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The Sarbanes-Oxley act and informed trading in the options market: Evidence from share repurchase announcements

Ihsan Badshah[1] | Hardjo Koerniadi[1] | James Kolari[2]

[1]Department of Finance, Business School, Auckland University of Technology, Auckland, New Zealand

[2]JP Morgan Chase, Department of Finance, Texas A&M University, College Station, Texas

Correspondence
Hardjo Koerniadi, Department of Finance, Faculty of Business, Economics and Law, Auckland University of Technology, Private Bag 92006, Auckland 1142, New Zealand.
Email: hkoernia@aut.ac.nz

Abstract

This study examines the informed options trading hypothesis before and after the implementation of the Sarbanes-Oxley Act (SOX). We find that informed option trading, as measured by implied volatility spreads, occurs only in the period before the enactment of this Act but disappears thereafter. Our results suggest that the SOX had a significant impact on informed trading in U.S. option markets.

KEYWORDS

informed trading, options, Sarbanes-Oxley Act, share repurchase announcements

JEL CLASSIFICATION

G10; G13; G14

1 | INTRODUCTION

Prior research suggests that informed traders prefer trading in option markets to equity markets due to relatively lower trading costs, higher leverage, limited downside risks, volatility trading, and short sale access (Biais & Hillion, 1994; Easley, O'Hara, & Srinivas, 1998). As such, it is commonly believed that options prices lead stock prices. In this regard, a number of studies find that transactions in the options market contain information about future stock prices.[1] Recent studies suggest that informed option trading also occurs prior to major corporate events, such as quarterly earnings announcements (Jin, Livnat, and Zhang, 2012; Atilgan, 2014), merger and acquisition announcements (Chan, Ge, & Lin, 2015), and share repurchase announcements (Hao, 2016).

Informed trading arises due to information asymmetry among market participants. When information is asymmetric, investors acquiring undisclosed material information can benefit from this private information at the expense of uninformed investors. This asymmetry occurs when information is not disseminated in a timely manner or not disclosed accurately. Prior to the enactment of the Sarbanes-Oxley Act of 2002 (SOX), U.S. financial markets were plagued with scandals (e.g., Enron and Worldcom) due to inaccurate financial information (Coates IV, 2007). After

the implementation of SOX, Jain, Kim, and Rezaee (2008) find that market liquidity increased in U.S. stock markets due to improved financial report quality. Cohen, Dey, and Lys (2008) and Chen and Huang (2013) report that, after the passage of SOX, there was a significant decrease in accrual-based earnings management. Lee, Strong, and Zhu (2014) find that SOX significantly reduced security mispricing following analyst forecast revisions and earnings announcements. Similarly, due in part to SOX, Fu and Huang (2016) document the disappearance of long-term abnormal returns following share repurchase announcements and seasoned equity issuance after 2003. Overall, these studies suggest that SOX improved U.S. stock market efficiency and lowered information asymmetry due to greater transparency and credibility of corporate financial information.

If U.S. stock markets are relatively more efficient after the implementation of the SOX, options are redundant assets that should not carry information beyond the information impounded in the underlying stock prices. However, if there is still private information flow to some investors in the post-SOX period after its implementation, prior studies suggest that options could benefit from the acquired information. Thus, our study extends previous SOX studies by examining whether private information flow related to informed trading persisted in the U.S. options market in the post-SOX period. More specifically, we posit that, if SOX increased stock market efficiency in the U.S. stock market, this Act should have a significant effect on informed trading in the options market.[2] We investigate this question by employing share repurchase announcements. Since share repurchase announcements are unscheduled/unexpected events, only investors with real private information would be able to make profit from these unanticipated events. A related study by Hao (2016) finds evidence consistent with the informed options trading hypothesis prior to share repurchase announcements. However, Hao (2016) does not isolate informed trading before and after the SOX periods. As arbitrage opportunities are expected to be most profitable prior to the implementation of SOX (due to relatively less efficient stock prices), employing a sample period that spans the implementation of SOX could affect the empirical results. To our knowledge, no previous studies examine the impact of SOX on informed trading in the options market.

Following recent studies, we utilize implied volatility spread (VS), which have been documented to be associated with expected changes in underlying stock prices to measure informed option trading.[3] We find that, in the sample period from 1996 to 2014, implied VSs measured in the pre-announcement period (−10, −2) are positively related to abnormal stock returns in event window days (−1, +1). This result is consistent with Hao (2016), who documents that option traders have private information prior to open market, tender offer and negotiated share repurchase announcements. However, when we split the sample period before and after the implementation of SOX, we find that informed option trading occurs only prior to 2003 but not thereafter. This finding is important and contributes to the literature given that the existing literature suggests that informed option trading occurs prior to share repurchase announcements in a period after the application of the SOX. Our study finds that informed option trading related to this event occurred only during the period prior to the implementation of the SOX in 2003 but documents no informed option trading associated with share repurchase announcement since 2003. Our results suggest that SOX tended to lessen *private* information flow which has significant impact on informed trading in U.S. options markets prior to share repurchase announcements.

