

# Accruals Quality and Internal Control over Financial Reporting

Jeffrey Doyle  
David Eccles School of Business  
University of Utah  
1645 East Campus Center Drive  
Salt Lake City, UT 84112  
jef.doyle@utah.edu

Weili Ge  
Ross School of Business  
University of Michigan  
701 Tappan Street  
Ann Arbor, MI 48109  
geweili@bus.umich.edu

Sarah McVay  
Stern School of Business  
New York University  
44 West Fourth Street, Suite 10-94  
New York, NY 10012  
smcvay@stern.nyu.edu

March 23, 2006

---

We would like to thank Dan Cohen, Patty Dechow, Ilia Dichev, Russell Lundholm, Matt Magilke, Christine Petrovitz, Tom Smith, and Suraj Srinivasan for their helpful comments and suggestions. This paper has also benefited from comments received at the 2005 4-School Conference at Columbia University, the 2005 AAA Mid-West Regional Meeting, the 2006 AAA FARS Mid-Year Meeting, and the University of Michigan. All errors are our own. This paper is one of two excerpts from a paper entitled “Determinants of weaknesses in internal control over financial reporting and the implications for earnings quality.”

## **ABSTRACT**

We examine the relation between accruals quality and internal control deficiencies using 709 firms that disclosed at least one material weakness from August 2002 to November 2005 and find that weaknesses are associated with poorly estimated accruals that are not realized as cash flows. This relation between internal control and accruals quality is robust to the inclusion of firm characteristics that proxy for difficulty in accrual estimation, known determinants of material weaknesses, and corrections for self-selection bias. Accruals quality is especially poor for those material weaknesses that relate to overall company-level controls, which may be more difficult to “audit around.” We find similar results using four additional measures of accruals quality: discretionary accruals, average accruals quality, historical accounting restatements, and earnings persistence.

## 1. Introduction

In this paper we examine the relation between accruals quality and the internal control environment of the firm. By definition, when there is a material weakness in internal control, there is “*more than a remote likelihood that a material misstatement of the annual or interim financial statements will not be prevented or detected*” (PCAOB 2004, emphasis added). A weak control environment has the potential to allow both 1) intentionally biased accruals through earnings management (e.g., lack of segregation of duties) and 2) unintentional errors in accrual estimation (e.g., lack of experience in estimating the bad-debt expense provision). Therefore, we hypothesize that reported material weaknesses will be associated with lower accruals quality.

While this relation has been suggested in prior literature (Kinney 2000), the unavailability of internal control data for firms has generally precluded an empirical investigation and, therefore, the literature on earnings quality has been relatively silent on the matter of internal control over financial reporting. For example, neither of the two recent publications on earnings quality (Schipper and Vincent 2003; Dechow and Schrand 2004) mentions a possible relation between internal control and earnings/accruals quality. In this paper, we investigate this relation using a sample of 709 companies that disclosed material weaknesses in internal control over financial reporting from August 2002 to November 2005 under the new requirements of Sections 302 and 404 of the Sarbanes-Oxley Act of 2002.

In order to capture the effect of a weak internal control system on accruals quality, our main tests use the accruals quality measure developed by Dechow and Dichev (2002), as modified by McNichols (2002) and Francis et al. (2005). This measure attempts to capture how well accruals map into cash flows. In other words, an “accurate” accrual should, at some point,

correspond to cash flows. Accruals that are never realized as cash tend to be erroneous.<sup>1</sup> These errors could be a result of earnings management, data entry errors, or estimation errors, which we hypothesize will all be exacerbated by weaknesses in internal control.<sup>2</sup>

We find that weak internal controls are associated with relatively low quality accruals, as measured by weaker mappings of accruals into cash flows. This relation is robust to the inclusion of innate firm characteristics that proxy for the inherent difficulty in accrual estimation (e.g., firm size and length of the operating cycle; Dechow and Dichev 2002) and additional determinants of material weaknesses that are likely to be directly correlated with accruals quality (e.g., profitability and complexity; Ashbaugh-Skaife et al. 2006a; Doyle et al. 2005).

In addition, since firms can choose both their quality of internal controls and their effort to discover and disclose any known deficiencies (Ashbaugh-Skaife et al. 2006a), we incorporate the known determinants of internal control weakness disclosures, and control for self-selection bias in three ways. First, we focus only on material weakness disclosures (a subset of all significant deficiencies), which are required to be disclosed, in order to abstract away from the choice to disclose. Second, we use a two-stage approach that first estimates a probit regression of whether or not a firm discloses a material weakness on the determinants of material weaknesses. From this first-stage regression, we calculate the inverse Mill's ratio (see Heckman 1979; Leuz and Verrecchia 2000) and include this ratio in our accruals quality regressions. The third way we control for self-selection issues is to create a matched sample, based on the predicted probabilities from the first-stage probit regression. This method, known as propensity

---

<sup>1</sup> The basic Dechow and Dichev measure is the firm-specific standard deviation of the residuals over time, from the following model:  $\Delta WC_t = \beta_0 + \beta_1 CFO_{t-1} + \beta_2 CFO_t + \beta_3 CFO_{t+1} + \varepsilon_t$ . A more detailed explanation of our accruals quality measure is given in Section 3.2, as well as the limitations of this research design choice (e.g., McNichols 2002; Wysocki 2005).

<sup>2</sup> We measure accruals quality from 1996 to 2002 and operate under the assumption that recently disclosed material weaknesses have, on average, existed for some time. For example, a common material weakness is segregation of duties, especially in smaller firms. It is unlikely that the firm, in prior years, had proper segregation of duties. We discuss this assumption in greater detail in Section 4.4.1.

score matching (LaLonde 1986), creates a nonmaterial-weakness control sample with the same predicted probabilities of having a material weakness. We find that our results are robust to controlling for self-selection bias using both the inverse Mills and propensity score matching approaches.

Although our focus is on the Dechow and Dichev (2002) measure, which we feel is both theoretically and intuitively appealing, we also consider other common proxies for accruals quality: discretionary accruals (Dechow et al. 1995; Kothari et al. 2005), average accruals quality (Dechow and Dichev 2002), historical restatements (Richardson et al. 2004), and earnings persistence (Schipper and Vincent 2003). For each of these measures, we find that weak internal controls are associated with lower accruals quality—albeit weakly for historical restatements.

We limit our examination of internal control problems to material weaknesses—the most severe internal control classification.<sup>3</sup> However, even within this classification, the severity of these weaknesses varies substantially. The credit rating company Moody's, Inc., is more concerned with the company-level material weaknesses than with account-specific, auditable, material weaknesses (Doss and Jonas 2004). This distinction could be important for accruals quality, as misstatements resulting from auditable weaknesses are likely detected and corrected by auditors prior to the issuance of the financial statements (Hogan and Wilkins 2005). Thus, we distinguish between company-level and account-specific weaknesses in our accruals quality

---

<sup>3</sup> A material weakness is “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,” as defined by the Public Company Accounting Oversight Board (PCAOB) under Auditing Standard No. 2. 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, Paragraph 9). Only material weaknesses are required to be publicly disclosed under Sections 302 and 404; therefore, we do not examine less severe significant deficiencies.

tests. We find that company-level material weaknesses are more strongly associated with accruals quality. This finding complements Hogan and Wilkins (2005), who find that in the year preceding the disclosure of an internal control deficiency, audit fees were, on average, abnormally high for the deficient firms. They suggest that this is due to additional substantive testing undertaken by auditors, who knew of the internal control problem. Therefore, it is reasonable that account-specific weaknesses are less associated with poor accruals quality.

Our results are largely consistent with those of concurrent research. Ashbaugh-Skaife et al. (2006b) examine 326 firms reporting significant deficiencies from November 2003 through December 2004 and find that earnings quality measured by both discretionary accruals and the Dechow and Dichev (2002) measure is lower for firms that reported internal control problems. Chan et al. (2005) examine discretionary accruals and the absolute value of discretionary accruals for a sample of 122 firms that disclosed that their internal controls were not effective (following the effective date of Section 404 using December year-end firms). They provide weak statistical evidence that both variables are higher for internal control deficiency firms in multivariate analyses. Finally, Hogan and Wilkins (2005) examine 282 firms reporting significant deficiencies from November 1, 2003 to November 30, 2004. While the focus of their paper is on audit fees and internal controls, they find that both the absolute value of discretionary accruals in the year of the disclosure and the standard deviation of accruals in the five years leading up to the disclosure are larger for firms with internal control problems, in univariate tests.<sup>4</sup> Interestingly, as noted above, Hogan and Wilkins (2005) find that the audit fees for the

---

<sup>4</sup> Hogan and Wilkins (2005) find that their discretionary accruals result is driven by income-decreasing accruals, and suggest that firms experiencing internal control problems are also more likely to be experiencing large write-offs. As noted in Ashbaugh-Skaife et al. (2006a) and Doyle et al. (2005), special items/restructurings are a major determinant of poor internal controls. In our paper, we focus on working capital accruals, which should not be unduly affected by special items or restructuring charges (which are largely negative accruals), and control directly for both losses and restructuring charges.

internal control problem firms are larger in the year *prior* to the significant deficiency disclosure, consistent with auditors performing additional substantive testing for these firms. We corroborate and extend these studies by examining a larger time period and sample, controlling for endogeneity in the three ways previously discussed, examining the types of material weakness (account-specific or company-level), and examining a total of five measures of accruals quality.

Our paper makes two contributions to the literature. First, we extend the literature on earnings/accruals quality. Conceptually, it makes sense that a good internal control system is the foundation for high-quality financial reporting, since strong internal controls likely curtail both procedural and estimation errors, as well as earnings management. Our findings present empirical evidence to support this fundamental link between internal controls and accruals quality. Our evidence indicates that reported weaknesses in internal control are negatively associated with accruals quality. This finding is informative to managers, auditors, regulators, and investors. In addition, our findings indicate that auditors mitigate poor internal control quality related to account-specific weaknesses.

Second, our paper provides evidence on the effectiveness of Sarbanes-Oxley, specifically Sections 302 and 404. These sections have been among the most cumbersome sections of the new legislation, with many critics alleging that the costs of compliance far exceed any benefits. Here we provide evidence of a potential benefit of these sections by showing that material weakness disclosures are associated with real economic events (i.e., lower accruals quality). Moreover, these required disclosures reveal to investors and regulators *which* firms may have lower accruals quality—beyond those predicted by innate firm characteristics. This finding complements recent studies that examine market reactions to these disclosures (Bryan and Lilien

2005; DeFranco et al. 2005; Hammersley et al. 2005) and provides evidence on one element these disclosures might be conveying—that these firms are more likely to have poor accruals quality.

The paper proceeds as follows. In the next section we motivate our hypotheses. In Section 3 we describe our sample selection and variable definitions. In Section 4 we present our main results, and in Section 5 we conclude.

## 2. Hypotheses

Internal control over financial reporting is defined as “a process...to provide *reasonable assurance* regarding the *reliability* of financial reporting ...” (PCAOB 2004, emphasis added). By definition, good internal control is supposed to result in more *reliable* financial information. Internal controls aim to prevent and/or detect errors or fraud that could result in a misstatement of the financial statements. However, there is limited empirical evidence in the existing literature regarding the relation between internal control and the quality of accounting information.<sup>5</sup> A major reason is lack of data on internal control; in general, it is difficult to directly observe or verify internal control (Kinney 2000).

