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Full Length Research Paper

Section 404 of the Sarbanes-Oxley act and its capital market effects

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Starting with November 15, 2004, Section 404 of the Sarbanes-Oxley Act of 2002 (SOX 404) requires all accelerated firms (with at least $75 million in public equity) to report on the effectiveness of their internal controls over financial reporting. There has been some controversy regarding the burden that it casts on companies and whether the benefits outweigh the costs of compliance. Reporting under SOX is meant to improve investor confidence concerning the stock of a specific company by adding credibility to its financial statements. An increase in the quality of financial information should determine a narrowing of the bid-ask spread. I identify the cost components of the market makers bid-ask spread for a sample of stocks surrounding the implementation of SOX 404. The expectation is that market makers react to the implementation of Section 404 as if information asymmetry has diminished. The study uses the model developed by Bollen et al. (2004) to separate the cost components of the bid-ask spread for a sample of compliant firms in the period surrounding the implementation of SOX 404.

Key words: Bid-ask spread, informed trading, information asymmetry, internal controls, adverse selection cost.

INTRODUCTION

This paper investigates the market effects of Section 404 of the Sarbanes-Oxley act of 2002 (SOX404) by looking at the changes that the passage has brought in trader's information asymmetry, proxied by market makers' bid-ask spreads. Before the enactment of Sarbanes-Oxley, firms were only required to publicly disclose internal control deficiencies if there was a change in auditor. The study argues that if compliance with SOX 404 increases internal control over financial reporting (ICFR), investor confidence in annual reports will also increase. Superior disclosures available to all traders lead to a reduction of information asymmetry. An increase in the quality of financial information should determine a narrowing of market maker's bid-ask spreads because the adverse selection cost is lower. My expectation is that market makers react to the implementation of Section 404 as if information asymmetry has diminished, considering that the chances of trading against better informed traders are lower.

Information asymmetry is a situation in which one party in a transaction has more or superior information compared to another. This often happens in transactions where the seller knows more than the buyer (although, the reverse can happen as well) and can lead to adverse selection - immoral behavior that takes advantage of asymmetric information before a transaction.

The Bid price is the current highest price at which someone in the market is willing to buy a stock. The Ask price is the current lowest price that someone is willing to sell a stock. The difference in these two amounts is called the Bid-Ask spread. These prices are constantly changing during each trading session as shares change

Abbreviations: CRSP, Center for research in security prices; **ICFR,** internal control over financial reporting; **ICW,** internal control over financial reporting weakness; **IHP,** inventory holding premium; **MHI,** Modified Herfindahl Index; **MW,** material weakness; **Reg FD,** regulation fair disclosure; **SOX,** Sarbanes-Oxley act of 2002; **SOX 404,** Section 404 of the Sarbanes-Oxley act; **MW,** material weaknesses; IT**,** information technology; **ND,** number of dealers.

hands. The Bid-Ask spread is determined mainly by liquidity. If a stock is highly liquid, meaning there is a large volume of shares being bought and sold, the Bid-Ask spread will be much lower. A low Bid-Ask spread is important to traders because the extra cost that they pay in the spread will eat away at the profits of their trades (Kosmider, 2006).

Section 302 of the act, requires that chief executive officers and chief financial officers evaluate quarterly the design and effectiveness of internal controls, and report an overall conclusion about their effectiveness. Section 404(a) of SOX outlines management's responsibility and requires that the annual report include an internal control report by management which contains an assessment of the effectiveness of internal control over financial reporting as of the end of the most recent fiscal year. Section 404(b) requires the auditor to make a separate independent assessment of the company's internal controls over financial reporting.

Implementing stronger internal controls over financial reporting (ICFR) is considered an important step towards higher quality disclosures, although there has been some criticism concerning the high costs of compliance with Section 404. Healy and Palepu (2001) argued that the demand for financial reporting and disclosure arises from information asymmetry and agency conflicts between managers and outside directors. The credibility of management disclosures is enhanced by regulators, standard setters, auditors (mandatory provisions for auditor assessment of ICFR effectiveness) and other capital market intermediaries. The passage of the Sarbanes-Oxley Act by U.S. was meant to provide this precise enhancement of credibility, after the market had previously witnessed significant financial failures and frauds. The financial reporting system is generally regarded as a means by which shareholders can monitor managers and, furthermore, effective ICFR is considered a tool for mitigating the agency problem (Goh, 2009; Hoitash et al., 2009, among others). Because strong ICFR restrict management's discretion over earnings measurement, disclosures made under sections 302 and 404 provide additional measures beyond financial reports that can reveal the extent to which corporate governance has succeeded in reducing agency costs.

