The Effect of SOX Internal Control Deficiencies on Firm Risk and Cost of Equity

Hollis Ashbaugh-Skaife
University of Wisconsin-Madison
hskaife@bus.wisc.edu

Daniel W. Collins*
University of Iowa
daniel-collins@uiowa.edu

William R. Kinney, Jr.
University of Texas-at Austin
william.kinney@mccombs.utexas.edu

Ryan LaFond
MIT-Sloan School of Management
rzlafond@mit.edu

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Abstract

In an attempt to increase investor confidence in financial reporting, the Sarbanes-Oxley Act (SOX) mandates management evaluation and independent audits of internal control effectiveness. The mandate is costly to firms but may yield benefits through lower information risk that translates into lower cost of equity. We use unaudited pre-SOX 404 disclosures and SOX 404 audit opinions to assess how changes in internal control quality affect risk and the cost of equity. After controlling for other risk factors, we find that firms with internal control deficiencies have significantly higher idiosyncratic risk, systematic risk, and cost of equity. Our cost of equity change analyses document that auditor-confirmed changes in internal control effectiveness (including remediation of previously disclosed internal control deficiencies) are followed by statistically significant and economically important changes in the cost of equity that range from 50 to 150 basis points, depending on the analysis. Overall, the results of our cross-sectional and inter-temporal change analysis tests are consistent with effective internal controls being valued by the equity market.

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I. Introduction

Prior research on the impact of the Sarbanes-Oxley Act (SOX) (U.S. Congress 2002) has focused primarily on the cost of its internal control reporting and audit requirements. In this study, we explore the relation between internal control quality and idiosyncratic and systematic risk, and the potential benefits of effective internal control in terms of cost of equity. Specifically, we investigate whether firms with internal control deficiencies (ICDs) exhibit higher systematic risk, higher idiosyncratic risk, and higher cost of equity relative to firms with effective internal controls. Further, we investigate whether managements' initial disclosures of ICDs and remediation of previously reported ICDs are related to changes in firms' cost of equity.

Ashbaugh-Skaife, Collins, Kinney, and LaFond (2007) and Doyle, Ge, and McVay (2007) posit that ineffective internal controls allow or introduce both intentional and unintentional misstatements into the financial reporting process that lead to lower quality accruals. Consistent with this conjecture, these studies find that firms reporting ICDs exhibit greater noise in accruals and larger abnormal accruals relative to firms not reporting ICDs. In this study, we posit that ineffective internal control results in less reliable financial reporting thus increasing the information risk faced by investors that manifests in higher cost of equity.[1]

[1] Unlike inferences about information quality that are based on estimates (e.g., large abnormal accruals), the disclosure of an ICD is an indicator that the reliability of financial information is threatened and thus of low quality.

Recent theoretical work by Lambert, Leuz, and Verrecchia (2006) models the direct and indirect effects of information quality on cost of capital in a single period multi-security CAPM setting. With respect to direct effects, they show that low quality information increases market participants' assessed variance of a firm's cash flows and the assessed covariances with other firms' cash flows leading to a higher cost of equity capital. Moreover, they show that the quality of information systems, which includes effectiveness of internal controls as well as the quality of financial disclosures that firms make to outsiders, has an effect on firms' real decisions including the assets appropriated by management. Management's appropriation of firm assets reduces the expected value of cash flows to investors, thus contributing to an indirect effect on firms' cost of equity.

Based on the theoretical work in Lambert et al. (2006), we conduct a series of cross-sectional and inter-temporal tests to assess whether firms with ICDs present higher information risk to investors relative to firms having effective internal controls. As expected, the results of our cross-sectional tests indicate that firms reporting ICDs exhibit significantly higher idiosyncratic risk, betas, and cost of equity relative to firms not reporting ICDs. These differences persist after controlling for other factors shown by prior research to be related to these risk measures. Our finding that differences in these risk measures pre-date the first disclosures of ICDs suggests that market participants' assessment of non-diversifiable market risk (beta), idiosyncratic risk, and cost of equity incorporated expectations about internal control risks based on observable firm characteristics prior to firms' initial revelation of control problems. This conjecture is consistent with Ashbaugh-Skaife, Collins, and Kinney (2006) and Doyle et al. (2006) who demonstrate that firms with more complex operations, recent changes in organization structure, greater accounting risk exposure, and less investment in internal control systems are more likely to disclose ICDs.

In an attempt to document a causal relation between internal control quality and firms' cost of equity, we construct three sets of inter-temporal change analysis tests. Our first change analysis examines the market reaction to the first disclosure of an ICD. Our results reveal that ICD firms experience a statistically significant increase in market-adjusted cost of capital, averaging about 93 basis points, around the first disclosure of an ICD. Moreover, we find that ICD firms with the lowest probability of reporting internal control problems (based on observable firm characteristics) exhibit a greater cost of capital change (125 basis points on average) relative to those ICD firms with the highest likelihood of reporting control problems (49 basis points on average). This result is consistent with the market incorporating incomplete adjustments for internal control risks into firms' cost of equity prior to the revelation of which firms have ICDs, and then updating these risk assessments after the control problems are revealed.

Our second change analysis examines cost of equity changes firms that remediate previously disclosed ICDs as evidenced by an unqualified SOX 404 audit opinion. If revelation of ICDs contributes to an increase in firms' cost of equity as our first set of change results suggest, then successful remediation of those problems should lead to a decrease in cost of capital. Consistent with this prediction, we find that ICD firms that subsequently receive an unqualified SOX 404 opinion exhibit an average decrease in market-adjusted cost of capital of 151 basis points around the disclosure of the opinion. In contrast, we find that ICD firms that subsequently receive adverse SOX 404 audit opinions, which indicate that internal control problems persist, exhibit a modest but insignificant change in cost of equity around the SOX 404 opinion release.

For our final inter-temporal change analysis, we examine the cost of capital change for non-ICD firms (i.e., no prior disclosure of internal control problems) that received unqualified SOX 404 opinions. We find a significant *decrease* in the average market-adjusted cost of equity of 116 basis points around the release of an unqualified SOX 404 opinion for firms most likely to report ICDs, but no significant cost of capital change for firms least likely to report an ICD. These findings suggest that the market forms prior probability assessments of the likelihood of internal control problems, and the confirmation that firms have effective internal controls via the SOX 404 audit report is value relevant to investors.

Collectively our cross-sectional and inter-temporal tests present consistent evidence that internal control risk is an important determinant of both idiosyncratic risk and systematic market risk that affects the market's assessment of firms' cost of equity. We document that firms with effective internal control or firms that remediate previously reported ICDs are rewarded with a significantly lower cost of equity. Thus, our study is among the first to document potential benefits of a systematic reporting structure to communicate information about internal control in terms of cost of equity consequences.

Our study contributes to the literature regarding the effects of information quality on investors' risk assessments and cost of equity in two ways. First, prior research examining the effect of information quality on the cost of equity has used measures of information quality that are dependent upon researcher estimates of information attributes or subjective metrics of voluntary disclosure (Botosan 1996; Bhattacharya, Daouk, and

Welker 2003; Francis, LaFond, Olsson, and Schipper 2004). We use the unique setting of SOX internal control reporting to identify firms that have ICDs, which is a less ambiguous indicator of the quality of firms' accounting information relative to information quality measures used in prior studies. Moreover, the independent auditors' SOX 404 opinions provide unambiguous signals about the remediation of ICDs that allow tests of changes in information system quality on firms' cost of equity in ways that minimize competing explanations for our results.

A second contribution to the literature on disclosure quality and cost of capital is that we document both direct and indirect effects of information quality on firms' cost of equity. Much of the prior accounting research that investigates the effects of information transparency and disclosure quality on cost of equity measures these effects after controlling for the effects of systematic risk on expected return (Botosan 1997; Botosan and Plumlee 2002; Bhattacharya et al. 2003; Francis, LaFond, Olsson, and Schipper 2005). Relying on the theoretical framework developed in Lambert et al. (2006), we predict and find that ICD firms exhibit higher betas and higher idiosyncratic risk. Thus, we document linkages between information systems quality and market risk measures largely overlooked in prior literature. More importantly, our results suggest that studies that investigate the effect of information transparency or disclosure quality on cost of capital after controlling for the effects of market risk (beta) are removing part of the information quality effects they seek to document.

Our study also contributes to the literature assessing economic consequences of the SOX legislation, which is primarily focused on the costs of implementing SOX internal control auditing and reporting requirements (Li, Pincus, and Rego 2006; Zhang 2005;

Berger, Li, and Wong 2005; Solomon and Bryan-Low 2004). This paper, along with a concurrent study by Ogneva, Subramanyan, and Raghunanadan (2006), is among the first to investigate the potential benefits of SOX in terms of cost of equity effects. In contrast to the Ogneva et al. (2006) study that concludes there is no consistent association between ICDs and cost of equity, we find clear evidence that internal control risk matters to investors and that firms reporting effective internal controls or firms remediating previously disclosed ICDs benefit through lower cost of equity.[2]

The remainder of the paper is organized as follows. Section II summarizes the theoretical underpinnings of our analysis and sets forth our predictions about internal control weaknesses and remediation, market and idiosyncratic risk and cost of equity. Section III provides institutional background and summarizes related work. Section IV describes our samples and provides descriptive statistics. Section V presents our empirical findings and Section VI concludes.

II. Linkages between Internal Control Weaknesses, Firm Risk and Cost of Equity

Lambert et al. (2006) develop a model in a single period multi-security CAPM setting that links the quality of accounting disclosures and information systems to firm risk and cost of equity. In the Lambert et al. (2006) framework, accounting information system quality is broadly defined to include not only the disclosures the firm makes to outsiders, but also the internal control systems that a firm has in place. A key insight from their analysis is that the quality of accounting information and the systems that produce that

[2] Later in the paper, we discuss sample, design choices, and cost of equity proxy differences between our study and the Ogneva et al. (2006) study that contribute to the differences in results. As an example, we document a look-ahead bias in the Ogneva et al. (2006) sample selection procedure that contributes to their finding of no significant difference in cost of equity for ICD and non-ICD firms. After correcting for the look-ahead bias, we find a significant difference in the cost of equity between ICD and non-ICD firms.

information influence a firm's cost of capital in two ways: (1) direct effects—where higher quality accounting information does not affect firm cash flows, per se, but does affect market participants' assessments of the variance of a firm's cash flows and the covariance of the firm's cash flows with aggregate market cash flows; and (2) indirect effects—where higher quality information and better internal controls affect real decisions within the firm, including the amount of firm resources that managers appropriate for themselves.

Lambert et al. (2006) analyze the direct effects of information system quality by introducing an accounting information signal, $\tilde{Z}_j$ (e.g., earnings), that provides a noisy signal about the (future) end-of-period cash flows of the firm, $\tilde{V}_j$. That is, $\tilde{Z}_j = \tilde{V}_j + \tilde{\varepsilon}_j$ where $\tilde{\varepsilon}_j$ is the noise or measurement error in the information signal. Because the (future) end-of-period firm cash flows are unobservable, the market's assessment of the variance of firm j's cash flows and the covariance structure of firm j's future cash flows with all other firms in the market is conditioned by the quality or precision of firm j's accounting signal. Specifically,

$$\sum_{k=1}^{J} \mathrm{Cov}(\tilde{V}_j, \tilde{V}_k \mid Z_j) =$$

$$\sum_{k=1}^{J} \frac{Var(\tilde{\varepsilon}_j)}{Var(\tilde{Z}_j)} Cov(\tilde{V}_j, V_k) = \frac{Var(\tilde{\varepsilon}_j)}{Var(\tilde{Z}_j)} \left(Cov(\tilde{V}_j, \tilde{V}_j) + Cov\left(\tilde{V}_j, \sum_{k \neq 1} \tilde{V}_k \right) \right). \quad (1)$$

As equation (1) shows, investors' assessment of the variance of firm j's cash flows and covariance of firm j's cash flows with the cash flows of all other firms in the market is proportional to the measurement error or noise in the information signal about firm j's future cash flows. Importantly, the effect of measurement error in the information signal does not diversify away as the number of securities grows large--the effect is present for each and every covariance term with firm j.

