

STOCK INVESTORS' RESPONSE TO DISCLOSURES OF MATERIAL WEAKNESSES IN INTERNAL CONTROL

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ABSTRACT

There has been some controversy regarding the burden that the Sarbanes-Oxley Section 404 (SOX 404) casts on American public companies and whether the benefits outweigh the costs of compliance. Starting with November 15, 2004, Section 404 of the Act requires all accelerated firms (with at least \$75 million in public equity) to report on the effectiveness of their internal controls over financial reporting. 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 reduction in information asymmetry among stock investors, narrowing the bid-ask spread. I use the model developed by Bollen, Smith and Whaley (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. The expectation is that the passage did have a positive effect, by reducing the bid-ask spread.

✦ *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. I argue that if compliance with

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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 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 (Kosminder, 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) argue 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 and 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. The recent Dodd-Frank Act (July 2010) finally resolved part of the 6-years controversy by exempting smaller public companies from paragraph (b) of SOX 404.

Instead of looking for a general disclosure quality measure, I investigate 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), I separate 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 & 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's (2007) in that it also aims to show that disclosure quality reduces information asymmetry.

1. 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 material weaknesses. 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 material weaknesses tend to be smaller, younger, financially weaker, more complex, growing rapidly, or undergoing restructuring. Also, firms with IT-related weak components report more material weaknesses 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 & 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 (Sinnott, 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.

I also add 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 Ashbaugh – Skaife *et al.* (2009) investigates 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. 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), contrary to its objectives. They use the model developed by Bollen *et al.* (2004), which is also the one that this research is based on.

2. THE DODD-FRANK ACT OF 2010 – SMALL PUBLIC COMPANIES ARE EXEMPTED FROM THE BURDENING SECTION 404 (B)

There have been dramatic changes since this study was first drafted. The efforts to relieve smaller public companies of having to comply with the costly Section 404 of the Sarbanes-Oxley Act, which lasted well over six years, have finally reached a partial objective – exemption from paragraph 404 (b). The long awaited salvatory solution came in July 2010 via the Dodd - Frank Actⁱ, which was passed as a response to the late 2000s recession. The new legislation provides that companies with a public float below \$75 million (the so-called "non-accelerated filers") will be exempt from complying with the attestation requirements of Section 404(b) of the Sarbanes-Oxley legislation. Section 989G of Dodd-Frankⁱⁱ provides that:

- Subsection (b) of Section 404 shall not apply to non-accelerated filers, and
- The Securities and Exchange Commission (SEC) shall conduct a study to determine how to reduce the burden of applying Section 404(b) to companies with a market capitalization between \$75 million and \$250 million "while maintaining investor protections for such companies". The study is required to be completed no later than nine months following enactment of the bill.

Some issues seem to have been resolved, while others emerged. The Dodd-Frank bill commissions a second study with the Comptroller General of the United States on the impact of the above amendments to Section 404(b). This study is to include an analysis of the following:

- Whether the exempt issuers have fewer or more restatements of published financial statements than issuers which must comply with the attestation requirements of Section 404(b);

- How the cost of capital of issuers exempt from Section 404(b) compares to the cost of capital of issuers that are required to comply with Section 404(b);
- Whether there is any difference in the confidence of investors in the integrity of financial statements of issuers that comply with Section 404(b) and issuers that exempt from such compliance;
- Whether issuers that do not receive an attestation of ICFR should be required to disclose the lack of such attestation to investors; and
- The costs and benefits to issuers that are exempt from Section 404(b) that voluntarily have obtained an attestation from their external auditor.

This study is required to be completed no later than three years following enactment of the bill.

While the recent development exempts smaller companies from the audit of internal control, it doesn't relax any of the requirements for companies to establish and maintain an effective control environment or to report on the effectiveness of controls. That's because the Dodd-Frank bill does not exempt smaller companies from Section 404(a), which is the requirement for management to produce its own report on the effectiveness of controls to mitigate errors in financial statements. It means some newfound flexibility for the management of these companies but they still have to understand the design of internal control and assess the effectiveness. Companies may not have to produce as much documentation or perform as much testing to produce management's assertion as they might have had to produce for the sake of the audit. The exemption provides a further benefit to smaller companies: certainty. They no longer will face the uncertainty of a pending requirement that kept moving further into the future as regulators and larger companies worked through the implementation issues.