Our sample is generated from the disclosures that first appeared as a result of Section 302 of Sarbanes-Oxley, which requires that officers certify the financial statements, including the effectiveness of the internal control over financial reporting, and any material changes in internal control. If management identifies a material weakness in internal control, they are precluded from reporting that the internal controls are effective and must disclose the identified material

---

<sup>5</sup> In related work, Krishnan (2005) finds that internal control problems are negatively associated with the quality of the audit committee. To the extent that audit committee quality and internal control quality are positively associated, this finding supports our hypothesis. As noted in the introduction, there are several concurrent works in this area that examine this relation (e.g., Ashbaugh-Skaife et al. 2006b; Hogan and Wilkins 2005).

weakness. Material weaknesses have also been disclosed in conjunction with Section 404 requirements, which became effective for accelerated filers for fiscal years ending after November 15, 2004.<sup>6</sup> Section 404 requires that management issue a report on internal control over financial reporting, and that auditors attest to their findings. Regardless of the origin of the material weakness disclosure, all else equal we expect these disclosures to be informative about the quality of firms' accruals.

Prior research on earnings quality is generally related to accruals quality (Dechow and Schrand 2004), and that is also the focus in this paper. Accruals can be of poor quality for two basic reasons: 1) management could intentionally bias accruals through earnings management and 2) unintentional errors in accrual estimation could occur because it is difficult to predict an uncertain future, or simply because there are insufficient controls in place to catch errors. Both of these roles have been investigated in the existing literature. With respect to earnings management, managers have been shown to use "discretionary accruals" to manage earnings for various incentives, such as equity offerings (e.g., Rangan 1998; Teoh et al. 1998). As for unintentional errors, Dechow and Dichev (2002) point out that the quality of accruals and earnings are not limited to managerial opportunism but are also related to the inherent difficulty in estimating accruals for firms with certain characteristics (e.g., longer operating cycles). They measure the quality of accruals by the extent to which the accruals map into cash flows. In general, they find that the quality of accruals is poorer for firms with certain characteristics, such

---

<sup>6</sup> Section 302 of the Sarbanes-Oxley Act became effective for fiscal years ending after August 29, 2002 for all SEC registrants. Section 404 became effective for fiscal years ending after November 15, 2004 for accelerated filers, a classification that 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 July 15, 2007. Since the reporting requirements differ on important dimensions that are likely correlated with accruals quality, we conduct sensitivity analyses that differentiate between Section 302 and 404 disclosures. These alternative results are discussed in Section 4.43.

as a high proportion of losses, more volatile sales and cash flows, lower total assets, and longer operating cycles.

We expect that weaknesses in internal control will result in lower accruals quality because, by definition, they have the potential to allow errors in accrual estimation to occur and impact the reported financial statements. These potential errors include both intentional (earnings management) and unintentional (poor estimation ability) errors. For a company with weak controls, intentionally biased “discretionary” accruals could be greater by failing to limit management’s ability to manage earnings (e.g., by segregating duties). Unintentional errors could be higher if weak controls result in more estimation errors for difficult to estimate accruals (e.g., by failing to ensure that qualified personnel are calculating the pension expense/liability estimation) and allow more procedural errors (e.g., by failing to have appropriate reconciliations and reviews in place). As an example, Cardiodynamic International disclosed a material weakness related to the frequency of their analysis of the inventory obsolescence provision. This material weakness most likely resulted in estimation errors related to its inventory accounts, which may have been intentional to allow the understatement of expenses. These estimation errors, caused by the material weakness in internal control, likely resulted in lower overall accruals quality for Cardiodynamic. This leads to our first hypothesis:

***H1: Material weaknesses in internal control are negatively associated with accruals quality.***

Although our first hypothesis seems reasonable, it is also possible that auditors increase substantive testing when encountering weak internal controls. In other words, internal controls and substantive testing could be substitutes in producing high quality accruals (e.g., Wright and

Wright 1996). Our next hypothesis, therefore, is related to the “auditability” or potential severity of the internal control weaknesses.

While a material weakness is the most severe type of internal control deficiency, within the material weakness classification the severity of internal control problems varies substantially. Moody’s, the bond-rating company, 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 “auditable,” and thus do not represent as serious a concern regarding the reliability of the financial statements. Company-level material weaknesses, however, relate to more fundamental problems such as the control environment or the overall financial reporting process, which auditors may not be able to “audit around” effectively. 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). The disclosure by Nitches, Inc., illustrates a typical “company-level” material weakness:

In October 2004, our management concluded that there were certain material weaknesses in our internal controls and procedures. The material weaknesses noted related to segregation of duties in the payroll process and in the monthly closing process; inadequate review and approval of management-level adjustments and entries. We have discussed these material weaknesses with our auditors, Moss Adams, LLP, who have recommended taking steps to alleviate the inadequate segregation of duties within these areas....

This internal control problem could feasibly affect accruals quality. The lack of proper checks and balances might result in procedural errors, while inadequate review of managerial adjustments might facilitate earnings management. Thus, we expect Nitches to exhibit poorer accruals quality than a similar firm (with respect to size, operating cycle, etc.) without a material

weakness in internal control. A seemingly less severe “auditable” material weakness was reported by I-Flow Corporation:

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....

It is not clear that this weakness would result in lower accruals quality. The distinction between company-level and account-specific material weaknesses is especially important for the more recent material weakness disclosures in our sample. These disclosures appear to be more conservative, and, per discussions with auditors, might be overly conservative. Moreover, in research examining the stock price reaction to internal control problems, investors react more negatively to disclosures that are “less auditable,” consistent with company-level control problems representing a more severe weakness (Hammersley et al. 2005). This leads to our second hypothesis:

***H2: A company-level material weakness has a stronger negative relation with accruals quality than an account-specific material weakness.***

### **3. Data and sample selection**

#### *3.1 Identifying and classifying firms with material weaknesses*

As mentioned above, material weaknesses in internal control have only been required to be widely disclosed in SEC filings since August of 2002. To collect our test firms, we search 10Kwizard.com (10-Ks, 10-Qs, and 8-Ks) using the keyword “material weakness!” from August 1, 2002 to October 31, 2005. We include only those firms that classify their internal control problem(s) as a material weakness, the most severe internal control deficiency. We read through each SEC filing to ensure that a material weakness in internal control is disclosed. We focus on

material weaknesses for two reasons. First, it is the most severe type of deficiency in internal control and the most likely to affect accruals quality. Second, the disclosure of material weaknesses is mandatory, while the disclosure of lesser “significant deficiencies” is voluntary. Focusing on mandatory disclosures helps avoid self-selection issues associated with voluntary disclosures.

This procedure identifies 1,210 firms that disclosed at least one material weakness from August 2002 to November 2005, outlined in Table 1, Panel A. Of these firms, 164 are not covered by Compustat, and 79 companies in our sample disclosed a material weakness related to lease accounting in 2005. These disclosures were responses to the views expressed by the Office of the Chief Accountant of the SEC in a February 7, 2005 letter to the AICPA. Due to the narrow, technical nature of this issue, we exclude these firms from our analysis (the inclusion of these firms leads to very similar results). If a parent and subsidiary both file with the SEC and report the same material weakness, we include only the parent company and remove the subsidiary from our control firms if the subsidiary is covered by Compustat (17 firms).<sup>7</sup> Next, 255 of our sample firms have insufficient data to calculate our measure of accruals quality. We also eliminate three material weakness firms and 14 control firms that were involved in a significant merger (greater than 50 percent of sales), in the current or subsequent year, because the merger could result in mismatched current accruals and future cash flows (Hribar and Collins 2002). A significant merger is identified in Compustat footnote 1 as “AB.” These restrictions result in a sample of 709 firms with non-missing accruals quality data. Finally, 61 of our material weakness firms do not have data for our other control variables (discussed below in

---

<sup>7</sup> We also identify 100 firms identified by Compliance Week as having a significant deficiency other than a material weakness and exclude these firms from our control group. Compliance Week is a website dedicated to Sarbanes-Oxley related compliance issues that has been collecting and publishing monthly reports on firms that disclose internal control deficiencies since November 2003.

Sections 3.3 and 3.4), resulting in 648 material weakness firms in the multivariate tests.<sup>8</sup> Our corresponding control sample has 3,292 firms with non-missing accruals quality data and 2,955 firms in the multivariate analysis. We summarize our sample selection process in Table 1, Panel A.

We next classify firms as having either a company-level or account-specific material weakness in order to test the hypothesis that more severe, company-level, weaknesses will be more negatively associated with accruals quality. We provide examples of each category in Appendix A. These classifications are mutually exclusive; if a firm has both company-level and account-specific weaknesses, we code the firm as having a company-level material weakness. In some cases, it is straightforward to categorize a disclosure as company-level; for example, when “ineffective control environment” or “management override” is specifically identified as a material weakness in the disclosure. However, most disclosures are not so forthcoming. Thus, if a firm has material weaknesses related to at least three account-specific problems, we classify the firm as having a company-level material weakness. In two cases, the firm has insufficient information to code the disclosure; we classify both of these disclosures as company-level. Of our 709 firms with non-missing accruals quality data, 430 are classified as account-specific and 279 as company-level.

### *3.2 Accruals quality measure*

We use the measure of accrual estimation error developed in Dechow and Dichev (2002) and modified in McNichols (2002) and Francis et al. (2005) as our main measure of accruals quality. This measure defines the quality of accruals as the extent to which they map into past,

---

<sup>8</sup> Of our 648 material weakness firms in our final sample, eight were disclosed in 2002, 56 in 2003, 209 in 2004, and the remaining 375 in 2005. Of the 375 disclosures in 2005, 276 (74 percent) correspond to our estimate of 404 filers (a float greater than or equal to \$75 million). Only 15 (7 percent) of the disclosures from 2004 correspond to 404 filers (a float of greater than or equal to \$75 million and a filing date after November 14, 2004).

current, and future cash flows. We assume that this measure can capture the effect of internal control on accruals quality for two reasons. First, a large number of disclosed material weaknesses are related to specific accounts (e.g., inventory, see Ge and McVay 2005). These specific accounts could have estimation errors that will be captured by this measure. For example, if the inventory account is overstated, the obsolete inventory will not result in cash inflows in the next period, resulting in a low correlation between the accrual and realized cash flows. Second, compared to other measures of accruals quality, the measure in Dechow and Dichev (2002) does not rely solely on earnings management or assumptions related to market efficiency (e.g., value-relevance). This measure can capture both biased “discretionary” accruals and unintentionally poorly estimated accruals, which we predict will be the result of an internal control system with material weaknesses.<sup>9</sup>

Specifically, the proxy for accruals quality is measured by estimating the following regression by industry:

$$\Delta WC_t = \beta_0 + \beta_1 CFO_{t-1} + \beta_2 CFO_t + \beta_3 CFO_{t+1} + \beta_4 \Delta REV_t + \beta_5 PPE_t + \varepsilon_t \quad (1)$$

The residuals from the regression measure the extent to which current accruals ( $\Delta WC$ ) do not effectively map into past, present, or future cash flows ( $CFO$ ).<sup>10</sup> Following both McNichols (2002) and Francis et al. (2005), we also include the current year change in sales ( $\Delta REV = \Delta(\text{data item 12})$ ) and the current year level of property, plant, and equipment ( $PPE = \text{data item 7}$ ) in equation (1). The inclusion of these two variables links the Dechow and Dichev (2002) measure to the Jones (1991) model of discretionary accruals.

---

<sup>9</sup> Roychowdhury (2004), among others, shows that firms appear to manipulate real operating activities in order to “manage” earnings. However, such an action is not a violation of generally accepted accounting principles, and thus we do not expect good internal control to constrain this behavior. Our main focus in this paper is on accruals quality as measured by the accrual/cash flow relation.

<sup>10</sup> We define the change in working capital accruals from year  $t-1$  to  $t$  as  $\Delta WC = \Delta \text{Accounts Receivable} + \Delta \text{Inventory} - \Delta \text{Accounts Payable} - \Delta \text{Taxes Payable} + \Delta \text{Other Assets}$ , or  $\Delta WC = -(\text{data item 302} + \text{data item 303} + \text{data item 304} + \text{data item 305} + \text{data item 307})$ .  $CFO$  is cash flow from operations (data item 308). All variables in equation (1) are scaled by average total assets (data item 6) and winsorized at the 1<sup>st</sup> and 99<sup>th</sup> percentiles, by year.

