appears to be less influential on internal controls for companies in litigious industries.

**Table 6: Logit Regression of Internal Control Material Weakness on Age Difference Interacted with Litigious Industries**

Variables	Expected Sign	Coefficient	Wald $\chi^2$	p-value
Intercept		1.887	3.026	0.082
<i>AGEDIFF</i>	-	-5.794	9.033	0.003
<i>LITIGATION</i>	-	-0.502	5.687	0.017
<i>AGEDIFF*LITIGATION</i>	+	7.592	4.133	0.042
<i>CEODUAL</i>	+	-0.035	0.119	0.730
<i>BDSIZE</i>	-	-0.123	3.521	0.061
<i>INDEPENDENCE</i>	-	-1.900	4.477	0.034
<i>FINEX</i>	-	0.026	0.003	0.957
<i>ACSIZE</i>	-	0.003	0.001	0.983
<i>INITIAL</i>	+	0.051	0.009	0.926
<i>BIGFOUR</i>	-	0.285	3.122	0.077
<i>LOGTA</i>	-	-0.291	10.050	0.002
<i>GROWTH</i>	+	-0.298	0.479	0.489
<i>LOSS</i>	+	0.419	13.819	0.000
<i>FOREIGN</i>	+	0.147	1.827	0.177
<i>SEGMENTS</i>	+	-0.064	2.073	0.150
<i>DEBT</i>	+	0.699	3.033	0.082
<i>INVREC</i>	+	0.147	0.061	0.805
<i>RESTRUCTURE</i>	+	-0.022	0.042	0.838
<i>AGEDIFF+AGEDIFF*LITIGATION</i>		1.7978	4.133	0.0421
Year Fix Effects		Included		
N		4,501		
Pseudo R <sup>2</sup>		0.1133		

All independent variable definitions are described in Appendix A.

We separate sample firms into litigious and non-litigious groups to run logistic regressions on these subsamples and compare their coefficients using F-test. Table 7a reports the result of the litigious subsample. We do not find evidence that age difference is associated with internal control effectiveness in litigious industries. In Table 7b, the results of non-litigious industries, the age difference is negatively associated with *ICMW*. Table 7c reports the significance of the difference in coefficients of subsamples. The difference in *AGEDIFF* between litigious and non-litigious industries is significant at 0.1 level, suggesting that the age gap is an effective means of enhancing internal controls only when the company is not in a litigious industry.

**Table 7a: Logit Regression of Internal Control Material Weakness on Age Difference under Litigious Environment (LITIGATION=1)**

Variable	Expected Sign	Coefficient	Wald $\chi^2$	P-value
Intercept		2.937	1.305	0.253
<i>AGEDIFF</i>	-	0.007	0.000	0.998
<i>CEODUAL</i>	+	-0.042	0.028	0.867
<i>BDSIZE</i>	-	-0.145	0.665	0.415
<i>INDEP</i>	-	-4.228	3.730	0.054
<i>FINEX</i>	-	-0.121	0.011	0.915
<i>ACSIZE</i>	-	0.495	2.030	0.154
<i>INITIAL</i>	+	0.703	1.379	0.240
<i>BIGFOUR</i>	-	0.601	2.721	0.099
<i>LOGTA</i>	-	-0.313	1.857	0.173
<i>GROWTH</i>	+	1.071	1.803	0.179
<i>LOSS</i>	+	0.791	8.297	0.004
<i>FOREIGN</i>	+	-0.275	0.985	0.321
<i>SEGMENTS</i>	+	-0.037	0.167	0.683
<i>DEBT</i>	+	-0.751	0.546	0.460
<i>INVREC</i>	+	1.531	1.193	0.275
<i>RESTRUCTURE</i>	+	0.100	0.135	0.713
Year Fix Effects		Included		
n		945		
Pseudo R <sup>2</sup>		0.203		

All independent variable definitions are described in Appendix A.

**Table 7b: Logit Regression of Internal Control Material Weakness on Age Difference under Nonlitigious Environment (LITIGATION=0)**

Variable	Expected Sign	Coefficient	Wald $\chi^2$	P-value
Intercept		-4.144	0.000	0.991
<i>AGEDIFF</i>	-	-5.356	9.060	0.003
<i>CEODUAL</i>	+	-0.018	0.024	0.877
<i>BDSIZE</i>	-	-0.115	2.597	0.107
<i>INDEP</i>	-	-1.567	2.468	0.116
<i>FINEX</i>	-	0.015	0.001	0.978
<i>ACSIZE</i>	-	-0.069	0.219	0.640
<i>INITIAL</i>	+	-6.280	0.000	0.986
<i>BIGFOUR</i>	-	0.210	1.294	0.255
<i>LOGTA</i>	-	-0.306	8.683	0.003