3. COMPANY DISCLOSURES OF MATERIAL WEAKNESSES IN INTERNAL CONTROL OVER FINANCIAL REPORTING – A QUALITATIVE APPROACH

A qualitative method of research investigates the *why* and *how* of decision making, not just *what*, *where*, *when*. In this chapter, I attempt to draw an image of how companies identify their own weaknesses, how they disclose them, and more importantly, how they deal with them.

Using Compliance Weekⁱⁱⁱ as a tool and search engine for company filings, I investigate how Section 404 was perceived and what sort of immediate effects it generated during the first few months it was in force.

Compliance Week searches through the SEC Edgar database and provides excerpts from company filings. The 10-K is a document filed with the SEC which contains a

detailed explanation of a business. It is reported annually and contains the same financial statements the annual report does, in a more detailed form. The benefit of the 10K is that it presents additional information such as the amount of stock options awarded to executives at the company, as well as a more in-depth discussion of the nature of the business and marketplace. The 10-Q is similar to the 10K, but is filed quarterly (four times a year - normally the end of January, June, September, and December). If the company is planning on changing its dividend policy or something equally as important (such as internal control weaknesses) they may bury it in the 10Q.

The list accessed through Compliance Week only includes disclosures from "Russell 3000® Index," which is comprised of the 3,000 largest and most liquid stocks, representing approximately 98 % of the U.S. market. Compliance Week used to track disclosures made by a wider universe of smaller companies; however, they began limiting their coverage at the request of subscribers, most of whom are executives at larger companies seeking comparables with their peers.

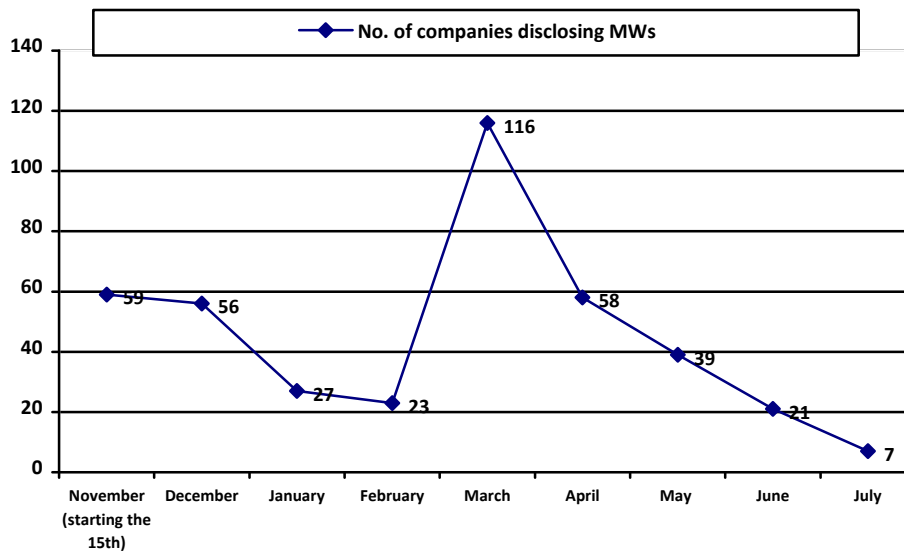
The following are the company compliance dates with Section 404 from final SEC requirements:

Table 1. Compliance dates for Section 404 of the Sarbanes Oxley Act

Filer status	SEC release no.	404(a) – Management’s Assessment	404(b) – Auditor Attestation
US issuer - Large ^{iv} accelerated filer	No. 33-8392 (February 24, 2004)	Fiscal year ending on or after November 15, 2004	Fiscal year ending on or after November 15, 2004
US issuer - Accelerated filer ^v	No. 33-8392 (February 24, 2004)	Fiscal year ending on or after November 15, 2004	Fiscal year ending on or after November 15, 2004
Foreign private issuer - Large accelerated filer	No. 33-8730 (August 9, 2006)	Fiscal year ending on or after July 15, 2006	Fiscal year ending on or after November 15, 2006
Foreign private issuer - Accelerated filer	No. 33-8730 (August 9, 2006)	Fiscal year ending on or after July 15, 2006	Fiscal year ending on or after November 15, 2006

The 404 Section database provided by Compliance Week is limited to the interval November 2004 –July 2005. These first few months are the most likely to show how the market reacted to material weakness disclosures. The following chart shows how weakness disclosures have evolved starting with November 15th 2004 to July 2005.