Following Francis et al. (2005), we estimate the above regression cross-sectionally, by year, within each of the 48 Fama and French (1997) industry classifications. If an industry group has fewer than 20 observations in any given year, those observations pertaining to that industry are deleted. We use annual Compustat data spanning 1995–2003, which results in seven years of observations (1996–2002), since the regression requires data from the past and future years. We then aggregate the residuals by firm and calculate the standard deviation of residuals ( $AQ$ ), by firm, requiring a minimum of four years of data out of the seven years.<sup>11</sup> A higher standard deviation indicates lower accruals quality.

As with any proxy, our measure of accruals quality has limitations. As noted in McNichols (2002), the Dechow and Dichev approach limits the applicability of the model to accruals that are shorter term in nature (i.e., working capital accruals). In addition, the definition of accruals quality is symmetric for estimation errors that overstate and understate cash flow realizations by an equal amount, which may be problematic in certain settings, although less of a concern in our setting as unintentional errors are not expected to be systematically over- or understated. Moreover, a sizable fraction of the explanatory power of the measure is attributable to the negative contemporaneous association between accruals and cash flows. To the extent that this contemporaneous component does not capture accruals quality, it can handicap the ability of the Dechow and Dichev model to capture accruals quality (Wysocki 2005). Finally, as with any measure, to the extent that we do not properly control for the joint determinants of both accruals quality and material weaknesses, our conclusions would not be warranted.

In order to further validate our results and to enhance comparison with other research on earnings quality, we also examine four additional proxies of earnings/accruals quality in Section

---

<sup>11</sup> In results not tabulated, we have also estimated equation (1) using quarterly data, using quarters from 2001 to 2003 and requiring a minimum of six firm-specific residuals (generated cross-sectionally by industry and quarter) to calculate the measure of accruals quality. Our results continue to hold using this alternate approach.

4.4.2: discretionary accruals, the average of the absolute value of the Dechow and Dichev residuals, historical accounting restatements, and earnings persistence. Using these alternative measures, our results continue to support the link between accruals quality and internal control over financial reporting.

### *3.3 Innate firm characteristics that affect the quality of accruals*

Dechow and Dichev (2002) find that accruals quality is poorer for firms with certain characteristics, such as for smaller firms. We expect that internal control weaknesses will reduce accruals quality *beyond* that explained by these innate firm characteristics. While Dechow and Dichev (2002) find that smaller firms tend to have lower quality accruals, we expect that, for two equally small firms, the company with weak internal controls will have lower accruals quality. For this reason, we include these five innate firm variables as controls in our analysis: proportion of losses, sales volatility, cash flow volatility, firm size, and operating cycle, as we wish to focus on the effect of the internal control problem, rather than generic volatility or a firm's operating cycle.<sup>12</sup>

In addition to including these innate factors as control variables, Francis et al. (2005) also disaggregate "discretionary accruals quality" by estimating a first-stage regression using these innate factors and attributing the residual from the regression to managerial actions. We replicate our findings using this alternative method (not tabulated), and the results strongly support the conjecture of a negative relation between (discretionary) accruals quality and weak internal control over financial reporting.

### *3.4 Controlling for determinants of material weaknesses and potential self-selection bias*

---

<sup>12</sup> We provide the definitions and corresponding data items of each of these variables in Table 1, Panel B.

Prior research has also identified determinants of material weaknesses in internal control. Material weakness firms tend to report losses, be smaller, younger, more complex, growing rapidly, or undergoing restructuring (e.g., Krishnan 2005; Ge and McVay 2005; Ashbaugh-Skaife et al. 2006a; Bryan and Lilien 2005; Doyle et al. 2005).<sup>13</sup> As these characteristics may have a *direct* effect on accruals quality, we include one proxy for each of these constructs in our main regressions as follows: the size of the firm (*FIRM SIZE*), the age of the firm (*FIRM AGE*), financial resources (*LOSS PROPORTION*), the complexity of the firm's operations (*SEGMENTS*), rapid growth (*EXTREME SALES GROWTH*), and restructurings (*RESTRUCTURING CHARGE*); see Table 1, Panel B, for definitions. We include a more comprehensive set of controls when estimating the first-stage regression of material weakness firms (Appendix B). We have replicated our results using the comprehensive list of control variables directly in the regression, and the results generally are stronger than those reported in the paper; we present the limited set of controls for succinctness.

In addition to adding these determinants as independent variables to our analyses, we also control for the fact that our variable of interest, the disclosure of a material weakness, is not exogenous. Firms can choose both the quality of their internal controls and their efforts to discover and disclose any known weakness (Ashbaugh-Skaife et al. 2006a). We control for this potential self-selection bias in several ways. First, we focus only on internal control problems that reach the severity of a material weakness (the most severe problems), which are required to be disclosed, thereby eliminating the choice to disclose. Next, we use a two-stage approach and estimate a probit regression of *MW* on the determinants of material weaknesses discussed above. This first-stage regression closely follows Doyle et al. (2005) and is presented in Appendix B.

---

<sup>13</sup> Krishnan (2005) finds that internal control problems and audit committee quality are negatively associated. We examine this variable in a sensitivity analysis in Section 4.4.4.

This probit regression estimates the likelihood of reporting a material weakness, with all 2003 Compustat firms without a material weakness serving as the control group. From this first-stage regression, which identifies the likelihood of a firm being “selected” as a material weakness firm, we calculate the inverse Mills ratio (see Heckman 1979; Leuz and Verrecchia 2000) and include this ratio in our accruals quality regressions. Including the ratio in our main regressions helps control for the likelihood of self-selecting into the material weakness group. As in the first-stage probit regression, we use all 2003 Compustat firms with available data that do not report a material weakness as our control group for our tests using the inverse Mills ratio.

Finally, we control for self-selection by creating a matched sample based on the predicted probabilities from the first-stage probit regression. This method, known as propensity score matching (LaLonde 1986), creates a nonmaterial-weakness control sample with the same predicted probabilities of having a material weakness. The propensity score matching method produces a matched sample of 648 control firms, which meet the data requirements listed above.

## **4. Results**

### *4.1 Descriptive statistics and univariate analysis*

Table 2 presents descriptive statistics for our sample of firms reporting material weaknesses. As our comparison group, we present all 2003 Compustat firms that were not identified as having an internal control deficiency and do not have missing data for our accruals quality measure; we report the results of a difference in means under a two-tailed t-test for each of the variables. Turning first to Accruals Quality (*AQ*), a higher *AQ* indicates a higher standard deviation of residuals, and thus lower accruals quality. The mean of *AQ* is higher for the material weakness firms compared to the control sample (0.070 versus 0.058; p-value of 0.001),

providing initial support for H1.<sup>14</sup> This univariate result extends to each of our proxies for accruals quality. The average absolute value of discretionary accruals is significantly higher for material weakness firms (0.131 versus 0.111; p-value of 0.001), and their proportion of historical accounting restatements is also higher (0.079 versus 0.058; p-value of 0.023). Finally, earnings persistence is lower for the material weakness firms (0.702 versus 0.741; prob>F-value of 0.001).

Overall, the univariate results support H1; however, as noted above, we expect material weakness firms to also have lower *innate* accruals quality, an expectation supported by Table 2. Material weakness firms have more losses, have higher sales and cash flow volatility, and are smaller than the control firms. In addition, in results measured from 1996 through 2002 (scaled by average total assets and not tabulated), material weakness firms have lower average cash flows from operations (−0.012 versus 0.020), lower average earnings before extraordinary items (−0.100 versus −0.063), but higher average working capital accruals (0.072 versus 0.057). Since the material weakness firms tend to be more volatile and in worse financial condition, it is vital to control for these innate characteristics in our multivariate tests.<sup>15</sup>

In Table 3, we compare account-specific material weakness firms to company-level material weakness firms. *AQ* is significantly higher for firms that disclose company-level material weaknesses than account-specific material weaknesses (mean of 0.080 versus 0.063). *Discretionary Accruals* (0.145 versus 0.122), *Average Accruals Quality* (0.069 versus 0.056), and *Historical Restatement* (0.087 versus 0.073) are all higher for the company-level weakness

---

<sup>14</sup> The univariate results are extremely similar if we use firms matched on the probability of having a material weakness as the control firms.

<sup>15</sup> Interestingly, while the bulk of the determinants of material weaknesses in internal control are consistent with prior literature, our sample does not exhibit univariate differences for rapid growth. Upon further inspection, this difference is a function of our stringent data requirements to calculate accruals quality; if the means are compared before requiring accruals quality data, results are consistent with prior research.

firms as well, although *Historical Restatement* is not significant (p-value of 0.427). Finally, *Earnings Persistence* is lower for the company-level group at 0.675 versus 0.729. Overall, the univariate results seem to provide initial support for H2; firms with company-level weaknesses have lower accruals quality than firms with account-specific weaknesses. The variables for innate accruals quality also tend to be higher for the company-level disclosure firms, supporting the need for these control variables when testing H2; for example, firms with company-level disclosures tend to have more losses and greater sales and cash flow volatility compared to their account-specific counterparts. They also have lower average cash flows and earnings before extraordinary items, and higher working capital accruals (not tabulated). Account-specific disclosure firms tend to be slightly larger and older and have more segments than company-level disclosure firms, consistent with the notion that the additional complexity associated with size and decentralization creates unique challenges for these firms (Doyle et al. 2005).

Turning to Table 4, which presents a correlation matrix among the main variables, material weakness firms are positively correlated with most of the innate characteristics of firms with poor accruals quality identified in Dechow and Dichev (2002). Material weakness disclosures are positively associated with a higher proportion of losses, higher cash flow and sales volatility, and longer operating cycles, which raises the possibility that these innate firm characteristics are driving the lower accruals quality, and not the material weaknesses per se. Our multivariate analyses below investigate our hypotheses further.

#### *4.2 Multivariate analysis of accruals quality and material weaknesses*

Table 5 presents a regression of accruals quality on an indicator variable, material weakness (*MW*), where *MW* is equal to one if the firm reports a material weakness and zero if the firm is in the control group. The regressions are estimated using ordinary least squares, with

adjusted standard errors for heteroscedasticity based on White (1980). We present our primary accruals quality measure (*AQ*) as the dependent variable, with three model specifications shown. In the first column of Table 5 we present the main regression. In the last two columns, we present results using two methods to control for the self-selection bias discussed in Section 3.4, denoted as either *Inverse Mills Ratio* or *Propensity Score Match* in the “Selectivity Control Method” row.<sup>16</sup> In each column, we control for the innate firm characteristics related to accruals quality as well as the determinants of material weaknesses. As noted above, we include only one proxy for each of the determinants of material weaknesses for succinctness. Results are not sensitive to the inclusion of the comprehensive list of variables. For example, for the regression specification in column one, the coefficient on *MW* is 0.004 with a p-value of 0.003 when all variables are included.

Our main variable of interest, *MW*, is positively related to the accruals quality measures across all three specifications, supporting H1 and suggesting material weakness firms have poorer accruals quality. Each of the variables measuring innate firm characteristics that are expected to affect accruals quality are significant in the predicted direction across each of the specifications (Dechow and Dichev 2002).<sup>17</sup> Finally, the additional controls we identified through our examination of the internal control literature are largely insignificant.

---

<sup>16</sup> An alternative way to test our hypotheses using the propensity score match approach is to take the differences of the variables between the test and matched control firms and test the significance of the intercept. Results are very similar using this alternative approach. For all material weaknesses, the intercept is positive and significant; 0.004 with a p-value of 0.051. For account-specific weaknesses, the intercept is insignificant (p-value of 0.348, and for the company-level weaknesses, the intercept is positive and significant; 0.007 with a p-value of 0.044).