2 | RESEARCH DESIGN

Prior work by Cremers and Weinbaum (2010) shows that VS based on the deviation from the put-call parity reflects informed trading in the options market about expected changes in underlying asset prices. When option investors have private information concerning the future positive (negative) direction of an underlying asset's return, demand for its call (put) options will increase (decrease) suggesting high (low) call implied volatilities relative to put implied volatilities. VS is calculated as the difference in implied volatility of call and put options matched by the strike price and maturity. The VS of stock i on day t is measured as:

$$VS_{i,t} = IV_{i,t}^{\text{calls}} - IV_{i,t}^{\text{puts}} = \sum_{j=1}^{N_{i,t}} w_{j,t}^j \left(IV_{j,t}^{i,\text{call}} - IV_{j,t}^{i,\text{put}} \right),$$

(1)

where $IV_{i,t}$ is calculated using a binomial tree model adjusted for expected dividends and early exercise, j represents pairs of call and put options matched on the strike price and maturity, $w_{i,j}$ are weights using the average open interest in call and put options, and $N_{i,t}$ is the number of valid pairs of options for stock i on day t.

We test the predictive stock pricing ability of VS as a proxy for informed trading in the options market around unscheduled share repurchase announcements. Following Jin et al. (2012), we utilize a base-window event period from −50 to −11 days prior to the announcement date, pre-event window from −10 to −2 days, and event window from −1 to +1 days relative to a share repurchase announcement. Option implied VSs computed for each sample stock in the base- and pre-event window periods are denoted as *BASE_SPREAD* and *SPREAD*, respectively. Cumulative abnormal returns (*XRET*) for a stock in the event window are calculated as market-adjusted return using the CRSP value-weighted market return obtained from Kenneth French's website.

To examine whether options traders have private information prior to the announcement date after the post-SOX periods, we adopt two approaches. In our first approach, we estimate the following regression:

$$XRET(-1,+1)_i = \text{Intercept} + \alpha PRESOXSPREAD + \beta POSTSOXSPREAD + \delta BASE\_SPREAD_i$$
$$+ \sum_{j=1}^{N} \gamma_j \text{Control Variables}_{i,j} + \text{Year Effect} + \text{Industry Effect} + \varepsilon_i, \tag{2}$$

where *PRESOXSPREAD* is *SPREAD* prior to 2003 and otherwise zero, and *POSTSOXSPREAD* is *SPREAD* since 2003 and otherwise zero. If VS contains information relevant to expected short-run changes in stock prices from the announcements, the coefficient on *PRESOXSPREAD* and/or *POSTSOXSPREAD* should be positively related to *XRET*. Fu and Huang (2016) find that institutional ownership increased in the post-SOX period, which significantly impacted stock repurchasing firms' abnormal returns and information asymmetry. Thus, we control for this potential explanation by including institutional ownership (*INST*) in the regression model. The definitions of control variables are provided in the Table A1.

In the second approach, we employ the following difference in differences regression model:

$$XRET(-1,+1)_i = \text{Intercept} + a POSTSOX + \beta IVABOVE + \delta POSTSOX * IVABOVE$$
$$+ \sum_{j=1}^{N} \gamma_j \text{Control Variables}_{i,j} + \text{Year Effect} + \text{Industry Effect} + \varepsilon_i, \tag{3}$$

where *POSTSOX* is a dummy variable for the period after 2002, and *IVABOVE* is a dummy variable for implied VS above its median value.

3 | SAMPLE

The equity options and underlying stock related data are obtained from the OptionMetrics database for the sample period from 1996 to 2014. Following Cremers and Weinbaum (2010), Jin et al. (2012), and Atilgan (2014), we include options (calls and puts) with maturities from 10 to 60 days. To address thin trading issues, options with zero open interest and zero volume are removed. The implied VS is calculated based on implied volatility data wherein call and put options are matched based on strike price and maturity. The Research Insight database is used to gather data control variables, including size, book-to-market equity, return on assets, and leverage. The Securities Data Company (SDC) provides share repurchase data for nonfinancial and nonutility firms. Subsequent announcements made by a firm within less than a year are excluded to avoid clustering effects. We collect institutional ownership data from Thomson Reuters Eikon. Firms repurchasing shares during the sample period with optionable stocks are merged with the underlying equity data. We also winsorize all variables used in the regression at the 1 and 99% percentile to mitigate the potential effects of outliers.

