Determinants of weaknesses in internal control over financial reporting ☆

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Abstract

We examine determinants of weaknesses in internal control for 779 firms disclosing material weaknesses from August 2002 to 2005. We find that these firms tend to be smaller, younger, financially weaker, more complex, growing rapidly, or undergoing restructuring. Firms with more serious entity-wide control problems are smaller, younger and weaker financially, while firms with less severe, account-specific problems are healthy financially but have complex, diversified, and rapidly changing operations. Finally, we find that the determinants also vary based on the specific reason for the material weakness, consistent with each firm facing their own unique set of internal control challenges.
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1. Introduction

In this paper, we examine the determinants of material weaknesses in internal control over financial reporting. A material weakness in internal control is defined as "a significant deficiency, or combination of significant deficiencies, that results in more than a remote likelihood that a material misstatement of the annual or interim financial statements will not be prevented or detected" (PCAOB, 2004).[1] We use a sample of companies that disclosed material weaknesses in internal control over financial reporting under Sections 302 and 404 of the Sarbanes-Oxley Act of 2002 from August 2002 to 2005.[2] Under Section 302, SEC registrants' executives are required to certify that they have evaluated the effectiveness of their internal controls over financial reporting. If management identifies a material weakness in their controls, they are precluded from reporting that the controls are effective and must disclose the identified material weakness (SEC, 2002, 2004). Section 404 requires that each annual report include an assessment by management of the effectiveness of the internal control structure and procedures of the issuer for financial reporting that is attested to by the firm's public accountants.

Although firms were required to maintain an adequate system of internal control before the enactment of Sarbanes-Oxley, they were only required to publicly disclose deficiencies if there was a change in auditor (SEC, 1988). While prior research studies this limited set of disclosures (Krishnan, 2005), there is little evidence regarding internal control quality for firms in general under the new Sarbanes-Oxley regime.

We investigate whether material weaknesses in internal control are associated with (1) firm size, measured by market value of equity; (2) firm age, measured by the number of years the firm has CRSP data; (3) financial health, measured by an aggregate loss indicator variable and a proxy for the likelihood of bankruptcy based on the hazard model developed by Shumway (2001); (4) financial reporting complexity, measured by the number of special purpose entities reported, the number of segments reported, and the existence of a foreign currency translation; (5) rapid growth, measured by merger and acquisition expenditures and extreme sales growth; (6) restructuring charges; and (7) corporate governance, measured using the governance score developed by Brown and Caylor (2006).

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[1]A significant deficiency is defined as "a control deficiency, or combination of control deficiencies, that adversely affects the company's ability to initiate, authorize, record, process, or report external financial data reliably in accordance with generally accepted accounting principles such that there is more than a remote likelihood that a misstatement of the company's annual or interim financial statements that is more than inconsequential will not be prevented or detected" (PCAOB, 2004, Auditing Standard 2, Paragraph 9). A "significant deficiency" and a "material weakness" are both deficiencies in the design or operation of internal controls, but significant deficiencies are less severe and are not required to be publicly disclosed under Sections 302 or 404 (SEC, 2004).

[2]Section 404 became effective for fiscal years ending after November 15, 2004 for accelerated filers, which generally includes public firms with a market capitalization of at least $75 million (the due date was extended an additional 45 days for accelerated filers with a market capitalization of less than $700 million in November 2004). For non-accelerated filers, Section 404 will be effective for years ending after December 15, 2007 and auditor attestation will be required for years ending after December 15, 2008. Non-accelerated filers, however, must still evaluate their controls and disclose any material weaknesses under Section 302. To the extent that our inclusion of Section 404 disclosures biases our sample toward larger firms, the inclusion of market value of equity in our multivariate analyses should act as a control. In untabulated results we also replicate our results using only the Section 302 disclosures and find qualitatively similar results.

Our sample is comprised of 970 unique firms that reported at least one material weakness from August 2002 to 2005, of which 779 have Compustat data. We identify these firms through a combination of a search of Compliance Week, a website which tracks internal control disclosures after Sarbanes-Oxley, and a search of 10-K filings in the EDGAR database.

For the full sample, we find that material weaknesses in internal control are more likely for firms that are smaller, younger, financially weaker, more complex, growing rapidly, and/or undergoing restructuring. These firm-specific characteristics seem to create challenges for companies in maintaining a strong system of internal controls. Our findings also appear to be economically significant in identifying firms with material weaknesses. For example, the joint marginal effect of our main model (i.e., the change in the predicted probability of a material weakness when altering the independent variables in the predicted direction between the 1st and 3rd quartiles or between zero and one for indicator variables) greatly increases the predicted probability of a material weakness—from 3.75 percent to 26.41 percent.

In this paper, we focus solely on material weaknesses for two reasons. First, it is the most severe type of internal control deficiency, and thus offers the greatest power for our determinants tests. Second, the disclosure of material weaknesses is effectively mandatory, while the disclosure of "significant deficiencies" is unambiguously voluntary.[3] Focusing on these more mandatory disclosures helps avoid self-selection issues associated with voluntary disclosures. Although disclosures of material weaknesses are effectively mandatory, it is possible that individual firms or auditors apply different materiality standards in deciding what to disclose. While we do not have a model of the materiality threshold of material weaknesses (Mayper, 1982; Mayper et al., 1989; Messier et al., 2005), our determinants results are similar to those documented by Ashbaugh-Skaife et al. (2007) who examine all types of significant deficiencies (i.e., not just those internal control weaknesses that meet the threshold to be classified as "material weaknesses") and find that firms disclosing significant deficiencies typically have more complex operations, recent changes in organization structure, more accounting risk exposure, and fewer resources to invest in internal control. Therefore, it appears that our results extend to a broader sample that does not rely on a potentially subjective judgment of what constitutes a "material weakness," although it is still possible that the broader sample in Ashbaugh-Skaife et al. (2007) suffers from the same concern.[4] Since Ashbaugh-Skaife et al. (2007) focus on all significant deficiencies, including unambiguously voluntary disclosures, they also include

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[3]Although disclosure of material weaknesses is definitely mandatory under Section 404 (SEC, 2003), there is some ambiguity regarding whether Section 302 certifications *require* public disclosure of material weaknesses. For example, Question 9 of the SEC's Frequently Asked Questions (SEC, 2004) seems to imply that firms should only "carefully consider" whether to publicly disclose material weaknesses. However in Question 11 they state without reserve that "A registrant is obligated to identify and publicly disclose all material weaknesses." Confusion arises due to the existence of two largely overlapping definitions of controls ("disclosure controls and procedures" and "internal controls over financial reporting"), two reporting regimes (Sections 302 and 404), and two tiers of reporting requirements (accelerated vs. non-accelerated filers). Although it is possible that some firms might interpret the material weakness disclosure requirement under Section 302 as voluntary, our reading of the bulk of SEC guidance and many firms' begrudging material weakness disclosures seems to indicate that most firms are treating the disclosure as mandatory.

[4]Moreover, prior research on materiality thresholds for internal control problems finds that the type of problem (e.g., segregation of duties), rather than firm characteristics, is the best indicator of whether the internal control problem will be classified as a material weakness (Mayper, 1982, p. 782).

additional variables to model the choice to disclose in their analyses. Since our focus is on material weakness disclosures, we do not include these variables in our main analysis. In untabulated results, our results are robust to their inclusion, though sales growth weakens considerably in the more restricted sample (with or without the additional variables).[5]

In addition to our general findings about material weakness firms, discussed above, which complement and corroborate the findings of concurrent studies, we differ from Ashbaugh-Skaife et al. (2007) and others by examining the specific types of material weaknesses disclosed, and how the determinants of internal control problems differ based on these types. We find that the type of internal control problem is an important factor when examining determinants, and thus should be considered by future research on internal control. Specifically, while we focus on material weaknesses, the most severe internal control problems, these weaknesses vary widely with respect to severity and underlying reason. For example, consider the two following material weakness disclosures:

> As part of the annual audit process, a material weakness was identified in our controls related to the application of generally accepted accounting principles, specifically related to the classification of the Company's short-term investments, resulting in the Company reclassifying approximately $34 million of cash and cash equivalents to short-term investments… (I-Flow Corporation, 12/31/04 10-K).

> The material weaknesses identified by the independent registered accounting firm include the following weaknesses in certain divisions of the Company: (1) Failure to reconcile certain general ledger accounts on a timely and regular basis and lack of management review of certain reconciliations. (2) Inconsistent application of accounting policies, including capitalization policies and procedures for determining unrecorded liabilities. (3) Failure of financial management in certain operating segments to properly supervise personnel, enforce and follow policies and procedures, and perform their assigned duties. (4) Lack of adequately staffed accounting departments (Evergreen Holdings, Inc., 2/29/2004 10-K/A).

While I-Flow's disclosure relates to an account-specific balance sheet classification error, Evergreen's disclosure speaks of larger, more pervasive problems in the company. This distinction is deemed to be important by Moody's, the bond rating company. Moody's posits that while account-specific weaknesses are auditable, company-level weaknesses are more difficult to audit around and call into question not only management's ability to prepare accurate financial reports but also its ability to control the business (Doss and Jonas, 2004). We investigate whether the determinants of these two types of weaknesses differ.

We find that firms that report account-specific weaknesses tend to be larger, older, and financially healthier than firms that report company-level weaknesses. They also have more complex and diversified business operations and are growing more rapidly. The complexity of their operating environment, along with the rapid change evidenced by merger and acquisition activity and high sales growth, seems to hinder these firms in maintaining

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[5]The additional proxies for the incentives to discover and disclose internal control problems include the size of the auditor (consistent with Ge and McVay, 2005), the existence of a past restatement (which could also be evidence of lower accruals quality in the presence of weak internal controls, Doyle et al., 2007), the level of ownership concentration, and whether or not the firm operates in a litigious industry. The latter two variables were not significant in our regressions.

adequate account-specific internal controls. In contrast, firms with company-wide problems seem to lack the resources or experience to maintain comprehensive control systems.