<sup>17</sup> Since loss years can be problematic for accruals quality calculations, we have estimated two additional specifications. The first eliminates any firm years where operating earnings are less than zero prior to calculating *AQ*. This process eliminates about 32 percent of our original total sample, but the results are quite similar. For the specification shown in the first column of Tables 5 and 6, the coefficients on *MW* and *MW\_COMPANY-LEVEL* are 0.002 (p-value of 0.078) and 0.003 (p-value of 0.044). The second specification eliminates any firm where *LOSS PROPORTION* is greater than 25 percent. This specification eliminates about 53 percent of our original sample. The results are stronger than those shown in the first column of Tables 5 and 6. The coefficients on *MW* and *MW\_COMPANY-LEVEL* are 0.004 (p-value of 0.008) and 0.011 (p-value of 0.001). Overall, it does not seem that losses are driving our results.

### 4.3 Analysis by type of material weakness

Table 6 reports the regression results on the relation between accruals quality and the different types of internal control deficiencies. H2 predicts that company-level material weaknesses will have a stronger association with accruals quality than will account-specific material weaknesses, since company-level internal control deficiencies are less “auditable” and thus more likely to result in erroneous accruals in the filed financial statements. As in our earlier tests, we control for the innate firm characteristics that proxy for the inherent difficulty in accrual estimation and the determinants of material weaknesses. We also correct for self-selection bias using both the inverse Mills ratio and the propensity score matching approach.

In Table 6, company-level material weaknesses are positively related to *AQ* across all three specifications. The association between account-specific material weaknesses and *AQ* is much more tenuous, account-specific material weaknesses are not associated with *AQ* in columns one or three, and only weakly associated in column two. Consistent with H2, across all three regression specifications, the magnitude of the coefficient on account-specific weaknesses is significantly lower than the magnitude of the coefficient on company-level weaknesses under an F-test ( $p < 0.10$ ). This finding complements Hogan and Wilkins (2005), who find that auditor fees were significantly higher for material weakness firms in the year prior to the disclosure of a significant deficiency. In conjuncture with Hogan and Wilkins (2005), our findings suggest that when the internal control problems are “auditable,” auditors appear to be better able to mitigate the negative impact on accruals quality.

The economic magnitude of the coefficients on the *MW* variables in Tables 5 and 6 also appears to be significant. For example, in Table 5, the coefficients on *MW* range from 0.004 to 0.011. In Table 6, the coefficients on *MW\_COMPANY-LEVEL* range from 0.007 to 0.013. So,

for the typical control firm (median *ACCRUALS QUALITY* of 0.042 from Table 2) a switch from  $MW=0$  to  $MW=1$  results in a 9.5 percent (0.004 divided by 0.042) to 26.2 percent increase in the accruals quality metric (implying poorer accruals quality), after controlling for other known determinants of accruals quality. A switch from  $MW\_COMPANY-LEVEL = 0$  to  $MW\_COMPANY-LEVEL = 1$ , implies a 16.7 percent to 31.0 percent increase in the accruals quality variable.

#### *4.4 Robustness checks*

##### *4.4.1 Timing of the measurement of accruals quality*

Since internal control disclosures were not widely available prior to the Sarbanes-Oxley Act of 2002, it is difficult to determine how long the newly disclosed weaknesses have existed in the company. This has implications for the time period over which we measure our accruals quality variable. In our paper, we assume that the weaknesses, on average, have existed several years prior to their disclosure, if not since the firm's inception. Each of our proxies for accruals quality is measured from 1996 to 2002, which results in almost no overlap with the financial periods in which the weaknesses were reported. We can infer from the descriptions that many of the disclosures have been around for some time. For example, 3D Systems had the following disclosure:

Specifically, our revenue recognition policies and procedures were poorly documented and not readily accessible to most of our employees. Our documentation for machine sales transactions was inconsistent and not adequately defined. Furthermore, the then existing policies and procedures [were] broad-based, and did not include specific procedures and controls by department or function. Moreover, our accounting and finance staff were inadequate to meet the needs of an international public company.

It seems unlikely that 3D Systems did not have these problems in the recent years preceding the disclosure. Rather, it seems likely that Sarbanes-Oxley led to the disclosure of a situation that had existed for some time. As another example, Sonix Research Inc., reported the following:

Due to its small size and limited financial resources, however, the Company's chief financial officer, a member of management, has been the only employee involved in accounting and financial reporting. The Board of Directors has recognized that as a result, there is no segregation of duties within the accounting function, leaving all aspects of financial reporting and physical control of cash and equivalents in the hands of the same employee. Usually, this lack of segregation of duties represents a material weakness in a company's internal control over financial reporting; however, based on the demonstrated integrity and trustworthiness of the Company's chief financial officer, the Board of Directors has had confidence that there have been no irregularities in the Company's financial reporting or in the protection of its assets.

The above condition has probably existed since the firm's inception. Clearly, not all the material weakness disclosures are long-standing; however, in our study we operate under the assumption that, on average, these problems have been around for multiple years, and measure our accruals quality proxies over the preceding seven years (1996–2002).

An alternative approach is to measure accruals quality in the same period that the material weakness was reported. This method has two disadvantages. First, the impending disclosure of an internal control weakness may cause management and/or the auditor to intensify their search for misestimated accruals, resulting in more write-downs and thereby lower accruals quality. If these low-quality accruals do not result from the company's poor internal controls per se, a lower concurrent accruals quality measure could be misattributed to the control system. Our use of an accruals quality measure that is calculated in the periods preceding the material weakness disclosure helps to address this competing explanation that auditors applied additional scrutiny and conservatism to the firms that they knew would be publicly disclosing their internal control problems. Consider, however, an equally plausible explanation, that, when noting the

weakness in internal control, the management or auditor discovers a product of that weakness—namely misestimated accruals—in which case the connection between internal controls and accruals quality is justified. By focusing on the period prior to the disclosure, we largely avoid the problem of disentangling these competing explanations. The second, more practical problem with using a concurrent accruals quality metric is that our measure requires a future year of data, and the future data is limited for our material weakness firms. Most of these firms reported weaknesses in 2004 and 2005, which would necessitate data from 2005 and 2006 that is currently unavailable.

To shed light on the validity of our timing assumption, and thereby the validity of using this historical measure, we graph accruals quality over time for both our test and control firms in Figure 1 (requiring that included firms have data for each estimation period for comparison purposes). The accruals quality metric in Figure 1 is that of Francis et al. (2005) described in Section 3.3, which is orthogonal to the innate characteristics expected to affect accruals quality. Referring to the right portion of the figure, there is clearly a large gap between the test and control firms (consistent with H1) for the 1996–2002 estimation period; material weakness firms have a higher standard deviation even after controlling for the innate characteristics. As we roll back the seven-year measurement period, the gap lessens, but accruals quality continues to be poorer in each of the estimation periods, suggesting our timing assumption has merit. In Section 4.4.2 below, we examine four alternative proxies for accruals quality. In addition, we calculate these alternative proxies contemporaneously rather than historically and continue to find weaker accruals quality for the firms disclosing material weaknesses in internal control.

#### *4.4.2 Additional accruals quality measures*

We focus on accruals quality as measured by Dechow and Dichev (2002), as we are interested in both intentional and unintentional errors and this measure is likely to capture both of these errors. There are several additional proxies in the literature. In Tables 7 and 8, we replicate our main results for four additional measures of accruals quality. The first is *Discretionary Accruals*, which is the absolute value of discretionary accruals, estimated following Kothari et al. (2005) and Ashbaugh-Skaife et al. (2006b). Referring to the first column of results in Table 7, consistent with Ashbaugh-Skaife et al. (2006b) and Hogan and Wilkins (2005), material weakness disclosures are positively associated with this measure (p-value of 0.048). We parse out account-specific and company-level problems in Table 8. Consistent with our main results, it appears that company-level problems are driving this association.

Our second alternative proxy, *Average Accruals Quality*, is suggested in Dechow and Dichev (2002). This measure, the average of the absolute value of the firm residuals from equation (1), is estimated in the cross-section and is highly correlated with our main accruals quality measure (the standard deviation of the residuals). Results are consistent with our main results in both Tables 7 and 8.

The third alternative proxy of accruals quality is *Historical Restatement*, which is an indicator variable that is equal to one if the firm was listed by the General Accounting Office (GAO) as having had a restatement; the GAO report covers the period from approximately January 1997 to June 2002. Intuitively, in order for a restatement to occur, an error (either intentional or unintentional) must have been made. Therefore, while our Dechow and Dichev (2002) measure attempts to capture these errors through the realization of cash flows,

restatements provide explicit evidence of these errors.<sup>18</sup> In the third column of results in Table 7, where we have estimated a logistic regression, the coefficient on *MW* is positive but not significant after the inclusion of control variables (p-value of 0.317). Table 8 reveals that company-level weaknesses are weakly significant in the direction predicted (p-value of 0.115).

Our final alternative measure of accruals quality is *Earnings Persistence* (Dechow and Dichev 2002; Schipper and Vincent 2003). We interact *MW* with *Earnings* (data item #123) to evaluate the incremental persistence of material weakness firms. The interaction term on *MW* is negative and significant (−0.054; p-value of 0.001), suggesting, once again, that the earnings/accruals quality of material weakness firms is poorer than that of our control firms. As shown in Table 8, this relation appears to be stronger for account-specific weaknesses, which is the opposite of the univariate result from Table 3. An account-specific weakness appears to lower the average earnings persistence by approximately nine percent, while a company-level weakness reduces persistence by three percent.<sup>19</sup>

As a final robustness test we calculate the accruals quality measures for the years in which the material weakness disclosures are made (data permitting), rather than using accruals quality measures that precede the period of the material weakness disclosure (not tabulated). For 2003, *Discretionary Accruals* has a mean (median) value of 0.137 (0.089) for material weakness firms and 0.124 (0.077) for the control firms. For 2004, the values are 0.145 (0.094) for weakness firms and 0.130 (0.078) for the control firms. *Average Accruals Quality* and *Earnings Persistence* are available only for 2003, since they require a future year of data. *Average*

---

<sup>18</sup> It is possible that the causality is reversed. Ashbaugh-Skaife et al. (2006a) suggest that a recent restatement results in increased auditor and regulator scrutiny, which may result in additional search procedures or increase the likelihood of a voluntary disclosure of a significant deficiency.

<sup>19</sup> If the sample is restricted to Section 302 reporters, the coefficient on *MW* is 0.338 (p-value of 0.067), the coefficient on *MW\_Account-Specific* is 0.147 (p-value of 0.552), and the coefficient on *MW\_Company-Level* is 0.572 (p-value of 0.023). See Section 4.4.3 for further details on the 302 and 404 breakdown.

*Accruals Quality* is worse for material weakness firms: 0.053 (0.031) versus 0.049 (0.027) for control firms. *Earnings Persistence* is also worse, at 0.614 for material weakness firms versus 0.780 for control firms. While we do not have concurrent restatement data for all firms, about half of our material weakness sample had a concurrent restatement, which is clearly above the population restatement rate.

Overall, the results generally support the notion that accruals quality is lower when a firm has a weak internal control system (H1) and that the relation is stronger when the internal control problems are at the company level (H2). These results seem to be robust across different proxies for accruals quality and across varying measurement periods.