Recognizing that $\tilde{Z}_j$ is a noisy signal from a broader information set Φ that conditions investors assessment of the end of period cash flows, the following expression can be derived from the Lambert et al. formulation for expected return (cost of capital):

$$\mathrm{E}(\tilde{\mathrm{R}}_{\mathrm{j}} | \Phi) = \frac{R_f H(\Phi) + 1}{H(\Phi) - 1},$$

$$\text{where } \mathrm{H}(\Phi) = \frac{\mathrm{E}(\tilde{\mathrm{V}}_{\mathrm{j}} | \Phi)}{\frac{1}{N\tau}\left[\frac{Var(\tilde{\varepsilon}_j)}{Var(\tilde{Z}_j)}\left(Cov(\tilde{V}_j, \tilde{V}_j) + Cov\left(\tilde{V}_j, \sum_{k \neq 1} \tilde{V}_k\right)\right)\right]}. \qquad (2)$$

Where R_f is the risk free rate, Φ is the information set available to investors to make their assessments regarding the distribution of future cash flows for firm j, and $N\tau$ is the aggregate risk tolerance of the market. All other variables are defined above. As indicated in equation (2), as the noise in the firm's accounting signals [$Var(\tilde{\varepsilon}_j)$] increases (decreases) the firm's cost of capital is expected to be higher (lower). Furthermore, within the Lambert et al. (2006) framework, the quality of a firm's information system, which includes its internal control, can affect a firm's real decisions. The real decisions include, but are not limited to, the amount of firm cash flows that managers appropriate for themselves. Ceteris paribus, we conjecture that ineffective internal control decreases the ratio of expected cash flows available to investors relative to the covariance of firm cash flows with the market as shown in equation (2). This indirect real effect translates into a higher cost of equity.[3]

In sum, we posit that the quality of a firm's internal control over financial reporting affects investors' assessments of firm risk and cost of capital because if a firm has weak internal control, then the quality or precision of its accounting signals is impaired. Consistent with this conjecture, Ashbaugh-Skaife et al. (2007) and Doyle et al. (2007) find that firms reporting ICDs exhibit noisier accruals after controlling for other firm characteristics that affect accrual quality. Combining these empirical findings with the theory in Lambert et al. (2006), we develop both cross-sectional and inter-temporal predictions.

In the cross-section, we predict that firms with ICDs will exhibit higher idiosyncratic risk, higher systematic (beta) risk and higher cost of capital relative to firms with strong internal controls. Moreover, we expect firms' costs of capital will *increase* when the first revelation of internal control problems is made public under SOX 302 or 404 reporting provisions, and will *decrease* when external auditor SOX 404 opinions affirm that the firm's control problems have been remediated. In developing testable implications of the Lambert et al. (2006) model there are several key points to keep in mind.

First, in the Lambert et al. (2006) framework, the cost of capital effect of higher quality information is fully captured by an appropriately specified *forward-looking beta*, i.e., the covariance of *expected* end of period cash flows. Thus, if one could properly

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[3] It is important to note that the Lambert et al. (2006) model of information quality effects on firms' cost of capital is developed in a single period setting. However, in a multi-period world the cost of capital effects of additional cash flows that result from reduced financing costs or from reduced manager appropriation of firm resources when internal controls are strengthened are more difficult to predict. How the additional cash flows are invested can change the ratio of the expected cash flows to the covariances of the firm's cash flows with the market [see equation (2)]. If the additional cash flows are invested in high risk projects, then the ratio of expected cash flows to the covariance of those cash flows could increase.

measure forward-looking betas there would be no role for an ICD indicator in explaining differences in cost of equity because all effects of internal control problems on cost of capital would be subsumed by forward-looking beta. However, betas estimated using *historical return data* do not fully capture all information quality effects of internal control differences. Because historical beta estimates provide a noisy estimate of the forward-looking beta in the Lambert et al. (2006) model, we posit that the indicator variables for ICDs and remediation of ICDs used in our empirical tests will have incremental explanatory power beyond beta with respect to cost of capital.

Second, the *direct* effects of information quality differences on investors' assessed variances and covariances of a firm's cash flows in the Lambert et al. (2006) framework are developed under the maintained hypothesis that the firm's real investment and operating decisions are held constant. Accordingly, our predictions of the *direct* effects of ICDs and remediation on cost of capital are developed under the maintained hypothesis that firms' investment/operating decisions are held constant. Given the relatively short time horizon from the initial disclosure of an ICD and its subsequent remediation as evidenced by an unqualified SOX 404 audit opinion (generally, within one year), we believe this maintained hypothesis is reasonable.

Finally, in formulating our inter-temporal tests, we recognize that investors hold priors on the likelihood of ICDs based on observable firm characteristics (Ashbaugh-Skaife et al. 2006; Doyle et al. 2006). Thus, we predict that the effect of negative or positive signals about firms' internal control quality will have a greater (smaller) effect on cost of capital the smaller (the greater) the probability of a firm reporting an ICD.

III. Institutional Background and Reporting Environment

Prior to passage of the Sarbanes-Oxley Act (SOX) in July 2002, public companies in the U.S. were required to maintain books and records that would protect corporate assets and facilitate GAAP-based financial reporting (e.g., Foreign Corrupt Practices Act 1977). However, pre-SOX statutes did not require management evaluations of internal control or public assertions about control adequacy and the statutes did not require independent audits of internal control.[4] SOX changed the public assertion, audit, and audit reporting landscape in two steps.

First, Section 302 of SOX (effective August 29, 2002) mandates that a firm's CEO and CFO certify in periodic (interim and annual) SEC filings that they have "evaluated . . . and have presented in the report their conclusions about the effectiveness of their internal controls based on their evaluation" (SOX 302 (a) (4) (C) and (D)). Second, Section 404(b) requires the financial statement auditor to express an opinion on management's evaluation of the effectiveness of internal control over financial reporting. Auditing Standard (AS) No. 2 (effective for larger firms for fiscal years ending on or after November 15, 2004) adds a requirement that the auditor express a separate opinion about the effectiveness of the firm's internal controls based on the auditor's own review.

In the empirical work to follow, we use ICD disclosures made under SOX Sections 302 and 404 as indicators of poor quality accounting information. ICDs can affect firms' information quality in two principal ways. One way is through random, *unintentional* misstatements due to the lack of adequate policies, training, or diligence by company

[4] The Foreign Corrupt Practices Act did require external auditors to report to the board of directors any material weaknesses in the firm's internal control over financial reporting noted during conduct of the financial statement audit.

employees. Examples are: inventory counting and pricing errors that misreport inventory on hand and related cost of sales, omission of items such as failure to record credit purchases, variation in revenue recording due to lack of specific policies (or employee discretion) for revenue recognition, expensing amounts that should be capitalized and vice-versa, inadequate basis for accounting estimates such as the allowance of inventory obsolescence, and unreliable procedures for "rolling up" amounts from segments and subsidiaries at fiscal year end. These unintentional misstatements are likely to be random and can lead to increases or decreases in resulting earnings.

A second way that ICDs can adversely affect information quality is through *intentional* misrepresentations or omissions by employees or by management. These non-random misstatements typically overstate earnings for the current period, but "big bath" write-offs or cookie jar reserves result in opportunistic understatement of current earnings as well. For example, management's exercise of discretion in accounting choices allows financial misrepresentation through manipulation of accruals for recording important accounting estimates such as warranty liabilities, reserves for sales returns, and allowance for uncollectible receivables. Furthermore, employee fraud is made possible by inadequate segregation of internal control duties. Weak internal control in the form of inadequate segregation of duties can allow the misappropriation of assets and alteration of recorded amounts by employees that are not detected because the company has inadequate staff for monitoring or lack of action by top management because of a lax control environment. In addition, misstatements can be introduced into the financial reporting process through opportunistic "oversights" or omissions in accumulating segment and subsidiary information for consolidated reports, as well as through management emphasizing earnings targets in instructions to employees.

Determining the status of internal controls (i.e., whether effective or ineffective) and whether previously reported control problems have been remediated are important aspects of our research design. In the empirical tests that follow, we rely on an independent third party evaluation of the effectiveness of internal controls as reflected in the SOX 404 audit report. Firms that previously disclosed ICDs and receive an unqualified SOX 404 audit opinion comprise our remediation sub-sample, while ICD firms that receive a qualified SOX 404 opinion comprise our non-remediation sub-sample. Control firms are firms that did not voluntarily report ICDs under SOX 302 and received unqualified SOX 404 opinions in the first SOX 404 reporting year, thus indicating that their internal controls were effective.

IV. Sample and Descriptive Statistics

IV.1 Internal Control Deficiency Sample Details

Our initial sample of firms providing ICD disclosures is obtained from compilations of SEC filings reported in *Compliance Week* and by Glass-Lewis & Co., LLC from November 2003 to September 2005.[5] In addition, we supplement these two databases with hand collected ICD disclosures from SEC filings made after September 2005 for firms that delayed their SEC filings but indicated they were expecting an adverse internal control opinion.[6] These procedures result in an initial sample of 1,053 firms disclosing at least one ICD in either the SOX 302 or SOX 404 reporting regime.

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[5] *Compliance Week* is a weekly electronic newsletter published by Boston's Financial Media Holdings Group and Glass-Lewis & Co., LLC is an investment research and proxy advisory firm.
[6] For these firms we confirmed the SOX 404 opinion and filing dates.

Of the 1,053 ICD firms, 587 have the necessary data to estimate our idiosyncratic risk and systematic risk models. We have the necessary data to conduct cross-sectional market reaction and cost of equity tests for 787 and 221 firms, respectively. There are 162 firms that have the necessary data to examine the inter-temporal change in cost of equity at the time of the first ICD disclosure. The remaining analyses examine the change in ICD firms' cost of equity based on the type of SOX 404 opinion received. We have data for 38 firms that reported an ICD under 302 but received an unqualified SOX 404 opinion. These 38 firms comprise our "remediation" sample. We have data for 50 firms identified as having persistent control problems because they disclosed ICDs under SOX 302 and subsequently received an adverse SOX 404 opinion. These firms comprise our "no-remediation" sample.[7] Table 1 displays the sub-samples used to conduct our cross-sectional tests of risk differences, market reaction tests, and inter-temporal cost of equity change analyses.

IV.2 Descriptive Statistics

Table 2 reports descriptive statistics for the 587 ICD firms and the 3,024 non-ICD firms, i.e., control firms, having sufficient data to conduct our cross-sectional tests of the association between internal control problems and idiosyncratic risk and systematic risk. Idiosyncratic risk (I_RISK) is the standard deviation of the residuals from the following model:

$$EXRET = \beta_0 + \beta_1 RMRF + \varepsilon \tag{3}$$

[7] For the sake of completeness, it is important to note that there are 527 firms that disclosed an ICD under SOX 302 but did not have a SOX 404 opinion. These firms do not have a SOX 404 opinion because they are either non-accelerated filers (i.e., are not required to file a SOX 404 opinion because they have less than $75 M in float) or they had not yet filed a 10-K that contained a SOX 404 report by the sample cut-off date of September 2005.

where EXRET is the firm's monthly return minus the risk free rate and RMRF is the excess return on the market. Systematic risk (BETA) is measured as the coefficient on RMRF.[8] Equation (3) is estimated using monthly returns requiring a minimum of 24 and maximum of 60 observations over 2004 and the prior four fiscal years.[9] We assume that ICDs that were first disclosed in 2004 had existed for some time prior to disclosure and that the market was able to form expectations about this fact based on observable firm characteristics, and that these expectations were incorporated in the risk measures noted above. Ashbaugh-Skaife et al. (2006) and Doyle et al. (2006) provide evidence that observable firm characteristics predict the incidence of ICDs and Doyle et al. (2007) provide evidence that firms that first disclosed control problems in 2004 exhibited evidence of the existence of these control problems over an extended period before the first disclosure.