We also examine whether the determinants differ based on whether the firm attributes its material weakness to staffing issues (e.g., segregation of duties), complexity issues (e.g., trouble in calculating the deferred tax provision) or more general issues (e.g., lack of supporting documentation). Not surprisingly, firms disclosing staffing problems are more likely to be smaller and younger than other firms disclosing material weaknesses. These firms also tend to be the weakest financially, with the highest incidence of losses and the highest bankruptcy risk. Resource constraints likely hinder the ability of such firms to adequately staff their operations with competent personnel.

Firms disclosing material weaknesses related to complexity are the largest and oldest companies of the three groups and have the most sophisticated and diversified operations. In addition, when compared to the average Compustat firm, these firms continue to have more diversified and complex operations, and also tend to be weaker financially and have higher restructuring charges. Thus, complex operations, combined with relatively poor financial health and a quickly changing environment, appear to yield difficult financial reporting issues for these firms.

When examining firms providing more general material weakness disclosures, we find that each of the constructs examined tends to be associated with these firm disclosures, consistent with this subgroup containing many differing weaknesses (e.g., inadequate reconciliation procedures, revenue recognition problems, or a complete lack of policies and procedures in place). As a final analysis, we examine only those firms with material weaknesses related to revenue recognition problems and find that these disclosures are negatively associated with our proxy for good corporate governance.

In Section 2, we discuss the new requirements on internal control disclosures, prior research, and our hypotheses. In Section 3, we discuss our sample selection procedure and the data items used as construct proxies. In Section 4, we describe the methodology used to test our hypotheses and discuss the results. We summarize and conclude in Section 5.

2. Background of internal control over financial reporting, prior research, and hypotheses

2.1. Background and prior research

Internal control over financial reporting has long been recognized as an important feature of a company (see Kinney et al., 1990; Kinney, 2000, 2001).[6] However, prior to Sarbanes-Oxley, standards in place were very limited in scope. The sole statutory regulation of internal control over all SEC registrants was the Foreign Corrupt Practices

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[6]Internal control over financial reporting "includes those policies and procedures that: (1) pertain to the maintenance of records that, in reasonable detail, accurately and fairly reflect the transactions and dispositions of the assets of the company; (2) provide reasonable assurance that transactions are recorded as necessary to permit preparation of financial statements in accordance with generally accepted accounting principles, and that receipts and expenditures of the company are being made only in accordance with authorizations of management and directors of the company; and (3) provide reasonable assurance regarding prevention or timely detection of unauthorized acquisition, use or disposition of the company's assets that could have a material effect on the financial statements" (PCAOB, 2004).

Act (FCPA) of 1977, and the only required public disclosure of significant internal control deficiencies for all SEC firms was in the firm's 8-K, when disclosing a change in auditors (SEC, 1988; Geiger and Taylor, 2003; Krishnan, 2005). Within the banking industry, the Federal Deposit Insurance Corporation Improvement Act (FDICIA) of 1991 requires banks operating in the United States to file an annual report with regulators in which management attests to the effectiveness of their controls, and their independent public accountants attest to and separately report on management's assertions.

Similarly, under Section 404 of Sarbanes-Oxley (effective November 15, 2004 for accelerated filers) managers must review and provide an annual report on their internal controls, assessing the effectiveness of the internal control structure and procedures. However, even before the implementation of Section 404, firms began disclosing material weaknesses in their controls in response to Section 302 of Sarbanes-Oxley, under which the company executives are required to certify in the periodic reports (e.g., the 10-Qs and 10-Ks) filed with the SEC that their systems of controls are effective and report any significant changes in internal control.[7]

The details of internal control problems are most often provided in Item 9A—Controls and Procedures in firms' 10-Ks and Item 4—Controls and Procedures in firms' 10-Qs. In addition, managers often discuss internal control problems under Risk Factors in the MD&A. At least 970 firms have disclosed at least one material weakness in internal control from August 2002 to August 2005 under both Sections 302 and 404. We provide several additional examples of material weakness disclosures in Appendix A.

Both Sections 302 and 404 use definitions of "effective" internal control similar to those developed in 1992 by the Committee of Sponsoring Organizations (COSO) of the Treadway Commission. The SEC thus defines internal control as "a process, effected by an entity's board of directors, management and other personnel, designed to provide reasonable assurance regarding the reliability of financial reporting." Although the COSO framework broadly defines internal control in terms of achieving (1) the effectiveness and efficiency of operations, (2) reliability of financial reporting, and (3) compliance with applicable laws and regulations (Statements on Auditing Standards, Section 319), Sarbanes-Oxley only pertains to internal control related to the reliability of financial reporting.[8]

Internal control is a major focus of recent regulatory changes under Sarbanes-Oxley. However, empirical research on the determinants of internal control quality prior to Sarbanes-Oxley is extremely limited. The most direct evidence is provided by Krishnan

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[7]In its final rules, the SEC adopted the commonly known definition for a material weakness under existing GAAS and attestation standards (Interim Auditing Standards AU 325.15, PCAOB; see also SEC, 2003 and Krishnan, 2005). Although the material weakness definition was slightly updated by the PCAOB in March 2004 in its issuance of Auditing Standard 2 (Paragraph 10), it was essentially unchanged from before. Furthermore, about 90% of our sample disclosures are after March 2004, resulting in a fairly standard "material weakness" definition across time.

[8]For Section 302, the SEC also refers to "disclosure controls and procedures," which largely overlap with "internal control over financial reporting." The definition encompasses "the quality and timeliness of disclosure" to the SEC and is intended to include "material non-financial information, as well as financial information" (SEC, 2002), but may exclude some internal controls such as "safeguarding of assets" (SEC, 2003). In practice, there seems to be quite a bit of confusion about how the concepts differ, and it seems that most firms generally refer to the "internal control over financial reporting" definition in their disclosures. Our results are robust to the exclusion of the Section 404 disclosures and their potentially different control definition.

(2005). She examines 128 internal control deficiencies (including significant deficiencies that are not classified as material weaknesses) reported from 1994 to 2000 in the 8-Ks of firms that changed auditors. Her focus is on the association between audit committee quality and internal control quality, which she finds to be positively related. However, her sample is limited to firms that changed auditors. We present a much broader study of the determinants of internal control problems with our sample of 779 unique firms disclosing material weaknesses in the three years following the effective date of Section 302.

To provide evidence on the pervasiveness of material weakness disclosures prior to Sarbanes-Oxley we search all 10-Ks in the EDGAR database for the three years prior to Section 302 (from August 1, 1999 to August 1, 2002) using the keywords "material weakness" and "material weaknesses." We identify 61 distinct disclosures of material weaknesses. Of these 61 disclosures, 40 are listed under Item 9—Changes in and Disagreements with Accountants on Accounting and Financial Disclosure, and pertain to a change in auditor, the mandatory disclosure requirement discussed above. Among the 21 voluntary disclosures noted, six were disclosed in conjunction with a restatement of the financial statements, four with the disclosure of theft or fraud, and two were identified and disclosed by new senior management. Clearly there has been a marked increase in the disclosure of material weaknesses following the passage of Sarbanes-Oxley, opening the door to many new studies in this area.[9]

Prior to Sarbanes-Oxley, many studies opted to provide indirect evidence on internal control. Kinney and McDaniel (1989) examine characteristics of 73 firms that correct previously reported quarterly earnings from 1976 to 1985. They posit that a restatement implies a breach in the firm's internal control system, and find that both firm size and firm profitability are negatively associated with these restatements in univariate tests. DeFond and Jiambalvo (1991) examine 41 firms with prior period adjustments from 1977 to 1988 and use firm size as a proxy for the strength of a firm's internal controls. While firm size is weakly negatively associated with prior period adjustments in univariate tests, they find that firm size is not a statistically significant variable in their multivariate regression analysis. Finally, McMullen et al. (1996) proxy for weak internal control with both SEC enforcement actions and corrections of previously reported earnings. Their focus is on whether weak internal control firms voluntarily report on internal control. They find that small firms with weak internal control are less likely than other small firms to provide voluntary reports on internal control.

As noted above, restatements are often viewed as indicative of internal control problems. However, little research examines the determinants of restatements. Again, Kinney and McDaniel (1989) and DeFond and Jiambalvo (1991) document negative univariate associations between restatements and size and profitability. In addition, Richardson et al. (2003) examine the determinants of income-decreasing restatements using a sample of 225 restatement firms with 440 restatements from 1971 to 2000. The authors find that neither size nor profitability varies between their test and control firms.

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[9]For example, Bryan and Lilien (2005) examine firm characteristics such as firm size and beta, Chan et al. (2005) examine if firms reporting material weaknesses in internal control under Section 404 have more earnings management and lower return-earnings associations compared to other firms, Doyle et al. (2007) examine the accruals quality of material weakness firms, Hogan and Wilkins (2005) examine earnings management and audit fees, and Beneish et al. (2006) and Ogneva et al. (2006) examine the association between implied cost of equity and internal control effectiveness.

Their focus is largely on the incentives to manage earnings (e.g., external financing and meeting the analyst forecast). As discussed later in Section 4.4, we also perform our tests on only those material weakness firms that do not contemporaneously restate their financial statements in order to ensure that we are not merely documenting the determinants of restatements.