Figure 1. Number of companies disclosing Material Weaknesses in the first months of compliance



Section 404 of The Sarbanes-Oxley Act of 2002 obliges companies to only report material weaknesses in internal controls over financial reporting, not significant deficiencies. However, there's a catch, and it can be found in the standard used by accounting firms to audit a company's internal control over financial reporting, as promulgated by the Public Company Accounting Oversight Board. Among the examples that Auditing Standard No. 2 (later replaced by AS No. 5) cites as "a strong indicator" that a material weakness exists are "significant deficiencies that have been communicated to management and the audit committee [that] remain uncorrected after some reasonable period of time." This is why significant deficiencies are also included in this comparative study. Another reason is that their remediation is an indicator of a powerful internal control system, whereas failure to remediate may result in a material weakness.

The number of companies disclosing material weaknesses or significant deficiencies in internal controls jumped significantly during the month of November 2004. 119 companies disclosed such deficiencies or weaknesses in November, nearly the double number of October. In November 2003, only 11 companies made similar disclosures. The increase was largely due to the volume of companies filing quarterly reports, which—for many companies—are their final 10-Qs before Sarbanes-Oxley Section 404 assessments are due as part of their next 10-K.

116 companies disclosed material weaknesses in their internal control over financial reporting in March 2005. The number of weakness disclosures was up significantly

from the 23 that were made in February 2005; however, the increase was largely due to the high volume of companies filing their annual reports in March. In fact, while some of the weakness disclosures were made on Form 8-K, most were made in 10-Ks; approximately 5% of the 1,852 10-Ks reviewed by Compliance Week in March included a weakness disclosure.

I have chosen March 2005 disclosures for this study, mainly because it is the first large output of annual reports after implementation of Section 404. For year-over-year comparison, only 28 companies made similar disclosures in March 2004.

In numerous ways, the disclosures made during the month of March were unique from those made in prior months. For example, of the nearly 750 internal control problems disclosed in 2004, approximately 50% were related to financial systems and procedures. Those problems typically involved the financial close process, account reconciliation, or inventory processes. But during March 2005, that number jumped to 70 % of disclosures.

In addition, in 2004 a very small percentage of the disclosures noted problems with tax issues—approximately 3 %. But in March 2005, over 22% of the disclosures mentioned problems with tax accounting. In some instances, the problems were personnel related. That was the case with \$1 billion MEMC Electronic Materials, which disclosed a weakness related to the company "not employing resources with adequate expertise in matters related to the accounting for income taxes." At most companies, the tax problems were tied to financial systems and procedures. McAfee, for example, disclosed a weakness related to "unreconciled differences in our tax reserve accounts", and AES Corp. noted a "lack of appropriate controls related to income tax accounting."

Accounting for leases and loans was also a commonly cited weakness in the "financial systems and procedures" category; the pair accounted for approximately 14 % of those disclosures. Usually, the problems were related to lease accounting practices or errors, loan loss allowances, or depreciation assumptions.

In many cases, the weakness disclosures were not a surprise, as the companies had already set the stage for such announcements.

McAfee, for example, had warned in an 8-K back in February that—based on evaluation and testing at that point—the company "may have one or more internal control deficiencies" when it files its 10-K. One month later, the company indeed noted in its 10-K that three material weaknesses had been identified. Talk America Holdings also disclosed in February that it had identified some problems, and that "The ultimate resolution of these items may indicate material weaknesses in our internal controls." The company disclosed a weakness March 1.

Tobacco dealer DIMON Inc. also warned back in August 2004 that its auditor had found problems, although the company noted at that time that "none of the deficiencies is believed to be a material weakness." On March 1, the company acknowledged that it had identified a material weakness "relating to the failure to properly monitor the restricted payment covenant in the indentures governing its senior notes and certain defects that occurred as a result." Others, like \$480.5 million chemical manufacturer Octel Corp., had recently announced they would delay financial statements, implying that weaknesses might be disclosed. On the case of Octel, the delay was due to an investigation of a certain transaction from earlier this year. \$239.3 million magnetic disk storage company Dot Hill Systems also announced in February that - due to a data entry error resulting from weak internal controls - the company planned to restate its quarterly financial statements for the first three quarters of 2004. The same was the case at \$255.2 million Hypercom, which had also recently announced a restatement.