The control variables included in our analysis of I_RISK and BETA are as follows:

- Standard deviation of cash flow from operations (STD_CFO) defined as the five year standard deviation of cash flow from operations (Compustat #308) divided by total assets (Compustat #6) requiring a minimum of three years of data;

- Leverage (LEV) defined as total debt (Compustat #9 plus Compustat #34) divided by total assets (Compustat #6);

- Cash flow from operations (CFO) defined as cash flow from operations divided by total assets;

- Book-to-market (BM) defined as book value of equity (Compustat #60) divided by market value of equity (Compustat #199* Compustat #25);

- Firm size (SIZE) defined as the natural log of market value of equity;

[8] The data source for equation (3) is http://mba.tuck.dartmouth.edu/pages/faculty/ ken.french/data_library.html.

[9] We use monthly returns to estimate equation (3) to reduce the bias in BETA due to infrequent trading (Dimson 1979).

- Dividend distribution (DIVPAYER) defined as one if the firm pays dividends (Compustat # 21), and zero otherwise;

- Return (RET) defined as the buy and hold return over the firm's fiscal year;

- Covariance of the firm's cash flows with the market cash flows (COVCFO) measured as the quarterly cash flows from operations using 2004 and the prior four fiscal years, requiring a minimum of three years (12 quarters) of data, scaled by total assets of the firm and market, respectively. This variable is multiplied by 1,000 to facilitate comparisons to other coefficients;

- Industry beta (INDBETA) measured as the coefficient on excess market return in an industry return regression. Please see Appendix 1 for specific details.

All control variables are measured as of a firm's 2004 fiscal year-end.

The descriptive statistics reported in Table 2 indicate, on average, ICD firms have statistically higher I_RISK, larger BETAs, lower cash flows from operations, are smaller and are less likely to pay dividends relative to non-ICD firms. In addition, ICD firms have statistically lower returns, higher covariance of firm cash flows with market cash flows, and larger industry betas relative to non-ICD firms.

Panel B of Table 2 displays the correlations among the control variables and the ICD indicator variable, where ICD is coded one if the firm reports an internal control problem and zero otherwise. The upper right hand portion of the panel presents Pearson product-moment correlations, while the lower left hand portion presents the Spearman rank-order correlations. To facilitate discussion, we focus on the Pearson correlations, but note that the Spearman rank-order correlations are generally consistent with the Pearson correlations. The ICD indicator is positively correlated with both I_RISK (0.09) and BETA (0.08). In addition, the ICD indicator is negatively correlated with CFO (-0.04), SIZE (-0.07), DIVPAYER (-0.10) and RET (-0.07), and positively correlated with

COVCFO (0.03) and INDBETA (0.08). As expected, I_RISK and BETA exhibit a relatively large positive correlation (0.64) as do INDBETA and BETA (0.51).

V. Results

V.1 Cross-Sectional Return Results

In this section we investigate whether there is a negative market reaction to firms' initial reporting of an ICD. Anecdotal evidence presented in the financial press highlights immediate material declines in the stock prices of select firms that report ICDs, e.g., Flowserve's stock price declined 12% on the day after the announcement of an internal control problem (Goldman Sachs 2005). In contrast, academic research is inconclusive as to whether there is a negative market reaction to ICD disclosures. For example, Whisenant, Sankaraguruswamy, and Raghunandan (2003) find no evidence that disclosures of internal control weaknesses, as reportable events via a change in auditor reported on Form 8-K, result in significant negative abnormal returns around the 8-K filing dates. Hammersley, Myers, and Shakespeare (2007), however, find a significant negative market reaction to material weakness ICDs disclosed under SOX 302.

To provide further insights into the market's immediate reaction to firms' initial announcement of an internal control problem, we calculate market-adjusted returns (BHAR) measured over a three-day window starting one day before and including the day after the announcement that contained the ICD disclosure (BHAR).[10] Panel A of Table 3 reports a mean (median) drop in share price of -0.76% (-0.41%) over the three-

[10] The announcement day is the date of the SEC filing that first mentions a control weakness. We identified firms that reported ICDs using compilations prepared by *Compliance Week* and Glass-Lewis. We then back-traced all SEC filings of firms identified by these two sources. For over 30% of the sample, we found the first mention of control problems occurred in an SEC filing that preceded the filing noted as the initial disclosure in *Compliance Week* or Glass-Lewis. Thus, studies using the dates provided by these two sources may incorrectly identify the event date for the first ICD disclosure.

day window, which is significant at the 0.00 (0.01) level. The average market cap of our sample firms at the beginning of fiscal year 2004 was $2860 million. So a -0.76% (-0.41%) abnormal return translates into $21.74 million decline in market value, on average. Below, we link this negative market reaction to increases in the cost of equity.

When we partition ICD disclosures by the severity of the internal control problem, we find no significant difference between the market's response to material weaknesses versus significant deficiencies or control deficiencies. Specifically, we regress BHAR on a binary variable coded one for material weakness ICD disclosures and zero otherwise (MATERIAL_WEAKNESS). The regression results reported in Panel B of Table 3 indicate an insignificant coefficient on MATERIAL_WEAKNESS, which is contrary to the findings in Hammersley et al. (2007) who document a greater negative market reaction to material weakness ICDs compared to those that firms self-classify as being of lesser severity.[11]

Overall, our market reaction tests provide evidence that the market reacts negatively to signals that firms' internal controls are ineffective. However, it appears that the uncertainty about the differences between material weaknesses versus significant deficiencies or control deficiencies as discussed in Ashbaugh-Skaife et al. (2006) results in the market not making a significant distinction between the severity of ICDs.[12]

V.2 Cross-Sectional Risk Results

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[11] One potential explanation for the differences in results is the difficulty of classifying the nature of internal control problems prior to the enactment of AS No. 2 (see the next footnote for details). In addition, the Hammersley et al. (2007) study did not take into account investors' prior probability assessments of ICD likelihood.

[12] Recall that AS No. 2, which provided guidance for the classification of ICDs,was issued after many firms provided their initial ICD disclosures. Thus, many firms that voluntarily reported lesser internal control problems in the SOX 302 era, in all likelihood, had more severe problems.

The Lambert et al. (2006) model predicts that investors' assessed variances of end of period cash flows will be higher for firms that are deemed to report noisier or lower quality accounting numbers. We predict firms that report ICDs will be deemed to have noisier accruals that will manifest in higher idiosyncratic risk. We begin our empirical tests of the risk effects of weak internal controls by investigating whether firms that report ICDs exhibit higher idiosyncratic risk (I_RISK) relative to non-ICD firms using an OLS regression that controls for other factors that prior research has shown to be related to idiosyncratic risk (Rajgopal and Venkatachalam 2005; Hanlon, Rajgopal, and Shevlin 2004; Pastor and Veronesi 2003; Wei and Zhang 2006). Specifically, we estimate the following model:

$$\begin{aligned} I\_RISK = {} & \beta_0 + \beta_1 ICD + \beta_2 STD\_CFO + \beta_3 LEV + \beta_4 CFO + \beta_5 BM \\ & + \beta_6 SIZE + \beta_7 DIVPAYER + \beta_8 RET + \varepsilon \end{aligned} \qquad (4)$$

where all variables are as previously defined.

We predict a significant positive coefficient on ICD. CFO and STD_CFO are used to capture operating performance and the volatility of operations, respectively. We expect firms with under-performing operations and more volatile operations to exhibit greater I_RISK. Thus, we predict a negative (positive) coefficient on CFO (STD_CFO). SIZE and DIVPAYER represent firm size and firm maturity where large firms and more mature firms are expected to be less risky. Therefore, we predict a negative relation between SIZE, DIVPAYER, and I_RISK. Finally, we expect firms with higher leverage (LEV) to exhibit greater I_RISK. We make no prediction about the association between BM and I_RISK or RET and I_RISK. BM can reflect financial distress, which would lead to a positive association between BM and the risk measure, or can proxy for growth opportunities, which would lead to a negative association between BM and the risk measure. Rajgopal and Venkatachalam (2006) document a negative association between I_RISK and RET. However, Duffie (1995) finds that the association between I_RISK and RET is sensitive to the sample of firms used in the analysis. Specifically, he finds that the association varies depending on the treatment of firms that experience events such as bankruptcies, takeovers and delistings. Therefore, while we include RET in the model, we leave the prediction unsigned.

The Model 1 column of Table 4 displays the results of estimating equation (4). As expected, we find that larger firms, firms that more often pay dividends, firms with better operating performance and firms with lower volatility of cash flows from operations exhibit lower idiosyncratic risk. We find a significant negative coefficient on BM that is consistent with the findings of Rajgopal and Venkatachalam (2005) and suggests that firms with greater growth opportunities have lower idiosyncratic risk. The results indicate a significant negative coefficient on LEV, contrary to expectations. However, when we eliminate firms from the sample that do not have debt (or that have trivial amounts of debt), we find, as expected, a positive coefficient on LEV, which indicates that firms with more financing risk exhibit higher idiosyncratic risk.[13]

Turning to the variable of interest, we find a positive and significant coefficient on ICD. This result indicates that after controlling for operating, financing, and other risk attributes, firms with ineffective internal controls exhibit greater idiosyncratic risk than firms that do not report internal control problems.

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[13] The tabled result that LEV is negatively associated with I_RISK is consistent with the findings of Duffee (1995). Duffee (1995) reports that the positive relation between leverage and risk measures documented in prior work is due to the samples used in the empirical analysis. When Duffee (1995) requires firms to have debt, he finds a positive relation between leverage and risk. Relaxing this requirement results in either insignificant results or in some instances the opposite result. Following Duffee's (1995) work, we delete firms with LEV values less than 0.10 and find that a positive association between leverage and I_RISK.

The results reported in the Model 1 column of Table 4 serve to benchmark the relation between firms' information quality as a function of internal controls and I_RISK after controlling for firm fundamentals documented in prior research to be related to idiosyncratic risk. Ashbaugh-Skaife et al. (2006) report that firms are more likely to have ICDs when they have more segments, engage in foreign sales, participate in mergers and acquisitions, and engage in restructurings. These economic events also influence firms' operating performance and the volatility of operations. To ensure that our ICD variable is not proxying for some other inherent operating risk, we expand our I_RISK model with the ICD determinants documented in Ashbaugh-Skaife et al. (2006) and estimate the following OLS regression:

$$\begin{aligned} I\_RISK = {} & \beta_0 + \beta_1 ICD + \beta_2 STD\_CFO + \beta_3 LEV + \beta_4 CFO + \beta_5 BM \\ & + \beta_6 SIZE + \beta_7 DIVPAYER + \beta_8 RET + \beta_9 SEGMENTS \\ & + \beta_{10} FOREIGN\_SALES + \beta_{11} M\&A + \beta_{12} RESTRUCTURE \\ & + \beta_{13} RGROWTH + \beta_{14} INVENTORY + \beta_{15} \%LOSS + \\ & \beta_{16} RZSCORE + \beta_{17} AUDITOR\_RESIGN \\ & + \beta_{18} RESTATEMENT + \beta_{19} AUDITOR + \beta_{20} INST\_CON \\ & + \beta_{21} LITIGATION + \varepsilon \end{aligned} \tag{5}$$

where

- SEGMENTS is the number of reported business segments in 2003 (Compustat Segment file);
- FOREIGN_SALES is equal to one if a firm reports foreign sales in 2003, and zero otherwise(Compustat Segment file);
- M&A equals one if a firm is involved in a merger or acquisition from 2001 to 2003, and zero otherwise (Compustat AFNT #1);
- RESTRUCTURE equals one if a firm was involved in a restructuring from 2001 to 2003, and zero otherwise (this variable is coded one if any of the following Compustat data items are non-zero: 376, 377, 378 or 379);
- RGROWTH is the decile rank of average growth rate in sales from 2001 to 2003 (the percent change in Compustat #12);
- INVENTORY is the average inventory to total assets from 2001 to 2003 (Compustat #3/ Compustat #6);
- %LOSS is the proportion of years from 2001 to 2003 that a firm reports negative earnings;
- RZSCORE is the decile rank of Altman (1980) z-score measure of distress risk;

- AUDITOR_RESIGN equals one if the auditor resigned from the client in 2003, zero otherwise (8-K filings);
- RESTATEMENT equals one if a firm had a restatement or an SEC AAER from 2001 to 2003 and zero otherwise;
- AUDITOR is coded one if the firm engaged one of the largest six audit firms for 2003, and zero otherwise (Compustat), where the largest six audit firms include PWC, Deloitte & Touche, Ernst & Young, KPMG, Grant Thornton and BDO Seidman;
- INST_CON is the percentage of shares held by institutional investors divided by the number of institutions that own the stock as of December 31, 2003 (Thomson Financial Securities Data);
- LITIGATION is coded one if a firm was in a litigious industry—SIC codes 2833 to 2836; 3570 to 3577; 3600 to 3674; 5200 to 5961; and 7370, and zero otherwise;

and all other variables are as previously defined. All ICD determinants are measured as of the firm's 2003 fiscal year end since prior economic events affect the likelihood of contemporaneous internal control problems (Ashbaugh-Skaife et al. 2006). We do not make predictions on the sign of the ICD determinant coefficients because many of the ICD determinants proxy for similar constructs included in the basic I_RISK model (e.g., more risky operations).

