

Accruals Quality and Internal Control over Financial Reporting

Jeffrey T. Doyle
Utah State University

Weili Ge
University of Washington

Sarah McVay
University of Utah

ABSTRACT: We examine the relation between accruals quality and internal controls using 705 firms that disclosed at least one material weakness from August 2002 to November 2005 and find that weaknesses are generally associated with poorly estimated accruals that are not realized as cash flows. Further, we find that this relation between weak internal controls and lower accruals quality is driven by weakness disclosures that relate to overall company-level controls, which may be more difficult to “audit around.” We find no such relation for more auditable, account-specific weaknesses. We find similar results using four additional measures of accruals quality: discretionary accruals, average accruals quality, historical accounting restatements, and earnings persistence. Our results are 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.

Keywords: *earnings quality; accruals quality; internal control; material weaknesses.*

Data Availability: *All data used in the paper are available from publicly available sources noted in the text; the data on internal control weaknesses are available in machine-readable form from the authors upon request.*

I. 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

We thank two anonymous reviewers, Dan Cohen, Patty Dechow, Dan Dhaliwal (the editor), Ilia Dichev, Kalin Kolev, Russ Lundholm, Matt Magilke, Zoe-Vonna Palmrose, Christine Petrovits, Cathy Shakespeare, 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 Midwest Regional Meeting, the 2006 AAA FARS Midyear Meeting, the 2006 Accounting and Finance Association of Australia and New Zealand Annual Meeting, the 2006 International Symposium on Audit Research Conference, and the University of Michigan.

Editor’s note: This paper was accepted by Dan Dhaliwal.

Submitted August 2005
Accepted January 2007

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 lack of internal control data 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 705 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 2002.¹

Using the accruals quality measure developed by Dechow and Dichev (2002), as modified by McNichols (2002) and Francis et al. (2005), we generally 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., length of the operating cycle and cash flow volatility [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 [Ge and McVay 2005; Ashbaugh-Skaife et al. 2007; Doyle et al. 2007]).

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 (Jones 1991), average accruals quality (Dechow and Dichev 2002), historical restatements (Anderson and Yohn 2002), and earnings persistence (Schipper and Vincent 2003). For each of these measures, we find that weak internal controls are associated with lower accruals quality.

Finally, we find that the relation between weak internal controls and lower accruals quality is stronger for two groups of firms. First, only those firms with company-level material weaknesses, rather than more auditable, account-specific problems, have lower accruals quality. The finding that account-specific material weaknesses are not associated with lower accruals quality is consistent with auditors detecting and correcting auditable weaknesses through increased substantive testing prior to the issuance of the financial statements (e.g., Hogan and Wilkins 2006).

Second, material weakness disclosures made under Section 302 (versus those under Section 404) seem to be more strongly associated with lower accruals quality. We find that, on average, Section 404 disclosures are not associated with poorer accruals quality. However, when disclosures are broken down by account-specific versus company-level weaknesses, company-level Section 404 weaknesses are associated with poorer accruals quality.

¹ Section 302 (applicable to all SEC filers and effective August 2002) requires that officers certify the financial statements, including the effectiveness of the internal control over financial reporting, and disclose any material changes in internal control. Section 404 (thus far effective November 2004 for accelerated filers only) requires management to issue a report on internal control over financial reporting that is subject to auditor attestation. Additional details are provided in Section II. 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. We provide sample material weaknesses in Appendix A, Section II, and Section III.

Although there are several plausible explanations for the weaker results using the Section 404 disclosures, one obvious difference between Sections 302 and 404 is the increased level of scrutiny under Section 404, which requires an audit opinion on the internal controls by the external auditors. It is possible that external auditors applied a lower effective threshold for Section 404 compared to management's threshold under Section 302 and therefore identified a greater number of material weaknesses that lacked real financial reporting consequences. We discuss these results and other possible explanations later in Section IV.

Our paper makes two primary contributions. 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. In addition, our paper extends this basic research question by (1) examining the types of material weaknesses (company-level versus account-specific), (2) distinguishing between the Section 302 versus 404 reporting regimes, (3) using a cross-section of five earnings/accruals quality measures, and (4) controlling for self-selection bias through the use of both a Heckman (1979) two-stage process and a propensity score matching approach (LaLonde 1986).

Second, our paper provides empirical evidence on the effectiveness of Sections 302 and 404 of Sarbanes-Oxley. These sections have been among the most cumbersome of the new legislation, with many critics alleging that the costs of compliance far exceed any benefits. We find that the most informative material weakness disclosures (i.e., those that are associated with real economic events such as lower accruals quality) are those that relate to more serious, company-level problems for both Sections 302 and 404. Furthermore, the company-level disclosures made under Section 302 seem to be more strongly related to lower accruals quality than the company-wide disclosures under Section 404. The disclosures of material weaknesses that report less serious, account-specific problems under both Sections 302 and 404 do not appear to be effective in our tests at identifying firms with lower financial reporting quality.

Since the implementation of Sections 302 and 404 of Sarbanes-Oxley is fairly new, there are a number of concurrent papers in this area. Our findings are generally consistent with and complementary to these other papers. First, our main finding—that material weaknesses are associated with lower accruals quality—is consistent with several other papers that examine this relation employing varying time periods, accruals quality proxies, and types of deficiencies (Ashbaugh-Skaife et al. 2006; Bedard 2006; Chan et al. 2005; Hogan and Wilkins 2005).² Second, our finding that the more auditable account-specific weaknesses are not associated with lower accruals quality is complementary to Hogan and Wilkins (2006) who find that audit fees are abnormally high for firms with an internal control deficiency in the year preceding the deficiency disclosure, indicating that auditors are able to reduce the impact of poor controls through substantive testing. Finally, our conclusion that it is the internal control problem that is the root cause of the lower accruals quality is supported by Ashbaugh-Skaife et al. (2006) and Bedard (2006) who find that accruals quality improves in the year following the reported internal control problem for

² This finding also complements and motivates recent studies that examine market reactions to these disclosures as well as differences in the implied cost of capital for firms with weak internal controls (e.g., Beneish et al. 2006; DeFranco et al. 2005; Hammersley et al. 2008; Ogneva et al. 2007).

firms that appear to have remediated their deficiencies.³ In sum, the papers in this area jointly present a fairly cohesive picture of how internal controls affect accruals quality.

The paper proceeds as follows. The next section motivates our hypotheses, and Section III describes our sample selection and variable definitions. Section IV presents our main results, and Section V describes our robustness tests. A summary and concluding remarks are offered in the final section.

II. 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 the quality of internal control and the quality of accounting information.⁴ A major reason is lack of data on internal control; in general, it is difficult to directly observe or verify internal control quality (Kinney 2000).

Our sample is generated from the disclosures of material weaknesses in internal controls 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. 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, 2004.⁵ Section 404 requires that management issue a report on internal control over financial reporting, and that auditors attest to their findings. The unaudited internal control disclosures under Section 302 are meant to be a transition to the full “attestation” regime under Section 404, with Section 404 becoming the ongoing internal control reporting mechanism. However, as the date for non-accelerated filers to comply with Section 404 has been extended several times (most recently to December 15, 2008 for full attestation), internal control disclosures continue to be reported under Section 302 for these smaller companies. 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.