2.2. Hypotheses

As reviewed above, there is limited guidance from prior research regarding the determinants of internal control quality. Thus, while we attempt to incorporate this literature in the formulation of our hypotheses, our study may be viewed as exploratory in nature, and a first step in examining the determinants of internal control quality. To begin, prior research hypothesizes that firm size may be a determinant of good internal control (e.g., Kinney and McDaniel, 1989; DeFond and Jiambalvo, 1991), though the evidence is mixed (DeFond and Jiambalvo, 1991; Krishnan, 2005). Intuitively, large firms likely 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.[10] Larger firms are also more likely to enjoy economies of scale when developing and implementing internal control systems. Moreover they tend to have greater resources to spend on internal auditors or 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). One possible confounding factor in prior research is that large firms also tend to be more complex and engage in a larger number and variety of transactions. However, as discussed below, we explicitly control for complexity in our tests. Thus, we expect to find fewer control weaknesses in larger firms, after controlling for complexity. We measure firm size (*MARKETCAP*) as the log of the firm's market value of equity.[11]

Another factor that likely determines the processes and procedures in place is the age of the firm. The older the firm, the more likely they are to have "ironed out the kinks" in their internal control procedures. Thus, we expect to find fewer control weaknesses in older firms. We define *FIRM AGE* as the log of the number of years the firm has been public, measured by the number of years the firm has price information on CRSP.

A third determinant of strong internal control is expected to be a firm's financial health. Poorly performing firms simply 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 that are concerned about simply staying in business. Consistent with this hypothesis, past research finds that financial reporting errors

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[10]Weak internal control may occur in equilibrium, especially for small firms. For example, Universal Security Instruments, Inc., reported a material weakness in their internal control regarding a lack of segregation of duties. However, "…management has decided that … the risks associated with such lack of segregation are insignificant and the potential benefits of adding employees to clearly segregate duties do not justify the expenses associated with such increases."

[11]We present the log of the market value of equity as our size proxy since we span the effective date of Section 404 for accelerated filers, a definition largely based on market value. We also use market capitalization because our underlying construct is firm resources, and we think market capitalization best captures the resources available to the firm. Size continues to be a negative predictor of material weakness disclosures if we examine the log of total assets or the log of total book value, but is not significant if we use the log of sales.

are negatively associated with performance (DeFond and Jiambalvo, 1991) and that the existence of a loss is positively associated with reporting an internal control problem in audit-change firms (Krishnan, 2005). We expect to find fewer internal control weaknesses in firms with stronger financial health. We examine two financial resource measures, *AGGREGATE LOSS* (whether or not the sum of earnings before extraordinary items for years t and t–1 is negative) and *BANKRUPTCY RISK*, the decile rank of the percentage probability of bankruptcy from the hazard default prediction model developed by Shumway (2001).[12]

While we expect the size, age, and financial resources of the firm to affect its ability to establish proper internal controls, the need for internal controls is unique to each firm's particular operating environment.[13] As a firm engages in more complex transactions and has more diverse operations, we expect the need for internal control to be higher, and thus expect the complexity of the firm to be a driver of internal control weaknesses. Consider the complexity introduced by having multiple geographic or business divisions. These companies face challenges when implementing internal control consistently across different divisions and when consolidating information for financial statements. For each division, different factors might affect the *implementation* of adequate internal control. For example, for a multinational company, the local institutional and legal environment of each location might differ, and thus affect the effectiveness of internal control.[14] We examine complexity using three measures: the log of the number of special purpose entities associated with the firm, *SPEs*, the log of the sum of the number of operating and geographic segments, *SEGMENTS,* and the existence of a foreign currency adjustment, *FOREIGN TRANSACTIONS* (e.g., DeFond et al., 2002; Bushman et al., 2004).[15]

A fifth possible determinant of internal control weaknesses is rapid growth. A quickly growing firm may outgrow any internal controls it has in place, and may require time to establish new procedures (Kinney and McDaniel, 1989; Stice, 1991). New personnel, processes, and technology are usually needed to match the internal control with the firm's growth. For example, in their 2003 10-K, MarkWest Energy Partners disclosed "inadequate implementation of uniform controls over certain acquired entities and

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[12]Results are similar if we use a three-year earnings aggregation (t, t–1, t–2). We present the two-year aggregation to minimize data requirements. Shumway's model uses accounting information, market returns, and return volatility to estimate the probability of bankruptcy in any given period. Results are stronger if we use the Altman Z-score instead of the Shumway score. We present the Shumway score as this variable has more available observations.

[13]For example, Glass and Lewis (2004) state "…the size of the company, quality of its staff, risk management processes, the type of information technology systems, complexity of product lines including marketing channels, geographical dispersion, nature of the business (e.g. manufacturing versus service) as well as many other factors can affect the types of internal control necessary. Most often, small businesses will not require the type of complex internal control systems that are required of large international conglomerates engaging in extensive risk management techniques and financial instruments."

[14]For example, Baxter International Inc., one of our sample companies, disclosed a material weakness that occurred in their Brazilian division in their 2003 10-K. For firms with complex organizations, it may not be cost effective for them to maintain a high level of controls at all locations or divisions.

[15]We thank Mei Feng, Jeff Gramlich, and Sanjay Gupta for providing the special purpose entity data. We use the sum of the number of operating and geographic segments for two reasons. First, in most cases, companies report either operating segments or geographic segments; second, in some cases, companies report location related segments (e.g., Japan) as their operating segments. Thus the distinction between operating and geographic segments is not very clear. However, the results are similar if we use the number of operating and geographic segments as two separate variables.

operations" as one aspect of their material weakness in internal control. We consider two types of growth. The first, *ACQUISITION VALUE,* is the aggregate dollar value of acquisitions that result in at least 50 percent ownership of the acquired company in years t and t–1 scaled by the acquiring firm's year t market capitalization, as reported by the SDC Platinum database. Our second rapid growth measure, *EXTREME SALES GROWTH*, is an indicator variable that is equal to one if the firm's year-over-year sales growth is in the highest quintile of sales growth for their industry, and zero otherwise.[16] We expect rapid growth to be positively associated with internal control weaknesses.

Similarly, we expect firms undergoing restructuring to have relatively more internal control weaknesses. 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—the internal control system must be updated to match the new organizational structure. 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. For example, Nortel Networks disclosed a lack of compliance with the established procedures for monitoring and adjusting balances relating to restructuring charges as a material weakness in their June 2003 10-Q. As larger restructurings are likely to cause proportionally larger challenges for internal control, we define *RESTRUCTURING CHARGE* as a continuous variable, equal to aggregate restructuring charges in years t and t–1 scaled by the firm's year t market capitalization.[17] We expect material weaknesses to be more prevalent as firms record larger restructuring charges.

Finally, we expect corporate governance to play a role in a firm's internal control quality. Krishnan (2005) finds that firms with more effective audit committees report fewer internal control problems in their 8-Ks when reporting an auditor change. We expect a well-governed firm to exhibit fewer material weaknesses, all else equal.[18] We measure corporate governance with the measure developed by Brown and Caylor (2006). *GOVERNANCE SCORE* is a composite measure of 51 factors encompassing eight corporate governance categories: audit, board of directors, charter/bylaws, director education, executive and director compensation, ownership, progressive practices, and

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[16]Results are not sensitive to the calculation of this metric. We also consider sales growth as a continuous variable, unadjusted sales growth (as both a continuous variable and an indicator variable), and each sales growth metric from year t–2 to year t. We opt to use the extreme growth indicator variable to focus on those firms that have "abnormal" sales growth that is most likely to cause firms to outgrow their internal controls. We use the one-year time horizon to minimize the data requirement.

[17]Results hold if we use current year's restructuring charge or three years' aggregate restructuring charge. We also consider indicator variables for non-zero restructuring charges, and charges of at least one percent and five percent of market value. Restructuring charges remain a positive predictor of material weaknesses if an indicator variable is used, though results weaken slightly, suggesting that the likelihood of a weakness is increasing in the magnitude of the restructuring charge.

[18]In this paper, we use material weakness disclosures to proxy for the existence of an underlying internal control problem. Governance may also affect the choice to disclose a known deficiency (e.g., Ashbaugh-Skaife et al., 2007), thus biasing against our stated hypothesis. Krishnan (2005) examines audit committee effectiveness. However, her sample predates the new requirements pertaining to audit committee independence and required financial expertise (see Klein, 2003, for an overview of these requirements). Thus, there is sufficient variation in her data for a powerful test of her hypothesis. However, in recent years, the variation in audit committee effectiveness has declined. For example, the mean percentage of independent audit board members is 90 percent for 2002.

Table 1
Variable definitions and expected relation with the probability of disclosing a material weakness

Variable	Predicted direction	Calculation
MARKETCAP	−	The log of share price x number of shares outstanding [data item #25 × data item #199]
FIRM AGE	−	The log of the number of years the firm has CRSP data
AGGREGATE LOSS	+	An indicator variable equal to one if earnings before extraordinary items [data item #18] in years t and $t–1$ sum to less than zero, and zero otherwise
BANKRUPTCY RISK	+	The decile rank of the percentage probability of bankruptcy from the default hazard model prediction based on Shumway (2001)
SPEs	+	The log of the number of special purpose entities associated with the firm in year t
SEGMENTS	+	The log of the sum of the number of operating and geographic segments reported by the Compustat Segments database for the firm in year t
FOREIGN TRANSACTIONS	+	An indicator variable equal to one if the firm has a non-zero foreign currency translation [data item #150] in year t, and zero otherwise
ACQUISITION VALUE	+	The aggregate dollar value of acquisitions that result in at least 50 percent ownership of the acquired company in years t and $t–1$ scaled by the acquiring firm's year t market capitalization
EXTREME SALES GROWTH	+	An indicator variable that is equal to one if year-over-year industry-adjusted sales growth [data item #12] falls into the top quintile, and zero otherwise
RESTRUCTURING CHARGE	+	The aggregate restructuring charges [data item #376 × −1] in years t and $t–1$ scaled by the firm's year t market capitalization
GOVERNANCE SCORE	−	A composite measure of 51 factors encompassing eight corporate governance categories: audit, board of directors, charter/bylaws, director education, executive and director compensation, ownership, progressive practices, and state of incorporation developed by Brown and Caylor (2006)

state of incorporation.[19] We summarize each of our directional predictions and variable measurements in Table 1.

