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Internal Control Quality and Credit Default Swap Spreads

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SYNOPSIS: This paper presents the first study on the effects of internal control quality on derivatives pricing. Specifically, we utilize data from the credit default swap (CDS) transactions of well-monitored companies to examine the relationship between the quality of internal control and the cost of debt. CDS data are advantageous for the study of this relationship because CDS contracts are comparatively more homogeneous, standardized, and liquid than either bank loans or public bonds. We find that, all else being equal, companies experiencing internal control material weakness (MW) exhibit higher CDS spreads than companies with effective internal control. Moreover, the MW effect on CDS spreads is more pronounced for company-level MWs than for less severe, account-specific MWs. We also document that CDS spreads increase around the filings of MWs. Furthermore, the deterioration of internal control quality is related to increases in CDS spreads. Finally, short-maturity CDS spreads are more affected by MWs than are long-maturity CDS spreads.

Keywords: internal control over financial reporting; SOX 404; material weaknesses; credit default swaps; CDS; cost of debt; derivatives pricing.

JEL Classifications: M41; G32; K22.

Data Availability: The data are available from public sources.

INTRODUCTION

We examine the effect of internal control quality under Section 404 of the Sarbanes-Oxley Act of 2002 (SOX 404, U.S. House of Representatives 2002) on the pricing of credit derivatives by analyzing a unique transaction dataset from the credit default swap

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(CDS) market. CDSs are derivatives based on the credit risk of reference firms and are considered among the most important recent developments in credit markets. The CDS market has enjoyed tremendous growth, reaching over $21 trillion in outstanding notional value by the end of 2013.[1] CDS contracts are the primary instrument for credit risk transfer and provide a superior measure of credit risk because they are more standardized, homogeneous, and liquid than either public bonds or bank loan.[2] Popular media outlets, such as *Bloomberg*, often cite CDS spreads as a summary measure of a firm's financial health. Therefore, the CDS market provides an adequate setting to examine the relationship between internal control quality under SOX 404, and credit risk, and to understand the broad effects of accounting information on derivatives pricing (Griffin 2014).

SOX 404 requires that managers and auditors provide an annual assessment of the effectiveness of internal control over financial reporting (i.e., internal control quality). The compliance requirements for SOX 404 have remained controversial for a decade, and lawmakers have repeatedly revisited these requirements (Gupta, Weirich, and Turner 2013). One of the main rationales for SOX 404 is that material weaknesses (MWs) signal the likelihood of unreliable financial reporting and greater information risk, which thereby affect the functioning of capital markets (U.S. House of Representatives 2005).

We hypothesize that CDS spreads are higher for firms disclosing MWs. First, MWs reduce the reliability of financial reporting and increase the information risk for credit investors. Hence, investors may charge higher credit premiums to compensate for this heightened information risk (see, e.g., Duffie and Lando 2001; Lambert, Leuz, and Verrecchia 2007). Second, the default risk of borrowing firms with MWs may be higher because managerial misappropriation is more easily concealed in the presence of MWs (Lambert et al. 2007), and the value of credit claims may also decrease if misappropriation takes place.

Our empirical analysis supports this hypothesis and indicates that CDS spreads are significantly higher for firms with MWs than for firms with effective internal control. The effect of internal control quality on CDS spreads is economically large, that is, the annual debt interest expense is $35.7 million higher for the average firm with MWs. Over the short term, CDS spreads increase by 1.78 percent around the three days of MW disclosures, suggesting a decrease of $49 million in the outstanding debt value for the average firm in our sample. CDS spreads are higher for firms with more severe, company-level MWs than for firms with account-specific MWs. Furthermore, two pieces of evidence suggest that changes in CDS spreads are associated with MWs. First, the reporting of MWs is significantly associated with an increase of CDS spreads. Second, the deterioration of internal control quality (from effective during the prior year to reporting MWs in the current year) is significantly related to an increase of CDS spreads.

Our unique data enable us to conduct a novel test to investigate how internal control quality affects the term structure of CDS spreads across maturities. The prominent prediction from the Duffie and Lando (2001) model is that the effect of MWs on CDS spreads is more pronounced over the short term than over the long term because information risk from MWs matters most for debts that will mature soon. We find that the effect of MWs on one-year CDS spreads is significantly larger than the effect on five-year CDS spreads. This finding supports the theoretical prediction and suggests that accounting information is particularly useful for short-term credit derivative valuation.

[1] A survey conducted by the International Swap and Derivatives Association (ISDA) implies an annualized growth rate of 179 percent during the period 1998–2007 (Available at: http://www.isda.org/statistics/pdf/ISDA-Market-Survey-historical-data.pdf).

[2] Studies such as Griffin (2014) argue that CDS spreads provide relatively pure pricing of credit risk and reflect changes in credit risk more accurately and quickly than other debt instruments because of the unique characteristics of CDS contracts.

Our study provides evidence of the importance of internal control quality and the usefulness of SOX 404 disclosures for credit derivatives pricing. Schneider, Gramling, Hermanson, and Ye (2009) note that prior research on the impact of SOX 404 is inconclusive. Extant studies using equity data have yielded mixed findings regarding the association between internal control quality and the cost of equity (Ogneva, Raghunandan, and Subramanyam 2007; Ashbaugh-Skaife, Collins, Kinney, and LaFond 2009; Gordon and Wilford 2012). Debt market evidence extracted from bonds and loans has also been inconsistent. Although Kim, Song, and Zhang (2011) demonstrate that bank loan rates are higher for companies with internal control MWs than for firms without such MWs, Dhaliwal, Hogan, Trezevant, and Wilkins (2011) find that there is no association between reporting internal control MWs and increased bond spreads in their study of companies monitored by banks or rating agencies (essentially large firms). Contributing to the prior credit market research, we provide strong evidence that MWs are positively related with CDS spreads both cross-sectionally and over time. More importantly, our investigation on the effect of MWs on the term structure of CDS spreads produces additional insight into how internal control quality affects credit risk.

The findings of this study also improve the understanding of CDS pricing, which has been previously studied by Das, Hanouna, and Sarin (2009) and Callen, Livnat, and Segal (2009). Recently, Griffin (2014) reviews the accounting research on CDSs and calls for further research, including into the role of MWs in the CDS market. Our evidence that CDS pricing is influenced by information risk measured by the quality of internal control supports the theoretical prediction of Duffie and Lando (2001). Our findings also complement Arora, Richardson, and Tuna (2014) on the effect of financial asset reliability on the term structure of CDS spreads for financial firms, and Yu (2005) on the effect of accounting transparency on the term structure of bond spreads.

The rest of the paper is organized as follows. First, we introduce the CDS market and hypothesize the relationship between CDS spreads and internal control quality. We then describe our sample and the empirical design. Next, we report our findings on the effects of internal control quality on CDS prices. Finally, we summarize our findings and conclude.

BACKGROUND AND HYPOTHESIS DEVELOPMENT

The CDS Market and Related Studies

CDSs can be regarded as insurance contracts protecting credit claims. In a CDS transaction, the protection seller agrees to compensate the protection buyer if a default event with respect to a reference issue occurs before the contract expires. For this credit protection, the buyer pays the seller a fee that resembles an insurance premium. The annualized fee for a CDS contract is referred to as the CDS spread or the CDS price. The CDS market has grown rapidly in recent years. An ISDA survey indicates that the outstanding notional size of the CDS market was $180 billion in 1998 and grew to $62 trillion by 2007 (the CDS market continued to be active after the 2008 global financial crisis).[3]

CDS contracts have become the main financial instrument to undertake credit risk transfer. The major participants in the CDS market include large commercial banks, insurance companies, and hedge funds. CDS reference companies are usually large firms. CDSs attracted a substantial amount of attention during the 2008 global financial crisis and the 2010–2012 European sovereign crisis. CDS spreads are often quoted as a timely barometer of the financial health of a reference firm or sovereign entity. Recent empirical research on credit risk often employs CDS contracts as the main instrument, and Longstaff, Mithal, and Neis (2005) suggest that CDS spreads are a superior

[3] See Longstaff et al. (2005), Callen et al. (2009), Augustin, Subrahmanyam, Tang, and Wang (2014), and Griffin (2014) for overviews of the CDS market.

measure of the credit risk premium. The advantages of CDSs in credit risk analysis are also supported by other studies. For instance, Blanco, Brennan, and Marsh (2005) find that the CDS market leads the bond market in the price discovery of credit risk. Acharya and Johnson (2007) report that information flows from the CDS market to the equity market, particularly for major negative news. Ericsson, Jacobs, and Oviedo (2009) show that much of the variation in CDS spreads can be explained by structural model factors linked to firm fundamentals. Hilscher, Pollet, and Wilson (2014) indicate that the CDS market does not lead the equity market in general but that during major events, such as earnings releases, CDSs incorporate information quickly.