While complying with SOX 404 is considered by far more expensive than SOX 302, a good research question is whether all the supplementary requirements are really necessary and meet their intended purposes, or complying with SOX 302 does a similar job in the eyes of investors? This issue is of great importance, as the extension of Section 404 auditor testing to smaller U.S. public companies remains controversial (Hoitash et al., 2009) and has been postponed several times in the recent years. The answer could be useful to regulators in other countries who seek evidence on whether less stringent internal control regimes are sufficient for high-quality financial reporting.

Instead of looking for a general disclosure quality measure, the study investigates the effects of a specific type of disclosure in the market – material weaknesses (MW) disclosures under Section 404 a) and b). Reporting these weaknesses reflects a firm's ability to identify internal control risks and could be a good indicator of future remediation of such weaknesses.

Since there are few measures for information asymmetry between informed and uninformed traders, previous research mainly uses the relative bid-ask spread to proxy for it. The market bid-ask spread is the amount by which the ask price exceeds the bid for a share. It is a function of order-processing costs, inventory holding costs, market maker competition and adverse selection costs. The first three are not affected by SOX 404 so any variation of the spread must be driven by a change in adverse selection costs. Increased disclosure quality driven by compliance with SOX 404 should determine a reduction in information asymmetry between informed and uninformed traders and therefore, a reduction of adverse selection costs included in the bid-ask spreads.

Following Sidhu et al. (2008), the study separates the cost components of the bid-ask spread for a sample of compliant firms in the period surrounding the implementation of SOX 404. Their model is based on the one developed by Bollen et al. (2004) and investigates the market effects of a law imposed by the SEC – Regulation Fair Disclosure. Other authors (Brown and Hillegeist, 2007) have used the PIN (probability of informed trading) proxy for information asymmetry, but it is not entirely reliable (Ertimur, 2007). However, my study is related to that of Brown and Hillegeist in that it also aims to show that disclosure quality reduces information asymmetry.

The Sarbanes Oxley Act of 2002 and its market effects - Prior research

This paper contributes to the literature on internal control by further investigating the market effects of regulation concerning internal control weaknesses disclosures. Three types of internal control weaknesses can be disclosed under Sections 302 and 404. Listed in increasing order of severity, these are control deficiencies, significant deficiencies, and MW. The primary differences between a control deficiency and a significant deficiency are in the probability and magnitude of the financial statement misstatements, which may result due to the existence of the weaknesses. A material weakness is "a deficiency, or a combination of deficiencies, in internal control over financial reporting, such that there is a reasonable possibility that a material misstatement of the company's annual or interim financial statements will not be prevented or detected on a timely basis. Although the initial impact in stock price of such disclosures is negative

(Litvak, 2007), other research shows that internal control risk matters to investors and that firms reporting effective internal controls or firms remediating previously disclosed internal control deficiencies benefit through lower cost of equity and higher accruals quality (Ashbaugh-Skaife et al., 2009). Doyle et al. (2007a) show that firms which disclose MW tend to be smaller, younger, financially weaker, more complex, growing rapidly, or undergoing restructuring. Also, firms with information technology (IT) related weak components report more MW and misstatements than firms without IT related weak components, providing evidence on the pervasive negative impact of weak IT controls, especially in control environment, risk assessment, and monitoring (Klamm and Watson, 2009).

There is also a line of research addressing the issue whether the provisions of section 302 are sufficient for informed investment decisions, or more restrictive, detailed regulation of such disclosures is truly necessary, taking into account both costs and benefits. Some critics of SOX maintain that the costs of regulation exceed its benefits for many corporations (Carney, 2006). Additionally, it has been suggested that internal controls, no matter how adequate, could not have done much to prevent the accounting scandals that took place. The requirements to set up and assess the efficiency of these controls were already in place sometime before. Internal controls are generally designed to prevent small frauds, but the large frauds are perpetrated by those with the authority to circumvent any policy (Sinnett, 2004). Litvak's research (2007) tests investor's beliefs about costs and benefits of SOX. Results show that stock prices have declined for foreign firms subject to SOX, compared to cross-listed firms not subject to SOX. Engel et al. (2007) argue that going-private is an attractive response to SOX for some firms. Zhang (2007) hypothesizes and finds evidence that if the governance provisions of SOX imposed net costs on firms, firms with corporate governance structure weaker than optimum would incur more costs and experience more negative cumulative abnormal returns around the SOX rulemaking events. Bhamornsiri et al. (2009) focus on the impact of SOX 404 requirements for cross-listed non- US companies and the impact on external audit fees for filers during the first 2 years it was effective. Findings indicate that audit fees increased by an average of 65% for the initial group of filers in the first year SOX 404 was effective and by 9% in the second year. This increase was associated with a 5% decrease in earnings for these companies.