Other had already announced significant problems, and in some cases investigations or probes. That was the case at Goodyear, which had been disclosing problems for over a year. Back in October 2003, the company had announced that it would restate its previously issued financial results for the years ended 1998 through 2002, and for the first and second quarters of 2003. The SEC commenced an informal inquiry that was upgraded to a formal order of investigation on Feb. 5, 2004, and shortly thereafter the company disclosed new accounting problems and financial statement delays. In July of 2004, the company acknowledged that "we have not yet completed the implementation of our plan to improve our internal controls and may be unable to remedy certain internal control weaknesses identified by our external auditors and take other actions in time to meet the March 1, 2005 deadline for complying with Section 404 of the Sarbanes-Oxley Act of 2002..."

\$1.7 billion biopharmaceutical company Chiron Corp. announced in October 2004 that it had received a grand jury subpoena from the U.S. Attorney's Office for the Southern District of New York, requesting documents related to flu vaccine supplies. The SEC upgraded a probe of the company to "formal" in February 2005, and Chiron disclosed a related weakness on March 10. The same was the case at Sonus Networks, which - over 2004 - had delayed financials and had been the subject of an SEC probe over revenue recognition problems; in fact, the company was the subject of a class action lawsuit that alleged - among other items - that Sonus "lacked adequate internal controls and were therefore unable to ascertain [the company's] true financial condition."

Other companies, however, didn't appear to set the stage as well for investors. Back in July 2004, International Steel filed a quarterly report that noted its internal controls were being improved. "[W]e continued to implement changes to improve our internal controls over financial reporting," said the company, listing changes being made to accounting systems, audit department headcount, analytical review procedures, and

more. "Management intends to continue to review, revise and improve our internal controls over financial reporting until the material weaknesses are eliminated." However, on March 10 the company filed an amended 10-Q saying that several significant deficiencies constituted a material weakness, including problems with "documentation, consistency, review and information systems, among other issues." The company noted in the report that, "while our chief executive officer and chief financial officer concluded that our disclosure controls and procedures were effective as of the Evaluation Date [the three months ended June 30, 2004], the rapid growth we have experienced since we were established in February 2002 has placed a significant strain on our internal controls over financial reporting." That being said, International Steel wrote that "[O]ur disclosure controls and procedures have included extraordinary steps and measures to provide reasonable assurance that, notwithstanding these material weaknesses, the information required to be disclosed in our Exchange Act filings was recorded, processed, summarized and reported within the time period specified in SEC rules and forms, and was accumulated and communicated to our management, including our chief executive officer and our chief financial officer, as appropriate to allow timely decisions regarding required disclosure."

\$8.9 billion Calpine had disclosed certain deficiencies back in August, and the company noted that it had "completed the process of correcting these design deficiencies" by taking numerous steps, like replacing manual procedures, improving segregation of duties, restricting system access, and more. But on March 1, the company reported that—as the result of a third quarter error—the company may conclude that, "with respect to the recording of taxes within discontinued operations, its controls environment as of Dec. 31, 2004 was ineffective, and the company's external auditors may issue an adverse opinion on the company's controls environment as of Dec. 31, 2004 because of this issue."

Captaris also went out of its way, in an August 10-Q, to note that the company "has made and will continue to make, improvements to its policies, procedures, systems and staff who have significant roles in internal control to address the internal control deficiencies" that had been identified by the company's auditor. According to Captaris, key improvements included the hiring of a CFO and controller, enhancements to control processes, new enterprise reporting systems at certain subsidiaries, and a worldwide accounting system. Nevertheless, the company disclosed several weaknesses on March 4.

These are the trends worth noting in March 2005 analysis:

- *Monitoring:* For the first time, companies began disclosing weaknesses related to the monitoring of internal control over financial reporting.

For example, Riggs National, which owns Riggs Bank in Washington, D.C., disclosed a number of weaknesses, one of which stated that the company's internal audit program "was not sufficient to provide management a basis to assess the quality of the

Company's internal control performance over time". As a result, Riggs' management noted that the monitoring component of their internal control over financial reporting was not effective. Internal control monitoring involves assessing the design and operation of internal control on a timely basis and taking necessary corrective actions, the company noted.

The same was the case at USI Holdings Corp., which disclosed "a lack of operating effectiveness of detection and monitoring controls over the year-end close process." The Rowan Companies also noted a "lack of effective detective and monitoring controls within internal control over financial reporting."

