Accounting Horizons
Vol. 25, No. 3
2011
pp. 465–485

American Accounting Association
DOI: 10.2308/acch-50008

Was the Sarbanes-Oxley Act Good News for Corporate Bondholders?

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SYNOPSIS: We investigate the impact of the Sarbanes-Oxley Act (SOX) on corporate bondholder value by examining the bond market reaction to news events leading up to the passage of SOX. The net impact of SOX on bondholder value is difficult to predict, and there are many reasons why it may be viewed as either good or bad news. Our primary analysis reveals a significant decline in average bondholder value around these events. In addition, cross-sectional tests find that the decline is significantly larger among riskier bonds and among bonds held by firms that are expected to experience the greatest changes under SOX. Thus, our findings are consistent with the bond market expecting the exogenously imposed changes under SOX to make bondholders worse off.

INTRODUCTION

The Sarbanes-Oxley Act of 2002 (SOX) was passed in response to a series of high-profile accounting scandals with the principal aim of protecting *shareholder* value. Empirical evidence from the stock market, however, is mixed on whether SOX actually benefits shareholders. While Zhang (2007) finds that stock prices decline in response to the passage of SOX, Rezaee and Jain (2006) and Li et al. (2008) find that the stock market reacts favorably to the passage of SOX. Given the lack of consensus on the value implications of SOX, further analyses of SOX are needed, and we extend the literature by examining the impact of SOX on a different, yet significant, stakeholder—bondholders. Thus, the purpose of this paper is to explore the impact of

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We thank workshop participants at Brigham Young University, Chulalongkorn University, the Chinese University of Hong Kong, Hong Kong University of Science and Technology, the University of Houston Accounting Conference, the London Business School, the National University of Singapore, the University of Southern California, the University of Toronto, the University of Utah, and the 2007 International Symposium on Auditing Research (Shanghai) for helpful comments and suggestions.

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Submitted: July 2010
Accepted: January 2011
Published Online: September 2011
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SOX on bond values by examining the bond market reaction to news events leading up to the passage of SOX.

The net impact of SOX on bondholder value is difficult to predict, and there are many reasons why it may be viewed as either good or bad news. Ultimately, therefore, it is an empirical question whether market participants view the passage of SOX as good or bad news for bondholders. SOX may potentially benefit bondholders for several reasons.[1] For example, SOX may reduce default risk by reducing the incidence of corporate fraud and management's preferences for risk taking (e.g., Bargeron et al. 2010). SOX may also improve financial reporting quality, as suggested by Cohen et al. (2008), thereby improving bondholders' ability to assess the likelihood of default (Zhang 2008).

There are, however, also many reasons why the passage of SOX may not benefit bondholders and may even be expected to harm them. First, SOX may not benefit bondholders because bondholders generally have less to gain from good corporate governance when compared to stockholders (i.e., Shleifer and Vishny 1997). This is consistent with "good" corporate governance often being defined as more closely aligning the interests of managers and stockholders (Bertsch and Watson 2003). Second, SOX may reduce firms' future cash flows, both because of implementation costs and because the regulatory burden is likely to distract management's attention away from "value creation" (Butler and Ribstein 2006). Finally, SOX may unintentionally reduce earnings quality. For example, the ban on non-audit services under SOX may impair audit quality by eliminating the knowledge spillovers that auditors potentially derive from doing both audit and consulting work.

We begin our investigation by examining the cumulative *unexpected* change in corporate bond yield spreads surrounding 16 legislative events leading up to the passage of the Sarbanes-Oxley Act as identified in Zhang (2007).[2] We argue that the market's expectation of the passage of SOX moves from essentially 0 to 1 over the period spanned by our events, and, therefore, we cumulate the bond market's reaction over all our events to capture the market's *net* assessment of the impact of SOX on bondholder wealth.

Our primary analysis uses a sample of 2,671 U.S. straight corporate bonds issued by 847 corporations from the Datastream database and a reduced sample of 769 bonds issued by 229 corporations that satisfy data requirements for our regression analysis. Our event study results show a significant unexpected increase in yield spreads during the events leading up to the passage of SOX, ranging between 16 and 26 basis points, depending on our expectation model. Thus, we conclude that the answer to the rhetorical question posed in the title of the paper is "no, SOX was not good news for corporate bondholders."

We also perform analyses that explore the cross-sectional variation in the bond market reaction to SOX to further our understanding of why SOX reduces bondholder value. If SOX is, indeed, bad news for bondholders, then we expect the riskiest bonds and bonds issued by firms expected to undergo the greatest changes due to SOX to experience the largest price declines. Consistent with our expectations, we find that the negative bond market reaction found in our primary analysis is significantly more negative among non-investment grade bonds that are likely to undergo the greatest changes under SOX.

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[1] We note that while some of the arguments below apply to both shareholders and bondholder, others apply exclusively to bondholders. We combine these arguments because the purpose of the paper is to assess the net impact of SOX on bondholders.

[2] We use only 16 of the 17 news events in Zhang (2007), because we drop an event that overlaps with the announcement of the WorldCom bankruptcy. The announcement of the WorldCom bankruptcy resulted in a large market decline in bond values, and hence potentially biases our results toward finding an overall negative market reaction of the SOX-related events. In untabulated analysis, we find that our result remains qualitatively identical after including this event.

Our study contributes to the literature in several ways. First, while prior research examines the impact of SOX on stockholders (e.g., Zhang 2007), ours is the first study we are aware of to assess its impact on bondholders. Second, we add to the growing body of research that identifies an association between the cost of debt and various endogenously determined governance choices (e.g., Anderson et al. 2004; Mansi et al. 2004). SOX essentially provides a natural experimental setting in which we are able to examine the expected effects of exogenously determined governance changes, thereby avoiding the problems commonly encountered in more traditional cross-sectional analysis that examines endogenously determined governance (Hermalin and Weisbach 2003).[3] Third, we add to the research that examines the impact of accounting-related securities regulation on firm value. While most of this literature focuses on shareholder value (i.e., Benston 1973), a notable exception is Chow (1983), an event study that examines changes in bond prices around the passage of the Securities Acts of 1933 and 1934. In contrast to our findings, Chow (1983) concludes that there is "weak evidence" of an increase in bondholder value around the passage of the 1933 Securities Act, legislation that increases the financial accounting disclosures of firms issuing new securities. Numerous differences in methodology and research design, however, make it difficult to compare our findings with Chow (1983).[4]

The rest of the paper is organized as follows. The next section provides the motivation for our study. In the section that follows, we discuss our sample selection procedures and present the results of our primary analysis. We then present additional analysis that examines cross-sectional differences in our sample. Finally, we summarize the study and our conclusions.

