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ABSTRACT: In this paper we investigate whether board independence has an impact on the incidence of internal control weakness. Using a comprehensive sample of 11,226 firm-year observations spanning the period 2004-2012, we establish several new results. First, we show that board independence has a significant negative relation with the incidence of internal control weakness. Second, we find that of the four committees investigated, the independence of the audit committee has a significant negative relation with the incidence of internal control weakness. Third, audit committee independence is more effective for account-specific weaknesses and the compensation committee independence is more effective for company-level weaknesses. Fourth, board and compensation committee independence are negative and significant only for the subsample of firms with unitary leadership. Our findings are robust to endogenous effects and selection bias.

JEL Classification: G10; G18
Keywords: Internal control weakness; Board independence; Compensation committee; Audit Committee; Unitary versus Dual leadership; SOX 404

1. Introduction

The corporate governance structure of an organization can be quite complex. Since the purpose of corporate governance is to manage various aspects of risk, different characteristics of the corporate structure may be either substitutes or complements (Knechel and Willekens 2006). Management is responsible for designing and implementing a system of internal control within an organization. In this study, we examine how the structure of corporate governance influences how well management performs this task. More specifically, we examine how the structure of the Board of Directors and its various components (i.e., committees) impact the incidence of internal control weaknesses (hereafter ICWs) within a company. The disclosure of a material weakness in internal control indicates an acknowledgement by management (and the auditor) that the internal control system may not adequately prevent material errors in the firmôs financial report.[1] Consequently, we investigate (a) whether there is an association between board

[1] Essentially, firmsô internal control system should prevent or detect the errors in their financial statements (PCAOB, 2007). Firmôs disclosing material weaknesses in internal control must indicate that their internal control system is not effective, which suggests that management is not completely fulfilling its responsibilities.

independence and the incidence of an ICW, (b) whether there is an association between committee level independence and the incidence of an ICW, and (c) whether there is an association between board and committee independence and internal control weaknesses conditional on the structure of top management.

Although prior research has broadly examined the determinants of material weaknesses in internal control (Krishnan 2005, Doyle *et al.* 2007, Ashbaugh-Skaife *et al.* 2007), less attention has been paid to whether corporate governance plays a significant role in a firmôs internal control over financial reporting. This study investigates whether the independence of board of directors is associated with the quality of a firmôs internal control given the general belief that Board independence can provide effective monitoring and control of firm activities. For instance, Bhagat and Black (1999) observe that most large U.S. public companies have Boards with a majority of independent directors, which reflects the view that the Boardôs central task is to monitor management, and independent directors can be the most objective monitors in such a role. Regulatory bodies, such as the SEC, NYSE and NASDAQ, have long espoused independence as a desirable Board attribute. In addition, the NYSE and NASDAQ mandate that a majority of directors on corporate boards should be independent and only independent directors should serve on the audit and compensation committees.

Since prior studies strongly support the view that independent boards provide superior oversight, we hypothesize that Board and committee independence should lead to a lower propensity for ICWs, *ceteris paribus*, given managementôs fundamental responsibility for designing and implementing a system of internal control. We feel that examining independence at the committee level is particularly important because independent directors have specific but diverse responsibilities tied to their committee membership(s) that could involve different objectives, *e.g.*, an independent director on the audit committee may have different concerns than someone serving on the nominations committee.[2] Further, we also

[2] In a recent paper, Hoitash (2011) notes that the Sarbanes-Oxley Act of 2002 mandates that the three principal committees (compensation, nomination and audit) should comprise solely independent board members.

explore whether the effect of Board and committee level independence is more pronounced for firms with unitary leadership (i.e., CEO and Chairman titles are vested in one individual) since unitary leadership is widely believed to be an indication of weaker governance.

Using a comprehensive sample of 11,226 firm-year observations spanning the period 2004-2012, we establish several new results. First, we show that board independence has a significant negative relation with the incidence of an ICW. Second, we show that of four committees - audit, compensation, nomination and corporate governance - the independence of the audit committee has a significant negative relation with the incidence of an ICW. Third, we show that Board independence has a significant negative effect on the incidence of both account-specific (transaction level) ICWs and entity-level ICWs. At the committee level, we find that audit committee independence has significant impact on the incidence of account-specific ICWs, while compensation committee independence has a significant impact on entity-level ICWs. Finally, we document that Board and audit committee independence matters most for the subsample of firms with unitary leadership.[3]

Our study contributes to the existing literature on internal control and corporate governance in a number of ways. First, we show a significant negative relation between board independence and the incidence of an ICW. This is in contrast to Doyle *et al.* (2007) who find no association between material weakness disclosures and corporate governance using the Brown and Caylor (2006) Governance Score. Our second contribution is that we investigate the association between the degree of independence at the committee level and its effect on internal control weakness. We observe that audit committee independence is most effective for account-specific internal control,[4] while the compensation committee plays

[3] We follow Brickley, Coles and Jarrell (1997) in defining unitary and dual leadership. Unitary leadership is the case when the CEO and the Chairman of the board titles are vested in one individual and dual leadership is the case where the two positions are held by different individuals.
[4] Krishnan (2005) focuses on the period prior to the passage of SOX and showed that independent audit committees and audit committees with financial expertise are significantly less likely to be associated with incidence of internal control weaknesses. The current period examines the period after SOX and also considers the role of four separate committees in improving internal control.

an important role for entity-level internal control.[5] This pattern of results is consistent with the primary responsibilities of these two committees, with audit committees focusing on the reliability of the detailed information in the financial statements and compensation committees focused on incentivizing appropriate behaviour by management.[6] Our third contribution is that we document that the effect of Board and committee level independence is conditional on the structure of firm leadership because such independence is only associated with a lower incidence of ICWs when there is a unitary leadership structure in place. Since prior corporate finance research clearly shows that unitary leadership is undesirable, this finding suggests that Board and committee independence can be particularly important and effective when strong governance is most needed.

The remainder of the paper is organised as follows: Section 2 presents prior literature and develops the testable hypotheses. Section 3 describes the data and methodology. The results are presented in Section 4 and further analysis is presented in Section 5. Section 6 concludes.

2. Related Literature and Hypotheses Development

Determinants of Internal Control Weaknesses

Research on internal control has intensified after the introduction of SOX 404 in 2002. Numerous attributes of a firm have been shown to be associated with reported ICWs. For example, Ashbaugh-Skaife *et al.* (2007) find that firms disclosing ICW have more complex operations, recent organizational changes, greater accounting risk, more auditor resignations and fewer resources available for internal control. Doyle *et al.* (2007) show that ICWs are associated with firm size, firm age, financial health, financial reporting complexity, rapid growth, restructuring charges and corporate governance. They also document that the determinants of ICW vary depending on the type of internal control weakness reported.

[5] Whilst our study has some similarity with Doyle, Ge and McVay (2007), which focused on the determinants of the internal control weaknesses, we focus specifically on the association between the independence of board committees and types of internal control weaknesses.
[6] Entity-level controls often address issues related to management incentives and attitudes towards ethical behaviour and financial reporting (e.g., the so-called ñbelief systemsò defined by Simon 1995).

A number of prior studies have shown that firm size can be an important determinant of good internal control (e.g., Kinney and McDaniel, 1989; DeFond and Jiambalvo, 1991), though the empirical evidence is somewhat mixed (DeFond and Jiambalvo, 1991; Krishnan, 2005). Intuitively, large firms are likely to have more financial reporting processes and procedures in place and are more likely to have an adequate number of employees to ensure proper segregation of duties. Larger firms are also more likely to obtain economies of scale when developing and implementing internal control systems. Moreover they tend to have greater resources to spend on internal auditors and consulting fees, which may aid in the generation of strong internal control. For example, there is a strong positive association between non-audit fees and firm size (*e.g.*, DeFond *et al.*, 2002; Frankel *et al.*, 2002). However, the complexity of transactions associated with large firms may work in the opposite direction, which may explain the inconclusive evidence from extant literature on firm size as a determinant of internal control.

Another potentially relevant factor is the age of the firm. Older firms may have more standardized internal control procedures and fewer ICWs. A third determinant is a firmôs financial health. Poorly performing firms may not be able to adequately invest time and/or money in proper controls. Good internal control requires both financial resources and management time, and this may not be a priority for firms with poor performance. Consistent with this intuition, prior research shows that financial reporting errors are negatively associated with firm performance (DeFond and Jiambalvo, 1991) and that the existence of a loss is positively associated with reporting an internal control problem when firms change auditors (Krishnan, 2005).

Internal control procedures are also linked to firm growth. A quickly growing firm can outgrow its systems and related controls (Kinney and McDaniel, 1989; Stice, 1991). New personnel, processes, and technology are usually needed to match internal control with the firmôs growth. Similarly, firms undergoing restructuring are likely to have relatively more ICWs. First, restructuring often results in the downsizing of departments, the loss of experienced employees, and general disarray during and after the re-engineering of the firm.

Second, restructuring typically involves many difficult accrual estimations and adjustments (e.g., impairment of goodwill; see also Dechow and Ge, 2006). Insufficient staff and more accounting estimation likely lead to more internal control deficiencies.

There is also evidence that ICW can have an effect on the reporting and evaluation of financial information. Ashbaugh-Skaife *et al.* (2008) document that firms reporting an ICW have lower quality accruals relative to firms that do not disclose an ICW. Feng *et al.* (2009) suggest that firms with weak internal control release less accurate management guidance. Li *et al.* (2011) find that firms with ICWs have less qualified CFOs and higher CFO turnover. Kim *et al.* (2011) report that the loan spread is 28 basis points higher for ICW firms than for non-ICW firms.