<i>GROWTH</i>	+	-0.760	1.981	0.159
<i>LOSS</i>	+	0.341	7.050	0.008
<i>FOREIGN</i>	+	0.224	3.460	0.063
<i>SEGMENTS</i>	+	-0.063	1.415	0.234
<i>DEBT</i>	+	0.996	4.758	0.029
<i>INVREC</i>	+	-0.231	0.112	0.738
<i>RESTRUCTURE</i>	+	-0.054	0.201	0.654
Year Fix Effects		Included		
n		3,556		
Pseudo R <sup>2</sup>		0.113		

All independent variable definitions are described in Appendix A.

**Table 7c: Comparison of Coefficients between Litigious and Nonlitigious Environment (Nonlitigious - Litigious )**

Variable	Coefficient Difference (0-1)	Wald $\chi^2$	P-value
<i>AGEDIFF</i>	-5.363	2.720	0.099
<i>CEODUAL</i>	0.025	0.051	0.822
<i>BDSIZE</i>	0.031	0.015	0.902
<i>INDEP</i>	2.661	1.087	0.297
<i>FINEX</i>	0.136	0.019	0.889
<i>ACSIZE</i>	-0.564	1.758	0.185
<i>INITIAL</i>	-6.983	0.000	0.985
<i>BIGFOUR</i>	-0.391	0.812	0.368
<i>LOGTA</i>	0.008	0.000	0.986
<i>GROWTH</i>	-1.831	3.040	0.081
<i>LOSS</i>	-0.450	1.863	0.172
<i>FOREIGN</i>	0.500	2.797	0.094
<i>SEGMENTS</i>	-0.026	0.026	0.871
<i>DEBT</i>	1.747	2.796	0.095
<i>INVREC</i>	-1.762	1.232	0.267
<i>RESTRUCTURE</i>	-0.154	0.484	0.487

All independent variable definitions are described in Appendix A.

## 6. Conclusion

In this paper, we document empirical evidence that tone at the top, measured by the CEO's and the CFO's career stage difference, affects the quality of firms' internal control

systems. Specifically, we follow prior literature to use the age gap between CEO and CFO to surrogate the conflict of career goals in the management hierarchy. We find that companies with a larger age difference between CEO and CFO are less likely to report internal control material weaknesses. Further analysis shows that the widened age difference is significantly related to improved internal control quality. We also find that the age difference enhances the internal control quality of non-litigious industries better than litigious industries.

One limitation of our study is that we only focus on the situation where the age of the CFO is smaller than the age of the CEO. The reason is that the CEO with the highest power of the firm is more responsible for the operational process of the company. We hypothesize that younger CFOs may constrain the earnings management behavior of pre-retirement CEOs and therefore set a better tone at the top of the firm.

**Appendix A: Variable Definition**

<b>Variable</b>	<b>Definition</b>
<i>ACSIZE</i>	=the number of directors on the audit committee.
<i>AGEDIFF</i>	=natural log of the percentage of the age difference between CEO and CFO.
<i>BDSIZE</i>	=the number of directors on the board.
<i>BIGFOUR</i>	=1 if the auditor is PwC, Deloitte, Ernst&Young, or KMPG and 0 otherwise.
<i>CEODUAL</i>	=1 if the CEO is also the chair of the board and 0 otherwise.
<i>DEBT</i>	=total debt divided by total assets.
<i>FINEX</i>	=percentage of financial experts on the board.
<i>Delta_AGEDIFF</i>	= $AGEDIFF_t - AGEDIFF_{t-1}$
<i>Delta_ICMW</i>	= $ICMW_t - ICMW_{t-1}$ .
<i>FOREIGN</i>	=1 if the company reports foreign currency gain or loss and 0 otherwise.
<i>GROWTH</i>	=percentage increase of sales for the fiscal year.
<i>INDEP</i>	=percentage of independent directors on the board.
<i>INITIAL</i>	=1 if the year is the first year of the auditor's engagement and 0 otherwise.
<i>INVREC</i>	=sum of inventory and receivables scaled by total assets.
<i>LITIGATION</i>	=1 if the company's SIC code is 2833-3836, 3570-3577, 3600-3674, 5200-5961 or 7370, and 0 otherwise.
<i>LOGTA</i>	=natural log of total assets at the beginning of the fiscal year.
<i>LOSS</i>	=1 if the company reports a loss for the year and 0 otherwise.
<i>RESTRUCTURE</i>	=1 if the company reports restructuring gains or losses and 0 otherwise.
<i>SEGMENTS</i>	=number of geographic operating segments.

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