There is a growing literature within accounting that analyzes CDSs. Callen et al. (2009) and Das et al. (2009) find that accounting earnings are priced into the levels of and changes in CDS spreads, whereas De Franco, Vasvari, and Wittenberg-Moerman (2009) show that CDS prices are responsive to debt analysts' reports. Shivakumar, Urcan, Vasvari, and Zhang (2011) demonstrate that CDS pricing reacts significantly to management forecast news and that the reaction to forecast news is stronger than to actual earnings news. Batta (2011) examines the direct relevance of accounting information for CDS pricing. Kim, Kraft, and Ryan (2013) find that greater financial statement comparability is associated with lower CDS spreads. Griffin (2014) provides a comprehensive review of CDS-related research in accounting and calls for additional accounting research on CDSs, including the role of internal control quality in the CDS market, because such research would enhance our understanding of the role of accounting information in helping investors assess various credit risks.

Internal Control over Financial Reporting (SOX 404)

The evaluation of internal control over financial reporting has long been an important part of the auditing process (Kinney, Maher, and Wright 1990). Prior to the enactment of the Sarbanes-Oxley Act (SOX) in 2002, U.S. companies were required to disclose the effectiveness of internal control only occasionally (e.g., in the event of an auditor termination). Since November 15, 2004, SOX 404 has required firm management to assess the quality of internal control over financial reporting and to provide periodic, auditor-attested evaluations of internal control effectiveness.[4,5]

A number of studies have evaluated the determinants of internal control quality (e.g., Ashbaugh-Skaife, Collins, and Kinney 2007; Doyle, Ge, and McVay 2007b; Ge and McVay 2005) and found that smaller, younger, riskier, and financially weaker firms tend to report internal control

[4] Section 404 has been one of the most controversial provisions of SOX because of the costs associated with compliance (Palmrose 2010). Consequently, the Securities and Exchange Commission (SEC) has issued several management guidelines and the Public Company Accounting Oversight Board (PCAOB) replaced Audit Standard No. 2 (AS No. 2) with Audit Standard No. 5 (AS No. 5) to alleviate the burden on filing firms and their auditors. In addition, compliance with Section 404 was postponed several times for small firms (market value below $75 million). See http://www.sec.gov/rules/interp/2007/33-8810.pdf and http://pcaobus.org/News/Releases/Pages/05242007_BoardApprovesNewAuditStandard.aspx. Furthermore, the Dodd-Frank Wall Street Reform and Consumer Protection Act of 2010 (U.S. House of Representatives 2010) granted small firms, i.e., non-accelerated filers, permanent exemptions from auditor certification requirements under Section 404 (b) of SOX. On April 5, 2012, the Jumpstart Our Business Startups Act (JOBS Act, U.S. House of Representatives 2012) further exempted emerging growth companies, newly publicly listed companies, and middle-sized companies with revenues below $1 billion or market value below $700 million, from compliance under SOX Section 404 (b).

[5] The implementation of SOX 404 has become an important issue in auditing. Audits of internal control processes under Section 404 are fundamentally different from audits of financial statements in terms of objective, value, and approach (Kinney, Martin, and Shepardson 2013; Akresh 2010). Correspondingly, audit fees increased significantly after the implementation of SOX 404 and were positively associated with MWs (Raghunandan and Rama 2006; R. Hoitash, U. Hoitash, and Beard 2008). Furthermore, although companies that remediate MWs have lower audit fees compared to firms that continue to report MWs, the remediating firms continue to pay a significant fee premium compared to firms with clean internal control reports since the SOX 404 implementation (Munsif, Raghunandan, Rama, and Singhvi 2011). DeFond and Zhang (2014) present a comprehensive review of the topic.

MWs. Klamm, Kobelsky, and Watson (2012) observe that various types of MWs are positively related to the persistent MWs. Nagy (2010) and Holder, Karim, and Robin (2013) note that the implementation of SOX 404 improves earnings quality. Moreover, Doyle et al. (2007a) and Ashbaugh-Skaife, Collins, Kinney, and LaFond (2008) report that internal control quality is positively associated with earnings quality.[6]

Extant studies of the equity market offer a mixed picture of the capital market implications of internal control quality. On the one hand, Ogneva et al. (2007) find no association among internal control MWs and several risk measures—including the cost of equity capital, earnings quality, and return volatility—after controlling for other firm characteristics. Beneish, Billings, and Hodder (2008) demonstrate that equity markets do not react to Section 404 internal control MW disclosures. On the other hand, Ashbaugh-Skaife et al. (2009) show that internal control weaknesses are associated with higher idiosyncratic risk, higher systematic risk, and higher cost of equity. Gordon and Wilford (2012) use a more recent sample of internal controls under SOX 404 to revisit the relationship between internal control quality and the cost of equity and suggest that internal control weaknesses are related to higher costs of equity. Skaife, Veenman, and Wangerin (2013) report that internal control weaknesses are associated with higher profitability of insider trading, which suggests that wealth transfers from companies to managers may occur under inferior internal control regimes. Coates and Srinivasan (2014) provide a comprehensive review of the effects of SOX in general, and Section 404 in particular, and suggest that more research is needed since evidence of the Act's net social welfare remains inconclusive.

Hypothesis Development

Internal control quality disclosures may be useful to credit investors in assessing information risk. First, MWs cast doubt on the reliability of firms' financial reports. As defined by auditing standards (i.e., AS No. 2 [PCAOB 2004] or AS No. 5 [PCAOB 2007]), MWs in a firm imply more than a remote likelihood that the firm's internal control system will fail to detect or avoid material misstatements in financial reports. This definition implies greater uncertainty regarding whether financial reports and disclosures of a company are reliable. Such uncertainty increases the information risk to creditors when assessing potential credit losses resulting from default. Eventually, according to theory, creditors require compensation for information-related risk (Verrecchia 2001; Duffie and Lando 2001; Easley and O'Hara 2004; Lambert et al. 2007). Second, weak internal controls exacerbate agency conflicts because expropriation of debt holders by managers may be more difficult to detect. Cheng, Dhaliwal, and Zhang (2013) show that firms with weak internal controls tend to either over-invest or under-invest. Thus, ineffective internal controls might increase information asymmetry between managers and creditors, which should lead to higher credit spreads.

Recent studies have examined the relationship between internal control quality and the cost of debt and employed this line of reasoning using data on public bonds or private loans. Dhaliwal et al. (2011) find that corporate bond spreads are marginally higher for firms disclosing internal control MWs, but this relationship is nonexistent for firms monitored by banks. Conversely, Costello and Wittenberg-Moerman (2011) and Kim et al. (2011) document that loan spreads are higher for firms reporting internal control MWs among bank-monitored companies. Therefore, the evidence is mixed. Because credit risk estimations in both bond and bank loan markets are complicated by their embedded heterogeneous features—such as covenants, callability, and convertibility—it is important to examine the relationship between credit risk and internal control quality in a cleaner setting. We analyze this relationship in the largest market for credit derivatives, i.e., the CDS

[6] Bardhan, Lin, and Wu (2015) study S&P 500 companies and find that family firms exhibit more MWs than nonfamily firms.

market, because CDS-referenced companies are monitored by an arguably broader set of market participants, which includes banks and participants in the bond and derivatives markets.[7] Therefore, given the theoretical prediction regarding the relationship between the quality of internal control and credit risk, we hypothesize the following:

H1: CDS spreads are positively associated with internal control MWs.

MWs have different types and severities. Doyle, Ge, and McVay (2007a) classify internal control MWs as two types. The first type of internal control MWs (i.e., account-specific MWs) is related to specific accounts and transactions that can be easily overcome by auditors with additional procedures (i.e., additional substantive tests). The other type of MWs (i.e., company-level MWs), however, is associated with a firm's overall control environment and/or financial reporting process. Such systematic weaknesses can have a pervasive and permanent effect on the reliability of financial reporting. This type of MW calls into question whether managers are able to maintain effective management systems for their companies. Thus, debt market analysts regard company-level MWs as more severe than account-specific MWs (Moody's Investor Service 2004, 2006, 2007). Studies of both private loan and public bond markets investigate the different effects of company-level MWs versus account-specific MWs (Costello and Wittenberg-Moerman 2011; Dhaliwal et al. 2011; Kim et al. 2011). These studies indicate that the effect of company-level MWs on credit spreads is larger than the effect of account-specific MWs in private loans but not in the public bond market. Moreover, Doyle et al. (2007a) find that company-level internal control weaknesses are more strongly related to a range of risk measures (earnings quality, management forecast accuracy, etc.) than are account-specific MWs.[8] Accordingly, we hypothesize the following:

H2: Company-level MWs are more positively associated with CDS spreads than account-specific MWs.