Board Independence and the Incidence of Internal Control Weakness

In spite of the growth of research on the determinants of ICW, less attention has been paid to the association between the corporate governance structure of a firm and internal control problems. Studies have documented that stronger boards are negatively associated with earnings management, restatements and fraud, and positively associated with audit effort and earnings quality (Dechow, Sloan and Sweeney 1996, Beasley *et al.*, 2000, Carcello *et al.*, 2002, Klein, 2002 and Bedard *et al.*, 2004). Krishnan (2005) finds that firms with more effective audit committees report fewer internal control problems in their 8-Ks when reporting an auditor change prior to SOX. Doyle *et al.* (2007) hypothesize corporate governance to play a role in a firmôs internal control quality. That is, they expect a well-governed firm to exhibit fewer material weaknesses. They measure corporate governance using the Governance Score developed by Brown and Caylor (2006).

The Brown and Caylor (2006) score is a composite measure of 51 factors covering eight governance categories (audit, board of directors, charter/by laws, director education, executive and director compensation, ownership, progressive practices and state of incorporation). Doyle *et al.* (2007) do not find a significant relation between material weakness disclosures and corporate governance using this score. Our study builds on Doyle *et al.* (2007) but the principal difference is we focus on one critical dimension of corporate

governance - board independence. Our use of single measure follows the strand of literature that considers board characteristics as key determinants of corporate governance. For instance, Hermalin and Weisbach (1998, 2003) and Bhagat and Black (2002) advance board independence as an important determinant of corporate governance while Brickley, Coles and Jarrell (1997) suggest that separating the Chairman and CEO titles will reduce agency costs and improve performance. Bhagat and Bolton (2008, p.258) state:

> *"Corporate boards have the power to make, or at least ratify, all important decisions including decisions about investment policy, management compensation policy, and board governance itself. It is plausible that board members with appropriate stock ownership will have the incentive to provide effective monitoring and oversight of important corporate decisions noted above; hence board independence or ownership can be a good proxy for overall good governance".*

In addition, Larcker *et al.* (2007) note that results from prior studies using multiple measures of corporate governance are mixed and inconclusive because these measures exhibit only a modest level of reliability and construct validity. Bhagat and Bolton (2008) argue that on both economic and econometric grounds it is possible for a single characteristic to be an effective measure of corporate governance. They conclude that board independence is a good, standalone, measure of corporate governance. A number of recent studies offer strong support for this view. For example, Goh (2009) documents that firms with more independent boards remediate material weaknesses more quickly and Johnstone *et al.* (2011) document a positive association between disclosure of ICWs and subsequent turnover of members of boards of directors, audit committees and top management. More importantly, their results support the audit committee regulations under SOX and the board independence regulations of the listing exchanges.

Hypotheses

Our first hypothesis conjectures that board independence[7] plays a positive role on firm performance and reducing the likelihood of corporate fraud. For instance, Weisbach

[7] The NYSE states that the director is considered independent if ôthe director has no material relationship with the listed company (either directly or as a partner, shareholder or officer of an organization that has a relationship with the company)é ôMaterial relationships can include commercial, industrial, banking, consulting, legal,

(1998) attributes the relation between higher firm value and board independence to better monitoring. Beasley (1996) finds that the inclusion of outside director reduces the probability of financial statement fraud. Uzun *et al.* (2004) demonstrate that the likelihood of corporate fraud decreases with an increase in board independence. Our focus is on board independence and its association with the incidence of internal control weaknesses.

Previous research has examined some aspects of the association between some Board and audit committee characteristics and the incidence and remediation of ICWs. For example, Goh (2009) examines whether the effectiveness of the audit committee and the board of directors is associated with firmsô timeliness in the remediation of an ICW. They document that firms with large audit committees, audit committees with greater non-accounting financial expertise and more independent boards are more likely to remediate ICWs in a timely manner. Hoitash *et al.* (2009) also focus on board and audit committee characteristics and find that higher quality corporate governance is associated with more effective internal controls. In particular, they find that a lower likelihood of disclosing a material weakness is associated with relatively more audit committee members having accounting and supervisory experience as well as board strength. Our study is different as we investigate whether the degree of independence across committees are associated with the incidence of internal control problems. In addition, we also examine the relation between board and committee independence and the incidence of internal control weakness for unitary versus dual leadership styles. Johnstone *et al.* (2011) focus on the association between the disclosure or remediation of internal control weakness and turnover of members

accounting, charitable, and familial relationships, among others. The NASDAQ define an independent director if: (1) the director, or one of his/her family members, was not an officer or employee of the company or its subsidiaries during the past 3 years; (2) the director, or his/her family member, do not accept any payments from the company, or any parent or subsidiary of the company, in excess of $60,000 during the past three fiscal years; (3) the director, or his her family member, is not a partner in, or a controlling shareholder or an executive officer of, any organization to which the company made, or from which the company received, payments for property or services in the current or any of the past three fiscal years that exceed 5% of the recipientôs consolidated gross revenues for that year, or $200,000. The final NYSE listing standards are available at http://www.nyse.com/pdfs/finalcorpgovrules.pdf. The final Nasdaq listing standards are available at http://www.nasdaq.com/about/Web_Corp_Gov_Summary%20Feb-revised.pdf. The final SEC rules adopting the NYSE and Nasdaq listing standards may be found at http://www.sec.gov/rules/sro/34-48745.htm (Hoitash 2011, footnote 2, page 419). .

of boards of directors, audit committees and top management. They find that remediation occurs in conjunction with improvements in boards, audit committees and top management.

In general, prior research has shown that better corporate governance is associated with a lower incidence of internal control weaknesses, leading to our first hypothesis pertaining to Board independence:

> ***HYPOTHESIS 1:*** *Board independence is negatively associated with the incidence of internal control weaknesses.*

Our second hypothesis considers whether there is an association between the degree of independence at the committee level and the incidence of ICWs. Boards usually do much of their work in committees and prior research has used committee level data to draw inferences about the functioning of the board (Adams, Hermalin and Weisbach 2010). Klein (1998) documents that board committees with specialized roles enhance a boardôs productivity and efficiency. She documents that although there is no relation between the overall board composition and firm performance, the number of insiders on the finance and investment committees is positively associated with better performance. Shivdasani and Yermack (1999) find that, when the CEO serves on the nominating committee or when there is no such committee, fewer independent directors are appointed and the stock price reaction to independent director appointments is lower than when there is a nominating committee that does not include the CEO.

Beasley *et al.* (2000) link corporate fraud occurrence to ineffective audit committees while Uzan *et al.* (2004) show that inclusion of non-independent directors with personal or business ties with the management increases the likelihood of corporate fraud. The compensation committeeôs task is to develop proposals on the level and mix of CEO compensation and the proposals have to be approved by the full board (Barkema and Gomez-Mejia 1998). In a similar vein, Hoitash et al (2011) document that the compensation committee is charged with setting, overseeing and administering executive pay (much of the prior work in this area has focused on CEO compensation).

Barkema and Gomez-Mejia (1998) document that remuneration committees provide a fertile ground for studying what determines top management pay and the existence of this committee is consistent with agency theory (Fama and Jensen, 1983) which advocates the separation of management from corporate control. In terms of theoretical importance of the compensation committee, Conyon and Peck (1998) highlight that in its absence there is a clear opportunity for senior executives to award themselves excessive pay raises. Conyon and Peck (1998) also state that compensation committees play an important role in the exercise of boardroom control. Newman and Mozes (1999) document that insiders in the compensation committee bias compensation in favour of CEOs, while Conyon and He (2004) document that the presence of outsiders on the committee is associated with lower CEO pay and higher equity incentives. In general, previous research has shown that Board committees with independent members are more effective. Extending this literature to the incidence of internal controls weaknesses leads to our second hypothesis:

> ***HYPOTHESIS 2:*** *Firms with fully independent committees have lower incidence of ICW compared to firms with partially independent committees.*

Our third hypothesis considers the role of unitary versus dual leadership styles on the association between board and committee independence and the incidence of ICWs. It is generally accepted that the CEO and Chairman positions should be held by different individuals in a strong governance environment. For instance, Jensen (1993, p.36) states:

> *"The function of the chairman is to run board meetings and oversee the process of hiring, firing, evaluating, and compensating the CEO. Clearly the CEO cannot perform this function apart from his or her personal interest. Without the direction of an independent leader, it is much more difficult for the board to perform its critical function. Therefore, for the board to be effective, it is important to separate the CEO and Chairman positions. The independent chairman should, at a minimum, be given the rights to initiate board appointments, board committee assignments, and (joint with the CEO) the setting of the board's agenda."*

Conyon and Peck (1998) state that unitary leadership (where the CEO and the Chairman of the board titles are vested in one individual) can provide the CEO with a wider power base and locus of control. Conyon and Peck (1998) argue that the two roles should be separated because an independent board chair will facilitate objective assessment of the performance

of the CEO and top management. Finkelstein and Hambrick (1996) also observe that the unitary leadership is a clear indicator of the CEO power over the board.