³ Altamuro and Beatty (2006) examine the impact of the FDICIA-mandated internal control reforms within the banking industry and find that these reforms led to improvements in earnings quality for banks affected by the regulation relative to unaffected banks during the same period. Their findings are also consistent with poorer internal control resulting in lower earnings quality.

⁴ 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 examining earnings quality and internal control problems (e.g., Ashbaugh-Skaife et al. 2006; Hogan and Wilkins 2005).

⁵ 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 on or after December 15, 2007 for management assessment of the effectiveness of internal control and December 15, 2008 for the auditor’s attestation report. 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 IV.

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 detect 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 in various settings, such as prior to 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 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 estimates) 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.

Our first hypothesis is based on the notion that good internal control over financial reporting is an effective internal monitoring device and results in higher quality financial reporting. However, the hypothesis does not consider external monitors. It is 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).⁶ 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. This leads to our second hypothesis:

H2: Company-level material weaknesses have a stronger negative relation with accruals quality than account-specific material weaknesses.

III. DATA, SAMPLE SELECTION, AND VARIABLE DEFINITIONS

Identifying and Classifying Firms with Material Weaknesses

As mentioned above, material weaknesses in internal control have only been widely disclosed in SEC filings since August 2002. To collect our test firms, we search 10-K Wizard (10-Ks, 10-Qs, and 8-Ks; <http://www.10kwizard.com>) using the keywords “material weakness” and “material weaknesses” from August 1, 2002 through October 31, 2005.

⁶ It might seem that auditors should also be able to substantively test company-level weaknesses, however, the general nature of these weaknesses does not pinpoint where additional substantive testing should occur, while the account-specific weaknesses highlight a specific area where auditors can then focus more attention.

We include only those firms that classify their internal control problem(s) as a material weakness, the most severe internal control deficiency.⁷ 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 effectively mandatory, while the disclosure of lesser “significant deficiencies” is unambiguously voluntary (see footnote 19). Focusing on the more 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, then we include only the parent company and remove the subsidiary from our control firms if the subsidiary is covered by Compustat (17 firms). We also exclude from our control sample the 100 firms identified by Compliance Week (<http://www.complianceweek.com>) as having a significant deficiency that does not reach the severity of a material weakness, in order to create a more powerful test between firms with clear internal control problems (firms reporting material weaknesses) and those with no apparent internal control problems. Next, 259 (1,974) of our material weakness (control) 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) during the accruals quality estimation period, 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 705 (3,280) material weakness (control) firms with non-missing accruals quality data and 645 (2,943) material weakness (control) firms in our multivariate tests.⁸ 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, then 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

⁷ 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, para. 9).

⁸ Of the 645 material weakness firms in our final sample, eight were disclosed in 2002, 55 in 2003, 207 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).

TABLE 1
Sample Selection and Variable Definitions

Panel A: Sample Selection**Material Weakness Sample**

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	1,046
Less firms with material weaknesses related only to accounting for leases	(79)
Less firms with unavailable data on accruals quality	(259)
Less firms with extreme merger and acquisition activity in the accruals quality estimation period	(3)
Total material weakness firms examined in univariate tests	705
Less firms with unavailable data for control variables	(60)
Total material weakness sample used in multivariate regressions	645

Compustat Control Sample

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	(1,974)
Less firms with extreme merger and acquisition activity in the accruals quality estimation period	(14)
Total control firms examined in univariate tests	3,280
Less firms with unavailable data for control variables	(337)
Total control sample used in multivariate regressions	2,943

Panel B: Variable Definitions

Variable	Definition
Material Weakness Disclosures	
<i>MW</i>	An indicator variable that is equal to 1 if the firm disclosed a material weakness in internal control in our sample period (August 2002 to November 2005), and 0 otherwise.
<i>MW_Account-Specific (Company-Level)</i>	An indicator variable that is equal to 1 if the firm disclosed a material weakness in internal control in our sample period (August 2002 to November 2005) related to an auditable account (a more pervasive company-wide problem), and 0 otherwise.
Accruals Quality Measures	
<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 III).
<i>Discretionary Accruals</i>	The average of the absolute value of discretionary accruals from 1996–2002, where discretionary accruals are calculated following Becker et al. (1998).
<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.

(continued on next page)

TABLE 1 (continued)

Variable	Definition
<i>Historical Restatement</i>	An indicator variable that is equal to 1 if the firm was listed by the GAO as having restated their financial statements from 1997–2002, and 0 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.
Innate Firm Characteristics That Affect Accruals Quality	
<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 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>Total Assets</i>	The log of total assets (data item #6) from 2003 Compustat.
<i>Operating Cycle</i>	The log of the average of [(Sales/360)/(Average Accounts Receivable) + (Cost of Goods Sold/360)/Average Inventory], calculated from 1996–2002.
Additional Material Weakness Determinants That Could Be Related To Accruals Quality	
<i>Firm Age</i>	The log of the number of years the firm has CRSP data as of 2003.
<i>Segments</i>	The 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 1 if year-over-year industry-adjusted sales growth (data item #12) from 2002 to 2003 falls into the top quintile, and 0 otherwise.
<i>Restructuring Charge</i>	The aggregate restructuring charges [data item #376 × (–1)] in 2003 and 2002, scaled by the firm’s 2003 market capitalization.

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 705 firms with non-missing accruals quality data, 426 are classified as account-specific and 279 as company-level.

Accruals Quality Measures

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, 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 [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, then 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.⁹

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

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

The residuals from the regression measure the extent to which current accruals (ΔWC) do not effectively map into past, present, or future cash flows (CFO).¹⁰ 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.

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, then 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. 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 (2002) approach limits the applicability of the model to accruals that are short 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 (2002) model to capture accruals quality (Wysocki 2006). 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.

⁹ Roychowdhury (2006), 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.

¹⁰ 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 1st and 99th percentiles, by year.

The first is *Discretionary Accruals*, which is the average of the absolute value of discretionary accruals, estimated following Becker et al. (1998) and Kothari et al. (2005).¹¹ 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). The third alternative proxy of accruals quality is *Historical Restatement*, which is an indicator variable that is equal to 1 if the firm was listed by the General Accounting Office (GAO) as having had a restatement from January 1997 through December 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.¹² Our final alternative measure of accruals quality is *Earnings Persistence* (Dechow and Dichev 2002; Schipper and Vincent 2003). These four alternative measures are defined in Table 1, Panel B.

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

¹¹ Discretionary accruals are estimated using the following OLS regression: $Total\ Accruals_t / Total\ Assets_{t-1} = \beta_0 + \beta_1(1 / Total\ Assets_{t-1}) + \beta_2(\Delta Revenue_t / Total\ Assets_{t-1}) + \beta_3(PPE_t / Total\ Assets_{t-1}) + \epsilon_t$. *Total Accruals* are calculated as the difference between income before extraordinary items (Compustat item 123) and operating cash flows (Compustat item 308). We estimate the above regression by two-digit SIC code, requiring at least 20 observations in each industry group. Our main tests present the Becker et al. (1998) specification. We also consider the performance-adjusted discretionary accruals prescribed by Kothari et al. (2005) as a robustness check.

¹² It is possible that the causality is reversed. Ashbaugh-Skaife et al. (2007) 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.