MOTIVATION

Stock Price Reaction to SOX

We are aware of three papers that examine the impact of SOX on *shareholder* value. Zhang (2007) examines the stock price reaction to 17 events disclosed in the media during the seven months prior to the passage of SOX and finds a significant decline on several key dates. In addition, Zhang (2007) finds that firms with poorer governance and higher pre-SOX non-audit service fees experience relatively higher negative returns. Contrary to the findings in Zhang (2007), however, Rezaee and Jain (2006) and Li et al. (2008) find positive abnormal returns around the final rulemaking events and conclude that investors expect SOX to be beneficial. Thus, evidence from the stock market is mixed on whether SOX is good or bad news for shareholders.

Given the lack of consensus on the value implications of SOX, further analyses of SOX are needed. Thus, this study extends the literature by examining the impact of SOX on a different, yet significant, stakeholder—bondholders. The remainder of this section discusses the various ways in which SOX may impact bondholder value.

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[3] While prior literature finds that various corporate governance choices, such as higher levels of board independence, are associated with lower costs of debt (Anderson et al. 2004), governance choices are expected to be *endogenously determined*, and thus it is unclear how *exogenously imposed* changes, such as those imposed by SOX, are likely to impact debtholders (Hermalin and Weisbach 2003).

[4] An important methodological difference that makes it difficult to compare our study with Chow (1983) is that, while we measure the changes in bondholder value using treasury-adjusted bond yield spreads and a multi-factor expectation model that controls for market-wide bond value changes, Chow (1983) uses raw bond returns adjusted for returns on non-event dates. In addition, Chow (1983) has a fairly small sample that includes just 23 bonds, compared to 2,671 in our study.

SOX's Impact on Bondholders

There are several reasons to believe that SOX may benefit bondholders. One is that as residual claimants, stockholders are likely to bear the bulk of the costs of implementing SOX. This suggests that, *ceteris paribus*, if any of the changes under SOX benefit bondholders, then bondholders may be better off, as long as the implementation costs are reasonably low. Of course, if the expected costs of implementing SOX are high, or if some of the changes actually impose costs on bondholders, then the costs associated with SOX may swamp any potential benefits to bondholders.[5]

SOX may also benefit bondholders by reducing management's propensity to make risky investments. This is consistent with Bargeron et al. (2010), who find that research and development expenditures and capital investment decline following SOX, but corporate cash holdings increase. If decreased risk taking reduces the variation of expected future cash flows, without reducing mean expected cash flows, then bondholders are expected to benefit. An additional way in which SOX may benefit bondholders is by reducing corporate fraud, which would decrease the risk of bond default. Finally, SOX may benefit bondholders by improving financial reporting quality, which should improve the ability of bondholders to assess default risk.

There are also several reasons why SOX may harm bondholders. One reason why SOX may not benefit bondholders is that corporate governance systems are primarily designed for the benefit of stockholders (Shleifer and Vishny 1997). Thus, SOX may harm bondholders by more closely aligning the interests of managers and stockholders. As noted in a recent report by Moody's, "good corporate governance" is often interpreted as better aligning the interests of managers and shareholders which in turn may harm bondholders (Bertsch and Watson 2003). This is consistent with prior evidence suggesting that strengthening manager-shareholder incentive alignment leads in wealth transfers from bondholders to shareholders (e.g., Maxwell and Stephens 2003; Klock et al. 2005; Cremers et al. 2007).

SOX may also harm bondholders because it reduces future cash flows, both in terms of implementation costs and in distracting management from productive activities. This is consistent with arguments that SOX is likely to cause managers to pay less attention to "value creation" (Butler and Ribstein 2006). Another way in which SOX may impair bond values is by unintentionally reducing financial reporting quality. For example, one of SOX's most contentious provisions essentially bans incumbent auditors from providing non-audit services. While the motivation for this provision is the belief that non-audit services impair auditor independence, there is little evidence to support this conjecture (DeFond and Francis 2005), and there is theoretical and empirical evidence suggesting that non-audit services may actually improve earnings quality by resulting in knowledge spillovers that improve audit quality (Simunic 1984; Palmrose 1986).

While there are several reasons why SOX may either benefit or harm bondholders, the net effect is unpredictable. The next section presents the tests we perform to assess whether the market expects the adoption of SOX to increase or decrease bondholder value.

[5] Consistent with the costs ultimately swamping the benefits, the Financial Executives Institute (FEI) reports that 94 percent of the financial executives responding to its March 2005 survey indicate that the costs of compliance with SOX outweigh the benefits (FEI 2005).

TABLE 1

Sample Selection

	Number of Bonds	Number of Issuers
U.S. domestic corporate bonds on Datastream as of January 1, 2002, with non-negative yield spreads,[a] after excluding the top and bottom 1 percent of daily spreads	4,249	1,369
Less:		
Bonds with convertible, putable, asset-backed, and security enhancement features	(1,011)	(373)
Bonds with missing spreads over the SOX event windows	(567)	(149)
Full sample	2,671	847
Less:		
Observations without Compustat data	(552)	(215)
Observations without Audit Analytics data	(789)	(243)
Observations without Investor Responsibility Research Center (IRRC) data	(172)	(73)
Observation without bond and stock returns	(389)	(87)
Reduced sample	769	229

[a] Yield spread is the yield to maturity of the corporate bond minus the yield to maturity of an equivalent-term government benchmark bond, expressed in basis points. When the maturity of a bond does not exactly match the maturity of the available government benchmark bond, linear interpolation is used. For bonds with a maturity longer (shorter) than the longest (shortest) benchmark, the yield is compared to the longest (shortest) benchmark.

EMPIRICAL ANALYSIS

Sample Selection

As in Chen et al. (2007), we use the Datastream database, from Thompson Financial, to obtain bond-related information on spreads, returns, issue amounts, and maturities.[6] Table 1 summarizes our sample selection process. We begin by using Datastream to identify 2,671 U.S. domestic straight corporate bonds issued by 847 corporations with yield spreads available during the period January through July 2002 (hereafter the full sample).[7] Following prior literature, we include only straight bonds because bonds with special features, such as call, put and conversion options, are priced differently. To mitigate the influence of outliers, we exclude the observations with spread changes that fall in the top and bottom 1 percent of distribution. We then drop 552 bonds issued by 215 companies without financial statement information on Compustat, 789 bonds issued by 243

[6] Datastream uses quotes from dealers at 4:00 p.m. each day. In the absence of quotes or trades, ex-coupon prices remain unchanged.

[7] We restrict our observations to positive spreads. According to Thompson, a negative spread generally occurs in their database for two reasons. First, the bond was never priced or the supplier of the price discontinued pricing it. This gives an incorrect current price and, consequently, an incorrect yield value, which results in a negative spread. Second, the bond is a "floater" (a bond whose interest rate floats with a benchmark rate such as a U.S. Treasury), and the supplier of the price ceases to update the price. This results in an incorrect coupon value, which will have an incorrect yield value and a negative spread.

companies without auditor fee data in the Audit Analytics database, 172 bonds issued by 73 companies without governance variables in the Investor Responsibility Research Center (IRRC) database, 389 bonds issued by 87 companies without stock or bond price data in the CRSP or Datastream databases. This process yields a reduced sample of 769 bonds issued by 229 corporations.