A number of papers have empirically examined the use of dual titles in corporate governance and the results are mixed and inconclusive. For instance, Brickley *et al.* (1997) challenge the conventional wisdom (which states that separating the titles will reduce agency cost and improve performance) by finding that the costs of separation are larger than the benefits of separation for most firms, and that combining the titles of CEO and Chairman can be efficient and consistent with shareholderôs interests. In contrast, Goyal and Park (2002) find that the sensitivity of CEO turnover to performance is lower when titles are combined and this finding is consistent with the view that the combination of titles is associated with increased power over the board.

In a similar vein, Adams *et al.* (2010) find that the unitary leadership structure appears to hold greater influence over corporate decision-making. They also note that although combining the titles would mean that an individual has more influence over the firm it does not necessarily mean that separating the titles will lead to improved performance. They conclude that policy makers should be wary of calls for prohibiting the CEO serving as the Chairman of the board. Thus, the question as to whether a Board can be more effective if the Chairman and CEO positions are held by different individuals is unsettled. However, we expect that independent directors can offset some of the potential negative effects of a unitary leadership structure. This view suggests that Board independence should matter the most when the CEO and Chairman are one person, leading to our third hypothesis:

> ***HYPOTHESIS 3:*** *Board and committee level independence is more strongly negatively associated with the incidence of ICW for firms with unitary leadership.*

3. Data and Methodology

We obtain the data for this study from multiple sources. We obtain the ICW data from Audit Analytics. Under SOX 404, accelerated filers are required to file both a management report and an auditor's attestation on internal controls over financial reporting beginning with

annual reports filed after November 15, 2004.[8] Audit Analytics extracts the ICW data primarily from the firm's 10-K, 10-K/A, 20-F and 40-F forms, which covers all SEC registrants who have disclosed their assessments of internal controls over financial reporting in electronic filings. We obtain board information from Risk Metrics. The database collects information about the board of directors such as name, age, gender, affiliation etc. for S&P 1500 firms. The database classifies each director into three categories: employee, independent and linked. We follow the classification and define a director as independent if he/she is classified by Risk Metrics as independent. Further, we obtain financial information from COMPUSTAT, firm age from CRSP, and M&A information from SDC Platinum. Since the ICW data starts from 2004, we restrict our sample period to 2004-2012. Our final sample consists of 2,048 unique firms with 11,226 firm-year observations.

Table 1 presents the industry distribution of ICWs. The table shows that the ñotherò group has the highest number of internal control weaknesses while hotels and personal services have the lowest. We also report that 8.7% of observations in the agriculture industry have ICWs. Industries with a high proportion of ICWs also include textiles and apparel, retail trade, and primary and fabricated metals.

Table 2 presents the summary statistics of the variables used in our analysis.[9] Panel A shows that 3.6% of the observations in our sample have an ICW. The average board has 9.379 directors and board independence is, on average, 76.2% over our sample period. The panel also shows that 93.6% of our sample firms have fully independent audit committee (i.e., all the members in the committee are independent directors). The fraction is 86% for the nomination committee, 91.7% for the compensation committee, and 83.6% for the corporate governance committee. Panel B of Table 2 shows the changes in board independence over time. The average percentage of independent directors on the board is

[8] Non-accelerated filers are firms with market capitalisation less than $75 million. These firms are not required to comply with Section 404 reporting provisions until fiscal year ending on or after July 15, 2007. For accelerated filers Section 404 became effective for fiscal year end after November 15, 2004. Accelerated filers include companies that have an aggregate market value of at least $75 million as of the end of their most recently completed second quarter.
[9] Variable definitions and sources are specified in Appendix 1.

71% in 2004, rising to 79.3% in 2012. The fraction of firms with a fully independent audit committee also increases over time, from 82.2% in 2004 to 96.9% in 2012.[10] A similar pattern is observed for the nomination committee, the compensation committee, and the corporate governance committee.

Looking again at Panel A, we see that, on average, each firm has 5.618 business segments, and 63.9% of the firms have foreign currency translation. Of the total sample, 44.9% and 49.2% of firms are involved in M&A and restructuring in the three-year period including the current year, respectively. The sample firms have an average sales growth rate of 7% and average inventory of 9.5%. 12.7% of them have negative earnings. Finally, the average market capitalization is $8,178 million and the CRSP age is 26.738 years.

The correlations between the variables are reported in Table 3. The first column shows that the dummy variable representing the existence of an ICW is negatively correlated with the fraction of independent directors ($p<.01$), suggesting that higher board independence is associated with lower probability of ICW. This result is consistent with our first hypothesis. Table 3 also shows that the ICW dummy is negatively correlated with the indicator variables of whether all the members in the audit committee, the nomination committee, the compensation committee, and the corporate governance committee are independent directors. Our findings suggest that the committee level independence is relevant to the incidence of ICW as well. Further, the dummy variable is positively correlated with the log number of business segments, M&A dummy, restructure dummy, growth rate quintile dummy, inventory, loss dummy, and Altman's Z-score decile dummy, while negatively correlated with log number of directors, log market value of equity, and log CRSP age.

4. Empirical Findings

Univariate Analysis

[10] We have repeated all the tests over the sub-period 2004-2007, during which the full independence of audit committee is less popular. Our results hold.

In this section, we report the results of the univariate analysis. More specifically, we divide the sample into deciles based on the fraction of independent directors and examine how the incidence of ICW changes across the deciles. Decile 1 includes firms with the lowest fraction of independent directors in the board while decile 10 includes those with the highest fraction. The results of the univariate analysis are presented in Panel A of Table 4. The table shows that 6.95% of observations in decile 1 have an ICW. When we move to decile 2, the fraction drops to 4.81%. The fraction drops further when we move to deciles with even higher board independence. While the pattern is not strictly monotonic, we can clearly observe the downward trend as we move from a low level of independence to a high level of independence. A comparison between deciles 1 and 10 reveals that the probability of having ICW is almost three quarters less for firms with the highest level of board independence than for firms with the lowest level of board independence. The difference is statistically significant (*t*-statistic 5.859). Overall, the univariate analysis shows a negative relation between board independence and ICW which is consistent with our hypothesis.

Multivariate Analysis

In this section, we conduct multivariate regression analysis on the association of Board independence and the incidence of an ICW. The regression specification is as follows:

$$\begin{aligned} DUMICW_{i,t} &= \alpha + \beta \cdot FIDIR_{i,t} + \gamma_1 \cdot LDIR_{i,t} + \gamma_2 \cdot LSEG_{i,t} + \gamma_3 \cdot FRGN_{i,t} \\ &+ \gamma_4 \cdot M\&A_{i,t} + \gamma_5 \cdot RESTR_{i,t} + \gamma_6 \cdot QSGRW_{i,t} + \gamma_7 \cdot INV_{i,t} + \gamma_8 \cdot LMVE_{i,t} \\ &+ \gamma_9 \cdot LOSS_{i,t} + \gamma_{10} \cdot RDAZ_{i,t} + \gamma_{11} \cdot LAGE_{i,t} + Ind_{j,t} + \varepsilon_{i,t} \end{aligned} \quad (1)$$

where *i* indexes firm, *t* indexes year, *j* indexes industry, *Ind* is industry fixed-effect, defined at the two-digit SIC code level, and *ε* is the error term. The dependent variable is a dummy for the occurrence of an ICW (DUMICW). The independent variable of interest is board independence (FIDIR), measured as the fraction of independent directors in the board. We predict a negative sign for ƀ. Control variables include the natural log of the number of directors (LDIR), the natural log of the number of business segments (LSEG), a dummy for

foreign currency translation (FRGN), a dummy for M&A activity (M&A), a dummy for restructuring activity (RESTR), a dummy if growth is in the top quintile of the sample (QSGRW), inventory relative to assets (INV), the natural log of the market value of assets (LMVE), dummy variable for reported loss (LOSS), reverse Altmanôs Z-score based on deciles (RDAZ), and the natural log of the CRSP age (LAGE). The selection of control variables follows Ge and McVay (2005), Ashbaugh-Skaife *et al.* (2007), Doyle *et al.* (2007), and Ogneva *et al.* (2007). The regression results are presented in Panel B of Table 4.

Column (1) shows that board independence is negatively and significantly related to ICW without any control variables, suggesting that higher board independence leads to lower probability of ICW. In column (2), we add the natural log of the number of directors (a measure of board size) as control variable; and in column (3), we further add a number of firm characteristics as controls. The coefficient for board independence retains its statistical significance in both the models. The coefficient of board independence in column (3) shows that a one-standard-deviation increase in board independence results in 0.88% drop in the probability of ICW. Since the unconditional probability of ICW is 3.6%, this constitutes a 24.31% drop in the probability. Therefore, the effect of board independence on the probability of ICW is not only statistically significant, but also economically significant.

The results for control variables are consistent with prior literature (e.g., Ogneva *et al.*, 2007). We find that the ICW dummy is positively and significantly associated with the number of business segments (LSEG), foreign currency translation dummy (FRGN), and inventory (INV), suggesting that firms with more complex operating environment are more likely to have an ICW. Further, the coefficient for the market value of assets (LMVE) is negative and significant. The findings show that small firms have higher probability having an ICW identified. ICW is also positively associated with the reverse Altmanôs Z-score (RDAZ), showing that firms with a higher probability of bankruptcy are more likely to have an ICW. The coefficients for RESTR and LOSS are both positive and significant, suggesting that firms experience business restructuring or an operating loss are more likely to have ICW.