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. We choose not to use this approach because 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 (Hogan and Wilkins 2005). If these low-quality accruals do not result from the company's poor internal controls per se, then 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.

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: *Loss Proportion*, *Sales Volatility*, *Cash Flow (CFO) Volatility*, *Total Assets*, and *Operating Cycle*, as our focus on the effect of the internal control problem, rather than generic volatility or a firm's operating cycle (see Table 1, Panel B for variable definitions).

Prior research has also identified determinants of material weaknesses in internal control. Material weakness firms tend to be less profitable, smaller, younger, more complex, growing rapidly, or undergoing restructuring (e.g., Krishnan 2005; Ge and McVay 2005; Ashbaugh-Skaife et al. 2007; Doyle et al. 2007).¹³ 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 (*Total Assets*), the age of the firm (*Firm Age*), profitability (*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.

¹³ Krishnan (2005) finds that internal control problems and audit committee quality are negatively associated. We examine this variable in a sensitivity analysis in Section V; our results are not sensitive to its inclusion.

IV. RESULTS

Descriptive Statistics and Univariate Analysis

Table 2, Panel A 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 0.057; p-value of 0.001), providing initial support for H1. 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 (0.166 versus 0.133; p-value of 0.001), and their proportion of historical accounting restatements is also higher (0.139 versus 0.092; p-value of 0.001). Finally, earnings persistence is lower for the material weakness firms (0.697 versus 0.736; p-value < 0.001 under an F-test).

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, Panel A. 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) and 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.¹⁴

In Table 2, Panel B 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 for firms that disclose account-specific material weaknesses (mean of 0.080 versus 0.063). *Discretionary Accruals* (0.191 versus 0.149), *Average Accruals Quality* (0.069 versus 0.056), and *Historical Restatement* (0.183 versus 0.110) are all higher for the company-level weakness firms as well. Finally, *Earnings Persistence* is lower for the company-level group at 0.668 versus 0.728. 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 innate variables associated with lower 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. 2007).

¹⁴ 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, then results are consistent with prior research.

TABLE 2
Descriptive Statistics

Panel A: Descriptive Statistics of Material Weakness Firms versus 2003 Compustat Firms

Variable	Material Weakness Firms		Predicted Difference	2003 Compustat Firms (Excluding Material Weakness Firms)		t-test of Mean Differences
	Mean	Median		Mean	Median	Two-tailed p-value
<i>Accruals Quality</i>	0.070	0.055	>	0.057	0.042	0.001
<i>Discretionary Accruals</i>	0.166	0.114	>	0.133	0.092	0.001
<i>Average Accruals Quality</i>	0.061	0.048	>	0.049	0.037	0.001
<i>Historical Restatement</i>	0.139	0.000	>	0.092	0.000	0.001
<i>Earnings Persistence</i>	0.697	NA	<	0.736	NA	0.001
<i>Loss Proportion</i>	0.430	0.429		0.343	0.250	0.001
<i>Sales Volatility</i>	0.291	0.222		0.239	0.170	0.001
<i>CFO Volatility</i>	0.113	0.079		0.098	0.064	0.001
<i>Total Assets (in millions)</i>	2,097.070	197.336		3,652.640	290.157	0.001
<i>Operating Cycle</i>	147.539	115.301		144.209	111.400	0.544
<i>Firm Age</i>	16.496	11.000		19.220	14.000	0.001
<i>Segments</i>	4.982	4.000		4.658	4.000	0.005
<i>Extreme Sales Growth</i>	0.179	0.000		0.179	0.000	0.993
<i>Restructuring Charge</i>	0.040	0.000		0.019	0.000	0.001

Panel B: 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	0.001
<i>Discretionary Accruals</i>	0.149	0.106	<	0.191	0.124	0.003
<i>Average Accruals Quality</i>	0.056	0.044	<	0.069	0.057	0.001
<i>Historical Restatement</i>	0.110	0.000	<	0.183	0.000	0.009
<i>Earnings Persistence</i>	0.728	NA	>	0.668	NA	0.001
<i>Loss Proportion</i>	0.387	0.286		0.495	0.429	0.001
<i>Sales Volatility</i>	0.272	0.211		0.320	0.235	0.017
<i>CFO Volatility</i>	0.103	0.071		0.129	0.092	0.003
<i>Total Assets (in millions)</i>	2,457.460	248.471		1,546.800	130.071	0.151
<i>Operating Cycle</i>	145.683	114.359		150.382	116.420	0.645
<i>Firm Age</i>	17.498	12.000		14.931	11.000	0.008
<i>Segments</i>	5.127	5.000		4.760	4.000	0.075
<i>Extreme Sales Growth</i>	0.193	0.000		0.159	0.000	0.243
<i>Restructuring Charge</i>	0.038	0.000		0.042	0.000	0.659

(continued on next page)

TABLE 2 (continued)

In this table, we present the untransformed values (rather than the natural log) of *Total Assets*, *Operating Cycle*, *Firm Age*, and *Segments* for ease of interpretation. The t-test results for the logged values are similar, except for *Total Assets* in Panel B, 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* \times *MW_Account-Specific* and *Earnings* \times *MW_Company-Level* interaction coefficients.

In Panel A, for the *Accruals Quality* t-test there are 705 material weakness firm observations (from August 2002 to November 2005) and 3,280 control firm observations (see Table 1, Panel A).

In Panel B, for the *Accruals Quality* t-test there are 426 account-specific material weakness firm observations and 279 company-level observations.

For both Panels A and B, 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 to have sufficient data to calculate *Accruals Quality*.

Each of the continuous variables is winsorized at 1 percent and 99 percent to mitigate outliers.

All variables are described in Table 1, Panel B.

Turning to Table 3, which presents a correlation matrix for 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.¹⁵

Multivariate Analysis of Accruals Quality and Material Weaknesses

The first column of results in Table 4 contains the regression estimates of accruals quality on an indicator variable, material weakness (*MW*), where *MW* is equal to 1 if the firm reports a material weakness, and 0 if the firm is in the control group. We present our primary accruals quality measure (*AQ*) as the dependent variable (recall that a higher value represents lower accruals quality) and 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; 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 measure (t-statistic = 2.51), supporting H1 and suggesting material weakness firms have poorer accruals quality. The economic magnitude of the coefficient on *MW* ($\alpha = 0.004$) is also significant. For the typical control firm (median *Accruals Quality* of 0.042 from Table 2, Panel A) a switch from *MW* = 0 to *MW* = 1 results in a 9.5 percent (0.004 divided by 0.042) increase in the accruals quality metric (implying poorer accruals quality), after controlling for other known determinants of accruals quality. Turning to our control variables, each of the variables measuring innate firm characteristics that are expected to affect accruals quality is significant in the predicted direction (Dechow and Dichev 2002). Finally,

¹⁵ As several of our variables are correlated at 0.40 or more, we examine the variance inflation factors (VIFs) for each of our multivariate regressions below to help ensure that multicollinearity is not a major concern. None of our calculated VIFs exceed 2, which is well below the level indicating harmful multicollinearity (Kennedy 1998, 190).

