The Effect of Internal Control Problems on the Bid-Ask Spread under SOX Section 302

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Received: December 23, 2015 Accepted: January 24, 2016 Online Published: January 26, 2016

doi:10.5430/afr.v5n1p180 URL: http://dx.doi.org/10.5430/afr.v5n1p180

Abstract

This study examines the relationship between firms' internal control problems and the bid-ask spread using a sample of firms that disclose the effectiveness of internal controls in financial reports under Section 302 of the Sarbanes-Oxley Act (SOX). The bid-ask spread has been used as a proxy for information asymmetry among market participants. By controlling other variables that affect the bid-ask spread, this study shows that the bid-ask spread of ineffective firms has different patterns from that of effective firms in three windows (before, around, and after disclosure). Even though the bid-ask spread of ineffective and effective firms before disclosure is the same, the ineffective firms show higher (lower) bid-ask spread than did effective firms around (after) disclosure. Moreover, the results show that the difference in the bid-ask spread between the two groups of firms after disclosure disappears over time. These results indicate that internal control problems affect market participants' perceptions of financial statements initially, but over time, participants attempt more actively to understand the financial reporting of firms with internal control problems than of those without.

Keywords: Internal control problems, Bid-ask spread, Information asymmetry, Sarbanes-Oxley Act

1. Introduction

This study examines whether internal controls over financial reporting affect market participants' perceptions about firms' financial reporting. If a firm reports internal control problems under Section 302 of the Sarbanes-Oxley Act (SOX), market participants may be suspicious of its financial reporting because weak internal controls may result in misstatements and fraud in such reporting. Therefore, there may be discrepancies in understanding the financial statements of such firms that lead to information asymmetry among market participants. Specifically, this study investigates whether there is a bid-ask spread that reflects information asymmetry between buyers and sellers because of the disclosure of internal control problems under Section 302.

Prior research has shown that because internal control problems lead to both intentional reporting biases and unintentional accounting errors in financial statements, they are related to low accounting quality (e.g., Doyle, Ge, & McVay, 2007a; Ashbaugh-Skaife, Collins, Kinney, & LaFond, 2008). Moreover, Lambert, Leuz and Verrecchia (2007) argue that the quality of accounting information and internal control problems affect investors' assessments of a firm's future cash flow. Given that managers can reduce market uncertainty and litigation risk by disclosing accounting information (Skinner 1994, 1997), they also can obtain the same benefit from the disclosure of internal control information. However, market participants may react differently to the disclosures of effective and ineffective firms.

This study predicts that if internal control problems lead to information asymmetry in the market, then the bid-ask spread of firms with such problems would be higher than that of firms without them. However, after firms file annual or interim financial reports, which also include internal control information, market participants analyze the information in such financial reports. If a firm has internal control problems, it will attract attention from the market. Thereafter, market participants actively attempt to understand better the financial information about those firms with internal control problems. Better understanding of the financial statements of such firms will lead to consensus among market participants within certain periods following the filing dates. Therefore, this study predicts that ineffective firms are likely to have a much lower bid-ask spread than do effective firms in periods subsequent to the filing dates.

To test the predictions above, this study uses a sample of firms that disclosed the effectiveness of their internal controls under Section 302 of the SOX in 2009. I employed a cross-sectional test to assess whether the firms with internal control problems have a higher bid-ask spread than do those without such problems. I found that the bid-ask spread of ineffective firms showed dynamic patterns in three windows: for 9 days prior to, 2 days around, and 9 days after the filing date of the 10-Ks or 10-Qs. The insignificant effect of internal control problems on the bid-ask spread in the regression of the first window (i.e., before the filing date) indicates that market participants do not perceive the potential for problems in the effectiveness of the firms at that time. The significantly positive effect in the regression of the second window (i.e., around the filing date) shows that once information about internal controls is released, market participants have different perceptions about the firms with internal control problems than those without internal control problems. However, the last window (i.e., after the filing date) shows a significantly negative effect, which suggests that market participants attempt actively to gain a better understanding of the financial information about internal controls of the relevant firms, and that ineffective firms demonstrate less information asymmetry than do effective firms. Furthermore, using three additional windows after the filing date, I found that market participants investigate ineffective firms more actively than effective firms 2 days after the internal control information is released; however, the market's reactions to ineffective firms do not differ from those to effective firms over time.

