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3-31-2009

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THE VALUATION DAMAGE FROM FINANCIAL SYSTEMS WEAKNESSES: A STUDY OF SOX SECTION 404 DISCLOSURES

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Abstract

IT systems and effective internal controls are essential to reliable financial reporting and good corporate governance. For this reason, Section 404 of the Sarbanes-Oxley Act of 2002 (SOX) identified IT and financial systems as a key source of financial reporting risk. Disclosures made in 68 10K filings from 46 companies in 2005-2007 reported that internal controls over financial reporting were ineffective due to shortcomings in IT systems. Although evidence on the financial payoffs from IT is mixed, material weaknesses in financial controls due to IT clearly have negative shareholder value consequences. For these firms, an average abnormal return of –1.6% was found over a 2-day (0,+1) window around the reporting date. Moreover, 23 of the companies failed to remediate their control problems, and suffered an average –2.1% abnormal return in the 2-day window around their next (2006) 10K filing date. Longer term returns on portfolios of these non-compliant companies also reflect underperformance. The shareholder returns evidence shows that IT management requirements for SOX compliance contribute to good corporate governance and shareholder value.

1 Introduction

Quantifying the economic value that information systems (IS) contribute to business organizations is a growing research concern. There is evidence of productivity enhancements and shareholder value increases from some IT investments (Brynjolfsson and Yang, 1996; Dehning, Richardson, and Zmud, 2003; Kohli and Devaraj, 2003). However other studies have shown the contribution of IT to business performance and shareholder returns remains uncertain (Melville et al., 2004). This paper quantifies in an event study how weaknesses in information systems management reduce market

valuations for publicly traded companies disclosing inadequacies in their annual regulatory filings.

In companies today, computerized systems are relied on to provide financial reports and support the information needs of managers and boards of directors. A number of corporate governance breakdowns have occurred when managers, directors, and shareholders lacked access to critical information, or when information was unreliable or fraudulent.[1] To address the integrity of public companies' controls and financial reporting, the Sarbanes-Oxley Act (SOX) was signed into law on July 30, 2002.[2]

Within the 66-page SOX Act are the two paragraphs of Section 404. The paragraphs are titled "Effectiveness of the design and operation of disclosure controls and procedures." Section 404 of SOX requires company management to assess and report on the effectiveness of the company's internal control. It also requires a company's independent auditor, registered with the Public Company Accounting Oversight Board (PCAOB), to evaluate managements' disclosures regarding the effectiveness of its internal control. In a Section 404 disclosure, management attests to the effectiveness of their company's internal controls, and the auditor (e.g., Deloitte & Touche LLP) provides an opinion on

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[1] Corporate scandals involving misleading financial reporting took place at Enron, Adelphia, WorldCom, and Tyco International and resulted in enormous losses to shareholders and reduced investor confidence in public company accounting. At WorldCom, $11 billion in accounting misstatements were identified. During legal investigations, executives in the companies claimed to have been unaware of the misreporting and other financial issues.

[2] The SOX corporate governance legislation was written by U.S. Senator Paul Sarbanes and Congressman Michael Oxley and was approved by votes of 423-3 in Congress and 99-0 by the Senate. President G.W. Bush signed it into law, stating it included "the most far-reaching reforms of American business practices since the time of Franklin D. Roosevelt." Among its requirements, CEOs and CFOs must sign an attestation in each annual or quarterly report that declares it fairly represents the company's financial condition, and that they have accepted responsibility for and evaluated internal controls over their financial processes.

whether the management's assessment is "fairly stated".[3] Beginning with firms' fiscal year 2005 10Ks, disclosures were mandatory for companies with market capitalizations of $75 million or more. This initially included 3,900 companies, of which just less than 16 percent reported their internal control over financial reporting was not effective. Companies and their auditors first identified the material weaknesses and outline remediation plans in their 2005 10Ks.

Among the most cited reasons for weaknesses is information technology and financial systems. Fox and Zonneveld (2002) write "For most organizations, the role of IT is crucial to achieving SOX objectives. Whether through a unified ERP system or a disparate collection of operational and financial management software applications, IT is the foundation of an effective system of internal control over financial reporting." The vast majority of firms were in compliance with SOX and did not have any material weaknesses in their accounting or IT procedures or controls.