If the quality of internal control is important to CDS pricing, then we expect that CDS spreads change around internal control filings. Importantly, we expect that the year-by-year change in internal control quality should be associated with a change in CDS spreads. If a firm's internal control changes from effective to reporting MWs, CDS spreads are expected to increase. If internal control weaknesses are remediated, then we expect to observe a decrease in CDS spreads because the reliability of financial reporting will have improved, which will lead to lower information risk. In the equity market, Gordon and Wilford (2012) find that cost of equity increases when internal control quality deteriorates or MWs are not remediated and decreases when MWs are remediated. In the debt market, Kim et al. (2011) document that loan spreads are negatively associated with the remediation of MWs, while Costello and Wittenberg-Moerman (2011) find no evidence for such an association.[9] Accordingly, we hypothesize the following:

[7] There are concerns that the CDS market is volatile and manipulated by a small number of banks (e.g., Alloway 2013). If this were the case, then the relationship between internal control quality and CDS spreads might be distorted, but would bias the results against our hypothesis.

[8] We focus on the classification with company-level and account-specific MWs. Such a classification is consistent with Moody's and the COSO/PCAOB internal control framework (COSO 2004; AS No. 5, PCAOB 2007). Depending on the research question, prior studies have used alternative classifications. For example, Klamm et al. (2012) categorize MWs into information technology (IT) related and non-IT related MWs to study the persistence of MWs, while Feng, Li, McVay, and Skaife (2015) emphasize the role of inventory-related MWs in operations and classify such MWs into inventory-tracking MWs and inventory-valuation MWs.

[9] Prior studies have also examined the association between changes in internal control quality and other accounting and financial outputs, such as accruals quality, management forecast errors, inventory turnover, investment efficiency, analyst forecasts, insider trading, and audit fees (e.g., Ashbaugh-Skaife et al. 2008; Cheng et al. 2013; Clinton, Pinello, and Skaife 2014; Feng, Li, and McVay 2009; Feng et al. 2015; Munsif et al. 2011; Skaife et al. 2013). This study focuses on the relationship between internal control and capital market consequences.

H3a: CDS spread changes are associated with internal control quality disclosures.

H3b: CDS spread changes are associated with internal control quality changes.

We test H3a by examining the change in CDS spreads when internal control reports are filed. We test H3b by examining the annual change in CDS spreads associated with changes in MWs in the following scenarios: remediation cases in which MWs are corrected, repeated weakness cases in which MWs repeat annually, and deterioration cases in which internal control changes from effective to ineffective.

According to Duffie and Lando (2001), the information risk from low-quality internal control not only increases credit spreads but also affects the term structure of credit spreads (i.e., credit spreads at different maturities). In their model, investors rely on financial reports to estimate credit risk. When financial reports are perceived as accurate, credit spreads approach zero as debt approaches maturity. If a firm has MWs in financial reporting, then its financial information is likely unreliable thereby creating information risk. Such information risk persists even as debt approaches maturity. Therefore, their theory predicts that the information risk effect on credit spreads is more pronounced at short maturities. Following Duffie and Lando (2001), Yu (2005) uses the annual Association for Investment Management and Research (AIMR) corporate disclosure rankings as a proxy for perceived disclosure quality and finds that firms with higher AIMR rankings tend to have lower bond spreads. This transparency spread is especially pronounced for short-term bonds. Compared to AIMR rankings, mandated internal control reports directly address financial reporting processes and are attested by auditors thereby representing a theoretically appealing measure of accounting information quality as described by Duffie and Lando (2001). Furthermore, Duffie and Lando (2001) argue that CDSs are ideal for investigating the effect of accounting information risk on term structure compared to bonds because CDSs are not contaminated by various covenant terms or the heterogeneous characteristics of bonds. Therefore, we hypothesize the following:

H4: The effect of MWs on short-term CDS spreads is more pronounced than on longer-term CDS spreads.

DATA AND SAMPLE DESCRIPTION

Our dataset is drawn from the intersection of SOX 404 disclosure data and CDS trading data for U.S. corporations. We combine three sets of data in our empirical analysis: CDS data from interdealer broker GFI Group Inc., Section 404 internal control reports compiled by Audit Analytics, and firm financial and accounting information from CRSP and Compustat.

Sample Selection

We first retrieve all internal control data under Section 404 from Audit Analytics for firms with a fiscal year ending between November 15, 2004, and May 31, 2007.[10] The reports contain management and auditor opinions about a firm's internal control quality.

We require CDS transaction data over the sample period for firms with internal control reporting. Our main CDS dataset comes from the GFI Group, a leading CDS interdealer broker. The data, captured by GFI Group's CreditMatch electronic and voice hybrid trading system, include all transacted prices and tradable quotes with varying maturities for a reference entity. We augment the GFI data with CDS trades and quotes from CreditTrade, another major interdealer broker operating

[10] We end the sample period before the credit crisis for our main analysis. In our additional analysis, we extend the data beyond 2007 and discuss the findings for the crisis period.

until 2006. CreditTrade data were previously used by Blanco et al. (2005) and Acharya and Johnson (2007). The combined GFI and CreditTrade CDS data provide comprehensive coverage of the market, although our findings are similar if we use only the GFI data. Actual transaction data are critical to compare CDS spreads before and after MW announcements. We focus on five-year CDS contracts, which are the most liquid. However, we also examine one-year and three-year contracts when we test H4.

Summary Statistics

Panel A of Table 1 reports the summary statistics for our main variables. Our final sample consists of 921 firm-year observations for 450 unique companies (i.e., CDS reference entities). The average CDS spread is 77.8 basis points (bps) over our sample observations (median = 41.7 bps). The data period corresponds to an economic expansion period with relatively low CDS spreads. Nevertheless, there is substantial variation across CDS observations, and the standard deviation is 106.3 bps. Our sample firms are relatively large; the median total asset value of our firms is approximately $11.8 billion. During our sample period, only firms (i.e., accelerated filers) with over $75 million in assets were required to comply with SOX 404. Overall, our sample represents an important cross-section of the U.S. capital market.

Panel B of Table 1 reports that the average CDS spread is 208 bps for firms reporting MWs and 68.4 bps for firms with effective internal controls. The difference in CDS spreads between these two groups is statistically significant at the 1 percent level. Furthermore, firms with MWs have more business segments, more restructuring activities, poorer performance, are more financially distressed, have higher leverage, and higher stock return volatility than firms with effective internal controls. These characteristics differences are consistent with previous studies of internal control quality (i.e., Ge and McVay 2005). Importantly, Panel B of Table 1 indicates that the bid-ask spread in the CDS market is much higher for MW firms than for non-MW firms. This pattern suggests that MWs are related to higher information risk to credit market participants.

EMPIRICAL RESULTS

Event Studies of Internal Control Material Weakness Disclosures

We first conduct event studies to examine whether investors in the CDS market react to the disclosure of MWs in internal controls. The extant studies of bank loan and public bond markets focus on long-run changes in credit spreads due to the illiquidity of these markets. In contrast, we capitalize on the higher trading frequency of CDSs to examine whether internal control disclosures provide relevant information to credit derivatives markets. To conduct such an investigation, we search for relevant news items through 10K Wizard and Factiva to determine the first date of a MW disclosure 90 days prior to the filing date of an internal control report for firms disclosing MWs in our sample. For these event dates, we estimate percentage changes in CDS spreads over the [−1, +1] three-day or [−2, +2] five-day event windows. For purposes of comparison, we also calculate cumulative stock returns during the same event window. Our estimation of the CDS spread change follows Shivakumar et al. (2011). We use changes in CDS spreads instead of returns because our window is a three-day (five-day) period, and calculating returns may involve estimation errors.[11] Our results are robust to various adjustments to the CDS changes.

[11] Lok and Richardson (2011) provide a method to calculate the credit return by considering the carry component of a CDS contract and its duration and show that, over short windows, raw changes and credit returns are highly correlated. We find similar results using CDS raw changes instead of percentage changes.