The study also adds to existing literature on general effects of the Sarbanes-Oxley act. Hansen et al. (2009) investigate the listings and delistings on US stock exchange after SOX. Results show that the passing of SOX was not associated with an increase in delisting likelihood for any size quintiles. However, the implementation of SOX 404 was significantly positively associated with the probability of delisting for larger firms, especially if they were performing poorly. Carter et al. (2009) find support for the joint hypothesis that the implementation of SOX led to a decrease in earnings management because the reporting environment became less flexible. A more recent paper by Ashbaug-Skaife et al. (2009) investigate how changes in internal control quality affect firm risk and cost of equity and finds that firms with internal control deficiencies have significantly higher idiosyncratic risk, systematic risk, and cost of equity. Accounting information system quality includes not only the disclosures the firm makes to outsiders, but also the internal control systems that a firm has in place. The quality of accounting information and the systems that produce that information influence a firm's cost of capital in two ways: (1) direct effects—where higher quality accounting information does not affect firm cash flows, per se, but does affect market participants' assessments of the variance of a firm's cash flows and the covariance of the firm's cash flows with aggregate market cash flows—and (2) indirect effects—where higher quality information and better internal controls affect real decisions within the firm, including the quality of operating decisions as well as the amount of firm resources that managers appropriate for themselves. Chhaochharia and Grinstein (2007) study the effects of SOX act of 2002 on firm's returns, taking into consideration their size and level of compliance. Evidence shows that firms that are less compliant have greater abnormal returns than those that are more compliant. Also, large, less compliant firms show positive abnormal returns while smaller, less compliant firms show negative abnormal returns, meaning that some provisions are detrimental to small firms.

Ogneva et al. (2008) find that, on average, internal control over financial reporting weaknesses (ICWs) are not directly associated with higher cost of equity, for firms that filed first-time Section 404 reports with the SEC. Although they find that ICW firms have higher implied cost of equity than firms without such weaknesses, there is no significant association between ICW and cost of equity after controlling for analyst forecast bias and primitive firm characteristics associated with ICWs.

Brown and Hillegeist (2007) examine the precise mechanisms through which disclosure quality affects information asymmetry among equity investors over a year. Information asymmetry occurs when one or more investors possess private information about the firm's value while other uninformed investors only have access to public information. The presence of information asymmetry creates an adverse selection problem in the market when privately informed investors trade on the basis of their private information. Their findings provide some empirical support for regulators' beliefs that high quality disclosures make the capital markets more attractive to ''ordinary'' uninformed investors. Results indicate that disclosure quality primarily affects information asymmetry

by reducing the likelihood that investors discover and trade on private information.

Sidhu et al. (2008) examine the cost of adverse selection before and after regulation fair disclosure (Reg FD) became effective in 2000. The evolution is observed through the cost components of market maker bid-ask spreads. The market bid-ask spread is the amount by which the ask price exceeds the bid for a share. This is essentially the difference in price between the highest price that a buyer is willing to pay for an asset and the lowest price for which a seller is willing to sell it. It is a function of order-processing costs, inventory holding costs, market maker competition and adverse selection costs. The first three are not affected by SOX Section 404 so any variation of the spread must be driven by a change in adverse selection costs. Their conclusion is that Reg FD led to an increase in adverse selection cost (risk premium which covers losses caused by trading against better informed traders). They use the model developed by Bollen et al. (2004), which is also the one that this research is based on. Sidhu et al. (2008) conclude that Reg FD has led to an increase in the expected cost of information asymmetry, contrary to its objectives.