The Model 2 column of Table 4 displays the results of estimating equation (5). Eight of the 13 ICD determinants are significantly related to I_RISK, and we continue to find significant coefficients on STD_CFO, LEV, BM, SIZE, and DIVPAYER. The CFO coefficient is no longer significant after including the ICD determinants, which also serve as measures of firm operating performance. One other finding that differs from the results reported in the Model 1 column of Table 3 is the coefficient on RET is now significantly positive. Most importantly, after including the additional control variables in the I_RISK model, we continue to find a positive and significant coefficient on ICD. This indicates that after controlling for operating, financing and internal control risk factors, firms with greater information risk due to internal control problems exhibit greater idiosyncratic risk.

Our next cross-sectional analysis examines the relation between ICDs and market risk (BETA). Similar to our I_RISK analysis, we estimate two models of BETA:

$$\begin{aligned} BETA = {} & \beta_0 + \beta_1 ICD + \beta_2 STD\_CFO + \beta_3 LEV + \beta_4 CFO + \beta_5 BM + \beta_6 SIZE \\ & + \beta_7 DIVPAYER + \beta_8 COVCFO + \beta_9 INDBETA + \varepsilon \end{aligned} \tag{6}$$

$$\begin{aligned} BETA = {} & \beta_0 + \beta_1 ICD + \beta_2 STD\_CFO + \beta_3 LEV + \beta_4 CFO + \beta_5 BM + \beta_6 SIZE \\ & + \beta_7 DIVPAYER + \beta_8 COVCFO + \beta_9 INDBETA + \beta_{10} SEGMENTS \\ & + \beta_{11} FOREIGN\_SALES + \beta_{12} M\&A + \beta_{13} RESTRUCTURE \\ & + \beta_{14} RGROWTH + \beta_{15} INVENTORY + \beta_{16} \%LOSS + \beta_{17} RZSCORE \\ & + \beta_{18} AUDITOR\_RESIGN + \beta_{19} RESTATEMENT + \beta_{20} AUDITOR \\ & + \beta_{21} INST\_CON + \beta_{22} LITIGATION + \varepsilon \end{aligned} \tag{7}$$

where all variables are as previously defined.

Equation (6) is the baseline model that includes the risk factors previously documented in the literature as being related to BETA (e.g., see Beaver, Kettler, and Scholes 1970). We predict a positive coefficient on STD_CFO and COVCFO because firms with more volatile cash flows from operations are considered to be more risky firms. We expect CFO, SIZE and DIVPAYER to be negatively related to BETA because firms with better operating performance, large firms, and more mature firms are expected to be less risky. We expect a positive coefficient on LEV because firms with greater financial risk are expected to have greater market risk. In addition, we expect a positive coefficient on INDBETA because firms that operate in riskier industries are expected to have greater market risk. Similar to our I_RISK analysis, we make no prediction on the association between BM and BETA because BM can proxy for growth or for financial distress.

The Model 1 column of Table 5 displays the results of estimating equation (6). Consistent with expectations, we find a significantly positive coefficient on STD_CFO and significantly negative coefficients on CFO and DIVPAYER, indicating that firms with more volatile operation, firms with weak operating performance and less mature firms exhibit larger market risk. Similar to the results presented in Table 4, we find a significantly negative coefficient on LEV. However, when we eliminate firms with little or no debt in their capital structure, the coefficient on LEV becomes insignificant. Inconsistent with expectations, we find a positive coefficient on SIZE. As noted earlier, many of the firm fundamentals in our risk models are highly correlated. A reduced form estimate of equation (6) that excludes DIVPAYER, yields a negative relation between SIZE and BETA as shown in prior research (Beaver et al. 1970).

The key result reported in Model 1 of Table 5 is the positive coefficient on ICD that indicates that firms with ineffective internal control exhibit higher BETAs relative to firms with effective internal control after controlling for known sources of beta risk. Furthermore, results of estimating the model that controls for known risk factors and ICD determinants (equation 7), which are reported in the Model 2 column of Table 5, provide additional evidence that firms with ineffective internal control, and therefore greater information risk, have greater market risk as the coefficient on ICD is positive and significant at conventional levels.[14]

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[14] It is possible that historical measures of the level of cash flows (CFO), the standard deviation of cash flows (STD_COV), and the covariance of cash flows (COVCFO) in equations (6) and (7) may be picking up some of the indirect effects of accounting quality differences discussed in Lambert et al. However, to the extent that better controls limit manager appropriation of firm assets, we expect this effect to show up in higher *expected* end of period cash flows [i.e., the numerator of equation (2)]. Since the cash flow measures included in the I_RISK and BETA specifications are based on *historical* data, the ICD measure is still likely to capture the indirect effects of weak controls because these effects are forward-looking.

Overall, the results reported in Tables 4 and 5 suggest that firms with ineffective internal control present greater information risk to investors, as investors assess larger variances in cash flows (I_RISK) and covariances in cash flows (BETA) as a result of firms' low quality financial information (Lambert et al. 2006).

Our third cross-sectional analysis focuses on firms' cost of equity. Our general hypothesis is that firms with ineffective internal control will exhibit higher cost of equity relative to firms with strong internal controls. Based on prior research (Botosan 1997; Francis et al. 2004; Ashbaugh-Skaife, Collins, and LaFond 2006), we use firms' expected rate of return, as reported in *Value Line*, as our measure of the cost of equity. *Value Line* issues four reports each calendar year. Between reports, however, *Value Line* updates the price information contained in their database and subsequently recalculates its estimate of expected returns. There is some variability in the updating of prices within the *Value Line* database. Some firms are updated each month resulting in twelve expected return estimates for a given fiscal year, while others are updated less frequently. We estimate the cost of equity as the simple average of the *Value Line* expected return measures over the fiscal year.[15]

Theoretical and empirical research indicates that a "good" measure of expected return will be positively related to beta and the book-to-market ratio and negatively related to size (Sharpe 1964; Linter 1965; Black 1972; Berk 1995; Fama and French 2004; Botosan and Plumlee 2004). Guay, Kothari, and Shu (2003) suggest evaluating cost of equity measures based on the association between measures of expected returns and realized

[15] Our results are robust to setting the cost of equity to the median expected return over the firm's fiscal year, and using only the first (or last) expected return for a given *Value Line* report period. The correlations across various measures of expected return based on different requirements of price updating exceed 0.95.

returns. They posit that expected returns, on average, should equal realized returns if investors' expected returns reflect rational expectations. In assessing the validity of *Value Line's* expected returns as a proxy for firms' cost of capital, we find that the *Value Line* expected returns exhibit a positive (negative) and significant association with beta and the book-to-market ratio (size), as expected. In addition, the *Value Line* cost of capital measure meets the Guay et al. (2003) rational expectations test.[16] Thus, we consider *Value Line's* expected returns to be a valid estimate of firms' cost of equity for our sample and research objectives.

Table 6 displays the descriptive statistics for the cost of capital estimate (CC) and the risk measures that serve as control variables in our cost of capital tests; BETA, SIZE, BM, and I_RISK. The mean (median) CC value for ICD firms is 15.006% (13.750%) whereas the mean (median) CC value for the non-ICD firms is significantly less (12.523% and 11.500%, respectively). The univariate tests also indicate that both the means and medians for BETA, BM and I_RISK are larger for the ICD firms. However, on average, ICD firms are smaller than non-IDC firms based on market value of equity.

As an initial test of our predictions regarding the effects of ICDs on the cost of equity, we use the following model:

$$CC = \beta_0 + \beta_1 ICD + \beta_2 SIZE + \beta_3 BM + \varepsilon \qquad (8)$$

[16] Botosan and Plumlee (2004) conclude that the *Value Line* cost of capital estimate and the PEG ratio (see Easton 2004) are equally valid estimates of firms' cost of equity capital. However, the PEG ratio estimate potentially has drawbacks in our setting. Specifically, to derive a cost of equity estimate the PEG ratio requires positive and increasing earnings forecasts. This introduces a potentially serious sample selection bias against ICD firms as Ashbaugh-Skaife et al. (2006) and Doyle et al. (2006) find that ICD firms have a much higher incidence of losses than non-ICD firms. We examine the implications of the PEG ratio's positive earnings and positive earnings growth requirements for the ICD firms in Section V.3.

where all variables are as previously defined. This simplified model that omits BETA and I_RISK allows us to measure both the indirect and direct effects of internal control problems on firms' cost of equity through the β_1 coefficient.

The Model 1 column of Table 7 reports the results of estimating equation (8). The signs of the coefficients on the risk factors are as expected in that we find that BM is positively and SIZE is negatively related to CC. We also find a significantly positive β_1 coefficient on ICD. Given our prior findings that ICD is positively correlated with BETA and I_RISK, this result suggests that the information risk resulting from ineffective internal control has both an indirect (through BETA and I_RISK) and direct effect on firms' cost of equity.

The Model 2 column of Table 7 reports the results of estimating equation (8) after expanding the CC model to include BETA and I_RISK. By controlling for these two additional risk measures, we provide evidence on the direct effects of ICDs on cost of equity.[17] The results indicate a positive and significant coefficient on BETA and I_RISK. However, with these two risk measures in the model, the coefficient on SIZE is no longer significant primarily because SIZE is highly negatively correlated with I_RISK.

Turning to the primary variable of interest, we once again find a significantly positive coefficient on ICD. This result supports our general hypothesis that firms with ICDs incur higher costs of equity than firms that do not. This finding provides empirical evidence consistent with the theoretical work of Lambert et al. (2006) who predict that firms with lower quality financial information will exhibit a higher cost of equity.

[17] As noted in Section II, the reason that ICDs can exhibit a direct effect on firms' cost of equity is because idiosyncratic risk and beta risk estimates based on historical data measure the information risk effects of ICDs with error (i.e., they are not based on forward-looking data as specified in the Lambert et al. (2006) framework).

To provide further evidence on the effect of ICDs on the cost of equity, we expand our CC model with the ICD determinants of the Ashbaugh-Skaife et al. (2006) model:

$$\begin{aligned} CC = {} & \beta_0 + \beta_1 ICD + \beta_2 BETA + \beta_3 SIZE + \beta_4 BM + \beta_5 I\_RISK + \beta_6 SEGMENTS + \\ & \beta_7 FOREIGN\_SALES + \beta_8 M\ \&\ A + \beta_9 RESTRUCTURE + \beta_{10} RGROWTH + \\ & \beta_{11} INVENTORY + \beta_{12} \%LOSS + \beta_{13} RZSCORE + \beta_{14} AUDITOR\_RESIGN + \\ & \beta_{15} RESTATEMENT + \beta_{16} AUDITOR + \beta_{17} INST\_CON + \beta_{18} LITIGATION + \varepsilon \end{aligned} \tag{9}$$

where all variables are as previously defined.