This study contributes to the literature about the effects of internal control problems on information asymmetry reflected in the bid-ask spread. First, to the best of my knowledge, this study is the first to investigate whether internal control problems under Section 302 affect the bid-ask spread in the market. Prior research has revolved around the effect of internal controls on firm risk, cost of equity (Ashbaugh-Skaife, Collins, Kinney & LaFond, 2009), analyst forecasts (Kim, Song, & Zhang, 2009), and management guidance (Feng, Li, & McVay, 2009) under Section 302 or/and Section 404. This study provides evidence that ineffective firms under Section 302 worsen information asymmetry in the market as reflected in increases in the bid-ask spread. Although Section 302 does not require firms to audit and assess their internal controls, the results show that, in itself, disclosure of internal controls under Section 302 is informative to investors. Furthermore, this study provides evidence that the level of information asymmetry among ineffective firms changes several days after the release of information on internal controls. Through a cross-sectional analysis, this study documents that information resolution takes place in ineffective firms shortly after the disclosure. Therefore, this result suggests that risk-averse investors should delay their decision to invest in firms until information asymmetry is resolved several days after the disclosure of internal control problems under Section 302.

The remainder of the paper is organized as follows: Section 2 provides background on the regulation of internal control problems. Section 3 develops the testable hypotheses after a literature review of internal control problems and bid-ask spread, and Section 4 presents the research design. Data collection and descriptive analyses are detailed in Section 5. Section 6 presents the regression analysis of internal control problems on bid-ask spread. Finally, Section 7 presents the main conclusions, and suggests direction for future research.

2. Institutional Background

After the SOX was passed in 2002, disclosure of internal controls became an important issue in accounting. Prior to this law, public companies were required to maintain financial reports and internal controls regulated under Generally Accepted Accounting Principles (GAAP) to provide relevant and reliable information to investors. However, Section 404 of the SOX requires company management to assess and report its internal controls and the subsequent effectiveness of its actions. In addition, the SOX requires independent auditors to investigate the effectiveness of the company's internal controls, and report whether they agree with the company management's assessment of the effectiveness of those controls in financial reporting. The purpose of this regulation is to prevent misstatements and fraud in financial reporting.

Another important regulation, Section 302 of the SOX, stipulates that company management, specifically the CEO and CFO, must assess the effectiveness of internal controls, and report to the audit committee and the external auditor all internal control problems, such as material weaknesses, significant deficiencies, and control deficiencies, as well as any significant changes in their internal controls.

According to the Public Company Accounting Oversight Board (PCAOB), internal control deficiencies (problems) can be classified into three categories—material weakness, significant deficiency, and control deficiency. These are defined as follows in Auditing Standard Number 2:

Material weakness: "a significant deficiency, or combination of significant deficiencies, that result in more than a remote likelihood that a material misstatement of the annual or interim financial statements will not be prevented or detected;" significant deficiency: "a control deficiency, or a combination of control deficiencies, that adversely affect

the company's ability to initiate, authorize, record, process, or report external financial data reliably in accordance with generally accepted accounting principles such that there is more than a remote likelihood that a misstatement of the company's annual or interim financial statements that is more than inconsequential will not be prevented or detected," and control deficiency: "when the design or operation of a control does not allow management or employees, in the normal course of performing their assigned functions, to prevent or detect misstatement on a timely basis."

3. Literature Review and Hypothesis Development

3.1 Literature Review

Some prior studies have focused on the characteristics of firms that disclose internal control deficiencies (e.g., Ge & McVay, 2005; Doyle, Ge, & McVay, 2007b; Ashbaugh-Skaife et al., 2008). They showed that firms with ineffective internal controls typically have lower profits, smaller size, and more complex structures, and undergo organizational changes such as restructuring and mergers and acquisitions. With regard to the effect of internal control problems, other studies have argued that firms with internal control problems lead to lower stock prices and higher costs of equity capital (e.g., Beneish, Billings, & Hodder, 2008; Hammersley, Myers, & Shakespeare, 2008; Ashbaugh-Skaife et al., 2009). In addition, previous studies have focused on the relationship between internal control problems and earnings quality. Bedard (2006) provides evidence of the greater effect of disclosure under Section 302 than under Section 404. He finds that the earnings quality of firms with material weaknesses in internal controls can be improved once the firms' internal control problems are resolved while Doyle et al. (2007a) also find a negative relationship between earnings quality and material weaknesses under Section 302, but not under Section 404.