TABLE 3
Spearman/Pearson Correlation Matrix

	<i>MW</i>	<i>AQ</i>	<i>Disc. Accruals</i>	<i>Loss Proportion</i>	<i>Sales Volatility</i>	<i>CFO Volatility</i>	<i>Total Assets</i>	<i>Operating Cycle</i>	<i>Firm Age</i>	<i>Segments</i>	<i>Extreme Sales Growth</i>	<i>Restructuring Charge</i>
<i>MW</i>		0.091 (0.0001)	0.082 (0.0001)	0.093 (0.0001)	0.087 (0.0001)	0.053 (0.0007)	-0.049 (0.0019)	0.025 (0.1135)	-0.081 (0.0001)	0.063 (0.0001)	0.000 (0.9925)	0.090 (0.0001)
<i>AQ</i>	0.113 (0.0001)		0.580 (0.0001)	0.457 (0.0001)	0.479 (0.0001)	0.697 (0.0001)	-0.551 (0.0001)	0.119 (0.0001)	-0.270 (0.0001)	-0.209 (0.0001)	0.127 (0.0001)	0.013 (0.4137)
<i>Discretionary Accruals</i>	0.113 (0.0001)	0.675 (0.0001)		0.455 (0.0001)	-0.138 (0.0001)	-0.127 (0.0001)	-0.405 (0.0001)	0.045 (0.0001)	-0.352 (0.0001)	-0.158 (0.0001)	0.118 (0.0001)	0.061 (0.0002)
<i>Loss Proportion</i>	0.107 (0.0001)	0.486 (0.0001)	0.520 (0.0001)		0.245 (0.0001)	0.535 (0.0001)	-0.524 (0.0001)	0.073 (0.0001)	-0.413 (0.0001)	-0.242 (0.0001)	0.129 (0.0001)	0.125 (0.0001)
<i>Sales Volatility</i>	0.093 (0.0001)	0.539 (0.0001)	-0.388 (0.0001)	0.286 (0.0001)		0.416 (0.0001)	-0.373 (0.0001)	-0.095 (0.0001)	-0.199 (0.0001)	-0.114 (0.0001)	0.067 (0.0001)	0.052 (0.0013)
<i>CFO Volatility</i>	0.083 (0.0001)	0.757 (0.0001)	-0.345 (0.0001)	0.567 (0.0001)	0.529 (0.0001)		-0.540 (0.0001)	0.112 (0.0001)	-0.298 (0.0001)	-0.258 (0.0001)	0.184 (0.0001)	-0.005 (0.7457)
<i>Total Assets</i>	-0.053 (0.0008)	-0.595 (0.0001)	-0.517 (0.0001)	-0.522 (0.0001)	-0.403 (0.0001)	-0.614 (0.0001)		-0.097 (0.0001)	0.304 (0.0001)	0.416 (0.0001)	-0.096 (0.0001)	0.039 (0.0174)
<i>Operating Cycle</i>	0.026 (0.1024)	0.192 (0.0001)	0.121 (0.0001)	0.092 (0.0001)	-0.051 (0.0014)	0.146 (0.0001)	-0.159 (0.0001)		0.001 (0.9387)	0.109 (0.0001)	0.098 (0.0001)	-0.009 (0.5648)
<i>Firm Age</i>	-0.080 (0.0001)	-0.312 (0.0001)	-0.448 (0.0001)	-0.393 (0.0001)	-0.190 (0.0001)	-0.367 (0.0001)	0.294 (0.0001)	0.016 (0.3369)		0.191 (0.0001)	-0.101 (0.0001)	-0.041 (0.0128)
<i>Segments</i>	0.066 (0.0001)	-0.194 (0.0001)	-0.161 (0.0001)	-0.223 (0.0001)	-0.077 (0.0001)	-0.251 (0.0001)	0.402 (0.0001)	0.133 (0.0001)	0.186 (0.0001)		-0.042 (0.0085)	0.042 (0.0100)
<i>Extreme Sales Growth</i>	0.000 (0.9925)	0.112 (0.0001)	0.109 (0.0001)	0.116 (0.0001)	0.059 (0.0002)	0.166 (0.0001)	-0.090 (0.0001)	0.092 (0.0001)	-0.100 (0.0001)	-0.040 (0.0109)		-0.081 (0.0001)
<i>Restructuring Charge</i>	0.056 (0.0005)	-0.005 (0.0001)	0.030 (0.063)	0.111 (0.0001)	0.041 (0.0114)	-0.015 (0.3729)	0.176 (0.0001)	0.032 (0.0473)	-0.031 (0.0624)	0.221 (0.0001)	-0.093 (0.0001)	

Pearson correlations are reported above the diagonal, and Spearman correlations are reported below.
Each of the continuous variables is winsorized at 1 percent and 99 percent to mitigate outliers.
All variables are described in Table 1, Panel B.

TABLE 4
Accruals Quality and Material Weaknesses

Independent Variables	Predicted Sign	Dependent Variable = Accruals Quality (AQ)	
		Coefficient Estimate (t-statistic)	Coefficient Estimate (t-statistic)
Intercept		0.026 (5.22 ^a)	0.026 (5.21 ^a)
<i>MW</i>	+	0.004 (2.51 ^b)	
<i>MW_Account-Specific</i>	+		0.002 (0.94)
<i>MW_Company-Level</i>	+		0.007 (3.09 ^a)
<i>Loss Proportion</i>	+	0.006 (2.93 ^a)	0.006 (2.89 ^a)
<i>Sales Volatility</i>	+	0.047 (16.13 ^a)	0.047 (16.12 ^a)
<i>CFO Volatility</i>	+	0.233 (31.78 ^a)	0.233 (31.78 ^a)
<i>Total Assets</i>	–	–0.004 (–12.28 ^a)	–0.004 (–12.22 ^a)
<i>Operating Cycle</i>	+	0.004 (5.26 ^a)	0.004 (5.23 ^a)
<i>Firm Age</i>		–0.001 (–1.11)	–0.001 (–1.08)
<i>Segments</i>		0.002 (1.80 ^c)	0.002 (1.79 ^c)
<i>Extreme Sales Growth</i>		0.000 (0.05)	0.000 (0.13)
<i>Restructuring Charge</i>		0.001 (0.21)	0.001 (0.21)
Number of Material Weakness Obs.		645	645
Number of Total Obs.		3,588	3,588
Adjusted R ²		54.82%	54.85%

^{a,b,c} Significant at a two-tailed p-value \leq 0.01, 0.05, or 0.10, respectively.

Each of the continuous variables is winsorized at 1 percent and 99 percent to mitigate outliers.

All variables are defined in Table 1, Panel B.

the additional controls we identified through our examination of the internal control literature are largely insignificant.

We next examine the relation between accruals quality and the different types of internal control deficiencies. Hypothesis 2 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.

Referring to the second column of results in Table 4, account-specific material weaknesses are not significantly associated with accruals quality (t-statistic = 0.94) while company-level material weaknesses are positively related to *AQ* (t-statistic = 3.09). Consistent with H2, the magnitude of the coefficient on account-specific weaknesses ($\alpha = 0.002$) is significantly lower than the magnitude of the coefficient on company-level weaknesses ($\alpha = 0.007$) under an F-test ($p = 0.057$, two-tailed). Economically speaking, the presence of a company-level (account-specific) material weakness is expected to result in an *AQ* that is 16.7 (4.8) percent larger than the control firms.