Research Design

The legislative response that ended with the passage of SOX on July 25, 2002, began in January 2002. During the intervening seven months, several events were announced in the media that are likely to have changed the market's expectations of the likelihood that major legislation was likely to be adopted. We use the events identified in Zhang (2007) to capture the periods in which the market is likely to have impounded information about the increasing likelihood of the passage of the SOX legislation.[8] We use only 16 of the 17 news events in Zhang (2007), because we drop an event that overlaps with the announcement of the WorldCom bankruptcy. The announcement of the WorldCom bankruptcy, the largest in history, resulted in a large increase in bond spreads, and hence potentially confounds our analysis.

Following Elton et al. (2001), we measure the change in bond values as the change in the bond yield spreads where the yield spread is defined as the corporate bond yield to maturity minus the yield to maturity of an equivalent-term government benchmark bond (i.e., a Treasury Note, Bond or Bill).[9] To isolate the effects of SOX during our event windows, we employ two models to capture the *unexpected* change in yield spreads. Our first model controls for the factors found to explain yield spread changes in Collin-Dufresne et al. (2001). We begin by estimating the coefficients in the following regression model for each bond in our sample over all trading days during 2001, the year preceding our event dates:

$$\Delta Spread_{it} = \alpha_i + \beta_1(Stock\ return_{it}) + \beta_2(\Delta Spot\ rate_t) + \beta_3(\Delta Spot\ rate_t^2) + \beta_4(\Delta Slope\ of\ yield\ curve_t) + \beta_5(\Delta VIX_t) + \beta_6(\Delta Jump_t) + \beta_7(S\ \&\ P\ return_t) + \varepsilon \quad (1)$$

where:

$\Delta Spread_{it}$ = daily change in yield spread for bond i, where yield spread is the yield to maturity of the corporate bond minus the yield to maturity of an equivalent-term government bond;

$Stock\ return_{it}$ = stock return for the issuer of bond i on day t. This variable is only used for the reduced sample with available stock return data;

$\Delta Spot\ rate_t$ = change in DataStream's ten-year benchmark Treasury rate on day t;

$\Delta Spot\ rate^2_t$ = square of the change in spot rate on day t;

$\Delta Slope\ of\ yield\ curve_t$ = change in the difference between DataStream's ten-year and two-year Benchmark Treasury yield;

ΔVIX_t = change in the implied volatility of the S&P 500 as captured by the Chicago Board of Options VIX Index;

$\Delta Jump_t$ = change in the probability or magnitude of a downward jump in firm value as measured by changes in the slope of the "smirk" of implied volatilities of options on the S&P 500 futures; and

$S\&P\ return_t$ = return on the S&P 500 Index.

[8] See Zhang (2007) (including Appendix I) for a detailed justification for using these event dates.

[9] For bond maturities that do not exactly match the maturity of the available government benchmark bond, Datastream uses linear interpolation. For bond maturities that are longer (shorter) than the longest (shortest) benchmark, Datastream uses the yield to the longest (shortest) benchmark bond.

We then use the estimated coefficients to fit the model for each bond on each event day. The unexplained portion of the fitted model is thus equal to the *unexpected* change in the bond yield spread after controlling for the factors found to be associated with bond spread changes in Collin-Dufresne et al. (2001).[10]

Our second model follows the approach in Zhang (2007) by controlling for the expected change in yield spreads as proxied by a set of foreign bonds issued by firms that are not subject to the SOX legislation.[11] For this approach, we begin by estimating the coefficients in the following regression for each bond in our sample over all trading days during 2001:

$$\begin{aligned}\Delta Spread_{it} = {} & \alpha_i + \beta_1(\Delta Spread\ Australia_t) + \beta_2(\Delta Spread\ Austria_t) + \beta_3(\Delta Spread\ Canada_t) \\ & + \beta_4(\Delta Spread\ Denmark_t) + \beta_5(\Delta Spread\ France_t) + \beta_6(\Delta Spread\ Italy_t) \\ & + \beta_7(\Delta Spread\ Netherlands_t) + \beta_8(\Delta Spread\ South\ Africa_t) + \beta_9(\Delta Spread\ Spain_t) \\ & + \beta_{10}(\Delta Spread\ Sweden_t) + \beta_{11}(\Delta Spread\ Switzerland_t) + \beta_{12}(\Delta Spread\ UK_t) + \varepsilon \end{aligned} \quad (2)$$

where:

$\Delta Spread_{it}$ = as in Equation (1); and

$\Delta Spread$ *"Country Name"*$_t$ = average of the daily change in yield spread for all available corporate bonds in the respective country, measured as the change in yield to maturity minus the yield to maturity of an equivalent-term government bond in that country.

As with our first model, we then use the estimated coefficients to fit the model for each bond on each event date, with the unexplained portion equaling the *unexpected* change in the bond yield spread after controlling for the changes in spreads of foreign bonds that are not governed by the SOX legislation.

To assess the cumulative effects of the SOX related announcements, we first sum the average of the daily unexpected changes in spread for our sample bonds for each event window as follows:

$$U\Delta SpreadEvent_w = \sum_{t=1}^{T_j}\left(\frac{1}{N}\sum_{i=1}^{N} U\Delta Spread_{it}\right) \quad (3)$$

where:

$U\Delta SpreadEvent_w$ = cumulative average unexpected change in spread for all bonds over event window w;

$U\Delta Spread_{it}$ = unexpected change in spread for bond i on day t;

N = total number of bonds in the corresponding (full or reduced) sample; and

T_j = the number of trading days in event window w.

We then add the cumulative average change in spread for each event window over the 16 event windows to measure the overall change in bond values during our sample period:

$$U\Delta SpreadAllEvents_{sum} = \sum_{w=1}^{16} U\Delta SpreadEvent_w \quad (4)$$

where:

[10] Collin-Dufresne et al. (2001) perform their analysis over a different time period and use monthly changes in bond yield spreads while we use daily changes in spreads. Nevertheless, our coefficient estimates are reasonably comparable to the coefficients found in their analysis.

[11] In untabulated analysis, we also repeat our analysis after using an expectation model that uses agency bonds (issued by not-for-profit institutions) in place of the foreign bonds and find that our results remain qualitatively identical to those of foreign bonds.

$U\Delta SpreadAllEvents_{sum}$ = cumulative unexpected change in spread for all bonds over all events windows; and
$U\Delta SpreadEvent_{w}$ = cumulative average unexpected change in spread for all bonds over event window w.

To test whether the cumulative average unexpected change in spread over all 16 events is significantly different from 0, we use a historical-based student t-statistic computed by dividing the unexpected change in spread of our sample bonds by the standard deviation of the residuals in the respective expectation model (estimated using 2001 data), adjusted for the number of days in each event window.

An assumption underlying our event study approach to bond value changes is that the bond market is reasonably efficient at pricing value relevant information on a timely basis. This is consistent with Hotchkiss and Ronen (2002), who conclude that earnings news is quickly incorporated into both stock and bond prices, that the informational efficiency of corporate bonds is similar to that of the underlying stocks. Moreover, if some of the bonds used in our analysis are not efficient with respect to value relevant news, we do not expect this to bias toward finding a systematic reaction in our cross-sectional analysis.