This paper will examine the shareholder value impacts in those firms that failed their SOX compliance obligations and disclosed IT deficiencies as the reason for ineffective internal control over financial reporting. A total of 52 companies disclosed in their 2005 10Ks that their internal controls over financial reporting were ineffective due to material weaknessed in the companies' computer systems.[4] For these firms, we find average abnormal returns of –1.6% over a 2-day (0,+1) window around the 2005 10K filing date, and for those that fail to remediate the next year –2.1% abnormal returns over the (0,+1) window around their 2006 10K filing date. Longer-period shareholder returns for these firms, while more difficult to attribute to the material weakness disclosures, indicate significant underperformance relative to the overall U.S. equity market.

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[3] Unaudited section 302 disclosures were required in firms' 10Q filings from November 15, 2004. These disclosures proven unreliable, and are not studied here. In only 75 cases out of 586 inffective Section 404 disclosures did the prior 10Q report ineffective control. See Lord & Benoit LLC, "Bridging the Sarbanes-Oxley Disclosure Control Gap" (www.Section404.org).

[4] Compliance Week, 2006

The next section will describe the requirements for effective internal control that have been laid out by a number of accounting, IT, and auditing organizations. The specific IT requirements will also be detailed in Section 2. The data set and event study research method are described in Section 3. Section 4 examines the shareholder returns performance of the firms with IT control deficiencies. Section 5 provides conclusions and ideas for further research.

2 Internal control and IT

Internal control is the process carried out in a company, and overseen by a board of directors, to provide reasonable assurance of the reliability of financial reporting, the effectiveness of financial operations, and compliance with applicable laws and regulations. Lee (2006) points out that internal controls are intended to "minimize the negative effects of human frailty." The Public Company Accounting Oversight Board (PCAOB) in its Auditing Standard No. 2 defines a material internal control weakness as *"… more than a remote likelihood that a material misstatement of the annual or interim financial statements will not be prevented or detected on a timely basis by employees in the normal course of their assigned functions."* Effective internal controls mean that misstatements will be detected by the client and the firm's financial data can relied upon by the auditor. Weaknesses in a firm's internal control procedures on the other hand mean that material misstatements in directors' and shareholders' financial reports may not be detected by the firm's auditor.

With little prescriptive detail in Section 404, a number of accounting and compliance organizations developed useful frameworks and roadmaps for 404 compliance. These frameworks offer guidance for how internal controls should be designed and managed. The three most prominent control frameworks are COSO, which focuses on controls for financial processes, and COBIT and ITIL, which focus on IT and IT controls. The Committee of Sponsoring Organizations of the Treadway Commission (COSO), was originally formed in 1985 to help prevent fraudulent financial reporting and make recommendations for public companies, independent auditors, the SEC and other

regulators, and educational institutions and training organizations for auditors. Control Objectives for Information and related Technology (COBIT) is a control framework built on the COSO framework and published by the IT Governance Institute and the Information Systems Audit and Control Association (ISACA). The IT Governance Institute published "IT Control Objectives for Sarbanes-Oxley" in 2002 to address controls issues directly related to internal control over financial reporting. IT Infrastructure Library (ITIL) was published by the U.K. Office of Government Commerce, and concerns controls for IT services.

2.1 IT Compliance in SOX

COSO distinguishes between general controls and application controls. General controls cover IT areas as the data center and network operations, systems software acquisition and maintenance, access security, and application system acquisition, development and maintenance. Application controls apply to individual accounting systems, such as payroll or accounts payable, and insure that transactions occurred, are authorized, and are completely and accurately recorded, processed, and reported.