Our finding that account-specific internal control problems are not significantly associated with lower accruals quality complements Hogan and Wilkins (2006), who find that auditor fees were significantly higher for material weakness firms in the year prior to the disclosure of a significant deficiency. Thus, our combined results are consistent with auditors historically “auditing around” the account-specific internal control problems, thereby mitigating the negative impact on accruals quality.

Multivariate Analysis of Additional Accruals Quality Variables

In Table 5, we replicate our main results for our four additional measures of accruals quality. Referring to the first column of results in Table 5, consistent with Ashbaugh-Skaife et al. (2006), material weakness disclosures are positively associated with *Discretionary Accruals* (t-statistic = 1.89).¹⁶ We parse out account-specific and company-level problems in the second column of results. While the coefficient on company-level problems appears to be larger in magnitude than that on account-specific weaknesses, consistent with our main results, the coefficients are not significantly different from one another under an F-test ($p = 0.410$, two-tailed).

Our second alternative proxy, *Average Accruals Quality*, is presented in the third and fourth columns of results in Table 5. Given the fact that this variable is highly correlated with our primary accruals quality measure, it is not surprising that the results are very similar to those shown in Table 4 and continue to support H1 and H2; the coefficients on account-specific and company-level weaknesses are significantly different under an F-test ($p = 0.063$, two-tailed).

In the third set of columns in Table 5 we present the estimates from a logistic regression, where *Historical Restatement* is equal to 1 if the company had a restatement from 1997–2002. The coefficient on *MW* is positive and significant ($\chi^2 = 12.21$), and the breakdown by type is consistent with the results above—the lower accruals quality is driven by company-level weaknesses. The difference between the coefficients is statistically significant under an F-test ($p = 0.008$, two-tailed).

Our final alternative measure of accruals quality is *Earnings Persistence*, presented in the final two columns in Table 5. We interact *MW* with *Earnings* (Compustat data item #123 scaled by average total assets) to evaluate the incremental persistence of material weakness firms for 2002. The interaction term on *MW* is negative and significant (-0.067 ; t-statistic = 2.73), suggesting again that the earnings/accruals quality of material weakness firms is poorer than that of our control firms. Finally, referring to the final column of results, *MW* is only negatively related to earnings persistence for company-level weaknesses, and this coefficient is statistically different from that on account-specific weaknesses under an F-test ($p = 0.001$, two-tailed).

¹⁶ The results remain similar if we use performance-matched discretionary accruals ($t = 1.82$) following Kothari et al. (2005).

TABLE 5
Alternative Measures of Accruals Quality and Material Weaknesses

Independent Variables	Dependent Variable:	Discretionary Accruals		Average Accruals Quality		Historical Restatement		Future Earnings (Persistence)		
		Predicted Sign	Coefficient Estimate (t-statistic)		Coefficient Estimate (t-statistic)		Coefficient Estimate (χ^2)		Coefficient Estimate (t-statistic)	
Intercept			0.302 (17.03 ^a)	0.301 (17.01 ^a)	0.028 (6.32 ^a)	0.028 (6.32 ^a)	-4.118 (90.25 ^a)	-4.132 (90.51 ^a)	0.065 (2.43 ^b)	0.058 (2.17 ^b)
MW	+ ^d		0.011 (1.89 ^c)		0.005 (3.66 ^a)		0.433 (12.21 ^a)		-0.018 (-1.88 ^c)	
MW_Account-Specific	?			0.006 (0.82)		0.003 (1.91 ^c)		0.177 (1.16)		-0.004 (-0.31)
MW_Company-Level	+			0.018 (2.17 ^b)		0.008 (3.83 ^a)		0.748 (20.58 ^a)		-0.031 (-2.15 ^b)
Earnings									0.647 (45.30 ^a)	0.654 (46.28 ^a)
Earnings \times MW	-								-0.067 (-2.73 ^a)	
Earnings MW_Account-Specific	?									0.262 (6.47 ^a)
Earnings MW_Company-Level	-									-0.207 (-7.30 ^a)
Loss Proportion			0.102 (13.36 ^a)	0.101 (13.33 ^a)	0.001 (0.63)	0.001 (0.59)	0.432 (4.49 ^b)	0.415 (4.14 ^b)	-0.067 (-4.87 ^a)	-0.058 (-4.29 ^a)
Sales Volatility			0.000 (1.60)	0.000 (1.56)	0.040 (16.00 ^a)	0.040 (15.99 ^a)	0.600 (6.79 ^a)	0.606 (6.87 ^a)	0.090 (5.66 ^a)	0.085 (5.39 ^a)

(continued on next page)

TABLE 5 (continued)

Dependent Variable:	<i>Discretionary Accruals</i>		<i>Average Accruals Quality</i>		<i>Historical Restatement</i>		<i>Future Earnings (Persistence)</i>		
	Predicted Sign	Coefficient Estimate (t-statistic)	Coefficient Estimate (t-statistic)	Coefficient Estimate (t-statistic)	Coefficient Estimate (χ^2)	Coefficient Estimate (t-statistic)	Coefficient Estimate (t-statistic)		
<i>CFO Volatility</i>		0.000 (4.14 ^a)	0.000 (4.16 ^a)	0.178 (27.85 ^a)	0.178 (27.84 ^a)	-0.62 (0.011)	-0.088 (0.02)	-0.429 (-10.60 ^a)	-0.419 (-10.48 ^a)
<i>Total Assets</i>		-0.019 (-14.31 ^a)	-0.019 (-14.25 ^a)	-0.003 (-11.22 ^a)	-0.003 (-11.16 ^a)	0.085 (8.31 ^a)	0.086 (8.64 ^a)	0.004 (2.24 ^b)	0.004 (2.30 ^b)
<i>Operating Cycle</i>		-0.002 (-0.88)	-0.002 (-0.90)	0.004 (6.27 ^a)	0.004 (6.25 ^a)	0.046 (0.52)	0.045 (0.50)	-0.006 (-1.49)	-0.004 (-1.15)
<i>Firm Age</i>		-0.040 (-11.74 ^a)	-0.040 (-11.71 ^a)	-0.003 (-3.48 ^a)	-0.003 (-3.45 ^a)	0.178 (5.62 ^b)	0.182 (5.89 ^b)	-0.010 (-2.15 ^b)	-0.011 (-2.29 ^b)
<i>Segments</i>		0.008 (1.94 ^c)	0.009 (1.93 ^c)	0.001 (0.97)	0.001 (0.95)	0.279 (7.09 ^a)	0.279 (7.03 ^a)	0.000 (0.01)	-0.000 (-0.03)
<i>Extreme Sales Growth</i>		0.020 (3.56 ^a)	0.020 (3.61 ^a)	0.002 (1.49)	0.002 (1.57)	-0.566 (12.99 ^a)	-0.554 (12.38 ^a)	0.043 (5.01 ^a)	0.043 (5.01 ^a)
<i>Restructuring Charge</i>		0.053 (2.14 ^b)	0.052 (2.12 ^b)	-0.002 (-0.36)	-0.002 (-0.36)	1.023 (4.75 ^b)	1.017 (4.68 ^b)	-0.049 (-1.20)	-0.032 (-0.80)
Number of Material Weakness Obs.		650	650	645	645	757	757	716	716
Number of Total Obs.		3,581	3,581	3,588	3,588	4,289	4,289	4,149	4,149
Adjusted R ² /Pseudo R ²		27.69%	27.69%	50.15%	50.19%	4.01%	4.35%	59.50%	60.46%

^{a,b,c} Significant at a two-tailed p-value \leq 0.01, 0.05, or 0.10, respectively.