The third and fourth columns of Table 7 present the results of the cross-sectional CC model including the additional control variables (equation 9). The Model 3 column displays the results omitting BETA and I_RISK so as to assess the combined indirect and direct effects of ICDs on firms' cost of equity (reflected in β_1). The direct effects of internal control problems after controlling for firms' operating risk is assessed by examining the results reported in the Model 4 column of Table 7 that includes BETA and I_RISK. While the magnitude and significance of the coefficients on the ICD variable reported in the last two columns of Table 7 are reduced relative to the results in the Model 1 and Model 2 columns, we continue to find a positive and significant association between the cost of equity and ICD after controlling for ICD determinants that capture differences in firms' operating risks.

Collectively, the findings reported in Table 7 provide additional support for the notion that information risk due to ineffective internal control manifests in both indirect and direct effects on firms' cost of equity.

V.3 Change in Cost of Equity Analysis

The cross-sectional results reported above suggest that ineffective internal control is associated with higher cost of equity, but these results provide little basis for inferring causality. To help establish a causal relation between internal control deficiencies and cost of equity, we conduct five inter-temporal change tests. The first analysis tests whether there is a change in the cost of equity when firms first report an ICD under a SOX requirement. Furthermore, because the market holds expectations for the quality of firms' internal controls based on observable events (see Ashbaugh-Skaife et al. 2006; Doyle et al. 2006), we examine whether the magnitude of change in cost of equity is inversely related to the market's assessed likelihood that a firm will report an ICD.

We start by identifying the first ICD report date for 162 sample firms for which we have *Value Line* CC estimates both before and after the ICD report date and data necessary to estimate the ICD determinant model in Appendix 2 that is used to calculate the firm-specific probability of reporting an ICD (see Ashbaugh-Skaife et al. 2006 for a complete discussion of the variables used in the ICD determinant model). We then compare the CC estimate pre-disclosure to the CC estimate post-disclosure.[18] In addition, we divide the 162 firms into deciles based on the likelihood of reporting an ICD to assess whether there are differences in the magnitude of changes in cost of equity conditional on the likelihood of a firm reporting an ICD.

Panel A of Table 8 reports the mean and median cost of equity estimates for the 162 firms. We report both raw and market-adjusted CC estimates, where the market-adjusted cost of equity is the difference between the firm's cost of equity and the average cost of equity for all firms on *Value Line* not reporting an ICD over the same time interval. The descriptive statistics indicate that both raw and market-adjusted cost of equity increased after firms' first disclosure of an ICD.

[18] In Tables 8, 9, 10, and 11 we report the results using market-adjusted cost of equity measures, where market adjustments are made using all firms not reporting an ICD over the same time period. We also examine the change in the cost of equity using unadjusted and industry-adjusted cost of capital measures and find similar results.

Panel B of Table 8 reports the mean (median) firm-specific change in cost of equity for the 162 firms is 0.927% (1.042%),[19] which is significantly different from zero at the 0.02 level.[20] In addition, Panel B of Table 8 reports the firm-specific change in cost of equity for sub-samples of the 162 firms, where sub-samples are defined by the likelihood of disclosing an ICD (where firms in the lower three deciles are deemed less likely and firms in upper three deciles are deemed more likely). As expected, we find that the cost of equity increase following the ICD report is greater for firms deemed less likely to report an ICD (1.254% and significant at the 0.06 level) relative to firms deemed more likely to report ICDs (0.490% and not significant at conventional levels).

To validate this cost of equity change analysis, we examine the association between the stock market reaction (BHAR) associated with the initial ICD disclosures reported in Table 3 and the change in CC for the 162 firms that have data to estimate the following OLS regression:

$$BHAR = \beta_0 + \beta_1 \Delta CC + \varepsilon \qquad (10)$$

where ΔCC is equal to the Post-First-ICD CC less the Pre-First-ICD CC, and all other variables are as previously defined.

The results reported in Panel C of Table 8 indicate a negative and significant coefficient on ΔCC. In the cross-section, firms with a larger negative market reaction on the initial disclosure of an ICD exhibit a larger increase in cost of equity. This finding

[19] We note that this estimated change in cost of equity of roughly 100 basis points is comparable to the estimated change in cost of equity associated with restatements documented by Hribar and Jenkins (2004) who report cost of equity changes of 100 to 150 basis points. Restatements are often a direct result of ineffective internal control.

[20] We also find that the mean (median) cost of equity increase was greater for firms disclosing relatively lesser ICDs, i.e., significant deficiency/control deficiency relative to firms that reported material weaknesses in internal control (1.632% versus 0.733%, respectively), but the difference is not statistically significant.

provides additional evidence that changes in firms' cost of equity are the result of firms' disclosure of ICDs to the market. Based on the results reported in Table 8, we conclude that the initial revelation of an ICD results in investors assigning a higher cost of equity to firms and that this revision in cost of equity is greater for firms that were least likely to report an ICD based on observable firm characteristics.

As a second test to link ICD disclosures to changes in firms' cost of equity, we investigate whether there is a change in the cost of equity when investors learn that firms have remediated their ICDs. Specifically, we examine the change in the cost of equity surrounding the release of an unqualified SOX 404 opinion for the sample of firms that previously disclosed an ICD under SOX 302. In conducting this analysis, we require firms to have at least two months between the release of the SOX 302 ICD and the unqualified SOX 404 audit opinion to ensure that investors had sufficient time to revise their cost of equity estimates.

Panel A of Table 9 reports descriptive statistics on the cost of equity for the 38 "remediation" firms with sufficient *Value Line* data to conduct our change analysis. We posit that when investors receive confirmation from a firm's independent auditor that prior ICDs have been resolved, the information risk they face goes down leading to a reduction in the firm's cost of equity. Consistent with this prediction, we find that the mean (median) cost of equity (both raw and market-adjusted) decreases from the 180 days prior to the 180 days after the filing of the unqualified SOX 404 opinion. In addition, the results reported in Panel B of Table 9 indicate that there was a significant reduction in remediation firms' market-adjusted cost of equity following release of the unqualified SOX 404 opinion (mean change = -1.513%, median change = -1.313%).

Collectively, the findings reported in Table 9 are consistent with the market responding to the reduction in information risk due to improved internal control by reducing firms' cost of equity.

In contrast to the remediating firms, our third change test investigates whether the cost of equity changes for the 50 ICD firms with necessary *Value Line* data that failed to remediate their ICDs as evidenced by receiving an adverse SOX 404 opinion for the period after the ICD disclosure. For these firms, one might expect no increase in cost of equity at the release of an adverse SOX 404 opinion because the market had already increased its cost of equity assessments to reflect the initial ICD disclosure (Table 8). Alternatively, there may be a modest increase in cost of equity because the adverse SOX 404 audit opinion may indicate that the firm was unwilling or unable to remediate their internal control problems or perhaps new ICDs have surfaced upon closer scrutiny by the auditor. In Panel A of Table 10, we report descriptive statistics on raw and market-adjusted CC for the 50 firms that failed to remediate prior to the SOX 404 audit. Panel B of Table 10 reports the mean and median market adjusted ΔCC around the SOX 404 audit opinion. We find a modest, but insignificant, increase in cost of equity around the adverse opinion release (mean=0.671%, median=0.146%).[21]

Our last set of inter-temporal change tests uses the "control sample" of firms that did not disclose ICDs under SOX 302 or 404 and received unqualified SOX 404 opinions, i.e., firms that never reported internal control problems and the effectiveness of internal controls is confirmed by an independent review by the outside auditor. Following the work in Ashbaugh-Skaife et al. (2006) and Doyle et al. (2006), we posit that the market

[21] One explanation for the lack of significance in the observed change in the cost of equity is the relatively small sample size that reduces the power of our test.

set expectations for the quality of firms' internal controls based on observable economic events or firm characteristics prior to receiving the SOX 404 audit report. Our final change analyses investigates whether there were changes in cost of equity around the release of an unqualified SOX 404 report for firms that investors expected (did not expect) to report an ICD.

Panel A of Table 11 displays descriptive statistics for the cost of equity pre- and post-issuance of the unqualified SOX 404 opinion for the 685 non-ICD firms with available expected returns from *Value Line*. In Panel B of Table 11, we partition the sample based on the likelihood of a firm reporting an ICD. We find the sub-sample of firms most likely to report an ICD (top three deciles) exhibit a significant reduction in the cost of equity following the release of an unqualified SOX 404 opinion. Specifically, the mean change in the market-adjusted cost of capital is -1.159% (significant at $p = 0.01$) and the median change is -0.583% (significant at $p = 0.05$). In contrast, we find no significant change in cost of equity for the firms least likely to report an ICD (bottom three deciles). Thus, the market appears to reward firms expected to have ineffective controls after the SOX 404 opinion confirms internal control effectiveness. This finding provides evidence that the reporting requirements of SOX 404 provide a cost of equity benefit to firms with effective internal controls.

In summary, the results presented in Tables 8-11 provide evidence consistent with the revelation of information about ICD changes causing significant revisions to investors' assessment of information risk, which is consistent with the theoretical arguments presented in Lambert et al. (2006). Our findings that the cost of equity declined for (1) firms that remediated their ICDs and (2) firms expected to report an ICD but did not, suggest that the market values the reduction in information risk that results from effective internal control. Furthermore, our finding that the cost of equity does not change for non-remediating firms mitigates concerns that our results are driven by factors unrelated to information risk. Collectively, our results provide evidence consistent with ineffective internal controls causing investors to assess higher information risk and a higher cost of equity.

V.4 Robustness Tests

V.4.1 Accrual Quality versus ICD

A primary objective of strong internal control over financial reporting is high quality financial information. There is evidence to suggest that firms with ineffective internal controls have low quality accruals relative to firms operating with effective internal controls (e.g. Doyle et al. 2007; Ashbaugh-Skaife et al. 2007). Prior research suggests that firms with low quality accruals have higher costs of equity (Francis et al. 2005). To assess whether the presence of an ICD results in greater information risk beyond that of poor accruals quality, we re-estimate equations (5), (7), and (9) including two accruals quality variables: abnormal accruals and noise in working capital accruals. Abnormal accruals (AA) are defined as the absolute value of performance adjusted abnormal accruals as estimated by the modified Jones model (see Ashbaugh, Mayhew, and LaFond 2003). The noise in working capital accruals (ACCRUAL_NOISE) is defined as in Dechow and Dichev (2002).

In untabled results, we find, as expected, positive coefficients on AA and ACCRUAL_NOISE indicating that poor accruals quality increases firm's idiosyncratic and systematic risk. However, we find no association between AA and

ACCRUAL_NOISE in the cost of equity cross-sectional analysis. More importantly, after controlling for the quality of firms' accruals, we continue to find a significantly positive coefficient on ICD in all three analyses.

V.4.2 Consequences of Misspecification of ICD Model and Misclassification of ICD Firms

In addition to our paper, Ogneva, Subramanyam, and Raghunandan (hereafter referred to as OSR) (2006) also examine the implications of SOX 404 internal control reporting for cost of equity. They view ICDs as having two potential effects on the cost of equity. The first arises from information risk associated with ineffective internal control and the second arises from ICDs being inherently more likely for firms facing greater operating risk. OSR find that the cost of equity effect of ICDs disappears after controlling for beta and factors associated with an increased likelihood of reporting internal control deficiencies. Based on this finding, OSR conclude that ICDs do not have a direct effect on the cost of equity. However, as noted earlier, measuring the cost of equity effects after controlling for beta ignores the effects that ICDs may have on cost of equity through beta risk (Lambert et al. 2006).