Proxy and hypotheses development

Since there are few measures for information asymmetry between informed and uninformed traders, previous research mainly uses the relative bid-ask spread to proxy for it. However, most models assume that the only time-series variation in spread is driven by information asymmetry. Movements in order-processing costs, inventory holding costs and competition are considered constant. In some cases, the adverse selection cost component of the spread is not explicitly isolated, in which case, results could be driven by the other components as well.

The most common proxies for information asymmetry are briefly described by Leuz and Verrechia (2000). The bid-ask spread is commonly thought to measure information asymmetry explicitly. The reason for this is that the bid-ask spread addresses the adverse selection problem that arises from transacting in firm shares in the presence of asymmetrically informed investors. Less information asymmetry implies less adverse selection, which, in turn, implies a narrower bid-ask spread. An alternative, and perhaps less explicit, proxy for adverse selection is trading volume in firm shares. Trading volume is a measure of liquidity in that it captures the willingness of some investors who hold firm shares to sell and the willingness of others to buy. This willingness to transact in firm shares should be inversely related to the existence of information asymmetries. Trading volume, however, can be influenced by a host of other factors unrelated to information. Finally, share price volatility has been used by prior studies as a proxy for information asymmetry. To the extent that smooth transitions in share prices suggest the absence of information asymmetries between the firm and shareholders, or among investors, low levels of volatility suggest fewer information asymmetries. Higher disclosure should lead to a lower bid-ask spread, increased trading volume and less share price volatility.

The study hypothesizes that if compliance with SOX 404 increases internal control over financial reporting, investor confidence in annual reports will also increase. A confidence increase means lower compensation premiums incorporated in the bid-ask spread. The higher financial information quality is, the lower the adverse selection cost should be, assuming that the chances of trading against better informed traders are lower. The expectation is that market makers react to the implementation of Section 404 as if information asymmetry has diminished, so the adverse selection cost component of the bid-ask spread of market makers should narrow after the implementation of SOX 404.

H_1: The adverse selection cost is a significant component of the bid-ask spread of market makers
H_2: The bid-ask spread should narrow after the implementation of SOX 404.

THE BOLLEN-SMITH-WHALEY MODEL

Following Sidhu et al. (2008), the study separates the cost components of the bid-ask spread for a sample of compliant firms in the period surrounding the imple-mentation of SOX 404. The study differs significantly; not only in time span but also in that it attempts to simplify the Bollen et al. (2004) model of estimating the spread components. The following are specifications of the original model:

Quoted spread = ask price – bid price (at the time of each transaction t).

Herfindahl index

This incorporates the number of dealers (ND) making a market in a particular stock, as well as their respective trading volumes Vi. Rate of return volatility is σ. The returns are obtained from the Center for Research in Security Prices daily return file, and the daily return standard deviation is annualized using the factor $\sqrt{252}$.

A preliminary regression is used including the following variables: inverse of trading volume modified Herfindahl Index, inventory holding premium. This regression shows that competition among market players also plays an important role in determining the absolute level of the bid-ask spread.

$$SPRDi = \alpha 0 + \alpha 1 InvTVi + \alpha 2 MHIi + \alpha 3 IHPi + \varepsilon i$$

Where *SPRDi* is the bid-ask spread of stock *i*, *InvTVi* is the inverse of trading volume, *MHIi* is the modified Herfindahl Index, and *IHPi* is the inventory holding premium. In this model, the specific components of the bid-ask spreads are: $\alpha 0$, the minimum tick size; $\alpha 1 InvTVi$, order-processing costs; $\alpha 2 MHIi$, competition; and $\alpha 3 IHPi$, the sum of the inventory holding and informational asymmetry components of the spread.

The first term on the right-hand side of the equation, $\alpha 0$, is the exchange mandated minimum tick size. It serves as the lower bound for the bid-ask spread. The second term models the effects of order-processing costs (for example, the exchange seat, floor space rent, computer costs, informational service costs, labor costs, and the opportunity cost of the market maker's time). Because these costs are largely fixed, at least in the short run, their contribution to the size of the bid-ask spread should fall with trading volume—the higher the trading volume, the lower the bid-ask spread. The third term captures the effects of competition among market makers, measured by a modified Herfindahl Index (*MHIi*).