#### *4.4.3 Material weakness disclosures under Section 302 versus Section 404*

As mentioned earlier, material weakness disclosures under Section 404 are likely to be different than those under Section 302. First, only “accelerated” filers (generally those firms with at least \$75 million in market capitalization) had to comply with Section 404 at the later stages of our sample period (from November 15, 2004 through the end of our sample period on October 31, 2005). Smaller firms that are not accelerated filers do not have to comply with Section 404 until the first fiscal year ending after July 15, 2007. Thus, our Section 404 subsample (279 firms) is biased toward larger firms. For example, the median of total assets and market capitalization is \$327 million and \$377 million for Section 404 reporters versus \$109 million and \$49 million for Section 302 reporters. The Section 404 firms also have lower *LOSS PROPORTION* (0.39 versus 0.46), *SALES VOLATILITY* (0.266 versus 0.311), and *CFO VOLATILITY* (0.105 versus 0.118) than the Section 302 firms.

Given these inherent differences between Section 302 and 404 disclosure firms, and that these differences are correlated with accruals quality, we re-estimate our regressions for each

sub-group to determine if our conclusions differ between these two samples. We find that the coefficients on the *MW* variables are insignificant for Section 404 filers and strongly positive for 302 reporters (not tabulated).

Since the Section 404 reporters constitute a biased sample of firms in general, in an additional test (not tabulated) we create a matched sample of non-material weakness firms for comparison to Section 404 weakness firms based on the log of market capitalization. In this test, the 291 Section 404 reporters are being compared to their “peers,” rather than to the entire population of Compustat firms. The coefficient on *MW* increases to 0.004 (p-value of 0.159), as do the coefficients on *MW\_ACCOUNT-SPECIFIC* (0.003, p-value of 0.298) and *MW\_COMPANY-LEVEL* (0.005, p-value of 0.186); the magnitudes are similar to those in Tables 5 and 6, though the significant levels are lower. In sum, when compared to an appropriate control sample, it still appears that Section 404 material weaknesses are associated with lower levels of accruals quality.

#### *4.4.4 Audit committee quality sensitivity analysis*

Krishnan (2005) documents that internal control deficiencies are negatively associated with audit committee quality, including audit committee independence, in her sample of firms that changed auditors from 1994 through 2000. Relatedly, Klein (2002) finds that audit committee independence is associated with lower levels of abnormal accruals and suggests that independent audit committees are able to constrain earnings management. Therefore, in this section, we investigate the potential correlated omitted variable of audit committee independence. We do not include this variable in our main analysis due to the limited availability of data; using the Investor Research Responsibility Center’s (IRRC) corporate

governance dataset, we have audit committee independence data for the year 2002 for only 179 of our material weakness sample firms and 954 of our control firms.

We include the proportion of independent directors on the audit committee as an additional control variable in Table 9. In each of the three specifications, *MW* remains strongly associated with poorer accruals quality. This finding suggests that the relation between internal control and accruals quality goes beyond the effect of corporate governance on accruals quality documented in the prior literature. Turning to audit committee independence, in the first two columns of results we find that the proportion of independent audit committee members is weakly negatively associated with accruals quality, consistent with Klein (2002), although this result is not significant in the third specification.<sup>20</sup>

## 5. Conclusion

We examine the relation between accruals quality and internal control quality and find that firms with weak internal control over financial reporting have lower accruals quality. We measure accruals quality as the extent to which accruals are realized as cash flows, following Dechow and Dichev (2002) and Francis et al. (2005). We identify weak internal control firms as those that disclosed a material weakness in internal control from August 2002 to November 2005 under Sections 302 and 404 of Sarbanes-Oxley. The relation between weak internal controls and poor accruals quality holds after controlling for known determinants of both accruals quality and internal control deficiencies. Moreover, the results are robust to corrections for self-selection bias using both the inverse Mills ratio approach and propensity score matching. We also find

---

<sup>20</sup> In December 1999 the NYSE and NASDAQ modified their requirements for audit committees. Under the new standards, firms must maintain audit committees with at least three independent directors (Klein 2003). Therefore, the variation in this variable is significantly lower in our data than in both Krishnan (2005) and Klein (2002), with a mean of outside directors of 89.23 percent for our 2002 sample.

that the relation between accruals quality is stronger when the internal control problems are pervasive, company-level, concerns as opposed to more auditable, account-specific, weaknesses.

Finally, we examine four additional proxies of accruals quality: discretionary accruals, the average absolute value of the Dechow and Dichev (2002) residuals, historical restatements, and earnings persistence. Our results are largely consistent using each of these alternative proxies. The results also seem to be consistent when measuring these variables concurrently in the year of material weakness disclosure, rather than over a preceding time period.

Our study has several limitations. First, we rely on the disclosure of a material weakness to proxy for the actual presence of an internal control problem. Therefore, to the extent that there is a systematic bias in the choice to identify and disclose material weaknesses—beyond those variables used as controls—our sample may not represent the true underlying population of firms with internal control problems. Second, we assume that the material weaknesses have been present for multiple years; our accruals quality measure is constructed from 1996–2002. However, it is hard to pinpoint the exact timing of the weaknesses and this assumption may not be valid. Third, since Sarbanes-Oxley has been in effect for a relatively short time, our ability to infer causality between internal control problems and accruals quality is limited. Future research might conduct a change analysis to determine whether firms with internal control improvements have subsequent increases in accruals quality. Finally, we must rely on a proxy for accruals quality. We use the model developed by Dechow and Dichev (2002) as modified by McNichols (2002) and Francis et al. (2005). As with any measure, ours is subject to certain limitations (e.g., McNichols 2002; Wysocki 2005) and might measure the accruals quality construct with noise.

Our findings have implications for regulators, auditors, managers, and researchers. First, our findings support the notion that the internal control environment is a fundamental element in

the production of high quality accruals, a link that has long been suggested (Kinney 2000) but was largely untestable prior to the introduction of Sarbanes-Oxley Sections 302 and 404. Second, our findings add to the debate on the benefits of Sarbanes-Oxley, suggesting that Sections 302 and 404 are, at least in part, appropriately identifying “poor quality” firms—specifically, those with poor accruals quality. Finally, our findings support the notion that at least some portion of accruals quality is incremental to the innate drivers of poor accruals quality, such as firm size or sales volatility, and thus subject to improvement by managers. Therefore, we might expect accruals quality to improve in coming years, after the implementation of Sarbanes-Oxley in general, and Sections 302 and 404 in particular.

## References

- Ashbaugh-Skaife, H., D. Collins, and W. Kinney. 2006a. The discovery and reporting of internal control deficiencies prior to SOX-mandated audits. Working paper, University of Wisconsin, University of Iowa, and University of Texas at Austin.
- Ashbaugh-Skaife, H., D. Collins, W. Kinney, and R. LaFond. 2006b. Internal control deficiencies, remediation and accrual quality. Working paper, University of Wisconsin, University of Iowa, University of Texas at Austin, and MIT.
- Bradshaw, M., S. Richardson, and R. Sloan. 2001. Do analysts and auditors use information in accruals? *Journal of Accounting Research* 39: 45–74.
- Bryan, S., and S. Lilien. 2005. Characteristics of firms with material weaknesses in internal control: An assessment of Section 404 of Sarbanes Oxley. Working paper, Wake Forest University and Baruch College.
- Chan, K., B. Farrell, and P. Lee. 2005. Earnings management and return-earnings association of firms reporting material internal control weaknesses under Section 404 of the Sarbanes-Oxley Act. Working paper, Pace University.
- Dechow, P., R. Sloan, and A. Sweeney. 1995. Detecting earnings management. *The Accounting Review* 70: 193–225.
- Dechow, P., and I. Dichev. 2002. The quality of accruals and earnings. *The Accounting Review* 77: 35–59.
- Dechow, P., and C. Schrand. 2004. *Earnings quality*. The Research Foundation of CFA Institute.
- De Franco, G., Y. Guan, and H. Lu. 2005. The wealth change and redistribution effects of Sarbanes-Oxley internal control disclosures. Working paper, University of Toronto.
- Doss, M., and G. Jonas. 2004. Section 404 reports on internal control: Impact on ratings will depend on nature of material weaknesses reported. Moody's Investors Service, Global Credit Research. October.
- Doyle, J., W. Ge, and S. McVay. 2005. Determinants of weaknesses in internal control over financial reporting. Working paper, University of Utah, University of Michigan, and New York University.
- Fama, E., and K. French. 1997. Industry costs of equity. *Journal of Financial Economics* 43: 153–193.
- Francis, J., R. LaFond, P. Olsson, and K. Schipper. 2005. The market pricing of accruals quality. *Journal of Accounting and Economics* 39: 295–327.

- Ge, W., and S. McVay. 2005. The disclosure of material weaknesses in internal control after the Sarbanes-Oxley Act. *Accounting Horizons* 19: 137–158.
- Hammersley, J., L. Myers, and C. Shakespeare. 2005. Market reactions to internal control weakness disclosures. Working paper, University of Georgia, University of Illinois at Urbana-Champaign, and University of Michigan.
- Heckman, J. 1979. Sample selection bias as a specification error. *Econometrica* 47: 153–161.
- Hogan, C., and M. Wilkins. 2005. Internal control weaknesses and earnings management. Working paper, Southern Methodist University and Texas A&M University.
- Hribar, P., and D. Collins. 2002. Errors in estimating accruals: Implications for empirical research. *Journal of Accounting Research* 40: 105–134.
- Jones, J. 1991. Earnings management during import relief investigations. *Journal of Accounting Research* 29: 193–228.
- Kinney, W. 2000. Research opportunities in internal control quality and quality assurance. *Auditing* 19: 83–90.
- Klein, A. 2002. Audit committee, board of director characteristics, and earnings management. *Journal of Accounting and Economics* 33: 375–400.
- Klein, A. 2003. Likely effects of stock exchange governance proposals and Sarbanes-Oxley on corporate boards. *Accounting Horizons* 17: 343–355.
- Kothari, S. P., A. Leone, and C. Wasley. 2005. Performance matched discretionary accrual measures. *Journal of Accounting and Economics* 39: 163–197.
- Krishnan, J. 2005. Audit committee quality and internal control: An empirical analysis. *The Accounting Review* 80: 649–675.
- LaLonde, R. 1986. Evaluating the econometric evaluations of training programs with experimental data. *American Economic Review* 76: 604–620.
- Leuz, C., and R. Verrecchia. 2000. The Economic Consequences of Increased Disclosure. *Journal of Accounting Research* 38: 91–124.
- McNichols, M. 2002. Discussion of the quality of accruals and earnings: The role of accrual estimation errors. *The Accounting Review* 77: 61–69.
- Public Company Accounting Oversight Board (PCAOB). 2004. Auditing Standard No. 2 – An audit of internal control over financial reporting performed in conjunction with an audit of financial statements.

- Rangan, S. 1998. Earnings management and the performance of seasoned equity offerings. *Journal of Financial Economics* 50: 101–122.
- Richardson, S., I. Tuna, and M. Wu. Predicting earnings management: The case of earnings restatements. Working paper, University of Pennsylvania.
- Roychowdhury, S. 2004. Management of earnings through the manipulation of real activities that affect cash flow from operations. Working paper, MIT.
- Schipper, K. and L. Vincent. 2003. Earnings quality. *Accounting Horizons* Supplement: 97–110.
- Teoh, S., I. Welch, and T. Wong. 1998. Earnings management and the underperformance of seasoned equity offerings. *Journal of Financial Economics* 50: 63–99.
- White, H. 1980. A heteroscedasticity-consistent covariance matrix estimator and a direct test for heteroscedasticity. *Econometrica* 48: 817–838.
- Wright, A., and S. Wright. 1996. The relationship between assessments of internal control strength and error occurrence, impact and cause. *Accounting and Business Research* 27: 58–71.
- Wysocki, P. 2005. Assessing earnings and accruals quality: U.S. and International Evidence. Working paper, MIT.