Below are two examples of SOX disclosures of material weaknesses in internal controls. The first illustrates a general control weakness:

2005 10K filed: September 13, 2005 - "Based on this assessment, management determined that a material weakness existed in the Company's internal controls over certain Information Technology General Controls as of June 30, 2005. Specifically, the Company did not have (i) monitoring of information technology managers who have access to the application and underlying data, (ii) mechanisms to track changes made to the application itself, and (iii) adequate security administration of users' access to the application. These control deficiencies did not result in any known financial statement misstatements. However, the aggregation of these control deficiencies represents a material weakness …" - Quixote Corp. (2005 sales $146 million)

The second example below illustrates an application controls weakness:

2006 10K filed: March 15, 2007 - "*Information Technology* - The Company did not adequately implement certain controls over information technology, including certain spreadsheets, used in its core business and financial reporting. These areas included logical access security controls to financial applications, segregation of duties and backup and recovery procedures. The Company's controls over the completeness, accuracy, validity, restricted access, and the review of certain spreadsheets used in the period-end financial statement preparation and reporting process was not designed appropriately. This material weakness affects the Company's ability to prevent improper access and changes to its accounting records." - CanArgo Energy Corp. (YE2006 Market Cap $384 million)

Weakness	Companies Reporting	Percentage of Companies
1. Personnel	166	41.5%
2. Taxes	132	33.0%
3. Financial Procedures	106	26.5%
4. Documentation	67	16.8%
5. Revenue Recognition	58	14.5%
6. IT, Financial Systems	**52**	**13.0%**
7. Hedge Accounting	28	7.0%
8. Cash Flows	27	6.8%
9. Tone at Top	20	5.0%
10. Lease Accounting	18	4.5%
11. Vendor Contracts	14	3.5%
Total weaknesses	688	

Figure 1: Cited reasons for material weakness in financial control and reporting, as tracked in Compliance Week

Companies may disclose more than one type of weakness contributing to its deficiencies in internal control over financial reporting. Figure 1 is based on data from 399 firms that disclosed 688 deficiencies in their 2005 10Ks. (CW, 2006)

Other weaknesses	Companies reporting	Percentage companies
Personnel: Inadequate Training, Staffing	30	63.8%
Other Accounting (M&A, etc.)	30	63.8%
Financial Procedures	21	44.7%
Revenue Recognition	13	27.7%
Documentation	11	23.4%
Taxes (Income, Payroll)	7	14.9%
Control Environment Or "Tone At The Top"	4	8.5%
Hedges, Derivatives (FAS133)	3	6.4%
Lease Accounting	2	4.3%
Vendor Contracts, SAS 70 Issues	2	4.3%
Cash Flows	1	2.1%
Total weaknesses	124	

Figure 2: Data were available for 46 of the 52 companies reporting "IT, Financial Systems" weaknesses. These 46 companies reported an average of 2.6 other deficiencies with Personnel and Accounting being most prevalent other weakness with IT and financial systems

3 Research Methodology

3.1 Theoretical Background for Event Studies

Adverse opinions on SOX Section 404 disclosures, similar to major earnings surprises, profit warnings, or income restatements can be a reflection of a poorly informed and ineffective boards. However, can these reporting and control weaknesses due to inadequate information management be linked to adverse consequences for shareholders?

Based on the event study method and returns comparisons, the answer is yes. The three figures below highlight the conclusions for the analyses.

Adverse opinions on SOX Section 404 disclosures, similar to major earnings surprises, profit warnings, or income restatements probably reflect poorly informed and ineffective boards. *However, can these reporting and control weaknesses due to inadequate information management be linked to adverse consequences for shareholders?*

Based on the event study method and returns comparisons, the answer is yes. Shareholder returns of 47 companies reporting material weaknesses in their controls over financial reporting due to IT and financial systems reveals the (0,+1) abnormal returns around the FY 2005 10K filing date relative to the CRSP equally weighted index for these was –1.46%. The average firm in the sample saw its market value drop by $6.2 million, For the 23 companies that fail to remediate their material weaknesses in their controls within the next year, the (0,+1) abnormal returns around the FY 2006 10K filing date relative to the CRSP equally weighted index for these was –2.16%. This is a $9.1 million fall in market cap for the average firm in the sample.