3. Data, sample selection, and material weakness classifications

3.1. Data and sample selection

As mentioned above, material weaknesses in internal control have only been widely disclosed in SEC filings since August of 2002. Since November 2003, Compliance Week

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[19]We thank Larry Brown and Marcus Caylor for providing the governance data.

(a website dedicated to Sarbanes-Oxley related compliance issues) has been collecting and publishing monthly reports on firms that disclose internal control deficiencies. We aggregate these monthly Compliance Week disclosures, obtaining 877 individual disclosures. We include only those firms that classify their internal control problem(s) as a material weakness, the most severe internal control deficiency, eliminating 239 non-material weakness disclosures.[20] In the event of a subsequent disclosure by the same firm, we retain the disclosure to aid in our type analysis, but do not include the firm multiple times in our sample, descriptive statistics, or statistical tests. There are 97 such duplicate disclosures.[21] To supplement our sample, we also search 10-Ks in the EDGAR database from August 2002 (the enactment date of Section 302) to August 2005 using the keyword "material weakness" and identify an additional 429 material weakness firms, thereby identifying a total of 970 distinct firms that disclosed at least one material weakness from August 2002 to 2005.[22] We then obtain financial data from the 2003 annual Compustat database and eliminate 191 firms that have insufficient Compustat data, resulting in a final sample of 779 material weakness firms.[23] In 175 instances, the material weakness firm does not have available data for 2003, but does have data available on Compustat for a prior year. In these cases, we take the most recent data available (2002 for 163 firms, 2001 for nine firms, and 2000 for three firms). In summary, our sample period is much longer than that of other concurrent work as we examine three full years, including both Section 302 and 404 disclosures. For example, Ashbaugh-Skaife et al. (2007) limit their analysis to Section 302 disclosures in the year prior to the effective date of Section 404.

For our control firms, we use all 2003 Compustat firms with available market value of equity and earnings before extraordinary items that are not in our material weakness sample and did not appear on Compliance Week as having reported a less severe significant deficiency. We use the entire non-material weakness population as our control group, rather than a matched sample, to avoid choice-based sample bias, which can lead to biased parameters and probability estimates (Palepu, 1986). We summarize our sample collection procedure in Table 2. It is likely that most material weaknesses were disclosed, as it is a criminal offense for managers to conclude that controls are effective when they have knowledge of a material weakness. However, the use of the proxy of a disclosure of a material weakness versus the true underlying existence of a weakness is a limitation of our study.

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[20]We read through each SEC filing to ensure a material weakness in internal control is disclosed. We eliminate non-material weakness disclosures, or significant deficiencies, in order to focus on the most severe types of internal control problems. Compliance Week discontinued tracking significant deficiencies that did not reach the level of a material weakness in March 2005. Therefore, no conclusions can be drawn regarding the proportion of material weaknesses to all significant deficiencies.

[21]Duplicates include those instances where a parent and subsidiary both file with the SEC and report the same material weakness. In these cases we include only the parent company; we found no instances where a parent and subsidiary reported different material weaknesses.

[22]Note that Compliance Week only tracks firms belonging to the Russell 3000 beginning in January 2005; only using internal control deficiency disclosures collected by Compliance Week would introduce a sample bias. Therefore, we supplement our data by searching the EDGAR database.

[23]Sixty-five companies in our final sample disclosed a material weakness related to lease accounting in early 2005, which primarily results from the views expressed by the Office of the Chief Accountant of the SEC in a February 7, 2005 letter to the AICPA. Our results are almost identical if we exclude these companies from our sample.

Table 2
Sample selection procedure

Test sample	
Total disclosures on Compliance Week from November 2003 to August 2005	877
Less: Internal control disclosures that were not material weaknesses	(239)
Duplicate disclosures	(97)
Total distinct material weakness disclosures on Compliance Week	541
Add: Additional material weakness disclosures via a 10-K search from August 2002 to 2005	429
Total identified material weakness disclosures	970
Less: Firms without Compustat data	(191)
Final sample of distinct firms that disclosed a material weakness from August 2002 to 2005	779
Control Sample	
Total firms on 2003 Compustat (with non-missing market value of equity and earnings before extraordinary items)	5,935
Less: Firms with identified material weakness disclosures	(779)
Firms with identified internal control disclosures that were not material weaknesses and subsidiaries of firms in our test sample that also disclosed an internal control deficiency	(109)
Final sample of control firms	5,047

3.2. Material weakness classifications

Although we focus on material weaknesses, the most severe internal control problems, these disclosures vary widely with respect to both the severity and underlying reason. Therefore, we partition our sample based on the description of each material weakness found in the SEC filing. Butler et al. (2004) illustrate the importance of examining subsets of common disclosures (in their case qualified audit opinions). In their setting, they find that a subset of going concern opinions appears to drive the association between abnormal accruals and qualified audit opinions. Similarly, we wish to explore how determinants differ among the various types of material weakness disclosures.

We have two classification schemes, one based on the *severity* of the internal control problem and the second based on the stated *reason* for the internal control problem. We then examine whether the underlying determinants of internal control problems vary based on severity or reason for the weakness. To determine whether a material weakness is severe, we follow the logic put forth by Moody's, the bond rating company. Moody's proposes that material weaknesses fall into one of two categories. Account-specific material weaknesses relate to controls over specific account balances or transaction-level processes. Moody's suggests that these types of material weaknesses are identifiable by auditors through substantive testing and thus do not represent as serious a concern regarding the reliability of the financial statements. Company-level material weaknesses, however, relate to more macro-level controls such as the control environment or the overall financial reporting process, which auditors may not be able

to effectively "audit around." Moody's suggests that company-level material weaknesses call into question not only management's ability to prepare accurate financial reports but also its ability to control the business (Doss and Jonas, 2004). We detail this classification scheme further in Appendix B.[24]

Though we do not have explicit hypotheses and emphasize that this work is exploratory in nature, it seems reasonable to believe that less severe, account-specific problems would be more common in larger, more mature firms that are dealing with complex accounting issues, often arising from rapidly changing operations. In contrast, more severe, company-wide material weaknesses would seem to be more prevalent in smaller, younger, financially weaker, and poorly governed firms that do not have the resources (or the proper board oversight) to maintain a comprehensive system of internal control.

Our second classification scheme is based on the company's stated *reason* for the material weakness. For example, some material weaknesses are related to staffing issues, while others pertain to overseas operations or inter company transactions. For this classification scheme, we create three categories of material weaknesses: Staffing, Complexity, and General. These categories are based on the main types of problems that we noted in our collection of material weaknesses. For example, there are a large number of material weaknesses associated with segregation of duties, and clearly we anticipate that these weaknesses will have fundamentally different determinants than those related to revenue recognition policies in overseas subsidiaries.

The common staffing issues are "inadequate segregation of duties," "inadequate qualified staffing and resources," or "lack of a full-time CFO." Complexity issues include, for example, trouble interpreting and applying complex accounting standards, such as those related to hedging and derivatives. General issues are usually related to deficient revenue recognition policies or control weaknesses in the period-end reporting process. This final type of weakness allows for greater opportunity to manage earnings. Note that in the first classification scheme (*severity*), we classify each material weakness company as either account-specific or company-level (i.e., the categories are mutually exclusive). In the second classification scheme, each company can have multiple deficiency types. For example, one company can have both a staff shortage deficiency and a material weakness related to applying complex accounting standards of hedge transactions. Again, examples of our material weakness classification schemes are included in Appendix B.

As mentioned, it seems likely that the determinants will differ across these three categories. Staffing issues (including segregation of duties problems) will probably be much more likely for smaller, younger, and financially weaker firms that lack resources to hire or train appropriate personnel. Firms with complexity-related weaknesses will likely be larger, older firms with highly diversified and complex operations. Finally, since the General category includes firms with revenue recognition problems, we expect that these firms may have weaker corporate governance.

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[24]In some cases, it is straightforward to categorize a company as having company-level material weaknesses; for example, when "ineffective control environment" or "management override" is specifically identified as a material weakness in the disclosure—consider, for example, Hollinger, Inc., displayed in Appendix A. However, most disclosures are not so forthcoming. Thus, if a firm has a material weakness related to at least three account-specific problems, we classify the firm as having a company-level material weakness.

4. Results

4.1. Univariate analysis and descriptive statistics

Table 3 presents descriptive statistics on the characteristics of material weakness firms and control firms. It also presents one-tailed tests of differences between the two groups using both *t*-tests and Wilcoxon rank-sum tests. For ease of interpretation, each summary statistic for the four logged variables (*MARKETCAP, FIRM AGE, SPEs,* and *SEGMENTS*) is converted to an unlogged amount in Table 3. For example, the mean of the log of *MARKETCAP* of 5.193 is unlogged to generate the 180.082 value that is presented in the first column.

First, the results on firm size, as measured by the log of market capitalization, seem to be mixed. The mean value is weakly significantly smaller for material weakness firms (using a *t*-test), but the median value is actually slightly larger for the control firms, and the Wilcoxon rank-sum test indicates an insignificant difference between the two groups. Although these univariate results are mixed, we hypothesize that firm size is a determinant of internal control quality *after controlling for complexity.* Therefore, we re-examine this variable in our multivariate analysis below.

Next, as predicted, firms with material weaknesses appear to be younger than the other Compustat firms. The mean material weakness firm has been publicly traded for 8.3 years, while the mean control firm has been traded for 9.1 years. Our financial health measures, *AGGREGATE LOSS* and *BANKRUPTCY RISK,* both indicate that firms disclosing material weaknesses in internal control are significantly weaker financially than the average Compustat firm, as expected. Our three complexity measures, the log of the number of sponsored special purpose entities (*SPEs*), the log of the total number of operating and geographic segments (*SEGMENTS*), and the existence of a foreign currency adjustment (*FOREIGN TRANSACTIONS*), are all higher for material weakness firms, providing preliminary support for our hypothesis that accounting complexity creates internal control challenges.