With respect to the bid-ask spread, Copeland and Galai (1983) find that greater price volatility, higher asset price level, and lower volume lead to an increase in the bid-ask spread, and these findings were verified in empirical studies (Demsetz, 1968; Tinic, 1972; Benston & Hagerman, 1974). Demsetz (1968) suggests that the bid-ask spread is a transaction cost for those traders who need to trade immediately, and formulizes this suggestion in a supply-demand framework. However, Copeland and Galai (1983) argue that liquidity and information motivate traders, and thus, dealers try to maximize their own profit by increasing the spread between the total revenues expected from liquidity trading and total losses expected from information trading. In this sense, the bid-ask spread is believed to be affected by the information in the market.

Consistent with this view, several studies have documented the bid-ask spread in relation to the disclosure of specific items such as management forecasts (Coller & Yohn, 1997) and earnings announcements (Lee, Mucklow, & Ready, 1993; Krinsky & Lee, 1996; Libby, Mathieu, & Robb, 2002). However, to the best of my knowledge, no study has investigated whether the internal control information of firms affects market participants' perceptions of firms and whether it eventually changes the bid-ask spread of firms in the market.

3.2 Hypothesis Development

Previous research has argued that if a firm's internal controls over financial reporting are ineffective, then the possibility of intentional and unintentional misstatement of financial reporting is high, which results in lower quality accruals. Ashbaugh-Skaife et al. (2008) find that firms with internal control problems have large abnormal accruals compared to those without such problems. Doyle et al. (2007a) also document that internal control problems lead to greater noise in accrual. One of the most interesting findings in the internal control literature is that the quality of accounting information can be defined to include not only the disclosures that the firm releases to external information seekers, but also the internal controls that the firm provides to insiders. Lambert et al. (2007) develops a model in which accounting information quality and internal controls affects not only investors' evaluations of the variance in a firm's cash flow and the covariance of the firm's cash flow with aggregate market cash flows, but also management decisions and the resources that managers use.

The purpose of internal controls over financial reporting is to provide investors with reliable financial statements. If a firm has ineffective internal controls, some market participants may be concerned about the reliability of the firm's financial statements while others may not. Based on these concerns, market participants behave differently from each other; some try to sell the stocks of ineffective firms immediately while others wait to gain a better understanding of financial statements. For example, given that institutional investors are usually able to analyze internal control information better than are individual investors, information asymmetry between institutional and individual investors may exist.

Some studies have argued that the relationship between news and market reactions is unconvincing. Those have found that particular announcements, such as those pertaining to dividends and earnings (Damodaran, 1989),

macroeconomic events (Haugen, Talmor & Torous, 1991) and news (Cutler, Poterba & Summer, 1998) explain only part of the market activities. However, other studies have found that the frequency with which news is reported is related to market participants' activities in the market (e.g., Penman, 1987; Thompson, Olsen & Dietrich, 1987; Berry & Howe, 1994). In favor of the relationship between news and market activities, this study predicts that market reaction to the disclosure of internal control problems is incorporated into the stock price (bid and ask price) following the filing date of the 10-K or 10-Q.

Given that the bid-ask spread constitutes the difference between the prices quoted by buyers and sellers for purchase (bid) and sale (ask), the size of the bid-ask spread in a given security is a measure of the difference in the perception and reaction to information between buyers and sellers, especially for security sales (Kyle, 1985; Easley & O'Hara, 1987). For example, when analyzing information about a firm's internal control problems, buyers become suspicious of the credibility of its financial statements, and thus, try to buy that particular stock at a lower price. At the same time, sellers also perceive that the same firm has internal control problems, but sellers' understanding and analysis of the problem might lead them to conclude that the problem is so insignificant that financial statements are still credible such that the stock price would not be affected by internal control problems. Thus, this discrepancy in the sell- and buy-side information about a firm increases the firm's bid-ask spread.

Before the filing date of periodic reports (interim and annual), the sell-side obtains as much information (regardless of whether the information is public or private) as the buy-side. Once a firm with internal control problems files the 10-K or 10-Q with the Securities and Exchange Commission (SEC), the bid-ask spread of the stock increases for awhile because of the market participants' different perceptions about the firm's financial reporting. Therefore, my first hypothesis is as follows:

Hypothesis 1: Around the date that the 10-K or 10-Q is filed with the SEC, the bid-ask spread in the stock of a firm with internal control problems is higher than that of a firm without such problems.