The efficient markets hypothesis (EMH; Fama, 1970; Fama, 1991) provides the foundation for the event study method. When the EMH holds, share prices reflect all current information that has a bearing on the value of a stock. Trading on the basis of existing information would not generate any excess returns relative to investing broadly in the entire market. If all information is fully reflected in a firm's share price, then only new and unanticipated information will cause the returns on a company's shares to diverge from the market's returns. Therefore, the stock price of a company will move up relative to the market when the news is perceived to be favorable, i.e. if the reported events are likely to benefit the company and raise its earnings generating potential. Returns will be less than the market when the new information is unfavorable. An event study therefore determines whether a set of news releases generates systematic positive or negative abnormal returns in the company stock. When abnormal returns are observed, the event is interpreted as having an impact on shareholders and on the company's prospects.

Standard methods used in previous event studies in the field of IT are applied here (Dos Santos et al., 1993, Im et al. 2001). Stock price reaction to 10K filings in our sample are computed as unexpected or abnormal returns (AR) based on the widely used market model (Brown and Warner, 1985). AR_{it}, for company i on day t, is the non-systematic consequence of its 10K filing and SOX disclosure. It is the difference between the actual return R_{it} and the expected return based on the market model:

$$AR_{it} = R_{it} - (\alpha_i - \beta_i R_{mt})$$

R_{mt} is the market return estimated by the CRSP Equally Weighted Index on day t, and α_i and β_i are parameters for company i estimated by regression analysis of daily returns of stock i against daily returns of the stock market. In this study, parameters were estimated using 255 one-day returns starting 260 days before before the 10K filing. The event period returns are computed for 11 days from 5 days before the filing and ending 5 days after. One year is a standard length estimation period, although other studies have used different length estimation periods, and wider and narrower event periods (e.g. 30 days prior to an announcement). There is little evidence that a different estimation period would lead to significantly different results. Since we are considering the effect of an adverse SOX disclosure on an individual company the equal weighted index was more appropriate than the value weighted indexes that put more weight on large cap stocks.

A number of event windows were considered including the 1-day (0,0) window and an 11-day (−5,+5) window. The most consistently significantly results were found for the 2-day (0,+1) window. This may reflect some filings being made late in the day, and the price reaction occurring the day after the event date. The Dow Jones Factiva database was used to determine the timing of the 10K filings. If a filing is made before trading in U.S. equities markets ends at 4:00 pm, the event date (0) is the filing date. The next trading day is considered the event date for filings after 4:00 pm. For example, one firm in the sample, Design Within Reach Inc., filed its 2005 10K on Friday April 14, 2006 at 3:48 PM. Its 2006 10K was filed Tuesday May 08, 2007 at 4:26 PM. The event dates used in the analysis were April 14, 2006 and May 9, 2007.

3.2 Data sample and description

The companies in the data sample come from a listing of 52 firms with material weaknesses in their 2005 10Ks. The average sample firm generated $374 million in revenue in 2005 and had a market capitalization of $427 million.

		FY2005		FY2006	
Revenue (millions)		Average	Median	Average	Median
	All	$373.8	$152.3	$438.6	$165.7
	Unremediated	$278.9	$158.2	$295.7	$161.1
	Remediated	$477.8	$133.4	$595.1	$185.1
Market Value (millions)-Year End 2005					
	All	$427.0	$191.8		
	Unremediated	$419.5	$187.7		
	Remediated	$433.9	$195.5		

Figure 3: Summary descriptive data from 47 companies reporting IT, Financial Systems weaknesses.

Of the 47 sample firms with IT material weaknesses in their 2005 10Ks, 44 filed a 2006 10K. Of the other three, one was acquired, one was restructured, and one was taken private. A total of 21 companies remediated their material weakness and reported effective control over financial reporting. The other 23 companies continued to disclose material weaknesses and reported ineffective control over financial reporting.