- *Third Party Causes Weakness:* Also for the first time, Compliance Week found that a company disclosed that it had a weakness related to a third party. \$328.7 million Iomega disclosed on March 29 that the company had a weakness related to controls maintained by their "third-party distribution/logistics service provider," and Iomega's "lack of adequate or comprehensive compensating internal controls." Iomega noted that it is reliant upon this service provider for worldwide inventory management, product pack-out, order fulfillment, final product assembly on certain product lines, and order management in Europe.

Companies that outsource critical business functions—like payroll—cannot claim to have relinquished the responsibility for internal control over those controls. "As far as Section 404 is concerned," wrote Deloitte and Touche internal control steering committee chairman Stephen Wagner in a 2004 Compliance Week guest column, "an outsourced business process is no different from one handled internally—if it impacts your financials, you are responsible for ensuring that the controls are effective." (Compliance Week Coverage. 2005b).

- *Two Problems, Two Periods:* Interestingly, for the first time, a company made two unique disclosures during the same month, but for different time periods. \$188 million Southwest Water Co. disclosed in its March 31 10-K that the company had identified a weakness related to accounting errors "caused by lack of an effective review, by appropriate accounting personnel," of certain non-routine transactions. The presence of the weakness forced the company to state that its internal control over financial reporting was not effective as of its fiscal year end.

But five days prior, the company had also disclosed on Form 8-K that it had identified deficiencies in "certain aspects of the monitoring and analysis components of the internal control procedures in our Services Group segment." The deficiencies did not require a misstatement and are being remediated, but the disclosure—made on Form 8-K for the "current" period—got Southwest Water in the March list twice.

- *International, M&A:* International issues continue to be the source of problems for many companies.

\$250.7 million American Physicians Capital, for example, noted problems with "underwriting and claims processes performed at its New Mexico location."

\$2.4 billion relocation specialist SIRVA noted that its problems were related to—among other issues—European operating units. For Arthrocare, the problem was related to the consolidation of foreign currency transactions at its European subsidiaries. \$284.6 million Bruker BioSciences announced that it had received "a revised, higher tax assessment from the German tax authorities" after the release of 2004 company financials.

The same was the case with mergers and acquisitions. \$451.4 million Navigant International, for example, disclosed a problem accounting for intangible assets resulting from acquisitions in prior years.

- *Timing: Missed, Extended, And Forward-Looking:* Interestingly, a few companies mentioned internal control problems in the "forward-looking statements" section of press releases. SBA Communications, for example, in a March 11 press release that reported the company's fourth quarter results and updated 2005 guidance, noted that "This press release includes forward looking statements, including statements regarding ... the Company's expectations that management and the Company's independent registered public accountant will conclude that a material weakness existed in its internal control over financial reporting and that such material weakness has been remediated..."

And some companies noted that they did not complete their 404 assessment in time. 99 Cent Only Stores disclosed in an 8-K that, while the company had "substantially completed" its work, the company "did not complete the necessary testing of its internal controls over financial reporting as of December 31, 2004. Therefore, the Company's independent accountants are unable to complete their audit of management's assessment of the internal controls over financial reporting."

Even companies that are using the SEC's 45-day extension period allowed by the SEC disclosed that weaknesses are likely. That was the case at Transmeta Corp., which noted in an 8-K that the company had identified "a number of deficiencies" that constitute a material weakness, either individually or in the aggregate.

- *Control Environment:* As mentioned above, most of the disclosures—70%—were related to problems with financial systems and procedures. The second most commonly cited problems were related to personnel issues. Other problems were with documentation, IT controls, and revenue recognition.

In a few instances—including Octel Corp., Bearingpoint, and 99 Cent Only Stores—the overall control environment was mentioned. Many consider problems with the control environment to be among the most serious types of weaknesses, as they can involve issues like integrity, ethical values, and tone at the top. Bearingpoint, for example, cited "the control environment in certain non-U.S. subsidiaries," and Octel noted "deficiencies in the maintenance of effective controls over compliance with the Company's Code of Ethics."

It was not uncommon for companies to have weaknesses with both financial systems *and* personnel issues. \$88.9 million Autobyte, for example, disclosed material weaknesses related to its reconciliation procedures, as well as "lack of personnel with sufficient skills and experience" to properly prepare account reconciliations.

Other companies had several problems within one single category, like financial systems and procedures. \$1.6 billion consulting firm Bearingpoint, for example, identified several deficiencies related to contract revenue and accounts receivable, expenditures and accounts payable, payroll operations, the financial statement close process, leases and fixed assets, and more.