^d Note that the main effect of *MW* has no prediction when the dependent variable is *Future Earnings*. For this model, the variable of interest is the interaction between *Earnings* and *MW*.

Earnings = earnings before extraordinary items (data item 123); and

Future Earnings = one-year-ahead earnings.

Each of the continuous variables is winsorized at 1 percent and 99 percent to mitigate outliers.

All other variables are defined in Table 1, Panel B.

Overall, the multivariate results support the notion that accruals quality is lower when a firm has a weak internal control system (H1) and that this relation is stronger when the internal control problem is at the company-level (H2). These results are consistent across the different proxies for accruals quality.

Analysis by Reporting Regime

As mentioned earlier, material weakness disclosures under Section 404 are likely to be different than those under Section 302. In this section, we investigate how these differences affect our study. In Table 6, we re-estimate our regressions separately for the 302 and 404 subgroups. The coefficients on the *MW* variable (t-statistic = 3.22) and the company-level variable (t-statistic = 3.73) are strongly positive for 302 reporters, consistent with the full-sample results. For Section 404 filers, the results are similar, but quite a bit weaker. The main driver of lower accruals quality, company-wide material weaknesses, is still significant (t-statistic = 2.00), but the coefficient value for Section 404 (0.005) is about half of the coefficient for Section 302 (0.011). This reduced effect translates into an overall coefficient on the *MW* variable that is now insignificant for the average Section 404 material weakness disclosure (t-statistic = 0.95).¹⁷

There are several possible explanations for the weaker results for the Section 404 subgroup. First, the increased scrutiny of a full Section 404 audit and the fact that the external auditor must sign off on an opinion regarding the company's controls may be causing auditors to be unduly cautious in identifying material weaknesses. This lower effective threshold for Section 404 material weaknesses could result in many reported weaknesses that are not related to real financial reporting consequences. Supporting this idea, the percentage of less severe, account-specific material weaknesses rises from 58 percent of our Section 302 disclosures to 64 percent of our Section 404 disclosures.¹⁸

Next, since non-accelerated filers are not yet subject to Section 404, it is possible that the bias in our existing Section 404 sample (e.g., 404 reporters are bigger and financially stronger) is leading to our finding of no relation between material weaknesses and accruals quality. 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. Although we control for these specific factors in our tests in Table 6, these controls may be incomplete. Future tests on Section 404 disclosures that include smaller, non-accelerated filers may yield different results from those shown in Table 6.

Finally, while the disclosure of material weaknesses is mandatory under Section 404, ambiguity exists as to whether material weaknesses are required to be disclosed under

¹⁷ Interestingly, if we exclude the 86 Section 404 material weakness disclosure firms that also filed a material weakness under Section 302, then the remaining 291 Section 404 material weakness disclosures are not associated with accruals quality in any of our regressions. Unfortunately, we are not able to discern how long the 291 internal control problems have been in existence (see Section III). Because our accruals quality variable is measured from 1996–2002, new internal control problems are not expected to be associated with our measure.

¹⁸ Note that this increase in account-specific weaknesses would not explain our result showing a weaker relation for company-level disclosures. However, it is also possible that the language imposed by auditors describing weaknesses is more severe under Section 404 causing us to code some account-specific weaknesses as more severe, company-level types, which would dilute the power of our tests.

TABLE 6
Accruals Quality and Material Weaknesses under Sections 302 and 404

Independent Variables	Dependent Variable = <i>Accruals Quality (AQ)</i>			
	Under Section 302		Under Section 404	
	Coefficient Estimate (t-statistic)	Coefficient Estimate (t-statistic)	Coefficient Estimate (t-statistic)	Coefficient Estimate (t-statistic)
Intercept	0.026 (5.03 ^a)	0.026 (5.04 ^a)	0.028 (5.26 ^a)	0.028 (5.26 ^a)
<i>MW</i>	0.007 (3.22 ^a)		0.002 (0.95)	
<i>MW_Account-Specific</i>		0.003 (1.23)		-0.000 (-0.20)
<i>MW_Company-Level</i>		0.011 (3.73 ^a)		0.005 (2.00 ^b)
<i>Loss Proportion</i>	0.007 (2.86 ^a)	0.006 (2.84 ^a)	0.005 (2.15 ^b)	0.005 (2.09 ^b)
<i>Sales Volatility</i>	0.047 (15.40 ^a)	0.047 (15.38 ^a)	0.044 (12.95 ^a)	0.044 (12.97 ^a)
<i>CFO Volatility</i>	0.240 (31.15 ^a)	0.240 (31.18 ^a)	0.224 (23.91 ^a)	0.223 (23.87 ^a)
<i>Total Assets</i>	-0.004 (-11.17 ^a)	-0.004 (-11.13 ^a)	-0.004 (-9.11 ^a)	-0.004 (-9.04 ^a)
<i>Operating Cycle</i>	0.004 (4.64 ^a)	0.004 (4.61 ^a)	0.004 (5.10 ^a)	0.004 (5.07 ^a)
<i>Firm Age</i>	-0.001 (-1.18)	-0.001 (-1.18)	-0.002 (-2.17 ^b)	-0.002 (-2.16 ^b)
<i>Segments</i>	0.002 (1.58)	0.002 (1.57)	0.002 (1.72 ^c)	0.002 (1.70 ^c)
<i>Extreme Sales Growth</i>	-0.000 (-0.23)	-0.000 (-0.20)	-0.000 (-0.00)	0.000 (0.10)
<i>Restructuring Charge</i>	0.001 (0.08)	-0.001 (0.10)	0.011 (0.90)	0.011 (0.87)
Number of Material Weakness Obs.	354	354	377	377
Number of Total Obs.	3,297	3,297	2,451	2,451
Adjusted R ²	55.49%	55.53%	49.03%	49.07%

^{a,b,c} Significant at a two-tailed p-value \leq 0.01, 0.05, or 0.10, respectively.

Material weakness firms under Section 302 are those that have a market value of less than \$75 million or disclosed their material weakness prior to November 15, 2004. The control sample for Section 302 firms is all control firms (as described in Table 1). Material weakness firms under Section 404 are those that have a market value of at least \$75 million and disclosed a material weakness on or after November 15, 2004; a firm can be both a 302 and 404 discloser if they disclosed a material weakness under both regimes. The control sample for Section 404 firms is all control firms that have a market value of at least \$75 million.

Each of the continuous variables is winsorized at 1 percent and 99 percent to mitigate outliers.

All variables are defined in Table 1, Panel B.

Section 302.¹⁹ If a large number of firms are treating material weakness disclosures under Section 302 as voluntary, it is possible that many firms are choosing not to report less severe Section 302 material weaknesses, thus leaving a reported 302 sample that is more serious in nature and more correlated with poor accruals quality.