TABLE 1
Summary Statistics

Panel A: Summary Statistics of the Overall Sample

Variables	Mean	S.D.	Q1	Median	Q3
CDS SPREAD	77.835	106.296	23.667	41.667	80.000
LOG(CDS SPREAD)	3.826	0.975	3.164	3.730	4.382
SEG	1.531	0.815	1.099	1.792	2.079
M&A	0.238	0.260	0.000	0.200	0.400
RESTRUCTURE	0.398	0.352	0.000	0.400	0.800
GROWTH	0.112	0.151	0.028	0.076	0.157
INVENTORY	0.095	0.120	0.011	0.054	0.133
%LOSS	0.116	0.199	0.000	0.000	0.200
RZSCORE	4.776	1.714	3.000	5.000	6.000
SIZE	9.437	1.195	8.501	9.386	10.227
SWAPRATE	4.878	0.344	4.560	5.020	5.150
TERMSLOPE	0.228	0.382	−0.100	−0.010	0.770
LEVERAGE	0.247	0.149	0.138	0.215	0.322
VOL_RET	0.245	0.083	0.185	0.226	0.289
LOG(Financial CDS)	4.374	0.276	4.279	4.310	4.649
LOG(CDX)	3.779	0.190	3.586	3.682	4.002
LOG(BASPREAD)	2.174	0.816	1.755	2.110	2.603
Total Assets ($billion)	47.636	158.944	4.860	11.796	27.690
Long-Term Debt ($billion)	8.720	33.037	0.969	2.482	5.674
Market Value ($billion)	23.481	40.024	4.318	10.322	22.969
Indicator Variables	Percentage of Nonzero Observations		Number of Nonzero Observations		
MW	6.73%		62		
ACCOUNT SPECIFIC MW	2.61%		24		
COMPANY LEVEL MW	4.13%		38		
FOREIGN	27.69%		255		

This panel reports the summary statistics of our sample, which consist of 921 firm years for 450 distinct firms. See Appendix A for variable definitions.

(continued on next page)

TABLE 1 (continued)

Panel B: Univariate Comparison of MW versus Non-MW Firms

	Firms with Effective Internal Control			MW Firms				
Variables	**Mean**	**Median**	**S.D.**	**Mean**	**Median**	**S.D.**	**t-test**	**Wilcoxon Test**
CDS SPREAD	68.442	40.500	87.205	207.972	152.333	212.108	(−5.15)***	(−6.54)***
LOG(CDS SPREAD)	3.757	3.701	0.924	4.775	5.026	1.167	(−6.71)***	(−6.54)***
SEG	1.513	1.792	0.812	1.780	2.013	0.821	(−2.48)**	(−3.02)***
M&A	0.234	0.200	0.259	0.290	0.200	0.274	(−1.55)	(−1.68)*
RESTRUCTURE	0.387	0.400	0.350	0.543	0.600	0.347	(−3.40)***	(−3.39)***
GROWTH	0.114	0.077	0.153	0.082	0.059	0.128	(1.89)*	(2.08)**
INVENTORY	0.097	0.054	0.122	0.076	0.053	0.088	(1.77)*	(0.77)
%LOSS	0.103	0.000	0.182	0.298	0.200	0.300	(−5.05)***	(−5.82)***
RZSCORE	4.849	5.000	1.705	3.774	4.000	1.519	(5.33)***	(4.70)***
SIZE	9.441	9.390	1.189	9.385	9.365	1.285	(0.33)	(0.63)
SWAPRATE	4.879	5.050	0.345	4.866	4.940	0.344	(0.29)	(0.82)
TERMSLOPE	0.228	−0.010	0.387	0.224	0.045	0.323	(0.10)	(−1.04)
LEVERAGE	0.242	0.211	0.145	0.305	0.273	0.186	(−2.61)**	(−2.48)**
VOL_RET	0.241	0.224	0.079	0.294	0.266	0.109	(−3.73)***	(−4.01)***
LOG(Financial CDS)	4.377	4.304	0.267	4.338	4.448	0.379	(0.80)	(−0.66)
LOG(CDX)	3.776	3.681	0.189	3.814	3.758	0.199	(−1.43)	(−2.48)**
LOG(BASPREAD)	2.141	2.079	0.792	2.625	2.746	1.002	(−3.72)***	(−4.85)***
Total Assets ($billion)	44.745	11.894	151.417	87.267	11.668	237.645	(−1.39)	(0.57)
Long-Term Debt ($billion)	7.203	2.558	19.794	29.527	2.216	101.856	(−1.72)*	(−0.32)
Market Value ($billion)	24.391	10.654	41.058	10.249	5.736	14.137	(6.01)***	(4.07)***
Indicator Variable	Percentage of Nonzero Observations			Percentage of Nonzero Observations			Chi-squared test	
FOREIGN	25.84%			53.23%			(21.65)***	

***, **, * Denote significance at the 0.01, 0.05, and 0.10 levels, respectively.
This panel reports the univariate comparison between firms with MWs and firms with effective internal control.
See Appendix A for variable definitions.

Panel A of Table 2 reports that CDS spreads increase by 1.78 percent (1.51 percent), on average, over a three-day (five-day) event window surrounding MW disclosures.[12] These CDS spread increases are statistically significant, which suggests that disclosures of SOX 404 MWs convey new negative information to the credit derivatives market.[13] The reaction to MW disclosures is also economically meaningful, that is, the debt value of an average MW firm in our sample is reduced by approximately 0.167 percent, or $49 million during the three days surrounding MW disclosures.[14] Moreover, we examine the first-time disclosure of MWs under SOX 404 and find that the percentage change in CDS spreads increases slightly in magnitude.

We scrutinize concurrent news within the three-day window to capture the MW announcement effect. Twenty events were accompanied with earnings announcements in firm press releases, six events with credit rating changes, four events with M&A and restructuring, and nine events with other news such as change in auditor/officer, lawsuits, and repurchase of shares. With exclusion of such concurrent news, 40 events remain.[15] Panel B of Table 2 indicates that, after dropping the events with abovementioned concurrent news, MW disclosures are associated with a 2.84 percent increase in CDS spreads, which is significant at the 5 percent level. In contrast, the cumulative stock market reaction is negative but insignificant. This finding is consistent with the findings obtained by Beneish et al. (2008) that SOX 404 MW disclosures have no noticeable impact on stock prices.[16] The different reactions of the CDS and stock markets might be due to market segmentation or the limits of arbitrage. Kapadia and Pu (2012) report that pricing discrepancies between CDSs and stocks are common, Acharya and Johnson (2007) show that CDSs lead stock prices for major negative events, while Hilscher et al. (2014) argue that CDSs react more quickly during salient news events.[17] Overall, the combined results from both the credit derivatives markets and the stock market suggest that MW disclosures provide relevant new information to the CDS markets.

Cross-Sectional Regression Analysis

The evidence regarding the immediate CDS market reaction to disclosures of internal control MWs suggests that CDS pricing is affected by internal control quality. To test our hypotheses, we construct cross-sectional regressions to analyze how internal control quality (internal control weaknesses versus effective internal control) is associated with CDS spreads, whether the severity

[12] The event studies include 72 MW events covered by our CDS data but only 62 are used in the subsequent regression analysis due to the constraints of control variables.

[13] We also estimate the adjusted CDS spread changes by subtracting the average CDS spread change with the same credit rating over the same period from raw CDS spread changes and obtain similar results.

[14] We estimate the bond price change using the duration relationship: $\Delta p \approx -D \times \Delta CDS$, where D is the debt duration of the company and Δp is the percentage change in debt value. Because the average CDS spread for MW firms is 208 bps, the change in CDS spreads is 3.7 bps. We obtain these approximate percentage and dollar estimates using the average debt duration of 4.5 years and total long-term liabilities of $29.5 billion in our MW sample.

[15] The initial MW disclosures before formal filings do not provide much detail as to whether MWs are company-level or account-specific weaknesses, but these reports provide information indicating the severity of MWs and imply that 20 MWs are detected because of financial misstatements and ten MWs are delinquent, which are regarded as more severe by Moody's Investors Service (2004, 2006). This pattern is consistent with the prior studies indicating that auditors detect a large portion of MWs through misstatements (Kinney et al. 2013; Gramling, O'Donnell, and Vandervelde 2013; Bedard and Graham 2011).

[16] We conjecture that the lack of a significant reaction in the stock market may be related to two factors: (1) Stock prices reflect MW information in a noisier way, and (2) MW information is explicitly taken into consideration by rating agencies such as Moody's, but not by equity analysts.

[17] However, there is considerable research on the correlations between CDS and stock returns. For example, Blanco et al. (2005) demonstrate that CDSs move with stock returns. However, the majority of studies testing the informational efficiency of the CDS market find that CDS prices lead price discovery in other markets (Griffin 2014). We believe that such an issue remains debatable.

TABLE 2

Event Studies on MW Disclosures

Panel A: All MW Disclosure Events

		CDS Spread Change		Cumulative Stock Return	
	n	Mean	t-stats	Mean	t-stats
Event Window [−1, +1]					
All SOX 404 MW disclosures	72	1.777	(2.02)**	0.289	(0.53)
First-time SOX 404 MW disclosure	53	2.195	(1.88)**	0.323	(0.54)
Event Window [−2, +2]					
All SOX 404 MW disclosures	72	1.508	(1.89)**	0.342	(0.59)
First-time SOX 404 MW disclosure	53	1.727	(1.66)*	0.248	(0.50)

Panel B: MW Events Excluding Earnings Announcements, Rating Changes, and Others

		CDS Spread Change		Cumulative Stock Return	
	n	Mean	t-stats	Mean	t-stats
Event Window [−1, +1]					
All SOX 404 MW disclosures	40	2.838	(1.98)**	−0.569	(−1.01)
First-time SOX 404 MW disclosure	35	3.210	(1.98)**	−0.320	(−0.57)
Event Window [−2, +2]					
All SOX 404 MW disclosures	40	2.335	(1.83)**	−0.607	(−0.84)
First-time SOX 404 MW disclosure	35	2.412	(1.68)**	−0.475	(−0.61)

**, * Denote significance at the 0.05 and 0.10 levels, one-tailed, respectively.
CDS changes are the percentage changes of CDS daily closing spreads from the beginning of the event window to the end of the window.

of internal control MW is related to CDS spreads differently, and whether a change in MW status is associated with a change in CDS spreads.