Finally, the coefficients for the number of directors (LDIR), M&A dummy (M&A), growth quintile dummy (QSGRW), and firm age (LAGE) are mostly insignificant.

Reverse Causality

The significant negative relation between board independence and the probability of ICW could be due to the fact that independent directors are better monitors. However, it is possible that the incidence of ICW can have a significant impact on the firm's governance structure. To address the potential reverse causality problem, we first employ the subsample regressions approach. In this approach, the first subsample includes observations in year 2004 only. Since 2004 is the first year that firms had to evaluate their internal control, board characteristics are less likely to change in response to the outcome of the evaluation. The second subsample includes observations without a previously identified ICW. For example, if a firm has an ICW in 2006 for the first time, we drop all observations after 2006 and only keep those from 2004 to 2006. The purpose of using the second subsample is similar to that of the first one, except that the sample size in this case is much larger. We use the lagged value of board independence as the independent variable to address the reverse causality problem further. Since firms do not have a previous ICW, board independence is less likely to have changed as a result of the ICW. This experimental setting ensures that the causality goes from board independence to ICW but not vice versa. The regression results for the two subsamples are presented in columns (1) and (2) of Table 5. We show that the negative relation between an ICW and the lagged value of board independence holds in both subsamples, suggesting that the relation is not driven by reverse causality.

In addition, we also conduct a formal test to address the potential reverse causality problem. We adopt an approach following Wooldridge (2002) where we first regress board independence against determinants of ICW and a set of instrumental variables. In the second stage, the predicted value of board independence from the first-stage regression is

employed as the instrumental variable.[11] We follow Linck *et al.* (2008) and employ the following instrumental variables in the first-stage: debt ratio (DEBT), market-to-book (MB), R&D (RND), stock return volatility (STDRET), free cash-flow (FCF), industry-adjusted ROA (ADJROA), CEO unitary (CEOUNI), CEO age (CEOAGE), CEO ownership (CEOOWN), and director ownership (DRTOWN). Debt ratio is the ratio of long-term debt over book value of assets. Market-to-book is the ratio of market value of equity over book value of equity. R&D is the ratio of R&D expenses over sales. Stock return volatility is the standard deviation of monthly stock returns. Free cash-flow is the ratio of the firm's free cash-flow over book value of assets. Industry-adjusted ROA is the difference between the firm's ROA and average ROA over the two-digit SIC industry. CEO unitary is a dummy variable equal to one if the CEO and the Chairman titles are vested in one individual and zero otherwise. CEO age is the natural logarithm of the CEO's age. CEO ownership is the percentage ownership of the CEO. Director ownership is the percentage ownership of the board of directors. For the sake of brevity, we only report the results for the second-stage regression in column (3) of Table 5. The column shows that board independence is negatively and significantly related to the probability of ICW suggesting that our findings are robust to the reverse causality problem.

Selection Bias

In order to understand the determinants of ICW, we select a control group consisting of those firms that did not report ICW because there is an implied assumption that firms that have reported ICW are the ones that have poor quality of reporting. We use propensity-score matching to select an appropriate control sample for our analysis (Rosenbaum and Rubin (1983); Heckman and Robb (1986); Heckman *et al.* (1997); Heckman *et al.* (1998); Hillion and Vermaelen, 2004; Drucker and Puri, 2005; Cooper *et al.*, 2005; and Li and Zhao, 2006). In the first stage, PSM estimates the inherent *ex ante* propensity for firms to report ICW based on firm characteristics. We use all the control variables in Table 6 (LDIR, LSEG,

[11] We cannot use the more traditional two-stage least squares technique because our dependent variable in the second stage (ICW) is a dummy variable.

FRGN, M&A, RESTR, QSGRW, INV, LMVE, LOSS, RDAZ, LAGE, and industry dummy) for estimating the propensity scores. The results of the first stage regression are presented in Panel A of Table 6. In the second stage, PSM matches treatment group with control group based on their nearest propensity scores of reporting ICW. Panel B of Table 6 presents the difference of board independence among the two groups. The results show that board independence is significantly lower for the ICW sample than for the control sample, confirming the importance of board independence in reducing the probability of ICW after controlling for the selection bias.

5. Further Analysis

Committee level analysis

Overall board independence is important in the incidence of ICW as shown in the previous analysis but various committees within the board perform different functions in overseeing the quality of financial reporting.[12] Consequently, we also examine how the degree of independence at a committee level influences internal control over financial reporting. We measure the independence of board committees using a series of dummy variables indicating whether *all* the members on a specific committee are independent directors (DUMAUD, DUMNOM, DUMCOMP and DUMCG). We report the results in Table 7. Panel A reports the univariate analysis of the association between ICW and full independence of the four committees. The distribution of ICW incidence is divided into cases where each committee is fully independent (dummy variable equal to one) versus partially

[12] In a U.S. publicly-traded company, an audit committee is an operating committee of the Board of Directors charged with oversight of financial reporting and disclosure. Responsibilities of the audit committee typically include (a) overseeing the financial reporting and disclosure process; (b) monitoring choice and accounting policies and principles; (c) overseeing hiring, performance and independence of the external auditors; (d) oversight of regulatory compliance, ethics and whistleblower hotlines; (e) monitoring internal control process; (f) overseeing the performance of the internal audit function; (g) discussing risk management policies and practices with management. The Compensation Committee of the Board of Directors, appointed by and acting on behalf of the Board, shall be responsible for formulating, evaluating and approving compensation and benefits of the Companyõs Board of Directors, executive officers and key employees, overseeing all compensation programs involving the use of the Companyõs stock, and producing an annual report on executive compensation for inclusion in the Companyõs proxy statement for its annual meeting of stockholders, in accordance with applicable rules and regulations.

independent or non-independent (dummy variable equal to zero). The results indicate that the incidence of control weakness is lower when a committee is fully independent regardless of the committee considered. The differences are statistically significant (*t*-statistic ranging from 3.715 to 4.645). Since some committees are not likely to have responsibility for accounting and internal control, this result suggests that the overall governance environment can indirectly influence the quality of internal control.

The multivariate analysis is reported in Panel B of Table 7. The results are reported in five columns. Columns (1) - (4) report the results for each committee individually, which show that the coefficient for committee independence is negative and significant for all four committees. Column (5) reports the results when we include all four committees in the analysis simultaneously, which show that only the coefficient of the audit committee independence remains significant. Since the audit committee is charged with the responsibility of overseeing the financial reporting process, it is not surprising that its independence is much more important in reducing the incidence of ICW than other three committees. Overall, these results confirm hypothesis 2 and highlight the appropriateness of a policy for full independence of board committees, especially the audit committee.

Unitary Leadership and Internal Control Weaknesses

In this section we analyse the role of unitary leadership on the relationship between board independence and the incidence of internal control problems. We follow Brickley, Coles and Jarrell (1997) in defining unitary and dual leadership. Unitary leadership is the case when the CEO and the Chairman of the board titles are vested in one individual and dual leadership is the case where the two positions are held by different individuals. To analyse whether there is an association between board and committee independence and internal control weaknesses for firms with unitary leadership we divide our sample of firms into unitary and dual leadership subsamples and present the regression results in Table 8.

In columns (1) and (2) we present the results for the subsample of firms with unitary leadership and in columns (3) and (4) we present the results for the subsample of firms with dual leadership. Our results in column (1) show that board independence is negatively and significantly associated with the probability of ICW for the subsample of firms with unitary leadership. However, column (3) shows that the coefficient of board independence is not significant when there is dual leadership. In column (2), we separate the committees and observe that the coefficient for the audit ($p<.05$) and compensation ($p<.10$) committee independence is negative while those of the other two committees are insignificant. Column (4) shows that the coefficients for all four committees are insignificant when there is dual leadership. Taken together, our findings suggest that board and compensation committee independence affects the incidence of ICW only for the subsample of firms with unitary leadership, which is also the situation where good governance could be most critical. The findings reported in Table 8 are consistent with our third hypothesis which states that board and committee level independence are most negatively associated with the incidence of internal control problems for firms with unitary leadership.

Types of Internal Control Weakness

As a final step in our analysis, we examine the association between board and committee independence and the incidence of specific types of ICW. Our initial analysis is based on the 21 types of weaknesses identified in the Audit Analytics database. We classify the 21 types of ICW into two broad categories identified by Doyle *et al.* (2007). Doyle *et al.* (2007) advance two classification schemes, with the first scheme based on the severity of the ICW and the second based on the stated reason for the weakness. They employ the logic proposed by Moody's to determine whether ICW is severe. Moody's state that ICW could fall into one of two categories. The two categories are: (a) account-specific or transaction-level material weaknesses and (b) company-level material weaknesses. Doyle *et al.* (2007) state that auditors can more easily adjust to account-specific or transaction level weakness so they are less critical than company-level weaknesses. We follow the

classification scheme of Doyle *et al.* (2007) to identify account-specific and company level weaknesses.[13]

We redo our analysis on the two broad categories of ICW. The dependent variable is a dummy variable equal to one if a firm has a certain category of ICW and zero otherwise. The results are presented in Table 9. Columns (1) and (3), show that a higher fraction of independent directors in the board is associated with lower incidence of ICW for both categories. At the committee level, column (2) shows that the coefficient of audit committee independence is negative and significant for account-specific ICWs, while the other three are statistically insignificant, i.e., independence of the audit committee is most effective for account-specific weaknesses. Our results in column (4) show that the coefficient of compensation committee independence is negative and significant, the coefficients overall Board and audit committee independence are negative and marginally significant ($p<.10$), and the coefficient for the nomination committee is insignificant. That is, independence of the compensation committee is more effective for company-level weakness and the independence of audit committee is more effective for account-specific weaknesses. Our findings are intuitive as Doyle, Ge and McVay (2007) document that account-specific problems are more common in larger and more mature firms that deal with complex accounting issues, whereas company-level weaknesses are more common in smaller, younger and poorly governed firms that lack resources to maintain a comprehensive internal control system.