The fourth term on the right-hand side of the equation is the market maker's "inventory-holding premium." This premium is demanded by the market maker to cover the expected cost of accommodating a customer order and then having the stock price move against him, independent of whether the trade is initiated by an informed or an uninformed customer. *IHPi* is estimated as a single at-the-money option, with no distinction drawn between informed and uninformed traders. Assuming that the market maker sets his inventory-holding premium (*IHP*) component of the bid-ask spread such that he minimizes the risk of losing money should the market move against him, his demanded compensation is:

$$IHP = -E(\Delta S \left| \Delta S < 0 \right.) \Pr(\Delta S < 0)$$

According to this equation, the minimum *IHP* equals the expected loss on the trade conditional on an adverse stock price movement times the probability of an adverse stock price movement. A market maker demands different inventory-holding premium for trades with informed and uninformed traders. From the market maker's perspective, the required inventory-holding premium, *IHP*, equals the sum of the expected inventory holding cost and expected adverse selection cost components of the spread, that is,

$$IHP = (1 - p_I) IHP_U + p_I IHP_I$$

Where *pI* (1 – *pI)* is the probability of an informed (uninformed) trade.

The coefficient $\alpha 1$ is expected to be positive because it represents the market maker's total order-processing costs. The coefficient $\alpha 2$ should be positive. The fewer the number of dealers and the less evenly distributed the trading volume across dealers, the higher the modified Herfindahl Index and the higher the spread. The coefficient $\alpha 3$ should also be positive. The higher the expected inventory-holding premium, the greater the bid-ask spread. This would prove H_1 true.

Sample and method

Using compliance week as a tool and search engine for company 10 K and 10 Q filings, I retrieve the names, ticker symbols and disclosure excerpts of the companies that disclosed material weaknesses. Next step was searching the center for research in security prices (CRSP) daily stock file for daily trading data for the 117 companies that disclosed material weaknesses in the month of March 2005. The reason for looking into March disclosures is that this was the first large output of annual reports after the implementation of Section 404. To see whether there has been significant change in returns, prices or bid/ask spreads surrounding the disclosures, the study also includes the previous and following months.

The study retrieves price and intra-day transaction information for a three month period from February 2005 to April 2005 for each of these companies and computes the cost components of the bid/ask spread (Inverse of Trading Volume, the Modified Herfindahl Index and the Inventory Holding Premium), which has been discussed in the previous chapter. After eliminating missing tickers, zero trading volumes and unavailable market maker count information, the search returns 1047 complete daily observations for 57 companies.

A simplified method of computation is used as compared to the original Bollen-Smith-Whaley model cost components. A dated panel is built, with 57 cross-sections, observed along 62 working days in the months of February, March and April 2005. Table 1 includes some statistics for the following series retrieved through database search:

The Ask and Bid columns represent the closing ask and bid of a certain stock on a particular day.

Ask or High Price is the highest trading price during the day, or the closing ask price on days when the closing price is not available. Bid or Low Price is the lowest trading price during the day or the closing bid price on days when the closing price is not available.

Price or bid/ask average is the closing price or the negative bid/ ask average for a trading day. If the closing price is not available on any given trading day, the number in the price field has a negative sign to indicate that it is a bid/ask average and not an actual closing price. Negative signs were eliminated where the bid/ask average is shown, for computation reasons and also because the negative sign is only a symbol - the value of the bid/ask average is not negative.

Holding Period Return: A return is the change in the total value of an investment in a common stock over some period of time per dollar of initial investment. *Return* is the return for a sale on day i. It is based on a purchase on the most recent time previous to day i when the security had a valid price.

Trading volume is the total number of shares of a stock sold on day i. It is expressed in units of one share, for daily data, and on hundred shares for monthly data. The data source for NYSE/AMEX reports the number rounded to the nearest hundred. For example, 12,345 shares traded will be reported on the NASDAQ Stock Exchange as 12,345 and on the NYSE or AMEX exchanges as 12,300.

Market Maker Count is the number of registered market makers for the issue.

Number of Trades contains the number of trades made on the NASDAQ Stock Market each date for a security. Trades on all exchanges are connected to NASDAQ's composite pricing network and all paper trades are included in the count.

The study computes the Bid/Ask spread for each stock *i* as:

SPREAD i = *Ask or High Price* i - *Bid or Low Price* i (1)

The Inverse of Trading Volume is:

InvTV i = *1 / Trading Volume i* (2)

The Herfindahl index is:

$$HI = \sum_{i=1}^{ND} \left(\frac{Vi}{V} \right)^2 \quad (3)$$

Table 1. Descriptive statistics.