However, several days after the filing date, the buy-side and sell-side try to understand better the financial information provided by firms with internal control problems. Consequently, information asymmetry between the sell- and buy-side in ineffective firms may decrease. Because market participants pay more attention to ineffective firms, they may have a better understanding of ineffective than effective firms, which may cause the information asymmetry of the ineffective firms to decline further. Thereafter, the continuous decline in information asymmetry may lead to less information asymmetry for ineffective than effective firms. Therefore, my second hypothesis is as follows:

Hypothesis 2: Several days after the 10-K or 10-Q is filed with the SEC, the bid-ask spread in the stock of a firm with internal control problems is lower than that of a firm without such problems.

4. Research Design

I analyze the regression of the bid-ask spread on internal controls and on other variables used in previous studies that affect the bid-ask spread. I perform a cross-sectional analysis of firms with and without effective internal controls prior to and after the Section 302 filing date, where the dummy variable of internal control problems (*IC*) captured the differences in the bid-ask spread between ineffective and effective firms.

$$\ln(SPREAD) = \alpha_1 + \alpha_2 \ln(TRADE) + \alpha_3 \ln(PRICE) + \alpha_4 \ln(VOLUME) + \alpha_5 \ln(VARIACE) + \alpha_6 IC + e$$

4.1 Three Windows of Trading

Among the four quarterly filing dates for 10-Ks or 10-Qs, the first was selected because internal control problems are unlikely to be resolved quickly. Earnings information included in the 10-Ks or 10-Qs usually is announced several days or even a month before the actual filing date. Thus, the information effect of the earnings announcement is incorporated already into market participants' perceptions and affects the bid-ask spread before the filing date. Therefore, information about internal controls separated from earnings information is believed to go public primarily on the annual or interim filing dates.

To investigate when information asymmetry due to internal control problems increases and whether it reduces several days after the filing date, the change in the bid-ask spread prior to the Section 302 filing date (9 days), around the filing date (2 days), and after the filing date (9 days) was analyzed. The bid-ask spreads for 9 days prior to the filing date [-9, -1], for 2 days around the filing date [0, 1], and for 9 days after the filing date [2, 10] were based on trading days.

4.2 Description of Variables

To achieve the maximum difference between bid and ask prices, which is contingent upon the difference in the market perceptions about information on internal controls, this study identifies a variable, *SPREAD*, to indicate the difference between the highest ask price and the lowest bid price each day. The absolute value of *SPREAD* was used to enhance interpretation because the raw *SPREAD* could have a negative sign. Following Coller and Yohn's (1997) study, I use the mean value of the bid-ask spread for each window—prior to, around, and after the filing date.

To control for the sell-side's order and inventory carrying costs, certain variables used in prior research were included. Given that the bid-ask spread has a negative relationship with trading activity (Demsetz, 1968; Tinic, 1972; Stoll, 1978), the mean value of the number of transactions (*TRADE*) in a firm's stock at 9, 2, and 9 trading days prior to, around, and after the filing date, respectively, was included as a control variable. Several studies also found that the bid-ask spread is related positively to stock prices (Demsetz, 1968; Benston & Hagerman, 1974). Thus, the mean value of the stock price (*PRICE*) during each trading window also was included as a control variable. The variability of stock returns is also believed to increase the bid-ask spread (Barnea & Logue 1975; Stoll, 1978). Therefore, I include the variance in stock returns (*VARIANCE*) during each trading window. Because I include the natural logarithm of variance, which might have a negative sign, I use its absolute value.

Table 1. The variables included in my analysis of bid-ask spread and internal controls

SPREAD	The average of bid-ask spread (highest ask minus lowest bid) of each day during each three window
TRADE	The average of number of all transactions of each day during each three window
PRICE	The average of stock price of each day during each three window
VOLUME	The average of number of all traded shares of each day during each three window
VARIANCE	The variance of stock returns of each day during each three window
IC	A dummy variable as defined as one if the firm has ineffective internal controls, and zero otherwise

Lee et al. (1993) argue that the best price available for purchases (bid) and sales (ask) is derived by the number of shares available for each price, and thus, the model includes the mean value of the number of shares of a stock (*VOLUME*) sold during each window. Given that a decrease in liquidity is expected in the case of higher spread and lower number of traded shares, and vice versa (Coller & Yohn, 1997), and the number of shares traded is higher during the period in which trading is concentrated because of induced informed-trading volume (Foster & Viswanathan 1990; 1993), this study expects a negative relationship between the bid-ask spread and the number of shares traded. Finally, based on prior research, I use the natural logarithm of all variables except the dummy variable of internal control problems in the regressions. The definition of the variables is given in Table 1.