There is also preliminary evidence that rapid growth is a determinant of internal control problems. *ACQUISITION VALUE* is significantly higher for material weakness firms than our control firms (0.033 versus 0.023), and material weakness firms are also more often in the highest quintile of industry-adjusted sales growth (0.222 versus 0.196). *RESTRUCTURING CHARGE* for material weakness firms is more than double that for the control firms, lending support for the idea that significant restructuring, with its disruptions to established processes, personnel turnover, and difficult accounting estimates, leads to internal control problems. Finally, there is some support that well-governed firms have fewer material weaknesses, with the *t*-test and Wilcoxon rank-sum test both generating weakly significant results.

In general our univariate results are consistent with our hypotheses outlined in Section 2.2. However, as evidenced in Table 4, many of our measures are correlated with one another. For example, *MARKETCAP*, *FIRM AGE*, *SPEs,* and *SEGMENTS* are all positively correlated with one another, and each is negatively correlated with *AGGREGATE LOSS* and *BANKRUPTCY RISK*. We examine these potential determinants further using a multivariate analysis below.

Table 3
Descriptive statistics of material weakness firms versus 2003 Compustat firms

Variable	Material weakness firms					Predicted difference	2003 Compustat firms (excluding material weakness firms)				
	Mean	Median	Std. Dev.	25%	75%		Mean	Median	Std. Dev.	25%	75%
MARKETCAP ($M)	180.082	224.420	7.862	49.242	660.317	<	204.196[c]	214.022	12.584	36.795	1,186.259
FIRM AGE	8.274	8.000	2.557	5.000	17.000	<	9.105[a]	10.000[a]	2.620	5.000	19.000
AGGREGATE LOSS	0.497	0.000	0.500	0.000	1.000	>	0.373[a]	0.000[a]	0.484	0.000	1.000
BANKRUPTCY RISK	4.875	5.000	2.945	2.000	7.000	>	4.437[a]	4.000[a]	2.855	2.000	7.000
SPEs	1.879	0.000	2.784	0.000	3.000	>	1.690[a]	0.000[a]	2.682	0.000	2.000
SEGMENTS	3.440	4.000	2.048	2.000	6.000	>	2.752[a]	3.000[a]	2.213	0.000	5.000
FOREIGN TRANSACTIONS	0.208	0.000	0.406	0.000	0.000	>	0.156[a]	0.000[a]	0.363	0.000	0.000
ACQUISITION VALUE	0.033	0.000	0.105	0.000	0.000	>	0.023[a]	0.000[c]	0.081	0.000	0.000
SALES GROWTH	0.222	0.000	0.416	0.000	0.000	>	0.196[b]	0.000[b]	0.397	0.000	0.000
RESTRUCTURING CHARGE	0.032	0.000	0.106	0.000	0.008	>	0.013[a]	0.000[a]	0.064	0.000	0.000
GOVERNANCE SCORE	22.325	22.000	3.563	20.000	25.000	<	22.667[c]	22.000[c]	3.476	20.000	25.000

All variables are described in Table 1. The t-test of means uses the pooled method when the underlying variances are equal and the Satterthwaite method when they are unequal. There are a maximum of 779 material weakness firm observations and 5,047 control firm observations. Each of the continuous variables is winsorized at 1% and 99% to mitigate outliers. For ease of interpretation, each summary statistic for the four logged variables (MARKETCAP, FIRM AGE, SPEs, and SEGMENTS) is converted to an unlogged amount when presented above.

[a,b, or c] Significantly different from Material Weakness group at a one-tailed p-value ⩽0.01, 0.05, or 0.10, respectively, under a t-test (shown on mean value above) or Wilcoxon rank-sum test (shown on median value above).

Table 4
Pearson correlation matrix

	MARKETCAP	FIRM AGE	AGG. LOSS	BANKR. RISK	SPEs	SEG-MENTS	FRGN. TRANS.	ACQ. VALUE	EXTR. SLS GRO	RESTR. CHG	GOV. SCORE
MW	−0.017 (0.1872)	−0.035 (0.0134)	0.087 (0.0001)	0.054 (0.0004)	0.036 (0.0054)	0.096 (0.0001)	0.048 (0.0002)	0.039 (0.0028)	0.022 (0.0969)	0.090 (0.0001)	−0.035 (0.1164)
MARKETCAP		0.103 (0.0001)	−0.402 (0.0001)	−0.505 (0.0001)	0.351 (0.0001)	0.379 (0.0001)	0.204 (0.0001)	0.103 (0.0001)	0.008 (0.5386)	−0.106 (0.0001)	0.253 (0.0001)
FIRM AGE			−0.125 (0.0001)	−0.052 (0.0005)	0.156 (0.0001)	0.217 (0.0001)	0.044 (0.0016)	−0.025 (0.0768)	−0.171 (0.0001)	−0.020 (0.1473)	0.281 (0.0001)
AGGREGATE LOSS				0.160 (0.0001)	−0.175 (0.0001)	−0.048 (0.0003)	−0.002 (0.8665)	−0.044 (0.0008)	0.047 (0.0005)	0.195 (0.0001)	−0.132 (0.0001)
BANKRUPTCY RISK					−0.092 (0.0001)	−0.252 (0.0001)	−0.141 (0.0001)	−0.025 (0.0955)	−0.162 (0.0001)	0.146 (0.0001)	−0.085 (0.0002)
SPEs						0.152 (0.0001)	−0.017 (0.1893)	0.112 (0.0001)	−0.066 (0.0001)	0.013 (0.3275)	0.088 (0.0001)
SEGMENTS							0.335 (0.0001)	0.084 (0.0001)	−0.016 (0.2394)	0.102 (0.0001)	0.146 (0.0001)
FOREIGN TRANSACTIONS								0.013 (0.3205)	0.002 (0.8848)	0.052 (0.0001)	0.055 (0.0130)
ACQUISITION VALUE									0.148 (0.0001)	−0.004 (0.7493)	−0.039 (0.0811)
EXTREME SALES GROWTH										−0.078 (0.0001)	−0.017 (0.4570)
RESTRUCTURING CHARGE											−0.054 (0.0162)

There are a maximum of 5,826 observations. All variables are described in Table 1. Each of the continuous variables is winsorized at 1% and 99% to mitigate outliers.

4.2. Multivariate analysis

We model the probability of disclosing a material weakness in internal control over financial reporting as a function of the above-mentioned firm characteristics using a logistic regression with the following constructs:

$$
\begin{aligned}
Prob(MW) = f(\beta_0 &+ \beta_1\ SIZE + \beta_2 FIRM\ AGE + \beta_3\ FINANCIAL\ HEALTH \\
&+ \beta_4\ COMPLEXITY + \beta_5\ RAPID\ GROWTH \\
&+ \beta_6\ RESTRUCTURING + \beta_7\ GOVERNANCE \\
&+ \Sigma_{k=1}^{K}\ \gamma_k\ INDUSTRY).
\end{aligned}
\tag{1}
$$

MW is an indicator variable that is equal to one if the firm disclosed a material weakness in internal control, and zero if the firm is a control firm. Though not tabulated, 16 industry indicator variables are also included to capture the tendency of material weakness firms to cluster by industry (Ge and McVay, 2005).[25] We present three regression specifications since two of our variables (*BANKRUPTCY RISK* and *GOVERNANCE SCORE*) have limited availability.

Referring to the first column of results in Table 5, all of the coefficients are in the predicted direction and statistically significant at *p*-values less than 0.05 under one-tailed tests. Overall, the joint marginal effect of the model (i.e., the change in the predicted probability of a material weakness when altering the independent variables in the predicted direction between the 1st and 3rd quartiles or between zero and one for indicator variables) more than quintuples the predicted probability of a material weakness. The predicted probability rises from 4.17 percent to 23.66 percent (not tabulated), showing that the model's predictive ability is economically significant.

The second column of results incorporates the financial health variable, *BANK-RUPTCY RISK*. This causes a loss of about 13 percent of our sample. Results are similar in this specification, though *ACQUISITION VALUE* weakens (X^2 statistic of 2.18). As predicted, a higher probability of bankruptcy is positively associated with reporting a material weakness (X^2 statistic of 3.81). The joint marginal effect of this specification raises the predicted probability of a material weakness from 3.75 percent to 26.41 percent (not tabulated).

Our final column of results includes *GOVERNANCE SCORE*. Note that the number of available observations drops dramatically, falling about 58 percent from the second column specification. Not surprisingly, results are somewhat weaker in this specification. *MARKETCAP*, *SPE*s, and *ACQUISITION VALUE* are no longer significant, likely due to both the lower power and possible size bias introduced by requiring corporate governance data. These private datasets tend to provide data for the largest firms, which reduce the variation in size and size-related variables. *GOVERNANCE SCORE* is not

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[25]Industry classifications are compiled using the following SIC codes: Agriculture 100–999; Mining: 1000–1299, 1400–1999; Food: 2000–2199; Textiles: 2200–2799; Drugs: 2830–2839, 3840–3851; Chemicals: 2800–2829, 2840–2899; Refining: 1300–1399, 2900–2999; Rubber: 3000–3499; Industrial: 3500–3569, 3580–3659; Electrical: 3660–3669, 3680–3699; Miscellaneous Equipment: 3700–3839, 3852–3999; Computers: 3570–3579, 3670–3679, 7370–7379; Transportation: 4000–4899; Utilities: 4900–4999; Retail: 5000–5999; Banks: 6000–6999; Services: 7000–7369, 7380–8999; Miscellaneous: 9000–9999. We also estimate the regression without the industry indicator variables, finding almost identical results.