Statistic	Ask	Bid	Ask or high price	Bid or low price	Price or bid/ask average	Returns	Trading volume	Market maker count	Number of trades
Mean	14.51581	14.48892	14.79640	14.26376	14.50458	-0.002541	898677.5	37.52377	2255.074
Median	12.35000	12.33000	12.69000	12.17000	12.35000	-0.001372	219330.0	33.00000	804.0000
Maximum	44.59000	44.48000	45.43000	44.43000	44.43000	0.993062	1.28E+08	89.00000	228699.0
Minimum	0.640000	0.630000	0.680000	0.610000	0.630000	-0.264469	2716.000	14.00000	20.00000
Std. Dev.	9.504561	9.495058	9.633784	9.395030	9.501572	0.046177	4403696.	15.99917	8292.905
Skewness	0.731981	0.733396	0.722224	0.743770	0.731821	8.480812	23.24814	0.994929	20.08574
Kurtosis	2.908778	2.910745	2.879117	2.936008	2.906689	207.1080	652.8263	3.543677	524.8706
Jarque-Bera	96.19017	96.54525	93.93407	99.11248	96.16550	1875414.	18975829	190.2393	12248417
Probability	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
Observations	1073	1073	1073	1073	1073	1073	1073	1073	1073

Values are expressed in U.S. dollars, except trading volume, market maker count and number of trades.

Where ND is the number of dealers (*Market Maker Count*), V is the *Trading Volume* for a particular stock; Vi is the trading volume for the respective dealer.
The Modified Herfindahl Index is:

$$MHIi = \frac{HIi - 1/NMi}{1 - 1/NMi} \quad (4)$$

where *HIi* is the Herfindahl Index and *NMi* is the number of market makers.
The expected inventory-holding premium is an at-the-money option whose value may be written

$$IHP = S[2N(.5\sigma E(\sqrt{t})) - 1] \quad (5)$$

where *S* is the true stock price at the time at which the market maker opens his position, σ is the standard deviation of security return, $E(\sqrt{t})$ is the expected value of the square root of the time between offsetting trades, and $N(\cdot)$ is the cumulative unit normal density function.

The estimated regression will be:

$$SPRDi = \alpha 0 + \alpha 1 InvTVi + \alpha 2 MHIi + \alpha 3 IHPi + \varepsilon i \quad (6)$$

In this model, the specific components of the bid-ask spread are: $\alpha 0$, the minimum tick size; $\alpha 1 InvTVi$, order-processing costs; $\alpha 2 MHIi$, competition; and $\alpha 3 IHPi$, the sum of the inventory holding and informational asymmetry components of the spread.

STATISTICS AND REGRESSION RESULTS

Figure 1 shows the evolution of stock prices, including one standard deviation line, before and after material weaknesses disclosures were made in March. The mean of prices was $14.5 and there seems to have been a decrease around the10th of March. The companies with a higher stock price than the mean have experienced a more dramatic downward spike, compared to companies that are priced below the mean, as the graph shows. But these are just average values and a more accurate

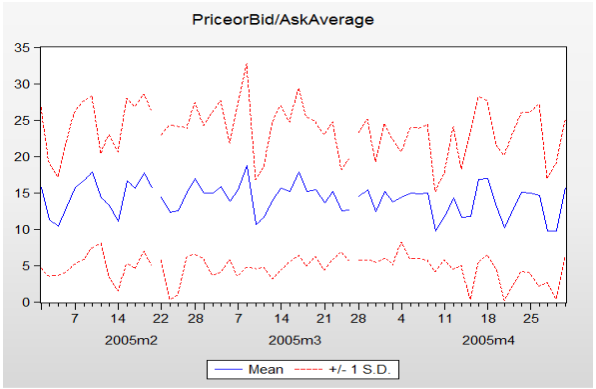

Figure 1. Mean of Price across 3 months daily observations.

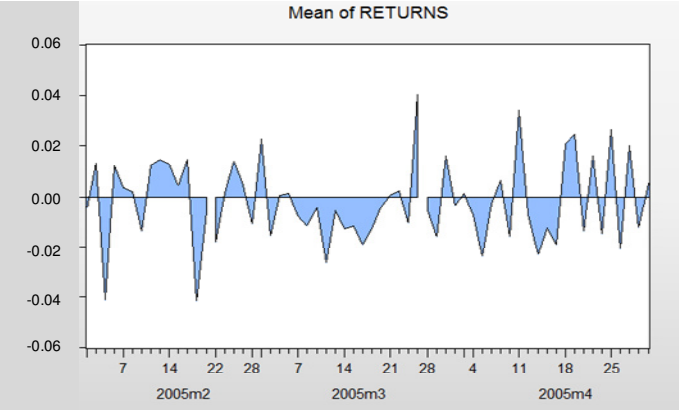

Figure 2. Mean of holding period returns across observation period.