Table 2. Sample selection

	Number of Observations
Firm-quarters with Section 302 reports for calendar year 2009	37,724
Less:	
Firm-quarters other than the first disclosure of the year	28,108
Firms not available in CRSP data	2,997
Firms missing the necessary stock data in CRSP	4,403
Number of firms in final sample	2,216

5. Sample Selection and Characteristics

I obtained the data in Section 302 from Audit Analytics. The data include information on quarterly internal control problems, including the effectiveness of internal controls in the 10-Ks and 10-Qs filed during 2009. Stock transaction data, including stock price, bid and ask prices, the number of shares traded, stock returns, and the number of transactions, were obtained from the Center for Research in Securities Prices (CRSP). Table 2 shows the construction of the sample.

Table 3. Descriptive statistics

	Internal Control	Variable	No. of Obs.	Mean	Median	Q1	Q3	Std. Dev.
9 days before filing [-9, -1]	Effective	*SPREAD*	2,148	2.697	**2.659**	2.329	2.984	0.602
		TRADE		**6.284**	**6.498**	4.554	7.851	2.247
		PRICE		**0.379**	**0.635**	0.091	0.975	0.906
		VOLUME		**11.569**	**11.674**	10.05	12.993	2.124
		VARIANCE		**6.038**	**6.062**	5.252	6.79	1.157
	Not Effective	*SPREAD*	68	2.599	**2.47**	2.2	2.812	0.818
		TRADE		**5.55**	**5.701**	4.157	6.741	1.157
		PRICE		**-0.11**	**0.162**	-0.308	0.506	1.087
		VOLUME		**11.043**	**11.136**	9.977	12.275	1.84
		VARIANCE		**5.72**	**5.93**	4.958	6.521	1.043
2 days around filing [0, 1]	Effective	*SPREAD*	2,149	2.645	2.626	2.228	2.987	0.699
		TRADE		**6.291**	**6.473**	4.548	7.937	2.234
		PRICE		**0.422**	**0.654**	0.116	0.977	0.809
		VOLUME		**11.559**	**11.656**	10.029	13.097	2.266
		VARIANCE		**7.044**	**6.658**	5.355	8.265	2.535
	Not Effective	*SPREAD*	67	2.669	2.55	2.08	2.898	1.175
		TRADE		**5.498**	**5.683**	4.337	6.765	1.957
		PRICE		**0.088**	**0.194**	-0.153	0.581	0.746
		VOLUME		**10.941**	**11.142**	9.743	12.487	2.001
		VARIANCE		**6.132**	**5.911**	4.622	7.535	2.163
9 days after filing [2, 10]	Effective	*SPREAD*	2,169	**2.741**	**2.705**	2.381	3.009	0.613
		TRADE		**6.263**	**6.428**	4.595	7.867	2.249
		PRICE		**0.41**	**0.649**	0.11	0.973	0.826
		VOLUME		11.557	11.674	10.073	12.953	2.125
		VARIANCE		**6.086**	**6.101**	5.292	6.818	1.147
	Not Effective	*SPREAD*	72	**2.504**	**2.486**	2.208	2.885	0.487
		TRADE		**5.487**	**5.793**	4.556	6.584	1.828
		PRICE		**-0.197**	**0.181**	-0.678	0.521	1.053
		VOLUME		11.1	11.406	9.889	12.355	1.709
		VARIANCE		**5.662**	**5.674**	4.967	6.392	1.248

Table shows descriptive statistics and tests of differences in means and medians of each variable between firms with effective internal controls and firms with not effective internal controls. Bold text indicates that the ineffective firms are significantly different from the effective firms at p=0.05 (two-tailed). Differences in mean value are tested using t-test while differences in median value are tested using Wilcoxon rank-sum test.

All 37,724 firm-quarter observations from Section 302 available on Audit Analytics for the calendar year 2009 were considered first, after which 28,108 firm-quarter observations that were not the first filing in calendar year 2009, were excluded. Elimination of 2,997 firm observations that were not available in the CRSP data resulted in 6,619 firm observations. Next, I removed firm observations that lacked the necessary stock data from CRSP. The final sample included 2,216 firm observations, consisting of 2,149 effective and 67 ineffective firms around the filing date (including 2,216 observations prior to, and 2,241 observations after the filing date).