One potential explanation for the "no association" result in the OSR paper is due to their research design choice to look ahead to determine their coding of firms' internal control status. OSR partition firms into ICD and non-ICD samples based on their fiscal year 2004 SOX 404 audit opinion released in 2005. OSR's ICD sample is defined as firms receiving adverse SOX 404 opinions whereas their non-ICD sample is comprised of all other firms receiving unqualified SOX 404 opinions and having the necessary data to estimate their model. OSR measure firms' cost of equity at June 2004 when the 2004 SOX 404 audit opinions were not known to the market. Because OSR's classification of

ICD and non-ICD firms is based on firms' 2004 SOX 404 opinions that were issued from six months up to a year and a half after the date used to compute implied cost of capital (June 2004), their partitioning of ICD and non-ICD samples imparts a "look-ahead" bias for firms that reported ICDs under SOX 302 but subsequently received an unqualified SOX 404 opinion that works in favor of finding no significant differences in cost of equity between their ICD and non-ICD samples.

To investigate whether the look-ahead misclassification of firms affects the inferences drawn from the OSR analysis, we replicate the OSR approach using our data. We estimate firms' cost of equity using the OSR measure, the PEG ratio (CC_PEG), and follow their procedure for partitioning firms based on the 2004 SOX 404 audit opinion. We use a new variable, labeled WEAK (coded one for firms with adverse 2004 SOX 404 opinions and zero otherwise) to distinguish between OSR's classification of firms from our classification of firms with ineffective internal control (i.e., our ICD variable) and estimate the following OLS regression:

$$\begin{aligned} CC\_PEG = {} & \beta_0 + \beta_1 WEAK + \beta_2 BETA + \beta_3 SIZE + \beta_4 BM + \beta_5 I\_RISK \\ & + \beta_6 SEGMENTS + \beta_7 FOREIGN\_SALES + \beta_8 M\ \&\ A \\ & + \beta_9 RESTRUCTURE + \beta_{10} RGROWTH + \beta_{11} INVENTORY \\ & + \beta_{12} \%LOSS + \beta_{13} RZSCORE + \beta_{14} AUDITOR\_RESIGN \\ & + \beta_{15} RESTATEMENT + \beta_{16} AUDITOR + \beta_{17} INST\_CON \\ & + \beta_{18} LITIGATION + \varepsilon \end{aligned} \tag{11}$$

where CC_PEG is defined as the cost of capital measure using the PEG ratio, where the PEG ratio is equal to:

$$CC\_PEG = \sqrt{\frac{eps_2 - eps_1}{P_0}} \tag{12}$$

where P_0 is the price at the end of June 2004 and eps is equal the median consensus forecast for one and two years ahead (these inputs are identical to ORS).

The Model 1 column of Table 12 reports the results of estimating equation 11. We identify 1,127 firms that have the necessary data to estimate CC_PEG. Of those 1,127 firms, 163 received adverse 2004 SOX 404 opinions and the remainder received unqualified SOX 404 opinions. The coefficient on WEAK is insignificant, suggesting that there is no significant difference in the cost of equity (CC_PEG) of ICD and non-ICD firms using OSR's classification scheme.

The Model 2 column of Table 12 displays the results after appropriately reclassifying 76 firms classified under the OSR criterion as non-ICD or "control" firms that received unqualified SOX 404 audit opinions in 2005, but had previously disclosed ICDs under SOX 302 in 2004. The reclassification results in 239 ICD firms and 888 non-ICD firms. The results of estimating equation 11 using the correct classification of firms indicate a positive and significant coefficient on the ICD variable. Furthermore, the results indicate that ICD firms have a higher implied cost of capital of roughly 45 basis points relative to non-ICD firms when using the PEG ratio as the estimate of firms' cost of equity.

In summary, the OSR paper and our paper are similar in that both studies include cross-sectional analyses of the cost of equity effects of internal control quality. However, the studies are different in two ways. First, our cross-sectional research design does not suffer from the misclassification look-ahead bias present in OSR. Second, our study goes beyond OSR by conducting inter-temporal firm-specific change analyses around two events—the initial disclosure of an ICD and the receipt of a SOX 404 audit opinion--that provide stronger tests of the cost of equity consequences of internal control reporting.

VI. Conclusions

Effective internal controls are fundamental to high quality information systems and high quality financial information. The recent theoretical work of Lambert et al. (2006) suggests that the quality of firms' information systems, which includes internal control over financial reporting, has both a direct and indirect effect on the cost of equity. We use the unique setting provided by SOX that requires firms to disclose ICDs and have independent audits of their internal control to empirically test whether the effectiveness of firms' internal control affects idiosyncratic risk, beta risk, and costs of equity.

In cross-sectional tests, we find that firms with ICDs exhibit significantly higher betas, idiosyncratic risk and cost of capital relative to firms not reporting ICDs. These differences persist after controlling for other factors that prior research has shown to be related to these risk measures. We also structure inter-temporal change analysis tests designed to investigate whether initial disclosure, repeated disclosure, or remediation of internal control problems cause predictable changes in firms' cost of equity capital.

Our findings indicate that firms that disclose ineffective internal control experience a significant increase in market-adjusted cost of capital and firms that subsequently improve their internal control as evidenced by an unqualified SOX 404 audit opinion exhibit a decrease in market-adjusted cost of capital. Thus, this study provides evidence that internal control risk matters to investors and firms reporting effective internal control or firms that remediate known internal control problems benefit from lower costs of equity beyond that predicted by other risk factors.

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Appendix 1 Variable Definitions

BETA	Beta measured as the coefficient on *RMRF* from the following model: $EXRET = \beta_0 + \beta_1 RMRF + \varepsilon$ estimated over the 60 months prior to the firm's 2004 fiscal year-end, requiring minimum of 18 months. EXRET is the firm's monthly return minus the risk free rate, RMRF is the excess return on the market (source http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html).
BM	Book to market measured as book value of equity (Compustat #60) divided by market value of equity (Compustat #199* Compustat #25) at the firm's 2004 fiscal year end.
CC	Cost of capital defined as the average annual *Value Line* 3 to 5 year expected return over the 12 months encompassing the firm's 2004 fiscal year.
CFO	Cash flow from operations measured as cash flow from operations (Compustat #308) scaled by total assets (Compustat #6) reported in the firm's 2004 fiscal year end.
COVCFO	The covariance of the firm's cash flows with the market cash flows, calculated using quarterly cash flows from operations using 2004 and the prior four fiscal years, requiring a minimum of three years (12 quarters) of data, scaled by total assets of the firm (market). This variable is multiplied by 1000.
DIVPAYER	One if the firm pays dividends (Compustat # 21), zero otherwise in its 2004 fiscal year.
ICD	One if the firm disclosed an internal control deficiency, and zero otherwise.
INDBETA	Industry Beta measured as the coefficient on *RMRF* from the following model: $INDRET = \beta_0 + \beta_1 RMRF + \varepsilon$ estimated over the 60 months prior to the firm's 2004 fiscal year-end, requiring minimum of 18 months. INDRET is the monthly value weighted return on a portfolio of firms in the same industry (3, 2, and 1 digit SIC codes requiring at least 10 firms in the industry) minus the risk free rate, RMRF is the excess return on the market (source http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html).
I_RISK	Idiosyncratic risk measured as the standard deviation of the residuals from the following model estimated over the 2004 and prior four years using monthly returns: $EXRET = \beta_0 + \beta_1 RMRF + \varepsilon$ EXRET is the firm's monthly return minus the risk free rate, RMRF is the excess return on the market (source http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html).
LEV	Leverage measured as total debt (Compustat #9 plus Compustat #34) divided by total assets (Compustat #6) at the firm's 2004 fiscal year end.
RET	The buy and hold return over the fiscal year.
SIZE	Natural log of 2004 fiscal year end market value of equity (Compustat #25 * Compustate #199).
STDCFO	Standard deviation of cash flow from operations defined as cash flows from operations (Compustat #308) divided by total assets (Compustat #6), where the standard deviation is calculated using 2004 and the prior four fiscal years, requiring a minimum of three years of data.

Appendix 2: ACK Internal Control Model

Variables	Predicted Sign	
INTERCEPT		-3.752***
SEGMENTS	+	0.078***
FOREIGN_SALES	+	0.466***
M&A	+	0.177**
RESTRUCTURE	+	0.296***
RGROWTH	+	0.064***
INVENTORY	+	0.785***
SIZE	-	-0.048***
%LOSS	+	0.192*
RZSCORE	-	-0.016
AUDITOR_RESIGN	+	1.506***
AUDITOR	+	0.965***
RESTATEMENT	+	0.470***
INST_CON	+	0.085**
LITIGATION	+	0.263***
Likelihood ratio χ^2		233.53***
Percent Concordant		66.3
Percent Discordant		33
N		4810

The dependent variable is set equal to one if the firm discloses an internal control deficiency, and zero otherwise. The independent variables are defined as follows: SEGMENTS is the number of reported business segments in 2003 (Compustat Segment file),FOREIGN_SALES is equal to one if a firm reports foreign sales in 2003, and zero otherwise(Compustat Segment file), M&A equals one if a firm is involved in a merger or acquisition from 2001 to 2003, and zero otherwise (Compustat AFNT #1), RESTRUCTURE equals one if a firm was involved in a restructuring from 2001 to 2003, and zero otherwise (this variable is coded one if any of the following Compustat data items are non-zero: 376, 377, 378 or 379), RGROWTH is the decile rank of average growth rate in sales from 2001 to 2003 (the percent change in Compustat #12), INVENTORY is the average inventory to total assets from 2001 to 2003 (Compustat #3/ Compustat #6), SIZE is the average market value of equity from 2001 to 2003 in $ billions (Compustat #199 * #25), %LOSS is the proportion of years from 2001 to 2003 that a firm reports negative earnings, RZSCORE is the decile rank of Altman (1980) z-score measure of distress risk, AUDITOR_RESIGN equals one if the auditor resigned from the client in 2003, zero otherwise (8-K filings), RESTATEMENT equals one if a firm had a restatement or an SEC AAER from 2001 to 2003 and zero otherwise, LITIGATION is coded one if a firm was in a litigious industry—SIC codes 2833 to 2836; 3570 to 3577; 3600 to 3674; 5200 to 5961; and 7370, and zero otherwise, INST_CON is the percentage of shares held by institutional investors divided by the number of institutions that own the stock as of December 31, 2003 (Thomson Financial Securities Data) multiplied by 100 to make the coefficient more comparable to other parameter estimates, and AUDITOR is coded one if the firm engaged one of the largest six audit firms for 2003, and zero otherwise (Compustat 149), where the largest six audit firms include PWC, Deloitte & Touche, Ernst & Young, KPMG, Grant Thornton and BDO Seidman.

Table 1
Internal Control Deficiencies Samples

	n
Firms disclosing an internal control deficiency (ICD) under SOX 302 or disclosing an internal control deficiency (ICD) under SOX 404 and concurrently receiving an adverse SOX 404 opinion "ICD firms"	1,053
ICD firms having the necessary data to conduct the market reaction analyses	787
ICD firms having the necessary data to conduct the cross-sectional idiosyncratic risk and market risk analyses	587
ICD firms having the necessary data to conduct the cross-sectional cost of equity analysis	221
ICD firms having the necessary data to conduct the cost of equity change analysis surrounding the issuance of the first ICD disclosure	162
ICD firms remediating their ICD and having the necessary data to conduct a change in cost of equity analysis "Remediation sample"	38
ICD firms not remediating their ICD and having the necessary data to conduct a change in cost of equity analysis "No-remediation sample"	50

Table 2
Descriptive Statistics on Variables used in the Idiosyncratic Risk and Beta Analyses

Panel A: Descriptive Statistics for ICD Firms and Non-ICD (control) Firms

ICD Firms (n=587)

	Mean	Median	Q1	Q3	Std Dev
I_RISK	**0.182**	**0.168**	0.118	0.230	0.085
BETA	**1.466**	**1.205**	0.627	2.063	1.100
STD_CFO	0.081	0.055	0.032	0.099	0.089
LEV	0.199	0.144	0.007	0.316	0.219
CFO	**0.023**	**0.047**	-0.009	0.108	0.179
BM	0.484	0.437	0.267	0.659	0.349
SIZE	**5.935**	**5.836**	4.860	6.952	1.705
DIVPAYER	**0.230**	**0.000**	0.000	0.000	0.421
RET	**0.159**	**0.101**	-0.204	0.399	0.545
COVCFO	**0.022**	0.013	-0.008	0.040	0.056
INDBETA	**1.193**	**1.097**	0.550	1.821	0.676

Control (non-ICD) Firms (n=3,024)

	Mean	Median	Q1	Q3	Std Dev
I_RISK	**0.160**	**0.140**	0.095	0.209	0.083
BETA	**1.235**	**0.963**	0.469	1.772	1.028
STD_CFO	0.080	0.054	0.028	0.094	0.094
LEV	0.201	0.151	0.007	0.312	0.215
CFO	**0.041**	**0.073**	0.015	0.131	0.190
BM	0.463	0.409	0.251	0.625	0.320
SIZE	**6.293**	**6.245**	4.819	7.606	1.969
DIVPAYER	**0.358**	**0.000**	0.000	1.000	0.479
RET	**0.256**	**0.174**	-0.066	0.441	0.547
COVCFO	**0.017**	0.009	-0.008	0.034	0.054
INDBETA	**1.044**	**0.921**	0.449	1.558	0.663

Bold text indicates that the ICD firms' values are significantly different from the non-ICD firms' values, (0.05 level or better two-tailed). Differences in means (medians) are assessed using a t-test (Wilcoxon rank sum test). Variables are measured as of firm's fiscal 2004 year end. See Appendix 1 for variable definitions.