The Bond Market's Reaction to SOX

Table 2 reports the cumulative average unexpected change in spread and associated t-statistic for each of our 16 event windows, and cumulatively across all event windows, for both the full and reduced samples, based on both the Collin-Dufresne et al. (2001) and Zhang (2007) expectation models. While the significance of the unexpected changes in spread for specific dates varies somewhat across the two expectation models and the two samples, both models report similar magnitudes for the cumulative unexpected changes in spread. Specifically, the last row reports that the cumulative unexpected change in spread over all 16 event windows is between 23.86 basis points (Zhang et al. model) and 26.49 basis points (Collin-Dufresne et al. model) for the full sample, both significant at $p < 1\%$ (two-tailed).[12] In addition, the cumulative unexpected change in spread for the reduced sample is between 15.93 (Zhang model) and 21.31 (Collin-Dufresne et al. model), significant at $p < 5\%$ (two-tailed). Thus, Table 2 presents evidence that bond prices declined during the events leading up to the passage of SOX, consistent with the market participants expecting the changes implied by SOX to reduce bondholder wealth.

CROSS-SECTIONAL ANALYSIS

To further our understanding of why SOX reduces bondholder value, this section discusses additional analysis that explores cross-sectional differences in bond market's reaction to SOX. If the market response we observe in Table 2 is, indeed, attributable to SOX, we expect the bonds closest to default and bonds from issuers most impacted by SOX to experience relatively larger declines in price.

Market Reaction Partitioned on Investment versus Non-investment Grade Bonds

Because non-investment grade bonds are closer to default, we expect non-investment grade bonds to react more negatively to bad news than investment grade bonds. This expectation is consistent with DeFond and Zhang (2008), who report that non-investment grade bonds react more

[12] The mean spread in our full sample is 289 basis points over the period of our analysis. Thus, the decline of 24–26 basis points equals an 8–9% decline in spread (24/289–26/289).

TABLE 2

Cumulative Unexpected Change in Yield Spreads in Basis Points with t-statistic in Parentheses

(n = 2,671 Bonds for Full Sample and n = 769 Bonds for Reduced Sample)

			Full Sample		Reduced Sample	
Event	Event Window	Event Description	Collin-Dufresne et al. (2001) Model	Zhang (2007) Model	Collin-Dufresne et al. (2001) Model	Zhang (2007) Model
1	1/15–1/18	SEC chairman proposes an accounting overhaul plan	0.69 (0.35)	2.72 (1.24)	0.58 (0.31)	1.89 (0.82)
2	2/1–2/4	Treasury Secretary calls for changes in rules governing corporations	0.76 (0.55)	1.56 (1.00)	0.07 (0.06)	0.83 (0.51)
3	2/11–2/14	Oxley introduces an accounting reform bill in the House Financial Services Committee	−0.02 (−0.01)	−0.22 (−0.10)	−0.31 (−0.17)	−1.01 (−0.44)
4	2/27–3/1	House Democrats introduce legislation that imposes more restrictions than in Oxley's proposal	1.29 (0.77)	3.62* (1.90)	2.38 (1.48)	3.98** (1.99)
5	3/6–3/8	Bush's first response to Enron—proposes 10 points, only one of which requires legislation	−1.84 (−1.09)	0.32 (0.17)	−1.45 (−0.90)	0.14 (0.07)
6	3/25–3/27	Greenspan warns against too much regulation	0.08 (0.05)	1.95 (1.02)	−0.32 (−0.20)	1.00 (0.50)
7	4/11–4/12	House Financial Services Committee scheduled to vote Oxley's bill, but the vote is postponed	0.08 (0.06)	−0.45 (−0.29)	0.01 (0.01)	−0.63 (−0.39)
8	4/16–4/17	Oxley's bill passes the House Financial Services Committee	0.33 (0.24)	0.60 (0.38)	0.81 (0.62)	0.81 (0.50)
9	4/24–4/26	Oxley's bill passes in the House; Senate Judiciary Committee approves legislation bolstering corporate fraud laws	1.21 (0.72)	1.29 (0.68)	0.57 (0.35)	0.50 (0.25)
10	5/7–5/9	Sarbanes circulates his reform bill in the Senate Banking Committee	1.91 (1.13)	−0.06 (−0.03)	1.48 (0.92)	−0.59 (−0.30)
11	6/10–6/13	Democrats in Senate Banking Committee unite behind Sarbanes' bill; SEC proposes rules to require executives to certify financial reports	2.16 (1.11)	3.85* (1.75)	−0.12 (−0.06)	0.67 (0.29)
12	6/18–6/19	Senate Banking Committee passes Sarbanes' bill	1.50 (1.09)	2.40 (1.55)	2.23* (1.70)	3.06* (1.88)

(continued on next page)

TABLE 2 (continued)

			Full Sample		Reduced Sample	
Event	**Event Window**	**Event Description**	**Collin-Dufresne et al. (2001) Model**	**Zhang (2007) Model**	**Collin-Dufresne et al. (2001) Model**	**Zhang (2007) Model**
13	7/8–7/12	Senate debates Sarbanes' bill; Bush gives a speech on corporate reform; Senate passes a tough amendment to strengthen criminal penalties	1.10 (0.51)	1.95 (0.79)	0.67 (0.34)	1.37 (0.53)
14	7/15–7/17	Senate passes Sarbanes' bill; House passes bill to strengthen criminal penalties	2.29 (1.36)	−1.56 (−0.82)	2.83* (1.76)	−0.38 (−0.19)
15	7/18–7/23	House Republican leaders retreat from efforts to dilute the Senate's tough bill. Conference committee starts negotiations to merge bills and Senate's bill became the framework. Bush pushes to speed up rulemaking in a radio address.	6.19*** (3.18)	6.69*** (3.05)	4.31** (2.32)	4.74** (2.06)
16	7/24–7/26	Senate and House pass SOX with overwhelming majorities.	8.77*** (5.20)	−0.79 (−0.41)	7.55*** (4.70)	−0.45 (−0.23)
		Cumulative unexpected change in spread over all event windows	26.49*** (3.85)	23.86*** (3.07)	21.31*** (3.25)	15.93** (1.95)

*,**,*** Significant at $p < 10$ percent, $p < 5$ percent, and $p < 1$ percent, respectively. All p-values are two-tailed.

Variable Definitions:

Event window = dates surrounding SOX-related events identified by Zhang (2007) from the *Wall Street Journal* and *The Washington Post*. Event 13 from Zhang (2007) is deleted because it contains an information release that potentially confounds bond returns. If the news item involves a single day, the event window consists of days [−1,1]. The window is longer if the news arrived on two or more consecutive days; and

Cumulative unexpected change in spread = sum of the daily unexpected change in spreads over event windows. We first estimate the coefficients using one of the following two expectation models to calculate the unexpected change in spread.