Table 3 provides the descriptive statistics for the full sample, including firms with effective and ineffective internal controls, for each of the three windows—9 days prior to [-9, -1], 2 days around [0, 1], and 9 days after the filing date [2, 10] for the 10-Ks or 10-Qs. The means and medians in this table confirm that it is necessary to control for the variables discussed previously that are known to affect the bid-ask spread, although *VOLUME* in the last window does not differ between effective and ineffective firms. For the second window, a two-tailed t-test reveals that *SPREAD* is larger for ineffective firms, but does not differ significantly from that for effective firms ($p>0.05$). However, for the third window, *SPREAD* is smaller and significantly different for ineffective than for effective firms ($p<0.05$), indicating that information asymmetry in ineffective firms is lower among market participants after

internal control problems are reported. Consistent with previous research, *TRADE*, *PRICE*, *VOLUME*, and *VARIANCE* are significantly different between effective and ineffective firms for every window. Thus, these factors (other than information asymmetry) also influence the bid-ask spread.

Specifically, market participants do not perceive a significant difference in *SPREAD* between effective and ineffective firms because they lack information about firms' internal control problems before the firms file their annual or interim financial reports. On the day of, and 1 day after the filing date, information asymmetry does not exist among market participants, which is represented by an insignificant, bid-ask spread among the ineffective firms; this is not consistent with Hypothesis 1. Instead, after the filing date, there is significantly less information asymmetry in ineffective than effective firms in the market, indicating that market participants investigate firms with internal control problems more intensively.

Table 4. Correlations

9 days before filing [-9, -1]					
SPREAD	*TRADE*	*PRICE*	*VOLUME*	*VARIANCE*	*IC*
SPREAD	**-0.167**	**0.252**	**-0.196**	**0.653**	-0.027
TRADE		**0.397**	**0.974**	**0.084**	**-0.056**
PRICE			**0.27**	**0.326**	**-0.092**
VOLUME				**0.063**	**-0.042**
VARIANCE					**-0.047**
IC					
2 days around filing [0, 1]					
SPREAD	**-0.149**	**0.261**	**-0.178**	**0.355**	0.005
TRADE		**0.379**	**0.97**	0.012	**-0.058**
PRICE			**0.248**	**0.156**	**-0.07**
VOLUME				-0.01	**-0.046**
VARIANCE					
IC					
Nine days after filing [2, 10]					
SPREAD	**-0.194**	**0.262**	**-0.213**	**0.643**	**-0.068**
TRADE		**0.404**	**0.971**	**0.067**	**-0.061**
PRICE			**0.265**	**0.335**	**-0.127**
VOLUME				**0.048**	-0.038
VARIANCE					**-0.064**
IC					

Table presents Pearson correlations between variables used in my analysis of the effect of internal control problems on bid-ask spread. Bold text indicates that correlations are significantly different from 0 at p=0.05 (two-tailed).

Table 4 presents the correlations between the dependent and independent variables. Consistent with the mean and median of *SPREAD* in the descriptive statistics, the dummy variable, *IC*, is significantly correlated with *SPREAD* only after the filing date, showing that market participants have less information about asymmetry in firms with internal control problems prior to filing. Given that *TRADE* is highly correlated with *PRICE* and *VOLUME* in each of the three windows, this study shows regressions without the variable *TRADE* in a later section. Note that the main variable, *IC*, is not highly correlated with the other independent variables and the dependent variable.

6. Regression Analysis

6.1 Regression in Three Windows

Although firms with ineffective internal controls are likely to provoke a negative market reaction, previous research has provided mixed evidence with respect to whether market participants have consistent perceptions of such firms. Orenstein (2004) argues that investors are not sufficiently sophisticated to understand the disclosure of internal control problems fully. Nicolaisen (2004) also documents that investors and regulators do not always react to such disclosures. However, Hammersley et al. (2008) find that firms with internal control problems face a significantly

negative market reaction. Thus, this study tests whether such different market reactions to internal control problems produce any change in the bid-ask spread.

Table 5. Regression of bid-ask spread and internal control problems

$\ln(SPREAD) = \alpha_1 + \alpha_2\ln(TRADE) + \alpha_3\ln(PRICE) + \alpha_4\ln(VOLUME) + \alpha_5\ln(VARIACE) + \alpha_6 IC + e$							
	INTERCEPT	*TRADE*	*PRICE*	*VOLUME*	*VARIANCE*	*IC*	R^2
- 9 days	1.289***	-0.051**	0.098***	-0.026	0.331***	0.003	0.495
window	(0.139)	(0.023)	(0.014)	(0.023)	(0.008)	(0.053)	
2 days	1.935***	-0.173***	0.317***	0.090***	0.088***	0.128*	0.236
window	(0.170)	(0.029)	(0.021)	(0.029)	(0.005)	(0.078)	
9 days	0.859***	-0.162***	0.165***	0.080***	0.313***	-0.092*	0.498
window	(0.134)	(0.023)	(0.015)	(0.023)	(0.008)	(0.052)	