Table 2 continued

Panel B: Correlations (Pearson (top) Spearman (bottom))

	ICD	I_ RISK	BETA	STD_ CFO	LEV	CFO	BM	SIZE	DIV- PAYER	RET	COV- CFO	IND- BETA
ICD		**0.09**	**0.08**	0.00	0.00	**-0.04**	0.02	**-0.07**	**-0.10**	**-0.07**	**0.03**	**0.08**
I_RISK	**0.11**		**0.64**	**0.46**	**-0.14**	**-0.41**	**-0.18**	**-0.46**	**-0.55**	**-0.03**	**0.05**	**0.31**
BETA	**0.08**	**0.65**		**0.28**	**-0.16**	**-0.27**	**-0.15**	**-0.11**	**-0.41**	**-0.13**	0.01	**0.51**
STD_CFO	0.02	**0.58**	**0.41**		**-0.14**	**-0.39**	**-0.21**	**-0.29**	**-0.28**	**-0.06**	**0.21**	**0.12**
LEV	-0.01	**-0.24**	**-0.22**	**-0.30**		-0.02	**-0.09**	**0.11**	**0.11**	**0.04**	**-0.08**	**-0.21**
CFO	**-0.09**	**-0.34**	**-0.26**	**-0.19**	**-0.03**		**0.08**	**0.33**	**0.24**	**0.21**	**0.13**	**-0.03**
BM	0.03	**-0.18**	**-0.16**	**-0.23**	0.03	**-0.13**		**-0.23**	**0.04**	**-0.18**	**-0.05**	**-0.03**
SIZE	**-0.07**	**-0.49**	**-0.12**	**-0.39**	**0.19**	**0.37**	**-0.19**		**0.42**	**0.05**	**-0.03**	**-0.09**
DIVPAYER	**-0.10**	**-0.63**	**-0.44**	**-0.41**	**0.16**	**0.24**	**0.07**	**0.41**		**0.04**	**-0.05**	**-0.27**
RET	**-0.08**	**-0.18**	**-0.21**	**-0.15**	**0.10**	**0.26**	**-0.16**	**0.16**	**0.14**		0.02	**-0.11**
COVCFO	0.03	**0.04**	0.01	**0.08**	**-0.06**	**0.12**	**-0.06**	-0.02	**-0.04**	0.03		**0.03**
INDBETA	**0.08**	**0.33**	**0.50**	**0.23**	**-0.22**	**-0.05**	-0.02	**-0.09**	**-0.26**	**-0.14**	**0.05**	

Bold text indicates significance at the 0.05 level or better two-tailed. ICD equals one for firms that report an internal control problem and zero otherwise. See Appendix 1 for other variable definitions.

Table 3
Market Reaction to Signals on Internal Control Quality

Panel A: Market Reaction to First Internal Control Deficiency Disclosure

	Mean 3-day BHAR	Median 3-day BHAR
ICD (n=787)	-0.76%***	-0.41%**

Panel B: OLS Regression Testing for Differences in Market Reactions between Types of ICDs

$$BHAR = \beta_0 + \beta_1 MW + \varepsilon$$

	Predicted Sign	Coefficient Estimate
INTERCEPT		-0.001
MATERIAL_WEAKNESS	-	-0.008
Adjusted R^2		0.00
n		787

BHAR is equal to the three-day (-1, 0, +1) market-adjusted event return, where day zero is the date of the first ICD disclosure. MATERIAL_WEAKNESS is coded one for ICDs that are reported as material weaknesses in internal control, and zero for significant deficiencies or control deficiencies. ***, **, indicates significance at the 0.01 and 0.05 levels. Differences in means (medians) are assessed using a t-test (one-sample median test), testing whether the mean and median values are significantly different form zero.

Table 4
Internal Control Deficiencies and Idiosyncratic Risk

Model 1

$$I\_RISK = \beta_0 + \beta_1 ICD + \beta_2 STD\_CFO + \beta_3 LEV + \beta_4 CFO + \beta_5 BM + \beta_6 SIZE + \beta_7 DIVPAYER + \beta_8 RET + \varepsilon$$

Model 2

$$I\_RISK = \beta_0 + \beta_1 ICD + \beta_2 STD\_CFO + \beta_3 LEV + \beta_4 CFO + \beta_5 BM + \beta_6 SIZE + \beta_7 DIVPAYER + \beta_8 RET + \beta_9 SEGMENTS + \beta_{10} FOREIGN\_SALES + \beta_{11} M\ \&\ A + \beta_{12} RESTRUCTURE + \beta_{13} RGROWTH + \beta_{14} INVENTORY + \beta_{15} \%LOSS + \beta_{16} RZSCORE + \beta_{17} AUDITOR\_RESIGN + \beta_{18} RESTATEMENT + \beta_{19} AUDITOR + \beta_{20} INST\_CON + \beta_{21} LITIGATION + \varepsilon$$

	Predicted Sign	Model 1	Model 2
INTERCEPT		0.266***	0.290***
ICD	+	0.010***	0.005**
STD_CFO	+	0.161***	0.106***
LEV	+	-0.029***	-0.037***
CFO	-	-0.073***	-0.003
BM	+/-	-0.046***	-0.033***
SIZE	-	-0.011***	-0.015***
DIVPAYER	-	-0.060***	-0.034***
RET	+/-	0.002	0.006***
SEGMENTS			-0.002**
FOREIGN_SALES			-0.001
M&A			0.005**
RESTRUCTURE			0.008***
RGROWTH			0.002***
INVENTORY			-0.008
%LOSS			0.055***
RZSCORE			-0.004***
AUDITOR_RESIGN			0.009
RESTATEMENT			0.002
AUDITOR			-0.003
INST_CON			-0.014***
LITIGATION			0.019***
Adjusted R^2		0.49	0.57
n		3,611	2,735

***, **, *, indicates significance at the 0.01, 0.05, 0.10 levels. See Appendix 1 and Appendix 2 for variable definitions. Variables measured as of firm's fiscal 2004 year end.

Table 5
Internal Control Deficiencies and Systematic Risk (Beta)

Model 1

$$BETA = \beta_0 + \beta_1 ICD + \beta_2 STD\_CFO + \beta_3 LEV + \beta_4 CFO + \beta_5 BM + \beta_6 SIZE + \beta_7 DIVPAYER + \beta_8 COVCFO + \beta_9 INDBETA + +\varepsilon$$

Model 2

$$BETA = \beta_0 + \beta_1 ICD + \beta_2 STD\_CFO + \beta_3 LEV + \beta_4 CFO + \beta_5 BM + \beta_6 SIZE + \beta_7 DIVPAYER + \beta_8 COVCFO + \beta_9 INDBETA + \beta_{10} SEGMENTS + \beta_{11} FOREIGN\_SALES + \beta_{12} M\&A + \beta_{13} RESTRUCTURE + \beta_{14} RGROWTH + \beta_{15} INVENTORY + \beta_{16} \%LOSS + \beta_{17} RZSCORE + \beta_{18} AUDITOR\_RESIGN + \beta_{19} RESTATEMENT + \beta_{20} AUDITOR + \beta_{21} INST\_CON + \beta_{22} LITIGATION + \varepsilon$$

	Predicted Sign	Model 1	Model 2
INTERCEPT		0.446***	0.599***
ICD	+	0.068**	0.048*
STD_CFO	+	1.214***	0.803***
LEV	+	-0.225***	-0.447***
CFO	-	-1.010***	-0.200**
BM	+/-	-0.205***	-0.042
SIZE	-	0.064***	0.029**
DIVPAYER	-	-0.585***	-0.355***
COVCFO	+	-0.364	-0.149
INDBETA	+	0.654***	0.481***
SEGMENTS			-0.057***
FOREIGN_SALES			0.102***
M&A			0.045
RESTRUCTURE			0.156***
RGROWTH			0.001
INVENTORY			-0.292**
%LOSS			0.795***
RZSCORE			-0.033***
AUDITOR_RESIGN			0.185
RESTATEMENT			0.036
AUDITOR			0.112*
INST_CON[a]			-0.172***
LITIGATION			0.184***
Adjusted R^2		0.41	0.51
n		3,611	2,735

***, **, *, indicates significance at the 0.01, 0.05, 0.10 levels. See Appendix 1 and Appendix 2 for variable definitions.

Table 6
Descriptive Statistics for Cost of Equity Sub-samples

ICD Firms (n=221)

	Mean	Median	Q1	Q3	Std Dev
CC	**15.006**	**13.750**	10.500	18.125	6.370
BETA	**1.367**	**1.108**	0.556	1.999	1.057
SIZE	**7.349**	**7.158**	6.428	8.242	1.447
BM	**0.495**	**0.460**	0.285	0.632	0.278
I_RISK	**0.140**	**0.129**	0.095	0.175	0.064

Non-ICD Firms (n=1,183)

	Mean	Median	Q1	Q3	Std Dev
CC	**12.523**	**11.500**	8.750	15.000	5.477
BETA	**1.011**	**0.757**	0.378	1.410	0.891
SIZE	**8.025**	**7.896**	6.961	8.995	1.478
BM	**0.427**	**0.401**	0.260	0.569	0.230
I_RISK	**0.117**	**0.100**	0.078	0.140	0.057

Bold text indicates that the ICD Firms' values are significantly different from the non-ICD firms' values (0.05 level or better two-tailed). Differences in means (medians) are assessed using a t-test (Wilcoxon rank sum test). See Appendix 1 for variable definitions.

Table 7
Internal Control Deficiencies and Cost of Equity

$$CC = \beta_0 + \beta_1 ICD + \beta_2 BETA + \beta_3 SIZE + \beta_4 BM + \beta_5 I\_RISK + \beta_6 SEGMENTS + \beta_7 FOREIGN\_SALES + \beta_8 M\&A + \beta_9 RESTRUCTURE + \beta_{10} RGROWTH + \beta_{11} INVENTORY + \beta_{12} \%LOSS + \beta_{13} RZSCORE + \beta_{14} AUDITOR\_RESIGN + \beta_{15} RESTATEMENT + \beta_{16} AUDITOR + \beta_{17} INST\_CON + \beta_{18} LITIGATION + \varepsilon$$

	Predicted Sign	Model 1	Model 2	Model 3	Model 4
INTERCEPT		17.933***	7.375***	18.674***	12.783***
ICD	+	1.938***	1.141***	0.781**	0.667**
BETA	+		1.355***		0.879***
SIZE	-	-0.719***	-0.063	-0.720***	-0.390**
BM	+	0.849***	2.358***	2.823***	3.209***
I_RISK	+		27.992***		15.446***
SEGMENTS				-0.167	-0.056
FOREIGN_SALES				-0.962**	-0.854*
M&A				-0.317	-0.455*
RESTRUCTURE				0.070	-0.053
RGROWTH				0.248***	0.215***
INVENTORY				0.990	2.361
%LOSS				5.853***	3.270***
RZSCORE				-0.247**	-0.257***
AUDITOR_RESIGN				0.106	0.924
RESTATEMENT				-0.220	-0.230
AUDITOR				-0.471	-0.034
INST_CON				-1.720**	-0.991*
LITIGATION				1.605***	0.988***
Adjusted R^2		0.06	0.25	0.25	0.28
n		1,404	1,404	1,027	1,027

***, **, *, indicates significance at the 0.01, 0.05, 0.10 levels. See Appendix 1 and Appendix 2 for variable definitions.