6. Conclusion

[13] The account-specific ICWs in Audit Analytics types are: Type 1 (Accounting documentation, policy or procedures), Type 4 (Inadequate disclosure controls), Type 6 (Ineffective, non-existent or understaffed audit committee), Type 8 (Insufficient or non-existent internal audit function), Type 9 (Journal entry control issues), Type 11 (Material or numerous auditor adjustments), Type 12 (Non-routine transaction control issues), Type 13 (Remediation of internal weakness identified), Type 14 (Restatement or non-reliance of company filings), Type 15 (Restatement of previous 404 disclosures), Type 16 (SAB 108 adjustments noted), Type 17 (Scope (disclaimer of opinion) or other limitations), Type 18 (SEC or other regulatory investigations or inquiries), Type 21 (Untimely or inadequate account reconciliations). The company-level ICW are: Type 2 (Accounting personnel resources, competency/training), Type 3 (Ethical or compliance issues with personnel), Type 5 (Ineffective or understaffed audit committee), Type 7 (Information technology, software, security and access issue), Type 10 (Management/board/audit committee investigation (s)), Type 19 (Segregations of duties/ design of controls (personnel)) and Type 20 (Senior management competency, tone, reliability issues).

In this paper we argue that the fiduciary responsibility and monitoring role of the outside directors should encourage better accounting practices and internal control mechanisms. Hence, board independence should be negatively related to the propensity for firms to report weaknesses in internal control over financial reporting. We also argue that committee level independence could have differential effects on the incidence of ICWs because of their different areas of responsibilities. Using a comprehensive sample of U.S. firms spanning the period 2004 - 2012, we show that board independence is negatively associated with the incidence of internal control weakness. More specifically, we observe that an independent audit committee is associated with fewer account-specific weaknesses, while an independent compensation committee is associated with fewer entity-level weaknesses, especially in a company that has unitary leadership (joint CEO/Chairman). Our findings are robust to the reverse causality problem and selection bias effects.

Our paper is subject to the following limitations. The first limitation is that firms filing section 404 reports in our sample are accelerated filers and thus may limit the generalizability of our findings. That is, we do not consider non-accelerated filers in our sample. Future research could focus on non-accelerated filers to understand whether the findings documented in this study persist for non-accelerated filers. The second limitation is that our data source, Audit Analytics covers all SEC registrants who have disclosed their assessments of internal controls over financial reporting and thus it is conceivable that some firms did not disclose their material weaknesses, thus causing us to understate our sample.

In spite of these potential limitations, our paper makes several contributions to the literature. First, we show a significant negative relation between board independence and the incidence of an ICW. Second, we show that ICWs are influenced by the degree of independence at the committee level, not just the Board level. Specifically, we observe that audit committee independence is most effective for account-specific internal control, while the compensation committee plays an important role for entity-level internal control. This pattern of results is consistent with the primary responsibilities of these two committees.

Third, we document that the effect of Board and committee level independence is conditional on the structure of firm leadership (dual versus unitary). These results should be of interest to regulators who oversee governance and financial reporting in the markets, investors and shareholders who are represented by the Board, and auditors who incorporate assessments of corporate governance in their assessment of risk within the audit process.

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Table 1
Industry Distribution of Internal Control Weakness
Sample Period: 2004-2012

This table presents the industry-wide distribution of internal control weakness identified under SOX 404. We obtain the internal control weakness data from Audit Analytics. We then merge the AuditAnalytics data with RiskMetrics (board data), Compustat (financial information), CRSP (firm age), and SDC Platinum (M&A data). Numbers in parentheses represent the fraction of observations within each industry.

Industry	Internal Control Weakness				Total
	No		Yes		
	Obs.	Percentage	Obs.	Percentage	
Agriculture	21	91.30%	2	8.70%	23
Mining	450	97.83%	10	2.17%	460
Construction	173	98.86%	2	1.14%	175
Food and Tobacco	320	97.26%	9	2.74%	329
Textile and Apparel	124	95.38%	6	4.62%	130
Lumber, Furniture, Paper, and Print	401	96.39%	15	3.61%	416
Chemicals	731	96.57%	26	3.43%	757
Petroleum, Rubber, and Plastic	190	97.44%	5	2.56%	195
Leather, Stone, and Glass	109	99.09%	1	0.91%	110
Primary and Fabricated Metals	302	94.38%	18	5.63%	320
Machinery	1,461	96.37%	55	3.63%	1,516
Transport Equipment	269	96.42%	10	3.58%	279
Instruments and Miscellaneous Manufacturing	715	96.49%	26	3.51%	741
Transport, Communications, and Utilities	1,139	96.69%	39	3.31%	1,178
Wholesale Trade	364	96.81%	12	3.19%	376
Retail Trade	869	95.60%	40	4.40%	909
Finance, Insurance, and Real Estate	2,001	97.42%	53	2.58%	2,054
Hotels and Personal Services	20	100.00%	0	0.00%	20
Services	1,549	94.74%	86	5.26%	1,635
Other	18	90.00%	2	10.00%	20
Total	11,226	96.42%	417	3.58%	11,643

Table 2
Summary Statistics
Sample Period: 2004-2012

This table presents the summary statistics of the variables used in the analysis. We obtain the internal control weakness data from AuditAnalytics. We then merge the Audit Analytics data with RiskMetrics (board data), Compustat (financial information), CRSP (firm age), and SDC Platinum (M&A data). Panel A presents the mean, standard deviation, 25-percentile, median and 75-percentile of the variables used in the analysis. Panel B presents the mean of board and committee independence by year. Variable definitions are presented in Appendix 1 and dollar values are in millions of U.S. dollars.

Panel A. Statistics of Variables

	Mean	S.D.	25%	Median	75%
DUMICW	0.036	0.186	0.000	0.000	0.000
FIDIR	0.762	0.125	0.667	0.778	0.875
NUMDIR	9.379	2.428	8.000	9.000	11.000
LDIR	2.206	0.254	2.079	2.197	2.398
DUMAUD	0.936	0.245	1.000	1.000	1.000
DUMNOM	0.860	0.347	1.000	1.000	1.000
DUMCOMP	0.917	0.276	1.000	1.000	1.000
DUMCG	0.836	0.371	1.000	1.000	1.000
NUMSEG	5.618	5.334	1.000	3.000	9.000
LSEG	1.245	1.015	0.000	1.099	2.197
FRGN	0.639	0.480	0.000	1.000	1.000
M&A	0.449	0.497	0.000	0.000	1.000
RESTR	0.492	0.500	0.000	0.000	1.000
SGRW	0.070	0.172	-0.008	0.071	0.152
INV	0.095	0.119	0.004	0.051	0.141
MVE($)	8,178	19,157	821	2,062	6,098
LMVE	7.782	1.482	6.711	7.631	8.716
LOSS	0.127	0.332	0.000	0.000	0.000
AZ	1.771	1.251	0.787	1.720	2.589
AGE	26.738	19.195	13.000	20.500	37.000
LAGE	3.028	0.752	2.565	3.020	3.611
Obs.			11,226		

Panel B. Board and Committee Level Independence

Year	FIDIR	DUMAUD	DUMNOM	DUMCOMP	DUMCG
2004	0.710	0.822	0.725	0.809	0.688
2005	0.717	0.884	0.738	0.851	0.706
2006	0.723	0.866	0.780	0.839	0.757
2007	0.768	0.968	0.898	0.945	0.871
2008	0.775	0.972	0.902	0.950	0.876
2009	0.773	0.958	0.880	0.928	0.856
2010	0.784	0.966	0.910	0.954	0.891
2011	0.790	0.972	0.920	0.961	0.902
2012	0.793	0.969	0.928	0.968	0.909
Total	0.762	0.936	0.860	0.917	0.836

Table 3
Correlation Matrix
Sample Period: 2004-2012

This table presents the correlation matrix of the variables used in the analysis. We obtain the internal control weakness data from Audit Analytics. We then merge the Audit Analytics data with RiskMetrics (board data), Compustat (financial information), CRSP (firm age), and SDC Platinum (M&A data). The table presents the correlation coefficient for each pair of variables. Numbers in parentheses are the significance level of the correlation coefficient.