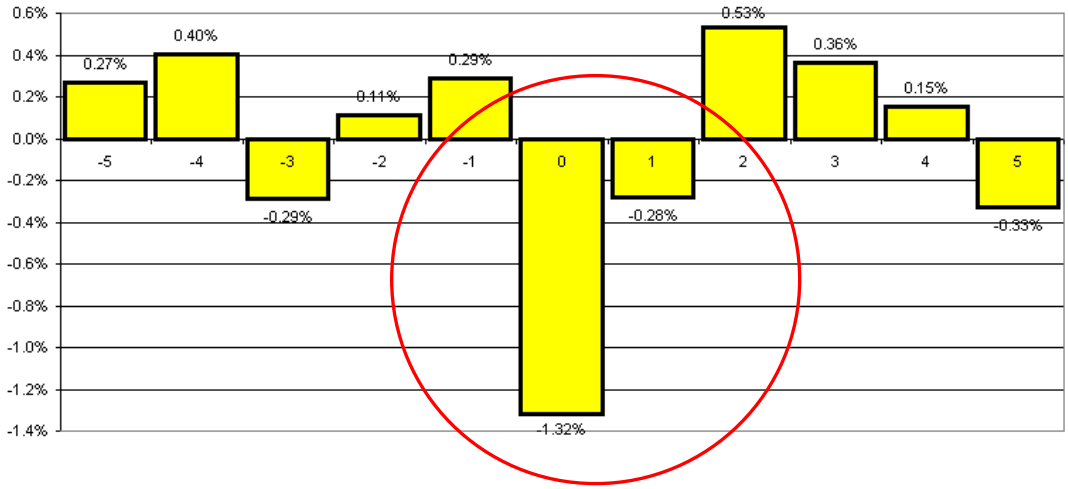

Figure 4: Abnormal returns around the FY 2005 10K filing date for 47 firms reporting ineffective control over financial reporting due to IT and financial systems problems.

Only the Day 0 return (p-value = 0.3%) is significantly different from zero with significance level 0.05. The 2-day (0,+1) return of −1.60% has a p-value of 0.4%, indicating it is significantly negative and would be unlikely to have occurred by chance.

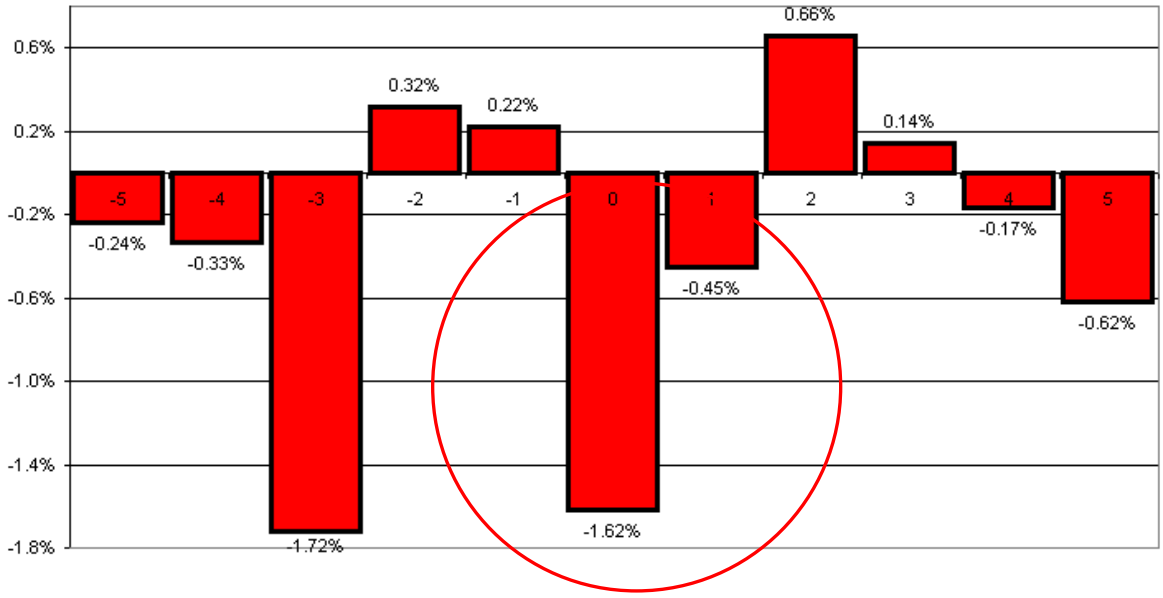

Figure 5: Abnormal returns around the FY 2006 10K filing date for 23 firms that have not remediated their problems and again report ineffective control over financial reporting due to IT and financial systems problems.