Collin-Dufresne et al. (2001) model:

$$\Delta Spread_{it} = \alpha_i + \beta_1(Stock\ return_{it}) + \beta_2(\Delta Spot\ rate_t) + \beta_3(\Delta Spot\ rate_t^2) + \beta_4(\Delta Slope\ of\ yield\ curve_t) + \beta_5(\Delta VIX_t) + \beta_6(\Delta Jump_t) + \beta_7(S\ \&\ P\ return_t) + \varepsilon$$

Zhang (2007) model:

$$\Delta Spread_{it} = \alpha_i + \beta_1(\Delta Spread\ Australia_t) + \beta_2(\Delta Spread\ Austria_t) + \beta_3(\Delta Spread\ Canada_t) + \beta_4(\Delta Spread\ Denmark_t) + \beta_5(\Delta Spread\ France_t) + \beta_6(\Delta Spread\ Italy_t) + \beta_7(\Delta Spread\ Netherlands_t) + \beta_8(\Delta Spread\ South\ Africa_t) + \beta_9(\Delta Spread\ Spain_t) + \beta_{10}(\Delta Spread\ Sweden_t) + \beta_{11}(\Delta Spread\ Switzerland_t) + \beta_{12}(\Delta Spread\ UK_t) + \varepsilon$$

(continued on next page)

TABLE 2 (continued)

where:
$\Delta Spread_i$ = daily change in yield spread for bond *i*, where yield spread is the yield to maturity of the corporate bond minus the yield to maturity of an equivalent-term government bond;
$Stock\ return_{it}$ = stock return for the issuer of bond *i* on day *t*. This variable is only used for the reduced sample with available stock return data;
$\Delta Spot\ rate_t$ = change in Datastream's ten-year benchmark Treasury rate on day *t*;
$\Delta Spot\ rate^2{}_t$ = square of the change in spot rate on day *t*;
$\Delta Slope\ of\ yield\ curve_t$ = change in the difference between Datastream's ten-year and two-year Benchmark Treasury yield;
ΔVIX_t = change in the implied volatility of the S&P 500 as captured by the Chicago Board of Options VIX Index;
$\Delta Jump_t$ = change in the probability or magnitude of a downward jump in firm value as measured by changes in the slope of the "smirk" of implied volatilities of options on the S&P 500 futures;
$S\&P\ return_t$ = return on the S&P 500 Index;
$\Delta Spread$ *"Country Name"*$_t$ = average of the daily change in yield spread for all available corporate bonds in the respective country, measured as the change in yield to maturity minus the yield to maturity of an equivalent-term government bond in that country; and
t-statistic = a historical-based student t-statistic computed by dividing the unexpected change in spread of our sample bonds by the standard deviation of the residuals in the expectation model (estimated using 2001 data), adjusted for the number of days in each event window.
Under both expectation models, we apply the coefficients estimated during year 2001 to obtain expected daily average change in spread. Daily unexpected change in spread equals actual minus the expected daily change in spread.

negatively to bad news earnings surprises. We perform a univariate test of this expectation in Table 3, Panel A by reporting the unexpected change in spread from Table 2 after partitioning our sample on whether the bonds are investment or non-investment grade. Consistent with our expectation, the results indicate that while the change in spread is significantly positive for both the investment and non-investment grade bonds, the change in spread is significantly more positive (i.e., the market reaction is significantly more negative) among the non-investment grade bonds.

Market Reaction Partitioned by the Impact of SOX

We attempt to provide some corroborating evidence on whether the changes portended in SOX are responsible for the unexpected increase in spreads we find in our primary analysis by identifying firm-level factors that are expected to change as a result of SOX. If the increases in spreads documented in Table 2 are due to the changes anticipated by the passage of SOX, then we expect them to be associated with factors expected to change under SOX. We identify the issuers most likely to be impacted by SOX by constructing a *summary* measure that combines the net effect of five firm-level characteristics that are subject to change under SOX. We use a summary measure that combines the net impact of all five factors because we are attempting to identify the firms that undergo the greatest changes under SOX. We assume that an issuer that undergoes changes in all five characteristics under SOX experiences a greater impact from SOX than an issuer that undergoes a change in only one factor. While some factors may have a greater impact than others, it is unclear how they should be weighted and, therefore, we weight them equally.

We begin this analysis by first creating a dichotomous measure for each of five firm-level characteristics that potentially change under SOX, where a value of 1 indicates that the issuer is more likely to undergo a change in this characteristic as a result of SOX, and 0 otherwise. We describe each of these five characteristics below, along with an explanation of why we expect them to change under SOX, why this change may adversely impact bondholders, and how we measure the likelihood of a change.

1. **Board independence**—SOX's board independence requirements are limited to audit committees. However, during the SOX deliberations, SEC Chairman Harvey Pitt requested

TABLE 3

Bond Market Reaction Partitioned on Riskiness of Bonds, and Impact of SOX

Panel A: Cumulative Unexpected Change in Spread, Partitioned by Investment versus Non-Investment Grade, Reduced Sample (n = 769 Bonds)[a]

Expectation Model	Investment-Grade Bonds (n = 593)	Non-Investment Grade Bonds (n = 176)	Difference
Collin-Dufresne et al. (2001) Model	14.96**	62.77***	47.81***
	(2.27)	(6.88)	(6.00)
Zhang (2007) Model	13.06*	49.30***	36.24***
	(1.76)	(3.67)	(3.13)

Panel B: Descriptive Statistics for Issuer Characteristics Used to Gauge the Expected Impact of SOX for U.S. Domestic Bonds, Reduced Sample versus Population

Variable	Des. Stat.	Reduced Sample	Population[b]	Mean Diff. (Median Diff.)[c]
Board independence	Mean	72%	66%	<0.01
	Median	75%	69%	(<0.01)
	Std. Dev.	17%	17%	
	n	229 issuers	1,731 issuers	
Audit committee independence	Mean	92%	91%	0.49
	Median	100%	100%	(0.54)
	Std. Dev.	16%	17%	
	n	229 issuers	1,731 issuers	
Audit committee size	Mean	38%	39%	0.17
	Median	36%	38%	(0.16)
	Std. Dev.	10%	12%	
	n	229 issuers	1,731 issuers	
Auditor independence	Mean	61%	47%	<0.01
	Median	64%	47%	(<0.01)
	Std. Dev.	16%	23%	
	n	229 issuers	5,485 issuers	
Internal control risk	Mean	4.93%	4.93%	NA
	Median	4.58%	4.58%	(NA)
	Std. Dev.	2.09%	2.09%	
	n	229 issuers	229 issuers	

Panel C: Cumulative Unexpected Change in Spread, Partitioned by Values of the Summary Measure of the Impact of SOX, Where Higher Values Designate Firms Likely to Undergo Greater Changes, and Hence Greater Impact, Under SOX (n = 769 bonds)