	DUM ICW	FIDIR	LDIR	DUM AUD	DUM NOM	DUM COMP	DUM CG	LSEG	FRGN	M&A	RES TR	QSG RW	INV	LMVE	LOSS	RDAZ	LAGE
DUMICW	1.000																
FIDIR	-0.061	1.000															
	(0.000)																
LDIR	-0.050	0.137	1.000														
	(0.000)	(0.000)															
DUMAUD	-0.034	0.313	-0.032	1.000													
	(0.000)	(0.000)	(0.001)														
DUMNOM	-0.037	0.453	-0.015	0.355	1.000												
	(0.000)	(0.000)	(0.113)	(0.000)													
DUMCOMP	-0.041	0.385	-0.001	0.308	0.506	1.000											
	(0.000)	(0.000)	(0.879)	(0.000)	(0.000)												
DUMCG	-0.043	0.457	0.037	0.321	0.889	0.468	1.000										
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)											
LSEG	0.034	0.005	-0.012	-0.038	-0.034	-0.033	-0.017	1.000									
	(0.000)	(0.606)	(0.191)	(0.000)	(0.000)	(0.001)	(0.061)										
FRGN	0.017	0.090	-0.002	-0.001	0.006	0.034	0.022	0.102	1.000								
	(0.068)	(0.000)	(0.804)	(0.892)	(0.498)	(0.000)	(0.018)	(0.000)									
M&A	0.016	-0.040	0.038	-0.062	-0.027	-0.040	-0.026	0.227	0.108	1.000							
	(0.094)	(0.000)	(0.000)	(0.000)	(0.004)	(0.000)	(0.006)	(0.000)	(0.000)								
RESTR	0.027	0.164	0.070	0.016	0.042	0.033	0.065	0.108	0.353	0.083	1.000						
	(0.004)	(0.000)	(0.000)	(0.090)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)							
QSGRW	0.002	-0.039	-0.102	-0.017	0.012	-0.003	0.001	-0.020	-0.008	0.060	-0.091	1.000					
	(0.843)	(0.000)	(0.000)	(0.064)	(0.213)	(0.739)	(0.917)	(0.034)	(0.411)	(0.000)	(0.000)						
INV	0.020	-0.029	-0.075	0.002	-0.014	0.000	-0.003	0.051	0.101	-0.057	0.054	-0.005	1.000				
	(0.037)	(0.002)	(0.000)	(0.847)	(0.136)	(1.000)	(0.739)	(0.000)	(0.000)	(0.000)	(0.000)	(0.569)					
LMVE	-0.099	0.150	0.470	-0.019	0.050	0.051	0.090	0.031	0.162	0.115	0.068	-0.012	-0.125	1.000			
	(0.000)	(0.000)	(0.000)	(0.043)	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)	(0.000)	(0.210)	(0.000)				
LOSS	0.070	0.021	-0.061	0.024	0.019	0.014	0.026	-0.003	0.014	-0.021	0.121	-0.073	0.046	-0.262	1.000		
	(0.000)	(0.022)	(0.000)	(0.010)	(0.037)	(0.127)	(0.005)	(0.761)	(0.133)	(0.027)	(0.000)	(0.000)	(0.000)	(0.000)			
RDAZ	0.026	0.035	0.176	-0.008	0.021	0.000	0.021	-0.113	-0.226	0.011	-0.063	-0.001	-0.441	0.037	0.220	1.000	
	(0.006)	(0.000)	(0.000)	(0.388)	(0.025)	(0.968)	(0.025)	(0.000)	(0.000)	(0.257)	(0.000)	(0.888)	(0.000)	(0.000)	(0.000)		
LAGE	-0.035	0.181	0.310	0.016	0.025	0.047	0.047	0.130	0.059	-0.069	0.100	-0.168	0.047	0.267	-0.024	-0.033	1.000
	(0.000)	(0.000)	(0.000)	(0.093)	(0.008)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.009)	(0.000)	

Table 4
Board Independence and Internal Control Weakness
Sample Period: 2004-2012

This table presents results of the univariate and multivariate analysis on the relation between board independence and internal control weakness. We obtain the internal control weakness data from Audit Analytics. We then merge the Audit Analytics data with Risk Metrics (board data), Compustat (financial information), CRSP (firm age), and SDC Platinum (M&A data). Panel A presents the number of observations with and without internal control weakness for deciles grouped by the fraction of independent directors in the board (FIDIR). Numbers in parentheses represent percentage of observations within each FIDIR decile. Panel B presents the results of the regression analysis on the relation between internal control weakness and board independence. Column (1) presents the results of ICW dummy against board independence. In Column (2), we add board size as the control variable. In Column (3), we further include additional firm characteristics as control variables. Industry dummies based on two-digit SIC code are included but not reported. The regressions are performed by Probit model and *t*-statistics in parentheses are calculated from the Huber-White sandwich heteroscedastic consistent errors, which are also corrected for correlation across observations for a given firm. *, **, and *** denote significance at the 10%, 5%, and 1% levels respectively. Variable definitions are specified in Appendix 1.

Panel A. Univariate Analysis

FIDIR Decile	Internal Control Weakness				Total
	No		Yes		
	Obs.	Percentage	Obs.	Percentage	
1	1,084	93.05%	81	6.95%	1,165
2	1,108	95.19%	56	4.81%	1,164
3	1,122	96.39%	52	4.47%	1,164
4	1,122	96.39%	42	3.61%	1,164
5	1,128	96.82%	37	3.18%	1,165
6	1,134	97.42%	30	2.58%	1,164
7	1,130	97.08%	34	2.92%	1,164
8	1,130	97.08%	34	2.92%	1,164
9	1,124	96.56%	30	2.58%	1,164
10	1,144	98.20%	21	1.80%	1,165
Total	11,226	96.42%	417	3.58%	11,643

Panel B. Regression Analysis

	(1)	(2)	(3)
FIDIR	-0.085	-0.077	-0.070
	(-5.723)***	(-5.234)***	(-5.260)***
LDIR		-0.031	-0.005
		(-3.749)***	(-0.593)
LSEG			0.006
			(2.417)**
FRGN			0.011
			(2.473)**
M&A			0.004
			(1.146)
RESTR			0.008
			(2.027)**
QSGRW			0.003
			(0.630)
INV			0.052
			(2.328)**
LMVE			-0.011
			(-6.276)***
LOSS			0.010
			(1.994)**
RDAZ			0.004
			(3.998)***
LAGE			-0.002
			(-0.676)
Obs.	11,226	11,226	11,226
Pseudo R2	0.031	0.036	0.082

Table 5
Reverse-Causality Tests
Sample Period: 2004-2012

This table presents the results for the endogeneity tests. We obtain the internal control weakness data from Audit Analytics. We then merge the Audit Analytics data with RiskMetrics (board data), Compustat (financial information), CRSP (firm age), and SDC Platinum (M&A data). Column (1) presents the results for observations in year 2004 only. Column (2) presents the results for the subsample of observations without internal control weakness identified before. In Column (3), we follow a method by Wooldridge (2002) and use the predicted value of board independence as an instrument in a standard instrumental variable estimation. Industry dummies based on two-digit SIC code are included but not reported. The regressions are performed by Probit model and *t*-statistics in parentheses are calculated from the Huber-White sandwich heteroscedastic consistent errors, which are also corrected for correlation across observations for a given firm. *, **, and *** denote significance at the 10%, 5%, and 1% levels respectively. Variable definitions are specified in Appendix 1.

	2004 Only	No ICW Before	Wooldridge (2002)
	(1)	(2)	(3)
FIDIR	-0.155	-0.061	-2.214
	(-2.146)**	(-5.556)***	(-4.093)***
LDIR	0.013	-0.000	0.007
	(0.280)	(-0.055)	(0.055)
LSEG	0.009	0.004	0.075
	(0.574)	(2.389)**	(2.655)***
FRGN	0.059	0.008	0.142
	(2.321)**	(2.128)**	(2.309)**
M&A	-0.027	0.004	0.047
	(-1.204)	(1.412)	(0.852)
RESTR	-0.004	0.008	0.131
	(-0.177)	(2.390)**	(2.148)**
QSGRW	-0.034	0.002	0.019
	(-1.339)	(0.598)	(0.289)
INV	0.552	0.063	0.453
	(2.887)***	(2.970)***	(1.944)*
LMVE	-0.028	-0.009	-0.136
	(-2.789)***	(-6.703)***	(-5.529)***
LOSS	0.112	0.006	0.138
	(2.692)***	(1.398)	(1.834)*
RDAZ	0.028	0.003	0.049
	(3.829)***	(3.826)***	(4.362)***
LAGE	0.011	-0.002	-0.028
	(0.648)	(-1.041)	(-0.666)
Obs.	711	9,920	8,215
Pseudo R2	0.191	0.098	-

Table 6
Propensity Score Matching
Sample Period: 2004-2012

The table presents the results of the relation between board independence and internal control weakness using the propensity score matching method. We obtain the internal control weakness data from Audit Analytics. We then merge the Audit Analytics data with RiskMetrics (board data), Compustat (financial information), CRSP (firm age), and SDC Platinum (M&A data). To do propensity score matching, we first run probit regression of ICW dummy against a set of control variables. Industry dummies based on two-digit SIC code are included but not reported. We then match each ICW firm with one non-ICW firm on propensity score using nearest neighbour matching. Finally, we estimate the average treatment effect of board independence tested by comparing treated and matching samples. *, **, and *** denote significance at the 10%, 5%, and 1% levels respectively. Variable definitions are specified in Appendix 1.