Appendix A  
Material Weakness Classification Scheme

**Account-specific 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 weakness**

1. Override by senior management
2. Ineffective control environment

**Account-specific material weakness disclosure examples**

*Enova Systems Incorporated*

Moss Adams advised the Company of a reportable condition involving the Company's internal controls in its procedures for tracking and reporting inventory. In 2002, this was reported to the Company by Moss Adams as a material weakness. Moss Adams informed the Company that (i) controls were not in place to timely detect possible inventory misstatements and (ii) the inability to timely detect these possible misstatements could potentially misstate cost of goods sold in the quarterly financial statements.

*Harken Energy Corp.*

On June 29, 2004, BDO advised the management and the Audit Committee that a material weakness in internal control over the Company's financial reporting exists. The material weakness relates to the Company's inability to determine the appropriate accounting for non-routine securities transactions on a timely basis.

**Company-level material weakness disclosure examples**

*Health Express USA*

As part of the audit for the year ended December 28, 2003, Ahearn, Jasco + Company, P.A. reported to management certain material weaknesses in the Company's internal control systems relating to the Company's controls over (1) non-accounting documents to the extent this information is communicated to the Chief Financial Officer, and (2) the internal accounting controls regarding segregation of duties.

*Vaxgen Inc.*

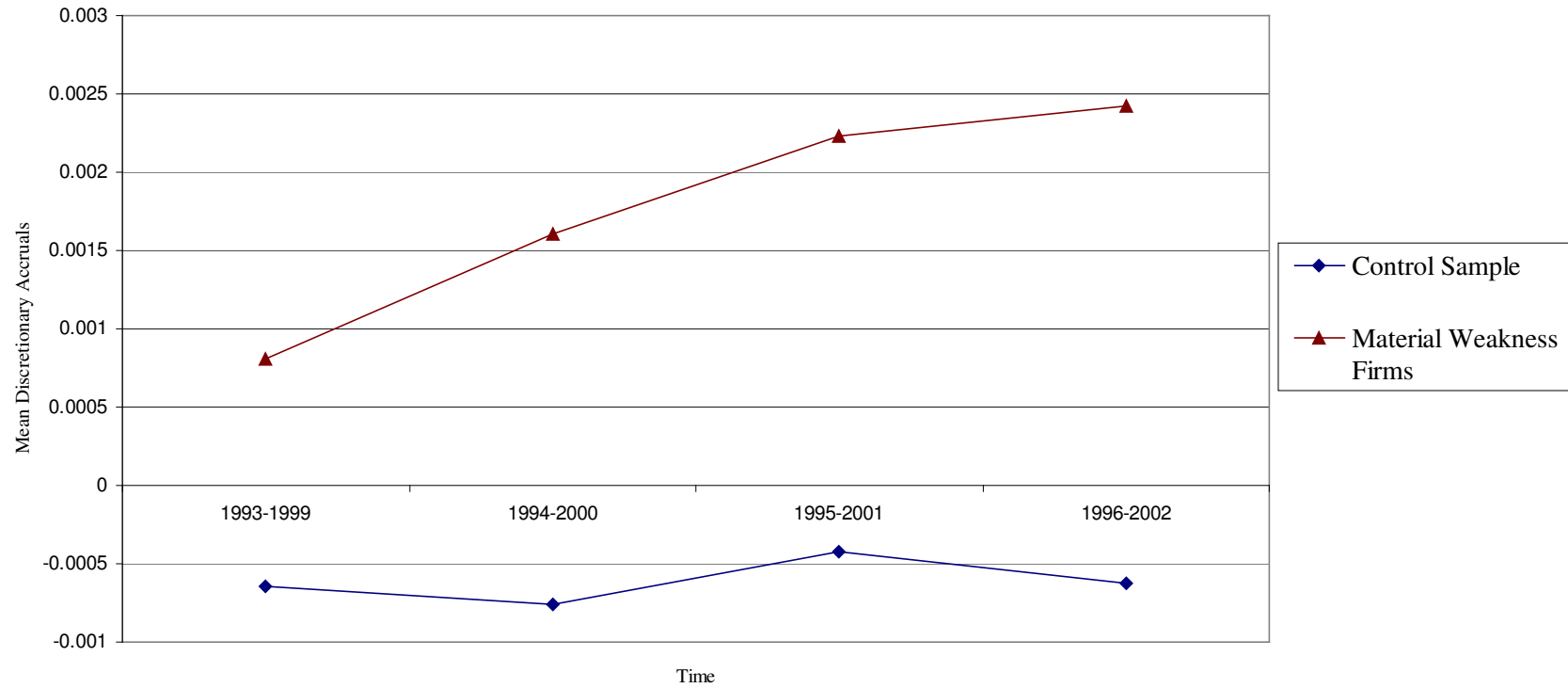
In connection with the completion of its audit ... KPMG advised the Audit Committee of the Company's Board of Directors of the following material weaknesses: Inappropriate revenue recognition for government contracts; Account reconciliations not performed on a timely basis or at all; Inadequate segregation of duties; Insufficient controls over recording of journal entries; and Lack of adequate depth of accounting knowledge.

Appendix B  
Determinants of Material Weaknesses – First-Stage Estimation

Independent Variables	Predicted Sign	Coefficient Estimate ( $Pr < X^2$ )
<i>INTERCEPT</i>		-1.213 (0.001)
<i>MARKETCAP</i>	-	-0.067 (0.001)
<i>FIRM AGE</i>	-	-0.025 (0.385)
<i>AGGREGATE LOSS</i>	+	0.247 (0.001)
<i>SEGMENTS</i>	+	0.226 (0.001)
<i>SPEs</i>	+	0.066 (0.005)
<i>FOREIGN TRANSACTIONS</i>	+	0.122 (0.044)
<i>ACQUISITION VALUE</i>	+	0.649 (0.008)
<i>EXTREME SALES GROWTH</i>	+	0.099 (0.066)
<i>RESTRUCTURING CHARGE</i>	+	0.677 (0.079)
<i>Industry Indicator Variables</i>		<i>Included</i>
<i>Number of Material Weakness Obs</i>		844
<i>Number of Total Observations</i>		5,303
<i>Likelihood Ratio Score</i> ( $Pr < X^2$ )		240.90 (0.001)

*MW* is an indicator variable that is equal to one if the firm disclosed a material weakness in internal control in our sample period (August 2002 to November 2005), and zero otherwise. *MARKETCAP* is log of share price  $\times$  number of shares outstanding [Compustat data item #25  $\times$  data item #199], *AGGREGATE LOSS* is 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, *SPEs* is the log of the number of special purpose entities reported by the company in year  $t$ , *FOREIGN TRANSACTIONS* is 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, and *ACQUISITION VALUE* is the aggregate dollar value of acquisitions that result in at least 50 percent ownership of the acquired company in year  $t$  and  $t-1$  scaled by the acquiring firm's year  $t$  market capitalization. All other variables are defined in Table1, Panel B.

Figure 1  
Discretionary Accruals Quality over Time



The sample consists of a constant sample of firms from 1993 through 2002, comprising 446 material weakness firms and 2,089 control firms. Discretionary Accruals Quality in this figure captures accruals quality that is not related to the innate characteristics of the firm. It is calculated as the residual from a regression of the Dechow and Dichev (2002) accruals quality measure on the innate firm characteristics (see Section 3.3 and Francis et al. (2005) for more details).

Table 1, Panel A  
Sample Selection

<b>Material Weakness Sample:</b>	
Identified material weakness firms from August 2002 to November 2005	1,210
Less firms not covered by Compustat	(164)
Total material weakness firms covered by Compustat	<u>1,046</u>
Less firms with lease material weaknesses	(79)
Less firms with unavailable data on accruals quality	(255)
Less firms with extreme merger and acquisition activity	(3)
Total material weakness firms examined in univariate tests	<u>709</u>
Less firms with unavailable data for control variables	(61)
Total material weakness sample used in multivariate regressions	<u>648</u>
<b>Compustat Control Sample:</b>	
All Compustat firms with 2003 data	6,431
Less firms identified as having a material weakness	(1,046)
Less firms identified as having an internal control weakness other than a material weakness by Compliance Week	(100)
Less firms identified as the subsidiary of a material weakness firm	(17)
Less firms with unavailable data on accruals quality	(1,962)
Less firms with extreme merger and acquisition activity	(14)
Total control firms examined in univariate tests	<u>3,292</u>
Less firms with unavailable data for control variables	(337)
Total control sample used in multivariate regressions	<u>2,955</u>

Table 1, Panel B  
Variable Definitions

<i>Variable</i>	<i>Definition</i>
<b>ACCRUALS QUALITY MEASURES</b>	
<i>ACCRUALS QUALITY (AQ)</i>	The standard deviation of the residuals from the Dechow and Dichev (2002) accruals quality measure, as adjusted by McNichols (2002) and Francis et al. (2005), measured from 1996–2002 (see Section 3.2)
<i>DISCRETIONARY ACCRUALS (DACC)</i>	The average of the absolute value of discretionary accruals from 1996–2002, where discretionary accruals are calculated following Kothari et al. (2005)
<i>AVERAGE ACCRUALS QUALITY</i>	The average of the absolute value of the residuals from the Dechow and Dichev (2002) accruals quality measure, as adjusted by McNichols (2002) and Francis et al. (2005), measured from 1996–2002
<i>HISTORICAL RESTATEMENT</i>	An indicator variable that is equal to one if the firm was listed by the GAO as having restated their financial statements from 1997–2002, and zero otherwise
<i>EARNINGS PERSISTENCE</i>	The coefficient on earnings from a cross-sectional regression of current earnings on one-year-ahead earnings estimated from 1996–2002
<b>INNATE FIRM CHARACTERISTICS THAT AFFECT ACCRUALS QUALITY</b>	
<i>LOSS PROPORTION</i>	The ratio of the number of years of losses [Compustat annual data item #123] relative to the total number of years of data from 1996–2002
<i>SALES VOLATILITY</i>	The standard deviation of the change in sales [data item #12], scaled by average assets [data item #6], from 1996–2002
<i>CFO VOLATILITY</i>	The standard deviation of cash from operations [data item #308], scaled by average assets, from 1996–2002
<i>FIRM SIZE</i>	The log of total assets [data item #6] from 2003 Compustat
<i>OPERATING CYCLE</i>	The log of the average of $[(\text{Sales}/360)/(\text{Average Accounts Receivable}) + (\text{Cost of Goods Sold}/360) / \text{Average Inventory}]$ , calculated from 1996–2002
<b>ADDITIONAL MATERIAL WEAKNESS DETERMINANTS THAT COULD BE RELATED TO ACCRUALS QUALITY</b>	
<i>FIRM AGE</i>	Log of the number of years the firm has CRSP data as of 2003
<i>SEGMENTS</i>	Log of the sum of the number of operating and geographic segments reported by the Compustat Segments database for the firm in 2003
<i>EXTREME SALES GROWTH</i>	An indicator variable that is equal to one if year-over-year industry-adjusted sales growth [data item #12] from 2002 to 2003 falls into the top quintile and zero otherwise
<i>RESTRUCTURING CHARGE</i>	The aggregate restructuring charges [data item #376 $\times$ (-1)] in 2003 and 2002, scaled by the firm's 2003 market capitalization

Table 2  
Descriptive Statistics of Material Weakness Firms versus 2003 Compustat Firms