Overall, the results seem to indicate that the Section 404 material weakness disclosures are less informative in identifying firms with real financial reporting concerns (e.g., lower accruals/earnings quality). This finding is especially important given the high cost of compliance with Section 404. However, given the limitations noted above for the initial Section 404 disclosures in our sample, future tests using a longer time-series and a more inclusive 404 sample may find different results.

V. ROBUSTNESS CHECKS

Self-Selection of Internal Control Quality

In our main analysis, we include known determinants of material weaknesses as independent variables and focus on material weaknesses (the most severe problems), which are effectively required to be disclosed, thereby eliminating much of the choice to disclose (see footnote 19). Nevertheless, it is still possible that firms can choose both the quality of their internal controls and their efforts to discover and disclose any known weaknesses (Ashbaugh-Skaife et al. 2007). This choice introduces a possible self-selection bias into our observed sample. In this section, we econometrically control for self-selection bias in two ways. First, we use a two-stage approach and estimate a probit regression of *MW* on the determinants of material weaknesses. This first-stage regression closely follows Doyle et al. (2007) and is presented in Appendix B. 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 shown in Table 7, after including the inverse Mills ratio, the results are similar to those in Table 4. The coefficient estimate of *MW* in the first column of Table 7 becomes 0.010 (t-statistic = 2.08) and the coefficient for the company-level material weaknesses in the second column is 0.013 (t-statistic = 2.53).²⁰

Second, 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

¹⁹ While Question 9 of the SEC’s Frequently Asked Questions (SEC 2004) seems to imply that firms should only “carefully consider” whether to publicly disclose material weaknesses under Section 302, Question 11 states without reserve that “[a] registrant is obligated to identify and publicly disclose all material weaknesses.” Confusion arises due to the existence of two largely overlapping definitions of controls (“disclosure controls and procedures” and “internal controls over financial reporting”), two reporting regimes (Sections 302 and 404), and two tiers of reporting requirements (accelerated versus non-accelerated filers). Although some firms might interpret the material weakness disclosure requirement under Section 302 as voluntary, our reading of the bulk of SEC guidance and many firms’ begrudging material weakness disclosures seems to indicate that most firms are treating the disclosure as mandatory.

²⁰ We consider multiple additional variables in our first-stage regression to ensure that we are properly controlling for volatility and performance. Specifically, we have considered: sales volatility, cash flow volatility, the rank of market-adjusted stock returns, and an indicator variable if sales growth falls into the lowest quintile in a given industry. Results are qualitatively and quantitatively consistent with those presented.

TABLE 7
Accruals Quality and Material Weaknesses with Self-Selection Controls

<u>Selectivity Control Method:</u>	<u>Dependent Variable = Accruals Quality (AQ)</u>			
	<u>Inverse Mills Ratio</u>		<u>Propensity Score Matching</u>	
	<u>Coefficient Estimate (t-statistic)</u>	<u>Coefficient Estimate (t-statistic)</u>	<u>Coefficient Estimate (t-statistic)</u>	<u>Coefficient Estimate (t-statistic)</u>
<u>Independent Variables</u>				
Intercept	0.028 (5.39 ^a)	0.028 (5.36 ^a)	0.027 (2.94 ^a)	0.026 (2.92 ^a)
<i>MW</i>	0.010 (2.08 ^b)		0.004 (1.71 ^c)	
<i>MW_Account-Specific</i>		0.008 (1.52)		0.002 (0.66)
<i>MW_Company-Level</i>		0.013 (2.53 ^b)		0.007 (2.39 ^b)
<i>Loss Proportion</i>	0.007 (3.03 ^a)	0.006 (2.98 ^a)	0.004 (0.95)	0.003 (0.90)
<i>Sales Volatility</i>	0.047 (16.17 ^a)	0.047 (16.16 ^a)	0.042 (8.97 ^a)	0.042 (8.97 ^a)
<i>CFO Volatility</i>	0.233 (31.74 ^a)	0.233 (31.73 ^a)	0.246 (19.33 ^a)	0.245 (19.32 ^a)
<i>Total Assets</i>	-0.004 (-12.36 ^a)	-0.004 (-12.28 ^a)	-0.005 (-8.41 ^a)	-0.005 (-8.30 ^a)
<i>Operating Cycle</i>	0.004 (5.22 ^a)	0.004 (5.20 ^a)	0.004 (3.26 ^a)	0.004 (3.23 ^a)
<i>Firm Age</i>	-0.001 (-1.06)	-0.001 (-1.04)	-0.001 (-0.66)	-0.001 (-0.62)
<i>Segments</i>	0.002 (1.97 ^b)	0.002 (1.94 ^c)	0.005 (2.36 ^b)	0.005 (2.35 ^b)
<i>Extreme Sales Growth</i>	0.000 (0.10)	0.000 (0.17)	0.002 (0.53)	0.002 (0.63)
<i>Restructuring Charge</i>	0.002 (0.29)	0.002 (0.28)	0.002 (0.22)	0.002 (0.22)
Number of Material Weakness Obs.	645	645	645	645
Number of Total Obs.	3,588	3,588	1,290	1,290
Adjusted R ²	54.83%	54.86%	53.38%	53.45%

^{a,b,c} Significant at a two-tailed p-value \leq 0.01, 0.05, or 0.10, respectively.

Each of the continuous variables is winsorized at 1 percent and 99 percent to mitigate outliers. All variables are defined in Table 1, Panel B.

same predicted probabilities of having a material weakness. The propensity score matching method produces a matched sample of 645 control firms that meet the data requirements to test H1. When using a matched sample, the results shown in the third and fourth columns of Table 7 are similar to those in Table 4. The coefficient estimate on *MW* in the third

column of Table 7 is 0.004 (t-statistic = 1.71) and the coefficient for the company-level material weaknesses in the fourth column is 0.007 (t-statistic = 2.39).²¹

Auditor Type and Auditor Changes Sensitivity Analysis

Both auditor type and auditor changes have been shown to be associated with disclosing an internal control problem. Ge and McVay (2005) and Ashbaugh-Skaife et al. (2007) document a positive association between being audited by large auditors (the Big N, BDO Seidman, and Grant Thornton) and disclosing internal control problems. Ashbaugh-Skaife et al. (2007) document that auditor changes are also positively associated with the disclosure of internal control problems. Both auditor type and auditor changes have also been shown to be associated with accruals quality (Becker et al. 1998; DeFond and Subramanyam 1998; Francis et al. 1999). In this section, we consider the effects of both auditor type and auditor changes on the association between accruals quality and material weakness disclosures.

As our accruals quality measure spans 1996–2002, we track the auditor for each of the firms in our sample across these years. We then create three new variables. *Big N* is the proportion of years the company was audited by a Big N audit firm; this variable has an in-sample mean of 86 percent. *Large Auditor* is the proportion of years the company was audited by a large auditor (described above); this variable has an in-sample mean of 91 percent. We also create a variable *Auditor Change*, which is the proportion of years the company changed its audit firm (excluding changes due to mergers); this variable has an in-sample mean of 9 percent. In general, we expect firms audited by larger auditors to have higher accruals quality (i.e., we expect a negative sign on auditor type). As DeFond and Subramanyam (1998) only consider the two years around the auditor change, while we consider a seven-year span, we do not have a predicted sign on auditor change.