Detailed information about a firm's internal control MWs is frequently contained in its annual internal control reports. Therefore, we use a regression model to compare CDS spreads among firms with and without MWs after controlling for other important factors that affect internal control quality and CDS spreads in cross-sectional regressions as suggested by prior studies (e.g., Ericsson et al. 2009; Callen et al. 2009; Ashbaugh-Skaife et al. 2007; Doyle et al. 2007b; Ge and McVay 2005). The regression model we use is described as follows:

$$LOG(CDS\ SPREAD)_t = \alpha + \beta_1 MW_t + \sum\nolimits_j \gamma_j Control_j + \varepsilon_t \quad (1)$$

where t denotes fiscal years. We use the logarithm of *CDS SPREAD,* which is the average five-year CDS spread over the three-month period subsequent to internal control filings for fiscal year t,[18] as

[18] We use the three-month period after internal control disclosures for two reasons. First, averaging trades over a three-month period might help reduce noise in the data caused by transitory liquidity issues, because trading in many firms' CDS contracts remains sparse and temporarily volatile (although still heavier than trading in their bonds). Second, we want to ensure that there is sufficient time for the CDS market to digest the internal control quality information before the release of the next quarterly report that contains the SOX 302 internal control information. In robustness checks, we demonstrate that our results are similar using one-month and two-month windows.

the dependent variable. The five-year CDS contracts are the most popular and most actively traded in the market. Our key independent variable is an indicator, *MW,* for whether a company reports internal control MWs ($MW = 1$) or not ($MW = 0$) in year *t*.

First, we control for the determinants of internal control weaknesses and include the number of segments (*SEG*), foreign transactions (*FOREIGN*), mergers and acquisitions (*M&A*), restructuring (*RESTRUCTURE*), sales growth (*GROWTH*), inventory (*INVENTORY*), firm size (*SIZE*), and past losses (*%LOSS*) (e.g., Ge and McVay 2005; Ashbaugh-Skaife et al. 2007; Doyle et al. 2007b). Second, we control for the commonly used determinants of credit spreads by including stock return volatility (*VOL_RET*) and leverage (*LEVERAGE*) (see, e.g., Ericsson et al. 2009; Callen et al. 2009). We include a ranked Altman (1968) Z-score (*RZSCORE*) to control for financial distress. We also control for macroeconomic conditions by including interest rate swap rate (*SWAPRATE*) and term slope (*TERMSLOPE*). Prior studies indicate that credit risk not only relies on the reference firm's risk, but also on the default risk of CDS contract sellers (i.e., counter-party risk) (Jarrow and Yu 2001; Morkoetter, Pleus, and Westerfeld 2012). Since CDS sellers are financial institutions in most situations, we include the financial industry CDS spreads to control for counter-party risk because the financial industry CDS spreads represent their ability to fulfill obligations as CDS sellers.[19] CDS index is included to control for the overall CDS market spread changes. We further follow Tang and Yan (2012) and Bongaerts, de Jong, and Driessen (2011) in utilizing the bid-ask spread of CDS contracts to control for the liquidity of the CDS market. Detailed definitions of these variables are provided in Appendix A. Our main regression analysis is conducted on a pooled time-series and cross-sectional panel with industry and year fixed effects. We cluster standard errors by firms and years.

Table 3 reports our baseline panel regression results using *LOG(CDS SPREAD)* as the dependent variable. Column (1) reports the results without including *MW*. Column (2) includes both *MW* and all control variables. In Column (2), the coefficient estimate for *MW* is positive and significant at the 5 percent level or better, which supports our first hypothesis that CDS spreads are positively associated with MWs. The coefficient on *MW* is 0.292, suggesting that internal control MWs are associated with a 33.9 percent ($= exp(0.292) - 1$) higher CDS spreads with a full set of control variables. To provide a more direct explanation regarding the effect of MWs on CDS spreads, we also use the CDS spread without taking a logarithm as the dependent variable to repeat the regressions and find that the coefficient estimate on *MW* is 47.1, which is significant at the 5 percent level. This estimate suggests that CDS spreads are 47 bps higher for MW firms than firms with effective internal controls. This CDS spread difference can be translated into a $40.9 million difference in annual interest expenses between a MW and a non-MW firm.[20]

In sum, our results in Table 3 suggest that internal control MWs are significantly associated with higher CDS spreads.[21] Therefore, our baseline empirical tests support H1. Our findings also imply that internal control quality plays an important role in credit risk pricing in the CDS market, a market in which reference companies are intensely monitored by sophisticated market participants.

To test H2—that company-level MWs are more positively associated with CDS spreads than account-specific MWs—we further analyze the effect of the severity of MWs on CDS spreads by employing the following regression:

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[19] Alternatively, we use the top six (or fourteen) CDS dealers' average CDS spreads as the proxy for the counter-party risk. Our analysis is robust to these alternative measures.

[20] Given the average debt amount of $8.7 billion, the annual interest expense is estimated as follows: $8{,}700 \times 0.47$ percent = $40.9 million. Since the average long-term debt interest rate (the risk-free rate in our sample period plus the credit spread) for a MW firm in our sample is 6.1 percent, these 47 bps account for 7.7 percent of the total interest expense for a MW firm.

[21] The analysis in Table 3 is based on a cross-sectional regression model, which does not imply the potential to exploit the slow diffusion of MW news.

TABLE 3

Internal Control Quality and CDS Spreads

	LOG(CDS SPREAD)			
Variables	**(1)**		**(2)**	
MW			0.292	(2.38)**
SEG	−0.049	(−1.42)	−0.053	(−1.53)
FOREIGN	0.057	(1.08)	0.024	(0.41)
M&A	0.148	(2.13)**	0.139	(1.90)*
RESTRUCTURE	0.171	(2.10)**	0.173	(2.16)**
GROWTH	0.385	(2.84)***	0.358	(3.36)***
INVENTORY	−0.077	(−0.14)	−0.011	(−0.02)
%LOSS	0.603	(6.13)***	0.554	(6.69)***
RZSCORE	−0.239	(−9.17)***	−0.232	(−8.32)***
SIZE	−0.289	(−4.32)***	−0.289	(−4.27)***
SWAPRATE	−0.144	(−1.50)	−0.150	(−2.12)**
TERMSLOPE	−0.617	(−2.29)**	−0.417	(−1.59)
LEVERAGE	0.014	(0.07)	−0.005	(−0.02)
VOL_RET	2.938	(4.51)***	2.890	(4.41)***
LOG(Financial CDS)	−0.218	(−2.15)**	−0.163	(−2.12)**
LOG(CDX)	1.793	(11.73)***	1.597	(8.94)***
LOG(BASPREAD)	0.357	(3.48)***	0.346	(3.38)***
Year and Industry Fixed Effects	Included		Included	
Observations	921		921	
Adj. R^2	0.696		0.700	

***, **, * Denote significance at the 0.01, 0.05, and 0.10 levels, respectively.
This table reports the regression results of Equation (1). The dependent variable is *LOG(CDS SPREAD)*. The independent variables are *MW* and the control variables, which are described in Appendix A. t-values are in parentheses. The standard errors are estimated by clustering firms and years.
See Appendix A for variable definitions.

$$LOG(CDS\ SPREAD)_t = \alpha + \beta_1 ACCOUNT\ SPECIFIC\ MW_t + \beta_2 COMPANY\ LEVEL\ MW_t + \sum_j \gamma_j Control_{jt} + \varepsilon_t \quad (2)$$

where all the variables are defined in Appendix A. Equation (2) extends Equation (1) by classifying MWs into account-specific (*ACCOUNT SPECIFIC MW*) and company-level categories (*COMPANY LEVEL MW*).

Table 4 presents evidence on how CDS spreads are affected by company-level and account-specific MWs. The coefficient for company-level MWs is positive at the 1 percent significance level, whereas the coefficient for account-specific MWs is insignificant, which suggests that the association between CDS spreads and MWs is mainly driven by company-level weaknesses. The t-statistic and coefficient estimate indicate that reporting company-level MWs is associated with approximately 42.6 percent (= $exp(0.355) - 1$) higher CDS spreads, whereas reporting account-specific MWs has an insignificant impact on CDS spreads.[22] These findings support our second

[22] We find similar results when we use raw CDS spreads in our regressions.