Variable	Material Weakness Firms			2003 Compustat Firms (Excluding Material Weakness Firms)		t-test of mean differences
	Mean	Median	Predicted Difference	Mean	Median	Two-tailed p-value
<i>ACCRUALS QUALITY</i>	0.070	0.055	>	0.058	0.042	<i>0.001</i>
<i>DISCRETIONARY ACCRUALS</i>	0.131	0.108	>	0.111	0.090	<i>0.001</i>
<i>AVERAGE ACCRUALS QUALITY</i>	0.061	0.048	>	0.050	0.037	<i>0.001</i>
<i>HISTORICAL RESTATEMENT EARNINGS PERSISTENCE</i>	0.079	0.000	>	0.058	0.000	<i>0.023</i>
	0.702	N/A	<	0.741	N/A	<i>0.001</i>
<i>LOSS PROPORTION</i>	0.430	0.429		0.344	0.250	<i>0.001</i>
<i>SALES VOLATILITY</i>	0.292	0.222		0.239	0.170	<i>0.001</i>
<i>CFO VOLATILITY</i>	0.113	0.079		0.098	0.064	<i>0.002</i>
<i>TOTAL ASSETS</i>	2,118.8	197.6		3,674.2	290.1	<i>0.001</i>
<i>OPERATING CYCLE</i>	147.6	115.3		144.3	111.2	<i>0.551</i>
<i>FIRM AGE</i>	16.5	11.0		19.2	14.0	<i>0.001</i>
<i>SEGMENTS</i>	4.8	4.0		4.5	4.0	<i>0.005</i>
<i>EXTREME SALES GROWTH</i>	0.178	0.000		0.180	0.000	<i>0.928</i>
<i>RESTRUCTURING CHARGE</i>	0.040	0.000		0.019	0.000	<i>0.001</i>

All variables are described in Table 1, Panel B. In this table, we present the untransformed values (rather than the natural log) of *FIRM SIZE*, *OPERATING CYCLE*, *FIRM AGE*, and *SEGMENTS* for ease of interpretation. The t-test results for the logged values are similar. The t-test of means uses the pooled method when the underlying variances are equal and the Satterthwaite method when they are unequal. The test on *EARNINGS PERSISTENCE* is an F-test on the incremental power of the *EARNINGS*×*MW* interaction coefficient. For the *ACCRUALS QUALITY* t-test there are 709 material weakness firm observations (from August 2002 to November 2005) and 3,292 control firm observations (see Table 1, Panel A). For the other four accruals quality proxies the sample requirement is the number of observations with data for the particular accruals quality metric. For the control variables, the sample requirement is have sufficient data to calculate *ACCRUALS QUALITY*.

Table 3  
Descriptive Statistics of Account-Specific versus Company-Level Material Weakness Firms

Variable	Account-Specific Material Weakness Firms		Predicted Difference	Company-Level Material Weakness Firms		t-test of mean differences
	Mean	Median		Mean	Median	Two-tailed p-value
<i>ACCRUALS QUALITY</i>	0.063	0.052	<	0.080	0.062	<i>0.001</i>
<i>DISCRETIONARY ACCRUALS</i>	0.122	0.108	<	0.145	0.109	<i>0.008</i>
<i>AVERAGE ACCRUALS QUALITY</i>	0.056	0.044	<	0.069	0.057	<i>0.001</i>
<i>HISTORICAL RESTATEMENT</i>	0.073	0.000	<	0.087	0.000	<i>0.427</i>
<i>EARNINGS PERSISTENCE</i>	0.729	N/A	>	0.675	N/A	<i>0.004</i>
<i>LOSS PROPORTION</i>	0.387	0.286		0.495	0.429	<i>0.001</i>
<i>SALES VOLATILITY</i>	0.274	0.211		0.320	0.235	<i>0.020</i>
<i>CFO VOLATILITY</i>	0.102	0.071		0.129	0.092	<i>0.003</i>
<i>TOTAL ASSETS</i>	2,488.6	248.6		1,548.7	130.1	<i>0.138</i>
<i>OPERATING CYCLE</i>	145.8	114.4		150.4	116.4	<i>0.650</i>
<i>FIRM AGE</i>	17.5	12.0		14.9	11.0	<i>0.007</i>
<i>SEGMENTS</i>	5.0	5.0		4.6	4.0	<i>0.072</i>
<i>EXTREME SALES GROWTH</i>	0.191	0.000		0.159	0.000	<i>0.275</i>
<i>RESTRUCTURING CHARGE</i>	0.038	0.000		0.042	0.000	<i>0.645</i>

All variables are described in Table 1, Panel B. In this table, we present the untransformed values (rather than the natural log) of *FIRM SIZE*, *OPERATING CYCLE*, *FIRM AGE*, and *SEGMENTS* for ease of interpretation. The t-test results for the logged values are similar, except for *TOTAL ASSETS*, where the log of *TOTAL ASSETS* is significantly smaller for the company-level material weakness firms. The t-test of means uses the pooled method when the underlying variances are equal and the Satterthwaite method when they are unequal. The test on *EARNINGS PERSISTENCE* is an F-test on the difference in incremental power of the *EARNINGS* × *MW\_ACCOUNT-SPECIFIC* and *EARNINGS* × *MW\_COMPANY-LEVEL* interaction coefficients. For the *ACCRUALS QUALITY* t-test there are 430 account-specific material weakness firm observations, 279 company-level observations, and 3,292 control firm observations (see Table 1, Panel A). For the other four accruals quality proxies the sample requirement is the number of observations with data for the particular accruals quality metric. For the control variables, the sample requirement is have sufficient data to calculate *ACCRUALS QUALITY*.

Table 4  
Spearman\Pearson Correlation Table

	<i>MW</i>	<i>AQ</i>	<i>DACC</i>	<i>LOSS PROP</i>	<i>SALES VOL</i>	<i>CFO VOL</i>	<i>SIZE</i>	<i>OP CYCLE</i>	<i>FIRM AGE</i>	<i>SEGMENTS</i>	<i>EX SLS GROW</i>	<i>RESTR CHG</i>
<i>MW</i>		0.083 (0.0001)	0.087 (0.0001)	0.088 (0.0001)	0.079 (0.0001)	0.049 (0.0024)	-0.049 (0.0024)	0.030 (0.0620)	-0.081 (0.0001)	0.062 (0.0001)	-0.003 (0.8451)	0.094 (0.0001)
<i>AQ</i>	0.108 (0.0001)		0.652 (0.0001)	0.455 (0.0001)	0.478 (0.0001)	0.695 (0.0001)	-0.546 (0.0001)	0.119 (0.0001)	-0.269 (0.0001)	-0.230 (0.0001)	0.134 (0.0001)	0.013 (0.4421)
<i>DACC</i>	0.092 (0.0001)	0.640 (0.0001)		0.451 (0.0001)	0.408 (0.0001)	0.597 (0.0001)	-0.468 (0.0001)	0.086 (0.0001)	-0.322 (0.0001)	-0.173 (0.0001)	0.117 (0.0001)	0.042 (0.0112)
<i>LOSS PROP</i>	0.103 (0.0001)	0.485 (0.0001)	0.468 (0.0001)		0.242 (0.0001)	0.534 (0.0001)	-0.521 (0.0001)	0.075 (0.0001)	-0.411 (0.0001)	-0.270 (0.0001)	0.135 (0.0001)	0.131 (0.0001)
<i>SALES VOL</i>	0.088 (0.0001)	0.536 (0.0001)	0.407 (0.0001)	0.286 (0.0001)		0.409 (0.0001)	-0.367 (0.0001)	-0.101 (0.0001)	-0.197 (0.0001)	-0.122 (0.0001)	0.061 (0.0001)	0.052 (0.0015)
<i>CFO VOL</i>	0.078 (0.0001)	0.755 (0.0001)	0.597 (0.0001)	0.565 (0.0001)	0.526 (0.0001)		-0.538 (0.0001)	0.113 (0.0001)	-0.298 (0.0001)	-0.292 (0.0001)	0.188 (0.0001)	-0.001 (0.9326)
<i>SIZE</i>	-0.052 (0.0011)	-0.590 (0.0001)	-0.483 (0.0001)	-0.517 (0.0001)	-0.399 (0.0001)	-0.610 (0.0001)		-0.092 (0.0001)	0.303 (0.0001)	0.425 (0.0001)	-0.101 (0.0001)	0.036 (0.0305)
<i>OP CYCLE</i>	0.029 (0.0680)	0.192 (0.0001)	0.138 (0.0001)	0.094 (0.0001)	-0.056 (0.0005)	0.144 (0.0001)	-0.154 (0.0001)		0.002 (0.8882)	0.090 (0.0001)	0.098 (0.0001)	-0.016 (0.3263)
<i>FIRM AGE</i>	-0.080 (0.0001)	-0.311 (0.0001)	-0.366 (0.0001)	-0.392 (0.0001)	-0.188 (0.0001)	-0.367 (0.0001)	0.292 (0.0001)	0.017 (0.2912)		0.198 (0.0001)	-0.101 (0.0001)	-0.046 (0.0055)
<i>SEGMENTS</i>	0.063 (0.0001)	-0.206 (0.0001)	-0.140 (0.0001)	-0.238 (0.0001)	-0.083 (0.0001)	-0.265 (0.0001)	0.413 (0.0001)	0.126 (0.0001)	0.191 (0.0001)		-0.051 (0.0013)	0.058 (0.0004)
<i>EX SALES GROWTH</i>	-0.003 (0.8451)	0.119 (0.0001)	0.102 (0.0001)	0.120 (0.0001)	0.059 (0.0002)	0.169 (0.0001)	-0.096 (0.0001)	0.094 (0.0001)	-0.100 (0.0001)	-0.049 (0.0021)		-0.079 (0.0001)
<i>RESTR CHARGE</i>	0.058 (0.0004)	-0.008 (0.6276)	0.012 (0.4509)	0.111 (0.0001)	0.044 (0.0072)	-0.013 (0.4303)	0.175 (0.0001)	0.038 (0.0224)	-0.033 (0.0460)	0.233 (0.0001)	-0.092 (0.0001)	

*MW* is an indicator variable that is equal to one if the firm disclosed a material weakness in internal control in our sample period (August 2002 to November 2005), and zero otherwise. All other variables are described in Table 1, Panel B. Pearson correlations are reported above the diagonal, and Spearman correlations are reported below. Each of the continuous variables is winsorized at 1% and 99% to mitigate outliers.

Table 5  
Accruals Quality and Material Weaknesses

Independent Variables	Predicted Sign	Dependent Variable = Accruals Quality (AQ)		
		Coefficient Estimate (p-value)	Coefficient Estimate (p-value)	Coefficient Estimate (p-value)
<i>INTERCEPT</i>		0.026 (0.001)	0.028 (0.001)	0.024 (0.006)
<i>MW</i>	+	<b>0.004</b> <b>(0.031)</b>	<b>0.011</b> <b>(0.051)</b>	<b>0.004</b> <b>(0.049)</b>
<i>LOSS PROPORTION</i>	+	0.006 (0.005)	0.007 (0.004)	0.008 (0.041)
<i>SALES VOLATILITY</i>	+	0.047 (0.001)	0.047 (0.001)	0.045 (0.001)
<i>CFO VOLATILITY</i>	+	0.235 (0.001)	0.235 (0.001)	0.222 (0.001)
<i>FIRM SIZE</i>	-	-0.004 (0.001)	-0.004 (0.001)	-0.006 (0.001)
<i>OPERATING CYCLE</i>	+	0.004 (0.001)	0.004 (0.001)	0.005 (0.001)
<i>FIRM AGE</i>		-0.001 (0.205)	-0.001 (0.225)	0.000 (0.793)
<i>SEGMENTS</i>		0.002 (0.056)	0.002 (0.033)	0.004 (0.024)
<i>EXTREME SALES GROWTH</i>		0.000 (0.975)	0.000 (0.935)	0.005 (0.177)
<i>RESTRUCTURING CHARGE</i>		0.001 (0.888)	0.002 (0.815)	0.000 (0.956)
<i>Selectivity Control Method</i>		<i>None</i>	<i>Inverse Mills Ratio</i>	<i>Propensity Score Match</i>
<i>Number of Material Weakness Obs</i>		648	648	648
<i>Number of Total Observations</i>		3,603	3,603	1,296
<i>Adjusted R<sup>2</sup></i>		54.85%	54.86%	52.65%

*MW* is an indicator variable that is equal to one if the firm disclosed a material weakness in internal control in our sample period (August 2002 to November 2005), and zero otherwise. All standard errors have been adjusted using White's (1980) correction for heteroscedasticity. All other variables are defined in Table 1, Panel B.