4 | RESULTS

4.1 | Informed option trading and SOX

Table 1 displays the mean and median of the variables used in the regression analysis. The average (median) cumulative abnormal announcement return is 1.04 (1.30) percent. The average (median) implied VS in the pre-event window is −0.71% (−0.33%). The negative average and median of the implied VS are consistent with the literature (Cremers & Weinbaum, 2010; Gharghori, Maberly, & Nguyen, 2017; Jin et al., 2012). Our sample firms are growth firms as indicated by their relatively low book to market ratios. Also, they have average (median) market value of $15 ($4) billion dollars, return on assets around 7%, and fairly low leverage ratios.

Table 2 reports the regression results on the relationships between implied VSs prior to share repurchase announcements and cumulative abnormal announcement returns. In model (1), implied VSs (SPREAD) measured during the period just before the announcements (−10,-2) are positively related to the announcement returns. When SPREAD is split into before and after the SOX periods (model 2), the significantly positive relationship remains only in the pre-SOX period and is absent in the post-SOX period. This relationship stays positive even after we control for institutional ownership and several other control variables. Institutional relationship is negatively related to the announcement returns, which is consistent with prior studies (Fu & Huang, 2016).

The above analyses assume that SOX reduced information asymmetry. We next relax this assumption via a difference in difference approach[4] using implied VS as a proxy for information asymmetry. Implied VS has been widely reported in the literature as a measure of informed option trading which is attributed to information asymmetry. The larger the spread, the higher is the information asymmetry, and vice versa. Thus, we sort our sample firms based on the value of their SPREAD and assign a dummy for those observations above the SPREAD median value (IVABOVE). We also assign a dummy variable for observations during the post-SOX period (POSTSOX). Table 3 reports the results of the difference in difference approach.[5] POSTSOX is statistically insignificant and IVABOVE is positive and significant as expected. The interaction variable, IVABOVE*POSTSOX is not statistically significant confirming our previous results reported in Table 2 that informed option trading prior to share repurchase announcements occurs only during the pre-SOX period.

4.2 | Robustness tests[6]

Firms undertaking tender offers are subject to relatively stringent disclosure and procedural regulations, whereas negotiated share repurchases are often initiated by the sellers rather than the corporation (Peyer & Vermaelen, 2005).

TABLE 1 Descriptive statistics

	Mean	Median
XRET	0.010	0.013
SPREAD	−0.007	−0.003
BASE_SPREAD	−0.007	−0.003
BM	0.368	0.316
MktCap (billions$)	15.186	4.211
AUTH	5.780	5.858
ROA (%)	6.996	7.306
LEVERAGE	0.208	0.188
INST	0.523	0.543

Note: XRET is defined as CAR (−1,+1). BASE_SPREAD and SPREAD are the option implied spreads for days −50 to −11 and − 10 to −2, respectively. The other control variables are defined in the Table A1.

TABLE 2 Relationship between cumulative abnormal returns (1, +1) and option volatility spreads in the pre-event window (−10, −2) in the pre- and post-SOX periods

	(1)	(2)	(3)	(4)
SPREAD	0.216*		0.238	
	(1.71)		(1.39)	
PRESOXSPREAD		0.299*		0.306*
		(1.88)		(1.69)
POSTSOXSPREAD		0.107		0.153
		(0.96)		(0.79)
BASE_SPREAD	0.058	0.100	0.107	0.140
	(0.19)	(0.16)	(−0.45)	(0.56)
SIZE			−0.010***	−0.010***
			(−2.84)	(−2.84)
BM			−0.013	−0.014
			(−0.88)	(−0.91)
AUTH			0.004	0.004
			(1.51)	(1.53)
ROA			0.001*	0.001*
			(1.70)	(1.65)
LEVERAGE			−0.007	−0.007
			(−0.42)	(−0.40)
INST			−0.001**	−0.001**
			(−2.27)	(−2.27)
Intercept	0.168***	0.168***	0.090***	0.092***
	(4.26)	(4.90)	(2.84)	(2.81)
Industry effect	Y	Y	Y	Y
Year effect	Y	Y	Y	Y
R^2	0.0655	0.0664	0.1032	0.1038
N	1,194	1,194	940	940

Note: The dependent variable is XRET defined as CAR (−1, +1). BASE_SPREAD and SPREAD are option implied volatility spreads for days −50 to −11 and −10 to −2, respectively. PRESOXSPREAD is SPREAD in the pre-SOX period prior to 2003, and POSTSOX SPREAD is SPREAD in the post-SOX period. Control variables as well as industry and year effects are defined in the Table A1. The t statistics (in parentheses) are adjusted for cluster-robust standard errors at firm level. *, **, and *** denote statistical significance at the 10, 5, and 1% levels, respectively.