Exclusions and Inclusions

\$716.8 million Alderwoods Group, for example, noted in an 8-K filed March 15 that it had identified material weakness, and that the company "expects that its independent auditors will issue an adverse opinion with respect to internal controls over financial reporting." On March 29, the company filed another 8-K with similar information; Alderwoods is only counted once in the tabulation of March disclosures.

Similarly Lee Enterprises, which was acquiring Pulitzer Inc. at the time, disclosed in an 8-K that Pulitzer had a material weakness that would result in an adverse opinion from Deloitte and Touche. But, since Pulitzer made the same disclosure on the same day, the Lee Enterprises disclosure would be duplicative and is hence not included in the March list.

The list does, however, include information on material updates to prior disclosures. Impac Mortgage Holdings, for example, had acknowledged in a Feb. 18 8-K that it had identified certain documentation and control deficiencies "that may rise to the level of significant deficiencies or material weaknesses." On March 16, the company acknowledged that it did indeed have a material weakness, and that the company "did not maintain effective internal control over financial reporting as of December 31, 2004, based on the criteria established in COSO..."

Covansys also disclosed a deficiency in August 2004, but upgraded that to a material weakness on March 16. The same was the case at \$131.5 million Financial Institutions Inc., which had disclosed a weakness in December, but provided a material update on March 16. And Gorman-Rupp disclosed a weakness in February, but in March noted the weakness' impact on net income.

Sonosite had disclosed a weakness—and likely adverse opinion—in February. However, the company's 8-K stated the tax accounting problem involved "complex tax rules relating to tax regulations that vary by state." On March 16, the company provided more information on the problem, noting that "we did not have the appropriate level of expertise to properly calculate and review our accounting for income taxes." The same was the case at several other companies, including Ixys Corp., and others.

In addition, I understand there is much gray area to these categorizations. For example, \$966.2 million manufacturer Grant Prideco disclosed a problem related to "inadequate documentation supporting the Company's revenue recognition procedures in certain of its operating divisions." I have categorized that disclosure as a "documentation" problem; however, others might have filed the problem under "revenue recognition."

4. PROXY AND HYPOTHESIS 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 Verrecchia (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.

I hypothesize 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. My 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.

H1 The adverse selection cost is a significant component of the bid-ask spread of market makers

H2 The bid-ask spread should narrow after the implementation of SOX 404.

5. THE BOLLEN - SMITH - WHALEY MODEL

Following Sidhu *et al.* (2008), I separate the cost components of the bid-ask spread for a sample of compliant firms in the period surrounding the implementation of SOX 404. My study differs significantly; not only in time span but also in that I attempt to simplify the Bollen, Smith and Whaley (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 – incorporates the number of dealers ND making a market in a particular stock, as well as their respective trading volumes V_i .

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.

$$SPRDi = \alpha_0 + \alpha_1 InvTV_i + \alpha_2 MHI_i + \alpha_3 IHP_i + \epsilon_i,$$

where $SPRDi$ is the bid-ask spread of stock i , $InvTV_i$ is the inverse of trading volume, MHI_i is the modified Herfindahl Index, and IHP_i is the inventory holding premium. In this model, the specific components of the bid-ask spread are: α_0 , the minimum tick size; $\alpha_1 InvTV_i$, order-processing costs; $\alpha_2 MHI_i$, competition; and $\alpha_3 IHP_i$, the sum of the inventory holding and informational asymmetry components of the spread.

The first term on the right-hand side of equation, α_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 (e.g., 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 (MHI_i).

The fourth term on the right-hand side of 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. IHP_i 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:

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

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 p_I ($1 - p_I$) is the probability of an informed (uninformed) trade.

The coefficient α_1 is expected to be positive because it represents the market maker's total order-processing costs. The coefficient α_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 α_3 should also be positive. The higher the expected inventory-holding premium, the greater the bid-ask spread. This would prove H1 true.

6. SAMPLE AND METHOD

Using Compliance Week as a tool and search engine for company 10K and 10 Q filings, I retrieve the names, ticker symbols and disclosure excerpts of the companies that disclosed material weaknesses. Next, I search The Center for Research in Security Prices (CRSP) Daily Stock file^{vi} 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, I also include the previous and following months.

I retrieve price and intra-day transaction information for a three month period from February 2005 to April 2005 for each of these companies and compute the cost components of the bid/ask spread (Inverse of Trading Volume, the Modified Herfindahl Index and the Inventory Holding Premium), which I have 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. I build a dated panel 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. I have eliminated the negative sign 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 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.