Table reports the parameter estimates and standard error (parentheses) from the OLS estimation of ln(*SPREAD*) on other control variables and *IC* dummy variable. Sample of before filing contains 2,148 effective firms and 68 ineffective firms. Sample of on filing contains 2,149 effective firms and 67 ineffective firms. Sample of after filing contains 2,169 effective firms and 72 ineffective firms. *,** and *** indicate significant difference from 0 at 0.1, 0.05 and 0.01 levels, respectively (two-tailed).

Table 5 presents the results of a cross-sectional analysis that regresses *SPREAD* on *TRADE*, *PRICE*, *VOLUME*, *VARIANCE*, and *IC*. Consistent with prior research, *PRICE* and *VARIANCE* (*TRADE*) have a significantly positive (negative) relationship with the bid-ask spread at least at p=0.05 for all three windows. However, *VOLUME* has no significant or negative relationship with the bid-ask spread before the filing date [-9, -1], as seen in previous studies.

The variable *IC* shows that internal control problems do not affect the bid-ask spread before the filing date, indicating that market participants do not have different perceptions about effective and ineffective firms before the release of information on their internal controls. However, on and 1 day after the filing date, *IC* increases the bid-ask spread significantly, and for 9 days after the filing date [2, 10], it decreases significantly (p<0.1). The results of 2 days around the filing date [0, 1] show that market participants have different opinions about firms with internal control problems. However, the results of 9 days after the filing date [2, 10] suggest that market participants investigate information about firms with internal control problems more actively, and achieve consensus on that information. Thereafter, information asymmetry in ineffective firms, represented by the bid-ask spread, declines more than that in effective firms.

The reason that *VOLUME* is insignificant in the first window and significantly positive in the second and third windows may be because *VOLUME* is highly correlated with *TRADE*. The regression of *SPREAD* on the variables, excluding *TRADE*, is shown in Table 6. *PRICE* and *VARIANCE* are significantly positive, and *VOLUME* is significantly negative in all three windows, as suggested in previous research. Furthermore, the variable *IC* is significant only in the second window (p=0.1). The positive sign of *IC* indicates that on and 1 day after the filing date, there is increased information asymmetry among market participants about firms with internal control problems, as predicted in Hypothesis 1.

Table 6. Regression of bid-ask spread and internal control problems without *TRADE* variable

$\ln(SPREAD) = \alpha_1 + \alpha_2\ln(PRICE) + \alpha_3\ln(VOLUME) + \alpha_4\ln(VARIACE) + \alpha_5 IC + e$						
	INTERCEPT	*PRICE*	*VOLUME*	*VARIANCE*	*IC*	R^2
- 9 days	1.547***	0.079***	-0.077***	0.334***	0.005	0.495
window	(0.073)	(0.011)	(0.004)	(0.008)	(0.053)	
2 days	2.807***	0.244***	-0.076***	0.088***	0.138*	0.224
window	(0.081)	(0.017)	(0.006)	(0.005)	(0.078)	
9 days	1.656***	0.092***	-0.080***	0.324***	-0.079	0.487
window	(0.074)	(0.012)	(0.004)	(0.008)	(0.052)	

Table reports the parameter estimates and standard error (parentheses) from the OLS estimation of ln(*SPREAD*) on other control variables and *IC* dummy variable. Sample of before filing contains 2,148 effective firms and 68 ineffective firms. Sample of on filing contains 2,149 effective firms and 67 ineffective firms. Sample of after filing

contains 2,169 effective firms and 72 ineffective firms. *,** and *** indicate significant difference from 0 at 0.1, 0.05 and 0.01 levels, respectively (two-tailed).

If 10-Ks or 10-Qs are filed early in the day, the effect of internal control problems would be reflected in the stock price that day, while if they are filed late in the day, it would take more than 1 day for the stock price to react to the filing. However, after the filing date, the coefficient of *IC* is not significantly negative, which suggests that information asymmetry for ineffective firms is not less than that for effective firms, which is inconsistent with the regression of *SPREAD* on other variables, including *TRADE*, as shown in Table 5.