Table 5
Logistic regression of the probability of disclosing a material weakness

Independent variables	Predicted sign	Dependent variable = MW		
		Logit estimate (X^2)	Logit estimate (X^2)	Logit estimate (X^2)
INTERCEPT		−2.182*** (129.95)	−2.200*** (57.61)	−2.650*** (18.35)
MARKETCAP	−	−0.080*** (12.20)	−0.105*** (11.78)	−0.018 (0.11)
FIRM AGE	−	−0.136** (8.30)	−0.134** (6.12)	−0.338*** (11.76)
AGGREGATE LOSSES	+	0.438*** (19.95)	0.331** (9.48)	0.329* (3.76)
BANKRUPTCY RISK	+		0.038* (3.81)	0.090** (7.89)
SPEs	+	0.161*** (13.70)	0.153*** (11.38)	0.040 (0.35)
SEGMENTS	+	0.269*** (14.04)	0.303*** (15.21)	0.291** (5.83)
FOREIGN TRANSACTIONS	+	0.311** (7.60)	0.320** (7.31)	0.448** (6.10)
ACQUISITION VALUE	+	0.763* (3.07)	0.682 (2.18)	0.185 (0.07)
EXTREME SALES GROWTH	+	0.227* (4.45)	0.262* (5.06)	0.311* (2.83)
RESTRUCTURING CHARGE	+	1.184** (6.62)	2.148** (10.89)	2.510** (5.73)
GOVERNANCE SCORE	−			0.011 (0.26)
Industry indicator variables		Included	Included	Included
Number of material weakness obs		707	627	273
Number of total observations		4,984	4,333	1,841
Likelihood ratio χ^2 (p-value)		230.247 (0.001)	229.690 (0.001)	126.085 (0.001)

MW is an indicator variable that is equal to one if the firm disclosed a material weakness in internal control from August 2002 to August 2005, and zero otherwise. All other variables are defined in Table 1. Each of the continuous variables is winsorized at 1% and 99% to mitigate outliers.
***, **, * $\text{Pr} \geqslant X^2$ of 0.001, 0.01, 0.05, respectively.

statistically significant in this specification (X^2 statistic of 0.26). We continue to consider this variable when examining specific types of material weaknesses below.

Overall, both our univariate and multivariate findings support our hypotheses outlined in Section 2.2. We find that material weaknesses in internal control are more likely for firms that are smaller, younger, financially weaker, more complex, growing rapidly, and/or undergoing restructuring. These findings are consistent with firms experiencing challenges with their financial reporting controls in the face of a lack of resources, complex accounting issues, and/or a rapidly changing business environment. We do not find a significant relation between material weakness disclosures and corporate governance;

Table 6a

Descriptive statistics of material weakness firms by severity of deficiency

Variable	Account-specific (maximum of 491 observations)		Predicted difference	Company-level (maximum of 286 observations)	
	Mean	Median		Mean	Median
MARKETCAP ($M)	208.819	264.407	>	142.836[a]	179.408[a]
FIRM AGE	8.617	8.000	>	7.695[c]	8.000[c]
AGGREGATE LOSS	0.420	0.000	<	0.627[a]	1.000[a]
BANKRUPTCY RISK	4.770	5.000	<	5.079	5.000[c]
SPEs	1.941	0.000	>	1.786	0.000[c]
SEGMENTS	3.458	4.000	>	3.438	4.000
FOREIGN TRANSACTIONS	0.226	0.000	>	0.178[c]	0.000[c]
ACQUISITION VALUE	0.035	0.000	>	0.029	0.000
EXTREME SALES GROWTH	0.226	0.000	>	0.213	0.000
RESTRUCTURING CHARGE	0.031	0.000	?	0.034	0.000
GOVERNANCE SCORE	22.284	22.000	>	22.408	22.000

There are a total of 779 material weakness firms, of which two had insufficient information to classify. All variables are described in Table 1. The *t*-tests of means use the pooled method when the underlying variances are equal and the Satterthwaite method when they are unequal. The difference tests for classification scheme #1 compare the variables for account-specific material weaknesses to the variables for company-level weaknesses; these classifications are mutually exclusive. Each of the continuous independent variables is winsorized at 1% and 99% to mitigate outliers. For ease of interpretation, each summary statistic for the four logged variables (*MARKETCAP, FIRM AGE, SPEs,* and *SEGMENTS*) is converted to an unlogged amount when presented above.

[a, b, or c] Significantly different from account-specific group at a one-tailed *p*-value ≤ 0.01, 0.05, or 0.10, respectively, under a *t*-test (shown on mean value above) or Wilcoxon rank-sum test (shown on median value above).

however, this may be a result of low power due to sample size limitations. In sum, not only are the variables generally statistically significant in the directions predicted, the economic significance of the overall models is quite high, increasing the predicted probability of a material weakness from about 4 percent to about 26 percent.

4.3. Material weakness type analysis

The above analysis combines all material weakness disclosure types. However, as previously mentioned, material weaknesses vary widely both in severity and the underlying reason for the weakness. Some occur in auditable accounts (account-specific), which can be easily corrected through adjusting entries, while others may be more pervasive and difficult to mitigate by additional auditor testing (company-level). Some are associated with staffing concerns (Staffing), and others with complex accounting issues (Complexity). Thus we explore how the determinants differ by material weakness type (outlined in Appendix B and discussed in Section 3.2).

We begin by providing descriptive statistics by material weakness type in Tables 6a and 6b and comparing the variables among the groups using *t*-tests and Wilcoxon rank-sum

Table 6b

Descriptive statistics of material weakness firms by reason for deficiency

Variable	Staffing (maximum of 251 observations)		Complexity (maximum of 347 observations)		General (maximum of 519 observations)	
	Mean	Median	Mean	Median	Mean	Median
MARKETCAP ($M)	103.516[c1,g1]	140.724[c1,g1]	235.316[s1,g5]	263.304[s1,g5]	181.877[s1,c5]	224.420[s1,c5]
FIRM AGE	7.308[c1]	8.000[c5]	8.754[s1,g5]	8.000[s5,g5]	7.877[c5]	8.000[c5]
AGGREGATE LOSS	0.582[c1,g10]	1.000[c1,g10]	0.467[s1,g5]	0.000[s1,g5]	0.516[s10,c5]	1.000[s10,c5]
BANKRUPTCY RISK	5.163	6.000	4.943	5.000	4.879	5.000
SPEs	1.477[c1,g1]	0.000[c1,g1]	2.121[s1,g5]	0.000[s1,g5]	1.841[s1,c5]	0.000[s1,c5]
SEGMENTS	3.249[c1,g5]	4.000[c1,g1]	3.691[s1]	4.000[s1]	3.573[s5]	4.000[s1]
FOREIGN TRANSACTIONS	0.195[c1]	0.000[c1]	0.265[s1,g5]	0.000[s1,g5]	0.210[c5]	0.000[c5]
ACQUISITION VALUE	0.032	0.000[c10]	0.035	0.000[s10,g5]	0.031	0.000[c5]
EXTREME SALES GROWTH	0.271[c5,g5]	0.000[c1,g5]	0.200[s5]	0.000[s1]	0.223[s5]	0.000[s5]
RESTRUCTURING CHARGE	0.025[c5,g10]	0.000[c10]	0.036[s5]	0.000[s10]	0.036[s10]	0.000
GOVERNANCE SCORE	22.304	22.000	22.329	22.000	22.106	22.000

All variables are described in Table 1. The *t*-tests of means use the pooled method when the underlying variances are equal and the Satterthwaite method when they are unequal. The difference tests for classification scheme #2 compare the variables for one group of material weakness firms (e.g., Staffing) to another group (e.g., Complexity). As this classification scheme is not mutually exclusive, if a firm is classified into two groups for scheme #2, it is dropped from the test calculation between those two groups. This causes a drop in the sample sizes actually tested and results in testing values that are somewhat different from those shown above. Each of the continuous independent variables is winsorized at 1% and 99% to mitigate outliers. For ease of interpretation, each summary statistic for the four logged variables (*MARKETCAP, FIRM AGE, SPEs,* and *SEGMENTS*) is converted to an unlogged amount when presented above.

[c1,5, or 10] Significantly different from Complexity group at a one-tailed *p*-value $\leqslant 0.01, 0.05,$ or 0.10, respectively, under a *t*-test (shown on mean value above) or Wilcoxon rank-sum test (shown on median value above).

[g1,5, or 10] Significantly different from General group at a one-tailed *p*-value $\leqslant 0.01, 0.05,$ or 0.10, respectively, under a *t*-test (shown on mean value above) or Wilcoxon rank-sum test (shown on median value above).

[s1,5, or 10] Significantly different from Staffing group at a one-tailed *p*-value $\leqslant 0.01, 0.05,$ or 0.10, respectively, under a *t*-test (shown on mean value above) or Wilcoxon rank-sum test (shown on median value above).

tests of the differences. As in Table 3, each summary statistic for the four logged variables (*MARKETCAP, FIRM AGE, SPEs,* and *SEGMENTS*) is converted to an unlogged amount in Tables 6a and 6b for ease of interpretation. For the first classification scheme, presented in Table 6a there are 491 account-specific material weakness firms, 286 firms in the company-level group, and two firms with insufficient information for classification (recall that these two groups are mutually exclusive). When contrasting within the material weakness sample, firms reporting more serious company-level weaknesses tend to be smaller, younger, and financially weaker (larger *AGGREGATE LOSS* and *BANK-RUPTCY RISK*). Firms reporting company-level weaknesses also appear to be less complex (smaller *SPEs, SEGMENTS,* and *FOREIGN TRANSACTIONS*) and growing less rapidly (smaller *ACQUISITION VALUE* and *EXTREME SALES GROWTH*). The differences in restructuring charges and governance quality between the groups are not statistically significant under either the *t*-test or Wilcoxon rank-sum test. In general, firms

with company-wide problems seem to lack the resources or experience to maintain comprehensive control systems.

In contrast, the firms with transaction-level weaknesses tend to be more mature (i.e., they are larger, older, and financially stronger), have more diversified and complex operations, and have higher internal and acquisition-related growth. The complexity of these firms' operating environments, along with the rapid change evidenced by merger and acquisition activity and high sales growth, seems to hinder them in maintaining adequate account-specific internal controls.