I compute the Bid/Ask Spread for each stock i as:

$$SPREAD_i = Ask\ or\ High\ Price_i - Bid\ or\ Low\ Price_i \quad (1)$$

The Inverse of Trading Volume is:

$$InvTV_i = 1 / Trading\ Volume_i \quad (2)$$

The Herfindahl Index is:

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

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:

$$MHI_i = \frac{HI_i - 1/NM_i}{1 - 1/NM_i} \quad (4)$$

where *HHi* 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:

$$SPRDi = \alpha_0 + \alpha_1 InvTV_i + \alpha_2 MHI_i + \alpha_3 IHP_i + \epsilon_i \quad (6)$$

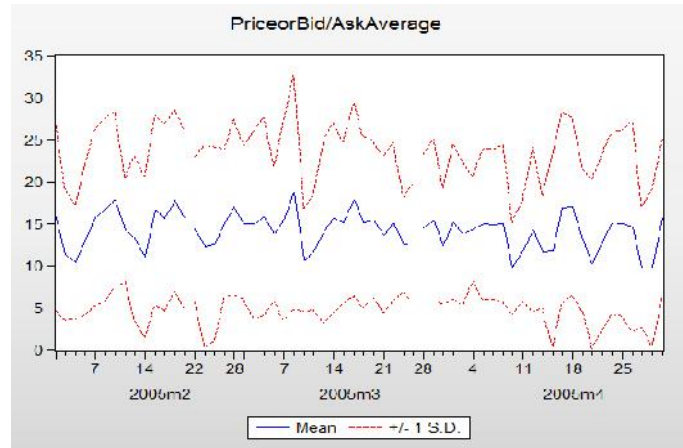
In this model, the specific components of the bid-ask spread are: α_0 , the minimum tick size; $\alpha_1 InvTV_i$, order-processing costs; $\alpha_2 MHI_i$, competition; and $\alpha_3 IHP_i$, the sum of the inventory holding and informational asymmetry components of the spread.

7. STATISTICS AND REGRESSION RESULTS

Figure 2 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 the 10th 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 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 2*. 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 3*.

Figure 2. Mean of Price across 3 months daily observations



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.

Figure 3. Mean of Holding Period Returns across observation period

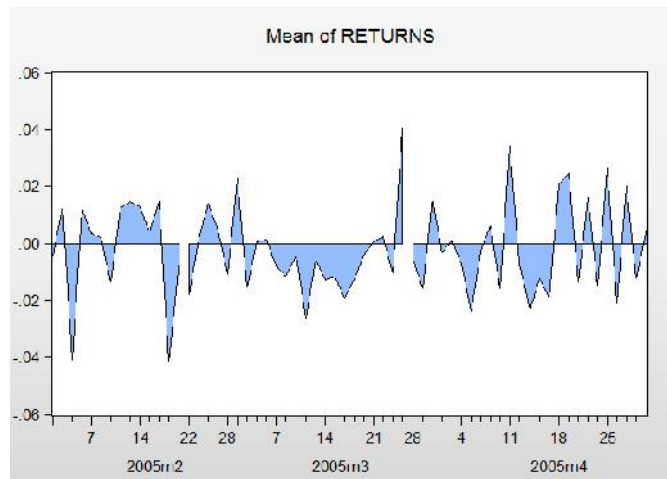


Table 2 includes a summary of the main statistics computed for each data series. The trading volume daily average for a company was quite high, around 900,000 units traded by an average of 38 market makers. I have only included companies which had number of trades, market maker count and trading volume 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.