Expectation Model	Greatest Impact 5&4&3 (n = 293)	Least Impact 2&1&0 (n = 476)	Difference
Collin-Dufresne et al. (2001) model	48.67***	11.76*	36.90***
	(7.90)	(1.69)	(8.38)
Zhang (2007) model	42.60***	9.22	33.38***
	(5.55)	(1.13)	(6.76)

(continued on next page)

TABLE 3 (continued)

Panel D: Cumulative Unexpected Change in Spread, Partitioned by Individual Impact Characteristics (n = 769 Bonds): Board Independence

	Board Independence		
Expectation Model	**Below Median (n = 221)**	**Above Median (n = 548)**	**Difference**
Collin-Dufresne et al. (2001) model	48.73***	15.15**	33.59***
	(7.37)	(2.24)	(6.61)
Zhang (2007) model	41.53***	12.57	28.96***
	(5.15)	(1.58)	(5.33)

Panel D: Cumulative Unexpected Change in Spread, Partitioned by Individual Impact Characteristics (n = 769 Bonds): Audit Committee Independence

	Audit Committee Independence		
Expectation Model	**Below 100% (n = 156)**	**Equal to 100% (n = 613)**	**Difference**
Collin-Dufresne et al. (2001) model	28.22***	21.73***	6.50
	(4.07)	(3.27)	(1.22)
Zhang (2007) model	25.39**	18.04**	7.35
	(2.17)	(2.28)	(1.38)

Panel D: Cumulative Unexpected Change in Spread, Partitioned by Individual Impact Characteristics (n = 769 Bonds): Audit Committee Size

	Audit Committee Size		
Expectation Model	**Below Median (n = 407)**	**Above Median (n = 362)**	**Difference**
Collin-Dufresne et al. (2001) model	33.77***	10.92	22.85***
	(5.10)	(1.61)	(5.82)
Zhang (2007) model	31.00***	6.49	24.51***
	(3.90)	(0.83)	(6.26)

Panel D: Cumulative Unexpected Change in Spread, Partitioned by Individual Impact Characteristics (n = 769 Bonds): Auditor Independence

	Auditor Independence		
Expectation Model	**Above Median (n = 615)**	**Below Median (n = 154)**	**Difference**
Collin-Dufresne et al. (2001) model	23.97***	16.87**	7.10
	(3.72)	(2.21)	(1.51)
Zhang (2007) model	20.16***	14.67*	5.49
	(2.63)	(1.69)	(1.24)

(continued on next page)

TABLE 3 (continued)

Panel D: Cumulative Unexpected Change in Spread, Partitioned by Individual Impact Characteristics (n = 769 Bonds): Internal Control Risk

	Internal Control Risk		
Expectation Model	**Above Median (n = 317)**	**Below Median (n = 452)**	**Difference**
Collin-Dufresne et al. (2001) model	26.36***	21.07***	5.30
	(3.61)	(3.26)	(1.12)
Zhang (2007) model	22.61***	17.60**	5.00
	(2.63)	(2.29)	(1.00)

*, **, *** = p < 10 percent, p < 5 percent, p < 1 percent, respectively. All p-values are two-tailed.
[a] Investment grade bonds are those with Standard & Poor's ratings of BBB– and higher, and non-investment grade bonds are all those with ratings below BBB–.
[b] The population for board independence, audit committee independence, and audit committee size is based on all firms covered in the IRRC database. The population for auditor independence is based on all Big 5 audited firms covered in the Audit Analytics database. The population for internal control risk is the reduced sample because the calculation of the internal control risk variable requires manually matching between the Compustat and Audit Analytics databases for each observation and it is prohibitively costly to do so for all firms covered in the database.
[c] Two-tailed p-values. Differences in means are based on a t-test; differences in medians are based on a Wilcoxon test.

Variable Definitions:
Board independence = percentage of independent directors on board;
Audit committee independence = percentage of independent directors on the audit committee;
Audit committee size = number of directors on audit committee as a percentage of the number of directors on the board;
Auditor independence = non-audit fees as a percentage of total audit fees in the fiscal year before 2002;
Internal control risk = probability of significant internal control weakness from Ashbaugh-Skaife et al. (2007). Specifically, internal control risk = $e^{IC}/(1+e^{IC})$ where:

$$IC = -3.996 + 0.087 \times Segments + 0.361 \times Foreign\_sales + 0.402 \times M\&A + 0.417 \times Restructure + 0.059 \times Growth + 1.163 \times Inventory - 0.036 \times MV + 0.475 \times Loss - 0.015 \times Zscore + 2.008 \times Auditor\_resign$$

Segments = number of reported business segments in 2001;
Foreign_sales = 1 if a firm reports foreign sales in 2001, and 0 otherwise;
M&A = 1 if a firm is involved in a merger or acquisition from 1999 to 2001, and 0 otherwise (Compustat AFTNT #1);
Restructure = 1 if a firm was involved in a restructuring from 1999 to 2001, and 0 otherwise. A firm is defined to be involved in a restructuring if any of the following Compustat data items are non-zero: 376, 377, 378, or 379;
Growth = average growth rate in sales from 1999 to 2001 (percent change in Compustat #12);
Inventory = average inventory to total assets from 1999 to 2001 (Compustat #3/#6);
MV = the natural log of market value of equity (Compustat #199 × #25) at the end of the last fiscal year prior to 2002;
Loss = proportion of years from 1999 to 2001 that a firm reports negative earnings (Compustat #172);
Zscore = decile rank of Altman (1968) z-score; and
Auditor_resign = 1 if auditor resigned from the client in 2001, and 0 otherwise.
Greatest (Least) impact = observations with value higher than or equal to (lower than) the median value of the summary measure of the impact characteristics. The summary measure of governance characteristics ranges from 0 to 5 and aggregates the following factors: (1) whether the value of board independent is less than the population median; (2) whether the value of audit committee independence is less than 100 percent; (3) whether the value of audit committee size is below the population median; (4) whether the value of auditor independence is above the population median; and (5) whether the value of internal control risk is above the sample median.

the NYSE and NASDAQ to require majority board independence as a listing requirement, which they did. Because of their ties to SOX, these newly adopted listing requirements are commonly referred to in the literature as having been adopted "pursuant" to SOX (e.g., Linck et al. 2008). An increase in board independence has potentially negative implications for bondholders if greater board independence results in management becoming more accountable to the stockholders and thereby more closely aligning the incentives of managers with stockholders. We code issuers in our sample 1 if the percentage of independent board members is less than the population median and 0 otherwise.[13]