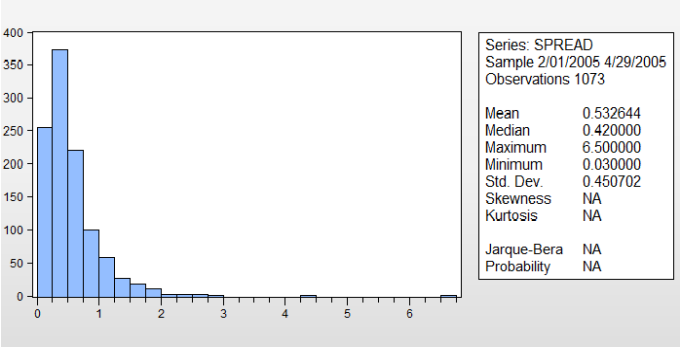

Figure 3. Histogram and statistics of the bid/ask spread.

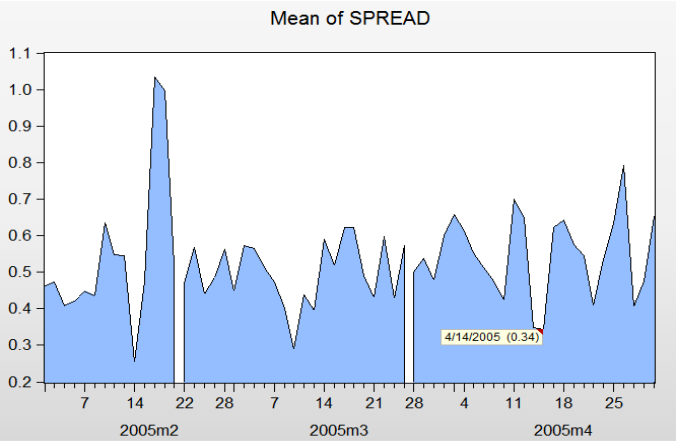

Figure 4. Mean of the bid/ask spread across 3 months daily observations.

analysis would have to include firm-specific characteristics, as stock prices vary significantly from one firm to another.

The 57 stocks analyzed across three months have generated negative average holding period return, as shown in Table 1. They were generally small, only adding up to a few cents. There were some negative spikes in February and the disclosing month of March was dominated by poor, negative returns. The evolution across the observation period is shown in Figure 2.

It is interesting to notice that there was a significant positive spike around the 25th of March, right after almost all material weaknesses were made public and the market had time to absorb the bad news. April's returns varied so much from positive to negative that is difficult to draw a conclusion as to any possible impact of the annual reports.

Table 1 includes a summary of the main statistics computed for each data series. The trading volume daily average for a company was quite high, around 900.000 units traded by an average of 38 market makers. The study has only included companies which had number of trades, market maker count and trading volume larger than one. The highest price for a share was 44$ while the lowest was 63 cents. Intriguingly, the maximum return was only 99 cents.

The bid/ask spread had a mean of 53 cents, around 370 out of the total 1073 observations were set around that amount, as shown Figure 3.

The spread seemed to have increased significantly around the 20th of February after a major narrowing a few days earlier. Mid-march and mid-April also showed reductions in the bid/ask spread, most probably around disclosure dates (Figure 4). Reductions of the bid/ask spread are associated, according to prior literature, with reduced information asymmetry. However the graph on this sample does not show a significant reduction as hypothesized earlier (H_2)

The next step was running a regression with the bid/ask spread as a dependent variable, using the least squares method with fixed effects. A key assumption in most applications of least squares regression is that there are not any omitted variables which are correlated with the included explanatory variables. (Omitted variables cause least squares estimates to be biased.) When the unobserved variable varies across one dimension of the panel but not across the other, there is a feature called fixed effects to make up for the omitted variable.