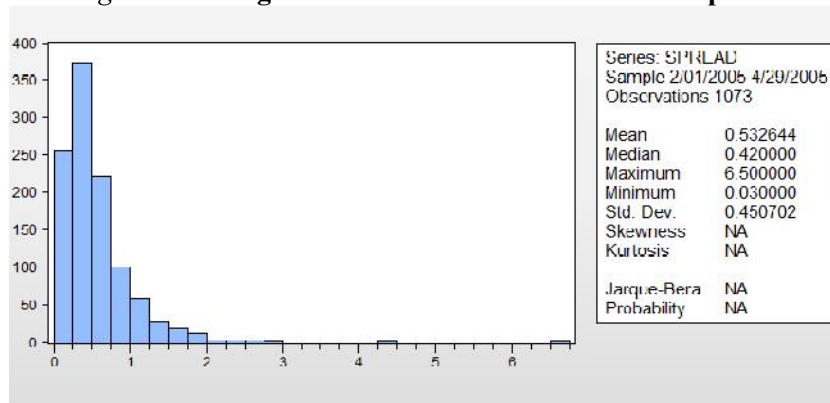
Table 2. Descriptive Statistics

	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	14.5158	14.48892	14.79540	14.26375	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	0.993362	1.23E+08	89.00000	228699.0
Minimum	0.640000	0.630000	0.630000	0.610000	0.630000	-0.264469	27.6000	14.00000	20.00000
Std. Dev.	9.504567	9.495058	9.633784	9.395030	9.501572	0.045177	4403696	15.99917	8292.505
Skewness	0.731987	0.733396	0.722224	0.743770	0.731821	8.480312	23.24814	0.994929	20.08574
Kurtosis	2.908778	2.910745	2.879117	2.936038	2.906689	207.1380	652.8263	3.543677	524.8706
Jarque-Bera	96.19017	96.54525	99.93407	99.11243	96.16550	1875414.	18575829	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.

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 in the histogram below, in Figure 4.

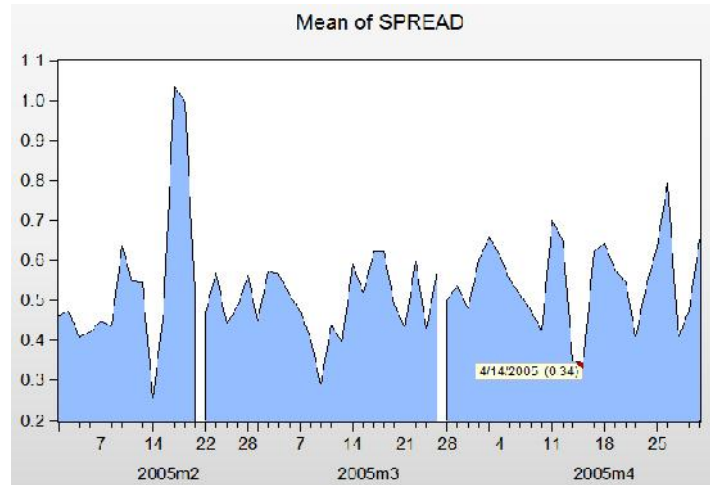
Figure 4. Histogram and Statistics of the Bid/Ask Spread



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 5). 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 (H2).

Figure 5. Mean of the Bid/Ask Spread across 3 months daily observations



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 aren't 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 period fixed effect.

Table 3 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. The R-squared 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.

Table 3. Regression estimates with fixed cross-section effects and fixed cross-section and period effects

Variables	Fixed cross-section effects	Fixed cross-section and period effects	Cross-section weights
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

Notes: t-stat Prob. are in parentheses

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.

DISCUSSION AND 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 H1 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, 2007 and 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).

I conclude 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 H2. However, this study is 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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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

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- ⁱ The Dodd-Frank Wall Street Reform and Consumer Protection Act (Pub.L. 111-203, H.R. 4173) is a federal statute in the United States that was signed into law by President Barack Obama on July 21, 2010. The Act is a product of the financial regulatory reform agenda of the Democratically-controlled 111th United States Congress and the Obama administration. The law was initially proposed on December 2, 2009, in the House by Barney Frank, and in the Senate Banking Committee by Chairman Chris Dodd.
- ⁱⁱ See full-text of the Dodd-Frank Act here: http://frwebgate.access.gpo.gov/cgi-bin/getdoc.cgi?dbname=111_cong_bills&docid=f:h4173enr.txt.pdf.
- ⁱⁱⁱ Compliance Week, published by Haymarket Media, Inc., is an information service on corporate governance, risk and compliance that features a weekly electronic newsletter, a monthly print magazine, proprietary databases. I have accessed online the database of Section 404 disclosures during a free trial period at www.complianceweek.com.
- ^{iv} The issuer had an aggregate worldwide market value of the voting and non-voting common equity held by its non-affiliates of \$700 million or more, as of the last business day of the issuer's most recently completed second fiscal quarter.
- ^v The issuer had an aggregate worldwide market value of the voting and non-voting common equity held by its non-affiliates of \$75 million or more, but less than \$700 million, as of the last business day of the issuer's most recently completed second fiscal quarter.
- ^{vi} Access kindly granted by Amsterdam Business School during a research mobility program.