2. **Audit committee independence**—SOX mandates 100 percent independent board members on the audit committee. A decline in non-independent directors on the audit committee may harm bondholders if insiders or affiliates are better at monitoring the outside auditors and/or evaluating management's financial reporting choices for the issuers that have chosen them (Klein 2003; DeFond and Francis 2005). This may occur if insiders and affiliates have greater firm-specific expertise and stronger incentives to maximize firm profitability compared to independent outsiders (Butler and Ribstein 2006). We code the issuers in our sample 1 if there is less than 100 percent independent board members on the audit committee and 0 otherwise.
3. **Audit committee size**—SOX mandates numerous changes that significantly increase the scope of the audit committee's duties. In addition, the new NYSE and NASDAQ listing requirements adopted pursuant to SOX require a minimum audit committee size of three. This means that bond issuers with relatively small audit committees are likely to have to add new members in order to comply with the new SOX requirements. Prior research argues that larger boards are less efficient due to greater agency problems, such as free-riding (Hermalin and Weisbach 2003). We code issuers 1 if the audit committee (as a ratio of the total board) is smaller than the population median and 0 otherwise.[14]
4. **Auditor independence**—SOX banned the purchase of many non-audit services from the incumbent auditor. This provision will harm bondholders if non-audit services provide the auditor with knowledge spillovers that improve the quality of the audited financial reports (Simunic 1984; Palmrose 1986). We code issuers 1 if the ratio of non-audit service fees to the total fees paid to the auditor is higher than the population median and 0 otherwise.
5. **Internal control risk**—SOX Section 404 requires, among other things, extensive detailed documentation, remediation, and auditing of issuers' internal control systems. Thus, issuers with higher levels of pre-SOX control risk are expected to require the greatest changes to their internal control systems under SOX, where control risk is defined as the risk that the firm's internal controls will fail to prevent or detect a material misstatement (Messier and Emby 2003). However, if the market does not expect the changes required under Section 404 to benefit bondholders and bondholders are expected to bear some of the associated costs, then this provision may harm bondholders. We use the internal control risk model in Ashbaugh-Skaife et al. (2007) to obtain a measure of internal control risk for each bond

[13] We use the population median as the benchmark cut-off because, in an untabulated analysis, we find that our sample firms tend to be larger than the population and hence may be skewed toward greater board independence. Thus, the population is expected to better capture the firms that SOX is most (and least) likely to impact. We do not measure board independence based upon whether the board has 50 percent or more independent directors because only 65 of our 769 firm observations are less than 50 percent independent.

[14] In untabulated analysis we repeat our analysis after measuring audit committee size as the number of members (rather than as the proportional size of the audit committee) and find qualitatively identical results.

issuer in our sample. We code issuers 1 if the fitted risk model is higher than the sample median and 0 otherwise.[15]

We form our summary combined measure by first coding each issuer in our sample 1 or 0 for each of the five characteristics. We then create a summary measure using the sum of the five measures for each issuer, where each issuer takes on a value between 5 (meaning they receive a coding of 1 for each of the above measures) and 0 (meaning they receive a coding of 0 for each of the five measures). Based on the summary measure, we then construct a partitioning of the firms likely to undergo the greatest changes under SOX by classifying issuers in the top three categories (3 through 5) as those likely to undergo the *greatest* changes under SOX, and issuers in the bottom three categories (0 through 2) as those likely to undergo the *least* changes under SOX.

Panel B of Table 3 provides descriptive statistics for the variables used to create our partitioning of firms expected to undergo the greatest changes under SOX. The third column of Panel B presents the statistics for our reduced sample, the fourth column presents the statistics for the population, and the fifth column presents the p-values for t-tests and Wilcoxon tests for the differences in the means and medians, respectively. To construct the population statistics, we use the IRRC database for board independence, audit committee independence, and audit committee size; and the Audit Analytics database for auditor independence. Panel B indicates that *Board independence* and *Auditor independence* have mean and median values in the reduced sample that are significantly larger than the population values. Thus, the firms that end up in our analysis tend to be relatively more independent than the population.

Panel C of Table 3 reports the cumulative unexpected change in spreads over our event windows after partitioning the sample based on our summary impact measure, where 293 issuers are categorized as undergoing the *greatest* change and 476 issuers are categorized as undergoing the *least* change. This univariate analysis finds that the cumulative unexpected change in spread is significantly larger for the issuers expected to undergo the greatest changes at $p < 1\%$.

To get some insight into the behavior of the five factors underlying our summary impact measure, Panel D of Table 3 reports the cumulative unexpected change in spread after partitioning on each characteristic. This analysis reveals that while the cumulative unexpected change in spread is significantly positive at $p \leq 1\%$ for every partition, only two partitions are significantly larger: Board independence and Audit committee size.

Multivariate Analysis of the Bond Market's Reaction to SOX

This section tests the association between the changes in bondholder value and the partitions created in the previous two sections by estimating the following regression:

$$\begin{aligned} U\Delta Spread_i = {} & \alpha_i + \beta_1(Non\text{-}investment\ grade\ dummy_i) + \beta_2(Impact\ dummy_i) \\ & + \beta_3(Non\text{-}investment\ grade\ dummy \times Impact\ dummy_i) + \beta_4(Illiquidity_i) + \beta_5(Bond\ size_i) \\ & + \beta_6(Maturity_i) + \beta_7(Issuer\ size_i) + \beta_8(ROA_i) + \beta_9(Leverage_i) + \beta_{10}(R\ \&\ D_i) \\ & + \beta_{11}(Industry\ membership_i) + \varepsilon \end{aligned} \tag{5}$$

where:

$U\Delta Spread_i$ = unexpected change in yield spread for bond *i*, measured using either the Collin-Dufresne et al. or the Zhang expectation model;

[15] We do not compare the internal control risk factor to the population median because it is prohibitively costly. Specifically, the variables used to compute the internal control risk factor require data from both the Compustat and Audit Analytics databases, which require manually matching each observation.

Non-investment grade dummy = a dummy variable coded 1 for bonds that are non-investment grade, and 0 otherwise;

Impact dummy = a dummy variable coded 1 for bond issuers likely to undergo the greatest governance changes under SOX, and 0 otherwise;

Illiquidity = number of days during 2001 with no ex-coupon price change divided by total number of trading days (measured as in Chen et al. 2007);

Bond size = amount of bond issuance in millions of dollars divided by total assets;

Maturity = the natural log of the number of years until bond matures;

Issuer size = the natural log of issuer assets at the end of the fiscal year immediately prior to 2002;

ROA = net income divided by total assets at the end of the fiscal year immediately prior to 2002;

Leverage = long-term debt divided by total assets of the issuer at the end of the fiscal year immediately prior to 2002;

R&D = R&D expenditure scaled by total assets at the end of the fiscal year immediately prior to 2002. Firms with missing R&D data are coded as having zero R&D expenditures; and

Industry membership = dummies capturing the industry classification scheme in Barth et al. (1998).

The control variables in the above model are included because they may be correlated with our variables of interest. *Illiquidity* (measured as in Chen et al. 2007) is included because illiquid bonds are more costly to trade; *Bond size* and *Maturity* may impact how the bond market reacts; *Issuer size* is included because SOX is directed toward larger firms; *ROA* is positively correlated with financial solvency; *Leverage* is negatively correlated with solvency; *R&D* is included because it may capture management's propensity to take risk; and *Industry membership* may impact how the bond market reacts.