TABLE 4

Severity of Internal Control Quality and CDS Spreads

Variables	*LOG*(*CDS SPREAD*)	
ACCOUNT SPECIFIC MW	0.196	(1.07)
COMPANY LEVEL MW	0.355	(4.22)***
SEG	−0.053	(−1.52)
FOREIGN	0.025	(0.41)
M&A	0.142	(1.96)*
RESTRUCTURE	0.174	(2.15)**
GROWTH	0.359	(3.40)***
INVENTORY	0.004	(0.01)
%LOSS	0.554	(6.75)***
RZSCORE	−0.232	(−8.23)***
SIZE	−0.289	(−4.24)***
SWAPRATE	−0.149	(−2.17)**
TERMSLOPE	−0.432	(−1.59)
LEVERAGE	−0.008	(−0.04)
VOL_RET	2.884	(4.42)***
LOG(*Financial CDS*)	−0.149	(−1.61)
LOG(*CDX*)	1.583	(10.06)***
LOG(*BASPREAD*)	0.345	(3.37)***
Year and Industry Fixed Effects	Included	
Observations	921	
Adj. R^2	0.700	

***, **, * Denote significance at the 0.01, 0.05, and 0.10 levels, respectively.
This table reports the regression results of Equation (2). The dependent variable is *LOG*(*CDS SPREAD*) of three month CDS spreads. The independent variables are *ACCOUNT SPECIFIC MW*, *COMPANY LEVEL MW*, and the control variables, which are described in Appendix A. t-values are in parentheses. The standard errors are estimated by clustering firms and years.
See Appendix A for variable definitions.

hypothesis that company-level MWs have a greater impact on CDS spreads than account-specific MWs.

The regression results in Tables 3 and 4 suggest that poor-quality internal control is associated with higher CDS spreads. To test H3, we examine the change in CDS spreads around internal control reports from three months prior to the reports to three months after the reports in Panel A of Table 5. Compared to the event study for short windows documented in Table 2, Panel A of Table 5 compares the change of CDS spreads to MWs to effective internal control with multiple controls. The results indicate that the CDS spread change to internal control reports with MWs is 15.8 percent higher than the change of spreads to effective internal control reports. This pattern supports H3a.

Because the quality of internal control under SOX 404 changes annually, we also examine how the change in MWs is related to the annual change in CDS spreads. Panel B of Table 5 reports the summary statistics for the annual change in CDS spreads for four types of changes in internal control quality. The table indicates that most firms in the sample maintain effective internal control over time. Of the firms, 13 firms experience internal control quality deterioration ($MW = 0$ to $MW = 1$), 20 firms remediate MWs ($MW = 1$ to $MW = 0$), and 19 firms continue to have MWs ($MW = 1$ to $MW = 1$). In Panel C, the multivariate regressions indicate that when firm internal control quality

TABLE 5

The Change in Internal Control Quality and the CDS Spread Change

Panel A: The Change of CDS Spreads around Internal Control Reports

	$\Delta LOG(CDS\ SPREAD)_t$			
Variables	**(1)**		**(2)**	
MW			0.147	(10.92)***
ΔSEG	−0.026	(−0.47)	−0.029	(−0.49)
$\Delta FOREIGN$	−0.031	(−0.58)	−0.034	(−0.68)
$\Delta M\&A$	−0.213	(−1.34)	−0.206	(−1.35)
$\Delta RESTRUCTURE$	0.070	(1.52)	0.058	(1.89)*
$\Delta GROWTH$	−0.096	(−1.36)	−0.090	(−1.12)
$\Delta INVENTORY$	2.244	(4.89)***	2.266	(5.10)***
$\Delta \%LOSS$	0.167	(1.13)	0.127	(4.96)***
$\Delta RZSCORE$	−0.007	(−0.30)	−0.006	(−0.27)
$\Delta SIZE$	0.055	(0.98)	0.068	(1.42)
$\Delta SWAPRATE$	−0.052	(−1.45)	−0.043	(−1.59)
$\Delta TERMSLOPE$	−0.162	(−1.76)*	−0.220	(−3.00)***
$\Delta LEVERAGE$	0.215	(2.26)**	0.228	(2.80)***
ΔVOL_RET	−0.131	(−0.40)	−0.102	(−0.33)
$\Delta LOG(Financial\ CDS)$	−0.055	(−2.27)**	−0.049	(−1.21)
$\Delta LOG(CDX)$	0.978	(3.83)***	1.010	(4.82)***
$\Delta LOG(BASPREAD)$	0.095	(2.88)***	0.095	(2.77)***
Year and Industry Fixed Effects	Included		Included	
Observations	815		815	
Adj. R^2	0.160		0.168	

***, **, * Denote significance at the 0.01, 0.05, and 0.10 levels, respectively.
This panel measures changes of all the variables as information change from three months subsequent to internal control reports to three months prior to internal control reports. The dependent variable is the three-month change of *LOG*(*CDS SPREAD*) around internal control reports. The standard errors are estimated by clustering firms and years.
See Appendix A for variable definitions.

Panel B: Descriptive Statistics on the CDS Spread Change Associated with the Change in Internal Control Quality

Change in Internal Control Quality	n	Mean	Median	S.D.
$MW = 0$ to $MW = 0$	467	−0.122	−0.173	0.507
$MW = 0$ to $MW = 1$	13	0.369	0.329	0.754
$MW = 1$ to $MW = 0$	20	−0.190	−0.220	0.388
$MW = 1$ to $MW = 1$	19	−0.071	−0.085	0.465

This panel presents descriptive statistics for the change of *LOG*(*CDS SPREAD*) from year $t-1$ to year t associated with each of the groups with the change of internal control quality from year $t-1$ to year t.

(continued on next page)

TABLE 5 (continued)

Panel C: Regression of the CDS Spread Change on the Change in Internal Control Quality

	$\Delta LOG(CDS\ SPREAD)_{t-1 \rightarrow t}$			
Variables	**(1)**		**(2)**	
MW = 0 to *MW* = 1			0.467	(2.50)**
MW = 1 to *MW* = 0			−0.073	(−1.00)
MW = 1 to *MW* = 1			−0.053	(−0.13)
Δ*SEG*	−0.033	(−0.16)	−0.041	(−0.20)
Δ*FOREIGN*	0.005	(0.07)	−0.032	(−3.22)***
Δ*M&A*	−0.027	(−0.04)	0.009	(0.01)
Δ*RESTRUCTURE*	−0.076	(−2.65)***	−0.031	(−0.27)
Δ*GROWTH*	0.871	(1.43)	0.901	(1.78)*
Δ*INVENTORY*	6.187	(3.67)***	6.079	(5.51)***
Δ*%LOSS*	−0.194	(−0.76)	−0.206	(−0.72)
Δ*RZSCORE*	−0.054	(−0.69)	−0.042	(−0.68)
Δ*SIZE*	−0.023	(−0.21)	−0.035	(−0.33)
Δ*SWAPRATE*	−0.005	(−0.11)	−0.025	(−0.42)
Δ*TERMSLOPE*	0.091	(0.85)	0.017	(0.18)
Δ*LEVERAGE*	0.895	(2.64)***	0.998	(6.11)***
Δ*VOL_RET*	0.617	(1.35)	0.565	(1.10)
Δ*LOG*(*Financial CDS*)	0.235	(1.51)	0.177	(2.62)***
Δ*LOG*(*CDX*)	−0.043	(−0.07)	0.190	(0.56)
Δ*LOG*(*BASPREAD*)	0.175	(2.08)**	0.162	(1.64)
Year and Industry Fixed Effects	Included		Included	
Observations	519		519	
Adj. R^2	0.148		0.164	

***, **, * Denote significance at the 0.01, 0.05, and 0.10 levels, respectively.
In this panel, the dependent variable is change of *LOG*(*CDS SPREAD*) from year *t*−1 to year *t*. The independent variables are the changes of *MW* and the control variables, which are described in Appendix A. t-values are in parentheses. The standard errors are estimated by clustering firms and years.
See Appendix A for variable definitions.

deteriorates, CDS spreads increase significantly compared with firms maintaining effective internal control. The negative coefficient on remediation cases suggests a decrease in CDS spreads, but this change is statistically insignificant.