The 2-day (0,+1) return of −2.07% has a p-value of 1.8%, indicating it is highly unlikely to have occurred by chance.

3.3 Longer-term returns

Also striking is that the portfolio of these 47 firms held for two years from January 1, 2005 to December 31, 2007 underperformed the market by 50.4%. From the recent FY 2006 10K filings of the sample firms, 21 of 44 firms remediated their material weaknesses, and reported effective control over financial reporting as of the end of FY2006. Splitting the sample into the firms that mediated (fixed) and did not fix the problems generated the result that remediating firms do not fall as far behind the market index. An equally weighted portfolio of the 23 nonremediating firms underperformed the market by −63%, while remediating firms underperform by −38%.

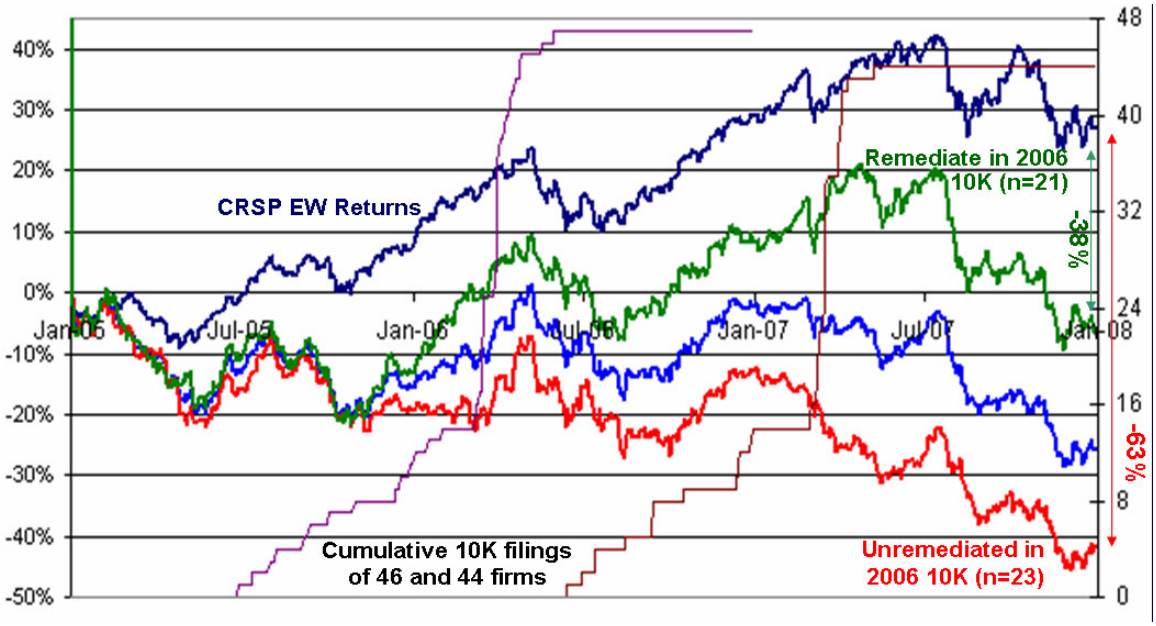

Figure 6: Cumulative returns of CRSP equal weighted index (above), the portfolio of the 47 in-sample firms, and the two sub-samples of firms. The cumulative number of 2005 10K and 2006 10K filings are shown on the right axis.