Table 6b presents our second classification scheme, where 251 of the disclosures relate to staffing (e.g., segregation of duties), 347 to complexity (e.g., consolidating foreign subsidiaries), and 519 were more general in nature (e.g., insufficient reconciliation procedures). Since these groups are not mutually exclusive, if a firm is classified into two groups it is dropped from the *t*-test of means and Wilcoxon rank-sum calculation between those two groups. We compare the means and ranks of our variables for one group (e.g., Staffing) to another group (e.g., Complexity).

Not surprisingly, when comparing Staffing problems to Complexity and General weaknesses, we find that Staffing problems are far more pervasive in smaller and younger firms. These firms also tend to be the weakest financially, with the highest incidence of losses and the highest average probability of bankruptcy. Firms with staffing problems also tend to have the least complex organizations (lowest *SPEs, SEGMENTS,* and *FOREIGN TRANSACTIONS*), which is perhaps related to their smaller size. Firms with staffing issues have the highest sales growth and incur the lowest average restructuring charges, which indicates that these firms are in the early stages of the business life cycle. These findings suggest that, when a firm is smaller, younger, financially weaker, and in a higher growth stage, it might not be able to commit sufficient resources for qualified staff and training. Weak internal controls follow as a direct consequence.

Conversely, firms with disclosures related to Complexity are the largest and oldest firms, have the lowest incidence of losses, and have the most diversified operations (highest *SPEs, SEGMENTS,* and *FOREIGN TRANSACTIONS*). They also have the highest level of acquisitions (*ACQUISITION VALUE*), the lowest extreme sales growth, and the highest governance quality (*GOVERNANCE SCORE*), perhaps reflecting their larger size and more mature status.

The final group, General, includes firms with a wide range of problems ranging from lack of documentation for transactions, deficiencies in the closing process, problems with revenue recognition, and transaction-specific issues, to problems with the overall tone set by management. As expected, with such a wide range of issues included in this group, few of the variables stand out from the other two groups. Most interestingly, given the fact that these firms have internal control problems more related to earnings management-type activities (e.g., revenue recognition issues or outright fraud), is that the *GOVERNANCE SCORE* is the lowest of the three groups (although not statistically significantly lower). Perhaps poor governance is contributing to these types of internal control problems.

In Table 7, we re-estimate the logistic regression Eq. (1) with the alternate dependent variables, account-specific and company-level. In Table 8, our alternate dependent variables are Staffing, Complexity, and General. Note that the regression now compares the firms in each group to the original Compustat control group and not to the other

Table 7
Logistic regression of the probability of disclosing a material weakness by severity of deficiency

Independent variables	Dependent variable = MW_ACCOUNT-SPECIFIC	Dependent variable = MW_COMPANY-LEVEL
	Logit estimate (X^2)	Logit estimate (X^2)
INTERCEPT	−2.579*** (54.54)	−3.434*** (53.29)
MARKETCAP	−0.116*** (10.21)	−0.081 (2.66)
FIRM AGE	−0.099 (2.38)	−0.211** (5.67)
AGGREGATE LOSS	0.093 (0.52)	0.777*** (20.02)
BANKRUPTCY RISK	0.032 (1.88)	0.054* (3.06)
SPEs	0.151** (7.85)	0.172* (5.29)
SEGMENTS	0.261** (7.90)	0.393*** (9.59)
FOREIGN TRANSACTIONS	0.451*** (10.49)	0.102 (0.27)
ACQUISITION VALUE	0.874* (2.72)	0.263 (0.107)
EXTREME SALES GROWTH	0.337** (6.00)	0.111 (0.34)
RESTRUCTURING CHARGE	2.627*** (12.48)	1.475 (2.40)
Industry indicator variables	Included	Included
Number of material weakness obs	415	212
Number of total observations	4,121	3,918
Likelihood ratio χ^2 (p-value)	160.997 (0.001)	123.721 (0.001)

MW_DESCRIPTOR is an indicator variable that is equal to one if the firm disclosed a material weakness (either Account-specific or Company-level) in internal control from August 2002 to 2005, and zero if the firm did not disclose a material weakness. Following Moody's, we define account-specific material weaknesses as those that are at the transaction level, and company-level material weaknesses as those that are more entity-wide control problems. All other variables are defined in Table 1. Each of the continuous variables is winsorized at 1% and 99% to mitigate outliers.
***, **, * $Pr \geqslant \chi^2$ of 0.001, 0.01, 0.05, respectively.

groups, as in Tables 6a and 6b. In both tables, we exclude GOVERNANCE SCORE as this variable severely limits the sample size. In results not tabulated, GOVERNANCE SCORE is insignificant in all specifications except when predicting control weaknesses over revenue recognition, which we discuss below.

The first column of results in Table 7 has transaction-level problems as the dependent variable, where MW_ACCOUNT-SPECIFIC is an indicator variable that is equal to one if the firm disclosed a material weakness related to a specific account, and zero if the firm did not disclose a material weakness. MARKETCAP, SPEs, SEGMENTS,

Table 8
Logistic regression of the probability of disclosing a material weakness by reason for deficiency

Independent variables	Dependent variable = MW_STAFFING	Dependent variable = MW_COMPLEXITY	Dependent variable = MW_GENERAL
	Logit estimate (X^2)	Logit estimate (X^2)	Logit estimate (X^2)
INTERCEPT	−3.419***	−3.333***	−2.545***
	(44.90)	(65.15)	(54.21)
MARKETCAP	−0.101*	−0.097*	−0.118***
	(3.57)	(5.25)	(10.36)
FIRM AGE	−0.240**	−0.054	−0.183**
	(6.41)	(0.49)	(8.08)
AGGREGATE LOSSES	0.397*	0.356**	0.353**
	(4.52)	(5.64)	(7.71)
BANKRUPTCY RISK	0.078**	0.056*	0.034
	(5.46)	(4.01)	(2.15)
SPEs	0.006	0.218***	0.148**
	(0.00)	(13.34)	(7.17)
SEGMENTS	0.211	0.302**	0.407***
	(2.39)	(7.65)	(19.00)
FOREIGN TRANSACTIONS	0.353*	0.692***	0.233*
	(3.08)	(19.46)	(2.74)
ACQUISITION VALUE	0.986	0.777	0.248
	(1.55)	(1.48)	(0.19)
EXTREME SALES GROWTH	0.321*	0.240	0.265*
	(2.69)	(2.12)	(3.70)
RESTRUCTURING CHARGE	0.970	2.089**	2.447***
	(0.72)	(6.26)	(12.54)
Industry indicator variables	Included	Included	Included
Number of MW observations	180	295	417
Number of total observations	3,886	4,001	4,123
Likelihood ratio χ^2 (p-value)	113.169	151.629	186.538
	(0.001)	(0.001)	(0.001)

MW_DESCRIPTOR is an indicator variable that is equal to one if the firm disclosed a material weakness described as due to staffing, business complexity, or that was more general in nature (STAFFING, COMPLEXITY and GENERAL, respectively), and zero if the firm did not disclose a material weakness. All other variables are defined in Table 1.
***, **, * $\text{Pr} \geqslant X^2$ of 0.001, 0.01, 0.05, respectively.

FOREIGN TRANSACTIONS, ACQUISITION VALUE, EXTREME SALES GROWTH and RESTRUCTURING CHARGE are all significant in the hypothesized directions at p-values less than 0.05 under one-tailed tests in this estimation. Companies with account-specific control problems do not appear to be financially weaker than the average Compustat firm (AGGREGATE LOSS is insignificant, while BANKRUPTCY RISK is fairly weak; one-tailed p-value = 0.085, not tabulated). The high level of complexity and diversification for these firms (higher SPEs, SEGMENTS, and FOREIGN TRANSAC-TIONS) and rapidly changing environment (higher ACQUISITION VALUE, EXTREME SALES GROWTH and RESTRUCTURING CHARGE) may be contributing to more

complex transactions (e.g., consolidation issues, restructuring-related accruals, etc.), resulting in account-specific material weaknesses.

Company-level material weaknesses, presented in the final column in Table 7, tend to be slightly smaller (one-tailed *p*-value = 0.052, not tabulated), younger, and financially weaker than the average Compustat firm. Interestingly, two of our three complexity measures load, *SPEs* and *SEGMENTS*, suggesting that decentralization might exacerbate serious control issues. Finally, a rapidly changing environment does not appear to lead to serious company-level control problems (*ACQUISITION VALUE* and *EXTREME SALES GROWTH* are insignificant, while *RESTRUCTURING CHARGE* is only weakly significant [one-tailed *p*-value = 0.061, not tabulated]).

In sum, firms with company-level material weaknesses are in some respects quite different from those that report account-specific weaknesses. Firm age and financial health are stronger predictors of more pervasive, company-level material weaknesses, while foreign transactions and rapid growth appear to be stronger predictors of account-specific problems. Decentralized operations appear to contribute to both types of problems, albeit for different reasons. This characteristic introduces both accounting complexity (account-specific) and a potential lack of oversight (company-level).

Table 8 presents our second classification scheme, based on whether the weakness was categorized as Staffing, Complexity, and/or General. The first column of results in Table 8 has Staffing as the dependent variable, where *MW_STAFFING* is an indicator variable that is equal to one if the firm disclosed a material weakness related to staffing issues, and zero if the firm did not disclose a material weakness.

First, both *MARKETCAP* and *FIRM AGE* are negative predictors of staffing problems, consistent with the notion that small and young firms are less likely to have sufficient resources or experience to develop high-quality accounting controls. These firms also likely have smaller accounting departments, exacerbating segregation of duties issues. Interestingly, of our three complexity measures, only *FOREIGN TRANSACTIONS* is significant at a *p*-value $\leqslant 0.05$, perhaps reflecting the additional staffing challenges introduced by having international operations. While rapid growth appears to be a weak predictor of staffing problems, restructurings are not, which is inconsistent with the notion that restructurings create staffing issues by laying off experienced workers. It appears that firms undergoing restructuring are large enough to avoid these issues. Overall, these results suggest that smaller, younger, and financially weaker firms may lack the resources to maintain adequate staffing levels and/or training, especially when the firm is rapidly growing and/or has multinational operations.