We find that across both measures of auditor size (*Big N* and *Large Auditor*), the larger auditors are associated with higher accruals quality, and *Auditor Change* is associated with lower accruals quality. Including these additional controls does not affect our inferences regarding internal control quality—material weakness disclosures continue to be associated with poorer accruals quality (t-statistic = 2.60 and 2.66 with *Big N* and *Large Auditor*, respectively; not tabulated).

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, audit committee independence could be a correlated omitted variable. To investigate this possibility, we collect 2002 audit committee independence data from the Investor Research Responsibility Center's corporate governance dataset and re-estimate our regressions for the 1,133 observations with sufficient data. We find that *MW* remains strongly

²¹ 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 coefficient. Results are very similar using this alternative approach. For all material weaknesses, the intercept coefficient is positive and significant; 0.004 with a p-value of 0.051. The intercept coefficient is insignificant for account-specific weaknesses (p-value of 0.348) and positive and significant for company-level weaknesses (0.007 with a p-value of 0.044).

associated with poorer accruals quality (t-statistic = 3.15), while the percentage of independent directors is associated with better accruals quality (t-statistic = 1.80). 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.

VI. CONCLUSION

We examine the relation between accruals quality and internal control quality and find that firms with weak internal control over financial reporting generally have lower accruals quality. We measure accruals quality as the extent to which accruals are realized as cash flows, following Dechow and Dichev (2002). 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 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 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.

Finally, we explore the severity of the material weaknesses (account-specific versus company-level) and the reporting regime (Section 302 versus Section 404). We find that those firms with company-level material weaknesses rather than more auditable, account-specific problems drive the relation between weak internal controls and lower accruals quality. This result is consistent for both Sections 302 and 404 disclosures, although we find that material weakness disclosures made under Section 302 are more strongly associated with lower accruals quality than those under Section 404.

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. 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 2006) 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 company-level material weakness disclosures are, at least in part, appropriately identifying “poor quality” firms—specifically, those with poor accruals quality. However,

the results in this paper show no such benefits from the disclosure of more auditable, account-specific weaknesses. 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.

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 nonroutine 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) nonaccounting 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

<u>Independent Variables</u>	<u>Predicted Sign</u>	<u>Dependent Variable = Material Weakness (MW) Coefficient Estimate (Pr < χ^2)</u>
Intercept		-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)
Industry Indicator Variables		Included
Number of Material Weakness Obs.		844
Number of Total Observations		5,303
Likelihood Ratio Score (Pr < χ^2)		240.90 (0.001)

MW = indicator variable that is equal to 1 if the firm disclosed a material weakness in internal control in our sample period (August 2002 to November 2005), and 0 otherwise;

Marketcap = log of share price \times number of shares outstanding (Compustat data item #25 \times data item #199);

Aggregate Loss = indicator variable equal to 1 if earnings before extraordinary items (data item #123) in years t and $t-1$ sum to less than 0, and 0 otherwise;

SPEs = log of the number of special purpose entities reported by the company in year t ;

Foreign Transactions = indicator variable equal to 1 if the firm has a non-zero foreign currency translation [data item #150] in year t , and 0 otherwise; and

Acquisition Value = aggregate dollar value of acquisitions that result in at least 50 percent ownership of the acquired company in years t and $t-1$, scaled by the acquiring firm's year t market capitalization.

All other variables are defined in Table 1, Panel B.

REFERENCES

- Altamuro, J., and A. Beatty. 2006. Do internal control reforms improve earnings quality? Working paper, The Ohio State University.
- Anderson, K., and T. Yohn. 2002. The effect of 10-K restatements on firm value, information asymmetries, and investors' reliance on earnings. Working paper, Georgetown University and University of Massachusetts.
- Ashbaugh-Skaife, H., D. Collins, W. Kinney, and R. LaFond. 2006. Internal control deficiencies, remediation and accrual quality. Working paper, University of Wisconsin, The University of Iowa, The University of Texas at Austin, and Massachusetts Institute of Technology.
- , ———, and ———. 2007. The discovery and reporting of internal control deficiencies prior to SOX-mandated audits. *Journal of Accounting and Economics* 44: 166–192.
- Becker, C., M. DeFond, J. Jiambalvo, and K. R. Subramanyam. 1998. The effect of audit quality on earnings management. *Contemporary Accounting Research* 15: 1–24.
- Bedard, J. 2006. Sarbanes-Oxley internal control requirements and earnings quality. Working paper, Laval University.
- Beneish, D., M. Billings, and L. Hodder. 2006. Internal control weaknesses and information uncertainty. Working paper, Indiana University.
- 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., and I. Dichev. 2002. The quality of accruals and earnings. *The Accounting Review* 77: 35–59.
- , and C. Schrand. 2004. *Earnings Quality*. Charlottesville, VA: The Research Foundation of CFA Institute.
- DeFond, M. and K. R. Subramanyam. 1998. Auditor changes and discretionary accruals. *Journal of Accounting and Economics* 25: 35–67.
- DeFranco, 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). New York, NY: Moody's.
- Doyle, J., W. Ge, and S. McVay. 2007. Determinants of weaknesses in internal control over financial reporting. *Journal of Accounting and Economics* 44: 193–223.
- Fama, E., and K. French. 1997. Industry costs of equity. *Journal of Financial Economics* 43: 153–193.
- Francis, J., E. Maydew, and H. Sparks. 1999. The role of Big 6 auditors in the credible reporting of accruals. *Auditing: A Journal of Practice & Theory* 18: 17–34.
- , 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. 2008. Market reactions to the disclosure of internal control weaknesses and to the characteristics of those weaknesses under Section 302 of the Sarbanes-Oxley Act of 2002. *Review of Accounting Studies* (forthcoming).
- 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.
- , and ———. 2006. Evidence on the audit risk model: Do auditors increase audit effort in the presence of internal control weaknesses? 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.
- Kennedy, P. 1998. *A Guide to Econometrics*. Cambridge, MA: MIT Press.
- 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.
- 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.
- Ogneva, M., K. Raghunandan, and K. R. Subramanyam. 2007. Internal control weakness and cost of equity: Evidence from SOX Section 404 disclosures. *The Accounting Review* (forthcoming).
- Public Company Accounting Oversight Board (PCAOB). 2004. *An Audit of Internal Control over Financial Reporting Performed in Conjunction with an Audit of Financial Statements*. Auditing Standard No. 2. Washington, D.C.: PCAOB.
- Rangan, S. 1998. Earnings management and the performance of seasoned equity offerings. *Journal of Financial Economics* 50: 101–122.
- Roychowdhury, S. 2006. Earnings management through real activities manipulation. *Journal of Accounting and Economics* 42: 335–370.
- Schipper, K., and L. Vincent. 2003. Earnings quality. *Accounting Horizons* (Supplement): 97–110.
- Securities and Exchange Commission (SEC). 2004. *Management's Reports on Internal Control Over Financial Reporting and Certification of Disclosure in Exchange Act Periodic Reports—Frequently Asked Questions*. October 6. Washington, D.C.: SEC.
- Teoh, S., I. Welch, and T. Wong. 1998. Earnings management and the underperformance of seasoned equity offerings. *Journal of Financial Economics* 50: 63–99.
- 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. 2006. Assessing earnings and accruals quality: U.S. and international evidence. Working paper, Massachusetts Institute of Technology.