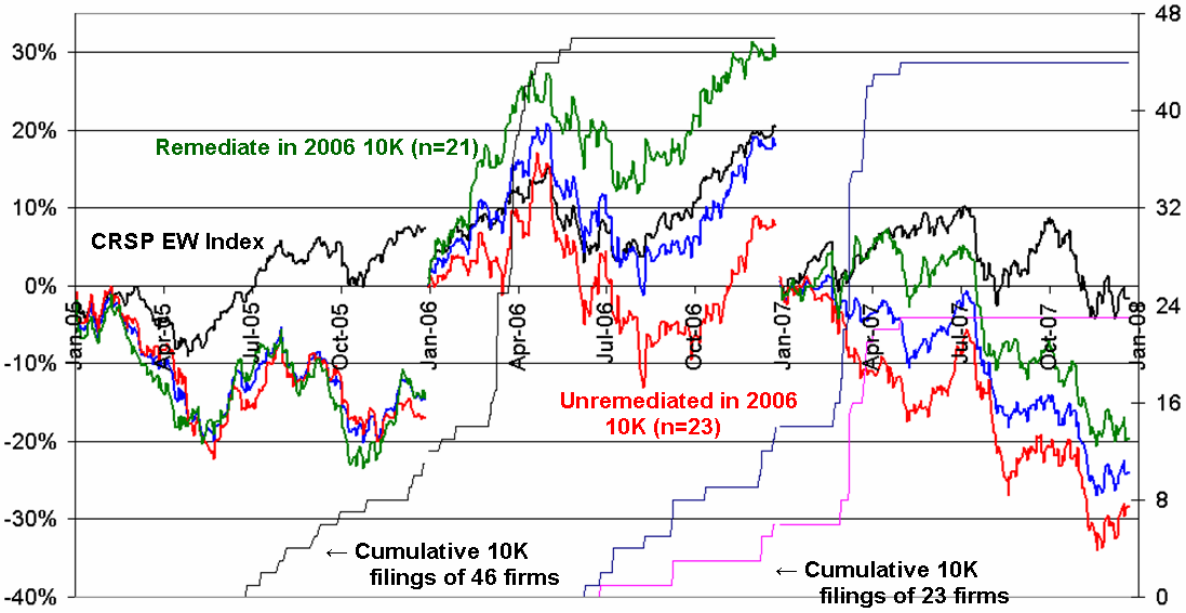

Figure 7: Returns 2004-2007 for firms reporting ineffective control over financial reporting due to IT and financial systems problems in their 2005 10K. In subsequent FY 2006 10K filings, 23 firms continued to report ineffective control (Red), 21 reported they had remediated their control problems (Green). The full sample is blue

The evidence shows that remediation helps shareholder return performance. On average the firms reporting they had corrected the material weakness by the end of FY 2006 outperformed the market in 2006 by 9.1%. However, the difference from zero is not statistically significant.

	2004	2005	2006	2007
CRSP equal weighted index	24.1%	7.3%	20.4%	-1.5%
All (47)	21.2%	-14.6%	18.1%	-23.8%
Not fixed (23 firms)	23.2%	-17.0%	8.0%	-28.3%
Remediated according to FY2006 10K (21 firms)	20.4%	-14.4%	29.4%	-19.5%
Performance relative to index				
All	-2.9%	**-21.9%****	-2.3%	**-22.3%****
Not fixed (23 firms)	-3.7%	**-24.3%***	-12.3%	**-26.8%***
Remediated according to FY2006 10K (21 firms)	-0.9%	**-21.7%***	9.1%	**-18.0%***

** Difference from zero statistically significant (with p-values less than 1.0%)
* Difference from zero statistically significant (with p-values less than 5.0%)

Figure 8: Performance of companies disclosing ineffective control over financial reporting due to IT and financial systems weaknesses. Two sub-samples are compared to the CRSP equal weighted index

4 Conclusions

Companies dedicate substantial resources to IT, but measuring and understanding the effects on performance remains a research challenge. Without investment in IT infrastructure and financial systems, companies risk having inadequate controls over financial reporting. We find that the lack of a robust control environment is seen as a significant and negative signal by investors. The 2-day abnormal drop in market value was 1.60% for the 47 firms disclosing IT-related material weaknesses in their 2005 and 2006 10Ks. It was 2.07% for the 23 firms that had a second adverse SOX disclosure in their 2006 10Ks. The study quantifies that IT failings can destroy shareholder value. Therefore, management must ensure there are resources are adequate to maintain IT systems that generate reliable financial reports.