According to Duffie and Lando (2001), the effect of information risk from financial reporting on CDS spreads is more pronounced at short maturities. In our previous empirical tests, we focus on five-year CDS spreads because these contracts are most liquid and are unlikely to be contaminated by the illiquidity of the credit market. To explore how internal control quality affects the term structure of credit spreads, we include three-year and one-year CDSs in the tests. Panel A of Table 6 reports the descriptive statistics regarding the effect of internal control quality on CDS spreads at five-, three-, and one-year maturities. The table indicates that MW firm spreads are always significantly larger than those of firms with effective internal control. More importantly, the effect of MWs on CDS spreads is more pronounced for one-year CDSs than three-year or five-year CDSs. Panel B reports the regression results by controlling for factors potentially affecting both internal control quality and CDS spreads. The coefficient on the interaction term *MW* × *3-Year Maturity* is positive and significant at the 1 percent level. This result suggests that, all else equal, the effect of MW on CDS spreads is 170 percent greater than the average credit spread effect. Moreover, the

TABLE 6

Internal Control Quality and Term Structure of CDS Spreads

Panel A: Descriptive Statistics of CDS Spread Term Structures

	Firms with Effective Internal Control			MW Firms				
Maturity	**n**	**Mean**	**Median**	**n**	**Mean**	**Median**	**t-test**	**Wilcoxon Test**
1 Year	54	3.352	3.008	7	5.612	5.096	(−3.55)***	(−3.05)***
3 Years	152	3.392	3.178	13	5.145	5.150	(−4.80)***	(−4.08)***
5 Years	859	3.757	3.701	62	4.775	5.026	(−6.71)***	(−6.54)***

This panel presents descriptive statistics of *LOG*(*CDS SPREAD*) for MW versus non-MW subsamples at different maturities.

Panel B: Regression Results

Variables	***LOG*(*CDS SPREAD*)**	
MW	0.242	(2.37)**
MW × *3-Year Maturity*	0.658	(3.22)***
MW × *1-Year Maturity*	1.110	(3.33)***
3-Year Maturity	−0.414	(−6.34)***
1-Year Maturity	−0.651	(−10.58)***
SEG	−0.083	(−1.78)*
FOREIGN	0.070	(1.05)
M&A	0.134	(1.60)
RESTRUCTURE	0.155	(2.13)**
GROWTH	0.346	(5.81)***
INVENTORY	−0.334	(−0.58)
%LOSS	0.445	(2.96)***
RZSCORE	−0.232	(−8.05)***
SIZE	−0.261	(−3.66)***
SWAPRATE	−0.093	(−1.65)
TERMSLOPE	−0.320	(−0.93)
LEVERAGE	0.145	(0.57)
VOL_RET	2.853	(4.11)***
LOG(*Financial CDS*)	−0.225	(−3.62)***
LOG(*CDX*)	1.614	(5.55)***
LOG(*BASPREAD*)	0.423	(4.25)***
Year and Industry Fixed Effects	Included	
Observations	1,147	
Adj. R^2	0.699	

***, **, * Denote significance at the 0.01, 0.05, and 0.10 levels, respectively.
t-statistics are in parentheses. The standard errors are estimated by clustering firms and years. *3-Year Maturity* is an indicator variable that equals 1 if a CDS is a three-year senior contract, and 0 otherwise; *1-Year Maturity* is an indicator variable that equals 1 if a CDS is a one-year senior contract, and 0 otherwise.
See Appendix A for other variable definitions.

coefficient on *MW* × *1-Year Maturity* is greater than the coefficients on *MW* and *MW* × *3-Year Maturity*.[23] The overall pattern of *MW* on CDS spreads at different maturities supports our hypothesis that the effect of *MW* on CDS spreads is more pronounced at short maturities, which suggests that MWs significantly increase the information risk component of CDS spreads.[24]

Additional Analysis and Robustness Checks

We conduct the following additional tests without tabulating the results. First, financial firms are highly regulated and often act as the dealers and counterparties in CDS contracts. There is a concern that the interconnectedness of financial firms might affect CDS informational efficiency (Griffin 2014). In fact, financial firms have complied with internal control provisions since 1992, which is much earlier than the implementation of SOX 404 (Altamuro and Beatty 2010). We exclude financial firms from the sample and obtain similar results.

Second, the CDS data from Markit are often used in research (e.g., Arora et al. 2014; Kim et al. 2013). As discussed by Subrahmanyam, Tang, and Wang (2014), CDS spreads in GFI more reliably reflect true market information because they are based on actual transactions, while Markit can provide CDS spreads for a larger number of firms because the CDS spreads can be generated from models and are not limited to those with market transactions. GFI data have been previously used by Hull, Predescu, and White (2004), Nashikkar, Subrahmanyam, and Mahanti (2011), and others.[25] Nevertheless, our analysis is robust to the use of Markit data.

Third, as discussed before, MWs affect credit spreads by increasing information risk and/or default risk. Our results for the effect of MWs on CDS spreads in Table 6 suggest that MWs have an impact on the information-related component of CDS spreads, but are silent on whether MWs can directly increase default risk. To distinguish the specific effects of these two channels, we decompose CDS spreads into a default-related and a nondefault-related component that closely relates to information risk. We first obtain Moody's KMV Expected Default Frequency (EDF) to estimate the default probability for nonfinancial firms.[26] We then regress CDS spreads on EDF for each industry-year group and obtain estimated coefficients. Next, we calculate the default-related CDS spreads by multiplying the estimated coefficients by EDF. The difference between the overall CDS spreads and fitted default-related CDS spreads is the nondefault-related CDS component. Our analysis shows that the effect of MWs on credit spreads is mainly related to information risk because the effect of company-level MWs is reflected in nondefault-related CDS spreads. This result suggests that the information risk from MWs largely drives the MW-CDS spread in the presence of controls for all other major factors that explain CDS spreads. When using the default-related CDS spreads as the dependent variable, the coefficient on MW is positive but insignificant. This result indicates that there is no evidence that MWs affect credit spreads by increasing default probability, which is consistent with findings from Kim et al. (2011) in the bank loan market.

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[23] However, the difference between the coefficients on *MW* × *3-Year Maturity* and *MW* × *1-Year Maturity* is not significant. Such insignificance is likely due to small number of MW cases with one-year CDS spread information (i.e., seven observations in Table 6, Panel A).

[24] In Table 6, the number of observed CDS spreads is smaller for shorter maturities. There may be a concern that a firm with five-year CDS but not three-year or one-year CDS trading information differs substantially from firms with CDS trading spanning all maturities. To mitigate this concern, we limit the sample to firms with CDS spreads at all three maturities. The results from this restricted, smaller sample are similar.

[25] Another transaction-based data source similar to GFI is CreditTrade, which has been previously used by other studies, such as Blanco et al. (2005), Acharya and Johnson (2007), Pan and Singleton (2008). We also obtain data from CreditTrade (the data stop in 2006) and combine GFI with CreditTrade as our CDS data (using GFI data alone provides similar results).

[26] We focus on nonfinancial firms in the decomposition because financial firms are highly regulated and their default probability is largely influenced by regulator policies.

Fourth, to mitigate concerns that information contemporaneous with internal control disclosures might lead to a positive relationship between MW and CDS spreads, we include the following control variables: (1) disclosure intensity, for which we use the disclosure of research and development expenditures, order backlog, and number of employees at the segment level as proxies (Karuna 2013); (2) strength of corporate governance, for which we follow Gompers, Ishii, and Metrick (2003) to include a governance index to control for the strength of corporate governance; (3) accruals quality, for which we include the absolute value of abnormal accruals to ensure that the effect of internal control quality on CDS spreads is incremental to the effect of accruals quality; (4) information environment, for which we include the number of analysts covering the firm to control for the firm's information environment; (5) news prominence, for which we include unexpected trading volume as a proxy for news prominence;[27] and (6) stock returns, for which we incorporate stock returns over the same period in the regressions to explore whether the effect of internal control disclosures on CDS spreads is incremental to factors affecting equity markets. These additional controls in the regressions produce similar results.

Fifth, our main sample period ends on May 31, 2007, which is before the 2008 global financial crisis. However, it is also interesting to explore the role of internal control quality in the CDS market during the financial crisis. We collect additional data for the period from June 1, 2007 through June 30, 2008 to extend our analysis. Our additional sample has includes 227 firm-year observations with all relevant information but only four instances of MWs.[28] Regression analysis based on such few observations is not likely to be meaningful.[29] Thus, we conduct event studies of these four MW instances to investigate the CDS market reaction to MW disclosures during the financial crisis, which indicate that CDS spreads increase by 4.5 percent during the three-day event window, though the change is not statistically significant. Nevertheless, this result is consistent with our previous finding that CDS spreads are positively associated with the presence of MWs.[30]

Sixth, we conduct several other sensitivity analyses. We first alter the observation window for CDS spreads. When we use either a two-month or one-month observation window for CDS spreads, and the results are similar to our baseline results using a three-month window. We also note that our results are robust for using individual CDS contracts directly, similar to Callen et al. (2009), instead of averaging CDS spreads across all contracts for the same name. Furthermore, when we restrict our sample of companies to those covered by rating agencies, we obtain results

[27] There are two reasons for using this proxy. First, Huberman and Regev (2001) demonstrate that prominent news is associated with high trading volume in the stock market; therefore, we control for news prominence by including abnormal stock trading volume. Second, prior studies, such as Cready and Hurtt (2002), suggest that equity trading volume contains information for future stock price changes; therefore, we control for information relevant to the equity market by including stock trading volume.