Panel A. First-stage

	(1)
LDIR	-0.007
	(-0.757)
LSEG	0.006
	(2.609)***
FRGN	0.011
	(2.347)**
M&A	0.005
	(1.278)
RESTR	0.005
	(1.321)
QSGRW	0.002
	(0.586)
INV	0.053
	(2.236)**
LMVE	-0.011
	(-6.669)***
LOSS	0.009
	(1.760)*
RDAZ	0.004
	(3.782)***
LAGE	-0.003
	(-1.103)
Obs.	11,226
Pseudo R2	0.081

Panel B. Second-stage

Variable	Treated	Controls	Difference	t-statistic
FIDIR	0.723	0.764	-0.041	-6.603***

Table 7
Committee Independence and Internal Control Weakness
Sample Period: 2004-2012

This table presents the univariate and multivariate results on the relation between internal control weakness and committee independence. We obtain the internal control weakness data from Audit Analytics. We then merge the Audit Analytics data with RiskMetrics (committee independence data), Compustat (financial information), CRSP (firm age), and SDC Platinum (M&A data). Panel A presents the internal control weakness for each committee level independence variable. Numbers in parentheses represent the percentage of observation within each value of committee independence dummy. Panel B presents the regression of ICW dummy on committee level independence. Column (1) reports the regression results for the audit committee, column (2) for the nominating committee, column (3) for the compensation committee and column (4) reports the results for the corporate governance committee. In column (5) we report the results for all four committees. Industry dummies based on two-digit SIC code are included but not reported. The regressions are performed by Probit model and *t*-statistics in parentheses are calculated from the Huber-White sandwich heteroscedastic consistent errors, which are also corrected for correlation across observations for a given firm. *, **, and *** denote significance at the 10%, 5%, and 1% levels respectively. Variable definitions are specified in Appendix 1.

Panel A. Univariate Analysis

Committee Independence	Internal Control Weakness				Total
	No		Yes		
	Obs.	Percentage	Obs.	Percentage	
DUMAUD=0	702	93.98%	45	6.02%	747
DUMAUD=1	10,524	96.59%	372	3.41%	10,896
DUMNOM=0	1,542	94.72%	86	5.28%	1,628
DUMNOM=1	9,684	96.69%	331	3.31%	10,015
DUMCOMP=0	906	93.89%	59	6.11%	965
DUMCOMP=1	10,320	96.65%	358	3.35%	10,678
DUMCG=0	1,810	94.62%	103	5.38%	1,913
DUMCG=1	9,416	96.77%	314	3.23%	9,730
Total	11,226	96.42%	417	3.58%	11,643

Panel B. Regression Analysis

	(1)	(2)	(3)	(4)	(5)
DUMAUD	-0.025				-0.015
	(-3.458)***				(-2.041)**
DUMNOM		-0.016			0.001
		(-3.326)***			(0.125)
DUMCOMP			-0.021		-0.010
			(-3.264)***		(-1.410)
DUMCG				-0.016	-0.009
				(-3.430)***	(-0.953)
LDIR	-0.007	-0.008	-0.008	-0.006	-0.007
	(-0.792)	(-0.867)	(-0.863)	(-0.729)	(-0.796)
LSEG	0.006	0.006	0.006	0.006	0.006
	(2.509)**	(2.513)**	(2.538)**	(2.521)**	(2.456)**
FRGN	0.011	0.010	0.011	0.010	0.011
	(2.351)**	(2.280)**	(2.381)**	(2.293)**	(2.337)**
M&A	0.004	0.005	0.004	0.004	0.004
	(1.105)	(1.250)	(1.216)	(1.203)	(1.083)
RESTR	0.005	0.006	0.005	0.006	0.005
	(1.320)	(1.446)	(1.404)	(1.470)	(1.449)
QSGRW	0.002	0.002	0.002	0.002	0.002
	(0.530)	(0.601)	(0.559)	(0.583)	(0.528)
INV	0.054	0.051	0.054	0.051	0.053
	(2.293)**	(2.186)**	(2.288)**	(2.183)**	(2.271)**
LMVE	-0.011	-0.011	-0.011	-0.011	-0.011
	(-6.615)***	(-6.423)***	(-6.479)***	(-6.389)***	(-6.398)***
LOSS	0.009	0.010	0.010	0.010	0.010
	(1.830)*	(1.904)*	(1.910)*	(1.971)**	(2.009)**
RDAZ	0.004	0.004	0.003	0.004	0.003
	(3.799)***	(3.840)***	(3.728)***	(3.817)***	(3.782)***
LAGE	-0.003	-0.003	-0.003	-0.003	-0.003
	(-1.062)	(-1.089)	(-1.025)	(-1.086)	(-1.021)
Obs.	11,226	11,226	11,226	11,226	11,226
Pseudo R^2	0.083	0.082	0.085	0.083	0.087

Table 8
Unitary and Dual Leadership Styles and Internal Control Weakness
Sample Period: 2004-2012

This table presents the results of the regression analysis on the relationship between internal control weakness and board independence for unitary and dual leadership styles. We obtain the internal control weakness data from Audit Analytics. We then merge the Audit Analytics data with RiskMetrics (board independence data), Compustat (financial information), CRSP (firm age data), and SDC Platinum (M&A data). In Columns (1) and (2), we report the results for the subsample of firms with unitary leadership. In Columns (3) and (4), we present the results for the subsample of firms with dual leadership. Industry dummies based on two-digit SIC code are included but not reported. The regressions are performed by Probit model and *t*-statistics in parentheses are calculated from the Huber-White sandwich heteroscedastic consistent errors, which are also corrected for correlation across observations for a given firm. *, **, and *** denote significance at the 10%, 5%, and 1% levels respectively. Variable definitions are specified in Appendix 1.

	Unitary Leadership		Dual Leadership	
	(1)	(2)	(3)	(4)
FIDIR	-0.088		-0.041	
	(-6.181)***		(-1.574)	
DUMAUD		-0.019		-0.006
		(-2.192)**		(-0.499)
DUMNOM		0.004		-0.006
		(0.303)		(-0.373)
DUMCOMP		-0.017		0.006
		(-1.877)*		(0.559)
DUMCG		-0.010		-0.005
		(-0.800)		(-0.347)
LDIR	0.006	0.004	-0.022	-0.023
	(0.568)	(0.369)	(-1.662)*	(-1.703)*
LSEG	0.006	0.007	0.005	0.006
	(2.425)**	(2.469)**	(1.586)	(1.629)
FRGN	0.007	0.007	0.017	0.017
	(1.387)	(1.277)	(2.500)**	(2.433)**
M&A	0.001	-0.000	0.008	0.008
	(0.132)	(-0.026)	(1.411)	(1.479)
RESTR	0.007	0.004	0.009	0.008
	(1.624)	(0.947)	(1.450)	(1.309)
QSGRW	0.007	0.007	-0.005	-0.006
	(1.476)	(1.359)	(-0.886)	(-0.945)
INV	0.053	0.056	0.026	0.021
	(2.129)**	(2.180)**	(0.577)	(0.458)
LMVE	-0.009	-0.010	-0.013	-0.012
	(-4.720)***	(-5.086)***	(-4.658)***	(-4.638)***
LOSS	0.014	0.014	0.004	0.004
	(2.206)**	(2.146)**	(0.605)	(0.614)
RDAZ	0.003	0.003	0.004	0.004
	(3.107)***	(2.947)***	(2.852)***	(2.722)***
LAGE	-0.002	-0.003	-0.002	-0.003
	(-0.490)	(-0.880)	(-0.489)	(-0.649)
Obs.	7,158	7,158	4,068	4,068
Pseudo R2	0.113	0.104	0.096	0.097

Table 9
Board and Committee Independence and Different Types of Internal Control Weakness
Sample Period: 2004-2012

This table presents the regression results of the relationship between board and committee level independence and various types of internal control weakness. We obtain the internal control weakness data from Audit Analytics. We then merge the Audit Analytics data with RiskMetrics (board independence data), Compustat (financial information), CRSP (firm age data), and SDC Platinum (M&A data). Following, Doyle at al. (2007) we classify the 21 types (Audit Analytics) of internal control weakness into two broad classification schemes of Doyle, Ge and McVay (2007). The two broad categories are: (a) Account Specific or transaction-level material weakness and, (b) Company-level material weakness. Industry dummies based on two-digit SIC code are included but not reported. The regressions are performed by Logit model, with robust standard errors. *, **, and *** denote significance at the 10%, 5%, and 1% levels respectively. Variable definitions are specified in Appendix 1.

	Account-specific (or transaction-level) ICW		Company-level ICW	
	(1)	(2)	(3)	(4)
FIDIR	-0.070		-0.032	
	(-5.275)***		(-4.181)***	
DUMAUD		-0.015		-0.007
		(-2.056)**		(-1.728)*
DUMNOM		0.001		0.006
		(0.132)		(1.392)
DUMCOMP		-0.010		-0.012
		(-1.407)		(-2.382)**
DUMCG		-0.009		-0.010
		(-0.967)		(-1.856)*
LDIR	-0.004	-0.006	-0.011	-0.012
	(-0.514)	(-0.719)	(-2.410)**	(-2.474)**
LSEG	0.006	0.006	0.003	0.003
	(2.381)**	(2.420)**	(1.831)*	(1.891)*
FRGN	0.011	0.011	0.004	0.003
	(2.458)**	(2.322)**	(1.464)	(1.308)
M&A	0.004	0.004	0.001	0.000
	(1.099)	(1.035)	(0.316)	(0.130)
RESTR	0.007	0.005	0.004	0.003
	(2.005)**	(1.425)	(1.812)*	(1.242)
QSGRW	0.003	0.002	0.003	0.003
	(0.658)	(0.555)	(1.248)	(1.081)
INV	0.052	0.052	0.016	0.016
	(2.302)**	(2.246)**	(1.312)	(1.286)
LMVE	-0.010	-0.011	-0.005	-0.005
	(-6.265)***	(-6.387)***	(-5.108)***	(-5.144)***
LOSS	0.010	0.010	0.003	0.003
	(2.030)**	(2.045)**	(0.876)	(0.997)
RDAZ	0.004	0.003	0.001	0.001
	(3.975)***	(3.759)***	(2.678)***	(2.384)**
LAGE	-0.002	-0.003	0.003	0.003
	(-0.712)	(-1.058)	(1.924)*	(1.700)*
Obs.	11,226	11,226	11,226	11,226
Pseudo R2	0.086	0.082	0.098	0.097