Table 7. Regression of bid-ask spread and internal control problems with shorter windows of 4 and 6 days

$\ln(SPREAD) = \alpha_1 + \alpha_2\ln(PRICE) + \alpha_3\ln(VOLUME) + \alpha_4\ln(VARIACE) + \alpha_5 IC + e$

	INTERCEPT	***PRICE***	***VOLUME***	***VARIANCE***	***IC***	R^2
4 days window	2.135***	0.150***	-0.064***	0.195***	-0.133**	0.386
[2, 5]	(0.069)	(0.012)	(0.004)	(0.006)	(0.058)	
6 days window	1.796***	0.121***	-0.069***	0.272***	-0.092*	0.487
[2, 7]	(0.066)	(0.010)	(0.004)	(0.007)	(0.051)	

Table reports the parameter estimates and standard error (parentheses) from the OLS estimation of ln(*SPREAD*) on other control variables and *IC* dummy variable. Sample of before filing contains 2,148 effective firms and 68 ineffective firms. Sample of on filing contains 2,149 effective firms and 67 ineffective firms. Sample of after filing contains 2,169 effective firms and 72 ineffective firms. *,** and *** indicate significant difference from 0 at 0.1, 0.05 and 0.01 levels, respectively (two-tailed).

6.2 Regression in Shorter Windows

To gain further insight on the bid-ask spread for ineffective internal controls after the filing date, this study regresses *SPREAD* on *PRICE*, *VOLUME*, *VARIANCE*, and *IC* for 4 [2, 5]and 6 days [2, 7] after the filing date. By analyzing these two shorter windows, we can determine whether the bid-ask spread behaves differently within those windows because of information asymmetry. Table 7 shows the results of the regression for 4 days [2, 5] and 6 days [2, 7] after the filing date. Although Table 6 shows that *IC* is insignificant for 9 days after the filing date [2, 10], it is significantly negative (-0.09; p=0.1) for 6 days after the filing date [2, 7], illustrating that market participants try to understand information about firms with internal control problems better. This leads to lower information asymmetry regarding ineffective firms, as represented by the bid-ask spread, by comparison to that of effective firms as time passes from 6 to 9 days after the filing date. Furthermore, the market reaction is more negative (-0.13; p=0.05) for 4 days after the filing date [2, 5] than for 6 days after the filing date [2, 7]. This result shows that the market reacts more actively to internal control problems (tries to understand the information better, thus reducing information asymmetry by comparison to effective firms) within 4 days rather than 6 or 9 days after the filing date, as predicted in Hypothesis 2. Combined with the results shown in Table 6, these results suggest that information asymmetry exists among market participants immediately after firms report their internal control problems. However, because market participants try to gain a better understanding of the information about such firms, information asymmetry regarding such firms is lower than that regarding firms without internal control problems in the short term (i.e., for 4 or 6 days in this study).

7. Conclusions

Previous research has examined the bid-ask spread in terms of factors that increase or decrease it, such as price volatility, trading volume, and the level of price change. However, few studies have analyzed how firms' internal control problems affect market participants' behavior given variations in the availability of information. This paper contributes to the stock market literature on the bid-ask spread from the perspective of internal controls by examining how such controls affect information asymmetry among market participants, as reflected in the bid-ask spread. The results show that market participants do react to the disclosure of internal control problems. Firms with ineffective internal controls produce greater information asymmetry, as represented by the bid-ask spread, than do effective firms around the date that 10-Ks or 10-Qs are filed. However, this discrepancy among market participants decreases shortly after the filing date (for 4 or 6 days). Specifically, the bid-ask spread of ineffective firms (-0.13 and -0.09 for 4 and 6 days, respectively) declines more than does that of effective firms. 6 days after the filing date, the difference in the bid-ask spread between ineffective and effective firms disappears. Therefore, these results suggest that risk-averse investors should delay their decisions to invest in firms with internal control problems until the sell-side and buy-side reach consensus on information provided by such firms several days after the disclosure of internal control problems under Section 302.

Future related studies could examine whether the reduced information asymmetry for firms with internal control problems that is reflected in the bid-ask spread actually results from active gathering and exchange of information by investors and/or analysts. This study finds that for several days after information about ineffective firms was disclosed, the information asymmetry among market participants regarding ineffective firms is lower than that regarding effective firms. However, firms with internal control problems may make efforts to resolve the information asymmetry by providing more information to the market. Therefore, investigating the number of analyst forecasts for ineffective firms or other increased activities to provide information after the disclosure of internal control problems may offer clearer reasons for the reduced information asymmetry.

Acknowledgments

I thank the participants at the 2011 American Accounting Association Northeast Region Meeting and two anonymous reviewers for their comments on an earlier version of this paper.

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