Table 6  
Accruals Quality and Material Weakness Deficiency Types

Independent Variables	Predicted Sign	Dependent Variable = Accruals Quality (AQ)		
		Coeff. Est (p-value)	Coeff. Est (p-value)	Coeff. Est (p-value)
<i>INTERCEPT</i>		0.026 (0.001)	0.028 (0.001)	0.023 (0.006)
<i>MW_ACCOUNT-SPECIFIC</i>	+	<b>0.002</b> <b>(0.422)</b>	<b>0.008</b> <b>(0.149)</b>	<b>0.002</b> <b>(0.346)</b>
<i>MW_COMPANY-LEVEL</i>	+	<b>0.007</b> <b>(0.015)</b>	<b>0.013</b> <b>(0.018)</b>	<b>0.007</b> <b>(0.020)</b>
<i>LOSS PROPORTION</i>	+	0.006 (0.006)	0.007 (0.004)	0.007 (0.047)
<i>SALES VOLATILITY</i>	+	0.047 (0.001)	0.047 (0.001)	0.044 (0.001)
<i>CFO VOLATILITY</i>	+	0.235 (0.001)	0.234 (0.001)	0.221 (0.001)
<i>FIRM SIZE</i>	-	-0.004 (0.001)	-0.004 (0.001)	-0.006 (0.001)
<i>OPERATING CYCLE</i>	+	0.004 (0.001)	0.004 (0.001)	0.005 (0.001)
<i>FIRM AGE</i>		-0.001 (0.216)	-0.001 (0.235)	0.000 (0.753)
<i>SEGMENTS</i>		0.002 (0.057)	0.002 (0.035)	0.004 (0.024)
<i>EXTREME SALES GROWTH</i>		0.000 (0.927)	0.000 (0.892)	0.005 (0.152)
<i>RESTRUCTURING CHARGE</i>		0.001 (0.890)	0.002 (0.821)	0.000 (0.955)
<i>Selectivity Control Method</i>		<i>None</i>	<i>Inverse Mills Ratio</i>	<i>Propensity Score Match</i>
<i>Number of Material Weakness Obs</i>		648	648	648
<i>Number of Total Observations</i>		3,603	3,603	1,296
<i>Adjusted R<sup>2</sup></i>		54.88%	54.89%	52.71%

*MW\_ACCOUNT-SPECIFIC (COMPANY-LEVEL)* is an indicator variable that is equal to one if the firm disclosed a material weakness in internal control in our sample period (August 2002 to November 2005) and was coded as being related to an auditable account (a more pervasive company-wide problem), and zero otherwise. All standard errors have been adjusted using White's (1980) correction for heteroscedasticity. All other variables are defined in Table 1, Panel B.

Table 7  
Alternative Measures of Accruals Quality and Material Weaknesses

Independent Variables	Dependent Variable:			
	Discretionary Accruals	Average Accruals Quality	Historical Restatement	Future Earnings (Persistence)
	Coeff. Est (p-value)	Coeff. Est (p-value)	Coeff. Est (pr < X <sup>2</sup> )	Coeff. Est (p-value)
<i>INTERCEPT</i>	0.213 (0.001)	0.027 (0.001)	-4.203 (0.001)	0.145 (0.001)
<i>MW</i>	<b>0.007</b> <b>(0.048)</b>	<b>0.005</b> <b>(0.002)</b>	<b>0.152</b> <b>(0.317)</b>	-0.003 (0.407)
<i>EARNINGS</i>				0.519 (0.001)
<i>EARNINGS</i> × <i>MW</i>				<b>-0.054</b> <b>(0.001)</b>
<i>LOSS PROPORTION</i>	0.050 (0.001)	0.001 (0.539)	0.508 (0.027)	-0.166 (0.001)
<i>SALES VOLATILITY</i>	0.000 (0.004)	0.040 (0.001)	0.513 (0.074)	-0.002 (0.752)
<i>CFO VOLATILITY</i>	0.000 (0.001)	0.179 (0.001)	0.155 (0.845)	-0.396 (0.001)
<i>FIRM SIZE</i>	-0.016 (0.001)	-0.003 (0.001)	0.046 (0.176)	-0.004 (0.001)
<i>OPERATING CYCLE</i>	0.002 (0.392)	0.004 (0.001)	0.045 (0.580)	-0.010 (0.001)
<i>FIRM AGE</i>	-0.019 (0.001)	-0.003 (0.001)	0.194 (0.042)	-0.007 (0.001)
<i>SEGMENTS</i>	0.005 (0.027)	0.001 (0.244)	0.342 (0.002)	0.011 (0.001)
<i>EXTREME SALES GROWTH</i>	0.011 (0.004)	0.002 (0.232)	-0.468 (0.012)	0.006 (0.052)
<i>RESTRUCTURING CHARGE</i>	0.027 (0.107)	-0.002 (0.713)	1.102 (0.031)	-0.015 (0.302)
<i>Number of Material Weakness Obs</i>	663	648	667	4,545
<i>Number of Total Observations</i>	3,668	3,603	3,621	23,036
<i>Adjusted R<sup>2</sup> / Likelihood Ratio</i>	30.00%	50.26%	45.03	54.63%

*MW* is an indicator variable that is equal to one if the firm disclosed a material weakness in internal control in our sample period (August 2002 to November 2005), and zero otherwise. *Earnings* is earnings before extraordinary items (data item 123). *Future Earnings* is one-year-ahead earnings. All standard errors have been adjusted using White's (1980) correction for heteroscedasticity. All other variables are defined in Table 1, Panel B.

Table 8  
Alternative Measures of Accruals Quality and Material Weakness Deficiency Types

Independent Variables	Dependent Variable:			
	Discretionary Accruals	Average Accruals Quality	Historical Restatement	Future Earnings (Persistence)
	Coeff Est (p-value)	Coeff Est (p-value)	Coeff Est (pr < X <sup>2</sup> )	Coeff Est (p-value)
<i>INTERCEPT</i>	0.213 (0.001)	0.028 (0.001)	-4.207 (0.001)	0.145 (0.001)
<i>MW_ACCOUNT-SPECIFIC</i>	<b>0.005</b> <b>(0.190)</b>	<b>0.003</b> <b>(0.095)</b>	<b>0.022</b> <b>(0.908)</b>	-0.001 (0.892)
<i>MW_COMPANY-LEVEL</i>	<b>0.010</b> <b>(0.037)</b>	<b>0.007</b> <b>(0.004)</b>	<b>0.336</b> <b>(0.115)</b>	-0.006 (0.223)
<i>EARNINGS</i>				0.519 (0.001)
<i>EARNINGS</i> × <i>MW_ACCOUNT-SPECIFIC</i>				<b>-0.088</b> <b>(0.001)</b>
<i>EARNINGS</i> × <i>MW_COMPANY-LEVEL</i>				<b>-0.029</b> <b>(0.052)</b>
<i>LOSS PROPORTION</i>	0.050 (0.001)	0.001 (0.562)	0.504 (0.029)	-0.166 (0.001)
<i>SALES VOLATILITY</i>	0.000 (0.061)	0.040 (0.001)	0.512 (0.075)	-0.002 (0.789)
<i>CFO VOLATILITY</i>	0.000 (0.001)	0.179 (0.001)	0.141 (0.859)	-0.398 (0.001)
<i>FIRM SIZE</i>	-0.016 (0.001)	-0.003 (0.001)	0.047 (0.168)	-0.004 (0.001)
<i>OPERATING CYCLE</i>	0.002 (0.320)	0.004 (0.001)	0.043 (0.593)	-0.010 (0.001)
<i>FIRM AGE</i>	-0.019 (0.001)	-0.003 (0.001)	0.197 (0.039)	-0.007 (0.001)
<i>SEGMENTS</i>	0.005 (0.024)	0.001 (0.249)	0.342 (0.014)	0.010 (0.001)
<i>EXTREME SALES GROWTH</i>	0.011 (0.001)	0.002 (0.209)	-0.461 (0.014)	0.006 (0.063)
<i>RESTRUCTURING CHARGE</i>	0.027 (0.058)	-0.002 (0.712)	1.110 (0.030)	-0.015 (0.291)
<i>Number of Material Weakness Obs</i>	663	648	667	4,545
<i>Number of Total Observations</i>	3,668	3,603	3,621	23,036
<i>Adjusted R<sup>2</sup> / Likelihood Ratio</i>	30.01%	50.29%	46.38	54.65%

*MW\_ACCOUNT-SPECIFIC (COMPANY-LEVEL)* is an indicator variable that is equal to one if the firm disclosed a material weakness in internal control in our sample period (August 2002 to November 2005), and it was coded as being related to an auditable account (a more pervasive company-wide problem), and zero otherwise. All standard errors have been adjusted using White's (1980) correction for heteroscedasticity. All other variables are defined in Table 1, Panel B.

Table 9  
Accruals Quality, Material Weaknesses and Audit Committee Independence

Independent Variables	Predicted Sign	Dependent Variable = Accruals Quality (AQ)		
		Coeff Est (p-value)	Coeff Est (p-value)	Coeff Est (p-value)
<i>INTERCEPT</i>		0.023 (0.001)	0.026 (0.001)	0.012 (0.343)
<i>MW</i>	+	<b>0.005</b> <b>(0.007)</b>	<b>0.015</b> <b>(0.010)</b>	<b>0.006</b> <b>(0.019)</b>
<i>AUDIT COMMITTEE INDEPENDENCE</i>	-	-0.0001 (0.173)	-0.0001 (0.175)	0.000 (0.647)
<i>LOSS PROPORTION</i>	+	0.005 (0.382)	0.005 (0.350)	0.021 (0.040)
<i>SALES VOLATILITY</i>	+	0.031 (0.001)	0.031 (0.001)	0.030 (0.003)
<i>CFO VOLATILITY</i>	+	0.363 (0.001)	0.364 (0.001)	0.394 (0.001)
<i>FIRM SIZE</i>	-	-0.002 (0.001)	-0.002 (0.001)	-0.003 (0.004)
<i>OPERATING CYCLE</i>	+	0.003 (0.001)	0.003 (0.001)	0.003 (0.051)
<i>FIRM AGE</i>		-0.003 (0.008)	-0.003 (0.008)	-0.002 (0.287)
<i>SEGMENTS</i>		0.001 (0.204)	0.001 (0.159)	0.001 (0.645)
<i>EXTREME SALES GROWTH</i>		-0.005 (0.036)	-0.005 (0.036)	-0.006 (0.203)
<i>RESTRUCTURING CHARGE</i>		-0.003 (0.710)	-0.001 (0.873)	-0.012 (0.269)
<i>Selectivity Control Method</i>		<i>None</i>	<i>Inverse Mills Ratio</i>	<i>Propensity Score Match</i>
<i>Number of Material Weakness Obs</i>		179	179	179
<i>Number of Total Observations</i>		1,133	1,133	358
<i>Adjusted R<sup>2</sup></i>		55.50%	55.76%	59.10%

*MW* is an indicator variable that is equal to one if the firm disclosed a material weakness in internal control in our sample period (August 2002 to November 2005), and zero otherwise. *AUDIT COMMITTEE INDEPENDENCE* is the proportion of outside audit committee members relative to total members. All standard errors have been adjusted using White's (1980) correction for heteroscedasticity. All other variables are defined in Table 1, Panel B.