Appendix 1
Variable, sources and definitions

Variable	Source	Definition
AGE	CRSP	Number of years the firm exists in the CRSP database.
AZ	Compustat	3.3 times pretax income (OIBDP) plus sales (SALE) plus 1.4 times retained earnings (RE) plus 1.2 times net working capital, then divided by total assets (AT). Net working capital is defined as current assets (ACT) minus current liabilities (LCT).
CEOUNI	Risk Metrics	Dummy variable equal to one if the CEO is also the chairman of the board and zero otherwise.
CEOOWN	Risk Metrics	Number of shares owned by the CEO divided by number of shares outstanding.
DEBT	Compustat	Long-term debt (DLTT) divided by total assets (AT).
DIROWN	Risk Metrics	Number of shares owned by all the board directors divided by number of shares outstanding.
DUMAUD	RiskMetrics	Dummy variable equal to one if all the members in the audit committee are independent and zero otherwise.
DUMICW	Audit Analytics	Dummy variable equal to one if the firm has ICW and zero otherwise.
DUMNOM	Risk Metrics	Dummy variable equal to one if all the members in the nomination committee are independent and zero otherwise.
DUMCOMP	Risk Metrics	Dummy variable equal to one if all the members in the compensation committee are independent and zero otherwise.
DUMCG	Risk Metrics	Dummy variable equal to one if all the members in the corporate governance committee are independent and zero otherwise.
FCF	Compustat	Income before extraordinary items (IB) minus total tax (TXT) minus change in deferred tax (TXDB) minus interest expense (XINT) minus common dividend (DVC) minus preferred dividend (DVP), then divided by total assets (AT).
FIDIR	Risk Metrics	Fraction of independent directors in the board.
FRGN	Compustat	Dummy variable equal to one if the firm has a non-zero foreign currency translation (CICURR) and zero otherwise
INDROA	Compustat	The different between the firm's ROA and the average ROA over the two-digit SIC industry. ROA is defined as operating income after depreciation (IOADP) divided by total assets (AT).
INV	Compustat	Inventories (INVT) divided by total assets (AT).
LDIR	Risk Metrics	Natural logarithm of NUMDIR.
LMVE	Compustat	Natural logarithm of MVE.
LOSS	Compustat	Dummy variable equal to one if earnings before extraordinary items (IB) is negative and zero otherwise.
LSEG	Compustat	Natural logarithm of NUMSEG.
LAGE	CRSP	Natural logarithm of AGE.
M&A	SDC	Dummy variable equal to one if the firm was involved in mergers or acquisitions over the three-year period including the current year and zero otherwise.
MB	Compustat	MVE divided by book equity (CEQ).
MVE	Compustat	Market value of equity, defined as number of shares outstanding (CSHPRI) times stock price (PRCC_F).
NUMDIR	Risk Metrics	Number of directors in the board.
NUMSEG	Compustat	Number of business segments in the firm
QSGRW	Compustat	Dummy variable equal to one if industry-adjusted SGRW falls into the top quintile and zero otherwise.

RND	Compustat	R&D expenses (XRD) divided by total assets (AT).
RDAZ	Compustat	Decreasing decile rank of AZ.
RESTR	Compustat	Dummy variable equal to one if the firm is involved in restructuring over the three-year period including the current year (at least one of RCA, RCD, RCEPS, and RCL is not equal to zero) and zero otherwise.
SGRW	Compustat	Annual growth rate of sales revenue (SALE).

Appendix 2
Types of Internal Control Weakness

Audit Analytics classifies Internal Controls over Financial Reporting Issues into 21 types. The following detailed explanations have been extracted from the Audit Analytics Manual.

Type 1: Accounting documentation, policy and/or procedures
Represents material weaknesses deriving from internal control systems that do not contain adequate documentation, policies or other means of justifying account balances. These issues may also include failures to ensure that accounts are recorded based on GAAP, SAB, FASB and/or the appropriate accounting methodology are followed. They may also include failures in policies or procedures designed to gather the correct information on a timely basis or problems with the y/e close process. It also includes failures to employ proper procedures over journal entries, non-routine transactions and other common procedural failures.

Type 2: Accounting personnel resources, competency/training
Consists of problems with accounting personnel resources, competency, training, experience and/or adequacy in any way. To meet these criteria, such an indication would have to be contained in the filing or in the remediation plan.

Type 3: Ethical or compliance issues with personnel
Consists of problems with personnel in the areas of compliance with policies, maintenance of ethical standards, fraud and intentional acts that lead to (or could lead to) misstated account balances or financial reports.

Type 4: Inadequate disclosure controls (timely, accuracy, complete)
Represents material weaknesses related to the adequacy of information flow that should result in a required disclosure.

Type 5: Ineffective or understaffed audit committee
Represents circumstances where an audit committee may not have the personnel, expert, experience and/or resources to perform their duties to the extent required by Sarbanes Oxley or their charter.

Type 6: Ineffective regulatory compliance issues
Consists of internal control deficiencies associated with failures to meet regulatory requirements other than taxes.

Type 7: Information technology, software, security & access issue
Deficiencies in this category include deficient program controls, software programs/implementation, segregation of duties associated with personnel having access to computer accounting or financial reporting records and related problems with oversight/access to electronic data/programs.

Type 8: Insufficient or non-existent internal audit function
Indicates circumstances where a company has stated that its internal audit function was insufficient in identifying and/or advising in the correction of internal control deficiencies. It cannot also identify circumstances where a registrant has identified a failure to have an internal audit department at all, as a ICFR failure.

Type 9: Journal entry control issues
This category is checked whenever the description given by the audit firm or company refers to deficiencies or issues associated with the journal entry process. This category is not checked when there is a journal entry error that originates from control deficiencies in other areas.

Type 10: Management/Board/Audit Committee investigation(s)
Consists of internal control reports indicating that an internal investigation is underway relative to accounting and/or financial reporting matters. This item is demographic in nature.

Type 11: Material and/or numerous auditor /YE adjustments

Represents circumstances where one of the explanations for a material weakness opinion was the number and/or size of year end adjustments including those proposed by the auditor. These adjustments also consider footnote and related errors that need to be corrected by the auditor at year-end. Too many, or auditor initiated year-end adjustments are considered prima facie evidence of a potential material weakness in financial reporting.

Type 12: Non-routine transaction control issues
This category is checked whenever a registrant specifically describes one of their control deficiencies as emanating from nonroutine types of transactions. These could include acquisitions, asset sales, establishment of new systems and other.

Type 13: Remediation of material weakness identified
Refers to disclosures that indicate that material weakness or internal control weaknesses have been remediated.

Type 14: Restatement or nonreliance of company filings

Consists of material weakness opinions deriving from problems that led to restatements. Restatements are often evidentiary of primi-facie internal control deficiencies.

Type 15: Restatement of previous 404 disclosures
Represents circumstances where a company has had to restate its 404 opinion because of some event (most likely a restatement of financials) that has occurred subsequently to filing.

Type 16: SAB 108 adjustments noted
This item is checked when the ICFR disclosure identifies that a SAB 108, as opposed to a financial restatement, process is used to correct the beginning retained earnings balances associated with previous period accounting errors.

Type 17: Scope (resource, time, inclination) limitations
A material weakness opinion may derive from assertions from the company or auditor that the company had not completed its own review of internal controls and therefore these controls could not be audited. These limitations could come about for any number of reasons.

Type 18: SEC or other regulatory investigations and/or inquiries
An SEC or related investigation into the company affairs is often evidentiary of accounting or financial reporting issues that point to internal control deficiencies. This category seeks to identify circumstances where registrants have indicated in their 404 assertion that an SEC investigation or inquiry is underway.

Type 19: Segregations of duties/ design of controls (personnel)
This category covers internal control deficiencies associated with the design and use of personnel within an organization. It primarily deals with segregation of duty issues, such as clerks having access to both the cash receipts and the bank reconciliation. It may also deal with more sophisticated design of control issues relating to executives having the ability to change customer records, etc.

Type 20: Senior management competency, tone, reliability issues
This category has been established to identify circumstances where internal control weaknesses are attributed directly to potentially improper or negligent conduct of the current or former senior management of the company. This does not necessarily mean that the assertion is correct, just that such language exists in the filing.

Type 21: Untimely or inadequate account reconciliations
In reviewing internal control assertions or opinions it is often the case that inadequate account reconciliations are identified as the reason for material or numerous adjustments. This category seeks to specifically identify such circumstances.

Appendix 3
Classification scheme of Doyle, Ge and McVay (2007)

Account-specific or transaction-level material weaknesses

(1) Inadequate internal controls for accounting for loss contingencies, including bad debts
(2) Deficiencies in the documentation of a receivables securitization program
(3) No adequate internal controls over the application of new accounting principles or the application of existing accounting principles to new transactions

Company-level material weaknesses

(1) Override by senior management
(2) Ineffective control environment