[28] The downward trend of the number of ineffective internal control reports filed is consistent with other studies on MWs. For example, Skaife et al. (2013) document that the fraction of MWs decreases from 17.3 percent in 2004 to 3.2 percent in 2008 in their sample. Several speeches by practitioners also confirm this trend (SEC 2009). We further explore the CDS sample from July 2008 to March 2009 and find that there is no MW case covered by the CDS sample during this period.

[29] Given that the CDS market becomes volatile during the financial crisis, including these observations would reduce the power of our tests but provide little to examine the internal control quality and CDS spread relationship because of the small number of reports of internal control weaknesses. Even if we include this group of the sample, we obtain similar results with slightly lower statistical significance.

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similar to those reported in Tables 3–5, which suggests that the effect of MWs on CDS spreads is in addition to the rating agency monitoring channel documented by Dhaliwal et al. (2011).[31,32]

CONCLUSIONS

We investigate how internal control quality affects the pricing of credit default swaps (CDSs). We find that, all else being equal, CDS spreads are 47.1 bps higher, on average, for firms with internal control material weaknesses (MWs) than for firms with effective internal controls. This MW effect on CDS spreads is driven mainly by company-level weaknesses rather than by account-specific weaknesses. We further document that CDS spreads increase around the reporting of MWs and that deterioration of internal control quality is related to an increase in CDS spreads. Furthermore, the effect of MWs on CDS spreads is stronger for short-term than for long-term CDS contracts.

Our study is the first to examine the effect of internal control quality on derivatives pricing. There is growing interest in understanding the role of accounting information for the CDS market and the impact of CDSs on accounting practices (Griffin 2014). Our analysis using CDS transaction data demonstrates that even in a market in which companies are continuously monitored, internal control quality plays an important role in credit pricing. Importantly, the use of CDS data distinguishes our study from prior research in the following two aspects. First, our finding on the term structure of CDS spreads reveals that MWs increase information risk to creditors, as the CDS market provides a cleaner setting to uncover this term structure effect (Duffie and Lando 2001). Second, because CDS spreads better reflect credit risk than bond or loan spreads (Longstaff et al. 2005), we are able to identify the information risk channel through which MWs affect CDS spreads. Moreover, regulatory bodies, such as the Public Company Accounting Oversight Board (PCAOB), differentiate the type of internal control MWs (i.e., company-level versus account-specific MWs) in their regulatory documents and our finding regarding the differential effects of these two types of MWs provides partial justification for such considerations.

One caveat for our study is that some companies may not disclose MW information in a timely manner (e.g., Rice and Weber 2012). Therefore, we may under or overestimate the effect of internal control MWs on CDS spreads. Nevertheless, we believe that our study provides an importance piece of evidence on how accounting information affects derivatives pricing. The effect of other accounting disclosures on credit derivatives markets warrants future studies.

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[31] Because the major investors in the CDS market are financial institutions, we expect that these financial institutions—such as banks and hedge funds—actively trade and monitor CDS reference companies.

[32] We also explore the differential effect of MWs on CDS spreads for subgroups with high or low credit ratings. The nonlinearity of creditor payoff functions suggests that CDS spreads are sensitive to credit risk-related information when reference firms are close to bankruptcy (Plummer and Tse 1999). We examine such nonlinearity by separating the sample to two subgroups: one with high credit ratings (BBB+ or higher) and one with low credit ratings. Our analysis shows that, in the subgroup with low crediting rating, the association between MWs and CDS spreads is significant and positive and that such an association is stronger for company-level MWs. However, the MW-CDS spread relation is insignificant in the subgroup with high credit ratings.

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APPENDIX A

Variable Definitions

Variable	Definition
CDS SPREAD	CDS spread, the average CDS spread (basis points) in the three months subsequent to the filing dates of SOX 404 reports, respectively, in year *t* (Data Source: GFI and CreditTrade). We use five-year senior CDS spreads for the results in Tables 3–5, and one-, three-, and five-year senior CDS spreads in Table 6 for the analysis of the CDS spread term structure with MWs.
LOG(*CDS SPREAD*)	LOG(CDS spread), natural logarithm of *CDS SPREAD* in year *t*.
MW	Material weakness, an indicator variable that is equal to 1 if a firm reports material weaknesses (MW) in internal control over financial reporting in the SOX 404 reports, and 0 otherwise in year *t* (Data Source: Audit Analytics).
ACCOUNT SPECIFIC MW	Account-specific material weakness, an indicator variable that is equal to 1 if the firm reports an account-specific MW, and 0 otherwise in year *t* (Data Source: Audit Analytics, 10K Wizard, and Moody's Investors Service).
COMPANY LEVEL MW	Company-level material weakness, an indicator variable that equals 1 if the firm reports a company-level MW, and 0 otherwise in year *t* (Data Source: Audit Analytics, 10K Wizard, and Moody's Investors Service).
SEG	Number of segments, the log of 1 plus the sum of the number of business and geographic segments reported for the firm in year *t* (Data Source: Compustat Segment Data).
FOREIGN	Foreign currency transaction, an indicator variable equal to 1 if the firm has a nonzero foreign currency transaction in year *t,* and 0 otherwise (Compustat item: FCA).
M&A	Mergers and acquisitions, proportion of the current and prior four years (from year *t* to year *t*−4) that a firm is involved in mergers and acquisition activities (Compustat item: SALE_FN).
RESTRUCTURE	Restructure, proportion of the current and prior four years (from year *t* to year *t*−4) that a firm is involved in restructuring activities (Compustat items: RCP, RCA, RCEPS, and RCD).
GROWTH	Sales growth, average sales growth in the past five years, as (Compustat item: SALE) from year *t* to year *t*−4.
INVENTORY	Inventory, inventory (Compustat item: INVT) divided by total assets (Compustat item: AT) at the end of year *t*.
%LOSS	Firm loss, proportion of the current and prior four years (from year *t* to year *t* −4) that a firm reports negative earnings (Compustat item: NI).
RZSCORE	Altman Z-score, decile rank of Altman (1968) Z-score at the end of year *t* (Data Source: Compustat). Here, Z-score = 1.2 × (working capital/total assets)[Compustat: (ACT − LCT)/AT] + 1.4 × (retained earnings/total assets)[Compustat: RE/AT] + 3.3 × (EBIT/total assets)[Compustat: (IB + XINT + TXT)/AT] + 0.6 × (market value of equity/total liabilities)[Compustat: (CSHO × PRCC_F)/LT] + 0.999 × (sales/total assets)[Compustat: SALE/AT].
SIZE	Firm size, natural logarithm of total assets at the end of year *t* (Compustat item: AT). Total assets (AT) are measured in $million.
SWAPRATE	Interest rate swap rate, five-year interest rate swap rate (in percentage points) at the month of the SOX 404 filing date in year *t* (Data Source: Federal Reserve Bank Interest Rates monthly data).

(continued on next page)

APPENDIX A (continued)

Variable	Definition
TERMSLOPE	Term slope, the difference (in percentage points) between the ten-year Maturity-Constant Treasury Rate and the two-year Maturity-Constant Treasury Rate at the month of the SOX 404 filing date in year *t* (Data Source: Federal Reserve Bank Interest Rates monthly data).
LEVERAGE	Leverage ratio, long-term debt (Compustat item: DLTT) divided by total assets (Compustat item: AT) at the end of year *t*.
VOL_RET	Stock return volatility, which is the standard deviation of stock returns during year *t* (Data Source: CRSP).
LOG(*Financial CDS*)	Financial industry CDS spread, natural logarithm of financial industry CDS spread, which is the average five-year senior CDS spread of financial firms (in basis points) in the three months subsequent to the filing dates of SOX 404 reports, respectively, in year *t* (Data Source: GFI and CreditTrade).
LOG(*CDX*)	CDS index, natural logarithm of CDX, which is the average CDX index spreads (in basis points) in the three months subsequent to filing dates of SOX 404 reports, respectively, in year *t* (Data Source: GFI). Here, CDX spreads are the DJ CDX North American Investment Grade Index, CDX.N.A.IG.5yr, based on a liquid basket of CDS contracts for 125 U.S. firms with investment grade corporate debt. The index is managed by Dow Jones, and trades just like a single-name CDS contract with a spread based on the equally weighted basket of its 125 constituents.
LOG(*BASPREAD*)	CDS bid-ask spread, natural logarithm of 1 plus the average CDS bid-ask spread. The average CDS bid-ask spread is estimated as the average weekly offer spread minus bid spread of CDS (in basis points) in the three months subsequent to the filing dates of SOX 404 reports, respectively, in year *t* (Data Source: GFI).