My data panel does not include observations for each company for each of the 62 days considered, limitation deriving from availability of data and restrictions explained in the sample section. It is an unbalanced data panel; therefore a substitution of missing observations by a constant is required. The presence of multiple observations for each company makes estimation of the fixed effect possible. It is a cross-section fixed effect where there is a missing day for a certain company. The same happens for a variable that was constant over time while varying across companies. This would lead to a varying

Table 2. Regression estimates with fixed cross-section effects and fixed cross-section and period effects.

Variable	Fixed cross-section effect	Fixed cross-section and period effect	Cross-section weight
INVTV	1904.008 (0.058)	1951.676 (0.060)	2135.953 (0.003)
MHI	-1.787(0.000)	-1.804 (0.000)	-1.682 (0.000)
IHP	0.260 (0.000)	0.348(0.000)	0.241(0.000)
C	-0.083 (0.478)	-0.308(0.022)	-0.042 (0.652)
R-squared	0.495	0.533	0.674
F	16.833	9.068	35.615
Prob. (F statistic)	0.00	0.000	0.000
Durbin- Watson	1.448	1.475	1.638

t-stat Prob. are in parentheses.

fixed effect.

Table 2 shows the regression results, first column including cross-section fixed effects, second including both cross-section and period fixed effects, third column with cross-section weights. Overall, the third regression seemed to be more accurate. The model explained only half of the variation of the SPREAD (49% and 53%, respectively), which means that it was also influenced by other factors not included in this linear regression. R^2 was improved (67%) when cross-section weights were applied. However, these results are not discouraging, as the fisher statistic showed that the model is relevant.

The modified Herfindahl index coefficient was negative in all three regressions, therefore narrowing the bid/ask spread, which is contrary to the model's expectations, and intriguing at the same time. The fewer the number of dealers and the less evenly distributed the trading volume across dealers, the higher the Modified Herfindahl Index and the higher the spread should be.

These results mean that a variation of the MHI of one unit inversely affected the SPREAD by 1.7 cents 1.8 cents and 1.6 cents, respectively. This inconsistency might have been caused by the small number of observations for such a volatile variable, or by the simplified method of computing the MHI. The inverse of trading volume had the highest coefficient and it was positive, as expected, although, the t-statistic and respective probability indicate that it is somewhat weakly significant (prob. was slightly higher than the acceptable 0.05 for a strongly significant coefficient). The Inventory Holding Premium coefficient estimate was positive, as expected, and significant, but only 0.26, 0.34 and 0.24, respectively. It showed that a variation of one cent in the inventory holding premium determined a variation of 0.34 cents in the bid/ask spread.

Conclusions

The answer to the SOX 404 controversy could be useful to regulators in other countries who seek evidence on whether less stringent internal control regimes are sufficient for high-quality financial reporting. Economic theory suggests that a commitment by a firm to increased levels of disclosure should lower the information asymmetry component of the market makers' bid/ask spread. The regression results obtained through a simplified version of the Bollen, Smith and Whaley model are not entirely consistent with expectations. Estimation showed that The inventory holding premium (which includes the adverse selection cost component of the bid/ask spread) does not have a large impact on the spread itself, although it has a positive influence, proving H_1 true.

The evolution of the spread has not seen a significant downward spike after the month of disclosures considered for this study. There may be two explanations for this result. First, the fact that these companies are disclosing issues related to financial reporting might send a negative signal towards investors and inspire distrust in the annual reports. The SEC's objective of reducing the information asymmetry has not been met immediately, due to „bad news" effects. This is intuitive, but in the long run the effect of such disclosures might be opposite. Companies have discovered ICFR weaknesses and might even have taken action to remediate them.

Second, this study is based on a reduced sample of newly compliant firms. A larger sample of companies with observations of the spread across years should show the expected reduction.

Also noticeable were the low returns that the stocks generated. This is consistent with previous research on cumulative abnormal returns and overall evolution of trading for compliant firms (Zhang et al 2007; Litvak, 2007, among others). Such poor performance is most probably caused by the financial difficulties these companies meet, MW disclosing companies being prone to such problems as shown by Doyle et al. (2007a) and Klamm and Watson (2009).

The study concludes that compliance with the Section 404 of the Sarbanes Oxley Act has not led to a reduction of information asymmetry among traders, and of the bid/ask spread, infirming H_2. However, this study is based

based on a short 3 month window, prior and after implementation, and regulation effects are usually noticeable in long the run, so it is possible a future study with a longer time-span would show the expected spread narrowing.

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