Model 1: Captures both the indirect and direct effects on cost of equity
Model 2: Captures the direct effect
Model 3: Indirect and direct controlling for ICD determinants
Model 4: Direct effects controlling for ICD determinants

Table 8
Change in Cost of Equity: Pre- versus Post-First-ICD Disclosure

Panel A: Descriptive Statistics on Cost of Equity (CC) Pre- and Post-First-ICD Disclosure (n=162)

	Mean	Median	Q1	Q3	Std Dev
Pre-First-ICD CC	15.878	14.750	11.000	18.250	7.391
Post-First-ICD CC	16.990	15.000	11.750	19.750	8.289
Pre-First-ICD Market-Adjusted CC	4.042	2.917	-0.500	6.500	7.420
Post-First-ICD Market-Adjusted CC	4.969	2.979	0.000	7.750	8.272

Panel B: Firm-Specific Change in Market-Adjusted Cost of Equity (ΔCC) (Post-First-ICD CC minus Pre-First-ICD CC)

	Mean	Median
ΔCC Full Sample (n=162)	0.927	1.042
p-value	*(0.02)*	*(0.02)*
ΔCC for Least Likely Firms to Report ICDs (n=48)	1.254	1.375
p-value	*(0.06)*	*(0.16)*
ΔCC for Most Likely Firms to Report ICDs (n=48)	0.490	0.750
p-value	*(0.29)*	*(0.24)*

Table 8 Continued

Panel C: OLS Regression 3-day BHAR regressed on Firm-Specific Change in Market-Adjusted Cost of Equity (ΔCC) (Post-First-ICD CC minus Pre-First-ICD CC)

$$BHAR = \beta_0 + \beta_1 \Delta CC + \varepsilon$$

	Predicted Sign	
INTERCEPT		-1.000
ΔCC	-	-0.168***
Adjusted R^2		0.03
n		162

Pre-First-ICD CC and Post-First-ICD CC are calculated using a maximum of 180 days before and after the first ICD report, respectively. CC is the cost of equity defined as the average annual *Value Line* 3 to 5 year expected return over the 12 months encompassing the firm's 2004 fiscal year. The market-adjusted cost of equity is the difference between the firm's cost of equity and the average cost of equity for all firms on *Value Line* not reporting an ICD over the same time interval. ΔCC is equal to the Post-First-ICD CC less the Pre-First-ICD CC. Least Likely (Most Likely) Firms to Report ICDs represents the firms falling in the lower (upper) three deciles of probability of reporting an ICD based on the Ashbaugh-Skaife (2006) ICD model presented in Appendix 2. Differences in means (medians) are assessed using a t-test (one-sample median test), testing whether the mean and median values are different from zero.

Table 9
Change in Cost of Equity: Remediation of Internal Control Deficiencies

Panel A: Descriptive Statistics on Cost of Equity (CC) for Firms Disclosing an ICD under 302 and Received an Unqualified SOX 404 Opinion (n=38)

	Mean	Median	Q1	Q3	Std Dev
Pre-404 CC	15.836	13.750	10.500	19.000	8.500
Post-404 CC	14.503	12.750	9.000	16.000	8.593
Pre-404 Market-Adjusted CC	4.096	2.125	-1.625	7.292	8.501
Post-404 Market-Adjusted CC	2.583	0.792	-2.750	4.333	8.592

Panel B: Firm-Specific Change in Market-Adjusted Cost of Equity (ΔCC) for Firms Disclosing an ICD under 302 and receiving an Unqualified SOX 404 Opinion
(Post-404 CC minus Pre-404 CC)

	Mean	Median
ΔCC for Firms that Remedied their ICDs (n=38)	-1.513	-1.313
p-value	*0.03*	*0.04*

Pre-404 CC and Post-404 CC are calculated using a maximum of 180 days before and after the issuance of the Section 404 internal control report, respectively. CC is the cost of equity defined as the average annual *Value Line* 3 to 5 year expected return over the 12 months encompassing the firm's 2004 fiscal year. The market-adjusted cost of equity is the difference between the firm's cost of equity and the average cost of equity for all firms on *Value Line* not reporting an ICD over the same time interval. ΔCC is equal to the Post-404 CC less the Pre-404 CC. The sample consists of firms disclosing an ICD under Section 302 at least two months prior to the issuance of an unqualified Section 404 opinion that had *Value Line* cost of equity estimates in both the Pre-404 and Post-404 periods (n=38). Differences in means (medians) are assessed using a t-test (one-sample median test), testing whether the mean and median values are different from zero.

Table 10
Change in Cost of Equity: No-Remediation of Internal Control Deficiencies

Panel A: Descriptive Statistics on Cost of Equity (CC) for Firms Disclosing an ICD under 302 and an ICD under 404 (n=50)

	Mean	Median	Q1	Q3	Std Dev
Pre-404 CC	16.775	15.500	12.000	17.500	7.991
Post-404 CC	17.485	15.438	12.000	20.000	8.643
Pre-404 Market-Adjusted CC	4.921	3.708	0.042	5.458	8.000
Post-404 Market-Adjusted CC	5.591	3.542	0.333	8.450	8.615

Panel B: Firm Specific Change in the Market-Adjusted Cost of Equity (ΔCC) for Firms Disclosing an ICD under 302 and an ICD under 404 (Post-404 CC minus Pre-404 CC)

	Mean	Median
ΔCC for ICD Firms Not Remediating the ICD (n=50)	0.671	0.146
p-value	*0.46*	*0.89*

Pre-404 CC and Post-404 CC are calculated using a maximum of 180 days before and after the 404 report, respectively. CC is the cost of equity defined as the average annual *Value Line* 3 to 5 year expected return over the 12 months encompassing the firm's 2004 fiscal year. The market-adjusted cost of equity is the difference between the firm's cost of equity and the average cost of equity for all firms on *Value Line* not reporting an ICD over the same time interval. ΔCC is equal to the Post-404 CC less the Pre-404 CC. The sample consists of all firms disclosing ICDs before the implementation of Section 404 internal control audits and receiving an adverse SOX 404 opinion that had *Value Line* cost of equity estimates in both the Pre-404 and Post-404 periods (n=50). Differences in means (medians) are assessed using a t-test (one-sample median test), testing whether the mean and median values are different from zero.

Table 11
Change in Cost of Equity: No Internal Control Deficiencies (control Firms)

Panel A: Descriptive Statistics on the Cost of Equity (CC) for Firms Receiving an Unqualified SOX 404 Opinion and had No Prior Disclosures of ICDs (n=685)

	Mean	Median	Q1	Q3	Std Dev
Pre-404 CC	13.612	12.000	9.000	16.250	6.628
Post-404 CC	13.816	12.500	9.000	17.500	7.512
Pre Period Market-Adjusted CC	1.612	0.167	-2.833	4.417	6.633
Post Period Market-Adjusted CC	1.622	0.333	-3.333	5.250	7.514

Panel B: Firm-Specific Change in the Market-Adjusted Cost of Equity (ΔCC) for Firms Receiving an Unqualified SOX 404 opinion and had No Prior Disclosures of ICDs (Post-404 CC minus Pre-404 CC)

	Mean	Median
ΔCC for Firms that did not Report ICDs (n=685)	0.010	0.250
p-value	*0.48*	*0.11*
ΔCC for Least Likely Firms to Report ICDs but did not (n=205)	0.141	0.250
p-value	*0.33*	*0.16*
ΔCC for Most Likely Firms to Report ICDs but did not (n=205)	-1.159	-0.583
p-value	*0.01*	*0.05*

Pre-404 CC and Post-404 CC are calculated using a maximum of 180 days before and after the 404 report, respectively. CC is the cost of equity defined as the average annual *Value Line* 3 to 5 year expected return over the 12 months encompassing the firm's 2004 fiscal year. The market-adjusted cost of equity is the difference between the firm's cost of equity and the average cost of equity for all firms on *Value Line* not reporting an ICD over the same time interval. ΔCC is equal to the Post-404 CC less the Pre-404 CC. The sample consists of all firms receiving an unqualified SOX 404 opinion and had not disclosed prior ICDs under Section 302 (n=685) that had *Value Line* cost of equity estimates in both the Pre-404 and Post-404 periods. Least Likely (Most Likely) Firms to Report ICDs represents the firms falling in the lower (upper) three deciles of probability of reporting an ICD based on the Ashbaugh-Skaife et al. (2006) ICD model reported in Appendix 2. Differences in means (medians) are assessed using a t-test (one-sample median test), testing whether the mean and median values are different from zero.

Table 12
Internal Control Deficiencies and Cost of Equity:
Consequences of Misclassifying ICD Firms

$$CC\_PEG = \beta_0 + \beta_1 ICD + \beta_2 BETA + \beta_3 SIZE + \beta_4 BM + \beta_5 I\_RISK + \beta_6 SEGMENTS$$
$$+ \beta_7 FOREIGN\_SALES + \beta_8 M\&A + \beta_9 RESTRUCTURE + \beta_{10} RGROWTH$$
$$+ \beta_{11} INVENTORY + \beta_{12} \%LOSS + \beta_{13} RZSCORE + \beta_{14} AUDITOR\_RESIGN$$
$$+ \beta_{15} RESTATEMENT + \beta_{16} AUDITOR + \beta_{17} INST\_CON + \beta_{18} LITIGATION + \varepsilon$$

	Predicted Sign	Model 1	Model 2
INTERCEPT		12.969***	12.887***
WEAK	+	0.331	
ICD	+		0.446**
BETA	+	-0.023	-0.025
SIZE	-	-0.526***	-0.515***
BM	+	2.306***	2.265***
I_RISK	+	4.816**	4.816**
SEGMENTS		0.108*	0.107*
FOREIGN_SALES		0.303	0.295
M&A		0.091	0.095
RESTRUCTURE		-0.342	-0.357
RGROWTH		-0.154***	-0.156***
INVENTORY		3.874***	3.885***
%LOSS		3.850***	3.849***
RZSCORE		-0.249***	-0.247***
AUDITOR_RESIGN		-1.154	-1.184
RESTATEMENT		0.005	-0.034
AUDITOR		0.519	0.500
INST_CON		0.246	0.260
LITIGATION		-0.219	-0.228
Adjusted R^2		0.32	0.32
ICD firms		163	239
Non-ICD firms		964	888
Total n		1,127	1,127

***, **, *, indicates significance at the 0.01, 0.05, 0.10 levels. See Appendix 1 and Appendix 2 for variable definitions. CC_PEG is equal to the PEG RATIO estimate of the cost of equity, The cost of equity measure used in this analysis is expressed in a percentage, i.e. ten percent is 10.00. Coefficient estimates differ from those reported in Ogneva et al. (2006) due to scaling, i.e., in Ogneva et al. a ten percent cost of equity is 0.10.

Model 1: Following Ogneva et al. (2006), WEAK is equal to one if the firm received an adverse SOX 404 opinion, and zero otherwise. This scheme incorrectly classifies firms with ICDs reported under SOX 302 as non-ICD firms (i.e., as if they had effective internal control).
Model 2: ICD is equal to one if the firm received an adverse SOX 404 opinion or made an ICD disclosure under SOX 302.