Therefore, relative to open market share repurchase announcements, tender offer and negotiated share repurchase announcements are more prone to information leakage prior to the events. Hence, it is possible that our results are driven by these two types of share repurchase announcements. To address this issue, we split our sample into two subsamples: one for open market repurchase announcements and another for both negotiated and tender offer announcements. We find that pre-event VSs for all types of share repurchase announcements in the pre-SOX period are positively related to announcement abnormal returns, but this significant relation disappears in the post-SOX period. Thus, our results suggest that some option investors obtained private information prior to share repurchase

	Coeff.	t stat
POSTSOX	0.002	(0.09)
IVABOVE	0.023**	(2.14)
IVABOVE*POSTSOX	−0.018	(−1.36)
Intercept	0.067**	(1.97)
R^2	0.0723	
N	940	

TABLE 3 Difference in difference approach

Note: The dependent variable is XRET defined as CAR (−1, +1). POSTSOX is a dummy variable for observations in the post-SOX period after 2002, and IVABOVE is a dummy variable for SPREADS above their median value. Control variables as well as industry and year effects are defined in the Table A1 but are not reported to conserve space (available upon request). The t statistics are in parentheses. * and ** denote statistical significance at the 10 and 5% levels, respectively.

announcements before the enactment of the SOX, but this advantage is no longer available after the Act was implemented since 2003.

Prior studies find informed option trading may occur around several corporate announcements, such as earnings, M&As, SEOs, stock splits, and spin-offs (Augustin, Brenner, Hu, & Subrahmanyam, 2015; Cao, Chen, & Griffin, 2005; Gharghori et al., 2017; Hao, 2016; Jayaraman, Frye, & Sabherwal, 2001; Jin et al., 2012, among others). To ensure that our results are not affected by informed option trading from these events, as a robustness check, we exclude from our final sample any share repurchase announcements that occur within 15 days before and after these potentially confounding announcements. Earnings announcements were obtained from Research Insight and other announcements from Thomson Reuters SDC database. Excluding corporate events that may have confounding effects reduces our sample observations by almost half, which is consistent with the literature (Hao, 2016). In unreported results, we find consistent results after eliminating confounding events. That is, informed option trading occurs only in the period prior to the implementation of the SOX but not thereafter.

5 | CONCLUSION

Previous empirical evidence has documented support for the informed options trading hypothesis that transactions in options markets contain information about future equity prices. Recent studies utilizing implied VS as a measure for informed trading have found evidence consistent with this hypothesis. Informed trading is most likely to occur in an inefficient market. Previous studies have shown that the SOX introduced in 2002 increased efficiency and reduced information asymmetry in the U.S. stock market. A more efficient stock market should impact the derivative options market. Does informed trading in the options market exist in the period after the implementation of SOX?

This study attempted to answer this research question by employing share repurchase announcements as unscheduled corporate events. We find evidence that option investors trade profitably on expected changes in stock prices around this unexpected announcement prior to the enactment of SOX in 2002. However, after SOX was implemented, our measure for informed option trading cannot predict expected stock returns related to share repurchase announcements. We interpret this evidence to mean that SOX reduced informed trading in the option markets.

ENDNOTES

[1] See, for example, Easley et al. (1998), Chan, Chung, and Fong (2002). Roll, Schwartz, and Subrahmanyam (2010), Xing, Zhang, and Zhao (2010), and Cremers and Weinbaum (2010).

[2] Given the extensive empirical evidence that the U.S. stock markets have become relatively more efficient after the implementation of the SOX, we take the efficient U.S. stock markets in the post-SOX period as given in our analysis.

[3] See Cremers and Weinbaum (2010), Jin, Livnat, and Zhang (2012), Atilgan (2014), Chan et al. (2015), and Hao (2016). Another implied volatility-based measure is volatility skew. However, this measure is related to negative changes in the underlying assets' returns (Xing et al., 2010; Jin et al., 2012; Chan et al., 2015). Because share repurchase announcements are on average positive corporate events, as in Hao (2016), we utilize volatility spread as our measure of informed trading in the options market.

[4] We are thankful to an anonymous referee for suggesting the difference in difference approach.

[5] To conserve space, we do not report the results for the control variables which are available upon request.

[6] For the sake of brevity, we do not tabulate the results but are available upon request.

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TABLE A1   Definition of control variables

BM	Book-to-market equity ratio of sample firms
SIZE	Natural logarithm of the market capitalization of sample firms
AUTH	Natural logarithm of the dollar authorization value
ROA	Return on assets
LEVERAGE	Total debt/total assets
INST	Institutional ownership
Industry effects year effects	