Turning to the second column of results, where the dependent variable is Complexity, firm age is no longer statistically significant, in contrast to the results for Staffing firms. Firms with complexity-related problems are smaller, financially weaker, more operationally and geographically diverse, and more likely to be undergoing restructuring than the average Compustat firm. These results are fairly intuitive. Complexity issues are driven by heterogeneous operations (*SPEs, SEGMENTS,* and *FOREIGN TRANSAC-TIONS*), while firms with fewer resources (*MARKETCAP, AGGREGATE LOSSES,* and *BANKRUPTCY RISK*) are least able to implement effective controls. Finally, complexity-related weaknesses appear to be strongly associated with restructuring charges. As previously mentioned, restructuring charges result in many complicated estimations (e.g., Dechow and Ge, 2006) and also may lead to more complicated tax

Table 9

Logistic regression of the probability of disclosing a material weakness related to revenue recognition problems

Independent variables	Dependent variable = MW_REVENUE_RECOGNITION	
	Logit estimate (X^2)	Logit estimate (X^2)
INTERCEPT	−4.450***	−3.372***
	(43.87)	(53.29)
MARKETCAP	−0.091	0.092
	(1.80)	(0.67)
FIRM AGE	−0.380***	−0.383*
	(10.33)	(2.96)
AGGREGATE LOSS	0.143	0.190
	(0.38)	(0.27)
BANKRUPTCY RISK	0.050	0.070
	(1.50)	(1.13)
SPEs	0.205*	−0.048
	(3.61)	(0.07)
SEGMENTS	0.720***	0.624*
	(15.47)	(4.93)
FOREIGN TRANSACTIONS	0.374	0.689*
	(2.58)	(4.04)
ACQUISITION VALUE	−2.294	−6.025*
	(2.29)	(2.95)
EXTREME SALES GROWTH	0.523*	0.761*
	(4.90)	(4.41)
RESTRUCTURING CHARGE	3.418***	2.072
	(9.76)	(0.96)
GOVERNANCE SCORE		−0.093*
		(3.59)
Industry indicator variables	Included	Included
Number of material weakness obs	113	49
Number of total observations	3,819	1,617
Likelihood ratio χ^2 (p-value)	121.002	72.093
	(0.001)	(0.001)

MW_REVENUE_RECOGNITION is an indicator variable that is equal to one if the firm disclosed a material weakness described as due to revenue recognition problems, and zero if the firm did not disclose a material weakness. All other variables are defined in Table 1.

***, **, * $\text{Pr} \geqslant X^2$ of 0.001, 0.01, 0.05, respectively.

issues (113 of our complexity-related firms mentioned tax issues). In general, firms with complexity-related problems seem to be smaller, financially troubled firms that have highly diverse operations.

Finally, we examine General material weaknesses in our final column of results. Each of the determinants examined is statistically significant with a one-tailed p-value ⩽0.05, with the exception of BANKRUPTCY RISK (one-tailed p-value = 0.071, not tabulated) and ACQUISITION VALUE (one-tailed p-value = 0.333, not tabulated). These general findings are not surprising as the "General" classification contains many different issues.

We further decompose General firms into those that are related to revenue recognition problems, which comprise 131 of the 417 General firms. As Table 9 shows, we find that firm size and financial health are no longer strong predictors. The financial health result suggests that some firms might choose to have weak internal control over revenue recognition in order to manage earnings. We investigate this further by adding in *GOVERNANCE SCORE*, which to this point has been an insignificant predictor in all multivariate analyses. We find that *GOVERNANCE SCORE* is a negative and significant predictor of material weaknesses related to revenue recognition (see second column of results).

Overall, the determinants of material weaknesses appear to be dependent on the types of material weaknesses disclosed. Firms with transaction-level weaknesses seem to have more diversified and complex operations and are undergoing significant changes. Firms with more serious, company-level problems tend to be younger and weaker financially. Consistent with each firm facing their own set of internal control challenges, staffing-related internal control problems are more pervasive in small, financially weak firms, while firms attributing their internal control weaknesses to complexity-related issues are more likely to have diversified and complex operations and to be undergoing rapid change.

4.4. Restatements

Auditing Standard No. 2 issued by the PCAOB indicates that a restatement of previously issued financial statements is a "strong indicator that a material weakness in internal control over financial reporting exists." The purpose of this paper is to examine the determinants of the underlying internal control problem itself, and not any resulting restatement. Thus, as a sensitivity analysis, we eliminate those firms that announced a restatement in connection with the material weakness disclosure or within one year of the material weakness disclosure (hereafter contemporaneous restatement). To identify contemporaneous restatement firms, we search Lexis-Nexis Academic Universe using the keyword "restate!" for each of our material weakness firms. To ensure our identification procedure is as accurate as possible, we look up each firm on EGDAR to ensure the company's name has not changed, and search on all possible names in the event of a name change. We also search through each of the material weakness disclosures to ensure that any firms announcing a restatement in that disclosure were also in our restatement sample. We identify 393 firms with contemporaneous restatements (50.4 percent of our 779 material weakness firms). We then exclude these restatement firms, and re-estimate our main regression (Table 5, Column 2). The results (not tabulated) for these non-restatement firms are similar to those reported—each coefficient is in the same predicted direction and all one-tailed *p*-values remain at levels of 0.06 or less.

5. Summary and conclusions

The recent passage of the Sarbanes-Oxley Act in 2002 marks the first time that all SEC registrants must publicly disclose material weaknesses in internal control over financial reporting. Past research on internal control has been limited to deficiency disclosures from firms that changed their auditors (this was the only prior public disclosure necessary for all SEC registrants), which created a very limited source of information (e.g., Krishnan, 2005).

Using a more comprehensive sample of mandatory material weakness disclosures made pursuant to Sections 302 and 404 of Sarbanes-Oxley from August 2002 to August 2005, we examine the determinants of material weaknesses. We show that material weaknesses in internal control are more likely for firms that are smaller, less profitable, more complex, growing rapidly, or undergoing restructuring. These findings are consistent with firms struggling with their financial reporting controls in the face of a lack of resources, complex accounting issues, and a rapidly changing business environment. We also document that these determinants vary in strength depending on the type of material weakness disclosed. This finding is informative for future research examining the reactions to, and implications of, internal control deficiencies.

A potential limitation of this study is the short time frame over which we gather our data and conduct our tests. It is hard to determine how the material weakness disclosures of the first few years of the new Sarbanes-Oxley regime will compare to future periods when both management and auditors are more familiar with the process of implementing, evaluating, and reporting on internal control. In addition, although we attempt to be comprehensive in collecting material weakness disclosures from August 2002 to 2005, it is still possible that some firms did not discover or disclose their material weaknesses, thus causing us to under-identify our true sample. Depending on the systematic characteristics of such firms, this could have an effect on our results. For example, it is possible that the materiality thresholds for determining whether or not a firm has a material weakness in internal control vary among the sample firms. Future research might attempt to model this materiality decision (Messier et al., 2005).

Appendix A. Examples of material weakness disclosures

America West Airlines (AWA) (12/31/2004 10-K)

Management concluded that AWA's fuel-hedging transactions did not qualify for hedge accounting under US generally accepted accounting principles and that the Company's financial statements for prior periods required restatement to reflect the fair value of fuel-hedging contracts in the balance sheets and statements of stockholders equity and comprehensive income for Holdings and AWA. These accounting errors were the result of deficiencies in its internal control over financial reporting from the lack of effective reviews of hedge transaction documentation and of quarterly mark-to-market accounting entries on open fuel hedging contracts by personnel at an appropriate level.

Comstock Homebuilding Company, Inc. (8/13/2004 S-1)

In connection with their audits of our financial statements, our independent auditors have reported certain conditions, which together constitute a material weakness in the internal controls over our ability to produce timely and accurate financial statements … The conditions resulting in the material weakness gave rise to a number of adjustments under generally accepted accounting principles, and adjustments relating to the completeness and accuracy of certain underlying data, which materially changed our financial statements. Our independent auditors also identified a need to add to the staff and strengthen the overall skills of our accounting department.

Hollinger International, Inc. (12/31/2003 10-K)

The Company's management concluded that the following material weaknesses in the Company's internal controls and ineffectiveness in the design and operation of the Company's disclosure controls and procedures, among others, existed during the year ended or as of 31 December 2003:

- The "tone from the top" established by the former executive officers was inappropriate to the establishment of an environment in which strong systems of internal controls and disclosure controls and procedures are encouraged.
- Certain former executive officers of the Company, who were also executive officers at the Company's various controlling stockholders, did not participate in open and timely communication with those responsible for the preparation of corporate reports or with the Board of Directors, in particular its independent members.
- The management and corporate organizational structures facilitated extraction of assets from the Company by way of related party transactions to benefit direct and indirect controlling stockholders. …

The above pervasive weaknesses directly or indirectly led to other material weaknesses or significant deficiencies in internal controls, such as inadequate documentation of business processes and internal controls.

Appendix B. Examples of material weakness classification schemes

First classification scheme

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

Second classification scheme

Staffing:

(1) Inadequate qualified staffing and resources leading to the untimely identification and resolution of certain accounting and disclosure matters and failure to perform timely and effective reviews
(2) The need to increase the training of the financial staff
(3) Weak internal controls and procedures relating to separation of duties

Complexity:

(1) Inconsistencies in the application of company policies among business units and segments
(2) Material weaknesses in the interpretation and application of complex accounting standards, such as standards related to hedge transactions

General:

(1) Weak internal controls related to contracting practices
(2) Deficiencies related to the design of policies and execution of processes related to accounting for transactions
(3) Deficiencies in the period-end reporting process

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