Panel A of Table 4 provides descriptive statistics for control variables included in the regression analysis. The first three rows indicate that the bonds have a mean and median illiquidity measure is 0.13 and 0.05, respectively; a mean and median size of $189 million and $150 million, respectively; and a mean and median years to maturity of 13.9 years and 9.0 years, respectively. Following Chen et al. (2007), illiquidity is measured as the number of days during 2001 in which there is no price movement scaled by the total number of trading days and suggests that the bonds in our sample tend to be relatively liquid. The last four rows of Panel A indicate that the issuers have mean and median assets of about $13 billion and $6 billion, respectively; have mean and median return on assets (ROA) of 2.6% and 3.1%, respectively; mean and median leverage of 0.3; and mean and median R&D expenditures of 1.4% and 0.0% of total assets, respectively.

Panel B of Table 4 presents coefficient estimates of Equation 5. Model 1 under both expectation models reports a positive coefficient on the *Impact* variable that is significant at $p < 1\%$, and a positive coefficient on the Non-investment grade dummy under the Collin-Dufresne et al. expectation model that is significant at $p < 10\%$. However, after including the interaction term in Model 2, both models report insignificant coefficients on the Non-investment grade and Impact dummies, and a positive coefficient on the interaction between these variables that is significant at $p < 5\%$. After including the control variables in Model 3, the results on the interaction term continue to hold. Thus, the multivariate analysis in Panel B of Table 4 reports that the negative bond market reaction to the SOX news announcements found in Table 2 is significantly larger among the non-investment grade issuers in our sample that are likely to undergo the greatest impact from SOX, and that this result holds after controlling for bond-level and issuer-level variables potentially correlated with our variables of interest.

TABLE 4

Regression Analysis of Cumulative Unexpected Change in Spread on Non-Investment Grade Dummy, Impact Dummy, Their Interaction, and Control Variables

Panel A: Descriptive Statistics of Reduced Sample (769 Bonds from 229 Issuers)

Variable	n	Mean	Std. Dev.	Q1	Median	Q3
Bond Characteristics						
Illiquidity	769	0.13	0.23	0.05	0.05	0.06
Bond size	769	189	203	25	150	250
Maturity	769	13.9	12.2	6.0	9.0	21.0
Issuer Characteristics						
Issuer size	229	13,463	26,573	2,577	6,291	16,434
ROA (%)	229	2.6	8.7	0.3	3.1	6.2
Leverage	229	0.3	0.1	0.2	0.3	0.4
R&D (%)	229	1.42	2.82	0	0	1.81

Panel B: Regression Analysis with the Dependent Variable Being Cumulative Unexpected Change in Spread (n = 769 Bonds)[a]

	Collin-Dufresne et al. (2001) Model			Zhang (2007) Model		
	(1)	(2)	(3)	(1)	(2)	(3)
Intercept	14.93***	18.56***	−78.60**	13.33***	17.49***	−28.10
	(4.14)	(5.12)	(−2.06)	(3.41)	(4.28)	(−0.72)
Non-investment grade dummy	17.36*	−4.26	3.91	5.69	−7.08	1.05
	(1.83)	(−0.36)	(0.35)	(0.78)	(−0.71)	(0.13)
Impact dummy	17.71***	6.77	2.40	18.46***	6.12	−0.50
	(2.73)	(1.11)	(0.38)	(2.97)	(1.14)	(−0.08)
Non-investment grade dummy × Impact dummy		43.90***	37.46***		31.21**	27.38**
		(2.62)	(2.77)		(2.39)	(2.36)
Bond-Level Control Variables						
Illiquidity			−35.92***			−45.49***
			(−2.61)			(−3.25)
Bond size			176.49***			218.47***
			(2.83)			(2.54)
Maturity			4.85*			−0.94
			(1.72)			(−0.36)
Issuer-Level Control Variables						
Issuer size			11.68***			10.61***
			(4.20)			(3.36)
ROA			−51.42			−79.27*
			(−1.22)			(−1.71)
Leverage			47.41**			50.37
			(1.96)			(1.26)
R&D			2.06			2.01
			(1.23)			(1.48)
Industry dummies			Included			Included
Adj. R^2	6.3%	9.7%	24.2%	3.6%	5.6%	21.3%

(continued on next page)

TABLE 4 (continued)

*,**,*** Significant at $p < 10$ percent, $p < 5$ percent, and $p < 1$ percent, respectively, (two-tailed).
[a] Robust z-statistics with firm cluster in parentheses.

Variable Definitions:
Cumulative unexpected change in spread = cumulative daily unexpected change in spread for each bond over the entire SOX events, measured using either the Collin-Dufresne et al. or the Zhang expectation model;
Non-investment grade dummy = a dummy variable coded 1 for bonds that are non-investment grade, and 0 otherwise;
Impact dummy = a dummy variable coded 1 for bond issuers likely to undergo the greatest changes under SOX, and 0 otherwise;
Illiquidity = number of days during 2001 with no ex-coupon price change divided by total number of trading days;
Bond size = amount of bond issuance in millions of dollars divided by total assets;
Maturity = the natural log of the number of years until bond matures;
Issuer size = the natural log of issuer assets at the end of the fiscal year immediately prior to 2002;
ROA = net income divided by total assets at the end of the fiscal year immediately prior to 2002;
Leverage = long-term debt divided by total assets at the end of the fiscal year immediately prior to 2002;
R&D = R&D expenditure scaled by total assets at the end of the fiscal year immediately prior to 2002; and
Industry membership = dummies capturing the industry classification scheme in Barth et al. (1998).

We also perform an untabulated analysis that attempts to identify the mechanism through which SOX affects bondholder values by wealth transfers. To explore whether SOX results in a wealth transfer from bondholders to stockholders, we rerun our analysis in Panel B of Table 4 after including an interaction term between leverage and our impact variable. To explore whether there was actually some benefit to bondholders from SOX reducing management risk taking, we rerun our analysis in Panel B of Table 4 after including an interaction term between R&D and our impact variable. Our results find that the coefficient on each of the interaction terms is insignificantly different from 0. Thus, we find no evidence that SOX impacted bondholder value through a wealth transfer.

Finally, we perform an analysis to explore which of the five impact factors are most important in explaining the significance of the interaction term in Panel B of Table 4. We rerun our multivariate analysis in Panel B of Table 4 after disaggregating the impact dummy into its five components, and interacting each component with the non-investment grade dummy. We find significantly positive coefficients on the interaction between the size of audit committee and the non-investment grade dummy, and on the interaction between internal control risk and the non-investment grade dummy. The interaction terms on the other three components are insignificant. Thus, the changes related to audit committee size and control risk are the factors most important in explaining the expected increased costs to bondholders imposed by SOX.

SUMMARY

This paper explores the impact of SOX on bondholder value. Using expectation models that control for a variety of factors that are known to impact bond values, we find a significant decline in average corporate bondholder value around SOX-related news events leading up to the passage of SOX. We also perform cross-sectional tests and find that the decline in bond values is larger among non-investment grade bonds that are issued by firms expected to experience relatively larger changes under SOX, consistent with the bond market expecting the changes under SOX to make bondholders relatively worse off.

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