Some commentors have pointed to SOX Section 404 as a reason some non-U.S. companies have chosen to delist from U.S. exchanges. The number of foreign companies traded on the NYSE has dropped 9.5% since SOX became law. For instance, the BG Group (U.K.) blamed its decision to leave NYSE on "U.S.-specific obligations [that] carry a cost and administrative complexity." Moody's however comments supportively on the effects of Section 404 (Jonas, 2004):

> *"We believe that reporting on internal control has helped restore confidence in U.S. financial reporting which was badly shaken after massive instances of fraudulent reporting Our discussions with companies suggest that control reporting has promoted investment in the people, policies, processes, and systems necessary to support quality reporting. Further, Moody's has benefited from new information about control problems which has helped us assess the risk of misleading financial reporting, which is one of many elements we consider when assessing credit risk. These benefits have been significant."*

Future research will compare the adverse SOX disclosures for IT problems with all other causes of material weaknesses. Are the negative abnormal returns the result of a real cost of IT investment and remediation, or a downgrading due to the perception of management sloppiness that could lead to ineffective control systems. To address this, will examine whether IT remediation costs were detectable in the financial statement of the 47 sample firms.

5 References

Brown, S.J. and J.B. Warner, "Using Daily Stock Returns: The Case of Event Studies," *Journal of Financial Economics,* 14(1), pp. 3-31, 1985.

Brynjolfsson, Erik and Yang, Shinkyu, "Information Technology and Productivity: A Review of the Literature", Advances in Computers, Academic Press, Vol. 43 pp. 179-214, 1996

Compliance Week, "Analysis of Internal Control Weakness Disclosures", Compliance Week, September 6, 2006.

Dehning, B., V. Richardson, and R. Zmud, "The Value Relevance of Announcements of Transformational Information Technology Investments," MIS Quarterly, Vol. 27, No. 4 (December 2003), pp. 637-656

Dos Santos, B.L., K. Peffers, and D. Mauer, "The Impact of Information Technology Investment Announcements on the Market Value of the Firm," *Information Systems Research,* 4(1), pp. 1-23, 1993.

Eberhart, Allan C., William F. Maxwell, And Akhtar R. Siddique "An Examination of Long-Term Abnormal Stock Returns and Operating Performance Following R&D Increases" The Journal of Finance, Vol. LIX, No. 2, April 2004

Fama, E. F. (1970) "Efficient Capital Markets: A Review of Theory and Empirical Work," The Journal of Finance (25) 2, pp. 383-417.

Fama, E. F. (1991) "Efficient Capital Markets: II," The Journal of Finance (46) 5, pp. 1575-1617.

Fox, Christopher and Paul Zonneveld, “IT Control Objectives for Sarbanes-Oxley: The Role of IT in the Design and Implementation of Internal Control Over Financial Reporting”, IT Governance Institute and Information Systems Audit and Control Association (ISACA), 2002

Hammersley, J., Myers, L., and C. Shakespeare (2006) “Market Reactions to the Disclosure of Internal Control Weaknesses and to the Characteristics of those Weaknesses under Section 302 of the Sarbanes Oxley Act of 2002”, Working Paper, 2006

Jonas, G., Gale, M., Rosenberg, A. and Hedges, L. (2004) "The Third Year of Section 404 Reporting on Internal Control", EFMA 2003 Helsinki Meetings Available at SSRN: http://ssrn.com/abstract=985546

Kohli, R. and S. Devaraj (2003) "Measuring Information Technology Payoff: A Meta-Analysis of Structural Variables in Firm-Level Empirical Research," Information Systems Research (14) 2, pp. 127-145.

Im, K.S., K.E. Dow, and V. Grover, "A Reexamination of IT Investment and the Market Value of the Firm - An Event Study Methodology," *Information Systems Research,* 12(1), pp. 103-117, 2001.

Lee, T.A. (2006) “Financial Reporting and Corporate Governance”, John Wiley & Sons, Chichester, England

Melville, N., K. Kraemer, and V. Gurbaxani (2004) "Review: Information Technology and Organizational Performance: An Integrative Model of IT Business Value," MIS Quarterly (28) 2, pp. 283-322.

Sinan Aral , Erik Brynjolfsson and D.J. Wu, "Which Came First, IT or Productivity? The Virtuous Cycle of Investment and Use in Enterprise Systems", MIT Center for Digital Business, Working Paper, October, 2006.